

## THE WRIGHT BROTHERS WERE FRAUDS

By Mike Disney      Version II Sept 7 2021.

We all know the iconic story of how two bicycle mechanics from Ohio first took to the air at Kitty Hawk in 1903, so realizing man's ancient dream of imitating the birds. Well they didn't – they couldn't have done; they didn't have an engine of sufficient power to get them off the ground. They may have glided down hill for a few hundred feet and in later years they did fly – but only with the aid of a catapult. Whether they were deliberate frauds is more difficult to prove – but there are some mightily suspicious circumstances. Man's first powered hops probably took place in France between 1906 and 08, but in my opinion the first true pioneer of powered flight was the Frenchman Louis Bleriot who flew the Channel in 1909.

Does it matter now? In one sense it really does. Here we have a famous claim with strong evidence apparently in its support, and other evidence, equally strong, or stronger, against. How are we to reach a sound verdict in a case where evidence conflicts? Isn't that the chief question not only of law but of history, politics, science – indeed of life itself? Education does not teach us how to answer that question so we need to figure it out for ourselves. I intend to use the Wright Brothers' exploit as an exercise in getting at the truth, not just of their claim, but of any other where evidence conflicts. In that sense I hope this discussion will be of broad interest.

Let me begin by saying how disappointed I was to discover that Wilbur and Orville were frauds. I am a mad cyclist, and a pilot, and I made pilgrimages to the workshop of my heroes in Dayton and to the Aerospace Museum in Washington to see their 'Flyer' hanging from the ceiling. I knew, or thought I knew, everything there was to know of their famous exploit. And they ticked all my boxes: they were 'common men'; they were brave; they were modest, and they did it all without government or industrial support. For me now to find that it was all a hoax has been a hard cross to bear. But hoaxing it certainly was – as I hope to convince you too.

I happened upon the truth quite by chance. In 2009, the centenary of Bleriot's Channel flight, I dusted off my knowledge of aerodynamics and applied it to his exploit. Everything worked out nicely: speed, range, weight,

lift, drag, power..... very exactly. So while the equations were fresh in mind I thought ‘Why not apply them to the Wright Flyer?’ All the numbers were in the record.....but this time they *didn't* work out. At a measured rating of 12 Horsepower their engine wasn't nearly powerful enough to get their clumsy biplane off the ground. However I wasn't worried at first because there was all that other evidence: the photograph; the witnesses; Orville's telegram; the unequivocal fact that they flew in later years in front of large crowds. Obviously I'd made a mistake somewhere. So I gathered more evidence. Bit by bit the favourable evidence crumbled in my hands, while the suspicious evidence piled up until the odds on the Wrights' story became a hundred thousand to one *against* – in my mind at least.

## 2 AERODYNAMICS....

you might suspect is an esoteric subject, easy to get wrong. And if you glance in a textbook your suspicion would be confirmed by the appearance of Differential Equations, Theorems, and Vortices. Indeed one wonders how any witless sparrow can fly.

My own fascination with flight began in 1968 when we were crossing the Atlantic by what was then the cheapest means available, a rust-bucket called the *Aurelia*. Eight hundred miles South of Iceland we ran into a storm and the ship and its passengers rolled their guts out. In search of a steady horizon I clambered to the uppermost deck, from where I could occasionally glimpse that stable Thank-God-Line above the gigantic waves which rolled towards us like grey office-blocks. But I glimpsed something else too: a tiny warbler in flight, no more than an ounce of hope and feathers, fighting for his life amidst that maelstrom of wind and water. One hears of such things, but to see a miracle in the flesh stirred my soul.

Christopher we called him because, like Columbus, and like us, he was bound for America. Somehow he managed to gain the respite of the ship's rail where, ruffled by the gale, he managed to cling, visibly weakening, for several days.

Unable to bear the spectacle any longer I grabbed him, popped him in a shoebox, and took him down to our cabin where my wife fed him sugar - water from a dropper, the only sustenance, being an insect eater, that he could take.

Once we were in sight and scent of Long Island, we took him back on deck and opened his box. He smelt the land, saw the stars overhead, and

leapt into the air. Alas the strain was too much even for his gallant heart and he dropped down dead at our feet. At his funeral I vowed to get to the bottom of Christopher's extraordinary feat. How could a tiny bird cross an ocean with never a rest and never a meal? As a scientist, I'm an astronomer, I don't believe in miracles – there had to be an explanation.

And there was – though it took me a dozen years to work it out. There is a beautiful equation, found originally by Louis Breguet which....but this is no place for details. The point is that aerodynamics is fundamentally simple. Stick your hand out of the car window, tilt it to the slipstream and up it lifts and back it goes, both forces increasing with the square of your speed. Any refinements in the sums can be absorbed into Lift and Drag Coefficients, fixed numbers which can be measured in a wind tunnel. Thus it is possible to calculate with some precision the speed the Wright Flyer would need to generate enough lift to take off, and the power its engine would need to overcome the resulting drag, especially now that the replica has been tested in a full size wind-tunnel. Even with perfect propellers, which they didn't have, the 12 HP engine built for them by Charlie Taylor wasn't up to the job. Even Bleriot, with his far better design, needed 25 HP to take off and stay up. There's no way the Wright Brothers could have flown at Kitty Hawk – it's as simple as that. For those who want to see the sums as they bear on them, on Bleriot, and on Christopher, I've put them in a brief Appendix<sup>1</sup>.

### 3 WHAT HAPPENED AT KITTY HAWK?

The alleged flight took place in the Kill Devil Hills 700 miles away from the Wrights home in Ohio. It was then an extremely remote site on the outer sandbanks of North Carolina, ideal for testing their earlier gliders – which could be launched from the hill-tops to drift down into the sandy bottoms, but it could hardly have been worse for powered flight, which requires a smooth flat runway, no hills and low wind-speeds. On December 17 1903 they made four short hops the longest of 852 feet allegedly. Immediately afterwards high wind reportedly flipped the Flyer, destroying it completely. Before returning to Dayton Orville sent a telegram to his father Bishop Wright reporting: “Success four flights

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<sup>1</sup> See ‘A Taster in Aerodynamics’ on our website [mjdisney.org](http://mjdisney.org)



The famous photo of the first flight. For future reference note the wooden track along which their skid ran because they had no undercarriage. The pronounced an-hedral in the wing and the canard out ahead of the plane, instead of a tail-plane, made the design inherently unstable. The 12 HP motor, which sits next to the pilot who lies prone on the lower wing, drives the two contra-rotating pusher propellers via chains which can be seen running diagonally upwards in tubes to either side of the pilot. Since the photo wasn't released until 5 years after the alleged flight there is good reason to doubt its authenticity.

Thursday morning all against 21 miles hour wind started from level with engine power alone average speed through air 31 mph longest 57 sec inform press home Christmas.” The five witnesses, mostly surf-men from the life-saving station, helped to manhandle the aeroplane back up to the wooden launch-rail along which it skidded before take-off because it had no undercarriage.

Next day a local newspaper the '*North Virginia Pilot*' appeared with the banner headline; “FLYING MACHINE SOARS 3 MILES IN TEETH OF HIGH WIND OVER SANDHILLS AND WAVES AT KITTY HAWK ON CAROLINA COAST. NO BALLOON ATTACHED TO AID IT.” A day later there followed a front page headline in the prestigious 'Washington Post' which added that after 3 miles “... it gracefully

descended to earth at the spot selected by the man in the navigator's car as a suitable landing place.”<sup>2</sup>

This is almost all the real-time evidence of the famous first powered flight. Subsequent accretions to the story, like the renowned photograph (which only appeared 5 years later), have to be regarded with scepticism. You must remember the Wrights saw themselves in a desperate race with Europeans but in particular with wealthy Samuel Langley who had tried to fly 8 days earlier near Washington, but failed with his 52 HP ‘Aerodrome’. The brothers had already tried to patent the aeroplane unsuccessfully in 1902 when all they had were gliders.

#### 4 WHAT HAPPENED AFTER: SOME KEY CLUES

- There was considerable suspicion, particularly in Europe, which had pioneered both the theory and practice of flight (and the internal combustion engine) up until that point, and indeed regained a commanding lead shortly afterwards.
- However most suspicions were quieted when the Wrights unquestionably flew high and handsome the following year from their new base in Ohio.
- But they never took off again under their own power. They used a weight-driven catapult to fling themselves into the air – which was necessary since they had no undercarriage. To my mind that's hardly powered flight. I've made four-hour flights in my glider (which has no engine) after being catapulted aloft.
- Their design was fundamentally flawed. Its canard (instead of an elevator) made it unstable to pitch; its anhedral unstable to side-slipping. Some pilots who have tried to replicate their flight have been killed in consequence.
- They never seriously improved their design, most likely because they didn't understand its glaring flaws. No one imitated them. Bleriot and others built instead essentially modern aeroplanes with rear tail-planes, elevators, ailerons, undercarriages and puller-propellers.

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<sup>2</sup> Most details here taken from “Taking Flight” by Richard P Hallion (Oxford University Press 1902) who had been an official USAF historian and is an uncritical ‘Wright booster’. But in general the Web is a far better place to look.

- Their original Flyer was never inspected by an expert (it was allegedly destroyed immediately following its pioneering flight), there were no drawings of it, so the only replica of it was built by Orville from memory 25 years later to go to the Science Museum in London. That it is incomplete is hardly suspicious because it was purely for display. That is the model hanging in the Aerospace Museum today.
- Although many ‘replicas’ have been built since – particularly for the centenary in 2003 – none managed to take off and fly with a 12 HP engine, not even from a runway. Surely telling.
- An alleged photo of the 1903 flight didn’t appear until 5 years afterwards - which is mightily suspicious.
- The eye-witnesses to that same flight actually reported that they dragged the Flyer up a hill, so it couldn’t have taken off from the flat.
- Attempts to trace Orville’s telegram have failed to find any sign of it in the telegraph-company’s records.
- The Wrights were highly secretive about their designs. Fans say that was because they ‘were anxious to patent it first’.
- In fact no one showed much commercial interest in it – which is hardly surprising given that it couldn’t take off, and was so difficult to pilot.

I won’t say more. Rather than accept my possibly jaundiced views readers can follow up the evidence themselves (as always Wikipedia is a good place to start). But remember there’s a whole Wright industry out there of authors, scholars and museums who make their livings out of the story and who cannot afford to have doubts cast upon it.

#### 4 REACHING A VERDICT

Perhaps it doesn’t matter a damn any more whether Wilbur and Orville were heroes or hucksters. What does matter immensely, whenever we are faced with difficult decisions, is having a rational procedure for weighing conflicting evidence and reaching a sound conclusion. Although I have been a scientist for 50 years, and a full professor for 40, no one ever taught me this trick, while all the hundreds of books I have consulted on the matter proved either irrelevant, confused or downright wrong.

So here is the trick I would recommend for weighing any hypothesis or idea. It is drawn from gambling theory and invokes betting odds. Write:

$$O(H | E_1, E_2) = W(E_1 | H) \times W(E_2 | H) \times O(H) \quad (1)$$

which may look unfamiliar but is actually straightforward. On the left hand side are the Odds on our hypothesis H being true, given the two clues  $E_1$  and  $E_2$  (E for Evidence). This, after all, is what we want. On the right hand side are the Weights,  $W(E_1 | H)$  etc, we assign to each clue (as they apply to H): they are simply numbers drawn from *one of only* (4, 2, 1,  $\frac{1}{2}$ , and  $\frac{1}{4}$ ).  $O(H)$ , called ‘The Prior’, is our prior guess on the Odds on H, *before* considering the two clues in question. It is, if you like, our prior prejudice as to the matter. It too is a number, but initially it can take any value you assign it.

If I take as my hypothesis H “*The Wrights made mankind’s first powered flight in 1903*” and the two clues to be:

$E_1$  ‘Some eye-witnesses saw them in flight’; Weight  $W(E_1 | H) = 2$

$E_2$  ‘But their engine was underpowered’; Weight  $W(E_2 | H) = \frac{1}{4}$

I can then calculate my combined Odds on H according to (1) as:

$$O(H | 2 \text{ clues}) = 2 \times \frac{1}{4} \times O(H)$$

and as I had initially had no doubts as to their authenticity my Prior Odds on H would be say 8 to 1 on so  $O(H) = 8$ , in which case

$$O(H | 2 \text{ clues}) = 2 \times \frac{1}{4} \times (8) = 4, \text{ or } 4 \text{ to } 1 \text{ on } H \text{ being true.}$$

But why stop at 2 clues? Suppose:

$E_3$  ‘They always needed a catapult thereafter’; Weight  $W(E_3 | H) = \frac{1}{4}$

$E_4$  ‘No authentic replica has managed to fly’; Weight  $W(E_4 | H) = \frac{1}{4}$

My Prior this time is 4 to 1 on, from the previous clues, so now:

$$O(H | 4 \text{ clues}) = \frac{1}{4} \times \frac{1}{4} \times (4) = \frac{1}{4}, \text{ or } 4 \text{ to } 1 \text{ against}$$

Add two further clues:

$E_5$  ‘Their design was dangerously flawed’ : Weight  $W(E_5 | H) = \frac{1}{2}$

$E_6$  ‘They never modified it’: Weight  $W(E_6 | H) = 1/4$

Now with a Prior of (  $1/4$  ) from the calculation for 4 clues:

$$O(H|6 \text{ clues}) = 1/2 \times 1/4 \times ( 1/4 ) = 1/ 32, \text{ or } 32 \text{ to } 1 \text{ against.}$$

And so on; you can see emerging a general procedure for incorporating all the evidence you can find to reach a verdict on any hypothesis, be it legal, scientific or indeed personal.

The simplest way to use the trick is to write it out clue by clue, line by line as follows, in what I call an ‘Inference Table’:

#### INFERENCE TABLE 1

For hypothesis H: “*The Wrights made man’s first powered flight.*”

#	Clue	Weight	Accumulated odds on
	Prior	8	8 to 1 on
1	Eye witnesses	2	16 to 1 on
2	Underpowered	$1/4$	4 to 1 on
3	Needed catapult thereafter	$1/4$	1 i.e. evens
4	No authentic replica flew	$1/4$	4 to 1 against
5	Design dangerously flawed	$1/2$	8 to 1 against
6	Never modified design	$1/4$	32 to 1 against
7	.....		

And so on. You can incorporate as many clues as you can find, each time updating your Odds. When they reach what you consider to be a decisive value you can act upon them.

Where does this very useful trick come from? I hardly think it needs much justification because isn’t it simply Common Sense? Doesn’t it just trace the way by which we informally reach decisions, whether we are playing cards, sitting on a jury or using the Hubble Space Telescope? How better could one reach a verdict? Of course you won’t find it in books of Logic, or Philosophy, or Statistics, which is why we never get taught it.

Scholars, perhaps understandably, don't like it because there is no intellectual way to justify most of the Weights (nor especially the Prior). They may arise out of experience, or even instinct – but what is wrong with that? If there is no better way to proceed, and no such one has been found over the past 2,500 years, then why knock it? But if we want to be pedantic we are using ‘An iterated form of Bayes’ Theorem expressed in Odds form, and employing Subjective Weights’. For obvious reasons I call it ‘The Detective’s Equation’. The one refinement I have personally added is to restrict the Weights to one of only 4, 2, 1,  $\frac{1}{2}$  or  $\frac{1}{4}$ . That prevents one or two bad clues, or bad Weights, from having too much influence. And history tells us scientists that that is crucially important because so often progress has been halted for centuries due to one plausible but rotten clue; for instance the biblical evidence that the world is only 4000 years old precluded any serious discussion of Evolution before 1859. Restricting Weights to a narrow range requires that it be the *accumulation and breadth of evidence* which must carry the day, not a single strong argument.

The Detective’s Equation (DE) has 7 great virtues. It is *easy to use* – particularly in the form of an Inference Table like the one above. It is *decisive* because high Odds (either for or against) can be reached from a small number of clues *if they cohere* [because it is multiplicative]. It is *transparent*, because you cannot sneak in your prejudices without revealing the Weights you have assigned to them. It can deal with *Conflicting Evidence* – because the Weights can be either greater or smaller than 1. It *minimizes the effects of bad evidence* (through restricting the Weights). It is *provisional*, for new evidence can always be incorporated at the end: I hold this to be a great and liberalizing quality. And finally, despite flawed claims to the contrary from statisticians, no one has come up with a better way to decide.

People ask “At what odds should I halt the weighing process?” That depends on you, and the circumstances. All I can tell you is that the tradition in English Common Law is that a guilty verdict shouldn't be reached unless the odds on it are better than 10 to 1 [the ‘Blackstone Ratio’] while scientists – who sometimes have better evidence – reach tentative decisions at odds of 50 to 1 (‘2 sigma’) but generally prefer 1000 to 1 (‘3 sigma’) – either way of course.

## 5 THE VERDICT ON THE WRIGHT BROTHERS

Equipped with the DE we can return to Kitty Hawk and the Wrights' alleged first flight. This time I will invoke all the evidence I know of, and I am joined by two American friends Gene and Harland, who will assign their own Weights to reach verdicts independent from mine. Gene is a great American patriot, and a very smart scientist, but is uninterested in aerodynamics. Harland is an equally smart scientist, but a far better pilot than I am.

We have all agreed to set our Prior at 'evens' ( i.e.  $O(H) = 1$ ) because we want to reach our separate verdicts entirely on the evidence, not on our prior prejudices, though we all started out as strong Wright fans. I will write our separate Weights in binary notation because that turns out to be simplest [i.e.  $4 = 2^2, 2 = 2^1, 1 = 2^0, 1/2 = 2^{-1}, 1/4 = 2^{-2}$  ]

### INFERENCE TABLE 2

Hypothesis H : *"The Wrights made man's first powered flight"*

#	Clue	Weight		
		Gene	Harland	Me
	PRIOR $O(H)$	1	1	1
1	Eye-witness accounts	$2^2$		$2^{-1}$
2	Convincing photo of flight	$2^2$		$2^{-2}$
3	Too underpowered to fly		$2^{-2}$	$2^{-2}$
4	Telegram claim credible	$2^2$		$2^{-2}$
5	Aircraft immedly. destroyed			
6	Newspaper reports credible	$2^{-2}$	$2^{-2}$	$2^{-2}$
7	Flew there w sim. model later			$2^{-1}$
8	Flew sim. model elsewhere	$2^2$	$2^2$	$2^2$
9	But had to use catapult		$2^{-2}$	$2^{-2}$
10	Faithful replica exists	$2^2$		
11	Design basically sound		$2^{-1}$	$2^{-1}$
12	Had insight to improve it		$2^{-1}$	$2^{-2}$
13	Authentic replica flown since		$2^{-2}$	$2^{-2}$
14	Set a trend others followed		$2^{-2}$	$2^{-2}$
15	Were generally reliable chaps	$2^2$		

	COMBINED ODDS ON H	$2^{10}$	$2^{-10}$	$2^{-17}$
		1000/1	1/1000	1/200,000

It is fascinating to note how disparate our provisional verdicts are, and why. Being not greatly concerned in the matter Gene has discounted technical evidence he doesn't understand. Harland is modestly interested in the issue, has weighted the technical evidence, but hasn't delved into the background literature, as I have done. Our very different verdicts reflect differences in our interests, knowledge and experience – as you would expect.

It is further interesting to note how transparent our differences have become, and potentially how useful it is to see them spelled out so starkly, Weights and all. If I wanted to undermine Gene's conviction (I don't) I should try to undermine his faith in clues 1,2,3,9,10, rather than belabour him with aerodynamics. Conversely if Gene wanted to change Harland's opinion he would need to upset Harland's faith in clues 6,8,13 and 14. Since I would be content to largely rely on the technical evidence alone (Clues 3,9,11,12,13 and 14, yielding combined odds of 2000 to 1 against) Gene would need to seriously take up aerodynamics if he wanted to shake my conviction. These are the kind of issues that arise for instance in the Global Warming debate where only some of the participants are technically savvy. A key question arises here of whether laymen should trust 'experts', and which experts, and why.

I am convinced the Wright's never made a powered flight in 1903, nor did they afterwards – not without a catapult. I am confident in that conviction, not so much because of the overwhelming Odds, but because of the *diversity* of evidence which supports it. They were anyway entirely peripheral figures in the real history of aviation because nobody copied them or commercialised their ideas. Whether they were deliberate fraudsters is another question. Clues 1,2,4,5,6 and 16 are certainly suspicious when looked into in depth, and I suspect (64 to 1 on) they *were* actually hucksters in search of financial gain (why else try to patent the aeroplane in 1902 before they'd even built one?). However the possibility remains that they were country-boys overtaken by wildly exaggerated

newspaper reports, and opportunistically cashed in. In that regard I'd like to know more about clues 1, 2 and 4 and to know whether their Flyer really was so providentially destroyed immediately after its one alleged flight.

## 6 HOW TO DECIDE – AND THINK

At this point I confess to a hidden agenda. I am a scientist (astronomer) who has spent the past 20 years struggling to understand how Scientific Inference works: how are we to draw rational conclusions from conflicting evidence and limited data? At the outset I imagined the answer was known – it was just a matter of teasing it out of the literature. But to my surprise, indeed horror, the answer was nowhere clearly explained, at least not by scientists. I found the subject had been seized away from us, largely by vociferous tribes of philosophers and statisticians who didn't appear to know what they were talking about. The statisticians seemed to imagine that science is a branch of Mathematics — which it definitely is not – whilst the philosophers supposed we were searching for Certainty – which is absolutely not the case. We are explorers looking at new landscapes with new instruments, and trying to make some sort of coherent map of what we find. Our experience tells us that new instruments reveal new features, sometimes entirely new continents, and so our maps, and the stories which go with them, must regularly change too. Above all science must be *provisional!* We cannot afford to cage ourselves inside Mathematics – or blind ourselves with Certainty [It never occurred to Columbus, even after three crossings, that he had discovered a new continent because he was certain he had arrived in Asia, after all that had been intended destination]. In other words we have had to cover our ears against the clamour of logicians who want to drag us back into a mediaeval past. I found that practicing scientists had retired to their labs to get on with their research, preferring to leave the arid debate to confused outsiders. Unfortunately that leaves the explanation of what we do, and how we do it, to seriously misguided amateurs. Yes it is a barely credible story; but it is true.

We scientists *do* draw inferences, of course we have to, but we do so in the same hum-drum, common-sense fashion as our fellow citizens. In other words we use the Detective's Equation informally, as I outlined it above. The only thing which distinguishes science from other subjects in

search of the truth, is that scientists can usually go out to look for new evidence – which is often not the case in say law, or history. We can do so by devising better instruments, or exploring in different corners. Our philosophical and statistical friends imagine instead that we must have devised new, more ‘scientific’ thinking processes – which is *not* the case. All we do, all that thinkers anywhere have been able to do, is formulate hypotheses, look for clues bearing on those ideas, assign them Weights as best we can, then somehow combine those Weights to arrive at provisional Odds on whether those hypotheses are true or not. It is a hesitant process, devoid of certainty – but all the better for that. It is problematical because we have to decide, and sometimes to act, on nothing better than Odds. Of course that is risky but, in my opinion, it is childish to expect otherwise. And we must be pretty good at weighing risks, because we’re still in the game after a billion years of struggling to survive.

Why can’t the education establishment teach us how to think along these lines? Since we all desperately need this survival skill Nature couldn’t afford to leave the teaching of it to parents and mentors. In other words it is not a cultural but an organic part of our being, deeply hidden, automatic, and not easily susceptible to logical analysis. Therefore it is not surprising that scholars have confused themselves, and nearly everybody else, in trying to decipher how it works. Any discussion of the matter before Darwin was bound to fail. And unfortunately later attempts have been heavily confused by earlier misunderstandings based on deduction, religion and mathematics. Because they saw thinking as the highest evocation of the human spirit many of our scholarly forbears wanted it to have a god-like aspect – when it is really a survival mechanism we have inherited from our animal forbears, and share to a large extent with our animal cousins. At least that is my opinion.

To think effectively for ourselves we require the necessary information and the right tools. At last the Internet is making available an increasing flood of the kind of information we require to make crucial decisions for ourselves, instead of leaving them to experts. But we need in addition a sound understanding of the necessary thinking-tools – such as Bayes’ Rule, The Detective’s Equation, Ockham’s Razor, the Inference Table and The Principle of Animal Wisdom (PAW) in order to adapt them

to the unfamiliar modern world. I didn't invent them, so much as tease them out of the history of Science. They are assembled together in my paperback *Thinking for Ourselves*, (Amazon 2020 £14.50 ) and on our website on Wordpress at **mjdisney.org** because at present you won't find them in accessible form anywhere else. If you've found the Wright Brothers argument intriguing you might find some of the other controversies we cover downright provocative. There is a short list on the website on the Page "What's in his Blog?"