

*AIRPLANES AND INQUISITORS: REFLECTIONS ON  
SKEPTICS AND ANTI-REALISTS*

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Imagine that you are a real skeptic – you don't believe in science, and you stand shivering on the landing, refusing to board a plane.

The flight attendant, an earthly gentleman who never conflates his airline training with science classes, tries to convince you to come aboard. "Come on," he says, "so many of these go up, so few fall down." The attendant is neither a skeptic nor a believer – he is ignorant or agnostic, and you may think, like David Hume, that if you're to get anywhere, you'd better take his unreflective induction as a reasonable *modus vivendi et operandi*, despite its philosophical difficulties.<sup>1</sup> But perhaps your skepticism runs deeper than that and you refuse to oblige.

Then I, a simple believer, walk by. "Come on," I tell you, "the laws of aerodynamics say that this thing will fly, and these laws work. If you understand them, you'll be reassured." "I know what science says," you reply, "but I don't *trust* it. It has a dreadful track record and is based on flimsy evidence." "Your demands are stricter than mine," I reply and board.

Next comes the realist. "Come aboard," he says. "The laws of aerodynamics say that this thing will fly, and I can explain to you why these laws work: it is because the entities they postulate are really in the world." "I don't trust the laws of aerodynamics," you reply, "why should I trust your – much weaker – theory about their relations to things in the world?" "Because how else can aerodynamics be so successful?" he asks and boards.

The anti-realist arrives last: "Come aboard," she says. "The laws of aerodynamics say this thing will fly." "But I don't believe them," you say, "nor do I believe the last guy's story about them." "His is really a cock-and-bull story," she replies, "but you don't need it. Aerodynamics is empirically adequate, and that's enough."<sup>2</sup>

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<sup>1</sup>Hume 1748, Sect. V.

<sup>2</sup>In fact, there is no real agreement among aerodynamics experts about what keeps airplanes aloft: <https://www>.

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There are two philosophical lessons to draw from this little piece of airport theatre.

The first is that the (scientific-)anti-realist and the (science-)skeptical are different personae. They hold different and competing points of view. The skeptic does not believe in science. He fears airplanes, avoids vaccination and prefers stairs to elevators. His position is consistent, if difficult to maintain: if the explanations that science provides for the functioning of these artifacts are not to be trusted, then using any of these artifacts is extremely dangerous. The anti-realist, in contrast, does believe in science, and she may term her belief acceptance,<sup>3</sup> empirical adequacy,<sup>4</sup> or epistemic attitude.<sup>5</sup> Our anti-realist will be as happy as the realist to board the plane, *and for the same reasons*: they both trust aerodynamics and neither doubts the evidence which scientists provide to support it.

What the fable reminds us is that the anti-realist differs from the realist only in maintaining that as excellent as this evidence is, as perfectly as the phenomena are explained and predicted, the success of aerodynamics (or any other science) will never amount to getting a hold on the reality underlying these phenomena. But (modern) anti-realism is a theory *about* the success of science; about why it *should be* believed and *what it is* that we believe in when we do, and *ipso facto* it assumes this belief; anti-realism cannot be skeptical. Indeed, the paradigmatic anti-realists of the 20th century, against whom the early (modern) realist arguments were formulated, were the neo-positivists, the most committed believers in science as the one and only way to reliable knowledge. From the positivist perspective, anti-realism was the hallmark of scientific rationality: ‘positive’ science distinguished itself from metaphysics and assured its remarkable success exactly by discarding the craving for *Truth* or *The Real*.<sup>6</sup>

The airport dialogue is helpful because the conflation between the skeptic and the anti-

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scientificamerican.com/article/no-one-can-explain-why-planes-stay-in-the-air/ (I thank the anonymous reader for pointing out this reference). Since airplanes and aerodynamics serve only as illustration in this short paper, this does not affect the argument, but this kind of disagreement on what may seem to the non-scientist an issue long solved, is actually quite common and worth exploring at length. The *Rota Aristotelis* and the solutions to the paradox it presented to the ancients is another example of such disagreement with a much longer history than aerodynamics (See Gal and Chen-Morris 2013, 130-4, esp. F.N. 40).

<sup>3</sup>Laudan 1977, 120.

<sup>4</sup>van Fraassen 1980, 69

<sup>5</sup>van Fraassen 2008, 318.

<sup>6</sup>See Duhem 1954, Chs. 1-2, for the classical historical-philosophical argument why “physical theory ... never reveals realities hiding under the sensible appearances” (Duhem 1954, 26) and why this is exactly where its power lies, and Carnap, “Empiricism, Semantics and Ontology” (Carnap 1950) for the neo-Positivist methodological development of this theme. Van Fraassen adopts this stance explicitly in his *Scientific Representation*, explaining that to be an empiricist is “to take the empirical sciences as a paradigm of rational inquiry, and to resist the demand for further explanation that lead to metaphysical extensions of science” (Van Fraassen, 2008, 3).

realist is an important reason for the frustrating circularity of the decades-long realism debate. This conflation is embedded in the fundamental realist argument – ‘the inference to the best explanation,’ also known as ‘the no miracles argument’ – and explains its inefficacy. In our story, the argument may take the following form:

A) the plane is constructed according to the laws of aerodynamics; B) these laws have kept almost every plane in the air (and explain well the failures of those that have fallen); C) the laws of aerodynamics should therefore be trusted.

This is a strong argument against the science-skeptic. Whether or not it is enough to relieve this skeptic’s anxieties, it is a good inductive argument: from past success to future success. But for the anti-realist it is of little consequence, because she has never doubted the laws or aerodynamics, nor the relation between the trustworthiness of these laws and the flight of planes: “the success of current scientific theories is no miracle” says van Fraassen, the doyen of anti-realism.<sup>7</sup> To serve as an argument for realism – against anti-realism, rather than against skepticism – the conclusion should *not* be (C) but:

D) the laws of aerodynamics “home in on the true mechanisms behind the appearances.”<sup>8</sup>

But with (D) as conclusion, this is no longer a good inductive argument. That stones have always fallen should convince us that they will keep falling, but it cannot tell us whether the fall is caused by the stones’ inherent *gravitas* or by gravitational attraction between the stones and the earth. That Newtonian mechanics predicts the fall should convince us that Newtonian mechanics is true, but it cannot tell *why* it is true. Similarly, aerodynamics’ success should convince us to trust aerodynamics, but it cannot support a theory *about* this success. The anti-realist is not a skeptic and is fully willing to induce from aerodynamics’ past success to its future success. What she objects to is the realist’s *account* of the success, and no amount of induction from this very success could sway her.

The second insight allowed by the airport fable is that the incompatibility between the skeptic and the anti-realist is historically determined. Our anti-realist cannot be a science-skeptic exactly because she *is* about to board a plane. Anyone who does not trust science is taking an irrational risk any time they board an airplane (or step onto a 25th floor balcony or enter an elevator), *and the irrational merits no attention*. Anyone who dwells in the modern world – any philosopher who takes a flight to attend a conference – and claims to not believe

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<sup>7</sup>Van Fraassen 1980, 40.

<sup>8</sup>Papineau, “Theories of Nothing,” 491.

science, is inconsistent; and inconsistent positions are no basis for debate. A modern academic suggesting that boarding a plane is as ill-advised as jumping off it is either misguided or disingenuous. But this is *not* what modern anti-realists suggest. Modern anti-realism is not a skeptical position; it is not an argument why we should not trust science but a claim about the grounds on which we should.

The incompatibility between skepticism and anti-realism is historically determined because the science-saturated artifacts that the modern philosopher could not use while claiming to be a science-skeptic – plane, high-rise, elevator – are new. For the early modern, in the early days of what would become modern science, skeptical doubt was a completely genuine response to the claims of the new mathematical-empiricist natural philosophy. Instrumental anti-realism – adopting some practical consequences of these claims without committing to believe in their truth – was a tenable intellectual option. This, by way of example, was the option that Cardinal Roberto Bellarmine suggested Galileo should adopt concerning the Copernican hypothesis. You Copernicans, Bellarmine curtly commended Galileo and his allies in a letter from April 12 1615,<sup>9</sup> are “proceeding prudently by limiting yourselves to speaking [about the motion of the earth] suppositionally and not absolutely.”<sup>10</sup>

Hinted threat aside, Chief Inquisitor Bellarmine’s suggestion, in the context of his intellectual commitments and the available evidence, makes perfect epistemological sense. Bellarmine was not bound by practices which would be turned irrational by a deep suspicion in the astronomy of his time. The suggestion that the earth moves fared badly against common sense and tradition, so it was reasonable for him to suspect it was a frivolous hypothesis, even if favored by some (not all) astronomers. He demonstrates he is familiar with Galileo’s argument that “to someone who moves away from the seashore on a ship it looks like the shore is moving” but has no problem dismissing it. This person, Bellarmine reminds Galileo, still “knows that this is an error and corrects it, seeing clearly that the ship moves and not the shore,” and he continues:

In regard to the sun and the earth, no scientist has any need to correct the error, since he clearly experiences that the earth stands still and that the eye is not in error when it judges that the sun moves.<sup>11</sup>

Moreover, in the tradition shared by Bellarmine and Galileo,<sup>12</sup> astronomy was a branch of mathematics, charged with providing convenient calculations rather than physical claims.

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<sup>9</sup>Finocchiaro 1989, 67-9.

<sup>10</sup>Finocchiaro 1989, 67.

<sup>11</sup>Finocchiaro 1989, 68-9.

<sup>12</sup>Though being quickly undermined by Galileo, Kepler and others, a process that Bellarmine may not have fully come to terms with.

There was therefore neither a new metaphysical speculation nor a new epistemological maneuver in the suggestion that the Copernican hypothesis can be just such a convenient calculation device bereft of any aspiration to describe the planetary motions *as they really are*. Furthermore, the strategy of taking an outrageous idea “suppositionally,” *ex suppositione*, was a sanctioned pedagogical practice of the mediaeval university.<sup>13</sup> It was a fundamentally anti-realistic exercise: considering the intellectual merit of a hypothesis and supporting it with the best evidence and argument, without admitting (and usually rejecting) that the hypothesis captured reality. It is not the same, Bellarmine stressed,

to demonstrate that by supposing the sun to be in the center and the earth in the heaven one can save the appearances, and to demonstrate that in truth the sun in at the center and the earth in heaven.<sup>14</sup>

Bellarmino was both a skeptic and an anti-realist and his two positions cohered: he didn't believe that the earth moved, and he accepted that the hypothesis that it moved could be both wrong and successful. To the modern philosopher, many of whose daily activities are heavily laden with science, this combination is not a coherent option.

Rumors about the demise of the realism debate always prove premature, but it does appear that the debate can gain from expending its vocabulary and perspectives. This was a modest contribution in this direction.

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<sup>13</sup>C.f. Wisan 1984.

<sup>14</sup>Finocchiaro 1989, 68.

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