

THE RISE AND FALL OF ASTROLOGY

AND WHY IT IS STILL RELEVANT TODAY



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Word count	20.371

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Introduction

Change in philosophy and science is inevitable during the course of history. Due to the ongoing debates about a wide variety of topics and changes in discourses, we constantly adjust our perception of both philosophy and science. In this thesis I will discuss one of these changes within both philosophy and science. The initial goal of this thesis is to study the demarcation problem, the division between science and pseudoscience. After discussing this subject with my supervisor, professor Wiep van Bunge, he came with the suggestion of studying a discipline that used to be considered a science and now a pseudo science. There are several disciplines that fall into this category, examples are alchemy, phrenology and homeopathy. Homeopathy is still in use today, but an increasing amount of studies shows the pseudo scientific nature of this discipline¹.

The discipline I have chosen to study and its development towards pseudo science is astrology. As I will show in this thesis, astrology was a discipline taken very seriously for a very long time. Although it was taken very serious for a long time, this does not mean that criticism towards it is something of our time. As long as there was astrology, astrology has been criticized. Nowadays astrology is not taken seriously in academics and is alive in popular culture because it is fun. Only a minority of the people actually believe in the predictive power and merits of astrology. Today we see in most magazines and newspapers a section dedicated to a brief prediction regarding the twelve zodiac signs. These predictions often entail no more than people receiving a financial bonus, meeting the love of their life or the fact they will have an important decision to make in the nearby future. These predictions are purposely written to be general and vague as to apply to a wide range of people. Another method is using particular dates; if somebody's birthday is coming up, it is safe to assume that this person will come into some money in the nearby future. In the Netherlands, during the day there are several TV channels focused on providing the service of prognostication to viewers by advising them over the phone.

This change, from serious discipline to amusement, is what will be central to this thesis. How did astrology develop as a discipline and what has caused it to be reduced to hobby and amusement? In order to answer this question, I will discuss the history of astrology from the *Tetrabiblos* by Ptolemy to the publication of the *Encyclopédie* by Diderot and D'Alembert. At first I will discuss the history of astrology up to its height of academic prominence. It shows how several philosophers and thinkers have discussed astrology, added, reformed and criticised it. It shows who influenced it in what way and how it has contributed to the development of the discipline. In addition to discussing the beginning of astrology, I will also give a brief technical description of astrology and how its basics work.

After this discussion I will focus on how astrology came to fall after peaking and what developments caused its decline. The first clear attack on astrology, in such a systematic manner, is from Pico della Mirandola. Following this there are several developments, including technical, which have caused astrology to be ridiculed. Later thinkers and scholars are unable to understand how astrology could have taken such a prominent position in the academic world.

The final section of this thesis discusses modern day astrology. This is interesting due to the fact that by the end of the eighteenth, century astrology was no longer an academic discipline. Then why is it still visible in our modern society? And even more important, why is it still necessary to publish papers about the invalidity of astrology? The central question of this thesis I will try to answer is: Why was astrology a serious discipline and what has caused its fall?

Chapter 1: Origins of astrology

Ptolemy and the *Tetrabiblos*

In the second century Claudius Ptolemy (AD. 90 – AD. 168) wrote what would be one of the most influential books in the history of astrology. Ptolemy was born in Alexandria, in Egypt, and was to his contemporaries known as an astrologer, astronomer, mathematician and geographer². He wrote two books regarding astrology that would be used as standard textbooks for centuries after his death at universities to educate students in astrology. Astrology was a study that was at par with philosophy and medicine at the university of Bologna³. The most famous of his books is the *Tetrabiblos*, meaning ‘four books’, which is an attempt to give a scientific foundation for astrology. His other work is the *Almagest* which was written before the *Tetrabiblos*. The *Tetrabiblos* was a second volume of a work which was composed of the *Almagest* and the *Tetrabiblos*. The *Almagest* is a mathematical astronomical work that studies the motions of the planets and the stars. In this time astrology and astronomy are closely related to one and another. This is shown in the introduction of the *Tetrabiblos* where two methods of prediction are introduced:

‘One, which is first both in order and effectiveness, is that whereby we apprehend the aspects of the movements of the sun, moon, and the stars in relation to each other and to the earth, as they occur from time to time;...’⁴.

With this, Ptolemy refers to astronomy as we understand it today. The second method is described as:

‘the second is that in which by means of the natural character of these aspects themselves we investigate the changes which they bring about in that which they surround’⁵.

This is what we call astrology, the method of making predictions about a wide variety of events by using the stars and planets. In his introduction, Ptolemy states that the first method, astronomy, is a science in itself and gives certainty through mathematics and observations as is shown and elaborated in the *Almagest*. However, in the *Almagest* Ptolemy assumes a geocentric model and gives a wrong order of planetary distances in relation to the earth. This is shown by the fact that Ptolemy places Mercury and Venus between the earth and the sun in this model. We can see the influence of Aristotelian natural philosophy when Ptolemy gives attributes to certain planets based upon the four elements and the four properties that go along with them. Aristotle describes these elements and properties in his cosmological work *On the Heavens*. Taking the four elements of Empedocles (AD. 492 - AD. 432), earth, water, air and fire, each planet consists of a combination of the following properties: heat, cold, wetness and dryness⁶.

I will show later how he attributes these properties to the planets. I shall elaborate in detail on the first book of the *Tetrabiblos*, because it gives the scientific foundations of astrology that will be used for many centuries afterward. The attributes, characteristics and other rules that are given in this book are widely used in the astrology following the *Tetrabiblos*. He uses these characteristics of the planets and stars to show how they influence the entire earth. It is clear that the sun is responsible for the growth of what is grown on the land, and the influence of the moon on the water. Even in Ptolemy’s own time astrology was criticised by contemporaries due to the fact that there are many people uneducated in the discipline, and many more abuse it for the sake of their own gain. These frauds make predictions and claims that cannot be made if the discipline of astrology would be practiced correctly. Ptolemy thus

finds it necessary to defend astrology; after this defense he starts explaining his own reasonably founded principles of astrology.

In his first book, he starts by elaborating on the influences that the sun and the moon have on the earth. We notice their influence with the tides, generation of plants, animals, and the seasons. In addition we notice the influence of Aristotle early on, when Ptolemy starts summing up qualities like heat, moisture, dryness and cold. These Aristotelian qualities are then attributed to each of the different planets. Each of the planets receives one or more of these qualities based on their own positions. For example, Mars receives the qualities ‘...to dry and to burn...’⁷ because of its closeness to the sun. According to each of the individual physical qualities of the planets and their position in the system, each planet receives certain Aristotelian qualities. Resulting from the qualities, each planet receives certain characteristics. Ptolemy makes a distinction between beneficent and maleficent, masculine and feminine and diurnal and nocturnal planets. Venus and Jupiter are both planets that humidify and are hot, and are therefore considered to be fertile and thus beneficent. Mars, for example, is dry and hot, which is confirmed by its bright red colour, and is therefore a maleficent planet. The sun and mercury are regarded as planets that have both of these qualities. This is dependent upon their position. Mercury is sometimes regarded as a dry planet, when it is close to the sun, but sometimes humidifying because of its closeness to the moon. The moon was regarded as a humidifying planet because of its closeness to the earth. It was already believed in the time of Thales that the planets closest to the earth, like the moon, were moist because of the earth’s own moisture. As a result, each of the planets are placed in either of the two categories and Mercury gets both characteristics due to the fact that it is both drying and humidifying. Also it is both nocturnal and diurnal depending on whether it is a morning or evening star.

Regarding the fixed stars creating each of the zodiac signs, as discussed in chapter 9 of the *Tetrabiblos*, Aquarius, Scorpio etc, he gives the stars influences and qualities to certain planets.

‘Of the stars in the body of Scorpio, the bright stars on the forehead act in the same way as does Mars and in some degree as does Saturn;...’.

This is an example of how the chapter is structured, but he ends the chapter explaining that these influences are given by his predecessors⁸.

For the four seasons, winter, spring, summer and fall, he attributes to each of the four seasons one of the four qualities. He ascribes spring the quality of moist because it is the first season to become warmer after the cold of winter; therefore, as a result of the cold in the winter, it is the most moist. Summer is heat due to the intensity of the sun. Fall is dryness, because of the intensity of the sun all moisture has disappeared. And winter is cold because the sun is then furthest away from the zenith, meaning it is right above the equator and thus the furthest away from all regions further north or south from the equator.

After dealing with the planets and the fixed stars, Ptolemy continues to deal with the zodiac signs themselves. He differentiates between solstitial, equinoctial, solid and bicorporeal signs. What zodiac sign falls in which category depends upon the season with which the sign corresponds. There are two solstitial signs, this means that at that time, the sun is at its greatest angle with the celestial equator⁹. This happens two times a year, at the beginning of the summer and winter. The signs Cancer and Capricorn correspond to these two positions. The opposite are the equinoctial signs, this is when the sun is at the smallest angle with the celestial equator, and this happens during the fall and spring and this corresponds to Aries and Libra. The solid signs, being Taurus, Leo, Scorpio and Aquarius, follow the solstitial and

equinoctial signs in the zodiac. The bicorporeal signs follow the solid signs, Gemini, Virgo, Sagittarius and Pisces.

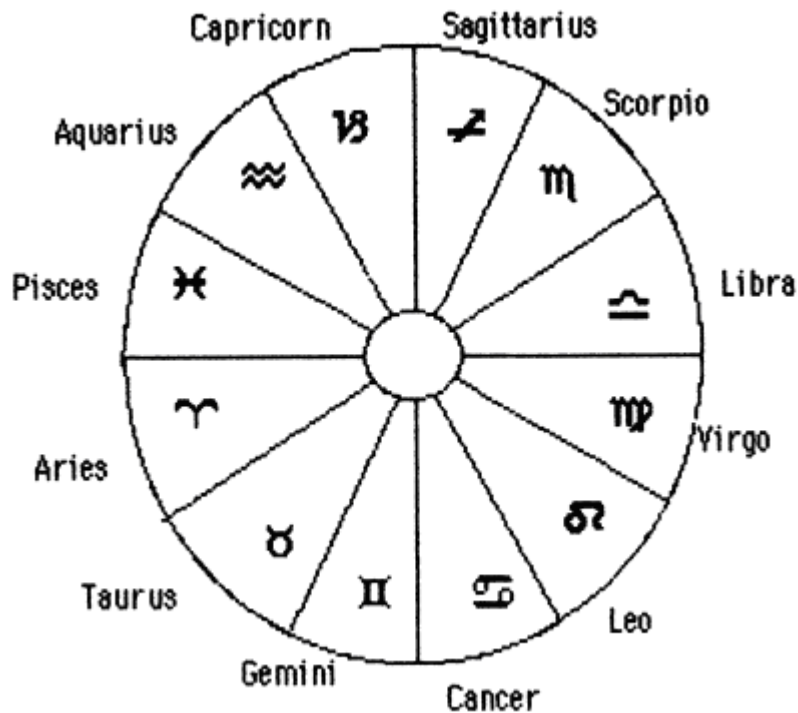


Figure 1

In making predictions in astrology, there are certain angles to be taken into consideration in the zodiac. The most important angles are: 180 degrees (opposites), 120 degrees, 90 degrees and 60 degrees. The 180 degrees is considered as evident, given that two signs that are opposites of one and another, but the other angles find their origins in music¹⁰. These come from the most important super particulars in music, being $3/2$ and $4/3$ ¹¹. As a result, opposite and quartile signs are disharmonious, because they link signs of opposite kinds. The other angles bring signs of the same kind together and are thus harmonious.

Then there are signs that are commanding and obeying, this is dependent upon the division of the zodiac ‘...which are disposed at an equal distance from the same equinoctial sign...’¹². This is again based upon the former mentioned geometrical observations in the zodiac. This also means that there are signs that are pairs. These pairs ‘hold the same power’¹³ because the days are of equal length when the sun comes in either of these signs. Then there is also the opposite, where there are signs that have no familiarities with one and another. These signs are called ‘disjunct’ or ‘alien’ signs. In chapter 17, Ptolemy elaborates on how certain signs have certain qualities, because of the planets that are predominant in those signs. For example, Scorpio and Aries have a similar nature like Mars: dry, destructive and inharmonious.

Using his natural philosophy and geometrics, he divides the zodiac in four triangles. Each of these triangles consists of three signs and has dominant planets. For example, the triangle consisting of the signs Aries, Leo and Sagittarius is ruled by Jupiter and the Sun. In addition, each of these triangles gets a predominant wind direction, in this case the dominant wind direction would be NorthWest. These dominant planets in the triangles are also applicable for individual signs. In certain signs certain planets exalt, meaning that they give more of their respective qualities to that particular sign. The Sun exalts in Aries, thereby giving Aries more

heat; so forth each planet exalts in a certain sign and, naturally, has a counterpart; in the case of the sun that is Libra.

After completing the foundation of his own astrology, he goes on to discuss other systems and point out their flaws. In this chapter, chapter 20, he starts by discussing what he calls ‘terms’. What terms are is not explained in the *Tertrabiblos*. These terms have an important role because he dedicates two chapters to them and evaluates two systems that deal with terms differently. So what are terms? Each sign is again divided up in five sections, one section for each planet, the sun and moon do not have terms. These terms are not equal in size and have per planet different sizes within each sign¹⁴. So with regard to the terms, there are two systems, he starts by discussing two flaws in the Egyptian system. The first objection is that the Egyptians sometimes assign first place to the houses, the triplicities and the exaltations. Consequently this gives results regarding assigning planets to signs and exaltations that are empirically untrue. The second argument is that the number of terms has no consistency. The sum of the terms, according to the Egyptians, would be the same even though the number of terms to each sign may differ from time to time. Thus, this is an arbitrary system.

The second system is the Chaldean system. This system is different from the Egyptian system, because it assigns a different amount of terms to each of the planets. Thus the total sum of degrees assigned to each planet is still 360, but the degrees are not equally divided. The amount of degrees per planet even differs depending on whether it is day- or night-time. He rejects this system based upon the fact that this system has no reasonable basis. However, he mentions that there is an ancient book that was heavily damaged that explains this system. He elaborates on what is known about the explanations for the system but due to its incompleteness Ptolemy prefers the Egyptian system. The rejection of the Chaldean system is also discussed regarding places and degrees. Some astrologers have divided the signs up in another twelve, 2.5 degrees each, called ‘places’. Which planet is dominant in each of these places is consistent with the order as presented by the Chaldean order of terms. In order to find the beginning of the signs, Ptolemy uses the equinoxes and solstices. (We have seen these terms before briefly, but I shall elaborate on them here.) Solstices are the angles under which the sun is in relation to the earth on the first day of summer, when the time between sunrise and sunset is the longest, and the first day of winter, when the time between sunrise and sunset is the shortest. The equinoxes occur two times a year when the sun shines directly on the equator that the angles between the north and south pole are the same. Ptolemy considers this system as the starting point of the signs as the only correct one, because if we would assume other starting positions the following system and results would be faulty. Ptolemy concludes the first book with two chapters that discuss the influence that planets and stars have in relation to one and another. Their powers may be exalted or diminished due to their positions in relation to the other planets and stars, and lastly, their relation to earth and their position on the horizon.

It is a reasonable approach that makes Ptolemy ascribe certain planets certain qualities, if a planet is close to the sun we can qualify this planet as hot. However, in the following three books we see a change in his methodology. The next three books focus on predictions and how to perform them. These predictions range from economics and politics to individual predictions about lifespan, health and possible misery that may befall a person. In these books he does not rely as much on the method he used in the first book¹⁵. In these following books he goes on to rely on traditional astrology. In chapter 9 of the fourth book he discusses the ‘quality of death’. In the chapter he assigns certain qualities that are not founded in science in the sense that they could not be derived from their physical qualities. ‘Now then, of Saturn holds the lordship of death, he brings about the end through long illness, pthisis, rheumatism,

colliquations, chills and fever, and such as arise through excesses of cold. Jupiter causes death through strangulation, pneumonia, apoplexy, spasm, headaches, and cardiac affections, and such conditions are accompanied by irregularity or foulness of breath.¹⁶ The crucial difference with these qualities assigned to Saturn and Jupiter is that they are not justified in a manner similar to the first chapter, or not even justified at all.

Christianity, St. Augustine and astrology

Despite the success of the *Tetrabiblos*, that remained influential for centuries after Ptolemy's death, astrology faced criticism early on, and was attacked by the church and several prominent scholars. There were several reasons for the church to dismiss astrology, both as a science and superstition¹⁷. It was regarded by the church as a pagan superstition and the fact that it sought to find answers in the stars and planets about the lives of people. This was regarded as close to replacing God, due to the fact that astrology claims to be able to tell a lot about a person from the moment of conception. These predictions can range from work, love and even when and how people will come to die. Astrology also claims that being born at a certain place or time will give certain character traits. In chapter five of his fourth book in the *Tetrabiblos* he states 'If she applies to Saturn, he makes the wives hardworking and stern;...' ¹⁸. If we also take into consideration how predictions are made about the weather, the fall of an empire and when to buy certain goods, it shows how astrology promotes a belief that implies determinism. These claims have very dangerous consequences for Christianity, namely that God is not omnipotent if the correct interpretation of the stars and planets can lead to predictions of the lives of people on earth. This would lead to a rejection of the Divine Grace and Providence by God and replace it with a deterministic and fatalistic worldview¹⁹. Enforcing a fatalistic worldview and the rejection of free will are the most important reasons why Christianity rejected astrology. This has led to several Christian writers developing arguments, or represent older arguments, against astrology. I will discuss some of the arguments presented by Christian writers against astrology.

The first argument, or actually a series of arguments related to each other, comes from Hippolytus (170 - 235) in his work 'Refutation of all Heresies'. It was a popular argument used by Christians to attack astrology and this argument was based upon the practical impossibility of fixing the horoscope of a child at the time of birth, or conception. He starts by stating some necessary conditions for setting the horoscope. First, it is important that the time of birth is firmly fixed, second the horoscope corresponding to this should be infallible, and thirdly that the ascension of the sign should be accurately observed²⁰. These seem like reasonable conditions for setting a horoscope, even a practicing astrologer should agree to this unless he has a more sophisticated system that can deal with deviations from these criteria. The first argument attacks the first criteria, namely the fact that the horoscope should be set at a fixed time. Astrologers take the moment of conception also into consideration and this is where the first problems arise. It is impossible to determine the exact time of conception. Even when the man's sperm is ejaculated in the woman, it is not possible to tell when conception will happen. For some women it may take a while, for some it happens immediately. This point adds to the practical difficulties of setting a time, not all women are the same. Similar problems arise during the birth of the child itself. When do we regard the baby as being born? When the head is out? Or when the baby is completely out and resting on the mother's chest? In addition, time itself is a problem, for writing down the position of the stars and planets takes time. During this time the position of the stars and planets has already changed, and therefore altered the horoscope for the child. This is an older argument against astrology, but during this time there were many more arguments against astrology presented.

But there is no philosopher and Christian from this time as influential as St. Augustine (354 - 430). He has had great historical influence on Christianity, but he used to be an active astrologer and believed in Manichaeism. This religion believes in strong dualism where good and evil are two separate entities that struggle with each other. The human soul is a part of the light and due to living several lives ascetically, the human soul can remove the dark world and eventually become again part of the light of which it was once a part. This is in contrast with the Christian belief that there is only god and no evil counterpart. The problem of evil is a problem in Christianity that has been widely discussed and is most famous with Leibniz's theodicy. Augustine being both an astrologer and Manichaeist was the result of his convictions in his youth, but later in life he abandoned both these beliefs.

The first cause that led him away from Manichaeism is the lack of explanation and detail about their cosmology. After leaving Manichaeism and writing about his time there, he gives three reasons for leaving. The first reason is their implicit materialism, second their dualism between good and evil, and lastly the notion that Manichaeism regards the human soul as a tiny part of the light, the good, that coexists with evil²¹. During the time in which he adhered to Manichaeism, he also studied astronomy and astrology. It is not clear if he was interested in astrology before he became part of Manichaeism or that these interests came at the same time.²² In the *Confessions*²³, we can find a lot of passages that tell us more about his relationship with astrology and how he changed from being a believer and student of astrology, to his rejection of astrology.

In book 4, chapter 3, (4.3) Augustine is talking to a wise old man, Helvius Vindicianus (340 - 400, approximately), who practiced medicine and had studied astrology early in his life. Eventually Helvius rejected astrology on the ground that it was deceitful. Later in his life Augustine came to reject astrology as well on similar grounds as the old, wise man told him. Augustine was a man of learning and looking for truth²⁴. At that time he was more persuaded by the authors of the astrology books, than by the opinion of the old doctor. He had not yet found a demonstrative argument to lead him away from astrology. The argument, actually a story, that would definitively lead him away from astrology would come later. He was approximately thirty years old when he broke with astrology²⁵. He came to the realisation that Vindicianus was right about astrology. The definitive argument that he had been searching for previously to disprove astrology, had been given to him by his friend Firminus. It is the story of Firminus' own birth while at the same time a maid was pregnant as well. The story is told in the *Confessions* (7.6) as follows:

‘So he said how he had heard of his father, that what time as his mother was big with him, the said Firminus, a certain maid servant of that friend of his father's was big with child also; which her master could not be ignorant of, who took care with most diligent examination to get knowledge even of his very bitches. And how it so fell out, that when one for his wife, and the other for his servant, with the carefulest observation reckoned the days, yea, the hours, nay, the very least particles of the hours, that both of them were brought to bed at the same instant: insomuch that both of them were constrained to allow the very same horoscope, even to the very smallest points, he for his son's birth, and the other for his little servant. For so soon as they began to fall in labour, they both gave notice to another of what was fallen out in either of their houses, and had messengers ready to send to one another, so soon as he had notice of the child's being born, which they could easily procure to have instant notice of, as being in their own kingdom. And he said that the messengers sent from one another, met by the way, in such equal distance from either house, that neither of the calculators could observe any other position of the stars, or seconds of minutes, than the other had done.’²⁶

If astrology were correct, then both children would have the same future and fortune because they would have the same natal charts. But this was not the case. Firminus would become an educated, respectable and honorable man and the servant's child would live his life as a servant serving whichever master would have him. For Augustine this was the definitive argument that would lead him to believe that astrology was false. In this chapter he also tells how no science is able to predict the future. The reason that astrologers are sometimes right in their predictions is purely by chance, if one makes enough predictions, one is bound to be true at one time or another. This was not the definitive end with astrology for Augustine in neither the *Confessions*, nor *The City of God*. The story of Firminus encouraged him to further investigate astrology. After this story he went on to study astrology and the horoscopes of twins. In the first seven chapters of the fifth book in his 'The City of God' (abbreviation: CoG) he elaborates on his attack on astrology.

He starts with the notion of fate. The average person at that time regarded fate as what the stars and planets say his fate would be. This goes against the will of God, for if the stars determine what good or bad will happen to a person, what role is left for God? Even if we consider the stars and planets as instrumental to God, then these stars are a necessity to our lives and what fate befalls us. But either way, if the stars are able to foretell what will happen to us and twins are conceived at the same time and born with a minimal interval between them, how come they often lead such different lives?

If twins have the same horoscope and they get the same illness, this would be consistent with their horoscope and the fact that they have been conceived and born at the same time. But this only works if the twins act in the same way, eat the same food, do the same exercises and stay in the same location. But it is clear that this will never be the case, their behaviour will differ and will differ only more during the course of their lives. There is a known objection to the argument of Augustine, which he discusses in the third chapter of the fifth book in CoG. This objection is given by Nigidius by means of an analogy. He uses the example of a potter's wheel, the pot rotates at high speed and Nigidius strikes the pot two times quickly with paint. After the wheel has stopped turning, he finds out that in spite of the short interval between the paint strokes the strokes are a great distance apart. The same, he says, can be said for the birth of twins. The time difference between the birth of twins may be small, but is a great distance in relation to the revolving of the planets.

In addition he gives the biblical example of the twins Esau and Jacob, who were said to be born with the second holding the ankle of the first, who turned out to be opposites in almost every regard. How does the analogy of the pottery hold up when for twins the difference is explained through the minute time interval, and not through the constellations, and other people's fate is predicted through their constellations? The opposite is also true; if the former is not the case and the difference in time can be observed, how does this relate to the pottery analogy?

After this Augustine comes with a lot of relevant questions regarding twins that are problematic to answer for any astrologer. For instance, 'Why do twins have to be sick at the same time, when they are not born at the same time?' Or, 'If the moment of conception is the same for both twins, then why do they have different destinies?' Is that the result of being born at different times? There are many difficulties to point out regarding twins when it comes to different destinies and being conceived or born at the same, or different, times. Similarly, and even more difficult to answer, questions can be asked about twins where one child is a boy and the other is a girl. Is the position of the constellations, stars and planets not the same for both children at the moment of conception?

These kind of questions continue to be asked by Augustine to show the absurdities that would result if one were to follow astrology as practiced at that time. The answer to each question only leads to more difficult questions to answer for the astrologer. The case of Augustine is more valid due to his integrity as a person. As previously shown, he would not dismiss astrology based on the fact that he did not have sufficient proof to completely reject it. He used to be an astrologer himself and this means that he had legitimate knowledge on how to practice astrology. This makes his questions and remarks even more valid.

Arabic astrology

When discussing philosophy, the history of philosophy, and in this thesis astrology, we are inclined to look at continental philosophy. But in order to make this small history of astrology complete, we have to take a look at an influential Arabic astrologer as well. This is especially important in the case of medieval astrology and science. Richard Lemay states this as a problem for anyone trying to study astrology in medieval times²⁷. Generally, historians are focused on the influence and scientific discourse created by Aristotle up until the reformation by Descartes. But focussing on medieval astrology, we have to take into account the influence and importance of the Arabian contributions to medieval astrology in the form of the works written by Abu Ma'shar (787 - 886, Latin name: Albumasar). Because even though we assume astrology to be a pseudo-science today, and after my previous discussion of Augustine who aggressively attacks astrology as nonsense, we cannot underestimate the influence astrology had in medieval times. The impact of astrology was noticeable on two ends of a spectrum. On the one hand, we have the day-to-day practitioners and on the other hand we have intellectuals occupying themselves with truth searching and providing theoretical support for correctly practicing astrology²⁸. This is a distinction already made by Mark Riley²⁹ in the time of Ptolemy, between the practitioners and the intellectuals trying to give a rational foundation, like Ptolemy himself.

In the twelfth century a lot of translations into Latin became public from both Greek and Arabic sources. Regarding the *Tetrabiblos*, the oldest known translation comes from the ninth century and this is an Arabic translation written by Ishaq ben Husein³⁰. The first translation into Latin of the *Tetrabiblos* came in 1136 by Plato of Tivoli³¹. The *Almagest* was translated into Latin twice around 1150. One version was translated from Greek, by Hermann of Carinthia, the other from Arabic, by Gerard of Cremona. The claim of Abu Ma'shar that the *Almagest* was not written by Ptolemy caused many people to want to have both books in Latin, after which both translations followed soon³². This influence of ancient Arabic and Greek astrological, astronomical and philosophical books was mostly the result of the Toledo school of Translators. This institute was mainly responsible for most of the translations during the twelfth and thirteenth century. Many important and famous translators worked there, but most important were John of Seville and Gerard of Cremona. These translations had great influence in the science of astrology and astronomy among Latin scholars. The translation of Abu Ma'shar's *Introductorium Maius*, translated by John of Seville, made it possible to give astrology and astronomy the meaning we would give them today. Astrology was 'the science of the judgements of the stars' and astronomy 'the science of the celestial motions'³³. These distinctions are more consistent with our modern connotations of these words.

The influence of Abu Ma'shar becomes clear when one studies books after the completion of the translation of his *Introductorium Maius*, and many of his other works, during the twelfth century. Herman of Carinthia said how Abu Ma'shar has 'amplified' the *Tetrabiblos* of Ptolemy. His importance is shown in the claim of an annotator of Roger Bacon's *Perspectiva* that stated that not Aristotle but Abu Ma'shar was 'the authority in the science of the

heavens³⁴. Given the influence of Aristotle exerted at that time, and would continue to exert in the curricula of the universities, this claim says a lot about his influence in medieval astrology, astronomy and philosophy. The influence of Abu Ma'shar is not to be underestimated, but one has to realize at the same time that Abu Ma'shar himself also was greatly influenced by Greek philosophers. In his own writing we see Ptolemy, Aristotle, Galen of Pergamon and Hippocrates being named as experts in their own respective fields - which only shows how he must have read them and admired their work.

The most significant contribution to astrology by Abu Ma'shar is by creating a geocentric astrology that is founded upon astrological revolutions. The transits of the planets were the cause of major events in the world when they came in conjunction with other planets. These celestial movements are part of a greater plan, because God has created the stars and his plan can be read in them³⁵. This type of astrology is called conjunctionist, because they are central to the revolutions of the planets and the events happening on earth. A conjunction in astrology is when two planets have the same longitude³⁶. These conjunctions between Jupiter and Saturn, which were the most influential planets, shift through four different triplicities. A triplicity is a group of three zodiac signs that share the same Aristotelian quality: earth, fire, water or air. As the planets shift through each of the triplicities meeting each other again in each triplicity, they eventually come back where they started in Aries, the first sign in the zodiac. Making a full circle and ending up where Jupiter and Saturn started, takes 960 years³⁷. This model implies a deep connection between astrology and history, because Saturn and Jupiter make the same rotation every 960 years.

Albertus Magnus and the *Speculum Astronomiae*

The *Speculum Astronomiae* by Albertus Magnus (somewhere before 1200 - 1280)³⁸, is regarded by Mark Riley as one of the two most influential astrological books in the field of astrology³⁹. It is central to the debate about astrology that was going on during that time. In the book, he defends astrology as a science compatible with Christianity and tries to distinguish the legitimate astrology from the illegitimate astrology. As we have seen earlier, astrology was attacked by Christian scholars and deemed as unchristian. The book was attacked severely by Gerard of Feltre who attacked astrology in the defense of Christianity. Here Gerard shows similarities to Augustine, because he as well has a good understanding of astrology⁴⁰. He criticizes astrology greatly using harsh language like: "Astrologers are not gods, but enemies of God"⁴¹. He regarded astrology as an enemy of Christianity on the basis that God was truth and wisdom. Another argument we have seen with Augustine as well is how astrology promotes moral determinism. The acts of man, both good and bad, become the result of the planets and the stars and are no longer due to free will. Although he was against astrology, there were some aspects where he and Albertus were able to agree on. They both agreed that man's actions were a result of free will. Albert had solved this problem by a correction to the astrological system. In addition, Gerard supported the claim that the stars are instruments of the divine will, but as a secondary, efficient, cause⁴². The rejection of moral determinism and the acceptance of the stars as secondary efficient causes for divine will seem to conflict with each other.

Albertus deals with the problem of free will and moral determinism in the *Speculum*, but is consistent throughout all his works and gives the same explanation for this problem. Key to the solution is the existence and role of the soul in every human being. The efficient cause of the stars upon a person does not mean necessity of moral actions. The necessity of the stars does not even include the lifespan of a person. The lifespan of a person can be determined by

the horoscope at the time of birth, but this is a theoretical astrological fact. Death is not certain because "...the prognostication could accidentally be hindered."⁴³ If even death is not certain, then other events and actions are not necessary either.

The stars are regarded as the 'higher world' and our life here on earth as the 'lower world'. The effects of the stars and planets upon the world are clear; we notice this when we see the influence of the sun and the moon, and it even has its influence upon man itself. The higher world has its influence on the world and all the bodies that are part of it. But the influence of the higher world does not necessarily extend to our free will; God has given man the gift of free will. But how does Albertus resolve this apparent contradiction between the influences of the higher world and the free will? This is where the soul gives the answer with the help of Aristotelian psychology:

"either it is considered as the actuality (actus) of the body, with regard to powers imprinted on the body and thus per accidens impressed upon the soul by the motions of the heavens, in so far as it follows the body's affections; or it is not considered as the actuality of any body, as far as the rational powers of the soul are concerned, and in this case no impression is made upon it by the motions of the heavens."⁴⁴

Albertus' answer is thus that the higher world influences the body and gives to it certain inclinations. One may be inclined by the stars to behave in a fearful, angry or joyful manner, but the rational soul can stop the body from acting in one of these manners. Thus there is no moral determinism in astrology; one is free not to act upon the inclinations given by the stars and planets. The rational soul can be trained to do this. This is shown by children who do not have developed a soul rational enough to stop themselves behaving according to their inclinations.

In consequence of this position on the free will and the influence of the stars, there is another problem that Albertus needed to deal with. This problem has been mentioned before, when discussing Augustine and Abu Ma'shar, about the omnipotence of God and the influence of higher powers on the stars and planets. Albertus was familiar with the works of both Augustine and Abu Ma'shar and their visions on a first mover for the celestial spheres⁴⁵. This is a problem that Albertus has been occupying himself with for quite some time. In the *Speculum*, he identifies the stars as being "deaf and dumb"⁴⁶. He considers them to be instruments of God that have no intelligence of their own. But making such a statement would have to be consistent with Christianity and fit within a scientific and theological framework.

A Platonic framework would state a higher influence with a soul that 'radiates' its influence towards the inferior world consisting of matter⁴⁷. The superior world's influence is able to influence the inferior world, but the inferior world is not able to influence the superior world. This radiation from the superior world was accepted by theologians. A problem with this view for astrologers would be that the stars would have intelligence and become less deterministic. Despite this platonic principle there were other possibilities posed as explanations for the movement of the celestial bodies. One of these explanations invoked angels. These would be considered as being intelligent movers but were by no doctrine approved. Albertus has two points to make against angels being intelligent movers. The first is that they do fulfill the function that they are there to 'carry out virtues of assistance and ministry'⁴⁸. And second, they would not be able to be intelligent movers due to the platonic principle mentioned before. Angels would receive their influence from God, but they would not be able to influence God nor act intelligently on their own, because this would interfere with the omnipotence of God. These are some of the problems that Albertus dealt with in order to defend astrology from the

criticism it faced. But now it is clear that due to Christianity the discussion was both attacked and defended in new ways.

Astrology at the universities

Up to this point we have discussed philosophers and astrologers that have been of great influence on astrology and astronomy. We have seen how astrology has developed as a discipline, from Ptolemy up to Albertus Magnus, and how it has been criticized over the years. What is important to note is that from 1100 onward universities began to be founded and developed themselves as important institutes in the cities where they were founded. Several universities have been founded during this time, but in this section I will elaborate on two, the universities of Bologna and Padua. Both these universities have been prominent universities in their early existence, and both have been of importance regarding astrology. Bologna is regarded as the first and oldest university in the world. On their own website they say the university has been founded in 1088⁴⁹, but this has been decided by the leaders of the university in the nineteenth century. In fact, it is not until around 1150 that the university had the organizational structure to qualify as a university. It was in 1158 that the students organized themselves in an association to gain rights, although many scholars agree that the existence of the university of Bologna was a gradual process, spanning many years⁵⁰.

The universities at that time were not like what we consider a university today. At that time universities differed from each other and in this chapter I will focus on the northern Italian universities of Bologna and Padua. A university at that time could only exist with a charter given by either the pope or the emperor, and with financing from the city government (commune). In order for the university to be regarded as a university, it had to teach in the subjects of law, medicine and the arts, and had to procure doctorate degrees. Whoever received a degree was allowed to teach wherever they wanted in the christendom⁵¹. The focus of the universities was on law and medicine, not philosophy, astrology or even theology, although these subjects were taught.

In 1222 several students and professors came to Padua to study there. However, the commune of Padua did not become active in the university until 1262 when it decided to start paying for professors of canon and civil law and give scholarly privileges⁵². For the subject of astrology, we have to start in Padua with Peter of Abano (1257 - 1315), his date of birth is unsure given that 1250 and 1246 are also mentioned as the years where he is born⁵³. Peter of Abano was a philosopher, astrologer and physician who taught at Padua university from 1306 up and to his death⁵⁴. He has written three important works regarding astrology, titled *Lucidator dubitabilium astro nomiae*, *De motu octavae sphaerae* and *Astrolabium planum*. In the *Lucidator* he attempts to show that astrology is a science and how it is no different from astronomy. He believed that many of the problems arising from astrology and discussed by scholars opposing astrology came from a misunderstanding of astrology and its principles. He tries to show how astrology is a science due to the fact that it studies the heavenly bodies that can be described in the mathematical language. It is a science that can be studied through both reason and demonstration and is therefore no different than any other mechanical study⁵⁵. Even compared to astronomy he doesn't see a difference. To him both terms have the same etymological origin in that both refer to a rational undertaking (*logos* or *lex*). It studies the motions and natures of the planets as a whole, this has led Peter to subdivide astrology in different branches. These two branches are a branch that studies the motions of the planets, and a branch that studies the influence the planets have from which we can derive judgements and prognostications⁵⁶.

This is not the only defense that Peter has given, he has also given argumentation that could unify astrology with theology. As I have previously shown there are several objections from Christianity towards astrology. Peter responds to this by saying how studying the planets is the same as studying God. God is the primary cause of everything and the motions of the planets are secondary causes. Thus studying the secondary causes with mathematical certainty gives us certain knowledge about God. Regarding the problem of free will he responds similar to Albertus Magnus by saying that ‘...the stars only incline, they do not compel.’⁵⁷.

It is important to know that Peter of Abano was mostly known for his skills as a physician. He was responsible for giving medicine a prominent place at the university of Padua. Medicine and astrology have long been part of the same curriculum at universities. Peter was convinced that any physician had to understand astrology in order to be a good physician. This was due to his believe that the planets, signs and stars had a great deal of influence on the treatment of the patient and on whether if the patient would get well. Like the zodiac, the human body is divided in twelve parts and each zodiac sign corresponds to a body part. So if there are unfavorable planets in the sign corresponding to the body part that needs treatment it is better not to perform surgery at that time^{58, 59}. This shows how astrology was still taken very seriously at the university of Padua in the early fourteenth century. Astrology remained relevant at the university into the early sixteenth century. We can see from the pay rolls of the university what teachers were teaching and what course they taught. The roll of 1500-1501 shows how there is still a teacher specifically for astrology, but the average roll from 1525 - 1560 does not have an astrologer anymore. Instead, we see professors in mathematics and astronomy⁶⁰.

At the time, from approximately 1150 to 1500, Bologna was the most prominent university in Italy. With the coming of several famous and influential teachers, like Taddeo Alderotti regarding medicine, it became an increasingly popular university for students. The commune soon found out that hiring famous teachers was an effective way to attract more students to the city. These students generally spend a lot of money which justified the sometimes exorbitant salaries paid to the teachers⁶¹.

Like in Padua, astrology did not have a prominent place at the universities. The university was mostly dominated by teachers of law. There were two influential astrologers at the university of Bologna, Michael Scot (1175 - c. 1232) and Guido Bonatti (c. 1210 - c. 1297). Both these astrologers studied at Bologna but did not stay; they continued to travel elsewhere and study at other universities. Michael Scot is mostly know as the astrologer of Frederick II in Sicily. During this time he wrote his most important astrological work the *Liber Introductorius ad Astrologiam*. This is an introduction to astrology for anyone not familiar with science or the formalities of astrology. In the introduction it states that is written ‘...for student beginners and those not over-burdened with intelligence.’⁶² After this introduction he wrote two more books on astrology, following the first book. These books give a more detailed and advanced explanation of astrology and how to apply it. These books are the *Liber Particularis* and the *Liber Physionomiae*⁶³. Even though he was very popular during his own time, later scholars, like e.g. Roger Bacon (c. 1214 - c. 1292)⁶⁴, regarded him as a charlatan..

Contrary to Scot, Guido Bonatti did enjoy a lot of fame after his death. Up to now, he is still regarded as the most influential astrologer of the thirteenth century. He studied medicine and astrology in Bologna which continues to show the connection made between astrology and the human body, as we have seen with Peter of Abano⁶⁵. His most famous work is his *Liber Astronomiae*, This book remained an influential astrological textbook for two centuries after it was written⁶⁶. These two astrologers together were of great importance to Bologna and

developing it into a university with a very prominent astrology curriculum. However, again both these astrologers have faced criticism after their death. This is best shown with the fact that both the astrologers are mentioned in the *Divine Comedy*, written between 1308 and 1320, by Dante Alighieri (1265 - 1321). According to Dante they both reside in the fourth *bolgia* of the eighth ring of hell, reserved for people who claimed to be able to foresee the future, but who, as it turned out, could not.

‘this thou know’st well, who knowest all of it.

That other one, so thin about his flanks,
was Michael Scot, who surely understood
the artful game of magical deceits.

Guido Bonatti see; and see Asdente,
who wishes now that he had given heed
to cord and leather, but too late repents.

See the sad women who abandoned needles,
spindles and shuttles, to become diviners;
these wrought their spells with herbs and images.⁶⁷

Peter, Michael and Guido were important in establishing astrology as a subject at the universities. This continued after their time up to the beginning of the sixteenth century. Prior to the sixteenth century there was a great polemic attack on astrology by Pico della Mirandola (1463 – 1494); I will discuss him and his attack at the beginning of the next chapter.

After the establishment of astrology at the universities by these philosophers and astrologers, we can see how astrology fades as a discipline at the universities in the sixteenth century. In the 1520’s, Bologna had no more astrologers on the pay roll; the only professors coming close were the four astronomers⁶⁸. In Padua we see a similar pattern; as we have mentioned earlier, there were no more astrologers in the period 1525 - 1560. What we see in these two universities, and other universities in Italy during this time, is a shift from astrology to astronomy and eventually to mathematics. Professors often held two of these titles while teaching at the university. They taught both astrology and astronomy, or both astronomy and mathematics, or in the end they were just mathematics teachers. Roughly from 1560 the title was just mathematics, and astrology and astronomy were hardly mentioned on the rolls of the universities⁶⁹.

Up to now, I have tried to give a brief history of astrology where the most important figures are mentioned, what position the study held and how it was criticized by contemporaries. From this point onwards I will study several influential scientists, philosophers and books regarding their criticism towards astrology that would eventually lead to its downturn from science to pseudo science.

Chapter 2: The fall of astrology

Pico della Mirandola

The first philosopher we will discuss regarding the fall of astrology is Pico della Mirandola. The most important reason for this is his posthumously published work called *Disputationes Adversus Astrologiam Divinatricium*. This work is unfortunately unfinished due to his early death at the age of 31⁷⁰. This book is one great attack on astrology and focuses on judicial astrology. However, this work is little original because many of the arguments can be found well before his time. The work did have a great impact at the time of publication and this is because never before was there an attack on astrology like this in combination with Pico's rhetoric skills. His studies have led him to Padua, Paris and Ferrara, where he studied philosophy. As mentioned before, astrology was taught at these universities as part of the curricula of mathematics, philosophy and medicine⁷¹. This meant that he had a solid theoretical understanding of astrology and was well aware of its practices.

In order to further understand how Pico came to writing his book, we have to understand more about his interests and how they influenced him academically, and how this influenced the *Disputationes* in turn. Astrology was a subject taught at the universities, but magic was not. Nowadays we think of magic as tricks performed by magicians and illusionists. But during the time of Pico magic was a subject studied by prominent scholars like Albertus Magnus and Thomas Aquinas. The study and acceptance of magic was a result of a neoplatonic philosophy that viewed the universe as animate, a living system that could be studied⁷². Magic in this time was a study of the universe and distinctions were made between several kind of magic. 'Good magic', or 'natural magic', which studied the occult qualities found within nature, was differentiated from 'demonic magic' which sought to alter the world in a non-natural manner with the help of demons⁷³. In his work called the *Conclusions*, Pico is clear about how natural magic is allowed and how the dark demonic magic is prohibited. It is not surprising that Pico dealt with magic as well as astrology, since magic, astrology, occult sciences and theology were often intertwined with each other⁷⁴. One of the important influences on Pico regarding magic was the Picatrix. The Picatrix is a book written around 1050 or early in the tenth century; there is no agreement on the date of the completion of the work. This book combines both old magic and astrology in four books.

The influence of magic on his own work becomes clear in his '*Conclusiones philosophicae, cabalasticae et theologicae*'. This is a book consisting of 900 theses of different prominent ancient philosophers. The *Conclusions* were supposed to be defended publicly in Rome, but the Pope at the time, Pope Innocent VIII, put a stop to the defense of the theses. As an introduction to these theses Pico wrote his most famous work called *Oration on the Dignity of Man*⁷⁵. In these 900 theses in the *Conclusions*, there were a lot of theses that were associated with magic. Section 9 was devoted just to magic, and other theses were related to other kinds of magic and ideologies related to magic. Aside from magic there was another important aspect of his philosophy that was fundamental to his overall philosophy and attack on astrology. He was also an expert in Kabbalah and incorporated it into his works together with astrology, magic and theology. This influence is also clearly shown in his *Conclusions* in which 119 theses are related to Kabbalah⁷⁶. Pico believed magic and Kabbalah to be the keys to prove Christianity. Pico became familiar with Kabbalah through his teacher, Flavius Mithridates, that translated old works regarding Kabbalah. The first texts regarding Kabbalah became known in the first half of the twelfth century⁷⁷. Pico had several works available to him which were: *Sefer Yetsirah* (Book of Creation), *Sefer ha-Bahir* (Book of Illumination)

and *Zohar* (Book of Splendor). His interest for Kabbalah came from the belief that Kabbalah was able to confirm Christian principles⁷⁸.

However, magic and Kabbalah were not two separate subjects he studied, both magic and Kabbalah were closely related to each other and in turn again with Christianity. In fact Pico claimed that Kabbalistic magic originated from the divine word and that the only proper magic was in relation to Kabbalah. As a result, only the good, natural magic could be performed through Kabbalah⁷⁹. But to what end would a Kabbalist perform natural magic? This comes from the belief that Kabbalists are actors in the name of God. They seek to unify themselves with God and the Kabbalist principles are focused on changing the world for the better. This search for the unification with God is the highest goal a person can achieve in his lifetime. This makes them actors that use magic in the name of God to change the world; in this way it makes sense that only natural magic can be performed in relation to Kabbalah⁸⁰. Pico believed that he was able to find the truth of Christianity through magic and Kabbalah. This belief is shown in all of his writings; whether a system was able to confirm Christianity was also the measure of its truth. This was the most important reason that astrology was a system that needed to be rejected. We have discussed the reasons for this earlier in this thesis. Astrology would lead people away from God, because of its fatalism and it prevents people from acting out of free will. Acting according to these principles would lead people away from God due to the fact that they would act according to the prognostications made by the astrologers.

Now that we know more about his motives and the background from which he was writing, we can discuss the arguments he presents in the *Disputationes*. Throughout the work he presents different arguments that have been mentioned before by other astrologers and philosophers. Another important fact to know, is that Pico had a purely theoretical understanding of astrology, as taught to him by the universities. But on the other hand, he has never been a practitioner of astrology, so he never made a natal chart himself. The first argument he discusses in the first book of the *Disputationes* is a historical account of people who have denounced astrology. By doing this, he places himself in a list of authoritative figures that have fought against judicial astrology. Among the philosophers he mentions are: Pythagoras, Plutarch, Democritus, Seneca and Cicero⁸¹. As we will see later, he also draws on arguments already given by Saint Augustine. This listing is more rhetorical than scholarly, given the mistakes in his listing regarding Plato and Aristotle. Plato and Aristotle were not familiar with astrology as Pico describes it, since it was not known in that manner at that time in Greece. Even though the book is polemic, it starts weak with an argument from authority. It is not hard to find examples of authorities making claim which turned out to be false. An exception is to be made for Aristotle, because of how his philosophy was the basis for nearly all academic endeavours up to Descartes. In addition, the abuse of Aristotle and Plato and their silence about astrology supporting Pico in his thesis is also false. So what other arguments does Pico develop?

In his second book he draws on an argument from reason. This argument we have seen before while discussing Saint Augustine when he says how astrologers are most of the time lucky. Pico makes the same claim by saying that if an astrologer is right, it is due to chance and not due to skill, or the science that astrology claims to be⁸². Because the fact of the matter is that astrologers were wrong most of the time, the clearest example is the story given by Augustine about the two boys born at the same time. Even to today's standards we would accept this argument as a very strong and sound argument. A good example of this is given in Carl Hempel's article 'Two Models of Scientific Explanation'⁸³. Hempel starts his essay by giving two explanations of human scientific endeavour. These two explanations of why we pursue in

scientific inquiry are, in my opinion, valid in the time of Augustine and today. The first is that man wants a better understanding of his surroundings in order to be able to better control and predict these surroundings. The second reason is curiosity, we have an innate desire to know and understand the world around us. Regardless of the remaining content of his essay, I wholeheartedly agree with these reasons. But if these principles need to hold from scientific philosophical view, we need theories and sciences that produce statements that are true. Giving explanations for phenomena that are untrue, is unscientific for it does not give us more knowledge. In order to be a science, we need to gain a better understanding of the world, through explanations, or increase the likelihood of the truthfulness of our predictions. Astrology meets neither of these requirements for proper scientific conduct.

Besides this very practical and reasonable argument, a second point is raised in the second book in the *Disputationes*. This point draws on the role of religion within astrology. He states here how anyone who talks about astrology and religion, makes astrology superior to religion itself. From the prognostications made from a reading of the stars and the tables and maps, astrology has become superior to religion. Using astrology to make predictions regarding religious matters puts religion in a strange position. This is mostly because what is deduced from the stars in an astrological context is proclaimed to have necessity⁸⁴. Albertus Magnus has made an argument about this point, by placing the omnipotence of God above the movement of the planets and stars. This solution also deals with man's free will and the existence of the soul.

In the third book he gives a form of criticism resulting from an analysis of cause and effect. Pico gives an explanation of how the causes and the effects suggested in astrological causality are simply not there. The important distinction to be made here is between general effects and particular effects. We can safely assume that astrologers are primarily discussing general causes. The stars and planets and other celestial bodies have a great influence among the entire planet. We obviously notice the heat of the sun on the planet. The problem arises when we look at the predictions made by astrologers. Often these are very specific and particular to certain people and/or countries. If an astrologer makes the claim that a person will die at a certain time, this is a very specific prediction. But if the planets are the causes of everything on the planet, how can we distinguish between such particular and individual effects of these great, general causes? Even more curious, how can the same cause result in different, often contrary, effects for different individuals?⁸⁵ Again the argument from Augustine regarding the two children being born at the same time can be given here. So the causes that are given by astrologers are too general to be causes for particular effects. With that in mind, it would probably be more reasonable to assume that particular causes would cause particular effects.

Even if there was a candidate that would be able to generate different outcomes for a single cause that would be God. Assuming that God is all knowing, almighty and all good, he would still have difficulties making this possible. For God has created the world the way he did, and with this world there are certain laws he created to govern the world as he thought it would be best. Making all these assumptions, it would create more difficulties than it would give solutions to the problem described. For if different particular, contradictory, effects would be the result of the same general cause, there must have been an intervention somewhere. God must have done something to create the situation different for either of the two effects; in this case he would be contradicting himself by contradicting his own created laws. This would not be the case resulting from him being all knowing, all good and almighty. And even if he would go against his own laws, every situation he chose to intervene in would be the result of some moral judgement. God would have a favourite, why would he choose to intervene in one

situation and not the other? And wouldn't the resulting, differing situation be the effect of a change in a different particular causal setting?

As a result, we may conclude that from within the framework of astrology itself, astrology cannot solve this problem. In the system of astrology, there is no solution to the general causes creating particular effects. Recall once more to the case of Augustine and the two babies being born at the same time. But even when we take a superior cause outside of astrology, God himself, as a possible explanation, we end up with more questions than answers. A solution might be that planets have an innate, spiritual ontology. On this point, Pico differs from Albertus Magnus. He agreed that religion is not inferior to astrology, but he does give a solution that Albertus rejected. This solution was angels. He saw angels as a solution of rational actors that are superior to man, but inferior to God, that are able to move between heaven and earth⁸⁶. The reason that Pico gave this explanation, is because angels are a part of Kabbalah. By achieving the highest state within Kabbalah, we unify ourselves with God and become angels ourselves⁸⁷.

Up to now, the arguments delivered by Pico focus on the problems that astrology would have to deal with as a science. But in his *Disputations*, he continues to attack the practices of astrology itself. The attack on astrology is so strong, because it is a very elaborate attack which encompasses all aspects of astrology. Two aspects of practicing astrology that were attacked were fundamental to astrology namely the signs and the houses. These two aspects have been discussed in the thesis, but even today most people know their signs. Signs and houses are crucial when making a natal chart for any newborn and making predictions in general. Regarding the signs and houses his criticism was that they simply did not exist. Astrologers see signs in the stars by connecting certain stars together, but this does not mean that these constellations of stars have any significant meaning to us people on earth⁸⁸. We see patterns in the stars and astrology gives meaning to these patterns, which make up the signs, and try to derive knowledge from them. Astrologers have given them meanings, but Pico states how astrologers have used their imagination to give these signs any significant meaning⁸⁹. In addition, each of these signs signify a certain quality that a person would possess if one was born in one of these signs. Just like the existence of the qualities of these signs, these qualities do not exist, just like the signs themselves do not exist.

As mentioned earlier, most of these arguments were not new or original. These arguments were already known and further elaborated by earlier philosophers. It is just the combination of all these arguments in one book that makes the book so noteworthy. Pico did write some original content in the *Disputations*, more in particular in book 12. In this book, he tries to write a historical account of astrology. Because what was peculiar to Pico, was his account of how astrology was able to be so fundamentally false, yet remain in existence and taken seriously for so long. As mentioned earlier, he composed the book with the intention of defending religion against astrology. An important classification regarding this was how Pico was always in search of eternal truths, and he believed these could be found in religion⁹⁰. Christianity, Plato and Aristotle used reason to arrive at irrefutable principles that have been tested and held true to Pico's own days. These true principles were not to be found in astrology. Ptolemy tried to write down the fundamental principles of astrology, but even with these principles there was much debate among the astrologers themselves⁹¹. This internal debate about the principles and events that astrology tries to describe, shows how it is not a science and void of any truth.

The Copernican revolution and Clavius's dismissal

Historically speaking, rational debate and the evaluation of arguments and judgements do not always resolve conflict. This is because people do not always act fully rational and the fact that there are often larger effects at play, may have significant influence on the debate in question. Even though Pico's *Disputationes* had great influence on the position of astrology in society, it was not enough to finally denounce it as a pseudo science. Astrology remained taught at the great Italian universities and in Belgium⁹². The clearest argument for this is the fact that great astronomers were still actively engaged with astrology, namely Tycho Brahe (1546 - 1601) and Johannes Kepler (1571 - 1630)⁹³. Both Brahe and Kepler accepted a Copernican heliocentric model, but they were both active astrologers. Nicolaus Copernicus (1473 - 1543) himself was not. However, in 1501 he did move to Padua to study medicine and therefore, it is most likely that he also studied astrology as part of his education. However, it is unlikely that he was much interested in the subject.

The Copernican revolution was of great influence on a great number of people and subjects of scholarly interest. We must realize that before Copernicus came with his new model, Ptolemy's geocentric model, which we started this thesis with, was still the accepted and dominant astronomical model. It still assumed circular motions of all planets orbiting the earth. The sun still had an important place since it took central stage in the system. This meant that there were three planets between the sun and the earth and three planets between the sun and the stars. It shall remain an unanswered question as to when and why Copernicus made the shift towards the heliocentric model. But we can say that there were certain influences that may have guided him towards this model. One of these factors was him leaving his uncle's palace to build his own observatory⁹⁴.

One would expect that such a drastic change in viewing the universe would have significant impact on a science based upon the celestial bodies. However, this impact is far less than what one would expect. One very practical reason for this is because astrology is in a sense a relative science. The zodiac signs and houses of astrology are all placed in a system from the perspective of earth. So what is important is the position of the planets in relation to earth and each other as viewed from earth. This means that a shift from the Ptolemaic to the Copernican model, or another shift in cosmological models, do not make a difference to the practice of astrology. When one makes a natal chart, the astrologer only looks at the position of the other planets in relation to the earth⁹⁵.

Crucial to the removal of astrology from the Italian curricula was Christoph Clavius (1538 - 1612). He had a major impact on the curricula of the Italian universities regarding mathematics and astronomy, because he wrote many of the textbooks from which the students were taught at the universities. His textbooks were mainly about the mathematical sciences like arithmetic, geometry and astronomy⁹⁶. Because he wrote the textbooks from which many studied, his influence can hardly be underestimated. So his work was the standard to which many theories were tested, and as a result, his opinions regarding these subjects matter greatly. Because of his status at the universities, he was a central figure in the cosmological debates surrounding the great cosmological changes at the time of the scientific revolution.

Clavius was a supporter of Ptolemaic cosmology his entire life and has defended his cosmology from several alternatives that were suggested at the time, including Copernicus's heliocentric model. It would be expected that such an avid defender of Ptolemy would also defend his astrology, so his removal of astrology from the universities seems contradictory. The most important work regarding cosmology was Clavius's 'Commentary on the "Sphere" of Sacrobosco' (1570). This was an introductory textbook regarding cosmology and it has

been revised several times while adjusting for the changes within cosmology. The most important change was the increasing importance of Copernicus in the later editions⁹⁷. In the Sphere there are other theories that are being discussed. At the time there were four major theories in cosmology; I will now discuss them briefly and how Clavius responded to each one.

The first theory was homocentrism. Homocentrism thought that the earth was the centre of everything and that all the celestial bodies and stars were moving in uniform circles in their respective spheres. Many different astronomers have tried to advance the model and make it a more fitting model, but the model could not be saved. Clavius, rightly so, stated that there were many phenomena that the model could not explain. These phenomena included the variations in size and brightness of the different planets. Girolamo Fracastoro (1483 - 1533) was a defender of the homocentric model and tried to save the model by adding an extra sphere. This sphere was placed between the moon and earth, and was responsible for the varying appearances of the planets due to variations in the air⁹⁸. Of course, this extra sphere was an desperate attempt to save the model, because the variations within the air were inconsistent with the way the planets presented themselves that night. In the end, to put the model to rest, Clavius uses an argument that we have seen used by Pico della Mirandola to disregard astrology as a whole. Namely that the homocentrics could not reach agreement between themselves to create a uniform theory⁹⁹.

The second theory was the ‘fluid-heaven’ theory presented by Robert Bellarmine (1542 - 1621). This model states that celestial spheres do not exist at all. The planets are spots on the moving transparent spheres. But the planets are not solid objects, but centric zones that move on their own through a fluid, waterlike, medium. This model is better able to deal with the varying motions of the planets and their differences in brightness and size. There are different variations on this theory, but for this thesis we will stay with Robert’s theory for his is the most prominent one, and because he was the most influential advocate for this theory. His goal was to present a theory that gave an explanation for the phenomena that needed to be explained, but to remain close to the scripture¹⁰⁰. His model presented the stars as being fixed on a solid sphere on the outside of the universe, while the space between earth and this sphere was filled with a fluid substance. The planets had the ability to move freely, at their own will, within this fluid substance¹⁰¹. This view does hold according to Clavius. It may appeal to us in an intuitive manner if we look up to the sky, but the result of this model is conflicting movements of both planets and stars. It is known that there are stars that move both east-to-west and west-to-east; this would not be possible if they are part of the same sphere moving in one direction. Another failure in Clavius’s eyes of the model, is how it does not explain anything and does not have any ability to make any prediction whatsoever¹⁰².

So far, we can see how Clavius upholds two scientific criteria that we uphold in modern science. The first is that the theory must correspond with our empirical observations. We see this in his criticisms of the homocentric and fluid-heaven theory. If we look at the Disputationes by Pico, we see that his criticism is more abstract; he and other authorities, focus on how the signs and houses are figments of our imagination, and an analysis of general causes leading to particular effects. He focuses on same empirical practicalities, like the birth of two babies at the same time, but this is an illustrative example to prove a more abstract point. The difference with Clavius, is that Clavius gives as a response to simply look up the sky and observe the phenomena to see how they are inconsistent with what the theory states.

This focus on the empirical criterion of theory being able to explain, predict and being consistent with the observed phenomena, is also found in his rejection of astrology. He makes

a distinction between the theoretical and practical astronomy. The theoretical part deals with the orbits of the planets and their location, in short astronomy as we have just discussed. The practical part applies to judicial astrology; about practical astrology he has the following to say:

“the practical astronomy, which other people call judicial or prognosticatory that is what they call divinatory, orients all these things towards the practicalities of human live for it contemplates complexions and the natures of both the signs and the constellations and also of the planets and of the remaining stars, and it indicates which signs are hot, which cold, and which temperate, which masculine, which feminine, and other things of this type. Again it predicts future events in the world below from the motions of the planets and their orbs, but since many people have dared to add many things rashly and falsely to this part of astronomia and they wish to amplify this prognosticatory part in such a way that it became all together superstitious and bodious and it is justly held to be suspect by the church and it was condemned in a marvelous manner by saint Augustine in his books 'on Christian doctrine', therefore I deem that we will say nothing whatsoever about this subject.”¹⁰³

This quote shows Clavius' sentiment toward judicial astrology and this was the reason for him to remove astrology from the curriculum at the university. In order to strengthen his position, he appeals to the authority of and arguments from Saint Augustine. The result of this decision was even more significant due to the fact that he was the prime supplier of textbooks to the universities. This move is more peculiar due to the fact that while he is defending the Ptolemaic astronomical system, the astrology of Ptolemy has been rejected with the rest of astrology. This is a clear indication that astrology and astronomy, as we would call them now, not theoretical and practical astronomy, have been separated. To further examine this change, we will now look at Johannes Kepler, Tycho Brahe and Galileo Galilei (1564 - 1642) and see how their relation to astrology has changed.

Brahe, Galilei and Kepler

Despite the previously discussed Disputationes of Pico della Mirandola and the removal of astrology from the curricula at the universities by Clavius, astrology was not completely denounced yet. Despite these significant changes in the debate regarding astrology, there were still eminent astronomers that occupied themselves with astrology. In this part, we will discuss these scholars and see how their relation to astrology changed.

Tycho Brahe is widely known as an astrologer and astronomer, but best known for his reputation of having the most exact astronomical observations of his time¹⁰⁴. His occupation with accurate astronomical data began at an early age, he started practicing astronomy in secret due to the conjunction of Saturn and Jupiter in august 1563. His observations did not match with the dominant tables at the time, so he set himself to get more precise tools to measure and to get the most accurate astronomical data possible¹⁰⁵. From early on in his life he was occupied with astrology. He tried to predict the weather for the year 1565, but later in his life his main occupation became astronomy. In his autobiography, he writes about his development in astronomy, but the years 1565 to 1569, the years where he spend most of his time on astrology and alchemy, are not very much discussed¹⁰⁶. This did not mean that his astronomy and astrology were not connected with each other. After the supernova of 1572 he spent a lot of his time on astronomy and the impact of the supernova on astronomy. As a result, he published a treatise about the new star. This treatise was published as an introduction to his new almanac which was received as being of great significance to astrology by his friend Iohannes Pratensis¹⁰⁷.

However, during this time we see a change in Tycho's attitude towards astrology. He noticed that astrology was not taken seriously by the common public. According to him, this was the result of quacks practicing astrology and having insufficient astronomical knowhow about proper prognostication. As a result, the good astrologers, like Tycho himself, were taken just as seriously, which is not much. However, during his first public oration on the subject of astronomy and astrology, he actively defended astrology from known counterarguments¹⁰⁸.

The general thesis in the article by Almási is that Tycho, while he matures as a scholar, astronomer and astrologer, increasingly distances himself publicly from astrology. He wrote a tract on the comet of 1585, but published it under the name of his assistant Elias Olsen Morsing. In addition, he was more careful about predicting the weather, since he admitted that there were problems that needed to be solved in this area. Because how could the weather be so different among Europe, but be susceptible to the same planetary conditions?¹⁰⁹ This would suggest that Brahe himself was doubting astrology, but at the end of his life, he still had a firm belief in astrology. He believed that what other people said had a lot of meaning, on condition that it was practiced correctly and that it was founded on a reliable astronomy¹¹⁰.

Over the course of his life, he continuously distanced himself from astrology. This was most apparent in what and how he published publicly. His main defense of astrology is that it is being practiced by too many people that have not sufficient knowledge of science, and therefore the general public does not take it seriously anymore. Tycho distancing himself is also apparent due to the fact that he had access to the most accurate, expensive and precise instruments to make observations regarding the stars and planets. Due to the empirical nature of his studies, he was well aware of all the rare phenomena that showed themselves during his lifetime, like comets and supernovas. Making astrological predictions was hard enough, but these anomalies were within the framework of astrology even more inexplicable¹¹¹. This distinction between astrology and astronomy shows how astronomy became an increasingly more mathematical science which was the foundation of astrology, but even Tycho admitted that astrology had a variety of problems to overcome. The empirical phenomena of comets and supernovas posed another problem for astrology. The Aristotelian view of a set, unchangeable celestial world view could not be defended with the appearance and disappearance of comets and the coming of new stars.

Another famous physicist that was a practicing astrologer was Galileo Galilei. He is most known for his astronomical work in which he used though he was not the inventor, the telescope for observing the universe. In addition, he was not the first one to use the telescope to observe the moon and make drawings of the craters on the moon¹¹². Among his other astronomical achievements are the discovery of the four moons of Jupiter, the discovery of sunspots and of course his proof of the heliocentric model which resulted in a conflict with the church¹¹³. What is most important in his work, is his empirical approach to science by testing hypotheses through observation. It is this change in attitude that has had a great impact on the science of astrology and its credibility. As we have seen with previous writers and astronomers, astrology was increasingly rejected due to inconsistencies in the observations, and how observations contradicted the basic assumptions of astrology. The sunspots and the craters of the moon are examples of observations that disprove Aristotle's claim that celestial bodies are perfect.

Despite the criticism that astrology endured in the past, Galileo was also an astrologer, so even the greatest intellectual minds occupied themselves with these activities. There is also no notion that Galileo ever doubted astrology or quit astrology during his lifetime. Favaro wrote in 1881 already on Galileo as an astrologer saying:

“It seems to me impossible to have the slightest doubt that Galileo was involved with astrology, indeed, that he was famous for his great ability in that art, so that distinguished people consulted him with complete confidence, in many cases asking for horoscopes and predictions.”¹¹⁴

Not only did he make his own horoscope, but also those of his daughters and of several other people. But his activities in astrology are obvious due to the fact that he held the chair of mathematics at the university of Padua from 1592 to 1610. As discussed earlier, Padua had a long standing tradition regarding astrology, and astrology was part of the mathematics chair held by Galileo. Astrology was no longer as important as it used to be at the universities, but it was still taught to medicine students. For medicine students, the ability to cast a horoscope for their patients was still a fundamental one¹¹⁵. His astrological activities were not limited to teaching, he even casted his own horoscope which he took very seriously. This is shown by the way he drew up the horoscope and that he looked to future life events. He also casted horoscopes for his two daughters and gave descriptions of their future personalities¹¹⁶. This shows that Galileo occupied himself during his lifetime with astrology. There is no indication on him changing his position on astrology; I have not been able to find any proposed reformation, adjustments or rejections of astrology. Brahe accepted a Copernican worldview, but also made his own model with a few adjustments to the Copernican model. It is well known that Galileo also accepted the heliocentric worldview. The most famous example of this is his conflict with the church, resulting from his defense of the heliocentric model. The claim of the earth moving around the sun was supposed to be against the scripture, because the bible clearly states how the earth is immobile (Psalm 93:1). Even during his trial, Galileo refused to admit that the heliocentric model was wrong. He was convicted to house arrest on the grounds that he was “vehemently suspect of heresy”¹¹⁷.

Despite the fact that there is no clear connection between Galileo’s astrological and astronomical work¹¹⁸, we can tell that astronomy and astrology have increasingly become two separate sciences. As we have seen with Brahe, the focus shifts more to empirical observations and how to explain them and to determine which model is best able to save the phenomena. Technological advances have been very important in this respect and more specifically, in Galileo’s case, the invention of the telescope. This allowed him to make several of the discoveries for which he eventually became famous. These observations, the fact that the universe changes all the time and that celestial bodies were in fact not perfect, contradicted the basic assumptions of astrology which were found in Ptolemy. We see here a shift from Ptolemy, where astrology was supported by the astronomical theories at that time, to modern astronomy which continues to contradict the basic assumptions of astrology based on empirical observations.

The last scholar that I will discuss in order to show that astrology was not completely rejected, is Johannes Kepler. Kepler is unique in the sense that he was a mathematician, astrologer, astronomer and cosmologist and tried to make of all these disciplines one coherent system. This meant that he had to reject certain assumptions or modify his system in order to make it all fit. One of these assumptions that was fundamental to his system was the fact that Kepler believed the universe to be finite and our solar system to be the only one in it¹¹⁹. His system works if the aforementioned assumption is true, but later on, scholars had troubles with his model because it did not fit with the studies of later cosmologists. These cosmologists assumed that the universe was infinite and that our solar system was just one among many.

Kepler did not simply accept astrology as it was taught to him; he accepted astrology but he did reform it and had his own arguments against certain aspects of astrology. His most

important criticism regards the zodiac signs. Kepler thought that the zodiac signs were made up by men and did not have any actuality within the physical reality of the world. He supports this argument by showing how the division of twelve is not consistent with his own contemporary mathematics. Lastly, we see how his argument is further supported with an analysis of how this division results in internal inconsistencies in astrology itself¹²⁰.

But this was not the only problem Kepler saw with astrology. As we have seen with the previous scholars, empirical observation brought doubt in their belief in the astrological discipline. Again this doubt came from the weather and astrology's inability to predict it. In 1601 he said that astrology would not be able to be more productive than vague weather predictions¹²¹. However, his doubt about astrology was already known in 1598 when he was writing the calendar for 1598. These calendars were astrological predictions for the coming year regarding a variety of subjects. In the preface of the calendar of 1598, Kepler wrote how these calendars should be regarded as superstition. Later he went on to write that he did not plead for a rejection of astrology, but simply a reform¹²². In his 1610 'Tertius Interveniens', he goes on to compare astrology with medicine. As we have seen, medicine is the discipline that was connected the longest with astrology. The comparison he makes is that both disciplines are trial-and-error. They both do their best to give the best possible prediction, or best treatment for the patient, and sometimes it works and sometimes it doesn't¹²³. However, in the, 'Tertius', he also writes how we must not 'throw out the baby with the bathwater'¹²⁴. This shows how he did have his doubts about astrology and suggested his reforms, but that fundamentally continued to believe in astrology.

Morin, Bayle, the Dictionnaire and the *Encyclopédie*

One of Kepler's contemporaries was Jean-Baptiste Morin (1583 - 1656) who was a mathematician, astrologer and astronomer. His entire life he occupied himself with astrology and held views that contradicted not only Kepler, but also Descartes and Copernicus. This is clear through his cosmological belief that the universe was geocentric and his conviction that it was proven that the earth had a fixed position and did not move¹²⁵. He held the mathematics chair at the Collège Royal in Paris and was therefore taken very seriously during his lifetime. Despite his enemies, he had Galileo as his friend who was very anxious to read Morin's book on astrology:

"I am astounded that Morino has such an extremely high regard for judicial [astrology] and that he claims with his conjectures (which to me appear uncertain, if not very uncertain) to establish the certainty of astrology; and it would really be a wonderful thing if - as he promises - he can, shrewd as he is, place astrology in the highest position of the human sciences; and I shall wait with great curiosity to see this marvellous innovation."¹²⁶

The work that Galileo is referring to is the 'Astrologia Gallica'; it is a work consisting of twenty-six books which tries to defend and give a foundation of astrology. The foundation of astrology is presented in the first sixteen books; only after those books comes the actual astrology. He did not get to see how the public would react to his work, since it was published two years after his death¹²⁷. In the seventeenth book he defends the houses of astrology, where Kepler attacked them and regarded them as man made. Whether or not this is a direct response to Kepler I cannot say, but the houses being arbitrary and man made is not an argument which has not been mentioned before. The cardines, the ASC (ascendant), MC (Medium Coeli) and the IMC (Imum Coeli) are according to Morin determined points in the heavens that divide the heavens in four equal quadrants. There are several methods to go from there, but according to Morin, there are at least four quadrants in the heavens that are not man made.

Aside from this objection, he tried to defend astrology from numerous objections made against it. However, he failed to do so and the successes he had during his lifetime would soon be forgotten and he would no longer be taken serious. When Pierre Bayle (1647 - 1706) published his 'Dictionaire Historique et Critique' in 1697, and a second edition published in 1702, Morin is discussed in it as well. If we read the footnotes in Morin's section we can see that Bayle did not have a lot of good to say about Morin. Which is not only an attack on Morin as a person, but also on astrology as a whole. In footnote F of his Dictionaire¹²⁸, he discusses how unbelievable it is that statesmen will not act without consulting astrologers. This is shown by the fact that Queen Christina wanted to see Morin, as she thought he was the best astrologer there was at the time. Another example of this is when Morin was hired by the count of Chavigni to aid him in his travels. Morin predicted why and when was the best time to leave and when to return from the journey. Beside these 'easy' predictions, Morin also predicted that the count would get sick and remain a free man. But this prediction turned out to be false, because the count stayed in good health and was eventually imprisoned. Strangely enough, this false prediction did not lead to any consequences for Morin and he was excused from his mistakes. But Bayle casts doubt on Morin's skills as an astrologer not only with this false predictions, but also when he shows that Morin has tried, and failed, to predict the death of several prominent figures. An example of this is Morin's prediction of the death of Lewis XIII. He made the prediction of the kings death when he was so ill, that recovery was no longer possible. He gave several specific days in early May that the king would pass, but he actually died on none of the days predicted by Morin¹²⁹. There are several more instances discussed where Morin made predictions but they did not come true and were false. Yet he had several methods to give explanations for his false predictions. One of them is how 'the wise will over-rule the stars'. Which meant that, for example, predicted illness could be prevented by healthy eating and proper exercise. Another method was the Godlike intervention, for sick people pray to God for a recovery and God answers these prayers¹³⁰. Lastly, Bayle also writes how it is most likely that Morin was an astrologer for the money. Morin was well connected with high profile people, religious and kings, which admired him much. This was the reason why he made a lot of money making prediction for these highly esteemed people.

This shows how during the seventeenth century astrology was in rapid decline. It was not after the death of Morin that astrology was refuted and criticized by Pierre Bayle, a prominent scholar at the time. Astrology was again criticized for the fact that it simply makes a lot of predictions that are untrue. And if the astrologer responds, the explanation for the failure of the prediction comes rarely from an admittance of the failure of astrology itself, but rather other external factors. We have seen how a wise man can prevent illness through living healthy and the answer of prayers by God. Bayle's strong position on the non-sense of astrology becomes clear with his reaction to the news that the French court does not hold any astrologers anymore. He said that the court was 'cured of that disease'¹³¹. The remark can be seen in the context of his disapproval of the weight statesmen would give to the predictions of astrologers. If the astrologers would determine when a statesmen would leave for a journey, or decide when to wage war, one could legitimately ask: "who was in charge?"

The most clear and telling example one can give of the death of astrology as a respectable, scientific discipline can be found in the *Encyclopédie* by Denis Diderot. It was published over a period of 21 years, between 1751 and 1772¹³², while being provided with supplements and changes during that time. The *Encyclopédie* by Diderot is often given as a prime example of thought during the enlightenment. This is mostly due to the secular and anti-authoritarian nature of the work, which is an attempt to store all knowledge of man, at that time, in one

place. This work shows also a new attitude towards science. As is written in the *Encyclopédie* ‘science’ is defined as:

‘Science, as a philosophical concept, means the clear and certain knowledge of something, whether founded on self-evident principles, or via systematic demonstration.’¹³³.

This definition is no longer consistent with astrology as I have described in this thesis. For the fundamentals and self-evident principles on which astrology was founded, turned out to be false. The Aristotelian basis for science, and thus astrology, was replaced with Descartes and later on Newton. The assumptions of astrology turned out to be untrue, nor was astrology capable of giving clear and certain knowledge. And this ‘knowledge’ was by no means given through systematic demonstration, because, among astrologers, there was much debate about many topics within astrology.

Regarding astrology there are two entries relevant to astrology namely: ‘Astrologer’ and ‘Astrology’. The entry on astrology is very brief and leaves nothing to the imagination:

‘Astrologer. A person given to astrology or divination by the stars. Astrologers used to be quite common; the greatest men also appeared to believe in Astrology, such as de Thou and several others. Today the name of *Astrologer* has become ridiculous, even worse the lowest classes attach it sometimes to the predictions of our almanacs.’¹³⁴

It shows how in the period between Bayle and Diderot, about 50 years, the attitude towards astrologers has changed. Bayle criticizes Morin for doing astrology simply for financial reasons and how his predictions are untrue. In the *Encyclopédie* the astrologer is ridiculed and only, sometimes, taken seriously by the lowest classes in society.

In the entry on astrology, there is a clear distinction made between judicial and natural astrology. This distinction is not new. Judicial is the astrology that tries to make predictions and natural astrology is “...a branch of physics or natural philosophy;...”¹³⁵ When discussing natural philosophy, there are several references to other articles in the *Encyclopédie* which we now would categorize as measuring instruments and natural phenomena studied by physics. The entry on judicial astrology is a historical overview of how astrology developed in certain times and places. The lack of respect for this ‘science’ is clearly shown by the usage of terms like ‘...this so-called art...’, ‘...superstition...’ and “...this ridiculous means of forecasting.”¹³⁶ The rest of the entry is characterized by describing what position astrologers used to have and admiration of people who have tried to bring astrology down. Astrology was also then no longer a discipline to be studied at the universities or debated among scholars. In the entry of astronomy, there is no mention of astrology; this could be regarded as a definitive separation between astronomy and astrology, and natural astrology and judicial astrology¹³⁷.

Chapter 3: Modern day astrology

It would seem that no one would take astrology serious again after the history I have described and the way it was spoken of during the enlightenment. But in our own time, astrology is still very much alive. Many newspapers and magazines still have a section reserved for astrological predictions regarding people's signs. Not only that, but during the day, many Dutch TV stations have shows which occupy themselves with astrological predictions, card reading and other methods of predicting the future. By no means do I think that people take these shows and magazine predictions seriously, but a part of the population actually does. Some people believe that the descriptions about their personality can be found in a correct analysis of the stars and planets. As described, from early on, astrology was criticized by many people in many different ways and after being taken out the curricula of the universities it quickly went downhill.

Compared to historical conceptions of a science or discipline, we have a very different notion of them, one in which astrology no longer fits. While many people would regard biology, physics and math as scientific, the majority of people would no longer consider astrology a science. We have found many reasons not to take astrology serious, but when placed in the discussion regarding the problem of demarcation, i.e., the question: 'what constitutes sciences and what pseudo/science?', it seems more difficult to definitively disregard astrology.

A good starting point for a discussion of the modern position of astrology is a statement published in the journal 'The Humanist', the edition of september/october 1975. In this statement, written by Bart Bok, Jerome E. Lawrence, Paul Kurtz and co signed by 183 leading scientists, among which several Nobel prize winners, they express their concern regarding the increasing popularity of astrology. In the statement¹³⁸ they give three reasons for the invalidity of astrology. Firstly, astrology has its origins and has developed itself in a time where a magical world view was dominant. Second, we can now measure the influence of other planets and stars on our own planet, and we can draw the conclusion that the influence is so small that it is negligible. Finally, the belief in astrology comes from a longing for comfort, but instead people must realize and accept that they themselves are primarily responsible for their lives.

These objections seem valid, but from a philosophy of science perspective, these objections, or most objections to astrology, are not as valid as one would expect. One famous astronomer and one philosopher responded to the request to co sign this statement. The first scientist is the famous astronomer Carl Sagan who thought the statement to be too authoritarian and also objected that many sciences have their origins in superstition. His last point is that the lack of mechanism to explain astrology is no reason to dismiss astrology, because many sciences and theories that were deemed incorrect at one point in time, eventually turned out to be true. These sciences and theories were true, but only later on were these mechanisms discovered and able to explain certain phenomena¹³⁹. I agree with the first point that he makes, many other sciences come from superstitious origins. But the second point is not as good because many of the theories that have developed mechanisms later on, did so in a reasonable amount of time. Astrology has had over 2000 years time to come up with a similar mechanism but was unable to do so. The lack of mechanism is not due to the lack of research done in astrology. As we have seen, the Italian universities have taught astrology prominently for a long time. The inability to develop a working mechanism after so much time and effort suggests that there may not be such a mechanism.

The famous philosopher to refuse to co sign was Paul Feyerabend. His main point to the statement is that the scientists that sign the statement have no knowledge of astrology. The

scientists use their authority to convince people of their opinion, even though they have little to no knowledge on the subject whatsoever. For example, the position of the planets does have influence on the sun and its activity, which as a result has varying influence upon earth and certain phenomena. The criticism expressed by the scientists undermines their own respective scientific fields, because of the influence of the sun on many processes on earth. I agree that it is strange how so many scientists actively make a statement like this against astrology. Although I do agree with the intention of the statement, it would have made more impact if it had proper historical and philosophical scientific arguments for their case¹⁴⁰.

The problems with attacking astrology as a science from a philosophical perspective are discussed in a paper published in 1978 by Paul R. Thagard. He supports the statements made against the statement by Bart Bok, that the arguments presented are invalid¹⁴¹. Not even that, some of the modern criteria of science are not sufficient to qualify astrology as a pseudoscience. Verificationism is a theory about what constitutes scientific knowledge. In essence, this is what verificationism means: "...no sentence that refers to a 'reality' transcending the limits of all possible sense-experience can have any cognitive significance."¹⁴². Which means that if we cannot verify it in reality, it has no cognitive and therefore no scientific validity. Logic positivism is no longer a serious influence in the philosophy of science, but it is an attempt to distinguish science from pseudoscience. So what happens when we empirically test astrology? There is an example by Michel Gauquelin which shows a statistical significant correlation between certain occupations and the position of the planets at their time of birth¹⁴³. Maybe it is just a coincidence or maybe there is in fact some relation between the position of the planets and people's behaviour. If anything, this example shows that in some instances astrology is verifiable and cannot be dismissed as a science with this method.

A second method is falsification as proposed by Karl Popper (1902 - 1994). Which states that a statement needs to be falsifiable in order to be scientific. If a theory cannot be falsified, we can regard it as unscientific¹⁴⁴. This method is also not adequate to dismiss astrology as a pseudoscience. Astrology is able to incorporate observations that may lead to falsification by adjusting certain predictions or stating that astrologers themselves are not clear about certain rules of astrology. In this thesis, we have seen several defenses with criticism towards astrology. The unfortunate conclusion is that astrology cannot be falsified. Not only because of astrology's attitude towards falsifying observations, but also because falsification itself is facing difficulties.

If these methods fail to dismiss astrology, then what does work? One promising paper comes from the scientist Shawn Carlson titled "Double-blind test of Astrology". In this paper he partially tests astrology for its validity; partially since the paper only takes on natal charts. This study has been set up with intense cooperation from several prominent astrologers and scientists. Carlson was worried for a scientific bias and made sure to include astrologers in the setup of the tests, so the astrologers themselves were satisfied with the conditions in which the test would be conducted. The involvement of the astrologers becomes clear in the definition of natal astrology which was formulated as follows:

"The positions of the 'planets' (all planets, the sun and moon, plus other objects defined by astrologers) at the moment of birth can be used to determine the subject's general personality traits and tendencies in temperament and behaviour, and to indicate the major issues with which one is likely to contend."¹⁴⁵

Now it is clear what the scope of the study is; not astrology as a whole but natal astrology. The study consisted of two tests. In the first test astrologers would make up a profile of

subjects based upon time of birth, place of birth and other information. After this, the subjects had to pick out their own profile, drawn up by the astrologer, which was one of three profiles presented to each of the subjects. The scientists expected that the subjects were able to pick their own profile one-third of the time, while the astrologers expected a success rate of 'at least half'¹⁴⁶. In the second test the astrologers received a natal chart and three profiles based upon the CPI (California Personality Inventory, a standard personality test). Now it was their objective to match the natal chart to the correct CPI. Again, the scientific hypothesis stated that the astrologers would be correct one-third of the time, while the astrologers claimed to be correct 'half the time or more'¹⁴⁷.

And what were the results? The astrologers performed according to the scientific hypotheses, so they performed no better than chance. Their performances in both the tests did not live up to their own claim of 'at least half' correct. The conclusion was that the astrologers did not perform any better than chance. This is some considerable evidence that natal astrology can be disregarded as a pseudoscience. But like any other science, astrology could take this study as a challenge to improve its practices in order to give more accurate profiles and predictions.

Aside from this, astrology is far from the only science to have difficulties and problems to solve in order to evolve. And this is where Thagard comes with his own solution to the problem of demarcation regarding astrology. He states that unlike other sciences, astrology has developed very little over the course of its existence¹⁴⁸. It has rarely dealt with anomalies by adjusting the theory or taking new theories into consideration. Where other sciences developed themselves and test theories, retest them and try to adjust their theory to deal with anomalies, astrology has not, or at least far too little. For the little progress it has made over its existence, the explanatory and predictive value of the natal charts, almanacs and prognostications has not increased. If we look at what astrology tries to do, it tries to predict future events, big or small, and give descriptions of personalities based upon the planets and stars. Some of the predictions that used to be made by astrology are now performed by other sciences. For example, the weather; Tycho and Kepler have tried to predict the weather using astrology but gave up. They saw the inaccuracy of their predictions and the problem of the variety in weather conditions, all whilst being caused by the planets. Now we have fairly accurate weather predictions which are the result of meteorology. And would psychology not be far more suited for giving descriptions of people's personality and their personality traits? The amount of influences that result in a person's behaviour is far greater than the planets and the place and time of birth. Is somebody the first child in a family? Does a person have a genetic predisposition for certain mental illnesses? Did a person experience a traumatic event? In what country is somebody born and by what culture is a person shaped? Astrology tries to make predictions on a variety of subjects and claims to know when a person is best to leave on a journey, in order for it to be a safe and good journey. We have seen this in the case of Morin.

People have always sought manners to be able to predict what is coming in order to prepare for it, or to influence its outcome. But in only a very limited number of cases, we are able to accurately predict the outcomes of certain situations; for the rest it is mostly educated guessing. Naturally this goes for astrology as well, but we can see a trend over the history of astrology as described in this thesis. In the beginning of astrology, we noticed how astronomy and astrology were complementary to one and another. Ptolemy already made the distinction between astrology and astronomy. But his astronomy was supportive of his astrology, given how the sun as the middle celestial body made Mars a hot planet with corresponding qualities. And for a period of time, astronomy was supportive of astrology.

But we also see that the criticism towards astrology changed as well as astrology changed over time. Most exemplary is the criticism of Augustine which is more conceptual by giving several examples of problems that arise from astrology. The most clear examples of this are the problem of twins and the case of two babies being born at the same time, wouldn't they then be destined to lead the same lives? In the time after this, up to Pico della Mirandola, many criticisms were similar. They would focus on the many false predictions made and the fact that the astrologers could not reach agreement on many subjects. Many of these objections are summarized by Pico della Mirandola, but an important change in the debate about astrology came around the time of Copernicus and his revolution. The Ptolemaic astronomical model was supportive of astrology, but now that was about to change. In addition, the Ptolemaic model was also built upon Aristotelian philosophy and had many assumptions in it based upon his philosophy. But during this time, the focus shifted towards a more empirical philosophical research which is clearly shown by Tycho Brahe. He had the means to observe the sky more accurately than before. The same can be said of Galileo and his telescope; the increased focus upon empirical studies showed the falseness of many of the assumptions made in both astrology and astronomy. This focus on empirical studies not only showed how many assumptions were false, they also increasingly separated the disciplines of astrology and astronomy. As mentioned earlier, astrology and astronomy were initially, supportive of each other, but during this period they became two separate disciplines and astronomy was no longer supportive of astrology. The increased accuracy of the prediction by the Copernican model made that astronomy could further develop, while astrology was dealing with the same problems. I believe that this eventually caused Bayle and Diderot not to take astrology serious any longer.

Conclusion

In the introduction I set out one central question in this thesis. This question was: Why was astrology a serious discipline and what has caused its fall? So how did astrology become a serious discipline? There are of course several causes for the status of astrology. One of the most important is the fact that throughout its history, astrologers have always made the distinction between serious astrologer that know what they talk about and the quacks that do it solely for the money. Ptolemy was one of the astrologers that took it very seriously and supported his astrology with Aristotelian philosophy and his geometric analysis in the *Almagest*. By using Aristotle in his astrology, it was extra credible and in combination with the geometric analysis, it was a good system for its time. Because for a long time afterwards, Aristotelianism was the dominant philosophical tradition and for this reason, it has been able to stay in existence for such a long period of time.

A second important factor was the discovery and translation of Arabic astrology. The Toledo School of Translators made known to the western world that they were not the only one occupying themselves with astrology. The fact that these new books and knowledge became available to astrologers gave astrology a new impulse. The fact that Abu Ma' Shar was considered the new authority on the study of the heavens, says a lot in contrast with the prominence of Aristotelian philosophy.

Another important influence was the founding of the universities. Even though astrology was not taught in the beginning of the universities, over time it took its place. Important in this process was Peter of Abano who taught astrology and regarded it as no different from astronomy. This fact in itself was not enough to make astrology flourish at the universities. His skill in medicine contributed greatly to the importance of the subject medicine which became a very popular part of the curriculum. Due to the combination of astrology and medicine, astrology had an important place at the universities and was therefore taught to a lot of students. As a result, astrology had a long lasting influence on medicine.

A definitive analysis on the fall of astrology is very difficult to write and is not complete. But there are several important factors. The first one, which I have discussed at length, is the influence of the Disputationes by Pico della Mirandola. In this work he collects and discusses all the reasons why astrology is not a serious science and should not be regarded as such. He attacks astrology from different angles, which makes his argument even more compelling. Another important factor, before discussing the last, is Clavius and his removal of astrology from the curricula at the universities. Astrology was taught together with other courses at the university and was part of the education. It was most closely related to medicine, so it held an important place at the universities. Clavius himself regarded astrology as superstition and I regard this as an indication of the separation between astrology and astronomy. By the removal of astrology from the universities, it received far less exposure due to all the students that were no longer educated in the subject anymore.

The last, and in my opinion the most important influence on the status of astrology, is the shift from the Ptolemaic model towards the Copernican model and the shift towards more empirical oriented science. Brahe and Galileo did new discoveries in astronomy with the use of new technologies, like the telescope. As a result, the older cosmological models were more critically discussed because their assumptions turned out to be false, and the new models were more consistent with empirical observations and were better models to make predictions. This further caused astrology to be separated from astronomy. For astronomy there were models that scholars could rely on and were able to predict phenomena like solar eclipses. Astrology did not undergo a similar development where it was able to make better predictions. Many of

the predictions that astrologers made, were simply not true. In addition, phenomena like supernovae and the discoveries of new celestial bodies were problematic for astrology. It was unable to change with the developments and discoveries in astronomy and cosmology. The separation between the two disciplines is in my opinion the most important cause of the decline of astrology. As I take it, this was the main cause of the perception of astrology and astrologers as described by Bayle, Diderot and D'Alembert.

Astrology today is no longer a discipline taught at the universities. But it is interesting to see how there are still papers published that concern themselves with the invalidity of astrology. Really denouncing astrology turned out to be more difficult than initially thought, because the major theories in philosophy of science are incapable to definitively classify astrology as pseudo science. So aside from the problems that arise from the problem of demarcation itself, I believe there are enough reasons to classify astrology as a pseudo science. I would not co sign the statement by Bart Bok for its authoritarian tone. But I do hope that people will see astrology for what it is, something fun in the paper but not to be taken as a serious guiding principle in people's lives. Because the decisions you make as a person, are indeed far more important in shaping your own life.

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Objections to astrology

Scientists in a variety of fields have become concerned about the increased acceptance of astrology in many parts of the world. We, the undersigned--astronomers, astrophysicists, and scientists in other fields--wish to caution the public against the unquestioning acceptance of the predictions and advice given privately and publicly by astrologers. Those who wish to believe in astrology should realize that there is no scientific foundation for its tenets.

In ancient times people believed in the predictions and advice of astrologers because astrology was part and parcel of their magical world view. They looked upon celestial objects as abodes or omens of the gods and, thus, intimately connected with events here on earth; they had no concept of the vast distances from the earth to the planets and stars. Now that these distances can and have been calculated, we can see how infinitesimally small are the gravitational and other effects produced by the distant planets and the far more distant stars. It is simply a mistake to imagine that the forces exerted by stars and planets at the moment of birth can in any way shape our futures. Neither is it true that the position of distant heavenly bodies make certain days or periods more favorable to particular kinds of action, or that the sign under which one was born determines one's compatibility or incompatibility with other people.

Why do people believe in astrology? In these uncertain times many long for the comfort of having guidance in making decisions. They would like to believe in a destiny predetermined by astral forces beyond their control. However, we must all face the world, and we must realize that our futures lie in ourselves, and not in the stars.

One would imagine, in this day of widespread enlightenment and education, that it would be unnecessary to debunk beliefs based on magic and superstition. Yet, acceptance of astrology pervades modern society. We are especially disturbed by the continued uncritical dissemination of astrological charts, forecasts, and horoscopes by the media and by otherwise reputable newspapers, magazines, and book publishers. This can only contribute to the growth of irrationalism and obscurantism. We believe that the time has come to challenge directly, and forcefully, the pretentious claims of astrological charlatans.

It should be apparent that those individuals who continue to have faith in astrology do so in spite of the fact that there is no verified scientific basis for their beliefs, and indeed that there is strong evidence to the contrary.

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