The Wright Brothers' First Flight

We've all heard the saying before: If at first you don't succeed, try, try again. Two brothers, Wilbur and Orville Wright, certainly took this phrase to heart as they developed the first successful piloted engine-powered airplane.[1] And it's a good thing they did.

The Wright brothers were born to Milton and Susan Wright. Their father, Milton, was a bishop in the Church of the United Brethren of Christ, while their mother, Susan, studied literature and science at Hartsville College and was the top mathematician in her class.[2] They instilled in their children a strong sense of family values.

Because of Milton's work in the church, the family moved quite often. Wilbur was born in Millville, Indiana, on April 16, 1867. He was the third of seven children in the Wright family. The fourth and fifth of the Wright children did not survive infancy.[3] Later, Orville was born on August 19, 1871, in Dayton, Ohio (where the family eventually settled more than a decade later). The youngest sibling was Katharine.[4]

The elder brother, Wilbur, was described by his father as "never rattled in thought or temper." As a young boy, he was smart, confident, cool-headed, and had a great talent for writing and speaking.[5] His favorite subjects in school were math and science. Before the end of his senior year in high school, the family moved again, and Wilbur planned to continue his education at Yale University's divinity school.[6] Though Wilbur didn't get to finish high school, he enrolled in college preparatory courses to work toward his goal of going to Yale and becoming a teacher.[7]

Then, when Wilbur was 18 years old, he was playing a type of ice hockey (known as "shinny") when a neighborhood bully knocked out his teeth with a hockey stick.[8] Following the injury, his confidence was shattered and he suffered numerous other health complications. He became depressed, quit his academic ambitions, and stayed home – but he didn't stop learning.

During his "lost years" from 1886 to1889, Wilbur spent his time in his father's library. He read so much and practiced his writing that he became as well-versed as any college graduate. He also helped to care for his mother, who was sick with tuberculosis and sadly died in 1889.[9]

Up until this point, Wilbur and Orville were not particularly close given their age difference. Wilbur gravitated toward the two oldest Wright brothers, while Orville was closer to the youngest Wright, Katharine.[10] But the two certainly showed similar interests as young men.

Orville, like Wilbur, was a sharp student who enjoyed math and science classes, though he had

a reputation for getting into mischief. He was seen as a leader who was enthusiastic and energetic, as well as impulsive and optimistic. But he also was inventive and curious.[11] He became known in the community for kites that he designed, built, flew, and sold himself.[12] He was also known to take things apart to figure out how they worked. Orville dropped out of 11th grade to enroll in college preparatory courses, as he wasn't being challenged in school. Like his brother, this meant that he didn't graduate from high school. However, he too spent time learning outside of school.[13]

As a teenager in 1886, Orville opened a printing business with his friend, Ed Sines. When Wilbur had recovered, he worked with Orville in the printing business. The two brothers also wrote, edited, published, and printed two local newspapers, and even built their own printing presses.[14]

Though the printing business continued until it was sold in 1899, the brothers shifted their focus to a new venture in 1892, when they opened a bicycle rental and repair business. Eventually, they started selling bikes and in 1896, they launched their own line of bikes.[15] They even added their own improvements, such as coaster brakes. You might be familiar with these types of brakes—these brakes slow down a bike by pedaling backward![16]

The bike business saw success, but the brothers again changed their focus to exploring a lifelong interest of theirs: human flight. They were always interested in flying ever since their father brought them a toy helicopter from one of his travels in 1878.

The brothers were inspired to pursue this childhood fascination following the death of the great glider experimenter Otto Lilienthal in 1896, and after learning of some of the advancements made by Samuel Langley. By this time, the brothers had developed and honed their mechanical skills by working on printing presses and bicycles, and also had the funds to embark on a new venture.[17]

On May 30, 1899, Wilbur wrote a request to the Smithsonian Institution in Washington, D.C. to provide any information they had on flying experiments. Orville was also drawn into the effort, and the two read all they could about flight.

The Wright brothers didn't set out to invent the airplane. They were interested in new aeronautical (flight) technology and wanted to make some type of contribution to the field.[18] They started by seeing what had already been done, what questions still needed answering, and what needed improving.

After learning all that they could, the brothers were surprised to find that though people had been interested in flight for centuries, not much progress had been made.[19]

Wilbur wrote to Octave Chanute, one of the world's leading experts on flight at the time, who became a friend and supporter of the brothers' efforts, "For some years I have been afflicted with the belief that flight is possible to man. My disease has increased in severity and I feel that it will soon cost me an increased amount of money if not my life. I have been trying to arrange my affairs in such a way that I can devote my entire time for a few months to experiment in this field."[20]

The brothers didn't just dedicate months, but years to this feat!

The brothers determined there were three key problems that needed to be solved to be successful in building and piloting an aircraft: how to balance and control the craft, how to design lift surfaces (wings), and how to propel it. While many experimenters focused on one area, the brothers decided to focus simultaneously on all three.

The brothers thought the most significant challenge that had prevented successful flight was the pilot's ability to balance and control the aircraft.[21] Think of a bike. The bike is unstable and wobbly, but a bike rider is the one who controls where it goes and keeps it from falling down. This is how the Wright brothers thought an aircraft should work, but they needed to figure out how to make it possible![22]

They ran numerous experiments and built and tested various kites and gliders. They did a lot of inventing and research in their bicycle shop in Dayton, Ohio.[23] After writing to the U.S. Weather Bureau, the brothers learned that Kitty Hawk – with its steady winds, soft sand, high sand dunes, privacy, and open spaces — had optimum conditions for flight tests. They ventured to Kitty Hawk, North Carolina, for the first time in 1900, where they conducted testing of their inventions.[24]

The brothers made numerous breakthroughs through their work. They developed the concept of "wing warping" to balance the wings in flight and control the lateral movement of the aircraft. When they tested their first two gliders in 1900 and 1901, the performances did not match up with their calculations.[25] So, they built a wind tunnel and did more than two hundred tests on multiple wings and airfoil models.[26] Through these tests, the brothers found that a commonly accepted figure, the Smeaton coefficient, was inaccurate and corrected it. They also determined which wing shape was most effective.

After their success in flying their 1902 glider, which earned the title of the "world's first fully controllable" flying machine and added a moveable rudder, the brothers set out to figure out how to power and propel their aircraft.[27] They designed a simple gasoline engine with their bicycle shop mechanic, Charlie Taylor, who completed it after only six weeks.[28] The brothers also turned airplane wings on their sides to create propellers and connected them to the engine

in a way that was similar to a bicycle chain system.[29]

In Kitty Hawk on December 17, 1903, the brothers were ready to test their newest flying machine. By this time, Wilbur and Orville were the most experienced pilots in the world, having made more than 1000 flights on gliders.[30] Keep in mind, they had already built and tested three full-sized gliders! First in 1900, then in 1901, and finally in 1902. The biggest difference – or upgrade – from the 1902 glider is what made the 1903 Wright Flyer so significant: its propulsion system. In other words, it had power![31]

Who would fly was determined by a coin toss. Wilbur won the coin toss, but days prior, had driven the flyer into the sand during his attempt. After repairs were done, it was Orville's turn.[32]

The two brothers wore coats and ties on the windy morning of December 17th. Orville's first flight covered about 120 feet and lasted 12 seconds. Though it was short, as the National Park Service wrote, it was "the first time a manned, heavier-than-air machine left the ground by its own power, moved forward under control without losing speed, and landed on a point as high as that from which it started." Three more flights were taken by the brothers that day. The last flight of the day by Wilbur was the most impressive, with the 1903 Wright Flyer journeying 852 feet in 59 seconds. It was an amazing and historic accomplishment. The machine wouldn't fly again because, after the last flight, a gust of wind rolled the Wright machine over and significantly damaged it.[33]

But this was only the beginning. The Wright brothers opened up a new era in aviation and continued to improve on their design. A new version of their aircraft flew for 39 minutes and completed 30 wide aerial circles across a 24.5-mile distance in 1905 – just two years later.[34]

The Wright brothers' discoveries changed the course of history. Their determination to keep trying and to never give up has left a remarkable impact on future generations. Their contributions have been so significant and built upon by so many after them that Neil Armstrong brought with him a piece of the Wright Flyer on his mission to become the first man to walk on the moon.[35]

Footnotes

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