All Celestial Bodies whatsoever, have an attraction or gravitating power towards their own centers, whereby they attract not only their own parts, and keep them from flying from them, as we may observe the Earth to do, but that they do also attract all the other Celestial Bodies that are within the sphere of their activity; and consequently that not only the Sun and Moon have an influence upon the body and motion of the Earth, and the Earth upon them, but that also [all other planets] by their attractive powers, have a considerable influence up on its motion as in the same manner the corresponding attractive power of the Earth hath a considerable influence upon every one of their motions also.

- Robert Hooke (1674)

03-P8) Robert Hooke (1635-1702), “An Attempt to Prove the Motion of the Earth from Observations” (1674) ¹

Whether the Earth move or stand still hath been a Problem; that since Copernicus revived it, hath much exercised the Wits of our best modem Astronomers and Philosophers, amongst which notwithstanding there hath not been any one who hath found out a certain manifestation either of the one or the other Doctrine. The knowing and judicious have for many plausible reasons adhered to the Copernican Hypothesis: But the generality of others, either out of ignorance or prejudice, have rejected it as a most extravagant opinion. To those indeed who understand not the grounds and principles of Astronomy, the prejudice of common converse doth make it seem so absurd, that a man shall as soon persuade them that the Sun doth not shine,

as that it doth not move; and as easily move the Earth as make them believe that it do's so already. For such Persons I cannot suppose that they should under-stand the cogency of the Reasons here presented, drawn from the following observations of Parallax, much less therefore can I expect their belief and assent thereunto; to them I have only this to say, 'Tis not here my business to instruct them in the first principles of Astronomy, there being already Introductions enough for that purpose: But rather to furnish the Learned with an experimentum crucis to determine between the Tychonic and Copernican Hypotheses. That which hath hitherto continued the dispute hath been the plausibleness of some Arguments alleged by the one and the other party, with such who have been by nature or education prejudiced to this or that way. [ . . . ]
Fig. 3.6.1) Giambattista Riccioli’s *Almagestum novum* (Bologna, 1651)
[In an elaborate frontispiece not atypical of Jesuit astronomers, Riccioli has exploited the rich visual language of emblems in order to state his view of the state of planetary theory at mid-century. The inscriptions are: (top center): the Hebrew characters for “Yahweh”; (upper left & right) Dies diei eructat [v]erbum . . . Et Nox nocti indicat scientiam, “One day speaks to another, and night to night imparts his knowledge”, Psalm 19,2; (upper center): Numerus, Mensura, Pondus, “Number, Measure, Weight”, Book of Wisdom 11,20; (left middle): Videbo Caelos tuos, opera digitor tuor, “I see thy heaven, work of thy hand”; (right middle) Non Inclinabitur in saculum saculi, “Never to be brought down”); middle: Ponderibus librata suis, “[The Earth is] balanced by its own weight”; (lower middle): Erigor dum Corrigor, “Corrected, [I am] raised up” (literally: “Raised up/erected when corrected”); (lower left): Cl. Ptolemeus, “Claudius Ptolemy”. Like all good emblems, the images and inscriptions serve as mutually supporting clues to its overall meaning.]

I confess there is somewhat of reason on both sides, but there is also something of prejudice even on that side that seems the most rational. For by way of objection; what way of demonstration have we that the frame and constitution of the World is so harmonious according to our notion of its harmony, as we suppose? Is there not a possibility that the things may be otherwise? Nay, is there not something of probability? May not the Sun move as Tycho supposes, and the Planets make their Revolutions about it whilst the Earth stands still, and by its magnetism attracts the Sun, and so keeps him moving about it, whilst at the same time [Mercury and [Venus] move about the Sun, after the same manner as [Saturn] and [Jupiter] move about the Sun whilst the Satellites move about them? [E]specially since it is not demonstrated without much art and difficulty, and taking many things for granted which are hard to be proved, that there is anybody in the Universe more considerable [than] the Earth we tread on. Is there not much reason for the Hypothesis of Tycho at least, when he with all the accurateness that he arrived to with his vast Instruments, or Riccioli, who pretends much to out-strip him, were not able to find any sensible Parallax of the Earths Orb among the fixt Stars, especially if the observations upon which they ground their assertions, were made to the accurateness of some few Seconds? What then, though we have a Chimera or Idea
of perfection and harmony in that Hypothesis we pitch upon, may there not be a much
greater harmony and proportion in the constitution it self which we know not, though it
be quite differing from what we fancy? Probable Arguments might thus have been urged
both on the one and the other side to the Worlds end; but there never was nor could
have been any determination of the Controversy without some positive observation for
determining whether there were a Parallax or no of the Orb of the Earth; This Tycho and
Riccioli affirm in the Negative, that there is none at all: But I do affirm there is no one
that can either prove that there is, or that there is not any Parallax of that Orb amongst
the fixt Stars from the Suppellex of observations yet made either by Tycho, Riccioli, or
any other Writer that I have yet met with from the beginning of writing to this day. For all
Observators having hitherto made use of the naked eye for determining the exact place
of f the object, and the eye being unable to distinguish any angle less than a minute,
and an observation requisite to determine this requiring a much greater exactness [than]
to a minute, it doth necessarily follow that this experimentum crucis was not in their
power, whatever either Tycho or Riccioli have said to the contrary, and would thence
overthrow the Copernican System, and establish their own. We are not therefore wholly
to acquiesce in their determination, since if we examine more nicety into the
observations made by them, together with their Instruments and [ways] of using them,
we shall find that their performances thereby were far otherwise [than] what they would
seen to make us believe. The Controversy therefore notwithstanding all that hath been
said either by the one or by the other Party, remains yet undetermined, Whether t he
Earth move above the Sun, or the Sun about the Earth; and all the Arguments alleged
either on this or that side, are but probabilities at best, and admit not of a necessary and
positive conclusion. Nor is there indeed any other means left for humane industry to
determine it, save this one which I have endeavored to make ; and the unquestionable
certainty thereof is a most undeniable Argument of the truth of the Copernican System;
and the want thereof hath been the principal Argument that hath hitherto somewhat
detained me from declaring absolutely for that Hypothesis, for though it doth in every
particular almost seem to Solve the appearances more naturally and easily, and to
afford an exceeding harmonious constitution of the great bodies of the World compared
one with another, as to their magnitudes, motions, and distances, yet this objection was
[always] very plausible to most men, that it is affirmed by such as have written more particularly of this Subject, that there never was any sensible Parallax discovered by the best observations of this supposed annual motion of the Earth about the Sun as its center, though moved in an Orb whose Diameter is by the greatest number of Astronomers reckoned between 11 and 12 hundred Diameters of the Earth: Though some others make it between 3 and 4 thousand; others between 7 and 8; and others between 14 and 15 thousands; and I am apt to believe it may be yet much more, each Diameter of the Earth being supposed to be between 7 and 8 thousand English miles, and consequently the whole being reduced into miles, if we reckon with the most, amounting to 120 millions of English miles. It cannot, I confess, but seem very uncouth and strange to such as have been used to confine the World, with less dimensions, that this annual Orb of the Earth of so vast a magnitude, should have no sensible Parallax amongst the fixt Stars, and therefore ‘twas in vain to [endeavor] to answer that objection. For it is unreasonable to expect that the fancies of most men should be so far [strained] beyond their narrow dimensions, as to make them believe the extent of the Universe so immensely great as they must have granted it to be, supposing no Parallax could have been found. [ . . . ]
'Tis manifest then by the observations of July the Sixth and Ninth: and that of the One and twentieth of October, that there is a sensible parallax of the Earth's Orb to the fixt Star in the head of Draco, and consequently a confirmation of the Copernican System against the Ptolomaic and Tychonic. [. . . ]

I should have here described some Clocks and Time-keepers of great use, nay absolute necessity in these and many other Astronomical observations, but that I reserve them for some attempts that are hereafter to follow, about the various waves I have tried, not without good success of improving Clocks and Watches, and adapting
them for various uses, as for accurating Astronomy, completing the Tables of the fixt Stars to Seconds, discovery of Longitude, regulating Navigation and Geography, detecting the proprieties and effects of motions for promoting secret and swift conveyance and correspondence, and many other considerable scrutinies of nature: And shall only for the present hint that I have in some of my foregoing observations discovered some new Motions even in the Earth it self, which perhaps were not dreamt of before, which I shall hereafter more at large describe, when further [trials] have more fully confirmed and completed these beginnings. At which time also I shall explain a System of the World differing in many particulars from any yet known, answering in all things to the common Rules of Mechanical Motions: This depends upon three Suppositions. First, That all Celestial Bodies whatsoever, have an attraction or gravitating power towards their own centers, whereby they attract not only their own parts, and keep them from flying from them, as we may observe the Earth to do, but that they do also attract all the other Celestial Bodies that are within the sphere of their activity; and consequently that not only the Sun and Moon have an influence upon the body and motion of the Earth, and the Earth upon them, but that also [Venus, Mars, Jupiter, and Jupiter] by their attractive powers, have a considerable influence up on its motion as in the same manner the corresponding attractive power of the Earth hath a considerable influence upon every one of their motions also. The second supposition is this, That all bodies whatsoever that are put into a direct and simple motion, will so continue to move forward in a [straight] line, till they are by some other effectual powers deflected and bent into a Motion, describing a Circle, Ellipsis, or some other more compounded Curve Line. The third supposition is, That these attractive powers are so much the more powerful in operating, by how much the nearer the body wrought upon is to their own Centers. Now what these several degrees are I have not yet experimentally verified; but it is a notion, which if fully prosecuted as it ought to be, will mightily assist the Astronomer to reduce all the Celestial Motions to a certain rule, which I doubt will never be done true without it. He that understands the nature of the Circular Pendulum and Circular Motion, will easily understand the whole ground of this Principle, and will know where to find direction in Nature for the true stating thereof. This I only hint at present to such as have ability and opportunity of prosecuting this Inquiry, and
are not wanting of Industry for observing and calculating, wishing heartily such may be found, having my self many other things in hand which I would first complete, and therefore cannot so well attend it. But this I durst promise the Undertaker, that he will find all the great Motions of the World to be influenced by this Principle, and that the true understanding thereof will be the true perfection of Astronomy.