

# A QUESTION OF SCALEABILITY

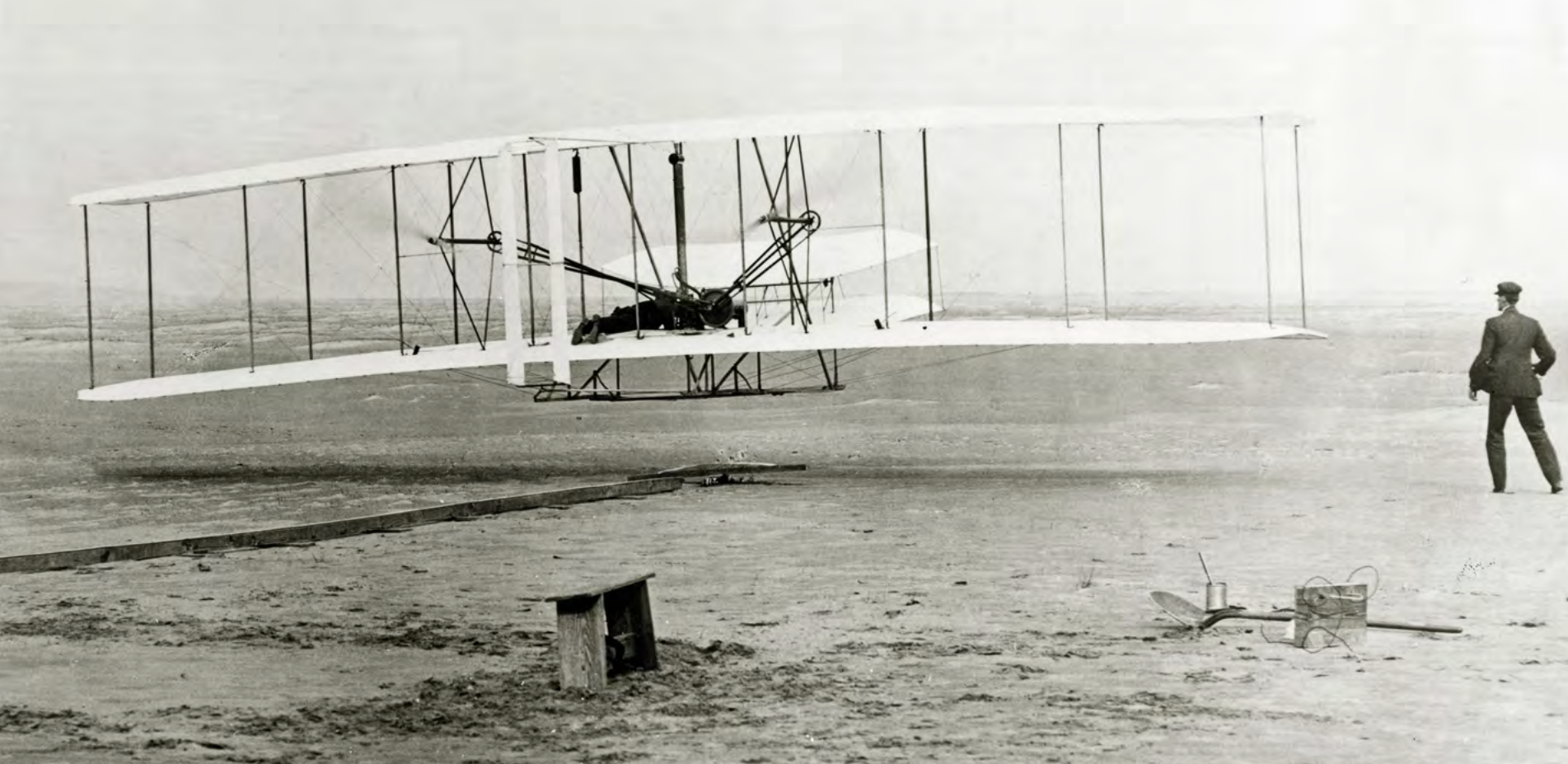
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## WHY THE WRIGHTS FORESAW THE FUTURE — AND OTHERS DIDN'T

What was it about the Wright brothers' concept of controlling a flying-machine that was different from those of their contemporaries, and why did it become the guiding principle for everything that followed? **PHILIP JARRETT HonCRAeS** explores the all-important factor of scaleability and how the Wrights realised its vital role in the future of aviation



SMITHSONIAN INSTITUTION X.2



**T**HE MAIN IMAGE on this spread has to be the most famous aviation photograph ever taken. Historians credit this aircraft, the Wright brothers' 1903 Flyer, with making the world's first powered, sustained and controlled flights under human control. These criteria are important. Without them, any uncontrolled brief hop off the ground might be acclaimed as a "flight". The flight has to have been made entirely under the power of the motor carried by the aircraft, and of sufficient endurance to rule out any possibility of assisted sustentation — after taking off down a slope, for example. And there has to be evidence that the pilot was capable of manoeuvring the machine and maintaining a required course.

The Wrights did not get everything absolutely right first time, and it would be unreasonable to expect them to have done so. Having perceived the inadequacies of weight-shifting — or "body English" as it is now described — as a means of controlling movements of the machine's centre of gravity and centre of pressure, they realised, correctly, that a better control system was needed before an engine of sufficient power was installed, along with the necessary transmission and propellers. Over a seven-year period they developed their aircraft and refined the control system, initially making extensive flights with gliders to get the system as right as possible before embarking on a powered machine.

Even then development continued. The prone-pilot position with a hip cradle used to operate the wing-warping, initially adopted to minimise drag, worked for short flights, but proved fatiguing and uncomfortable once extended flights were being achieved, so a seat was provided and the pilot's controls modified accordingly. Refinements had to be tested and proved before adoption. The fixed rear rudder was replaced by movable twin rudders, these were then linked to the warping, and then the link was removed, the booms carrying the forward elevator surfaces and the rear rudders were moved further ahead and behind the wings, and several different pilot's controls were used.

### PRIMITIVE MODERN

Pictured **TOP LEFT** is Mr Augustus Moore Herring of the USA, who made a few brief hops in his powered biplane of 1898. In addition to an automatic stability device, it was controlled in a limited manner by the operator swinging his body about, just as the German pioneer Otto Lilienthal and his English disciple Percy Pilcher had done with their primitive hang-gliders in the 1890s. This method of control is still used on hang-gliders today.

In 2018 American author C. David Gierke