

are all fictions of the mind, and as long as we do not discern what a complete being, or rather a substance, really is, we will never have something at which we can stop; [[and this is the only way of establishing solid and real principles.]] In conclusion, nothing should be posited without good grounds. Therefore, those who imagine beings and substances without genuine unity are left to prove that there is more reality than what we have just said,<sup>130</sup> and I am waiting for a notion of substance or of being which can include all these things—after which mock suns\* and perhaps even dreams will someday lay claim to reality, unless very precise limits are set for this *droit de bourgeoisie*<sup>131</sup> that is to be granted to beings formed by aggregation.

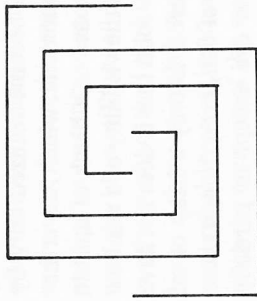


Figure 2

I have treated these matters so that you may be able to judge not only my opinions, but also, the arguments which forced me to adopt them. I submit them to your judgment, whose fairness and exactness I know. I also send something which you could have found in the *Nouvelles de la république des lettres*, to serve as a response to the Abbé Catelan.<sup>132</sup> I consider him an able man, given what you say of him; but what he has written against Huygens and against me makes it clear that he goes a little too fast. We will see what use he will make of this now.

I am delighted to learn of the good state of your health, and I hope for its continuation with all the zeal and all the passion which makes me what I am, etc.

P. S. I reserve for another time some other matters you have touched upon in your letter.

### *On Copernicanism and the Relativity of Motion (1689)*<sup>133</sup>

*Leibniz was in Italy from March 1689 to March 1690. While there, he wrote this essay, in which he confronts a particularly sensitive issue for his Italian colleagues, the Church's condemnation of Copernicanism, and offers an*

130. Writing to Arnauld, Leibniz continued: "and to show what it consists in."

131. A kind of inferior citizenship.

132. The paper in question is probably the "Réplique de M. L. à M. l'Abbé D. C. . . ." published in the *Nouvelles* in February 1687. It was part of the so-called *vis-à-vis* controversy. See the *Discourse on Metaphysics*, sec. 18.

133. Editors' title. C 590–93. Latin. On the identification of the text, see section 2 of Domenico Bertoloni Meli, "Leibniz on the Copernican System," *Studia Leibnitiana* 20 (1988), 19–42.

*interesting solution to the problem from the point of view of his system. This essay is sometimes identified as the preface to the dialogue Leibniz entitled "Phoronomus," which deals with related issues concerning motion and dynamics. [See GD, pp. 575–81.] However, it is now thought to be a separate work.*

SINCE we have already proved through geometrical demonstrations the equivalence of all hypotheses with respect to the motions of any bodies whatsoever, however numerous, moved only by collision with other bodies, it follows that not even an angel could determine with mathematical rigor which of the many bodies of that sort is at rest, and which is the center of motion for the others. And whether the bodies are moving freely or colliding with one another, it is a wondrous law of nature that no eye, wherever in matter it might be placed, has a sure criterion for telling from the phenomena where there is motion, how much motion there is, and of what sort it is, or even whether God moves everything around it, or whether he moves that very eye itself. [cf. Seneca, *Naturales Quaestiones* VII. 2.] To summarize my point, since space without matter is something imaginary, motion, in all mathematical rigor, is nothing but a change in the positions [situa] of bodies with respect to one another, and so, motion is not something absolute, but consists in a relation. This already follows from the Aristotelian definition of place, for motion is the change of place, and place is the surface of the surrounding body, so when this changes, motion occurs, and either the surrounding body or the thing in the place can be assumed to have moved away, leaving the other at rest.

But since, nevertheless, people do assign motion and rest to bodies, even to bodies they believe to be moved neither by a mind [intelligentia], nor by an internal impulse [instinctus], we must look into the sense in which they do this, so that we don't judge that they have spoken falsely. And on this matter we must reply that one should choose the more intelligible hypothesis, and that the truth of a hypothesis is nothing but its intelligibility. Now, from a different point of view, not with respect to people and their opinions, but with respect to the very things we need to deal with, one hypothesis might be more intelligible than another and more appropriate for a given purpose. And so, from different points of view, the one might be true and the other false. Thus, for a hypothesis to be true is just for it to be properly used. So, although a painter can present the same palace through drawings that use different perspectives, we would judge that he made the wrong choice if he brought forward the one which covers or hides parts that are important to know for a matter at hand. In just the same way, an astronomer makes no greater mistake by explaining the theory of the planets in accordance with the Tychoic hypothesis than he would make by using the Copernican hypothesis in teaching spherical astronomy and explaining day and night, thereby burdening the student with unnecessary difficulties. And the observational astronomer [Historicus] who insists that the Earth moves, rather than the Sun, or

that the Earth rather than the Sun is in the sign of Aries, would speak improperly, even though he follows the Copernican system; nor would Joshua have spoken less falsely (that is, less absurdly) had he said "be still, Earth." And so it is not necessary to flee, with Marin Mersenne and Honoratus Fabri, gentlemen I grant both learned and religious, to the view that the severe judgment against those who argue that Holy Scripture spoke in the words of the common man<sup>134</sup> should be considered only provisional (if it is permitted to speak in this way), as if once the motion of the Earth were demonstrated, the Church could declare that the words of Holy Scripture ought to be understood in the same way as we understand the words of the poet: "we are carried from port, and the lands and cities withdraw."<sup>135</sup> But it is correct to say that in this place Holy Scripture spoke in a way that serves both the truth and the proper meaning of the words; it is less correct to say that it accommodates itself in the beliefs people have than to say that it transmits the greatest hidden treasures of wisdom of all kinds, for this is something more worthy of its author, God.

But since, in explaining the theory of the planets, the Copernican hypothesis wonderfully illuminates the soul, and beautifully displays the harmony of things at the same time as it shows the wisdom of the creator, and since other hypotheses are burdened with innumerable perplexities and confuse everything in astonishing ways, we must say that, just as the Ptolemaic account is the truest one in spherical astronomy, on the other hand the Copernican account is the truest theory, that is, the most intelligible theory and the only one capable of an explanation sufficient for a person of sound reason. Claudius de Chales, a learned gentleman of the Jesuits, frankly confessed that one cannot hope for another hypothesis which satisfies the mind, and most distinguished astronomers have openly admitted that they are held back from presenting the Copernican system only by the fear of censure. But they would not need such caution any more and could freely follow Copernicus without damaging the authority of the censors, if only they were to recognize, with us, that the truth of a hypothesis should be taken to be nothing but its greater intelligibility, indeed, that it cannot be taken to be anything else, so that henceforth there would be no more distinction between those who prefer the Copernican system as the hypothesis more in agreement with the intellect, and those who defend it as the truth. For the nature of the matter is that the two claims are identical; nor should one look for a greater or a different truth here. And since it is permissible to present the Copernican system as the simpler hypothesis, it would also be permissible to teach it as the truth in this particular sense. This would preserve the authority of the censors, so that a retraction would never be needed in the future, no matter what new things should finally be uncovered in the heavens or on the earth, while at the same

134. Galileo argued that the Bible speaks in terms understandable to the common people, and should not be used as a guide for the make-up of the physical world. See his "Letter to the Grand Duchess Christina," translated in Stillman Drake, ed., *Discoveries and Opinions of Galileo*.  
135. Virgil, *Aeneid* III, 72.

time, there would be no violence done to the distinguished discoveries of our age through the outward appearance of official condemnation.

Once this is understood, we can finally restore philosophical freedom to those of ability, without damaging respect for the Church, and we will free Rome and Italy from the slander that great and beautiful truths are there suppressed by censors, something that is known to be said and written widely among the English and Dutch (not to mention the French). And certainly, unless the learned gentlemen who profess religious obedience take such a consideration into account, enormous damage will be done to the great light of our age, namely, it might appear as if they had been condemned to darkness, having themselves extinguished their ability to find extraordinary truths, while others are snatching up honor, to the disgrace of Italy. No sane person believes that the great gentlemen who have the power of the censor have such an intention. Nor can we deny that Copernicus brought, as it were, a certain light to the world, and that those who do not understand his doctrine wander about in nature as they would in the darkest night. For not only do the labyrinthine stations and retrogrades of the planets<sup>136</sup> disappear with one mental stroke, without any effort, but magnetic observations are also united in a marvelous way since the earth itself is like a magnet, not only with respect to the magnets of our everyday experience, but also with respect to the heavenly bodies themselves. Since this very magnetic law is so conspicuous in Jupiter with its moons, and similarly in the ring of Saturn with its moons, it would seem that Copernicus could hardly have hoped for any greater confirmation of his view. But nevertheless, this system has done itself one better in Kepler, who was the first to lay bare to mortals "the laws of the heavens, the regularity [fides] of things, and the laws of the Gods," observing that all of the phenomena can be derived if the earth and all of the primary planets are assumed to travel on an ellipse in whose focus is the sun, and if it is assumed that it is a law of motion for the orbiting of a planet that the areas swept out with respect to the sun are proportional to the times.

It remained for a physical explanation to be given for such an unexpected law, an explanation that has at last come to us, to our great delight. For I found that this universal motion of the planets can be explained beautifully by means of a vortex around the sun common [for all of the planets]. Indeed, it follows geometrically from Kepler's law of motion that the trajectory can be distinguished into two, a harmonic circulation of the planet around the sun (that is, one whose velocity is proportionally less when the body is more distant from the sun) and a rectilinear approach to the sun, like gravity [*gravitas*] or magnetism. Afterwards, I demonstrated that it is a general and reciprocal property of harmonic circulation (that is, circulation in which the velocities decrease regularly as the distance from the center

136. The stations of a planetary trajectory are the places where the planet appears to stop its forward or backward motions; the retrogrades are where it appears to move backward. On the Copernican system, stations and retrogrades are explained in terms of the planets moving in regular, circular paths, but viewed from an earth which is also moving in a regular, circular path.



uniformly increases, and conversely) that the areas swept out with respect to the center of circulation are proportional to the times, no matter what law governs the motion toward or away from the center. And so the matter comes directly down to this, that we have done something that the ancients seemed scarcely to have touched upon even in their prayers, that through geometrical analysis we have reduced the primary phenomena of the universe to principles that are the simplest and clearest for understanding, that is to the best, and, in our sense, truest hypothesis.<sup>137</sup>

### *On Freedom (1689?)*<sup>138</sup>

**H**OW FREEDOM and contingency can coexist with the series of causes and with providence is the oldest worry of the human race. And the difficulty of the problem has only increased through the investigations Christians have made concerning God's justice in providing for the salvation of men.

When I considered that nothing happens by chance or by accident (unless we are considering certain substances taken by themselves), that fortune distinguished from fate is an empty name, and that no thing exists unless its own particular conditions [*requisitis*] are present (conditions from whose joint presence it follows, in turn, that the thing exists), I was very close to the view of those who think that everything is absolutely necessary,<sup>139</sup> who judge that it is enough for freedom that we be uncoerced, even though we might be subject to necessity, and close to the view of those who do not distinguish what is infallible or certainly known to be true, from that which is necessary.

But the consideration of possibles, which are not, were not, and will not be, brought me back from this precipice. For if there are certain possibles that never exist, then the things that exist, at any rate, are not always necessary, for otherwise it would be impossible for others to exist in their place, and thus everything that never exists would be impossible. Nor can we really deny that many stories, especially those called novels, are thought to be possible, though they might find no place in this universal series God selected—unless one imagined that in such an expanse of space and time there are certain poetical regions, where you can see King Arthur of Great Britain, Amadis of Gaul, and the illustrious Dietrich von Bern of the German stories, all wandering through the world. This seems not too far from the view of a certain distinguished philosopher of our age, who in a certain place explicitly affirms that matter successively takes on all of the forms of which it is capable (*Principles of Philosophy*, part III, art. 47), something hardly defensible.<sup>140</sup> For it would

137. The last paragraph refers to the theory Leibniz gives in the "Tentamen de Monium Coelestium Causis," two versions of which are given in GM VI, pp. 144–87.

138. Editors' title. F de C. 178–85 & Gr 326. Latin.

139. Leibniz first wrote, then deleted: "and judged that being possible is the same as actually existing at some time."

140. The "certain distinguished philosopher" is, of course, Descartes.

eliminate all beauty from the universe and all choice among things, not to speak of other considerations by which the contrary can be proved.

Therefore, recognizing the contingency of things, I further considered what a clear notion of truth might be, for I hoped, and not absurdly, for some light from that direction on how necessary and contingent truths could be distinguished. Now, I saw that it is common to every true affirmative proposition, universal and particular, necessary or contingent, that the predicate is in the subject, that is, that the notion of the predicate is involved somehow in the notion of the subject. And this is the source [*principium*] of infallibility in every sort of truth for that being who knows everything *a priori*. But this seemed only to increase the difficulty, for if the notion of the predicate is in the notion of the subject at a given time, then how could the subject lack the predicate without contradiction and impossibility, and without changing that notion?

At last a certain new and unexpected light shined from where I least expected it, namely, from mathematical considerations on the nature of infinity. For there are two labyrinths of the human mind, one concerning the composition of the continuum, and the other concerning the nature of freedom, and they arise from the same source, infinity. That same distinguished philosopher I cited a short while ago preferred to slash through both of these knots with a sword since he either could not solve the problems, or did not want to reveal his view. For in his *Principles of Philosophy* I, art. 40 and 41, he says that we can easily become entangled\* in enormous difficulties if we try to reconcile God's preordination with freedom of the will; but, he says, we must refrain from discussing these matters, since we cannot comprehend God's nature. And also, in *Principles of Philosophy* II, art. 35, he says that we should not doubt the infinite divisibility of matter even if we cannot grasp it. But this is not satisfactory, for it is one thing for us not to comprehend something, and quite something else for us to comprehend that it is contradictory. And so, we must at least be able to respond to those arguments, which seem to entail that freedom or the division of matter implies a contradiction.

Therefore, we must realize that all creatures have impressed upon them a certain mark [*character*] of divine infinity, and that this is the source of many wonderful things which amaze the human mind.

Indeed, there is no portion of matter so tiny that it does not contain a sort of world of creatures infinite in number, and there is no individual created substance so imperfect that it does not act on all others and is not acted upon by all others, no substance so imperfect that it does not contain the entire universe, and whatever it is, was, or will be, in its complete notion (as it exists in the divine mind), nor is there any truth of fact or any truth concerning individual things that does not depend upon the series of infinite reasons; whatever is in this series can be seen by God alone. This is also the reason why God alone knows contingent truths *a priori* and sees their infallibility in a way other than through experience.

After I considered these matters more attentively, a most profound distinction between necessary and contingent truths was revealed. Namely, every