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THE "MOTIONLESS" MOTION OF SWIFT'S FLYING ISLAND*

BY ROBERT C. MERTON

Ever since the careful research of Marjorie Nicolson and her colleague in physics, Nora M. Mohler, Swift's "Voyage to Laputa" has been recognized as a detailed satire of XVIIth and XVIIIth-century science.¹ Many of the "scientific" ideas that the Laputans expounded are ridiculous exaggerations of ideas and experiments that Swift might have read about in such journals as the *Philosophical Transactions* of the Royal Society. The way the flying island moved, for example, is largely an adaptation of Gilbert's theories of magnetism. The island, with its shiny bottom made of a metal called adamant, resembled the "little world" or "terella" that Gilbert had made. Moreover, the giant but delicately balanced loadstone which was in the bowels of the flying island was an enormous example of Gilbert's famous "dipping needle." Because this loadstone and the adamantine base of the island were magnetically "repelled" by a certain "mineral" in the earth, the island was able to "fly," and its movements were controlled by tipping the stone one way or another. Although Nicolson and Mohler examined this motion in some detail, they omitted one curious aspect of it from their discussion: the way the island did not move.

Gulliver's explanation of how the island could float motionless is not as simple as it seems at first glance. Speaking of the loadstone, Gulliver wrote:

When the Stone is put parallel to the Plane of the Horizon, the Island standeth still; for in that Case, the Extremities of it being at equal Distance from the Earth, act with equal Force, the one in drawing downwards, the other in pushing upwards; and consequently no Motion can ensue.²

Earlier Gulliver had explained that one side of this stone was attracted to the mineral in the earth and that the other was repulsed by it. If the attracting side were pointed directly down, the island would descend, and vice versa. In order to move the island from one place to another instead of just up or down, the loadstone was tipped at an angle. In this case, the island would still move up or down, depending on which side of the stone was nearer the earth, but also it would move obliquely. "For in this Magnet," wrote Gulliver, "the Forces always act in Lines parallel to its Direction" (168). Only by a series of oblique up-and-down movements could the island move any distance across the land below.

Since the stone lies parallel to the horizon with an upward force on one end and an equal downward force on the other end, it would seem logical, at first glance, that the upward and downward forces should nullify one another, and that the island itself should hover motionless in mid-air, just as Gulliver said it would. Whoever believes whatever Gulliver says, however, misses many of Swift's jokes. In this case, if one looks more closely

* I have greatly profited from the suggestions of Steward LaCasce, Columbia University.

¹ See "The Scientific Background of Swift's *Voyage to Laputa*," *Annals of Science*, II (1937), 299-334, and "Swift's 'Flying Island' in the *Voyage to Laputa*," *Annals of Science*, II (1937), 405-430.

² *Gulliver's Travels*, ed. Herbert Davis (Oxford, 1959), 170.

at Gulliver's description, one will discover that the equal upward and downward forces operating on the stone will indeed prevent any vertical motion, but because these forces are applied at different ends of the stone, the stone will certainly not remain motionless. No great amount of scientific knowledge is required to see that if a delicately-balanced loadstone has an "upward" force applied to one extremity of it and an equally strong "downward" force applied to the other, it will rotate.³

From a scientific point of view, Gulliver's motionless island would probably move in one of two ways.⁴ In one movement, the stone might swing back and forth in a semicircular arc like the pendulum of a clock. For once the stone starts to rotate, the end which is attracted will swing downward. As it moves closer to earth, the end attracted by this increasing force will swing faster. By the principle of conservation of energy, the attracted end will continue in its circular path until it has swung through 180° or half a circle. It will then pause and swing back along the same path to its original position. Since the island itself moved in a direction parallel to whatever direction the stone pointed, the whole island will also swing in a semicircular arc, always maintaining its upright position as if it were a box on some invisible Ferris wheel.

Gulliver's description can be interpreted in quite another way: one side—let us say the magnetic north—always attracts and the other always repels. In this case, the principle governing the motion of the stone is similar to that which drives the shaft in an electric motor. When the stone completes its semicircular arc, as described before, instead of stopping and then returning along the same path like a pendulum, the stone's polarities will change,⁵ and the stone will then continue swinging in a full three hundred and sixty degree circle, and so will the "box" on the invisible Ferris wheel.

Although these two interpretations of Gulliver's passage are "scientifically" possible, it is doubtful that Swift had either of them in mind. There is no reason, scientific or satirical, why Swift should have wanted the flying island to swing back and forth in a semicircular arc. But there is a good reason why he might have wanted it to swing around in the full circle. If he intended Gulliver's "little world" to resemble Gilbert's "terrella," he might have been slyly suggesting that in its "motionless" state, it was actually in orbit around an imaginary sun. Although this interpretation may

³ This can be seen, simply enough, by a little homely experiment: one has only to hold a pencil, representing the stone, in a horizontal position, and then push up on one end while pushing down on the other.

⁴ It should be noted that the pronoun "it" in Gulliver's statement could refer either to "stone" or to "island," and that, hypothetically, twice as many types of motion are therefore possible. This ambiguity is probably the result of a "scientific" detail that Swift left vague. He never said what magnetic relationship there was between the adamantine base of the island and the loadstone. Since there is no indication, however, that the island ever flew in any but a horizontal position, we will assume that the forces operated on the extremities, not of the island, but of the stone.

⁵ The end of the stone that had been attracted would now be repelled because it had moved from the magnetic north side to the south, and similarly the repelled end of the stone, having moved, would now be attracted.

be satirically amusing, however, it should probably be discounted on the grounds of the limitations of Swift's scientific knowledge. It is not likely that Swift would have known the principle of magnetism that makes an electric motor run.

A third interpretation of how the "motionless" island might move, seen from the perspective of satire, is the most probable. Few non-scientific readers would expect the stone to continue swinging back and forth in a semicircular arc, let alone continue swinging in a full circle. Rather, they would expect the stone to rotate, its attracting end moving downward and its repelling end upward, until after rotating 90°, the attracting end pointed directly downward toward the mineral in the earth. With the stone in this position, the island itself would fall. But the Laputans were never very good at practical matters anyway. "The abstractions of 'higher mathematics' are their meat and drink," wrote Nicolson and Mohler. "They can solve equations—but they cannot build houses, because of the 'contempt they bear to practical geometry, which they despise as vulgar and mechanic.'"⁶ If, indeed, the Laputans were unable to put a house together, they might also have failed at their specialty of making islands fly. And as for Swift, what better joke could he play on his abstract scientists than to suggest that the very theories that set their island afloat would also bring it crashing down?

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⁶ "Scientific Background," 305.

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