

Chapter 3

Neither Genius nor Context Incarnate: Norman Lockyer, Jules Janssen and the Astrophysical Self

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Parallel Profiles and Parallel Lives

In December 1872, the French Ministry of Public Instruction issued a medal commemorating the parallel discovery by Jules Janssen (1824–1907) and J. Norman Lockyer (1836–1920) of a spectroscopic method for studying solar prominences (Figure 3.1).¹ Four years earlier, on 26 October 1868, the two men's letters, mailed from India and England respectively, reached the French Academy of Sciences at about the same time, and were read out at its following meeting. Lockyer claimed he had anticipated the discovery by two years, as a published note on the subject testified. Lacking the means and time actually to try out the method, he had applied to the Royal Society for a government grant to subsidise the construction of an appropriate spectroscope. Learning from reports of the 18 August 1868 eclipse that prominences emitted certain bright lines, Lockyer had immediately set out to find them using his proposed method, and succeeded (Meadows, 1972, pp. 52–5).

But Janssen had beaten him to it. Sent to India for the specific purpose of applying spectrum analysis to the observation of the eclipse, he was struck by the brightness of prominence emission lines. In an oft-quoted statement, he confidently predicted right after sunlight had blinded him: 'Je reverrai ces lignes-là!' ('I will see these lines again!'). He thought it over during the night, and the next day he had perfected and tested his method. As a result, the spectroscope was turned into an instrument allowing the investigation of not only the chemical constitution of the sun, but also of its otherwise inaccessible physical attributes. In October 1868, Janssen wrote to his wife: 'I was sent to India to observe the eclipse for 5 minutes, and I am bringing back the perpetual eclipse.'²

1 See *Comptes-rendus de l'Académie des sciences*, vol. 75 (1872), p. 1491. See also Sarton (1927–30), vol. 13, pp. 353–5.

2 Jules Janssen to Henriette Janssen, 1 October 1868, Janssen Papers, Bibliothèque de l'Institut, Paris, Ms. 4,133, fol. 106, quoted in Aubin (1999), p. 81. For more on Janssen, see Chapin (1984) and Aubin (2002).



Figure 3.1 Alphée Dubois' medal issued by the Paris Academy of Sciences in 1872 in honour of Jules Janssen's and J. Norman Lockyer's parallel discovery of a spectroscopic method for seeing the Sun's prominences. The physical resemblance between the two scientists portrayed here may not be entirely coincidental. © Académie des sciences de l'Institut de France; photo: David Aubin.

Putting nationalist vindication aside, the British and French scientific establishments agreed to view Lockyer and Janssen's achievements as a case of simultaneous discovery. The medal struck in 1872 reflected this sentiment. Designed by the renowned medallist Alphée Dubois, it pictured Phoebus on a horse-drawn chariot pointing at solar flares and, in a subtle tribute to Janssen's priority, recalled the date of the eclipse. On the flipside, the profiles of both men were engraved imperial-style, Janssen to the fore. At first glance, the parallelism of the profiles is striking, the features of both men enhancing the aesthetic appeal of Dubois' work of art. Lockyer and Janssen cast their resolute gaze towards the right, somewhat above the horizon. Their noble, assertive foreheads, their well-defined eyebrows, their prominent but thin noses and their tight, grave lips all emphasise the scientific discoverers' stern outlook.

Janssen and Lockyer's resemblance on this medal is not fortuitous. Clearly it was the product of Dubois' mastery of a well-established artistic genre. In the second half of the nineteenth century, the medal enjoyed a renaissance as a form of art independent of the coin and the bas-relief. Artists such as Dubois could make profitable careers as medal engravers.³ Medal-making, like other art forms, allowed artists to be creative within the limits of the genre. What distinguished the artist from the mere artisan was the ability to reproduce accurately not only the subject's physical features, but also character and expression. Medallion portraiture, according to the *Encyclopædia Britannica*, ought to be 'a thing of pure flesh and blood, suave and graceful in composition, and as pleasing in its purely decorative design as imagination can inspire or example suggest'.⁴

But Lockyer and Janssen's resemblance went beyond medallion convention. By the Victorian age one had come to expect active, innovative scientists to take the appearance of dignified, middle-aged European males with beards. One could have anticipated the medal's portrayal of the determination that had helped them rise from the low-level clerkships they once occupied to the position of officially acknowledged scientists. From then on, the two men, who remained on friendly terms for the remainder of their lives, were united in a common enterprise: the founding of a 'new astronomy' in general, and of astrophysical institutions in particular. But while Janssen was quickly successful in his bid for an independent, government-sponsored observatory, which was built for him in the Paris suburbs of Meudon in the 1870s, Lockyer struggled for years at the margins of the scientific establishment, his theories often greeted with scepticism and his professional status remaining uncertain. Historians now view these events as episodes in the establishment of a new discipline, astrophysics. Outsiders to traditional astronomy, Janssen and Lockyer had rapidly assimilated the new technique of spectrum analysis and made a fundamental discovery. Subsequently, they would lead numerous solar eclipse expeditions overseas.⁵ Both became vocal public promoters of the 'new astronomy', and strove to establish it as an autonomous field.

3 On Dubois, see Mazerolle (1906) and *Revue numismatique* (1905), pp. 518–19.

4 S.v. 'Medal', *Encyclopædia Britannica*, 11th edn, vol. 18, pp. 1–2.

5 On solar expeditions, see Pang (2002).

On further examination of the medal, however, features individualising the two scientists become apparent. The unruly curly hair of the Frenchman stands in contrast to the British scientist's; under the beards, the chins seem to have different shapes. Despite their similar trajectories, despite the conventions of medal engraving, Janssen and Lockyer were different persons. While both operated in a broadly similar environment (late nineteenth-century Western Europe, the rise of precision sciences and scientific disciplines, colonial capitalist culture), they lived and worked in different local environments. Victorian London and Third Republic Paris were homes to differing national conceptions of science's utility and its relationship to the state.

Our work on the early history of astrophysics, and in particular on the figures of Norman Lockyer (by Bigg) and Jules Janssen (by Aubin), has led us to methodological and historiographic reflections on the treatment of the individual in historical writing. Neither conventional biographical approaches nor social history's methods seemed to us appropriate for accounting for these pioneers, founders and discoverers. In this chapter, we tease out some of the underlying assumptions of social history of science, technology and medicine, and of the biographical genre which has given rise to what we describe the 'genius versus context' dichotomy. We examine some of the negative effects this polarisation has caused, in particular the premature obliteration of the problem of individual agency. Picking up on the growing literature on the 'self', we explore ways of going beyond this binary opposition, which might be of use to social historians and to biographers alike.

Genius versus Context

The social history of science, technology and medicine has been founded in part on a rejection of traditional biographical writing: 'The bad old history of science of the early twentieth century', Thomas Hankins wrote in 1979, 'which we have all been taught to abhor, was largely biographical' (p. 2). The suspicion harboured by practitioners of social history against biography as a genre stems from an array of methodological, ideological and political objections. Biography appeared tainted by its historical debt to hagiographic writing. Social historians condemned it for being over-sympathetic to its subjects (and their narratives), and largely concerned with great minds and their discoveries. Further, since Robert Merton's incitement to conceptualise science as a collective enterprise, and the emergence of the sociology of scientific knowledge, the very focus on individual lives as the central unit of historical analysis has been judged wrong-headed. While scientific biographers themselves sought to redefine the genre and make it less politically conservative by including lesser-known figures, women and representatives of the non-ruling classes, most social historians remained adamant that the significant agent was the collective, not the individual.

Thus while they shifted the focus from abstractions to society and social groups, constructivist accounts of the sciences have paradoxically failed to move closer to the biographical genre. They have tended to push aside the person as an incarnated locus of intentions, desires and decision-making ability. When persons feature in

these accounts, they appear often as ideal types of wider social entities – the invisible technician, the scientist-entrepreneur, the theoretical physicist. To put it bluntly: the task of exhibiting the social construction of knowledge has been carried out at the expense of the individual.

But the individual would not go away. As was clearly pointed out by the editorial board of the *Dictionary of Scientific Biography*: 'history of science ... is made by men [*sic*] and not by themes or abstraction' (vol. 1, p. x). Some social historians have recently sought to make social constructivism more compatible with the individual.⁶ They have in the process redefined the biographical genre as the study of individual trajectories through richly textured social spaces. As Yves Gingras, inspired by Pierre Bourdieu, put it: 'biography is embodied social history'.⁷ One example emblematic of this renewal is Crosbie Smith and Norton Wise's celebrated volume on Lord Kelvin, *Energy and Empire* (1989). In these biographies, contextualist elements none the less remain most apparent. Thus, in the case of Wise and Smith, it is the public, the social Kelvin which is presented. As the authors significantly point out, a 'problem of constant concern' to them was the fact that very few letters had survived revealing Thomson's 'innermost thoughts or emotional response to major crises, such as the death of his father'. Refusing to engage in speculation, they acknowledged that scattered 'letters ... unlike anything in the "official" archives' provided nothing less than 'a distorted sample'. Despite the comprehensiveness of their 800-page biography, they conceded: '[t]he truly private Thomson *must* remain a veiled figure' (Smith and Wise, 1989, p. xxii). Even in these works, social historians' ambivalence towards the biographical genre remains perceptible. In the introduction to his masterful book on Volta, Giuliano Pancaldi admits in convoluted terms that 'Insofar as it is a biography, this is a biography in context' (2003, p. 2).

For social historians and sociologists of science, 'biography in context' has been one strategy in their reassessment of the role of the individual. Parallel biography or prosopography are alternative ways of circumventing the genius versus context binary opposition. Just as Mario Biagioli examined a large panel of secondary mathematicians to identify what was exceptional about Galileo, a focus on two figures, such as Lockyer and Janssen, could help specify the general and local assumptions about the scientist's persona or his role in society and better apprehend the nature of the resources available for, and constrains limiting, the elaboration of astrophysicists in this period (see, for example, Biagioli, 1989; Pancaldi, 2003). Parallel biography might be seen as an experiment where the subjects of the comparison are probes immersed in different settings, revealing the resources offered to them in their particular conditions, and the constraints on their range of options. A comparative study of both scientists' trajectories tells us much about the general and specific, the

6 The complex and changing attitude of the history of science towards biography is not specific to the field: it is a recurrent subject of debate in the historical profession; for debates in the French context, see Marian (1986), Arnaud (1989) and Lévi (1989). Recent contextualist scientific biographies may be profitably compared to the biographies produced by the *Annales* historians, for example Duby (1984) and Le Goff (1996).

7 Gingras (2001), p. 125. See Bourdieu (2001) for his critique of science studies in relation to biography.

global and local character of the emergence of astrophysics as a distinct field, and of the configuration of state, science and society in which both men functioned. More broadly, the comparative dimension yields insights into the range of possibilities available to the enterprising individual seeking to invent a new practice, a new professional status and a new conception of the universe. It throws light on the tension between the universal, international and national conceptions of science, and how such a tension was managed by particular individuals. It helps us assess the singularity of historical actors against a shared background. One obvious benefit of studying Janssen and Lockyer in parallel has been a more nuanced understanding to 'context' and its determinisms.⁸

Very recently, isolated attempts have been made within sociology and social history of science, technology and medicine to confront the problem of individual actors head-on, to give this historiographical trend a theoretical backbone, a framework to conceptualise the 'singularity' of individuals. Taking the case of Robert Oppenheimer, Charles Thorpe and Steven Shapin (2000) have investigated 'charisma' using the methods of social studies of science. They define charisma as an 'interactional accomplishment' which serves the purpose of normative stabilisation of large technological organisations, such as Los Alamos in the 1930s and 1940s. Hélène Mialet (1999) has similarly explored 'singular subjectivity' through a study of the figure of the individual creator, taking Stephen Hawking as one example. She finds creativity to be 'distributed in specific tools, practices, and social networks', and thus proposes to understand the 'knowing subject as a distributed-centred subject'.

Whether these leads will be taken up in historical and sociological practice remains to be seen. But they are in any case significant expressions of a *malaise* in sociology and social history and recognitions that the issue of individual agency cannot indefinitely be brushed under the carpet. If social history of science, technology and medicine has been in part built on a rejection of the convenient and enduring straw man of biography, this has until recently been without engaging much with the genre itself or its representatives – and most damagingly, without addressing the central issues it raises for social history.

The Public Speech

How might we go beyond the 'false dichotomies in which historians are too often locked up' (Gingras, 2001, p. 125), for example between the individual and the collective? Specific arenas can be identified in which this binary opposition begins to dissolve, destabilising some of the underlying assumptions of both social history and biography. In our own work on the early history of astrophysics, and in dealing with Lockyer and Janssen in particular, we found that the figures – or types – of the *discoverer*, the *pioneer* of a new field and the *founder* of an institution were essential,

⁸ Several existing parallel biographies display this dynamic in its different variants. A study of John von Neuman and Norbert Wiener underscores the differences between both trajectories in the same context (Heims, 1980), while books on Hitler and Stalin (Bullock, 1991) and Einstein and Picasso (Miller, 2001) insist instead on the similarities of two trajectories in contexts conventionally perceived to be different or opposite.

yet hard to account for using the tools of social history – while, of course, being standard tropes of the biographical genre. While these types accurately describe one and/or the other character's activity, they are historiographically laden archetypes which require cautious treatment. Clearly, they are also contemporary roles our two protagonists played with. These types are central to the emergence and shaping of scientific disciplines in the late nineteenth century, as science took on the form of an increasingly collective endeavour, with groups of researchers identifying with well-defined procedures, conceptual frameworks, methods, approaches and instruments. Should we consider the individualistic types of the founder/explorer/discoverer, paradoxically endowed with all the more individuality as collective disciplines were subduing individual characteristics, as necessary counterparts, holding communities together by shared beliefs in them?⁹ How to deal with these types without taking them for granted, as biographies so often have?

Lockyer and Janssen adroitly toyed with such figures of self-representation in the many public speeches they delivered in the course of their scientific lives. There are sound reasons underlying historians' suspicious attitude towards such sources. Speeches are careful reconstructions of scientific research crafted to fulfil the expectations of specific constituencies. As such, they are often little reliable factually, but can be precious in other ways. Speeches surely deserve more attention from social historians because they are central to the self-construction of science and scientists. Speeches are revealing of the fragile negotiations at play in the elaboration of new sciences and new scientists, and of the arenas in which a personality can assert his/her individuality. This can be shown taking the example of a speech given by Lockyer, which exhibits the various resources and limitations of this type of forum for someone seeking to found a new astronomy.

On Tuesday 16 December 1873, Lockyer introduced the subject of 'celestial chemistry' to his audience at the Quebec Institute, London. This lecture participated in the broader economy of public science, alongside the British Association for the Advancement of Science's annual meetings, the Royal Society *conversazioni* as well as the expeditions by pioneering scientists, tourists and mountaineers whose accounts continuously poured into the metropolis, together with a stream of exotic objects, images and stories to feed the growing popular press. This culture must be taken into account for a proper understanding of the establishment of the new astronomy in Victorian Britain and of Lockyer's place within it.

As described in this lecture, Lockyer's conception of astrophysics was based on the notion of the advancement of knowledge, of progress, with its religious connotations in a society which considered self-improvement and the personal quest for knowledge to be moral duties. In further tying the advancement of knowledge with the history of the human race, Lockyer situated his talk in a frame not only tinged with imperial overtones but also one shaped by the ideas of Darwin, whose *Origin of Species* was published in the same year that Bunsen and Kirchhoff elaborated the principles of spectral analysis. Indeed, a few decades later, Lockyer himself developed a theory of inorganic evolution to account for the functioning

⁹ On the connection between self-fashioning and historiography in the case of 'discovery', see Schaffer (1986).

of the astronomical ecosystem, a theory in which Darwin's evolution became 'an appendix, as it were, to the work of inorganic evolution' (Lockyer, 1900, p. 168). Another major theme in Lockyer's work was the chemical unity of the universe as revealed by the spectroscope. Here Lockyer made another analogy, this time with notions recently elaborated by physicists: the conservation of energy and the uniformity of a universe composed of matter in motion was extended to include the chemical composition of all bodies: 'the Spectroscope show[s] us that like matter is acting in like manner everywhere' (Lockyer, 1874, p. 411). Taking this principle quite literally, Lockyer did not hesitate to extrapolate from his laboratory experiments about solar phenomena, just as he claimed that the sun was an ideal laboratory, giving him indications about the behaviour of gases at temperatures and pressures impossible to achieve in the laboratory. Lockyer's astrophysics was finally in tune with a Humboldtian conception of knowledge, seeking as it was to uncover the connections between all phenomena, to 'knit the universe together' by means of travel, observation and speculation. It took a literary and aesthetic rather than a mathematical approach to phenomena. It operated largely in the field, using robust, portable devices rather than precise apparatus in custom-made, padded laboratories. These early astrophysicists disliked the obsessively precise positional astronomy (see Bigg, forthcoming), preferring to follow William Herschel, the 'natural historian of the heavens' (Schaffer, 1980).

Putting forward an astrophysics integrating recent natural history, physics and the field sciences (as well as, on occasion, archaeology, meteorology and anthropology) enabled Lockyer to navigate between different social and scientific milieus and reach a wide public. Representation permeated his activities, taking the form of a constant presence on the multiple stages of London's cultural and scientific life, but it was also central to his scientific approach. When in 1871 Lockyer obtained funding from the British Association for the Advancement of Science to lead an expedition, he implicitly agreed to represent both the association and the Empire on his travels. Once in India, not only the Sun but also the eclipse camp were photographed, as were the travellers and their local helpers. Returning to London to tour the most prestigious and fashionable venues, Lockyer re-employed the same visual technologies to project pictures of himself against different backgrounds, multiplying himself on the spot, asserting his presence and the importance of his work, and blurring the distinction between science and its popularisation, opening up a space in which the astrophysicist could exist. But the mitigated reception among scientists of many of his theories reveals the challenges inherent in putting forward a different kind of science and practitioner. Here probably lies the origin of Lockyer's reputation for eccentricity, which he in turn enrolled when taking on the figure of the (misunderstood) proponent of a new approach and founder of a new field.¹⁰

The lecture hall, together with other similarly public spaces such as the newspaper column, thus constituted an essential site for the elaboration and representation of Lockyer's astrophysical self and science. That Lockyer's self-fashioned image took this character owed as much to his own taste for public presence, to his lack of

¹⁰ On the significance of optical and spectroscopic practices for astrophysics, and on alternative strategies of establishing the field, see Bigg (2002) and (2003).

professional situation and his conception of astrophysics as to broader social and cultural transformations of late-nineteenth century Britain which brought into existence a new kind of audience and market for him and his science, consisting of urban, educated, bourgeois middle classes.

Discourse Analysis

In what sense can we say that Lockyer was the author of his speech at the Quebec Institute? The postmodernist project provides some useful insights for analysing such a speech and for undermining the genius versus context dichotomy. In his seminal 1969 piece 'What is an Author?', Michel Foucault asserts that the author has disappeared: 'a key-moment of individualization in the history of ideas, knowledge, literature ... philosophy and science', the author has given way to indifference towards it, an indifference which constitutes 'one of the fundamental ethical principles of contemporary writing'.¹¹ This claim exposes him in the ensuing discussion to the modernist criticism (made by structuralist sociologist Lucien Goldmann) that the group of philosophers to which Foucault belongs 'is characterized by the negation of man in general, and, from there, of the subject in all its aspects, and the author as well' (Foucault, 1994, vol. 1, p. 812).¹² To which Foucault answers, clarifying his position: whether the subject has an ontological existence or not is not the point.¹³ The point is rather that, in examining a text, a particular method is applied, which supposes that the author has no significant existence. Foucault introduces the notion of 'author-function', as distinct from the actual author of the text, in order to draw attention to this other, long-ignored author: the authorial voice, which is expressed in the text itself, through a combination of style, pronouns and forms of language. Neither denying nor accepting a 'real' author, he simply dismisses the question of the author's existence, and this very dismissal creates interesting effects, such as the appearance of the author-function: 'The question I asked myself was the following: what does this rule by which the writer or author disappears allow us to discover? It allows us to discover the author-function at play' (Foucault, 1994, vol. 1, p. 817). And further: 'The author-function is thus characteristic of the mode of existence, circulation and working of certain discourses within a society' (Foucault, 1994, vol. 1, p. 798). This reasoning is applicable, Foucault insists, not only to the author of writings, but also more generally to the author of works of art, knowledge, including scientific, or even actions. In this wider understanding of 'discourse' which exceeds literal texts, the author-function appears as a fundamentally hybrid entity, resembling

¹¹ Foucault (1969), p. 792 (our translation); cf. the incomplete translation in Foucault (1977).

¹² On Goldmann's structuralist perspective, see Aubin (1997).

¹³ This and similar writings have often been charged with denying the existence of the subject and prompted violent debates among historians about the 'subject' with reciprocal misrepresentation of opposing positions: while the postmodernists often exaggerate the uncritical realism and essentialism of traditional historians (for example, Nye, 1983), modernists assert that their opponents deny the possibility of the subjects' existence (for example, Söderqvist, 1996, and Zagorin, 1999).

the actual author and his/her intention in some ways, but shaped by the (authorial and representational) conventions of discourse. But since any authorial expression necessarily operates within a discourse, Foucault implies that the author is as much the creator of the text as created by it. In this reading, it is meaningless to consider the author and the discourse separately.

Let us now turn to Janssen's speeches, where the construction of several types of author-functions appears clearly. Like Lockyer, Janssen thrived on public performances. On 17 February 1870, he gave a well-attended public lecture at the Sorbonne, which can be analysed usefully from a Foucauldian perspective. The picturesque side of his scientific travels, the imaging technologies of contemporary science and the widespread interest in questions of origins (of the universe and of man) were all drafted in this seduction operation. Somewhat candidly, he explained: 'I always thought that science is not widespread enough in our French society, and that this matter of fact is responsible for the slow development of our scientific institutions. ... Today, nothing considerable can exist, nor develop without the support of public opinion. Science must therefore communicate its significance and usefulness to the new society'. This 'propaganda', as he called it, would attract public support for state-sponsored institutions (Janssen, 1903, pp. 300–301). From 1869 to 1874, Janssen consistently campaigned for the establishment of a government-sponsored astrophysics observatory where he would apply his new method on a daily basis. In the last years of the Second Empire, there was much talk about institutional reform in astronomy and its centralisation under Paris observatory director Le Verrier (Aubin, 2003). In democratising France, the establishment of scientific institutions had to be supported by public opinion, however.

To succeed in his bid, Janssen not only needed recognition from his peers, and public and government support, but also to fashion himself (his self) to become a credible answer to contemporary concerns. Another lecture, delivered at l'Académie des sciences in 1871, is highly revealing in this respect. Returning from an unsuccessful expedition to Algeria, where clouds had hindered the observation of the eclipse, Janssen chose to entertain savants and auditors with a detailed description of his escape from besieged Paris in a hot-air balloon (Janssen, 1871a; 1871b). This text is highly revealing of the various 'author-functions' in tune with Third Republic scientific discourses. For the sake of brevity, let us here focus on four aspects exhibited by this text.

First, Janssen underscored his 'scientific persona'. In Lorraine Daston and Otto Sibum's analysis, 'scientific persona' is an 'intermediate between the individual biography and the social institution: ... a cultural identity that simultaneously shapes the individual in body and mind and creates a collective with a shared and recognizable physiognomy' (Daston and Sibum, 2003, p. 2).¹⁴ In 1871, Janssen was concerned with the problem of solar constitution, and applying spectroscopy to the study of the corona, he explained, was his mission. Emphasised at various junctures in the adventurous account of his flight, this dimension showed how his scientific attitude crucially shaped his approach to technology and the world: he took regular

measurements of atmospheric pressure and temperature at duly recorded times, and gave scientific explanations for various phenomena he came across. Several footnotes show him constantly on the look-out for ways to improve air navigation. But this scientist persona sometimes gave way to other dimensions.

Janssen also emphasised another aspect of his constructed persona, namely his self-portrayal as an experienced traveller. He had never flown an aerostat, he said. But he was 'convinced that theoretical knowledge maturely acquired and experience of traveling would suffice in giving me the cool-bloodedness and the inspirations needed' (Janssen, 1903, p. 4). In no contradiction with his scientific persona, this aspect of his selfhood was emphasised at great length as the canvas of his literary technology. Squarely situated within the genre of the travel report, his account was complete with preparations, excitements, changes of perspective, surmounted difficulties, picturesque anecdotes, and final success.

Third, Janssen regularly insisted on the importance of this voyage for France and of himself as its devoted servant; in a time of war, this was an eminently nationalistic enterprise. Commenting on the topographic value of aerial photography, he stated that: 'It belongs to France, which has created aerostation, to endow science with this new branch' (Janssen, 1903, p. 13). Throughout the text, 'France' was identified with its institutions, the Academy, the Bureau des Longitudes, and especially its government. His visit to Adolphe Thiers, the new head of post-war France, in Bordeaux is depicted as the starting point of 'agreeable and precious' reports. But 'France' was also its people, peasants and local elites from the countryside. Reporting the patriotic sentiment of those among whom he had landed, Janssen saw it as bearing testimony of 'all that one could have received from France, had one known how to speak to it, to train it, and above all to organize it' (Janssen, 1903, p. 20).

There is a final aspect of Janssen's self-representation that needs to be noted: the poetic outlook that his condition afforded him:

Below us, in a heavy, obscure atmosphere, the nightly apparatus of a big city whose reddish, volcanic fires gave rise to the idea of an inferior world with its appetites, its passions, its violence, its misery. And what a coincidence! Was not Paris wrestling at this very moment with the ardent embrace of our enemies.

But if, breaking away from these ideas, one gazed toward our pure, diaphanous regions, already inundated by the morning lights of the breaking day, what a contrast and what a relief! One felt relieved and penetrated by a feeling of indefinable purity that gently carried one's thought up to the level of extra-terrestrial ideas. (Janssen, 1903, pp. 7–8).

As far as travel reports go, the narrator's ability to be moved by the extraordinary things he experiences is hardly exceptional. In this lecture to the Academy about a failed mission, Janssen's recourse to the lyric served as a reminder of the beauty of nature, the sun especially, whose investigation he had made his life's mission. This was an indication of the hopes that could be invested in science to create a new world, more serene, more beautiful, and geared toward truer concerns. For a defeated, humiliated France, science was both technical solution and poetic escape. In short, Janssen put forward a deliberate, global depiction of himself, as a complex individual who, having adequate knowledge and experience, could address some

¹⁴ Daston and Sibum (2003) re-examines and develops the notion of persona as defined by Marcel Mauss (1938).

of the pressing problems of science and the nation, while retaining the ability to be exalted.

The Self as an Actor's Category

Searching for ways of reconciling essentialist and constructivist approaches to history and biography, we have been drawn to the self not only as a historiographical entity, but also as a historically situated one. Foucault suggests that the individual and the social are intimately linked. The person develops his/her identity in interaction with others, individuals and social groups, and the social landscape is constantly reinvented by individual initiatives. The way in which biological categories have been construed can provide pertinent guidelines. Since Simone de Beauvoir ('On ne naît pas femme, on le devient', 1949), the social roots of sexual categories have been one of the great lessons of gender studies. In discussing the problem of using personal experience, Joan Scott has further suggested that, counter to common perceptions, 'it is not subjects who have experience, but subjects who are constituted through experience. Experience in this definition then becomes not the origin of our explanation ... but rather that which we seek to explain, that about which this knowledge is produced' (Scott, 1991, pp. 779–80). Categories such as 'gay', 'Black' or 'male', which she calls 'foundationalist concepts', need to be analysed rather than naturalised by historians. 'All categories of analysis', she adds, should be taken as 'contextual, contested and contingent', so that historians should turn to 'the history of foundationalist concepts themselves' (Scott, 1991, p. 796; for a critique, see Smith, 2001).

In Western societies, one especially important foundationalist concept has been 'the self'. The extant literature on the self is vast and highly heterogeneous.¹⁵ For our purposes, one can distinguish three main threads: (1) philosophical, psychological and biological essays often rooted in cognitive science, that attempt to delineate the universal foundations of self-identity or consciousness; (2) mostly linear historical reconstructions of the emergence of the modern self, often seen to be intimately connected to Western capitalistic democracy, and (3) more recent historical analyses of various types 'ego-documents' (Schultze, 1996).¹⁶ These three sets of investigations point to three conceptions of the self: as biological universal (in the same way as, for example, the eye is), as historically constructed entity (like science or nations),

15 On the history of the 'self', the literature is enormous. See an extensive conventional account by Taylor (1989) and revisionist essays in Porter (1997). See also Mascuch (1996) and, on the emergence of contemporary positive meaning in the mid-nineteenth century, Earman (2001).

16 We avoid discussing psychoanalysis, which would lead us far astray. Let us, however, recall that Michel de Certeau's analysis of Lacan's 'mirror stage' (de Certeau, 1986) underscored self-construction in relation to others: 'In a "flutter of jubilant activity" he [the child] discovers that he is *one* (a primordial form of the *self*), but this discovery occurs through that alienation which identifies him with what is *other* than him (a specular image). The experience can be put into the formula, *I am that*. The self takes shape only in self-alienation' (de Certeau, 1986, p. 56).

and as historically active category (like ambition or love), playing specific roles for various people in different circumstances. Though distinct, these conceptions of the self all attempt to bring together different aspects of personhood.

It is not our intention to posit a stable, trans-historical conception of the self (compare, for example, Seigel, 1999). Nor do we assume that there is, for each given culture, a dominant conception that determines people's self-conception. As a historical category, the self becomes truly interesting when it is taken as an actors' category. It seems obvious that people have always had a sense of self. But as recent studies now show in a wealth of cases, this sense also is rooted in place, time and society. Historical writing that deals with individuals needs to be historically sensitive to the subjects' conception of themselves or of their selves. The social history of science has supplied an insightful critique of central though little theorised tenets of biographical writing: first, the presumption that a life, the *Lebenslauf* linearly unfolding from the birth to the death of the subject, exhibits continuity and unity, and second, the fact that persons can be taken as meaningful, unproblematic units in historical writing. It sometimes goes as far as altogether denying this unity of the life/person in the history of science. Taking its cue from postmodern scholarship, in particular the historical work of Michel Foucault, it questions the opportunity of adopting a view of individuality rooted in Enlightenment rationality, seeing in this (illusory) unity an ideological tool fostered by states to bring minds and bodies under control; the rational agents dear to modern economic theories being one of its later avatars. By affirming the fragmented self, it wishes to make a political statement against such means of buttressing conservative (neo-)liberalism, as well as to portray the self more truthfully. A wealth of theoretical and historical studies on selfhood has been produced in the wake of these reflections, which caution against the fundamental *Einheit* of an individual human being and explore alternative conceptions of personal identity (Taylor, 1989; Mascuch, 1996; Porter, 1997). The history of *mentalités*, Foucault's analysis of sexuality,¹⁷ Scott's history of foundationalist concepts, Daston and Sibum's categorising of personae, Daston and Galison's discussion of the 'scientific self' or *microstoria* (critiqued, for example, in LaCapra, 1985) are, in this view, so many attempts at studying the self in this light. We want to suggest that the growing body of literature devoted to the self might be one of the most exciting and most promising recent developments for providing a better treatment of individuals in social history of science and a more reflexive attitude in biography-writing. Let us turn once more to Janssen's public performances to illustrate this point.

Public lecturers need to come to terms with specific aspects of their selves, such as, for example, the physical engagement with their audience.¹⁸ After a public lecture in Lyons in 1873, Janssen put his impressions down on paper:

17 For the later Foucault, this notion was precisely the locus where the three dimensions discussed by Seigel intersected. See 'Subjectivité et vérité', and 'Les techniques du soi', in Foucault (1994), vol. 4, pp. 213–18 and 783–813, and, of course, Foucault (1978).

18 Another approach which we do not treat here is the study of material culture and instruments and their relation with the self, for example as extensions of the body (Schaffer, 1992).

At 8:10, I arrived. The Palace was full of people who climbed up the stairs to get into the amphitheatre. Walking in front of a door, one could see that the inside was packed, and a queue where people were pushing each other trying to get in. ... Some had got in the area reserved for technicians and the police had to be called to force them to leave their spot. Behind me the *Association [française]* members had taken place, so that I was literally besieged with almost no freedom to move. But, above all, the heat was oppressive. ... So many people, low ceilings, lights everywhere – that was too much. ... As I progressed, my strength dwindled, my forehead sweated copiously in this sauna. We had been forced to open all windows. Strong efforts were thus required to be heard beyond the first ranks. ... I judged that this should not be prolonged. ... I shortened some parts, reached my conclusion and ended up by calling attention on the necessity of founding an observatory of physical astronomy. (Janssen to his wife, 25 August 1873, Janssen Papers, Bibliothèque de l'Institut, Paris, Ms. 4133, fol. 168)

Having been dropped on the floor by his wet nurse as an infant, Janssen limped for the rest of his life. His handicap was little hindrance, so it seems, to his climbing mountains and criss-crossing the globe, but this circumstance, as well as the description above, reinforces the impression that he had to surmount great physical strains and pains to deliver his scientific results to an eager public. In other words, Janssen saw himself, and wanted others to see him, as a servant of science and country. The analysis above should also be read in the same way. In the 1870s, the dedicated service of a daring, competent man was precisely what French society expected from its elite. Janssen's self-fashioning was a crucial component for establishing an institutional home-base for astrophysics in France. If Janssen could come across as a convincing astrophysicist, he might well become one; and of course, not only Janssen's performance was important, but how his proposed self fitted with current conceptions and expectations, from the most immediate (the persons he spoke to) to the most general (forms of politeness, jargon, adequacy of self-presentation with the accepted comportment of a serious scientist).

The self needs not always to conform. But as we saw with Lockyer, even non-conformity obeys certain rules. Unlike the situation in France, the new astronomy in Britain did not become institutionalised. This was in part due to the effective resistance of positional astronomers to this competing new branch of astronomy, and to the British government's continued disinterest in subsidising science. The ongoing assumption in Britain that scientific investigation was an activity for men of independent means made it difficult for the rising generations of middle-class scientists such as Lockyer who had to live from their work. To be a respected scientist in Victorian Britain did not necessarily improve career prospects. Thus in the 1870s, Lockyer, while a Fellow of the Royal Society, was employed as a third-class clerk in the War Office. While he advocated for many decades state support of science generally, and the establishment of astrophysical observatories in particular, Lockyer developed alternative strategies to put himself and astrophysics forward (and to feed himself, his wife and their eight children) when professional status proved unforthcoming. Lockyer invested in other personae: as editor of a scientific journal, as public lecturer, and as expedition organiser. In the absence of permanent and secure institutional identities, lecture halls, newspaper columns and eclipse

campaigns were appropriated by Lockyer as so many stages where he could assert, even temporarily, his existence. He therefore practised science on the move, with portable instruments which were continuously packed and unpacked. His instruments, photographs and experiments always travelled with him, and were used and reused in a diversity of settings, in borrowed laboratories, on Indian mountains, for impromptu lectures on steamships, at soirees and in journals. Even the solar physics observatory which Lockyer founded and directed from 1879 was a temporary structure made of wood and sheets, and was always threatened, subsisting on the edge of the new South Kensington technical education complex until it was moved to Cambridge in the early twentieth century.

Conventionally, this has been interpreted as a failure. Helped by this 'failure', A.J. Meadows has, without resorting to heavy theoretical apparatus, produced an unconventional biography of the character (Meadows, 1972). Because they mostly deal with dead people, biographies often adopt a retrospective outlook on their subjects, one in which the inherent promise of success and 'genius' can be traced back to a range of personal and/or external factors. In Lockyer's case, the biographer has felt compelled to explain his subject's failure to institutionalise astrophysics by insisting on controversies. The biography therefore highlights Lockyer's constant struggles to construct his scientific self. But successful individuals could profitably be examined in this light, too, with a more systematic focus on the self-in-becoming.

Conclusion: The Self-in-becoming and a Fresh Look at the Sources

We have set out to explore the ways in which people self-fashioned themselves in relation to personae such as scientific pioneer, explorer and discoverer in nineteenth-century Europe, all endowed with strong connotations in the history of science, and which require closer investigation. The author of a recent biography on Galileo has described his work as a 'study of ... identity in all its sociocultural dimensions, as well as a scrutiny of the processes through which such an identity is shaped' (Biagioli, 1993, p. 14). The self's ability to act, even transcend these processes and dimensions, is in no way denied; only the focus has shifted. To quote Scott again: 'Subjects do have agency. They are not unified autonomous individuals exercising free will, but rather subjects whose agency is created through situations and statuses conferred on them' (Scott, 1991, p. 793). What emerges from ideas of self-fashioning is a dynamic process perpetually recommenced in relation to others, and especially to socio-cultural representations of self made available by individuals' society and body. Nothing in the process remains stable, neither individuals, nor bodies, nor societies. The self is elaborated, perceived and reflected in a constant process of negotiation. In the cases we study, various identities (or foundational concepts) – such as scientist, professional or 'amateur', husband, father or son, explorer and pioneer, discoverer, *français* under the Third Republic or British under Queen Victoria, none of which is stable, but squarely situated in culture – are combined in an original way to form Janssen's and Lockyer's selves.

As our discussion of Lockyer's and Janssen's speeches has suggested, our focus on the dynamic processes of self-fashioning has led us to look at our historical

materials in new ways. Commemorative medals, for instance, have rarely attracted much attention from historians of science. In a nine-part collection on 'medallic illustrations of the history of science', George Sarton (1927–30) seems to have considered them as little more than artistic illustrations of past scientists' greatness. The medals themselves (the objects) have mostly been deemed uninformative as sources for writing history of science. Without insisting on the *post facto* celebratory aspects of the commemorative medal – *éloges* and formal speeches can, after all, be counted among historians' standard resources – one may attribute this neglect mainly to the perception that the design and making of medals are constrained by too many social conventions. But rewards, medals, or rather the processes by which they were instituted and awarded, supply insights, for instance, into the early history of science policy (MacLeod, 1971; Bektas and Crosland, 1992; Grattan-Guinness, 1993).

Other forms of commemorations could be investigated, too. How are great savants celebrated in different times and places (for example, see Fara, 2001, or Rebekah Higgit's Chapter 9 in this volume)? Biographies are just one aspect of this elaboration, besides statues, banquets, funerals and *Oeuvres complètes*. Pierre Nora identifies these cultural manifestations as *lieux de mémoire*. Sources such as these, as well as their negative counterpoints (caricatures, satires), can be made to bear on the study of self-perception in societies and the way in which they shape individual struggles with the self. Recent cultural history has also seized upon autobiographies, which provide crucial insights into self-construction. One thinks here of *histoires de poilus*, accounts of First World War experiences (Audoin-Rouzeau, 2001; Congar, 1997), but also of Foucault's interest in texts such as *Moi, Pierre Rivière* (Rivière, 1973). Literary history – and the novel especially – could also be re-examined. How are biographies related to novels written in the same period?

Our focus on medals and public lectures is therefore not accidental. A shift of focus in the sources considered relevant, as well as a different approach to them, is entailed by our attempt to write self-based history. Taking the self into account makes us turn to hitherto dismissed sources in which the authorial voice is particularly present, such as public speeches, applications for funding or positions, representations of scientists' own selves and their science. To look at such sources, one has to consider the actors' stated intentions (see Cabrera, 2001). Generally, there has been a tendency to dismiss them as power-seeking strategies in disguise. This suspicion was a response to the perceived over-sympathetic attitude of conventional biographers and historians, who were seen to accept unproblematically the (often retrospective) rationalisations proposed by the actors themselves. Social historians have as a result tended to choose their sources guided by a concern to avoid any such accounts by the protagonists. We see 'propaganda' as a privileged locus for analysing the self-in-becoming: since the self constantly re-creates itself while it seeks to re-create its environment, it may be analysed in such programmatic statements which most clearly display this fiction of the self and its attempts at convincing, at being realised. Such utterings are taken here not so much as simple power-seeking exercises, but as revealing the construction of the self, the negotiation between the public's expectations and the scientists' beliefs and strategies; they are tests of credibility for the self-representation of the speaker; they are simultaneously efforts to shape the conceptions of others to make such a self-representation credible.

We would like to conclude with a plea for reflexivity. The point here is not so much that biographers should be more upfront about themselves and their intentions when writing, but rather that biographical writing needs to situate historically the construction of personhood and self.¹⁹

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¹⁹ Grafton's 1999 study of Cardano's autobiography seems to us an interesting step in that direction.

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Chapter 4

Framing the Evidence: Scientific Biography and Portraiture

Patricia Fara

'So that to sit for one's Picture, is to have an Abstract of one's Life written, and published, and ourselves thus consign'd over to Honour, or Infamy' (Wendorf, 1983, p. 103). Writing in 1719, Jonathan Richardson, England's leading art critic, participated in enduring discussions of the relationship between biography and portraiture that date back to classical times. Artists cited Horace's dictum, *ut pictura poesis* ('as is painting, so is poetry'), to justify their insistence that poetry and painting were sister arts. Other ancient sources asserting this close relationship include Aristotle's *Poetics* as well as the direct parallel drawn by Plutarch, who made artists' focus on faces parallel his own bid to recreate lives rather than histories: 'just as painters get the likenesses in their portraits from the face and the expression of their eyes,' he wrote, 'so I must be permitted to devote myself rather to the signs of the soul in men, and by means of these to portray the life of each' (Wendorf, 1983, p. 101; Silver, 1983).

Biographers generally reproduce portraits of their subject, even though physiognomy and phrenology are no longer considered legitimate sciences. In 2000, confounding all predictions, the exhibition *Seeing Salvation: The Image of Christ* at London's National Gallery, showing images of Christ, attracted enormous crowds, demonstrating that people attach great importance to appearance, even for a divine being whose significance lies in His spirituality (Gombrich, 1963, pp. 45–55; Cowling, 1989). The secular equivalent of Jesus Christ is Isaac Newton, whose *Principia* provided a non-denominational Bible to spread the faith of Western science throughout the world (Cabral, 1996). Newton, commented one biographer, is almost purely mind, a person to whom 'sensual and aesthetic experiences were denied' (Hall, 1992, p. xiv). Nevertheless, biographers and readers remain fascinated by his looks.

Godfrey Kneller's *Isaac Newton* of 1689 (Figure 4.1) has become science's most famous portrait. Some people comment that he here resembles Christ, but for many, this Newton epitomises scientific genius. Richard Westfall, Newton's major biographer, saw 'an arresting presence, instinct with intelligence ... Without difficulty, we recognize the author of the *Principia*' (Westfall, 1980, p. 482). This claim of instant recognition is suspect. We cannot know what Newton looked like: Westfall can only 'recognise' Newton because this particular picture, which differs from other representations, has become so popular. Moreover, Westfall's remark assumes a constancy in the depiction of supreme intelligence, and takes no account