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Johannes Kepler and his Neoplatonic Sources¹

Jiří Michalik

The relevant literature contains surprisingly few studies on the influence of ancient Neoplatonism on Kepler, despite the fact that it is clear from Kepler's texts that this influence was at least as strong as that of Plato himself. Several current, rather general, references can be found, for example, in the study *Proclus' Legacy* by Peter Adamson and Filip Karfik² or in Radek Chlup's book *Proclus. An Introduction*.³ Rhonda Martens and Andreas Speiser have also focused on this area.⁴ Only Guy Claessens⁵, who studied the influence of Proclus' theory of imagination on Kepler, has dealt with this area in more detail. Claessens has convincingly shown that it is possible to identify Proclus' influence on Kepler in this particular case, although this specific concept of imagination did not influence the paradigm of modern science, which ultimately leaned towards Aristotelian theory.⁶ Curiously, Kepler is completely missing in the otherwise excellent book *Interpreting Proclus*.⁷

I would initially like to briefly shed some light on how Kepler may have made an acquaintance with Proclus' writings. Simon Grynaeus (1493-1541) was a key figure in the story and was a close colleague of Philipp Melanchton. As a theologian, linguist and respected expert on the Antiquity, Grynaeus was invited by Ulrich, the Duke of Württemberg, to launch the Reformation at the University of Tübingen in 1534, where he was appointed as rector. Grynaeus installed

¹ This study is a result of research funded by the Czech Science Foundation as the project GA ČR 14-37038G "Between Renaissance and Baroque: Philosophy and Knowledge in the Czech Lands within the Wider European Context". I am also obliged to the following institutions: Ritman Library (Bibliotheca Hermetica), Amsterdam; Bizell Memorial Library, University of Oklahoma; Berenson Library, Villa I Tatti, Florence; Herzog August Bibliothek, Wolfenbüttel.

² Adamson, and Karfik (2017), 311-313.

³ Chlup (2012), 283.

⁴ Martens (2000), 34 – 35, 119; Speiser (1945), 102.

⁵ Claessens (2011), 179 – 199.

⁶ Claessens (2011), 180, 182.

⁷ Gersch, ed. (2014).

Melanchton's educational system at the university and was also active as a publisher. Prior to settling in Tübingen, he published the Greek version of Plato's *Opera Omnia* in 1534, a work containing Proclus' commentary on *Timaeus* as an appendix.⁸ A year earlier, he had teamed up with the Basel based printer and publisher Johan Oporin (1507-68) to publish *Euclid*,⁹ also including Proclus' commentary. The latter was also published in Latin, by Francesco Barozzi (1537-1604) in 1560.¹⁰ Grynaeus, who was one of Philipp Appian's (1531-89) teachers, was the son of the renowned German humanist Peter Appian (1495-1552). Appian was the teacher of Michael Mästlin (1550-1631) who was a teacher and friend of Kepler's.

As is apparent from Kepler's quotes from Proclus' *Commentary on the Elements of Geometry*, Kepler worked directly with Grynaeus and Oporinus' edition of the Greek text and not with Barozzi's Latin translation. Although he may have had the Latin text available, his Latin translation differs from Barozzi's to such an extent that it is clear that Kepler had the Greek original in front of him. Moreover, the text was kept in the library at the University of Tübingen, and the young theology student would certainly have had good access to it. Kepler's quotations from Proclus' *Commentary* clearly demonstrate what continually fascinated him about this text. This mainly concerns the idea that the world has a mathematical structure, which is the result of a creative act of supreme intellect. This is then associated with the conviction that the study of mathematics can enable a definitive knowledge of not only this world, but also of its creator. As such, mathematics merges with theology and becomes a useful tool in human efforts to understand God's providence.

While Johannes Kepler was completing his book *Harmonice Mundi* in 1618, he deemed it practical to include a short appendix: an explanation of his concept of different kinds of harmonies in which he postulated a critical stance to the theory of harmony as penned by the ancient Greek astronomer Ptolemy and his contemporary, the British doctor and alchemist Robert Fludd (1574 - 1637).¹¹ Kepler's short study triggered rather extensive polemics against Fludd and what was

⁸ Plato, Proclus (1534). Grynaeus also published Ficino's Latin translation of platonic corpus: Plato (1551). English translation: Proclus (2007 - 2015).

⁹ Euclid, Proclus (1533).

¹⁰ Proclus (1560). Critical ed.: Proclus (1873).

¹¹ KGW 6,373-377. (KGW = Johannes Kepler Gesammelte Werke).

originally a specific theme gradually expanded into a more generalist controversy on the nature and function of science, scientific thinking and the role of philosophy within science.

It is apparent from the arguments of both protagonists that they held radically diverging positions. The core of their disagreement could be simplified into an elementary paradigmatic distinction between the modern”, quantitative mathematic-based natural science, and the Renaissance, qualitative philosophy of nature. Both thinkers were also very well aware of the fact that their positions were deeply anchored in one and the same philosophical tradition, that of Neoplatonic philosophy.¹²

Kepler reflects upon this reality in his *Apology*¹³, which was a reaction to Fludd’s criticism of his exposé, published as part of the conclusion in *Harmonice Mundi*. In the *Apology*, he points out the difference between Fludd’s and his approaches to harmony and their understanding of the elementary principles of mathematics, which essentially correlates to which Neoplatonic philosophers each of the two sides aligns with. While Fludd is an admirer of Porphyry and Iamblichus, Kepler followed the line of thought endorsed by Proclus, valuing his acknowledgement of the deductive structure of Euclidean geometry in particular.¹⁴ This specific intention on the part of Proclus, Kepler argues, is in sharp contrast with Iamblichus’ concern with the Antique mysteries, Theurgy and its by-product, natural magic – the latter concerned with the Occultist secrets of nature, a theme found most fascinating by Fludd himself.¹⁵

An important question thus arises: was Kepler aware of the fact that Proclus, the same as Iamblichus, considered Theurgy an important part of religious rituals? In other words, the difference between Iamblichus and Proclus is rather minor: Theurgy was important in the religious-philosophical work of both thinkers, constituting an essential perspective in their understanding of science. Proclus’ *Commentary on Euclid*, like his *Elementa Theologiae*, may be structured as *more geometrico*, yet the religious paradigm of the two works is Platonic theology.

¹² Chen-Morris (2016), 138-158; Rösche (2008), esp. 465-495; Westman (1984), 177-231; Debus (1977), 205 - 294; Pauli (1952).

¹³ KGW 6,378-457.

¹⁴ KGW 6,395,8-13; KGW 6,451,30-33.

¹⁵ KGW 6,397-399.

I presume that Kepler was aware of the fact but decided not to elaborate on it in his polemics with Fludd, focusing rather on a straightforward, mutual delimitation of the two lines of late-antiquity Neoplatonism. Kepler offers very little reflection on Proclus' theological works; one of the few exceptions is his declared ambition to Christianize Proclus' philosophy and make it compatible with Christian ideas. In line with many of his peers, Kepler argues that the key ideas of Platonist and Neoplatonic ontology originated in the Hebrew and Christian religions. Kepler states that the pagan Neoplatonic thinkers have, rather unjustly, appropriated these ideas, as tools for the development and justification of their polytheism.

Kepler considered Proclus the most significant commentator on Euclid's *Elements*¹⁶, which he frequently referred to in the first two books of his *Harmonices mundi* dealing with the construction and congruence of geometric figures. It is precisely in these most technically "geometrical" books that Kepler demonstrates how strongly he was influenced by Euclid's methodology and his understanding of science as a logically consistent structure. Like Euclid, Kepler's argument lies in the presentation of geometric axioms and the definition of geometric terms and the theorems arising from them. In the third book of *Harmonices mundi*, Kepler endeavours to elaborate a consistent system of musical harmony, once again *more geometrico*. In this work, he addressed the harmonic theory of Ptolemy and his contemporaries such as Vincenzo Galilei (1520 – 1591).¹⁷

The main testimony to the influence of Neoplatonic philosophy and metaphysics on Kepler's thought is the fourth book, in which Kepler primarily turns his attention to the application of his theory of harmony to the relationship between the supralunary and sublunary worlds. Euclid's geometry also provided him with methodological inspiration here, and Kepler used it to propose a geometric theory of harmony defined on the basis of the mutual relationship between the different parts of Platonic solids inscribed in a circle. Harmonic proportions, defined in this manner, can also be applied to the speed and angle ratios of the individual planets. These planet angles, as observed from earth, can be used to compile a horoscope; which Kepler also called aspects. The geometric depiction of the planetary aspects enabled

¹⁶ For the edition of Proclus' work, see: Proclus (1873). English translation: Proclus (1970). For an analysis see Renoud (2011), 119-144; Renould, ed. (2010).

¹⁷ Galilei, (1581); Cf. Caspar (1940), 479.

Kepler to assign a certain tone to them and also to define their affects on the sublunary world in astrological-musical terms.

In the same book he also set out the framework for the philosophical reasoning based on a consideration of the basic philosophical concepts of Neoplatonic philosophy. Kepler is convinced that neither type of harmonic proportion, i.e. the proportions between musical tones and the heavenly bodies or their aspects, represents any property of objective reality. On the contrary, he argues that harmonic relationships only exist in the human soul¹⁸, which can identify and reconstruct them on the basis of its knowledge of geometry or geometrical archetypes. As Kepler emphasizes, these archetypes are inherent to the human mind and are images or rather exemplars of the same archetypes God used when creating the world. Kepler imagined this creation under the influence of Plato's *Timaeus* as a kind of demiurgic artistic activity, during which the ideas of the basic geometric figures God used to construct the world are critical. Within this context, Kepler referred to Plato's apparent claim of an eternally geometrizing God.¹⁹ I will return to the theme of Plato's concept of the creation of the world in this text, but would now like to further investigate Kepler's concept of the human mind and its creative activity when recognizing the world.

In the first chapter of the fourth book of *Harmonices mundi*, Kepler undertakes to investigate the difference between the harmonic proportions perceptible with the senses and the intellect. In doing so, he sets himself in opposition to the epistemological view of Plato and Aristotle on the origin of geometric concepts. According to Kepler, Plato believed that the human mind (*mens*) acquires all important concepts, axioms and geometrical figures from inside itself. Its cognition is not dependent on the external world or on data acquired through sensory experience. Kepler argues that it is apparent with reference to the theory of recollection elaborated in Plato's *Meno*.²⁰

¹⁸ KGW 6,217,19-21: "Harmonia, quae est inter circulum ejusque partem; quoad formale suum, nullo modo est extra animam..."

¹⁹ KGW 6,299,31-32, "...Creator...ut Plato scripsit, *aeternam exercens Geometriam*." The quote ἀεὶ ὁ θεὸς γεωμετρῆι actually comes from Plutarch, *Convivia (Symposiacs)* VIII,2, who even acknowledges that Plato himself did not use the sentence:

ἐμοῦ δὲ ταῦτ' εἰπόντος ὡς γέγραπται
μὲν ἐν οὐδενὶ σαφῶς τῶν ἐκείνου βιβλίων Ib.718c. See also Charrak (2005), 361-375.

²⁰ Plato, *Men.* 81 ff.

According to Kepler, Aristotle harshly criticised Plato's teachings in his *Metaphysics* and even called them "invented" and "based on arbitrary assumptions".²¹ Although Aristotle's words mainly apply to Plato's teachings concerning numbers, Kepler was of the view that they were also closely related to his epistemology. Kepler claimed that according to Aristotle the subjects of mathematics had no existence apart from sensory things. They therefore cannot exist in the human mind independently from our sensory perception.²² According to Aristotle, the human mind is a *tabula rasa*, a blank slate that does not contain any pre-existing concepts.²³ We acquire all our knowledge on the basis of our sensory experiences. Our minds then abstract various abstract concepts, such as universals or mathematical concepts, from the data acquired by our senses. These concepts are therefore hidden in things and are revealed by the activity of our minds.²⁴

In his analysis of Aristotle's criticism of Plato, Kepler indicated why he not only viewed Aristotle's epistemology, based on the priority of sensory perception, as incorrect, but also less Christian than Plato's concept of anamnesis based on an emphasis on cognition that is primarily based on an internal view of the human intellect.²⁵ Kepler states that even Christianity enables a correct understanding of Plato's epistemological concept, because it presupposes a fundamental creative act on the part of an almighty God. According to Kepler, God imbued the human soul with certain fundamental archetypes and ideas when he created it and these subsequently enabled an understanding of all of God's creation, because they are absolutely precise images of the archetypes and ideas he used when creating the world.²⁶

Kepler's stated argument, proposing preexisting ideas, has several interesting connotations. The most important of these is his immunity to scepticism. Cognition, based on innate ideas, must be completely

²¹ Kepler cites Aristotle here in Greek Aristotle, *Metaph.* 13,1082b,2-3.: "λέγω δὲ πλασματώδες τὸ πρὸς ὑπόθεσιν βεβιασμένον". Cf. KGW 6,217,36-37.

²² KGW 6,217,37-39: "Nec enim haec Mathematica seorsim à sensibilibus usquam subsistere: nec aliam esse illorum subsistentiam, ne quidem in Mente..."

²³ Aristotle, *De an.* 3,429a,18-29.

²⁴ KGW 6,217,36-218,28.

²⁵ KGW 6,218,24-25: "...hac inquam in parte nec in Christiana religione tolerandus est..."

²⁶ KGW 6,219,19-24.

certain during the use of correct methods, i.e. geometry²⁷, because the archetypes in the human and divine minds are of identical types. There is no way that our cognition could deceive us, because God used the flawless science of geometry when constructing the world according to these archetypes. Man merely reconstructs this divine creation in his mind, whereby he discovers the world in the same way that God created it. Man constructs more complex figures from simple ones using precise rules until he achieves sufficiently complex figures which characterise the complexity of the real world.²⁸ While God created the world in a single moment, man needs a time line on which the individual steps of this, in reality seamless, process may seem like discrete stages, to recognise and reconstruct the world created in this manner.

Given that the area of sensory cognition has been ruled out here as the primary source for our mathematical and geometrical ideas, the possibility of any error arising on the basis of the insufficient cognitive strength of our senses or the possible failure of the lower part of our intellectual soul, such as the memory or imagination, during the processing of sensory data has also been eliminated. Kepler's supposition of a flawless isomorphy between the human and divine mind also represents a further defence against possible scepticism. It is precisely this flawless isomorphy which is justified by Kepler on religious grounds: almighty God created man in his image.²⁹ On the basis of this idea, one may presuppose that the human mind, which represents the most faithful image of God because it is gifted with intellect, cannot be deceived during its activities while adhering to the basic mathematical and geometric rules defined by Euclid.³⁰

Like his younger contemporary Descartes, Kepler is therefore assisted by God in his defence against scepticism. While Descartes' defence mainly involves the idea of God present in the human mind, Kepler's defence, in contrast, involves an elaboration of the Biblical claim of the similarity between man and God further strengthened by period Renaissance considerations on the dignity and greatness of man. God cannot deceive man because 1) he placed the idea of the geometric

²⁷ KGW 8,52,8-9: "Etenim existimo ex amore Dei in hominem causas rerum in mundo plurimas deduci posse."

²⁸ KGW 6,222,1-7; KGW 7,51,1-22; KGW 8,44-45.

²⁹ KGW 8,52,12-14.

³⁰ KGW 2,18,4; Chen-Morris (2009), esp. 157-165.

figures in his mind and 2) he used geometry when creating the world. The most perfect, best and almighty God could not have used anything in his creation that would have contradicted his perfection. God therefore created the most perfect and beautiful world with the help of geometry, the most perfect and certain science, which is eternal like God and whose principles can be found in his mind.³¹

The second connotation of the theory of anamnesis is an important problem that Kepler had to come to terms with when he accepted this doctrine. A possible objection to the theory of anamnesis could be as follows: if we have innate ideas and archetypes in our minds, why do we have to “recollect” them at all? Why do we not flawlessly and clearly perceive them from birth and why do we not have a flawless and complete understanding of them from childhood? Why, on the other hand, do we have to laboriously learn everything and “discover” these archetypes in our minds?

The first possible answer to these questions is theological. This type of reasoning was very widespread among Kepler’s contemporaries, but also among his teachers at the Theology Faculty of the University of Tübingen. It involved a reference to the negative epistemological consequences of the original sin of man, which supposedly darkened the human mind so that it was no longer capable of the direct introspection which would otherwise have immediately enabled it to find all the archetypes present within it. Whereas Adam had “innate” perfect knowledge of all things while still in the Garden of Eden, his descendants had to find this understanding while at the same time being confronted by the imperfection of their minds and the epistemological deficiencies of their souls, which can only be improved through proper training.³²

Kepler does not, however, turn primarily to this theological argument in his defence of the theory of anamnesis, but endeavours to remain in the field of epistemology. He therefore introduces the concept of instinct, which enables him to presuppose that we actually already have *some* basic understanding or rather awareness of the innate archetypes at birth, even though we are not able to completely identify

³¹ KGW 6,219,21-24, KGW 8,30,6-9; KGW 8,44,31-45. Comp. Chen-Morris (2016), 118-121.

³² This reasoning appears in Melanchthon’s work, which also greatly influenced Kepler and his teachers. See, for example, Melanchthon (1854), 644. Cf. Methuen (1998), 88-89.

them. This instinct is part of the lower mental abilities of all creatures and even exists in a specific form in the soul of the world, which enables the perception of the harmonic proportions between the aspects of the planets affecting the sublunary world.³³ This instinct is not scientific knowledge, however, as yet and does not cause any such knowledge. This can only be based on a certain confrontation between the as yet completely obscure contents of our minds, i.e. the innate archetypes, and the data acquired from our sensory experiences. It is only the realisation of a certain geometric imperfection in the sensorily perceived world that enables us to search for its flawless patterns, which we discover in our minds rather than abstracting them from things, as Aristotle assumed. Each true piece of knowledge is therefore also self-knowledge and a theological message, because it not only enables us to reveal God's plan in the world, but also his intentions.³⁴

Kepler adopted his theory of anamnesis from Platonic lore and Proclus was in all probability his primary source alongside Plato's dialogues.³⁵ In Kepler's interpretation, the concept of anamnesis is associated with Plato's formulated question on the ontological status of mathematical entities. This is where a long direct quotation from Proclus appears. I will attempt to outline here the main ideas of Proclus' text that made such an impression on Kepler.

Proclus' ambition, in the text cited by Kepler,³⁶ is to confirm Plato's theory of the independence of the objects of mathematics from the sensory world. Proclus offers here several arguments as to why it is impossible to infer the existence of mathematical entities from sensory perceptible things. He proceeds in his reasoning from a Neoplatonic hierarchical ontology which presupposes the existence of matter as the lowest hypostasis. It is also associated with ontological "coarseness" and the concomitant scientific inaccuracy. Mathematical entities, which in their very essence require precision, cannot be inferred from such material. All sensory perceptible things are "mixed", mainly in the sense that they are not ontologically unequivocal. They always contain an admixture of their contradictions. They may be divided, mixed and moved even without their own will. In addition, it is never

³³ KGW 6,268,6-14.

³⁴ KGW 6,223,17-35.

³⁵ For information on Proclus' theory of anamnesis, see McIsaac (2001), 46-66.

³⁶ KGW 6,218,33-221,39. Proclus (1873), 11,26-18,4; Proclus (1533), 3-5; Proclus (1560), I,6.

possible to find the pure exemplification of geometric entities in sensory things, such as, for example, a point, a line or a surface. There is always an added substance or even the opposites to these entities.

Proclus further points out in his argument to the differences between mathematical entities and sensorily perceptible things from the point of view of their movement. While mathematical entities have the properties of Plato's ideas and are therefore motionless, objects in the sensory world are subjected to constant motion. It is clear that Proclus does not only mean local motion here, but also, for example, the motion of growth which cannot be prevented using our will. In short, substances in the sensory world are "condemned" to movement and as such to the associated change, because both these things, change and motion, occur in time. Mathematical entities, in contrast, are non-moving and do not change in time; they are eternal, as Kepler also emphasises. Mathematical entities therefore cannot be inferred, abstracted or deduced from perceptible things, because they display ontologically more valuable properties such as constancy, existence at rest and not in motion, purity and epistemological unequivocalness (precision). For this reason, we must search for their origins at a level of reality that better corresponds to their designated properties. This ontological level is not the material world of extensional matter, but the immaterial world of the soul.³⁷

Finding the ontological origins of mathematical concepts or their archetypes in the human soul, the essence of which they constitute,³⁸ enables Proclus to move to a consideration of the essence of creation, both artistic and scientific. This creation only involves finding mathematical principles in the human soul. Like Kepler, Proclus considered this finding to be a kind of self-reflective act that brings these archetypes into full consciousness. It is of interest that Kepler carried out relatively extensive comments on precisely these ideas in inserted brackets, whereby his main endeavour was to place them in a Christian context. Once again, he points out that the archetypes of geometrical figures are eternal in the Christian sense of the concept of eternity. Christians primarily predicate the concept of eternity to God, which Kepler uses to claim that the archetypes of geometric figures are coeternal with God. He also once again recalls the idea he has

³⁷KGW 6,218,39-219, 5; further Proclus, *In Eucl.* 4.24-5.2. Additionally, O'Meara, (2017), 173.

³⁸ Further Proclus *In Eucl.* 17.6.

repeatedly postulated as to the fact that the human soul and the human mind are an image of God or his soul and his mind. For this reason, they are similar to him in essential matters, and one of these essential matters also involves the nonexistence of the archetypes of the mathematical and geometrical figures which God has placed in the human mind³⁹ in which there are “innate” archetypes that have existed in God for eternity.⁴⁰

After this designation of the origins of the ideas and mathematical archetypes in the human soul, Proclus undertakes a thought experiment by asking what human cognition would look like if this were not the case. He primarily answers this question by stating that it would lose its certainty, because people would not acquire the fundamental objects of cognition from themselves, but from the outside. The archetypes, residing in the human soul, also have the function of a kind of standard of truth. That which comes from inside is truthful, while that which comes from outside is uncertain. Whereas “our” archetypes are to a certain extent part of us or a component of the higher part of our souls, we do not have any such certainty with regard to concepts derived from the sensory world.⁴¹ It seems that for Proclus and Kepler, the conviction as to the truthfulness of the archetypes lay mainly in the idea of their ontological simplicity, which Proclus contrasted with the plurality of the phenomenal world. Man then uses these simple basic archetypes to construct more complex concepts and figures in his thinking, which are, however, dependent in their truthful value on precisely those innate archetypes and not on any data acquired by our senses. Proclus describes this process of the creation of more complicated concepts and figures using the beautiful metaphor of weaving a wonderful chasuble of thought, the value of which cannot be derived from the world of illusion, but from the ontologically more valuable world of the innate contents of our souls.⁴²

Proclus’ second argument focuses on determining the origins of mathematical definitions. According to Proclus, they also cannot originate from the area of sensory things. This is the case, because it is impossible to find mathematical objects in the sensory world which would be 1) simple and 2) sufficiently general for us to be able to

³⁹ Kepler views the terms “mens” and “intellectus” as synonyms. KGW 6,221,4.

⁴⁰ KGW 6,219, 6-25.

⁴¹ KGW 6,219, 25-36.

⁴² KGW 6,219,25-28: “*admirabilem hunc ornatum*”

create the appropriate definition from them. We cannot consider individual sensory things to be the causes of general concepts, because it would then be impossible to define a triangle. Definitions cannot be based on searches for individual examples of the triangle in the world perceived by our senses, but on the designation of its general properties, which we arrive at on the basis of working with our intellect.⁴³

Finally, his third argument involves the elaboration of certain intentions from the first argument, specifically those which point to the ontological difference between the material and the intelligible world. The soul, as the ontologically more noble entity, cannot draw its contents from a substance located beneath it in the hierarchical understanding of the tiered universe. If this were the case, the soul would be a lower hypostasis than matter. The soul participates, however, in the mind (which is in some sense identical with Proclus' intellect) and in its intelligible content, while matter participates in the soul.

The emphasis on this participation diagram subsequently enables Proclus to move to reasoning, in which he searches for where the soul acquires its conceptual content, especially its mathematical concepts. The possibilities are as follows: 1) Only from sensory substance. Proclus ruled out this option in the previous argument. 2) Only from the mind. The elimination of this possibility will follow. 3) Only from itself. Proclus also eventually ruled out this possibility. 4) From the mind and from itself. In the end, he found this variant to be the most plausible.

Proclus had already ruled out the possibility of the soul acquiring its content from an ontologically lower hypostasis. If that were the case, then the lower hypostasis would have to be considered the cause of the higher hypostasis. This is not possible, however, and for that reason Proclus does not consider any further possible variants of how the soul acquires its mathematical concepts such as, for example, the combination of matter and the mind, matter and the soul itself or all three, i.e. substance, the soul and the mind. It should be mentioned here that Kepler himself explains that he primarily understands Proclus' terms "soul" and "mind" to mean the "soul" of the world, which Plato calls "created by god", while Kepler is of the opinion that Proclus' "mind" (intellect) means in fact the third divine entity. When

⁴³ KGW 6,219,37-220, 26.

thinking in this way, Kepler was evidently unconcerned by the fact that Proclus was a “dyed-in-the-wool” pagan and that he rejected the teaching of the Christian Trinity. Kepler further emphasises the basic ontological difference between the soul and the mind, which lies in their differing degrees of complexity. The mind is ontologically simple (even though it contains a plurality of ideas), but the soul, in contrast, consists of several parts that are taken to mean individual “souls”, for example the nourishing, avaricious and sensible souls. Kepler carries out this fundamental distinction mainly with reference to Plato and then to Proclus.⁴⁴

Let us now turn our attention to the arguments with which Proclus rules out variants 2) and 3). Option 3), i.e. the origin of the ideas or concepts of mathematical matters (Kepler does not differentiate between them in his arguments) coming only from the soul, is ruled out using the following reasoning. The prerequisite for the exclusive origin of mathematical ideas in the human soul should result in the soul being extracted from the chain of ontological hypostases in the Neoplatonic tiered universe. The contents of the soul would then not represent any images of the intelligible ideas contained in the mind. According to Proclus, however, this is impossible, because the soul does not constitute a substance with such a level of ontological autonomy that it can exist independently of those hypostases that precede it in the ontological hierarchy. Moreover, the soul cannot be at the top of this hierarchy, because not all things participate in it.⁴⁵

This argument is closely related to another one of Proclus’ arguments, in which he states that if we did presuppose such an ontological dignity for the soul, it could not perform its mediating role between the higher and lower hypostases, i.e. between the intellect and matter, between indivisible and divisible nature. This would also be impossible due to the fact that it would be lacking the regulative idea that comes to it from outside and which directs it to the fulfilment of its being occurring in the direction towards a higher hypostasis. Moreover, this regulative idea could not only not be applied to oneself, but it would also not be passed on “further” or “lower”, i.e. it would not be applied to the material world.

⁴⁴ KGW 6,275,4-17.

⁴⁵ See *Theologia Platonica* 3,6, where Proclus investigates all the ontological levels of reality and the relationships of interdependence between them. With regard to the soul, especially 21.27-22.1.

Proclus also rules out option 2), i.e. the idea that the soul acquires its mathematical concepts only from the intellect.⁴⁶ In this case, the self-motion of the soul, which is one of its key characteristics according to Plato and Aristotle, would not be possible. Proclus mainly means here motion in the sense of thought. If the soul acquired all the items of its thought from outside, it would merely be their passive recipient and would not be differentiated in any respect from matter, which is mere potential and does not create any material forms itself.

The soul therefore derives its intelligible content both from itself and from the mind. The soul also has access to other hypostases such as being, for example, via the normative ideas that come to the soul from the intellect. The aforementioned ranking of the soul, in the hierarchy of hypostases, leads Proclus to the assumption that Aristotle was wrong when he viewed the soul as a blank slate.⁴⁷ The absolute opposite is true; the soul is always overwritten both with concepts innate to it and with concepts given to it by a higher ontological hypostasis, i.e. the intellect. According to Proclus, the soul both overwrites itself and is overwritten by the mind and its intelligible content, but not by content acquired from the material world via sensory perception. Cognition does not follow a causal line from sensory data to intelligible content, but from intelligible content to intelligible content. In this regard, the soul is more an image of the intellect than an image of matter and as such its cognition also primarily has an intelligible nature.⁴⁸ Kepler points out the fact that the human soul is the most sovereign image of God in this context. According to Kepler, God not only creates human souls, but also sustains them with the radiance of his rays.

Proclus further investigates in what respect the soul resembles the intellect. Like the intellect, souls contain things in their own way, i.e. spiritually. The mind then contains everything intellectually. The soul's contents are images of the mind's archetypes. That which the mind contains in a contracted form (*contraxio*), the soul contains in a differentiated form (*divisio*). According to Proclus, Plato correctly recognised this fact when he also claimed that the soul consists of mathematical forms, that it can be broken down using numbers and that its parts are arranged using analogies and harmonic relationships.

⁴⁶ KGW 6,219,37.

⁴⁷ KGW 6,221,2: "Itaque nequaquam est Anima Tabula rasa..."

⁴⁸ KGW 6,220, 40 – 221, 8.

The soul also contains fundamental geometrical principles, namely the straight line and the curve, from which it is possible to construct additional more complex geometric figures such as circles. The soul does not only primarily contain mathematical entities,⁴⁹ but also, for example, relations such as harmonic relationships. The soul uses mathematical entities and relations to interpret events and the nature of the material world.

Proclus believes that an independent cosmos, immaterial, incorporeal, non-spatial, animated and moving on its own exists in its own way in the soul. Interestingly, ideas of space or extension also exist in the soul, but in their own way, i.e. non-spatially or unextended. The soul uses these ideas for its creative activity, both in the areas of science and the arts. Moreover, its inception and its most fundamental and most perfect motion lies within it, i.e. circular motion or along a circular path. The awareness of the existence of this motion (especially in the case of heavenly bodies, J.M.), as well as the awareness of the mathematical concepts pre-existing in the human soul and the further work with them in human deliberation then leads to the development and plurality of the mathematical sciences.⁵⁰

Proclus' stated placement of the source of mathematical entities in the human soul has a close connection with his ontology. While the subject of mathematics represents a transitive area between the sensory and the intelligible⁵¹, the soul similarly represents the transitive hypostasis between matter and intellect. This also means that the soul represents a link between eternity understood as timelessness, which is characteristic for the area of the intellect, and time, which matter is subject to.⁵² Given that the soul already functions in time, it is also a source of motion evoked by its activity.⁵³ The activity of the soul is its discursive thought (*dianoia*), which the soul uses to develop its mathematical archetypes and *logoi* and for the mental construction of more complicated entities. Mathematical *logoi* therefore jointly constitute the soul as its archetypes, on the one hand, and are

⁴⁹ KGW 6,221,12: "Omnia ergò Mathematica primùm sunt in Anima.."

⁵⁰ KGW 6,221,20-40.

⁵¹ Proclus' attitude in this regard resembles that of Aristotle, who places mathematics in the "central" ontological region between physics and metaphysics. See, for example, Aristotle, *Metaph.* 6,1.

⁵² Finamore, Kutasch (2017), 126.

⁵³ Finamore, Kutasch (2017), 128.

themselves created by the soul, on the other hand, as knowledge generated through deliberation, such as mathematical proofs or complex geometrical figures, for example. This mental motion of the soul during mathematical investigation leads to knowledge of their causes and inception and therefore to self-knowledge.⁵⁴

The aforementioned characteristic of Proclus' concept of mathematics clearly demonstrates why Kepler was so fascinated by it. For Kepler, the possibility of deriving all geometrical figures through the combination of two fundamental geometric figures, i.e. the straight line and the curve, is also critical.⁵⁵ Moreover, the fact that mathematical concepts have their origins in the soul and that the soul itself is defined on the basis of the mathematical relationships between its parts is also of importance according to Kepler. This is also associated with Proclus' criticism of Aristotle, to which Kepler is sympathetic; Kepler agrees, however, with Aristotle's rejection of Pythagoras' ideas on the possibility of the ontologically independent existence of numbers. When designating the origin of quantities, in contrast, Kepler fully agrees with Proclus, who places them in the human soul. Harmonic proportions and other relationships between qualitatively expressed variables are thus primarily intelligible and *a priori*.⁵⁶

It is precisely the measurable quantity that represents the fundamental epistemological identification criterion for each thing. Kepler best expresses this idea in a letter to his teacher and friend Michael Maestlin, in which he argues that God created all things according to quantitative standards so that they could be expressed mathematically. Analogously to this, he also created the human mind in such a way so that it would be able to view any such mathematically identifiable quantities. The human mind has been created to perceive quantities similar to the way the individual sensory organs have been created to perceive individual types of sensory data such as the eye for the perception of colour and the ear for the perception of sound.⁵⁷

⁵⁴ O'Meara (2017), 172. Comp. Chlup (2012), 155; McIsaac (2001), 57-59.

⁵⁵ Schwaetzer (1997), 36-37.

⁵⁶ KGW 6,222-223.

⁵⁷ KGW 13,113,10-14: "...Cum Deus omnia ad quantitatis normas considerit in toto mundo: mentem etiam hominij datam, quae TALIA comprehendat. Nam ut oculos ad colores auris ad sonos, ita mens hominis non ad quaevis, sed ad QVANTA intelligenda condita est, remque quamlibet tanto rectius percipit..."

The quantities then designate the properties of any observable physical phenomena.⁵⁸ Kepler expresses the aforementioned fact with an image in which the mathematically expressed quantities are represented by letters in the Book of Nature, which God created in a way that allows the human mind to read it.⁵⁹ As such, nothing is hidden in the Book of Nature, as everything is perfectly identifiable through the quantities.⁶⁰ According to Kepler, God appropriately equipped the human mind so that it can read this: he inserted “pure” archetypes in the mind so that it can identify the quantities, which are frequently out of focus to the will due to their connection with indeterminate substance.⁶¹ The epistemological motion of the soul then moves from its innate archetypes to their blurred images present in the physical world; the archetypes themselves, which take the form of geometrical figures, have both an initial (they awaken cognition) an identification (they guarantee cognition) and a creative function. Kepler also considers these archetypes in the human soul to be identical to those God used during his Creation; they are his ideas – and therefore they are also God himself.⁶²

The recognition of the harmonic proportions, which according to Kepler are defined by the geometric relationships of the circle and the polygonal figures inscribed within it, is mainly designated by the very possibility of constructing these figures. Certain geometric figures cannot be constructed, even though they are conceivable – a heptagon, for example. Knowledge of the possibility of constructing geometric figures is a consequence of the intellectual activity of the human and the divine mind. This intellectual activity, that eventually leads to the knowledge and construction of geometrical shapes, primarily lies in the comparison of the ratios between the sides of the geometric figure inscribed in the circle and the radius of the circle. In other words, we can admittedly hear the harmonic proportions, as in music, or see

⁵⁸ Field (1987), 80.

⁵⁹ KGW 7,47,33-36; KGW 7,25,29-31. The letters in the book of nature are also traces (vestigia) KGW 1, 192, 4-5) God the Creator left behind and which assist man to geometrically reconstruct his work. Cusa, *Sermo VIII*, I,16,6-7: “*Et creatoris vestigia in creaturis relucet...*” ; Comp. *Sermo CXXIII*, 6,18-24. Kepler expressed the relationship between material nature and geometry which grasps and measures it using the witticism “*ubi materia, ibi Geometria*”. KGW 4,15,26.

⁶⁰ KGW 8,16,22-23: “*Nihil est aut fuit in rerum natura occultius....*”.

⁶¹ KGW 6,277; KGW 15,172.

⁶² KGW 6,223; Chen-Morris (2016), 66-67, 90-96.

them, as in the case of the motion of the heavenly bodies, but we can only understand them on the basis of intellectual work with our *a priori* or innate geometric archetypes.

According to Kepler, the human mind is capable of perceiving the archetypes of mathematical entities using either its instinct or its spiritual “vision”. This supplements the function of physical eyes, which are also capable of identifying these archetypes in the material world. This is not, however, the end of the story. Kepler even considers the model example of the fact that the mind would never have contributed to sight, because it would not have had eyes available and as such could not have understood things that stood outside it through them. In such a case, it would create such eyes itself “according to the laws it detected in itself”, because the knowledge of quantities innate in the mind would lead it to the knowledge of how these eyes should be. Therefore, the eye is also created in a way that is similar to the way the mind is created, because it is capable of finding in itself the geometric archetypes which are images of the eternal architecture found in the divine mind. The physical process is determined by the reflection of light on the retina, while the intellectual process is associated with the work of our mind and its epistemological identification of intangible ideas on the one hand and concrete things on the other. The metaphysical precondition for Kepler’s theory is the aforementioned supposition of perfect isomorphy between the human mind and the world or the world soul respectively: they contain the same archetypes, but we identify them in different ways.⁶³

I would like to underline two important facts. The first of these is Kepler’s emphasis on the creative activity of the human mind, which creates complex archetypes of complicated geometric figures from a few simple archetypes. By means of this supposition, Kepler avoids the necessity of postulating a large number of innate archetypes in the human mind and justifying how such a large number of archetypes came to be in the human mind. The aforementioned supposition is closely associated with Kepler’s anthropology. The emphasis on the creative activity of the human mind, which constructs or rather reconstructs the mathematical structure of reality from several fundamental archetypes, is associated with Kepler’s idea of the human

⁶³ KGW 6,223,16-31; Chen-Morris (2009), 157-165.

mind as the most perfect image of God or the divine mind.⁶⁴ As an image of God, man has a privileged standing in the order of creation. This is also guaranteed by man's intellectual abilities; which he can use to reveal the basic design of the universe. This revelation of God's plan is not, however, a mere passive-receptive activity. It is, on the contrary, the active work of the human mind mimicking the initial act of God's creation of the physical world by means of its mental reconstruction of God's design in the universe. In other words: whereas God created the world, man reproduces this act of creation in his cognition.⁶⁵

This is also associated with the second circumstance, which is decisive in our context. Kepler emphasises it in his quotes from Proclus' *Commentary on Euclid's Elements*. According to Kepler, each piece of scientific cognition must ultimately be based on theology. A mathematical description of the world provides theology with a method for reliable knowledge, while theology determines the horizon of questioning for scientific endeavour. Knowledge of the universe and especially its perfect superlunary spheres must deal with the question of its primary cause and final purpose. Kepler asks this question in the philosophical context of Christian Neoplatonism, which constitutes a specific modification of Proclus' Neoplatonic polytheistic theology.⁶⁶ The supreme Neoplatonic hypostases are identified with the three persons of God, and emanation is understood as a creative act of the Christian God. This act is, however, defined in agreement with Plato's *Timaeus* as the geometric-mathematical construction of the world. This mathematical construction of the universe guarantees both the fact of its perfect arrangement and the possibility of its perfect understanding. Mathematics thus ultimately merges with theology, because the understanding of the mathematical design of the universe is associated with the identification of its cause and creator. This fact can be best demonstrated in the study of astronomy, because it is concerned with the orbits of heavenly bodies that are more perfect than the substance in the sublunary world. Similarly, their orbits are more perfect and regular, and it is possible to best apply the principles of geometry to them in the way they were compiled by Euclid.

⁶⁴ KGW 6,226,9. Compare: Hübner (1975), 184; Illmer (1991), 18.

⁶⁵ Schwaetzer (1997), 41.

⁶⁶ For more on Proclus' view of the relationship between theology and mathematics or geometry, see: O'Meara (2017), 133-147.

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