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Anticipations rationnelles. Étudier les spéculations sérieuses et les futurs possibles du vol humain

Introduction
Rational anticipations. Studying Serious Speculation and the Possible Futures of Human Flight

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OUTLINE

1. The future of aeronautics, the future through aeronautics
2. Futures in outer space
3. Aims and content of the issue

TEXT

The authors would like to express their gratitude to Arnaud Saint-Martin for his feedback on an earlier draft of this introduction and to Jonathan Givan for his review of the translation.

1. The future of aeronautics, the future through aeronautics

1 In 1912, Michelin printed one million copies of a brochure with the catchphrase "Our future is in the air.[1]" This slogan had already appeared the previous year in the Michelin Aerocible Prize, and was drawn by Pablo Picasso in three of his paintings.[2] Although mocking the vogues and obsessions of the time, Picasso's works are a reminder of the interest many artists took in aviation during its infancy.[3] The formula can also allude to the *avant-garde* artistic movement's role as pathfinders, which is probably why the catchphrase is sometimes attributed to the artist rather than to the industrialist.[4] In any case, the appearance of this phrase in a publication distributed by Michelin is significant.

2 The brochure included texts by military experts and journalists summoned by the industrialist. They made very concrete demands for aircraft, aviators and money in order to create an air force. The

cover suggested a national air future in a more abstract way. However, this vision was merely the extrapolation of a group whose main aim was to develop the military usage of aviation. As a representation of the future, the slogan was indeed an anticipation, but one that was part of a propaganda activity[5] as well as, for the Michelin brothers, a self-promotional activity advertizing the involvement of their company with the nation.[6]

3 Detached from the brochure, the slogan could just as easily apply to several other conjectures which, at the beginning of the 20th Century, flourished and gave substance to the expectations or fears aroused by the new flying techniques being tested in Europe and on the American continent. Airships, helicopters and aeroplanes all featured in a variety of accounts, testifying to a forward-looking, anticipatory mindset that mapped out various futures.

4 Although throughout the 19th century the problem of aerial locomotion – that is, the ability to maneuver through the air – fueled a dynamic of technical research,[7] the aeroplanes developed between 1903 and 1908 had no practical ends.[8] As Emmanuel Chadeau has remarked, uses and users had yet to be found;[9] one could even say invented. During the years 1908-1910, when aviation was first introduced to the public, the press, industrialists, patrons and political decision-makers were mobilised in favour of the aeroplane. The upheavals "promised" by developments in aviation were a constant feature of the discourse promoting this new mode of aerial locomotion.[10] In these years of effervescence, the aeroplane was initially seen as the future of sporting competitions – the discourses matched the facilities whose architecture, like that of Port-Aviation in Juvisy, borrowed directly from the codes of horse racing – acrobatic shows, advertising, war or of the transport of people and goods. Years later, after the trauma of the Great War, the use of aviation was still due to be defined;[11] then, aviators came to be seen as a new (and higher) types of human beings.[12] Illiberal parties and totalitarian regimes were not the only ones to seek to exploit the revolutionary potential of a flying human, but they largely picked up this reference, thus modifying (and masculinizing) this incarnation of a new society.[13] In such narratives, anticipations switched interest from the technical changes of the present to more distant futures shaped by political projects.[14]

5 As these few examples show, speculation and possible futures associated with human flight are many and varied. In order to grasp the expectations and fears linked to air travel or projected onto aviation, it is therefore essential to consider the diversity of visions of the future that coexist or follow each other, i.e. to deploy and analyse the futures of the past.[15] Such an approach is also necessary to better understand how the enlisting of the future plays a part in negotiating a technological development path or a national policy.[16] The study of these past futures should also not be neglected in order to shed light on the contemporary issues faced by the aeronautical sector, and to take account of the influence on the present of historically dated and situated imaginary futures.[17]

2. Futures in outer space

6 Similar observations apply equally to outer space activities. An additional feature, which can become a pitfall, arises from the number of works that situate human societies in outer space or envision encounters with extraterrestrial peoples (a situation that assumes the existence of modes of communication or locomotion in the cosmos). In comparison, imaginary aerial societies are far less common than imaginary outer space societies (if we exclude angels, divinities and other spirits willingly placed in the heavens, if not by theologians at least by popular tradition). Mentions or descriptions of spaceflight cannot simply be reduced to the prefiguration of a hoped-for future.

7 Within the genre of political utopia, other planets were easily suited to the setting of fictional states and ideal worlds from which authors could criticise their own while escaping censorship. At the end of the 18th Century, when utopian narratives increasingly relied on time travel rather than space travel, utopia took on the role of a hopeful reworking of social and political reality. The promise of a future society took shape and the link between fiction and action became tighter. What to infer from stories involving journeys in outer space? Since physical travel was materially impossible, such a journey could precisely symbolise the difficulty of achieving the hoped-for goal; it would not be a foreshadowing of spaceflight.[18] The challenge, then, is to identify what, for some authors, might be symbolic, while for others, a similar motif might indicate a questioning of a possibility be it

unlikely, a projection that extrapolates what already exists while remaining marked by a hesitation between the possible and the impossible. [19]

8 Adventure stories, which flourished from the 1860s onwards, are among the stories that bear a close relationship to scientific knowledge and technology. For his contemporaries, the "model" of Jules Verne's novels united reality and fiction in scientific reasoning (without necessarily incorporating imaginary scientific elements). As such, it was gradually characterised as anticipation in the literal (and not just literary) sense: the marvelous science it involved seemed likely to become true in the future [20] – which opened the way to an interpretation of the space travel in Jules Verne's work (or that of other authors who drew inspiration from it) in terms of prefigurations and projections into the future. Here again, however, interpretation remains somewhat challenging. Patrick Désile has thus recently re-examined Georges Méliès's *Voyage dans la Lune*, commonly seen as one of the first anticipation or science fiction films. By comparing the film with other types of contemporary spectacle, he has shown that the movie was less a prefiguration of a physical displacement than a play on the visual similarities made possible by optical techniques. [21] The author, a specialist of late 19th-Century curiosity shows and cinema, has compared the topicality of the trip to the Moon with the many optical devices, both scientific and fairground, that were being used more and more. He has stressed out that it was above all the eye that travelled and the gaze that changed. [22] Hence his conclusion:

> The trip to the Moon, which in the nineteenth century might have seemed to stem from a desire to conquer daunting but new spaces, and to prefigure a desired yet still imaginary future, was perhaps, for a long time, something quite different: less a desire for travel than a desire to see, and to see the Moon, no doubt, but also, fictitiously, to see the Earth from the Moon, the Earth, round and floating in space, strange, and to envision, not its future, but its past. [23]

9 The theme of outer space exploration continued to be widely exploited throughout the 20th Century, by popular novelists and, above all, by science fiction comic strips and films from the 1950s onwards. However, these "anticipations" (the term has come to be used to des-

ignate the literary genre) were not all prefigurations [24] – at least for those who created them, even though some authors envisaged the possibility of spaceflight by turning to fiction so as not to lose credibility in their professional fields.

10 The relationship between space travel and science fiction is by no means clear-cut, [25] and the continent of fiction, whether in literature or film, cannot simply be reduced to the idea of prefiguration or future vision. However, the accumulation of visions, discourses and images sediment into representations that accustom minds and eyes to imagining the human occupation of outer space, [26] Some texts may nurture individual dreams and desires for space travel, [27] but all of them may also crystallise into collective projections, blurring the boundaries between dream, fantasy, plausibility, social project and funded and implemented programmes.

11 "Astrofuturism", in the sense of the intimate link between utopian speculation and outer space future, [28] played a key role in the structuring of the space sector in both the United States and the Soviet Union from the 1950s onwards. Forecasting outer space activities is far from being a simple personal or intimate fantasy. From practical uses to settlements in space, forecasting outer space activities responds to the demands of society. It is a way of justifying and giving meaning to public investment. As such, it serves the emergence of a shared narrative whose mobilising virtue is performative. Hence, the reappearance of scenarios such as human settlement on Mars in a wide range of discourses, from claims in defense of civil space programmes to grand visions of human colonisation of space, should not be a surprise, [29] Contemporary space news is full of visions that revive some of the motifs of an astrofuturism that was born more than a century ago. While their main aim, from the point of view of industrialists, is to sell outer space, i.e. to monetise it [30] – it is important to identify and analyse ambitions and ideas that go hand in hand with past futuristic visions that still operate in the present. [31]

3. Aims and content of the issue

12 This issue aims to contribute to on-going studies of "aerial culture" and "astroculture" through a focus on past visions of the future involving aeronautics or spaceflight. [32] We propose to limit our invest-

igation to different forms of foresight which play with the articulation of fiction and reality to combine the existing and the possible. We will talk of "rational anticipations", not to make a reference to economic theory, but instead to stress this focus on works which extrapolate a technological future and associated applications and social evolutions from the contemporary world. Such forms of anticipation oscillate between predicting and shaping the future.

13 Conceived as a proposal that can help us explore the vast territories of aero- and astrofuturism,[33] this reduction is sufficiently broad to allow for the consideration of a variety of forms of projection into the future. These forms are thus amenable to analysis using a variety of tools, depending on the sources considered and the disciplinary approach adopted (from the point of view of media culture,[34] in terms of mechanisms related to an "economy of techno-scientific promises,[35]" "sociotechnical imaginaries,[36]" or situated forms of "projects[37]"). Rational anticipations considered in this issue reflect this diversity, ranging from novelistic conjectures (Zacharie Boubli), to projects involving the State and industrial actors (Sébastien Richez) or reflections on the theory of aerial warfare (Ashley Vieira). Catherine Radtka analyses projections into the future that serve to promote and credibilise a new techno-scientific field, while François Rulier explores how a new flying machine is understood and categorised. Above all, however, what this issue wishes to highlight is the diversity of the rationalities at play. Thus, the papers examine practices rooted in different professional sectors and cultures that generate a particular interest in aerospace innovations, far from a modernist vision of social evolution resulting from necessary technical innovations. Some of these practices appear to have contributed to the realisation of their visions through their performative nature. Others, however, have encountered competing rationalities. Their failure to succeed also makes them part of a long history of unfulfilled futures, where false promises stand side by side with plans disconnected from physical, technical or social reality.

14 In "French Air Power through the Lenses of Speculative Fiction (1783-1930)", Z. Boubli examines fictional accounts based on technical extrapolations in the service of an air force. He shows that fictional exploration allows authors not only to take stock of a technical development (the material possibility of flight, dirigibility, etc.), but also to

reflect on the nature of power and, particularly in the case of military authors who resorted to the genre of fiction between the two world wars, to defend the development of an autonomous air force.

15 A. Vieira's article also deals with this theme, but concentrates on the anticipations of General Paul Armengaud (1879-1970). Unlike Z. Boubli's compilation of resolutely fictional works, the writings studied in this second paper are published over a shorter period, between 1928 and 1932; as treatises, they also show a grasp of concrete reality in order to engage in a theoretical reflection on modern warfare that is also a plea for the autonomy of the air force.

16 The next contribution, by C. Radtka, covers the same period, but focuses on the public activities of Robert Esnault-Pelterie (1881-1957) and Alexandre Ananoff (1910-1992) to promote space travel. It shows how both link past, present and future to historicise astronautics and how, despite their differences, they mobilise concrete achievements of the inter-war period in the field of propulsion as well as projections into the long-term future to establish the credibility of astronautics.

17 Technical progress made in propulsion, which lead to the first flight of the X-15 "rocket plane" in June 1959, aroused the interest of the legal experts studied by F. Rulier in his article. Although the idea of interplanetary travel was not on their agenda, these lawyers followed very closely developments regarding spaceflight. For them, it was not just a question of curiosity in an international context marked by the "firsts" in outer space, but rather a question of establishing legal rules adapted to the future exploration of space, in order to avoid a legal vacuum. Their willingness to anticipate the future in order to adapt to it explains their interest in the X-15 and, more generally, in the development of aerospace.

18 The case studied by S. Richez also illustrates the attention paid to the development of aerospace techniques by outsiders. His study of the postal service's interest in rocketry takes us into the very logic of this administration. Here, the rocket is not a synonym for interplanetary flight, as in the case of space advocates, or even for sub-orbital flight, as in the case of the X-15. In the 1930s, it was part of a vision of transport that could cover an entire geographical area, regardless of topographical obstacles. In the 1950s and 1960s, it was part of the quest to

reduce the time taken to transport mail. The postal rocket is also a form of unmanned human flight, as well as an example of a use of technology in the aerospace sector that was seriously considered, at least by some of the players, and then abandoned.

19 The articles presented in this issue, while highlighting various forms of anticipation and uses of futuristic visions, do not exhaust the many questions that can be asked about the obsession with the future expressed in the field of aeronautics and space. In fact, projection into the future seems to accompany the entire material and concrete history of aeronautics (including ballooning) and outer space. This history is itself part of a period marked by a profound transformation in our experience of time and the future. With this issue on rational anticipations, we thus hope to contribute to the cultural history of aeronautics and space, but above all we wish to stress the wide range of the "futuristic" dimensions of these activities and open up the field of possibilities for further collaboration and multidisciplinary studies.

NOTES

1 Champeaux Antoine, « Bibendum et les débuts de l'aviation. (1908-1914) », *Guerres mondiales et conflits contemporains*, vol. 209, nº 1-(Avions, avionneurs et aviateurs au xxe siècle), 2003, p. 25-43, Doi: <https://doi.org/10.3917/gmcc.209.0025>. The Aerocible Prize was designed to encourage pilots to prove the feasibility of aerial bombardment in the face of military authorities' skepticism.

2 A direct reference to the slogan is made in the paintings' titles: the oil on canvas framed with rope *Notre avenir est dans l'air* is part of the collections of the Musée Picasso in Paris, the painting *Notre avenir est dans l'air* (originally entitled *Petite nature morte de notre avenir est dans l'air avec une pipe et 'le matin'*) is part of the collections of the Musée national d'art moderne - Centre Georges Pompidou, and the oil and enamel on canvas *La Coquille Saint-Jacques* ('*Our future is in the air*') is part of the Eugene V. Thaw collection at the Metropolitan Museum of Art in New York. A reproduction can be found in Le Thomas Claire, « Pionniers de la modernité ? Braque, Picasso, les frères Wright, l'aviation et le bricolage », in Lucbert Françoise and Tison Stéphane (dir.), *L'imaginaire de l'aviation pionnière : contribution à*

l'histoire des représentations de la conquête aérienne, 1903-1927, Rennes, Presses universitaires de Rennes, « Histoire », 2016, p. 91-104, p. 102.

3 Le Thomas Claire, « Pionniers de la modernité ? », op. cit. ; Finlay John, "'Notre avenir est dans l'air': flight and Picasso's Cubist sculpture", *The Burlington magazine*, vol. CLVIII, n° 1360, July 2016, p. 552-561. For a more general, dense and richly illustrated analysis of the interplay between aeronautics and art, see Asendorf Christoph, Super Constellation - *Flugzeug und Raumrevolution. Die Wirkung der Luftfahrt auf Kunst und Kultur der Moderne*, Wien/New York, Springer, 1997 or, in French, Asendorf Christoph, *Super Constellation : l'influence de l'aéronautique sur les arts et la culture*, Paris, Éd. Macula, 2013.

4 Wohl Robert, *A Passion for Wings: Aviation and the Western Imagination, 1908-1918*, New Haven (CT)/London, Yale University Press, 1994 or as an opening sentence in Richard Alan Lovegreen, *Aerofuturism: Vectors of Modernity in Nineteenth- and Twentieth-Century Literature and Culture*, PhD in English, Rob Latham (dir.), University of California Riverside, 2014, p. 1, <https://escholarship.org/uc/item/5mq8v12k>.

5 Champeaux Antoine, « Bibendum et les débuts de l'aviation », art. cit.

6 Harp Stephen, *Marketing Michelin: Advertising and Cultural Identity in Twentieth-Century France*, Baltimore/London, The Johns Hopkins University Press, 2002, ch. 5.

7 Thébaud-Sorger Marie, *Une histoire des ballons : invention, culture matérielle et imaginaire, 1783-1909*, Paris, éd. du Patrimoine/Centre des monuments nationaux, « Temps et espace des arts », 2010, p. 148-150.

8 These dates are based on the chronology of the Wright brothers' flights, from the time of their first private powered flights to that of their public recognition. The significance of the public display of these flights, between 8 August 1908 and 2 January 1909 at Le Mans, has been highlighted and measured by Tison Stéphane, « Les vols de Wilbur Wright au Mans, la mesure de l'événement », in Lucbert Françoise and Tison Stéphane (dir.), *L'imaginaire de l'aviation pionnière*, op. cit., p. 35-60.

9 Chadeau Emmanuel, *De Blériot à Dassault : histoire de l'industrie aéronautique en France* : 1900-1950, Paris, Fayard, 1987, p. 29.

10 This is especially stressed in the case of speeches made by members of the French scientific elite, see Anizan Anne-Laure, « Mathématiciens et physiciens français promoteurs de l'aviation », in Lucbert Françoise and

Tison Stéphane (dir.), *L'imaginaire de l'aviation pionnière*, op. cit., p. 107-117, esp. p. 112.

11 Doubts about the future of aviation, and hence the diversity of possibilities envisaged, can also be grasped through studies devoted to uses that have ultimately remained marginal, see, for example, the subject of aerial advertising analysed by Thibault Ghislain, "Celestial Apparitions: Media-machine, Broadcasting and Aerial Advertising", *Media Theory*, vol. 5, n° 2-(Into the Air), 2021, p. 99-122, <https://journalcontent.mediatheoryjournal.org/index.php/mt/article/view/926/614>.

12 Accoulon Damien, « La mystique de l'air : aviateur et homme nouveau » in Clémence Raynaud and Julie Ulloa (dir.), *Les Années folles de l'aviation : l'Aéronautique au cœur de la modernité* 1919-1939, LienArt/Musée de l'Air et de l'Espace, Paris, 2003, p. 141-152, <https://hal.science/hal-04362493>.

13 Palmer Scott W., *Dictatorship of the Air: Aviation Culture and the Fate of Modern Russia*, Cambridge, Cambridge University Press/New York, "Cambridge centennial of flight", 2006 ; Lehmann Éric, *Les Ailes du pouvoir : la propagande aéronautique dans l'Italie fasciste*, PhD thesis in History, Gilles Le Béguec (dir.), Université Paris 10, 2006. See also Boubli Zacharie, *La fabrique des héros : l'héroïsme aéronautique dans la presse française et italienne de la Grande Guerre*, Master's dissertation, Université Paris 1 Panthéon-Sorbonne, 2018.

14 We borrow this distinction from the introduction to the proceedings of the 7th Congress of the SERD (Société des études romantiques et dix-neuviémistes) organised in 2016, published by Barel-Moisan Claire, Déruelle Aude and Diaz Jose-Luis, *Le* xix*e siècle face au future : penser, représenter, rêver l'avenir au* xix*e siècle*, 2018, <https://serd.hypotheses.org/le-xixe-siecle-au-futur>.

15 This involves working on "Horizons of Expectation", i.e. how future was present for individuals from the past, as defined by Reinhard Koselleck. For the German historian, this concept is complemented by the non-symmetrical concept of "Space of Experience", i.e. the way in which the past was relevant and actual for these individuals. See Koselleck Reinhart, *Futures Past: On the Semantics of Historical Time*, Columbia University Press, 2004 (French Ref : *Le futur passé : contribution à la sémantique des temps historiques*, Paris, Éd. de l'EHESS, « Recherches d'histoire et de sciences sociales, 44 », 1990, p. 307-329).

16 See Edgerton David, *England and the Aeroplane: Militarism, Modernity and Machines*, London, Penguin Books, 2013 [1991], esp. p. 69-74.

17 Roseau Nathalie, "Mobile cultures and the Anthropocene", *The Journal of Transport History*, vol. 43, nº 3, 2022, p. 354-367, Doi: <https://doi.org/10.1177/00225266221122919>.

18 Clavel Maïté, « Des espaces en utopies », *Géographie et cultures*, nº 3, 1992, p. 45-56, Doi: <https://doi.org/10.4000/gc.6844> (this paper is concerned with spaces in the geographical rather than the cosmic sense, but the comments made about the unattainability of typical utopian places such as imaginary islands apply all the more to cosmic spaces).

19 In his conceptual history of flight in the Middle Ages, Nicolas Weill-Parot proposes the introduction of the term "scientific utopia" to describe "the development of an imaginary, extraordinary project or projection, expressed within the rational framework of science, whose status oscillates between the possible and the impossible in the eyes of the person who formulates it". See Weill-Parot Nicolas, *Le vol dans les airs au Moyen-Âge : essai historique sur une utopie scientifique*, Paris, Les Belles lettres, « Histoire, 150 », 2020, p. 23-27, cit. p. 27.

20 Pézard Émilie, « Le genre de Jules Verne ou de Wells ? Le récit d'anticipation défini d'après ses modèles (1863-1935) », *COnTEXTES*, nº 21-(L'anticipation dans les discours médiatiques et sociaux), 2018, Doi : <https://doi.org/10.4000/contextes.6558>.

21 Désile Patrick, « Le voyage dans la Lune, dans tous ses états », in Claire Barel-Moisan, Aude Déruelle and Jose-Luis Diaz (dir.), *Le xixe siècle face au futur*, op. cit., <https://serd.hypotheses.org/2147#_ftnref10>.

22 The development of aeronautics, and in particular photography, played a key role in the transformation of the way we look at things in the 19th century, leading to the "invention of the modern spectator", see Gervais Thierry, « Un basculement du regard, les débuts de la photographie aérienne 1855-1914 », *Études photographiques*, nº 9-(Photographie et illustration/À la poursuite du relief), mai 2001, p. 102-108, <http://journals.openedition.org/etudesphotographiques/916>; and Doucet Emily G., *Developing the Future: Félix Nadar's Photographic Experiments*, PhD in Art History, Jordan Bear (dir.), University of Toronto, 2020, <https://tspace.library.utoronto.ca/handle/1807/126036> and, for an analysis of the "modern spectator", Paîni Dominique, Perrin Paul and Robert Marie (dir.), *Enfin le cinéma ! Arts,*

images et spectacles en France (1833-1907), Paris, Musée d'Orsay/Réunion des musées nationaux – Grand Palais, 2021.

23 Désile Patrick, « Le voyage dans la Lune… », op. cit.

24 Simard-Houde Mélodie, « Voyages dans l'espace et avions électriques. L'imaginaire aéronautique comme figuration de l'écriture sous contraintes dans le roman en fascicules », *COnTEXTES*, nº 21-(L'anticipation dans les discours médiatiques et sociaux), 2018, Doi: <https://doi.org/10.4000/contextes.6629>; Langlet Irène, « Le paysage spatial dans la bande dessinée de science-fiction », *ReS Futurae*, nº 14-(Présence de la science-fiction dans la bande dessinée d'expression française), 2019, Doi: <https://doi.org/10.4000/resf.3374>.

25 Stories of anticipation written by astronomers in the last third of the nineteenth century are another example. Elsa Courant, who studies Flammarion's stories, shows that although his novels of anticipation contain realistic representations of the future, with, for example (it should be noted) a sky full of aeroplanes, they are above all "the work of an astronomer for whom the future is a metaphysical horizon guided by calculation, proven by observation, and above all full of the hope of the permanence of life and the integrity of the individual in the stars". The analysis also points out that for an astronomer to observe the sky is to look into the past. The story can therefore be seen as a reflection on the links between past, present and future, and on the nature of time. See Courant Elsa, « Les fictions de l'avenir chez Camille Flammarion », in Claire Barel-Moisan, Aude Déruelle and José-Luis Diaz (dir.), *Le xixe siècle face au futur*, op. cit., <https://serd.hypotheses.org/1843>.

26 De Smet Elsa, *Voir l'Espace : astronomie et science populaire illustrée* (1840-1969), Strasbourg, Presses Universitaires de Strasbourg, « Cultures visuelles », 2018.

27 In the case of the "pioneers" of astronautics – Konstantin Tsiolkovsky, Hermann Oberth and Robert Goddard – repeated reading of certain novels, in particular Jules Verne's space diptych, has been noted. See McCurdy Howard E., *Space and the American Imagination*, Baltimore, The Johns Hopkins University Press, 2011 [1997], p. 16-19.

28 The term astrofuturism was introduced by the American literary scholar De Witt Douglas Kilgore to describe an aesthetic, scientific and political movement in the United States that sought social improvement through the conquest of space. Kilgore emphasises the proximity of astrofuturism to

state-sponsored civil and military engineering projects. See Kilgore De Witt Douglas, *Astrofuturism: Science, Race, and Visions of Utopia in Space*, Philadelphia, University of Pennsylvania Press, 2003.

29 As Arnaud Saint-Martin points out, these scenarios are diverse, developed by different types of actors and received with varying degrees of acceptance, including by space engineers. The fact remains, however, that there is an intersection between Martian science fiction and futurology, and that the latter is particularly active at various levels of the global space community, in Europe and the United States. See Saint-Martin Arnaud, « Science-fiction et futurologie de la colonisation martienne. Espaces des possibles, régimes de croyances et entrecroisements », *Socio*, nº 13-(Science et science-fiction), 2019, p. 45-69, <https://doi.org/10.4000/socio.7681>.

30 Saint-Martin Arnaud et Régnauld Irénée, « Espace à vendre – de retour du Congrès international d'astronautique », AOC, vendredi 14 octobre 2022, <https://aoc.media/opinion/2022/10/13/espace-a-vendre-de-retour-du-congres-international-dastronautique/>. On the more general question of how space activities fit into the economic realm, see the debate in the thematic issue "The Space Industry" of the academic journal *Entreprises et Histoire*, nº 102-(L'industrie spatiale), 2021, p. 172-199, <https://doi.org/10.3917/eh.102.0172>.

31 Recently the journal *Terrain* devoted an issue to "Futurofolies" (a wordplay between future and follies), <https://doi.org/10.4000/terrain.25533>. It contains an entire section of four articles on astrofuturism. See Grimaud Emmanuel et Wacquez Julien, "Futurological vertigo" translation of « Le vertige futurologique », *Terrain*, nº 79, 2023, p. 2-25, <https://doi.org/10.4000/terrain.25613>, and papers by Saint-Martin Arnaud, « Persistance du rêve spatial américain » (<https://doi.org/10.4000/terrain.26044>, p. 28-39), Tabas Brad, "[To] the last [be] human. Against the New Futurist case for space expansion", Assaf Laure, « Dubaï sur orbite » (<https://doi.org/10.4000/terrain.25786>, p. 54-69) and Schultz Nikolaj, "What are the affects of staying on Earth?", <https://doi.org/10.4000/terrain.26416>.

32 The history of representations of the conquest of air and the history of representations of the conquest of space both prompt questions about the role of humans in the universe. The boundary between atmospheric and extra-atmospheric skies is often blurred in representations. For a more detailed understanding of the concepts of "aerial culture" and "astroculture", see Lucbert Françoise and Tison Stéphane, « Introduction » in ibid. (dir.), *L'imaginaire de l'aviation pionnière*, op. cit., p. 9-31; Roseau Nathalie and

Thébaud-Sorger Marie, « Les empreintes du vol, une culture de la modernité. Introduction », in Roseau Nathalie and Thébaud-Sorger Marie (dir.), *L'Emprise du vol : de l'invention à la massification. Histoire d'une culture moderne*, [Genève], MétisPresses, "VuesDensemble", 2013, p. 9-26, <https://enpc.hal.science/hal-00932336>, and Geppert Alexander C.T., "European Astrofuturism, Cosmic Provincialism: Historicizing the Space Age", in Geppert Alexander C.T. (ed.), *Imagining Outer Space: European Astroculture in the Twentieth Century*, New York/London, Palgrave Macmillan, 2018 [2012], p. 3-28.

33 A. Geppert points out that astrofuturism can be seen as a subset of astroculture, see Geppert Alexander C.T., "European Astrofuturism", op. cit., p. 17.

34 Chassay Jean-François and Barel-Moisan Claire (dir.), *Le roman des possibles : l'anticipation dans l'espace médiatique francophone (1860-1940)*, Montréal, Les Presses de l'Université de Montréal, « Cavales », 2019.

35 Joly Pierre-Benoît, "On the economics of techno-scientific promises", in Madeleine Akrich, Yannick Barthe, Fabian Muniesa and Philippe Mustar (dir), *Débordements : mélanges offerts à Michel Callon*, Paris, Transvalor-Presses des Mines, « Sciences sociales », 2010, p. 203-221, Doi: <https://doi.org/10.4000/books.pressesmines.747>.

36 Jasanoff Sheila, "Future Imperfect: Science, Technology, and the Imaginations of Modernity", in Sheila Jasanoff and Sang-Huyn Kim (eds), *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power*, Chicago, University of Chicago Press, 2015, p. 1-33, esp. p. 4, Doi: <https://doi.org/10.7208/chicago/9780226276663.003.0001>.

37 Graber Frédéric and Giraudeau Martin (dir.), *Les projets : une histoire politique, xvie-xxie siècles*, Paris, Mines ParisTech-PSL, « Sciences sociales », 2018.

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