

Origins of the Aerostat (1780s)

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ABSTRACT

The invention of the aerostat in France in 1783 was a major event in the history of the conquest of the air. However, the tremendous enthusiasm prompted by this machine on a European scale, especially when it came to flight experiments conducted before giant crowds in many cities, makes it a key moment in the history of the relationship between society and modernity. Never before had a technological or scientific invention had such a considerable impact on the public, since the aerostat for the first time coupled the resounding triumph of human progress with collective experience in the form of spectacle.



Jean-Pierre Blanchard's flight in an aerostat in Nuremberg on November 12, 1787. © BnF.

An aerostat is a machine that can rise into the sky thanks to an envelope inflated with a gas that is lighter than air. It was invented in 1783 in the France of Louis XVI, and in fact involved a dual invention, for two competing groups got two different types of aerostats off the ground in quick succession: in June, the brothers and paper manufacturers Joseph and Étienne Montgolfier launched a hot-air balloon, while in August, Jacques Charles and the brothers Anne-Jean and Marie-Noël Robert, a professor of physics and an engineer, respectively, launched a hydrogen balloon. Although the first flights were without passengers, the inventors soon developed aerostats able to carry people in a basket. Once again, the two teams carried out their initial trials in quick succession, each using its own technique: the first free manned flight in a hot-air balloon took place in November, and in a hydrogen balloon in December.

Never before under the Ancien Régime had a technological or scientific invention exerted such a powerful

fascination over so large a public. For contemporaries, the aerostat suddenly made possible the age-old dream of flying. The difficulties guiding the machine, vertically but especially horizontally, were certainly a glaring weakness, however the realm of what was possible abruptly seemed to have opened up. When the mechanic Jean-Pierre Blanchard successfully crossed the English Channel in January 1785, some already began speaking of a transatlantic crossing. Historians also ascribe great importance to the invention, considering it as the founding event of the conquest of the air, as well as significant for other reasons. The aerostat's modernity was indeed not limited to its technological novelty, but also extended to the context in which it emerged and prospered for a number of years, which is more precisely to say the unprecedented relation established between innovation and society. In this regard, four remarkable elements deserve to be emphasized.

The first is that the aerostat inspired scores of people to participate, either by reproducing the experiment, or by helping to improve the invention. Direct imitation was often on a small or even very small scale, and while it could involve scientists, it generally applied to amateurs of all sorts, from the enlightened aristocracy to the enthusiastic novice, as well as schoolteachers with their pupils. The desire to provide technical or scientific contributions was no less spectacular: in the space of a few months, Montgolfier received 111 unsolicited suggestions to improve his machine, the Académie de Lyon received 101 reports in response to its contest on the best methods for guiding aerostats, the Académie royale des sciences heard 133 papers focusing on the newly-discovered invention, etc. Once again, the social and intellectual spectrum of the contributors was strikingly large, with professional scientists mixing with tinkering artisans. Interest in aerostation itself was augmented by the fact that numerous scientists envisioned using altitude to conduct the most diverse experiments, such as astronomical or topographical observations, meteorological and medical analyses of the quality of the air, or research on the speed of sound or the falling of bodies, among others.

The second element worth stressing is the rapid growth of large-scale experiments in different parts of the kingdom, especially manned flights, of which there were over thirty in approximately twenty French cities in less than two years. Local authorities across the country sought to conduct flights in a context blending glorification of French genius, celebration of the organizing city, enthusiasm of urban elites, and fascination with scientific progress. The monarchy was not hostile to this new fashion, and was the first to promote the invention for purposes of propaganda, by authorizing a flight in front of the Château of Versailles during the same period when France symbolically triumphed over England through the signing of the treaty ending the American War of Independence. Nevertheless, it did not take the state long to intervene in the face of the genuine risks posed by the flights, especially ones involving hydrogen balloons, by requiring authorization for all experiments. The largest obstacle remained financing, which was based on patronage, subsidies and contributions.

The third fundamental element was that considerable crowds observed the flights. Unlike most scientific experiments of the eighteenth century, a balloon's take-off could be observed by large numbers of people. This practical motive is, all the same, not enough to account for the mobilization, especially among the people. On the day of a flight, spectators would rush en masse with their families, prompted by a curiosity kindled by numerous press articles and publicity by local authorities. The best places were often reserved for contributors, or were allotted by ticket sales, although the crowd could watch from some distance away at no cost. The scientific aspect was clearly drowned out in large part by a festival atmosphere, so much so that a flight took on the appearance of a magnificent collective entertainment. In the few cases where a technical issue required cancelling the experiment, the public would get out of hand, or even engage in riots. All the same, in the end most likely more than one million people witnessed the invention with their own eyes.

The fourth noteworthy aspect was the speed with which this machine created in France resonated in Europe. Thanks to the press, the invention of the aerostat immediately became an event of international importance, which in turn prompted its share of contributions: in Göttingen the physicist Lichtenberg worked relentlessly to reproduce the experiment in his study, in Saint Petersburg a patriotic Frenchman took the initiative of a demonstration flight, in the Italian states, no less than ten people decided to take part in the contest of the Académie de Lyon, etc. Manned flights were soon organized in a series of cities, and were similar to those in France, except that the demonstrations turned even more into public spectacles, rather than scientific experiments conducted under state control. Thus Blanchard, who had become a professional aeronaut, concluded an actual tour of German cities between 1785 and 1792. With respect to Great Britain, since scientific institutions including the Royal Society did not deem the invention worthy of interest, and public authorities provided no encouragement, flights remained the

domain of adventurers of varying ability, which served to reduce the aerostat to the status of a charlatan's attraction for the masses.

The aerostat's first career was brief, for in late 1786 it was no longer in the news in France. The machine, which was limited in its manoeuvrability and uses, was at a standstill, unless unimaginable financial means were involved: the project of the engineer Jean-Baptiste Meusnier, with a true dirigible able to carry thirty people for sixty days, would require three hundred to a thousand times more investment than an ordinary balloon. Nevertheless, beyond the field of technical and scientific history, the aerostat was an innovation with a considerable social impact.

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