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Scientific Publications, text corpora

- **Kepler's "Astronomia nova" Corpus**
 - Revolutionary new theory of planetary motion
 - Purely geometrical epicyclic models by physical interpretations
 - *Aim: Computational model of Kepler's argumentation*
- **Exoplanet Publication Corpus [1]**
 - Scientific articles on recent research on exoplanets 1990-2020
 - *Aim: Computational model to extract arguments*
- **Corona Virus Publication Corpus**
 - The corpus analysis modelling understanding of COVID-19

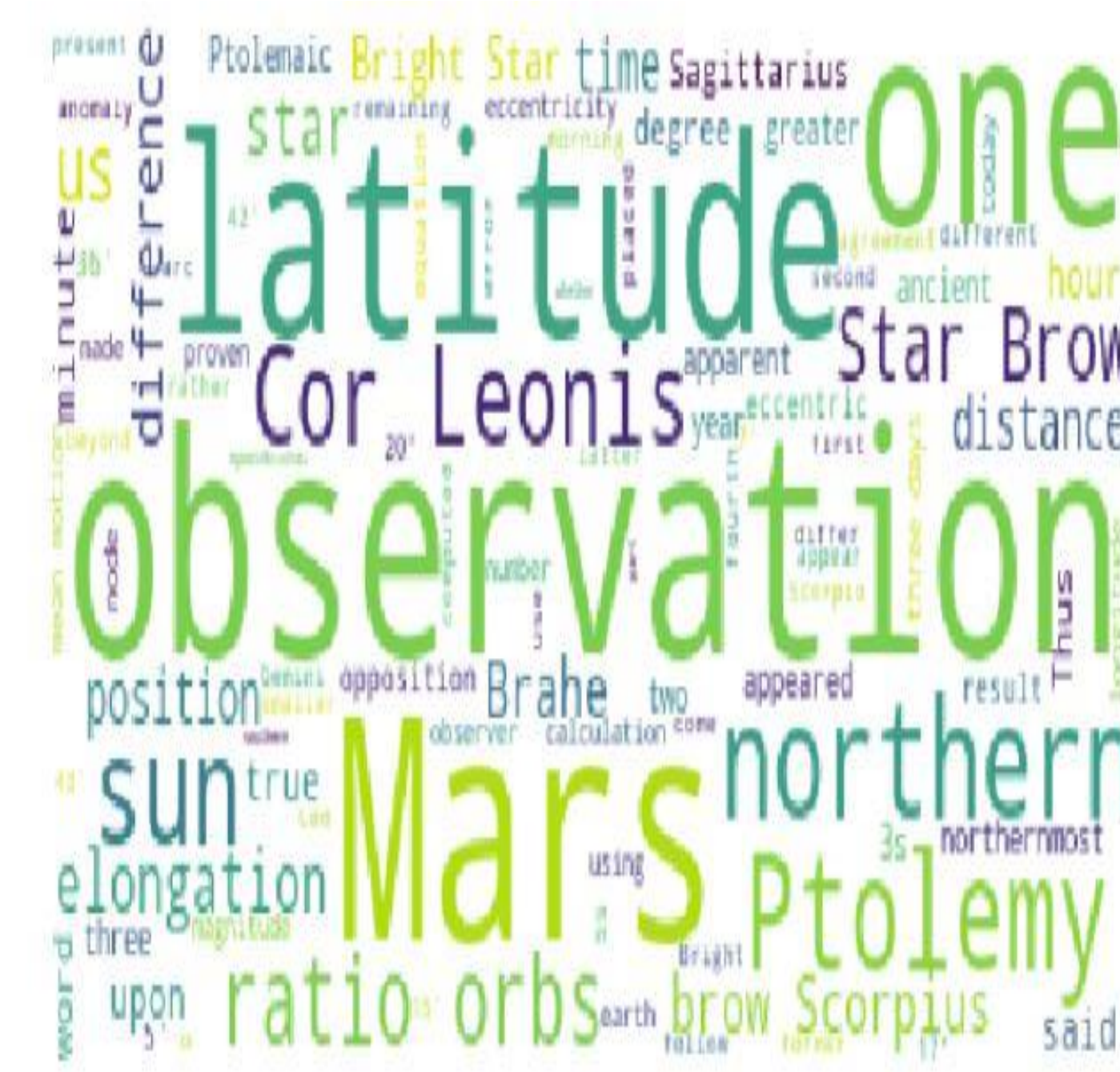
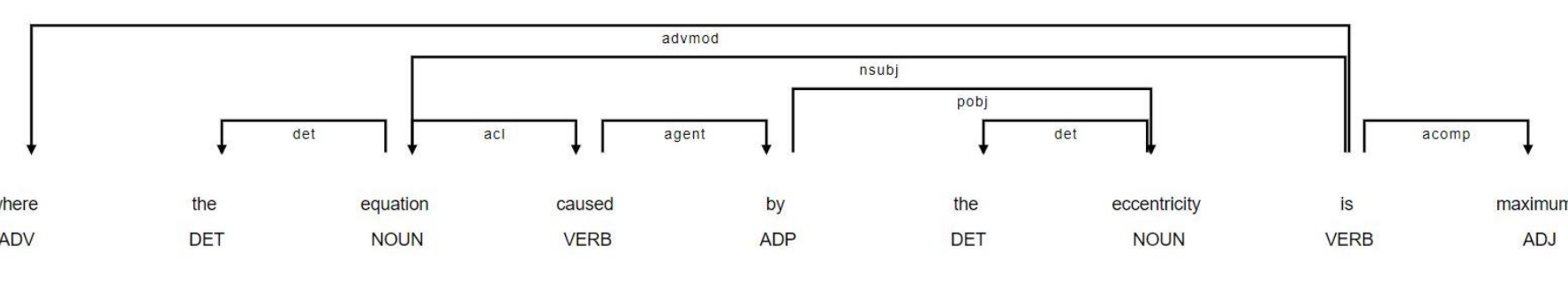
Astronomia nova

The corpora are represented in structural trees representing their textual division.

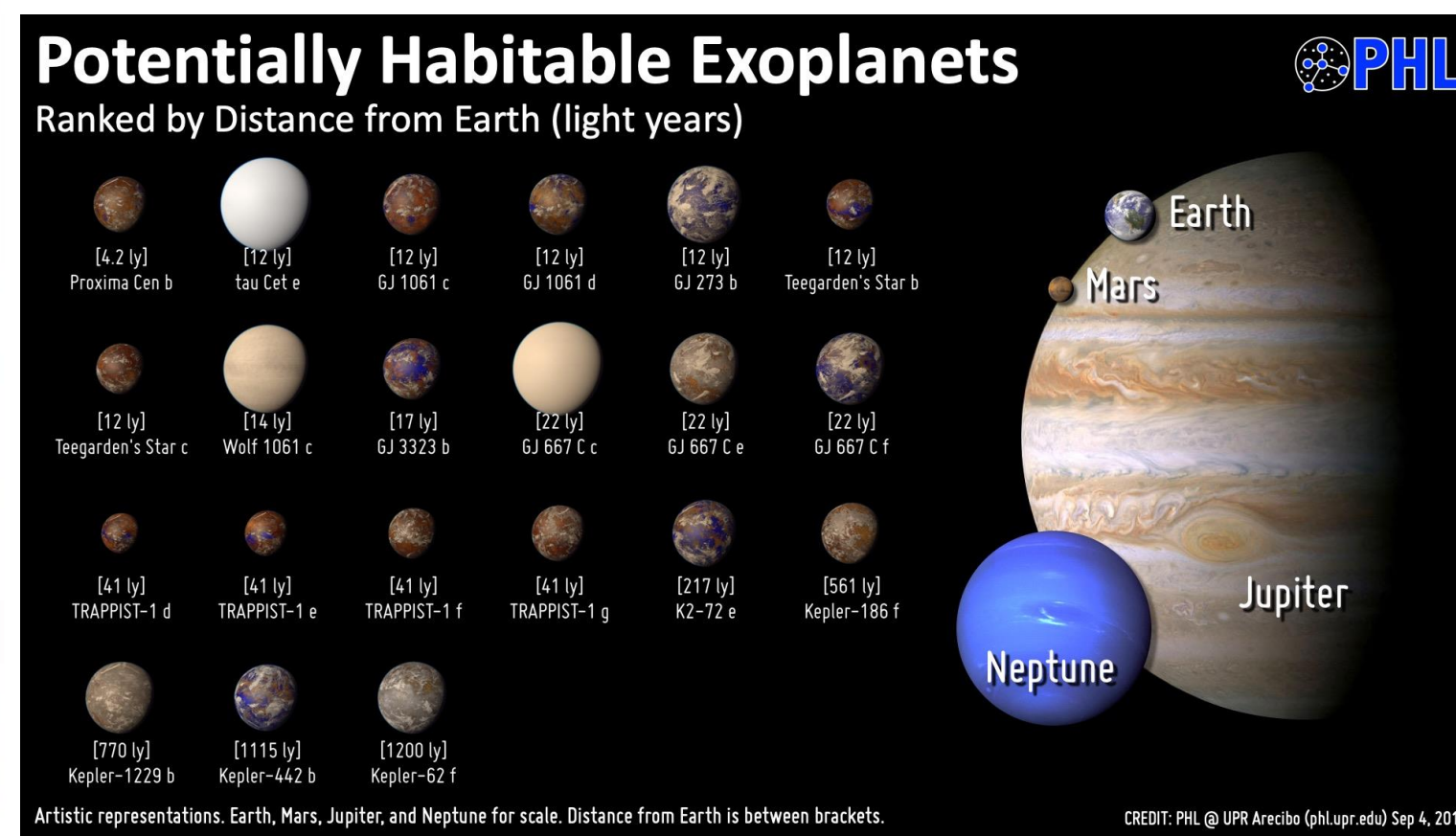
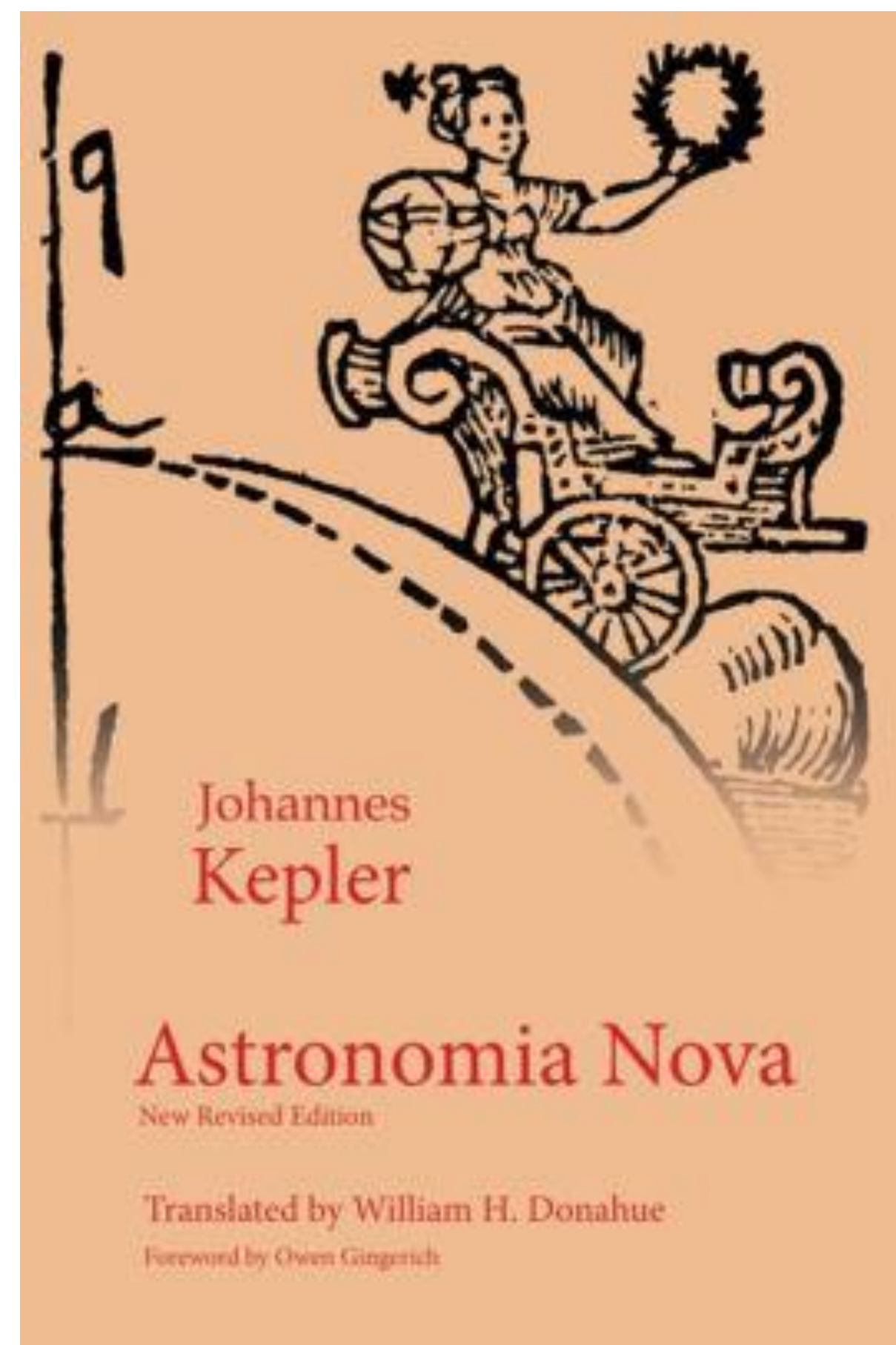
- 1) Parts, chapters, paragraphs, sentences, tables, diagrams
- 2) Sentence structure analysed with Spacy

a) Customized entities

b) Dependency parsing



y=0 top features	y=1 top features	y=2 top features	y=3 top features
Weight[†] +3.054 present +2.851 <BIAS> +2.061 model +1.711 using +1.207 use +1.190 planet +1.186 explore +1.023 demonstrate ... 6401 more positive ... -1910 more negative ... -1.006 optically -1.011 coronagraphic -1.020 events -1.024 conclusions -1.051 derived -1.060 predicted -1.069 spectra -1.099 support -1.107 obtained -1.110 microlensing -1.141 macho -1.143 trappist -1.158 pulsation -8.006 proposed -10.899 conclude +11.718 compared -12.273 propose -19.718 compare	Weight[†] +21.317 compare +12.742 compared +2.287 predictions +1.631 spectra +1.444 values +1.341 derived +1.301 obtained +1.240 results +1.225 trappist +1.023 L +1.060 slow +1.048 J. +1.225 trappist +1.023 L +1.016 000 +1.007 literature +1.007 frequencies +0.877 chromospheric +0.972 existing +0.967 measurements +0.967 compares +0.951 spectrum ... 1287 more positive 6924 more negative ... -0.944 use -0.954 investigate -0.977 composition -1.070 using -1.015 modeling -1.086 compare -1.216 planet -2.059 present -2.091 model -3.357 <BIAS>	Weight[†] +14.381 propose +9.343 proposed +1.402 macho +1.239 microlensing +1.106 theta. +0.950 big +0.936 better +0.925 test +0.923 coronagraphic +0.901 statistical +0.764 collect +0.737 experimental ... 752 more positive 7459 more negative ... -0.732 different -0.746 surface -0.757 planets -0.799 stellar -0.819 temperature -1.001 earth -0.895 evolution -0.830 light -0.935 using -1.001 earth -0.935 planet -0.984 planets -1.118 stellar -1.245 present -1.378 using -1.917 model -2.369 model -4.037 <BIAS>	Weight[†] +13.982 conclude +1.150 strong +0.932 fully +0.858 suggests +0.840 likely +0.813 taken +0.802 pulsation +0.799 presented +0.696 nonequilibrium +0.671 considered +0.658 necessary +0.643 explanation +0.641 normal +0.621 114762b +0.604 difficult ... 355 more positive 7656 more negative ... -0.594 results -0.601 new -0.643 apply -0.659 methods -0.660 models -0.662 based -0.616 discuss -0.882 use -0.935 planet -1.245 present -1.378 using -1.917 model -2.369 model -4.037 <BIAS>



Customized named entity recognition (NER) [2]

Key Idea. Hybrid approach; pattern(rule) based & deep learning approach to provide NER model using spaCy.

Chapter	Paraindex	Sentindex	Paragraph	Sentence	Entities	Label
0	10	218	967	On 1580 November 12 at 10h 50m, they set Mars down at 8° 35' 50" Gemini without mentioning the horizontal variations, by which term I wish the diurnal parallaxes and the refractions to be understood in what follows.	[1580 November 12, DATE] [10h 50m, TIME] [Mars, PLAN] [8° 35' 50", COOR] [Gemini, COOR] [diurnal, ASTR]	Obs
1	10	221	977	On 1582 December 26 at 11h 30m, they set Mars down at 16° 47' Cancer by observation *6. The moment of opposition assigned by Tycho comes 46 minutes later, during which the planet retrogressed less than one minute. Tycho therefore puts it at 16° 46' 16" Cancer *7. On an inserted sheet here, an attempt was made to correct for a refraction of two minutes. This was, I think, first trial of the theory of refraction then being developed. Nevertheless, he followed the observed value unchanged, thus declining to consider the planet as something which could alter its position. Nor was there any need for correction, since it was in Cancer, beyond the reach of refraction, and was in mid-sky where, in Cancer, there is no longitudinal parallax.	[1582 December 26, DATE] [11h 30m, TIME] [Mars, PLAN] [16° 47', COOR] [Cancer, LONG] [observation, ASTR]	Obs
2	10	222	984	On 1585 January 31 at 12h 0m, Mars was placed at 21° 18' 11" Leo *8. The diurnal motion, by comparison of observations, was 24' 15". The moment of opposition followed at 19h 35m, 7 hours and 35 minutes later. To this period belongs 7' 41" of diurnal motion westward. Therefore, at the designated moment, it would have been at 21° 19' 30" Leo, which is what was accepted. There is no mention of parallax. Nothing had to be done about refraction, because Mars was high and at mid-sky. Therefore find the list of advice in the table about refraction (properly) ignored.	[1585 January 31, DATE] [12h 0m, TIME] [Mars, PLAN] [21° 18' 11", COOR] [Leo, LONG] [diurnal, ASTR]	Obs
3	10	223	992	On 1587 March 7 at 19h 10m they deduced the position of Mars from the observations, which was 25° 10' 20" Virgo. This they kept in the table, but changed the time to 17h 32m. The difference of 1h 48m multiplied by a diurnal motion of 24' gives the same number of minutes and seconds (that is, 1' 48"), no more, it therefore should have been 25° 8' 32" Virgo, which also approaches nearer the point opposite the sun. The difference of a practically no importance *9.	[1587 March 7, DATE] [19h 10m, TIME] [Mars, PLAN] [25° 10' 20", COOR] [Virgo, LONG] [diurnal, ASTR]	Obs
4	10	224	997	On 1589 April 15 at 12h 5m they established the position of Mars very carefully at 3° 58' 21" Scorpio, and corrected for longitudinal parallax so as to make 8' 3' 52" Leo. The diurnal motion, by comparison of observations, was 24' 15". The moment of opposition followed at 19h 35m, 7 hours and 35 minutes later. To this period belongs 7' 41" of diurnal motion westward. Therefore, at the designated moment, it would have been at 21° 19' 30" Leo, which is what was accepted. There is no mention of parallax. Nothing had to be done about refraction, because Mars was high and at mid-sky. Therefore find the list of advice in the table about refraction (properly) ignored.	[1589 April 15, DATE] [12h 5m, TIME] [Mars, PLAN] [3° 58' 21", COOR] [Scorpio, LONG] [diurnal, ASTR]	Obs

observations *2. Suppose, however, that on 1580 November 12, date of 10h 50m, time, Mars, PLAN, was observed at 8° 35' 50" Gemini, and the motion over five days was 1' 48". Since at the given time the sun stood at 16° 46' 16" Cancer, and its motion over five days is 1' 48", the sum of the two motions will come to 1' 48". But the sun is 1' 48" 24' away from opposition to Mars, PLAN. Of this, seven degrees exactly are traversed in 5 days, or 120 hours, time. So, according to the same ratio, the remaining 1' 48" will be traversed in 14 hours 41 minutes, time. Therefore, the moment of opposition was November 18, date, at 10h 31m, time, its position was 16° 47' 41" Cancer, on the ecliptic. Now this is 20' away from 16° 47' 41" Cancer, look. I want to know how much longer this makes the arc on the orbit extended from the node to the arc of latitude through 16° 47' 41" Cancer. So I turn to Philip [randomly, NAME] is trigonometry *4. 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