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SANTOS DUMONT: THE FLYING POET

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Few names are as well known in Brazil as that of Alberto Santos Dumont. After all, the name has been given to streets and squares in hundreds of towns throughout the country, as well as a famous airport, a municipality, foundations, museums and institutes, among other things. Paradoxically, this massive exposure conceals an image somehow emptied of content and meaning. The intention of this text is to strip away this cloak of ignorance and superficiality to reveal the figure of a flying poet, a dreaming and persevering designer, who through his creations made a difference to history, and who is therefore able to teach us lessons even today.

According to a dictionary definition, design is the 'conception of a product or model; planning'. Santos Dumont did not just conceive and plan a series of products, but he also developed, built and experimented with them personally. The best known are his flying machines – balloons and airplanes. He also came up with numerous other inventions, such as some engine solutions, the hangar and garments.

The essentially investigative spirit of Santos Dumont made him able to detect needs and opportunities where others saw nothing. His knowledge of mechanics, technology and materials enabled him to materialize solutions to these needs and opportunities in perfectly functional objects or mechanisms. A rare sense of elegance, in turn, allowed him to go beyond practicality and to refine shapes. Combined, these skills characterize him as a designer in the fullest sense of the word.

From a technical point of view, his immense capacity for technological innovation stands out. 'He used inventions that were already available, such as the gasoline engine, the shape of the balloon, the use of hydrogen, but he did new things with them', notes physicist Henrique Lins de Barros, who has studied the inventor's work.

V!RUS12
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From an aesthetic perspective, his harmony stands out. 'The beauty of Santos Dumont's designs was the result of the relationship between economy of means, lightness of execution and clarity of objectives. In short, simplicity', says Guto Lacaz, an architect and artist who is fascinated by the aviator. In other words, he added his technical mastery to the poetry of the imagination embodied in his creations.

One of the biggest celebrities of his time, Santos Dumont lived in Paris, then the Western world's epicenter, where he had access to everything that money could buy. Through his work, he made a bridge between the humanist 19th century and the technological 20th century.

HANDLING AND DECIPHERING GEARS

His vocation for innovation manifested itself early. Alberto Santos Dumont was born on July 20, 1873 on the Cabangu Farm in the municipality of Palmira (now Santos Dumont), in the Mantiqueira Mountains of Minas Gerais, where his father, Henrique, a Minas Gerais-born engineer, the son of a French couple, built a railroad. When he was six years old, his father bought a coffee plantation 20 km from Ribeirão Preto, in the state of São Paulo. Descriptions of his childhood on the farm, alongside his brothers and sisters – he was the sixth of eight children – offer glimpses of his future.

A frail and solitary child, he divided up his time between reading books by Júlio Verne under the shade of trees and his fascination for coffee processing machines. 'It would be hard to devise a more stimulating environment for the imagination of a child who dreamed of mechanical inventions', he said in his 1904 autobiography, 'My Airships', in which he gave long descriptions about how the plantation's machines functioned, their gears and the inspiration they would generate. Fascinated by movement, he started to make small waterwheels and paper kites.

In 1883, during the farm's traditional June parties, he surprised his family and the workers with small balloons made of colored tissue paper that he filled up with hot air from the flame of a stove and released into the air. At the same time – in other words, when he was just 10 years old – he started to build little airplanes out of bamboo, which were propelled by stretched rubber bands, like in a slingshot.

A conviction was born from these experiments: that people would be able to fly. This conviction soon expressed itself in the children's game of 'flying birds', as he described:

> 'All the children came together around the table, and one of them asked in a loud voice: 'Do pigeons fly? Do chickens fly? Do bees fly?' and so on. Every time he asked this, we had to raise a finger and say yes. Sometimes, however, he would shout: 'Do dogs fly? Do foxes fly?' or some other impossibility, to catch us unawares. If anyone raised their finger, they were obliged to pay a forfeit. My playmates never failed to wink and smile mockingly at me when one of them called out: 'Do people fly?' because I would always lift my finger very high, as a sign of absolute conviction, and I resolutely refused to pay a forfeit'.

This episode shows that Santos Dumont was always a free thinker, capable of going against the tide. Another characteristic that appeared in his childhood was his courage to face and overcome risks. At the age of seven, he drove the steam engines used to carry the coffee beans from the harvest site to the main railroad. Aged 11, he

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MODERNS
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semestre 01 semester
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convinced the locomotive engineer to let him drive the Baldwin locomotives that his father had ordered from Europe. At the age of 13, he began to repair agricultural product processing machines. The farm became the country's biggest coffee producer, featuring 5 million coffee bushes and 96 km of internal railroad tracks served by seven locomotives, as well as all the technical novelties that his father had learned about in his engineering course in France.

In 1891, Henrique Dumont had an accident that left him partially bed-ridden. He decided to seek treatment in Paris, where he had relatives. His wife, Francisca, and some of their children accompanied him. At that moment, balloons were already crossing the skies of the French capital. Alberto soon wanted to fly in one, but he was taken aback by the 1,200 francs charged for a trip of just two hours. He and his father visited an exhibition of machines at the then Palace of Industry. He recounts: 'I was astonished when I saw, for the first time, a 1-horsepower gasoline engine, very compact and light, compared with the ones I knew, and… working! I stood before it as if struck by fate. I was completely fascinated'.

He turned his attentions to motoring and at the age of 18 he became the owner of a Peugeot. When he sailed back to Brazil in 1892, he brought his car to his house on rua Helvétia, in São Paulo, where his family had moved. He therefore became the first person to drive an automobile in Latin America.

Henrique Dumont failed to regain his health, and in 1892 he decided to sell his farm and share two-thirds of his fortune among his children. He also decided to officially emancipate his son Alberto, who was then 18 years old. Together with his freedom, he gave him plenty of money and the following advice:

> 'Go to Paris, the most dangerous place for a young man. Let us see if you will become a man. I prefer that you do not become a doctor. In Paris, with the help of our cousins, you will look for a specialist in physics, chemistry, mechanics, electricity, and so on. Study these subjects and do not forget that the world's future lies in mechanics. You do not need to think about making a living; I will leave you enough to live on'.

DRIFTING PAST VILLAGES AND WOODS

Alberto closely followed the recommendation of his father, who died in 1892. The same year, he left for France. Paris sparkled during the Belle Époque.Picasso, Cézanne, Matisse, Monet, Toulouse-Lautrec, Sarah Bernhardt and Marcel Proust were some of the famous people in the city's hectic cultural life. The wealthy young heir's circle of friends included artists, noblemen and their entourages. He began to frequent sophisticated places and restaurants, such as Maxim's. The city was also witnessing unparalleled technical progress, expressed in the balloons that crossed the skies, in the bridges that multiplied over the Seine River, and in feats such as the recently opened Eiffel Tower – a beautiful monument to the human capacity to overcome limits. There was palpable optimism for the future and a belief that scientific achievements would open up a new age for humanity.

He was the only son of Henrique Dumont who did not do a university degree in engineering. He began to take some private classes and, above all, to develop his immense capacity to directly research and study topics of interest. Balloons returned to

V!RUS12
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his dreams. However, as professional aeronauts 'charged extravagant sums for the most trivial ascents', he returned his attentions to motorcars and motorbikes. His enthusiasm was so great that once he rented the Parc des Princes velodrome and organized the city's first motorbike race.

In 1897, while in a bookstore during a trip to Rio de Janeiro, he came across a book that was to change his life. 'Andrée – Au Pôle Nord en Ballon' described the balloon in which Swedish men Salomon-Auguste Andrée, Nils Strindberg and Knut Fraenkel had made an abortive trip to the North Pole that year. The authors were the balloon's builders, Frenchmen Henri Lachambre and Alexis Machuron. Santos Dumont said that the book was a revelation to him. 'I ended up memorizing it as if it were a school textbook. The construction and pricing details opened up my eyes'.

Back in Paris, he decided to contact Lachambre and his nephew Machuron. Instead of paying the fee of around 1,000 francs that professional aeronauts charged for a balloon trip, the builders offered their experience for just 250 francs. Santos Dumont accepted immediately. His description of his first ascent is a masterpiece.

> The air around us seemed motionless. We were off, and the air current we had crossed was taking us at its own speed. […] This imperceptible forward movement has an infinitely pleasant feeling. The illusion is absolute. It seems not to be the balloon that is moving, but the earth that sinks down and away. […] Villages and woods, meadows and châteaux, passed across the moving scene, out of which the whistles of locomotives threw out faint but piercing sounds. Together with the yelping of dogs, they were the only sounds that reached us up high. The human voice does not travel to these boundless solitudes.

The joy he experienced in the skies encouraged him to make his own balloon. His design maintained the spherical shape that had been usual until then, but he innovated in terms of size. Rather than the usual capacity of 500 to 2,000 cubic meters, Santos Dumont planned a capacity of 100 cubic meters, using lightweight and durable Japanese silk. Hired to build the balloon, Lachambre and Machuron tried in vain to talk him out of what seemed to them a rash idea, as they thought balloons needed to be heavier in order to be stable.

Santos Dumont challenged common sense and, after resolving various construction details, at the age of 24 he managed to obtain a balloon just 6 meters in diameter and 113 cubic meters in volume. Baptized Brasil, it fit inside a case and was the smallest made until then. Parisian balloonists doubted its ability to fly, due to its size. 'But I am small', the Brazilian retorted. In fact, around 1.60 meters tall and weighing 50 kg, despite wearing platform shoes he was unable to avoid being nicknamed 'petit Santô' in the city.

In his own words, Brasil was

> 'beautiful in its extreme transparency, like a large soap bubble. […] I went along in the darkness. I knew we were going at a great speed, but I did not feel any movement. I heard and entered a storm. And that was it. I was aware of a great danger, but it was not tangible. A kind of wild joy dominated my nerves. How can I explain this? How can I describe it? Up on high, in the black solitude, among the lightning and thunder, I felt an integral part of the storm itself'.

V!RUS12
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ano 2016 year
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Between his first flight in a balloon and the victorious ascent of Brasil, just four months had gone by – the first was on March 23 and the second was on July 4. In this period, he took around two dozen trips in ordinary spherical balloons, including standing in for Lachambre when he was hired for public demonstrations. 'As I got the pleasure and the experience, and as I saved Lachambre the labor and paid for all my own expenses and damages, it was a mutually advantageous arrangement', Santos Dumont wrote. In these flights, 'quite alone, as the captain and sole passenger', he was able to test ideas that he was developing and observe details of the construction and behavior of flying machines. After Brasil, he made a larger balloon, called America; he was tired of traveling alone.

PERSISTENCE AND DETERMINATION

Having personally maneuvered these balloons was, in his view, 'an indispensable preliminary step' for his next project: to build an airship. Until then, he had flown at the mercy of the winds. Previous attempts at making an airship had run into the problem of engines – steam or electric – which were large, heavy and feeble.

Santos Dumont had the idea to use the petroleum motor, known as internal combustion engine, at the time used in automobiles. Other balloonists thought this was madness and argued that the sparks could ignite the hydrogen used to inflate them. Santos Dumont insisted on finding a solution, as he understood that gasoline engines were potent, light and compact, qualities that in his opinion made them superior to previous kinds of engines.

To test his hypothesis, he combined machine and nature in a unique experiment. He hung a tricycle equipped with a gasoline engine from a horizontal limb of a large tree in the Bois de Boulogne, in Paris, suspended a few centimeters over the ground, to test whether or not it would jerk around in this position. The aviator himself wrote: 'It is hard to explain my contentment when I found that, unlike what happened on the ground, the engine of my tricycle, when suspended, hummed so calmly that it appeared quite still'.

Besides innovating in terms of the type of engine used, Santos Dumont also chose a different shape of balloon: cylindrical, long and thin, ending in a cone in front and behind, in order to 'cleave the air'. Once again, the builders did not want to get involved in such a reckless enterprise; Santos Dumont convinced them to work for him by saying that if they did not do so, he himself 'would cut, sew and varnish the balloon'. His airship nº 1 flew in September 1898, two months after Brasil. It did not blow up, and it brought its designer 'wonder, delight and intoxication' from the sensation of having sailed through the air, feeling the wind blow in his face (because 'in spherical ballooning we go with the wind, and do not feel it. At most, we notice a rustle in the atmosphere, when rising and descending'). Airship nº 1 flew a single time and then fell to earth. Santos Dumont built another one, which also fell down. He soon discovered his design errors, and in airship nº 3 he was able to fly almost daily around Paris.

This experience encouraged him to continue to develop dirigible, and he built a series of cigar-shaped balloons, whose details he studied and modified. 'He had a fantastic ability to solve problems. The shapes arose from the needs he observed. He aimed to achieve lightness and strength, and he obtained them through his own solutions', says

V!RUS12
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Rio de Janeiro-born designer Flávio Lins de Barros, who has researched the aviator's creations. His designs were also elegant, precise and economic, resulting in an aesthetic quality far superior to that of the models of other aeronauts.

Another difference is that he himself remained willing to try out his inventions, and he began to frequent the skies of Paris as much as the salons of high society. He frightened people with his flybys and he occasionally crashed to earth. Once, in 1901, he fell into the trees in Baron de Rothschild's gardens. On another occasion he needed to be rescued by firemen from the side of the Trocadero hotel, where he was left hanging after his airship nº 5 deflated. At the time, flying was a genuinely extreme sport, demanding a good deal of courage. After all, there were no flight simulators, helmets, chest guards, safety belts or parachutes. It is estimated that at least 200 pilots had already died when Santos Dumont first took to the skies. Stubborn and persistent, he would fall, get up and 'go back up again'.

CELEBRITY *AVANT LA LETTRE*

A dandy and a connoisseur of fine champagne and luxurious restaurants, the inventor was what we would today call an opinion leader, a well-known and admired public figure. Unlike other pilots, who tended to go around in messy, greasy clothes, Santos Dumont was always impeccably dressed while flying, generally wearing pinstripes and a double collar shirt, pants with cuffs and a wavy straw hat with a high crown that he himself designed – details that helped to conceal his short stature. 'He was the best-dressed aeronaut the world ever knew', says Paul Hoffman, the author of the book 'Wings of Madness'. Santos Dumont's unique look was quickly copied in the capital of fashion. His high collar was called a 'Santos collar' by the press. He was even original in the way he combed his hair, with a middle parting.

In addition to flying machines and clothes, he extended his design talent to several other areas. Some of his creations were of little importance, resulting from one-off needs, such as a table with high chairs he designed for his home in Paris in order to get used to heights. Others shifted paradigms.

This is the case with the wristwatch, the original idea for which is attributed to him. It arose when, following another accident, he was awarded a São Benedito medal by Princess Isabel. He decided to wear it on his wrist, attached to a gold chain. When he looked at the bracelet, he had an insight into a solution to a longstanding problem of seeing what time it was while flying. To keep a track of flight times, pilots needed to take their pocket watch out of its pouch – a tricky operation at a moment when they needed both their hands to remain in firm control of their vehicle. Santos Dumont suggested his idea to jewelry maker Louis Cartier, his friend for some years. Cartier made a steel watch with a leather wristband. (In 1978, the Cartier company reissued the original model and, since then, it has periodically launched new models in the 'Santos Collection', in honor of the aviator.)

Santos Dumont also invented the hangar. One of the difficulties of being a balloonist at that time was the cost. In 1900, it cost around US$500 to fill a 620-cubic-meter balloon with hydrogen. And it had to be filled before every flight. Santos Dumont saw the problem and its solution. He decided to create a garage for his balloons. He came up with the design for a sliding door, which would need to be large and high enough to let a full balloon pass through it, but easy to open and close. In his design, executed in

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MODERNS
ano 2016 year
semestre 01 semester
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1900, in Saint-Cloud, on the outskirts of Paris, the sliding door was 11 meters high and 30 meters wide, but even so it could be moved very easily.

FLYING WHEREVER HE WANTED TO GO, NOT AT THE MERCY OF THE WINDS

It was out of his hangar that he left on October 19, 1901, with his balloon nº 6, to prove that it was possible to deliberately sail along a pre-established route. Watched by an attentive crowd, Santos Dumont departed from Saint-Cloud, flew around the Eiffel Tower and returned to his original point, in 30 minutes. He thereby won the Deutsch Prize, which the Aero Club of France had offered the previous year to whoever could prove that balloons could be successfully steered around a course. The prize was sponsored by Henri Deutsch de la Meurthe, an industrialist involved in oil refining and an avid supporter of aviation.

Guto Lacaz has a special fascination for the photo that symbolizes the Deutsch Prize. He says:

> 'In this image we have the harmonious meeting of two high-tech icons of the time: the architecture of the Eiffel Tower and the airship. The tower, made of iron, heavy and static, and a lighter-than-air experiment. Each one, in its own way, conquering the skies'~~, he says.~~

In his opinion, the image of this encounter between two icons of the age's technological achievements is as strong as those of the first Moon landing. Curiously, although the photo is generally shown with the date of October 19, it was actually taken in July, when Santos Dumont was preparing to win the Prize, and still using airship nº 5. It so happens that October 19 was a cloudy day, hampering efforts to take photos of the great event.

The achievement caused a great stir. On his drive home, he was greeted by people on the sidewalks, who waved their handkerchiefs and hats or threw flower petals at him. The elation became even greater due to his next act. Deutsch had promised to give 125,000 francs to whoever could win the prize bearing his name. Santos Dumont gave 50,000 to share between the mechanics and workers who had helped him, and the other 75,000 to Paris' local government, to distribute among the city's jobless. He knew that the first thing unemployed people would do is pawn their work tools. He asked the city government to pay back the pawnbrokers' loans in order to return these tools to their owners. In his book 'O Brasileiro Voador', Márcio Souza says that 'the press applauded this magnanimous gesture and the needy exalted Alberto as a demigod'. Thomas Edison, the inventor of the electric light bulb, and Guglielmo Marconi, the inventor of the telegraph, sent him congratulatory telegrams.

Santos Dumont's airship nº 6, the one with which he had won the Deutsch Prize, was lighter because for the first time he had used aluminum, and he swapped the ship rope he had used until then with piano wire. His willingness to go against convention in his designs continued. Nº 7, made in 1902, was a racing airship. Nº 9, built in 1903, was a leisure vehicle, which he used to descend down to cafés or the homes of millionaires, which people found very charming. In response to comments that his inventions did not have any utility or commercial value, he sold airship nº 8 to the vice president of the Aero Club of America, a Mr. Boyce. Nº 10, built in 1903, which could in theory carry 10 passengers (although it never flew with as many), was called an airship bus,

V!RUS12
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and he also sold it. In 1905, he designed nº 11, a monoplane; nº 12, a helicopter; nº 13, an airship consisting of two balloons, intended for long journeys, although it was not a success and Santos Dumont donated it to the Aero Club of France; and nº 14, an airship that performed demonstrations in Deauville (and was later used to test an airplane called 14bis by suspending it from it).

THE MILESTONE OF 14BIS

He then focused his creative energy on his intention to meet the challenge that occupied many minds in that period: to develop a heavier-than-air aircraft. At the age of 33, on October 23, 1906, on board 14bis, he managed to fly for 60 meters, at a height of 3 meters. This feat, watched by thousands of people, made the front pages of newspapers in many countries. However, there were doubts as to whether the flight had been into the wind or with the wind. He then performed a second flight on November 12, watched by specialists and members of the public, when he flew for 200 meters at a height of 6 meters, in the Château de Bagatelle's grounds in Paris. The event was filmed.

His flight of October 23, when he flew for 60 meters, won him the Archdeacon Prize, while his flight of November 12 was recognized by the Fédération Aéronautique Internationale (FAI) and it was the first officially recorded flight in the history of aviation. These feats gave Santos Dumont prominent international recognition. He had proven that it was possible to take off, fly and land using a heavier-than-air craft. After him, various inventors, including Blériot, Voisin and Esnault-Pelterie, started to conduct experiments, with varying degrees of success.

14bis was a large object: it was 10 meters long, it had a wingspan of 12 meters and it weighed 160 kg. The pilot was positioned at the rear of the aircraft, standing up, as in a balloon. The aircraft's appearance reminded the public of a flying duck, so machines of this kind were given the nickname of canard (French for duck).

14bis' design arouses conflicting opinions among its admirers. Visual artist Waltércio Caldas is one of its fans. He says it is the first constructive object he ever saw:

> 'It is prematurely constructive, in plastic terms. It is an object made to fly, built using a large dose of imagination linked with a large dose of constructive rationality. The two were combined in an absolutely daring project to fly. For me, 14bis is a very clear example of this possibility of using the emotion of willpower with the elements of reason to achieve goals as bold as flying'. Other people consider it ugly, heavy, bulky and clumsy.

Santos Dumont's feat turned him into one of the most celebrated people of his time. His name came to be exalted not only in newspapers and magazines, but also on postcards, dishes, matchboxes, chocolates, candies, toys and many other objects.

DEMOISELLE, THE MASTERPIECE, AT THE AGE OF 36

He then built airplane nº 15, hybrid airship nº 16, airplane 17 and nº 18, a 'hydro-float' vehicle. Nº 19 was given not just a number, but also a name, Demoiselle, which

V!RUS12
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semestre 01 semester
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can mean either damselfly or damsel in French. Gracious and transparent, Demoiselle is unanimously considered a beauty.

Built in 1907, it had a wingspan of just 5.10 meters and it was 8 meters long, almost half the size of his previous year's 14bis. When the slender Santos Dumont was on board, the total weight was 110 kg. He even created the engine, an arrangement of two opposed horizontal cylinders, based on a Dutheil-Chalmers motorbike engine. He was positioned at the front of the aircraft, meaning that for the first time he could remain seated during flight.

Demoiselle 19 made a short flight in November 1907, but it was very fragile and light. In March 1909, Santos Dumont presented his new Demoiselle, nº 20. The first ever ultralight aircraft, it had a 5.6-meter wingspan, it was 5.5 meters long and it had a 24-horsepower engine. This very successful airplane was made of a poetic mix of materials: the fuselage was made from bamboo tubes; the wings were covered with Japanese silk; the propeller was wooden; the joints were metal; and the fastening cables were made from thin, strong piano wire.

On one occasion, Santos Dumont got lost, ran out of fuel and landed in the grounds of Château de Wideville, which belonged to Count Galard. Demoiselle was an airplane of the type we know today. According to Professor Fernando Catalano, of the University of São Paulo, this plane influenced the whole of aeronautics. Its performance was extraordinary. It reached speeds of more than 90 km an hour, incredible for the time.

Santos Dumont received requests to buy the beautiful little craft, which conceptually defined the future of airplanes. To great surprise, the designer declared the design to be in the public domain, he gave up all rights to it, and he published all Demoiselle nº 20's technical details in American magazine Popular Mechanics.

Following this, dozens of people in many countries copied Demoiselle's design, made minor modifications and patented them as their own creations, including inventors such as Fokker. More than 200 similar craft were made in the following years by companies and individuals. Thus, it effectively became the first serial produced airplane.

Regarding Demoiselle, Santos Dumont told a journalist the following: 'If you want to do me a great favor, declare in your newspaper that, eager to spread aerial locomotion, I have made the patents to my airplane available to the public. Everyone has the right to build it, and to this end they may ask me for the plans. The craft is not expensive. Including the engine, it is less than 5,000 francs'.

RETIRING FROM THE SKIES

Santos Dumont considered his designs to be the property of mankind and he did everything publicly. Meanwhile, in Ohio, in the United States, Wilbur and Orville Wright, brothers who manufactured bicycles, were designing aircraft models in secrecy, in line with their avowed commercial interests. Following 14bis' flight, they publicly claimed that they had been the first to invent the airplane. On December 17, 1903, they had taken off from the dunes of Kitty Hawk, North Carolina, assisted by winds of nearly 40 km an hour. In 1904 or 1905, they used a catapult to facilitate takeoff, although they still needed strong winds.

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In 1908, the Wright brothers went to Paris to try to sell their airplane to the French government, flew around the Eiffel Tower and obtained considerable press coverage, stealing media attention. Although he was not financially ambitious, Santos Dumont was very vain. And now, 'out of nowhere', he saw his feats contested, and watched helplessly as the media's interest was diluted. He was no longer the only celebrity of aviation.

Moreover, he felt exhausted. Between 1898 and 1907, he had developed an average of two new models per year – a frenetic rate of output, which placed huge pressure on him. He had what his nephew Henrique Dumont Villares called 'reflected audacity'. He did not disregard the risks. On the contrary, he sought to think in advance about all possible problems, but he did not allow himself to become paralyzed by them, fighting the resistance and pessimistic prognoses of builders and friends. In this struggle, he put his own body at risk. Countless times he narrowly escaped death, thanks to quick decisions, using his proverbial self control and scientific knowledge. He fell down on land and on sea. He caught pneumonia because of the exposure to the wind and cold he experienced while flying, with his body unprotected.

In 1910, declaring that he was fatigued, he decided to put an end to his career as an aeronaut. Before retiring from the skies, he gave one more show in his Demoiselle. Invited to perform at a ceremony, during the flight he took his hands off the controls, spread out his arms and waved with a handkerchief in each hand to the crowd watching from the ground, in order to demonstrate the absolute stability of his masterpiece. He sold his Demoiselle to an aspiring pilot, Roland Garros, who became a hero in the First World War, honored after his death by having a tennis stadium in Paris named for him.

He then ended his activities in the field of aeronautics and began to give talks in many countries. In addition to Portuguese and French, he spoke Spanish and English fluently. He was still a public personality and one of the best-known people of his time, and he received many honors. In 1905, he was granted the title of Knight of the Legion of Honor of France. In 1913, he was made a Commander of the Legion of Honor, and in 1929 he became a Grand Officer of the Legion of Honor, when his voice was recorded in a film. In 1910, a granite monument was erected in Bagatelle, inscribed with the following words: 'Here, on November 12, 1906, overseen by the Aero Club of France, Santos Dumont established the world's first aviation records: duration – 21 1/5 seconds; distance: 220 meters'. In 1913, a statue of Icarus by sculptor Georges Colin was erected in his honor in Saint Cloud, Paris. In 1918, his autobiography, 'What I Have Seen, What We Will See' was published. In 1924, he was given an Order of Leopold medal by the Belgian nation. In 1931, he was elected a member of the Brazilian Academy of Literature, taking over seat number 38 from Tobias Barreto (originally Graça Aranha's seat).

NEW INVENTIONS

From time to time, the verve of the genius creator would manifest itself again. He made a set of motorized skis to bring skiers up mountains, at a time when there were no ski lifts. He created a slingshot-like device to throw life preservers at drowning people. He made instruments to drag treats around to keep racing greyhounds enticed and to facilitate dog training. He patented many of his inventions, but soon after made

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ano 2016 year
semestre 01 semester
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them available for free. This was the case with the first gasoline engine used in aviation (for airships nº 1, 2 and 3) and his opposed-cylinder engine (for Demoiselle 19), for example.

He even ventured into the field of interior and furniture design. In 1918, at the age of 44, he built a remarkable house in Petrópolis, Brazil, which featured many things that are now popular trends in this field. The site was considered to be terrible: steeply sloping, on the side of a hill, Morro do Encanto, in the street of the same name. However, the inventor liked the place and he decided to buy it to build his 'Enchanted House' there. To construct it, he hired engineer and builder Eduardo Pederneiras, who had built the acclaimed Copacabana Palace hotel in Rio.

Seen by contemporary eyes, the home is visionary. Like fashionable lofts, it does not have any internal walls. The rooms are divided up in line with their location on different levels of the slope. On the lowest floor, there is a small mechanical workshop. On the second, there is the living/dining room and library. From this floor there rises a staircase, whose steps are arranged in alternate halves, meaning that it can only be climbed by starting with one's right foot. It is said that this detail served one of the inventor's superstitions. However, this design feature enabled the stairs to be steeper, permitting incredibly effective usage of the house's limited space.

The third floor contains the bathroom and a mix of office and bedroom. He did not use a bed: at night, he laid a mattress on top of his desk. When not in use, the mattress was placed behind the bathroom door, in a niche specially designed for this purpose.

The bathroom also contained a novel feature: a shower made from a bucket with a hole in it. Two levers controlled the entry of alcohol-heated and cold water. Many authors credit Santos Dumont with having invented the shower. On the small roof terrace he had an observatory, where he kept a telescope to remain in contact with the skies.

One innovation is that the house does not have a kitchen, as he did not enjoy cooking. He would order meals by phone from the Palace Hotel, which was opposite the house – an early phone delivery service! His dining table had a specially designed hollow section out of which the waiter would take the food. When he had guests, he would receive them at the hotel rather than at home.

THE VARIOUS SENSES OF A CREATION

Away from the spotlights of Paris and tormented by the large number of deaths in air accidents and the growing use of airplanes as a weapon of war, Santos Dumont grew depressed. He tried to exonerate himself: 'I use a knife to cut a piece of Gruyère cheese, but it may also be used to stab someone. I was a fool to only think about the cheese', he said in 1915.

Although in his first book, published in 1904, he extoled the military advantages of aircraft and he took part in a military parade in his aircraft nº 9, in his 1918 autography, 'What I Have Seen, What We Will See', he said that his heart suffered from news of the 'terrible slaughter caused in Europe by aeronautics. […] We, the founders of aerial locomotion at the end of the last century, dreamed of a future path of peaceful glory for this daughter of our zeal'. Speaking both for himself and on behalf

V!RUS12
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of other aviation visionaries, 'hundreds of whom gave their life for our idea', he said that 'it never crossed our minds that our successors could in future be 'ordered' to attack children, women and elderly people'.

Some authors claim that, confusing creators and their creations, he felt guilty for every aircraft accident he heard about, every death in the skies. In 1926, he appealed to the League of Nations not to use aircraft in war. Besides considering himself personally responsible, he was also suffering from inactivity. After all, he had achieved an unimaginable power through his feats. 'I am not very tall or strong, but when I am standing in my basket, the machine has to obey me. It does not control me; I control it. It is the perception of this power that makes air travel a fascinating activity'.

Indeed, it must have been cruel for one of the world's most famous men, the great aviator, the refined dandy who was a friend of the sculptor Auguste Rodin and Princess Isabel, who had been greeted with petals after winning the Deutsch Prize, to see his celebrity fade. His glory had been immense: he had left the society of his bucolic childhood, which still had slaves, for Belle Époque Paris. In his life, he had made a bridge between the most backward things and what would arise from the most advanced things – the possibility of people flying. He, who in his heyday subscribed to three newspaper and magazine clipping services to have access to news about his deeds, suddenly found himself alone, without any recognition or visibility.

The once intrepid aviator started to isolate himself ever more. He later began to suffer from dizziness, double vision, urinary incontinence and a lack of appetite, mixed with seizures likely caused by multiple sclerosis, which he treated in long stays at rest homes and sanatoriums in Switzerland and France. In 1928, one of his nephews convinced him to return to Brazil, to be nearer his family of origin. At this moment he suffered a new blow, perhaps the cruelest. A seaplane containing 12 friends who had come to greet him crashed, killing all those on board. 'So many lives sacrificed by my humble self!' he told the newspapers, even more depressed.

The final blow was the aerial bombardments ordered by President Getúlio Vargas on rebels in São Paulo during the Constitutionalist Revolution, on July 9, 1932, at a time when few cities in the world had experienced this. Contacted by representatives of Minas Gerais, Santos Dumont agreed to sign a document in favor of the state where he was born and against São Paulo, but according to relatives he soon regretted this, confused about which position to take. On July 14, he saw military airplanes flying low over the beach in front of the hotel where he was staying in Guarujá, on the coast of São Paulo State. On July 23, three days after his 59th birthday, he hung himself with a tie in the hotel bedroom.

The government and his family decided to conceal his suicide and divulged the news that Santos Dumont had died from heart problems. During his funeral, 'thousands of pilots across the world tipped the wings of their airplanes in a final gesture of respect', claimed Paul Hoffman.

Other tributes were paid to the 'hero', the 'wronged genius', the 'father of aviation', as the Brazilian government and his family sought to mold his image. 'By being appropriated by the military, Santos Dumont turned into a bland figure, the symbol of a mediocre and resentful patriotism, typically Brazilian, a kind of puny and yellowing demigod, wronged only because he was born in this land of carnival and geniality', says Márcio Souza in the introduction to 'O Brasileiro Voador'.

V!RUS12
RADICAL
MODERNS
ano 2016 year
semestre 01 semester
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A MULTIFACETED AND PERSEVERING BRAZILIAN

At the end of the day, was Santos Dumont the father of aviation, or not? To whom should we credit the first flight in a heavier-than-air craft? In heated discussions, his'supporters' claim that the Brazilian was the first to fly by his own means – in other words, to make a self-sustained flight – in 1906, and to publicly demonstrate the feat. The Wright brothers made their flight in 1903, but without any official witnesses and in an airplane that required help from strong winds.

However, this increasingly seems to be a false dichotomy. After all, the attempts to emulate the myth of Icarus and conquer the skies are lost in history – and one important chapter in this story occurred around 1500, when Leonardo da Vinci designed his first flying machines. At the turn of the 20th century, the preconditions for this were finally mature, following a series of research and experiments that fed each other. Thus, this may be considered a collective achievement, involving many players, at different levels of involvement.

Other circumstances should be taken into account. The Wright brothers were from a country that knows how to promote itself, how to make money and how to work with the power arising from the control of information. Santos Dumont, on the other hand, suffered the consequences of giving up his patents and being from a country where success is often considered a personal offense. Moreover, he was very quiet, introspective and discreet, characteristics that may seem like arrogance in a country that celebrates extroversion and taps on the back. As the years passed, he became even more distant, withdrawn from official tributes and self-absorbed.

However, he always demonstrated pride in his origins. He carried a Brazilian flag in a small case, to display it wherever he was. He named his first balloon for the country – his only balloon to have a name rather than a number. At a certain moment he decided to sign his name with an equals sign (=) between the two parts of his surname – Santos, from his Brazilian maternal side, and Henrique Dumont, from his French paternal side – to make clear that both sides had equal weight to him. As many people thought this odd, he decided to replace it with a hyphen.

Santos Dumont was a multifaceted personality. He was a self-taught man who became a designer, inventor, engineer, mechanic, builder, scientist, esthete, writer and sportsman – and what permeated all these dimensions was his posture as a visionary poet. It is remarkable that, very young, between the age of 25 and 36 – from 1898, when he made his ascent in his first balloon, Brasil, to 1909, when he created the last version of Demoiselle – he gave the world so many achievements of such importance.

Rediscovering the size of this enormous legacy of this illustrious Brazilian could help the nation to free itself from its longstanding role as merely an exporter of raw materials, to find its place in international markets as a county capable of generating technological innovation of the highest quality. Knowing the multiple facets of his achievements will make it possible to go beyond the frozen image on official monuments, to recognize him for his many qualities, such as boldness, persistence, sensitivity, innovation, capacity for achievement, creativity, eagerness to experiment, ingenuity and courage. Through these qualities, a mirror may emerge, in which Brazilians may recognize themselves as a creative, innovative, persistent, persevering people, who overcome difficulties in the pursuit of their ideals.

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Revised and expanded version of a text published in 'Santos=Dumont designer', the catalogue for the exhibition of the same name curated by Guto Lacaz. This exhibition was held at Museu da Casa Brasileira, a museum in São Paulo dedicated to architecture and design, in 2006, when the author was the museum's director.

TO LEARN MORE

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NOTE

Many concepts included in this article come from conversations I have had about Santos Dumont with Guto Lacaz since August 1998, when I invited him to give the inaugural class in my course of Design History at the Armando Álvares Penteado Foundation's Fine Arts School in São Paulo, with a presentation about Santos Dumont, who we both consider to be the patron of Brazilian design.

The quotations from Henrique Lins de Barros and Flávio Lins de Barros come from interviews in October 2001, when I wrote a long article about the aviator for the Gazeta Mercantil newspaper. In 2016 I contacted Henrique Lins de Barros once more, whose collaboration was essential in revising this text. The quotation from Waltércio Caldas was originally published in the Banco do Brasil Cultural Center's Veredas magazine. All the quotations from Santos Dumont were taken from his two books, 'My Airships', published in 1904, and 'What I Have Seen, What We Will See', published in 1918. Other important sources for this article are listed in the 'To learn more' section. I highly recommend them. This article also incorporates observations made by students in recent years, whom I thank.