



7 First Flight and Beyond

1 Synopsis

This video looks at the history of flight, from the early drawings of Leonardo da Vinci to the invention of the modern jet engine. At first, inventors just tried to copy the way birds flapped their wings. However, once they understood the three separate challenges of lift, thrust, and control, they started to make progress. There were early experiments with balloon aircraft ("lighter-than-air" flying machines). Then, there were gliders, which tackled the problem of lift, but not control. The Wright brothers flew the first powered airplane in 1903. Since then, the development of more powerful engines and strong, light-weight materials has led to further advances.
Length of video: 5:44min

2 Target Language

Grammar: relative clauses; Simple Present and Simple Past Passive

Vocabulary: airplanes and flight

Language points: *capture the imagination, get off the ground, tackle the problem, be inspired by*

3 Procedural Notes

A Before you watch

Optional dictionary activity. Write on the board *fly* and *flight*, and explain that the video is about the early history of the airplane. Draw a picture of a bird on the board and elicit what it is. If you are not artistic, find a picture on the Internet, preferably of a bird in flight. Next to the picture, write the words *wings, feathers, flap, and tail*. Put the students into groups and tell them that all these words are connected to birds and flight. Tell them to use their dictionaries to find the words and to discuss how they are connected to flight. Give feedback by labeling the picture on the board.

As a class. Read aloud the names of the inventors and ask students if they have heard of them before. If you have access to the Internet, ask them to do a quick search and find out more about the people.

In pairs. Give the students a couple of minutes to match the names to their inventions. Explain that "aircraft" is a general term for any flying machine and that "wax" is what we use to make candles. Emphasize that the plural form of "aircraft" is aircraft. If necessary, explain the meaning of "dirigible" (an old-fashioned type of airship) and help students with the pronunciation of the word: /dɪ'rɪdʒəbəl/.

As a class. Check answers as a class, but do not accept or reject any of the answers at this point. Tell the students that they are going to learn more about these people in the video.

B While you watch

1 Individuals. Tell students that they are going to watch a video about the history of flight. Explain that they can check their answers to the exercises in *Before you watch* while watching. Play the whole video and check answers.

Answer key:

1 c, 2 d, 3 b, 4 a

2 Individuals. Have students read the sentences. Elicit what the speed of sound is (in dry air it's 343 meters per second, which is the equivalent of 1,236 km. per hour). Play the video again while students write the names. Check answers as a class.

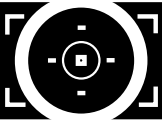
Answer key:

1 Daedalus 2 Leonardo da Vinci
 3 Alberto Santos-Dumont 4 Otto Lilienthal
 5 the Wright brothers 6 Chuck Yeager

C After you watch

1 As a class. Have students read the sentences and elicit suggestions from the class. If students find this difficult, play the video segment again [00:57-02:02]. Then, draw a diagram of a bird or airplane on the board, with an upward arrow (*lift*) and a forward arrow (*thrust*). Say that *control* is the ability to steer. (You can make a connection with the steering wheel on a car.) Have students complete the sentences. Check answers as a class.

Answer key: 1 c 2 b 3 a



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2 In pairs. Explain that students will be working on a joint presentation (i.e., a presentation given by two people). Have them decide which area of the video they would like to focus on. Encourage them to write the script together in their own words, and decide which person will read out which half of the presentation. If you like, have each student prepare a visual aid, too, e.g., a poster with a simple labeled drawing or diagram. You might find it helpful to review these structures on the board before students begin:

Relative clauses	The passive voice
Lift is the force that / which elevates birds when they fly.	The first powered airplane was invented in 1903.
Chuck Yeager is the pilot that / who broke the sound barrier.	It was invented by the Wright brothers.

Give 15 minutes for pairs to write their presentations and prepare any visual aids. While pairs are working, circulate and help with vocabulary and grammar. When they have finished, have pairs practice their presentations. Have some pairs deliver their presentations to the class.

Suggested answer:

Have you ever wondered how birds fly? First, they flap their wings, which gives them lift and thrust. Lift is the force that elevates them. It is caused by air flowing under their wings. Flapping their wings also gives them thrust. Thrust is the force which moves them forward. It is caused by powerful muscles in their chest and wings. Finally, birds use their tails and their wings to control the direction in which they are flying.

4 Video Script

Presenter: To fly like a bird. It's a desire that captures the human imagination. The Greeks told stories of Daedalus, an inventor who created wings made of wax and feathers, and flew. This first person who seriously tried to fly like a bird was Italian artist and inventor Leonardo da Vinci. Da Vinci designed complex and wondrous flying machines,

but his designs never got off the ground. Early inventors like da Vinci tried to fly by flapping just like birds. Here is what happens when a bird flaps. When a bird flaps, thrust and lift and control are all created at the same time. Lift is the force that keeps the bird elevated. Lift is generated by the air under the bird's wings. Thrust is the force that keeps the

D Language points

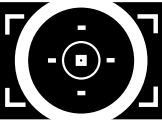
Individuals. Read aloud the phrases and check that students understand them. Elicit that *to be inspired by* is in the passive voice. If necessary, remind students how to form the passive: *be* + past participle (+ *by* + agent) and why we use it (because we want to emphasize the receiver of the action, not the agent of the action). Remind students that they need to put all the verbs in the phrases in the appropriate forms. Have students complete the sentences. Check answers.

Answer key:

1 captures the imagination 2 are inspired by
3 to tackle the problem 4 get off the ground

E Your viewpoint

In groups. Read the questions aloud and check that everybody understands them. If necessary, brainstorm some famous inventions on the board (fire, the wheel, penicillin, electricity, the telephone, the internal combustion engine, television, the microchip, the Internet, etc.). Draw the students' attention to the three model sentences below the questions and encourage them to use them. Have students work in small groups and have them discuss the questions. While groups are working, circulate and help with grammar and vocabulary. Finish off with a class discussion, and try to come to a consensus as a class.



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bird moving forward. Thrust is generated by powerful muscles in the bird's chest and wings. The bird maintains control by constantly adjusting its flapping. Much of a bird's control is generated by its tail.

A successful flying machine needed to provide the same forces that a bird used.

A successful flying machine needed to provide lift to overcome gravity, control to let the driver change direction, and thrust to make it move forward. And it needed to be light enough to stay in the air. Once inventors understood these three challenges separately and stopped trying to flap, they made progress.

One inventor was the Brazilian pilot and aviator, Alberto Santos-Dumont. Santos-Dumont experimented with balloons. He flew his lighter-than-air flying machines in France. In 1901, Santos-Dumont was the first to fly from Saint Cloud to the Eiffel Tower and back in a given time.

Meanwhile, other inventors were working on heavier-than-air flying machines. With these aircraft, lift was a big problem.

German flyer, Otto Lilienthal, tackled the problem of lift. He built many large gliders, constantly refining their design. Lilienthal made thousands of flights from the top of a hill, some that lasted as long as five hours. But, he eventually died in a tragic crash. Lilienthal successfully mastered the challenge of lift, but he did not master the challenge of control.

The Wright brothers were inspired by Lilienthal's inventions. The Wright brothers started to develop and test their own flying machines. In their Ohio workshop, they built a wind tunnel and wing models

that helped them understand and study aerodynamics. Through trial and error, they discovered how the shapes of different wings affected lift. They added a tail that moved, a stabilizer that made the front steady, and wings that were more flexible. Their 1902 glider was the first aircraft that was completely controllable. The next year, they added a custom-built engine that provided thrust. The engine powered them forward and increased distance and duration. On December 17th, 1903, after about a thousand test flights, the Wright brothers flew the first powered airplane over the sand dunes of North Carolina. Santos-Dumont invented heavier-than-air planes, too. In 1909, he developed a monoplane called Demoiselle, or the Grasshopper. It was the first modern aircraft.

After that, advances in aircraft design came quickly. More powerful engines were invented. New lightweight materials were developed so aircraft could go higher and faster. By World War II, strong metal replaced the canvas and wood of earlier planes.

In 1947, test pilot Chuck Yeager went faster than the speed of sound in a rocket-powered plane that looked like a bullet with wings. The invention of the jet engine made even higher speeds possible and pushed aircraft design in new directions. But technology doesn't always push to go faster. With new, ultra-light materials, the human-powered Gossamer makes it almost possible for people to fulfill the age-old desire and fly like a bird.