Introduction

Karin Priem and Frederik Herman

Where did all the vapour and the noise in Dante's 'Inferno' come from? | He saw and heard it all in Lardorello – | or at least that's what's the local museum in the Italian village of Lardorello claims. | Located in the middle of a geothermal valley, named the Devil's Valley in Tuscany ... | Lardorello takes pride in being "the closest thing to Hell on Earth." | What did Dante hear in Lardorello? | Fffffffffffffu-marole | Sssssssssssso-fffffioni | Mmmmmmo-fffffette | In March 1911, audiences watching the film 'L'Inferno' did not know ... | the actual sounds resonating at the place that inspired Dante. | Very few people knew at the time that in the Devil's Valley a technological revolution had started. | A scientific experiment had been conducted there. | Steam erupting from the earth was used for the first time to generate electricity. | A new industry of geothermal energy production was being born ... | a gigantic network of pipes was constructed transporting hot steam ... | directly from the guts of the earth to a power plant. | It was a pipe organ of geological proportions. | Hot vapour rushed through each pipe whistling and humming. | The entire landscape was tuned to the noises of new industry. | This was the voice of invisible energy production and industrial capitalism. | This industrial music was not simply new music being composed. | This music was composing a new world. | A dance for factory workers, machines and Hell. | Listen. | If for Dante the geological sounds of the Devil's Valley inspired his Hell ... | the continuous noise we hear across the same valley now is an interface ... | between geology and industry ... | physics and metaphysics | work and devotional labour. | Listen. | The sonic strata of the real and the imagined ... | are still composing the soundtrack of L'Inferno. | Listen closely.¹

1 This quote is taken from an audio-visual installation entitled *102 Years Out of Synch* by the Greek video, sound, and performance artist Mikhail Karikis (born in 1975). The artist retraces the historical soundscape of Dante's *Inferno* by visiting the site of the first Italian geothermal power plant in Tuscany. The installation was part of a solo exhibition of the artist at the CASINO Luxembourg – Forum d'art contemporain in Luxembourg City from July 1 through October 15, 2017.

1 The Dawn of a Mechanized Future

This book deals with the period of industrial revolution in Luxembourg at the turn of the nineteenth to the twentieth century. Starting in the 1880s, the young nation underwent a rapid and massive industrialization process driven by its booming mining and metallurgical industry.² In Luxembourg, as elsewhere in the West, the dawn of the “machine age,” or the “age of steel,” and its associated transformations quickly evoked a wide range of strong and occasionally very opinionated statements, feelings, and emotions.³ People felt overwhelmed by the massive and tremendous changes everywhere around them: the new cult of speed, rhythm, noise, and energy that accompanied the “machine age”; the exciting sensorial landscapes made of steel; the newly engineered land-, water-, air-, and cityscapes;⁴ mass production, new media, and the rapid rise of consumerism; migration, urbanization, and globalization; social and demographic shifts; the frantic scientific developments; and the cultural vitality and extraordinary artistic creativity that went along with these transformations. Indeed, the vibrating atmosphere of the “vertigo years”—as Philipp Blom has described the first decades of the twentieth century—was a fertile breeding ground for cultural productions and artistic manifestations and also became a major motif in the arts.⁵ Poets, novelists, painters, filmmakers, and photographers captured, depicted, and also (re)mediated not only various feelings of unease, insecurity, and nervousness but also the positive excitement and the hopes that emerged within this new cosmos of modernity.⁶ The arts seemed

2 Luxembourg became partly independent with the Treaties of London of 1839 and 1867, but it was only in 1890—with the abolition of the personal union between the Netherlands and Luxembourg (1815–1890)—that it became a fully sovereign nation-state.

3 Albert Renger-Patzsch, *Eisen und Stahl* (Berlin: Hermann Reckendorf, 1931).

4 Walter Benjamin, in his *Passagenwerk* (1927–1940), focused on the Parisian “*passages couverts*” and their iron and glass construction to describe a new feel of urban space and mentality that had already begun to emerge during the nineteenth century; see Walter Benjamin, *The Arcades Project*, trans. Howard Eiland and Kevin McLaughlin (Cambridge, MA: Harvard University Press, 2002), 156.

5 Philipp Blom, *The Vertigo Years: Change and Culture in the West, 1900–1914* (London: Phoenix, 2009). See also Philipp Blom, *Alleen de wolken: Cultuur en crisis in het Westen, 1918–1938*, trans. Pon Ruiter and Henny Corver (Amsterdam: De Bezige Bij, 2014).

6 Several contemporary films such as *Ballet Mécanique* (directed by Fernand Léger and Dudley Murphy; France: Synchro-Ciné, 1924), *Metropolis* (directed by Fritz Lang; Germany: UFA, 1927), and *Man with a Movie Camera* (directed by Dziga Vertov; Soviet Union: VUFKU, 1929) capture the fascination exerted by machinery and the rapid development of technology as well as the fear of an uncontrollable invasion of autonomous machines. See also Blom, *The Vertigo Years*; Blom, *Alleen de wolken*; Lewis W. Hine, *Men at Work: Photographic Studies of Modern Men and Machines* (1932; New York: Dover, 1977).

an appropriate and attractive tool to crystallize and raise awareness of both the possibilities and ills of a mechanized and industrialized civilization. In doing so, artists created “spaces of experience” and “horizons of expectation” against the background of an industrialized and mechanized present and an insecure future.⁷

One side of the spectrum, for instance, is represented by the artistic celebrations of the “machine age” by the international Futurist movement at the beginning of the twentieth century.⁸ The following quote from the *Manifesto of Futurism*, written by the Italian poet Filippo Tommaso Marinetti (1876–1944), is a provocative plea to celebrate modernity, break away from the past, and embrace the technological future:

We will sing of great crowds excited by work, by pleasure, and by riot; we will sing of the multicolored, polyphonic tides of revolution in the modern capitals; we will sing of the vibrant nightly fervor of arsenals and shipyards blazing with violent electric moons; greedy railway stations that devour smoke-plumed serpents; factories hung on clouds by the crooked lines of their smoke; bridges that stride the rivers like giant gymnasts, flashing in the sun with a glitter of knives; adventurous steamers that sniff the horizon; deep-chested locomotives whose wheels paw the

7 Reinhart Koselleck, *The Practice of Conceptual History: Timing History, Spacing Concepts* (Stanford, CA: Stanford University Press, 2002), 126–27. For the Luxembourg context, see, for instance, Jeanne E. Glesener and Frank Wilhelm, “L’image de la sidérurgie dans les romans des Luxembourgeois francophones Joseph Leydenbach, Willy Gilson et Nicolas Ries,” in *Terres rouges: Histoire de la sidérurgie luxembourgeoise*, vol. 1, ed. Charles Barthel and Josée Kirps (Luxembourg: Centre d’études et de recherches européennes Robert Schuman/Archives nationales de Luxembourg, 2009), 71–95; Anne-Marie Millim, “Schooling the Gaze: Industry and Nation-Building in Luxembourgish Landscape-Writing, 1900–1940,” *Journal of European Studies* 44, no. 2 (2014): 151–69; Frederik Herman and Ira Plein, “Envisioning the Industrial Present: Pathways of Cultural Learning in Luxembourg (1880s–1920s),” *Paedagogica Historica* 53, no. 3 (2017): 268–84; Ira Plein, “Der tägliche Weg zur Schicht: Aspekte zur proletarischen Kunst Albert Kaisers in der Zwischenkriegszeit,” in *100 Joer fräi Gewerkschaften 1916–2016*, ed. Frédéric Krier, Jacques Maas, Arnaud Sauer, and Denis Scuto (Esch-sur-Alzette: OGBL/Éditions Le Phare, 2016), 83–97; Ira Plein, “Beautiful Luxembourg, Steel Works, and a Swimming Pool: The Corporate Film *Columeta* and the Formation of a Corporate, and National, Image,” in *Films That Work Harder: The Global Circulations of Industrial Cinema*, ed. Vinzenz Hediger, Florian Hoof, and Yvonne Zimmermann (Amsterdam: Amsterdam University Press, forthcoming); Edmond Thill, ed., *Charles Bernhoeft: Photographe de la Belle Époque* (Luxembourg: Imprimerie Centrale, 2014).

8 Incidentally, Futurism did not really gain resonance in the arts in Luxembourg, unlike in some other European countries. It could be argued, however, that the Luxembourg industrialists employed the same or at least a similar aesthetic language.

tracks like the hooves of enormous steel horses bridled by tubing; and the sleek flight of planes whose propellers chatter in the wind like banners and seem to cheer like an enthusiastic crowd.⁹

Using a variety of bombastic metaphors, Marinetti, the founding father of the Futurist movement, welcomed the new technologies and objects, the mechanized environments and societal transformations. For the futurists, the new materials, textures, noises, machines and machine-parts, mass conveyances, and industrial sites were sources of spiritual and artistic inspiration. Indeed, for them, motors and machines did not make noise but were *singing*.¹⁰ The advocates of Futurism wanted to reconcile the arts with the new, the mechanical, the industrial, and the modern. Published in *Broom* (*An International Magazine of the Arts*), both Enrico Prampolini's essay "The Aesthetic of the Machine and Mechanical Introspection in Art" and Paul Strand's photographs of machine-parts (see figs. 0.1 and 0.2) echo the Futurists' ambitions by describing technology, machines, and mechanical elements as "new symbols of aesthetic inspiration" possessing "the marvellous mystery of inspiration."¹¹

In his essay, Prampolini (1894–1956), an Italian futurist artist, wrote: "Is not the machine today the most exuberant symbol of the mystery of human creation? Is it not the new mythical deity which weaves the legends and histories of the contemporary human drama? *The Machine* in its practical and material

9 Filippo Tommaso Marinetti, "Foundation and Manifesto of Futurism," trans. R. W. Flint and Arthur A. Coppotelli, in *Marinetti: Selected Writings*, ed. R. W. Flint (London: Seeker and Warburg, 1972), 41–43. "Le Manifeste du futurisme" was originally published in French in the February 20, 1909, edition of the Paris newspaper *Le Figaro*.

10 See Luciano Folgore, *Il canto dei motori* (Milan: Edizioni Futuriste di Poesia, 1912). The futurist painter and musical composer Luigi Russolo (1885–1947) was also fascinated by the new industrial soundscape and, in his pamphlet "The Art of Noise" (1913), raised the sounds of industry and the rhythm of the modern machines to the level of art. Russolo developed and constructed several mechanical noise installations to value the new sound and to "enrich ... the domain of musical sounds." See Luigi Russolo, "The Art of Noise (Futurist Manifesto, 1913)," trans. Robert Filliou, 11, http://www.artype.de/Sammlung/pdf/russolo_noise.pdf.

11 See Enrico Prampolini, "The Aesthetic of the Machine and Mechanical Introspection in Art," *Broom* 3, no. 3 (1922): 235–37. Paul Strand's photographs were published in the magazine's November 1922 issue, see *Broom* 3, no. 4 (1922): facing 257 and 272. Another example of the aesthetic fascination of iron and steel can be seen in the work of the German photographer Germaine Krull. In 1928, she completed a portfolio entitled "Métal" depicting 64 photographs of iron constructions as monuments of modernity, which were exhibited at the Pinakothek der Moderne in Munich from September 9, 2017, through June 10, 2018; see <https://www.pinakothek.de/ausstellungen/germaine-krull-metal>.

FIGURE 0.1

Paul Strand, *Gears, Akeley Camera Shop*, New York, 1922.

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FIGURE 0.2

Paul Strand, *Gear and Fanbelt*, New York, 1921.

© APERTURE FOUNDATION, INC., PAUL STRAND ARCHIVE.

function comes to have today in human concepts and thoughts the significance of an ideal and spiritual inspiration.”¹²

At the time, modern mechanical apparatuses thus offered a new way to look at, to reflect on, and to think and talk about the world. Indeed, it was a time when the language of mechanization and industrialization was (gradually) applied to the social, economic, medical, and scientific spheres, to individual bodies, society at large, and the universe as a whole, and when there emerged a wide variety of technological metaphors and conceptions such as the human body as a motor or factory, the human being as a gear wheel in the machinery of society, the universe as a machine, bodies that could be molded and restored, and societies that could be manufactured and engineered.¹³ The

¹² Ibid., 236, italics in the original.

¹³ The physician Fritz Kahn, a worldwide bestselling author in the 1920s and 1930s, for instance described the human body with the aid of technical metaphors and made several well-known drawings of the human body as a factory, such as the famous diagram

futurists in particular developed a new aesthetic language based on the machine and technological-mechanical elements to showcase the then modern present and future. This way they aimed at making the mechanical era accessible to the public in new ways and creating a sense of immediacy. Prampolini writes about this kind of “present- and/or future-presencing”¹⁴ as follows:

The artist can only pin his faith to the realities contingent on his own life or on those elements of expression which spiritualize the atmosphere he breathes. The elements and the plastic symbols of the *Machine* are inevitably much nearer to us (materially and spiritually) than any symbol of the past can be: symbols such as a god Pan, the taking down from the Cross, or the Assumption of the Virgin, etc.¹⁵

In contrast to these secular, quasi-religious celebrations of modernity, one can also find critical artistic manifestations arising from feelings of unease about the industrial present and an insecure future, often highlighting the negative side effects of industrialization and the rational organization of labor. Popular motifs here include the mentally and physically exhausted and nervous worker locked in the chains of industrial production and enslaved to the machine; the dejected, drunken, and gambling worker; the workers' unhealthy living and working conditions; and the unemployed worker, replaced by the machine.¹⁶ Typical examples in the Luxembourg context include the linocuts made by the Luxembourg mine and steel worker, unionist, and artist Albert Kaiser

“Der Mensch als Industriepalast” (Man as industrial palace). See Martin Kohlrausch and Helmuth Trischler, *Building Europe on Expertise: Innovators, Organizers, Networks* (New York: Palgrave Macmillan, 2014), 100, 106. See also Frederik Herman, Karin Priem, and Geert Thyssen, “Körper_Maschinen? Die Verschmelzung von Mensch und Technik in Pädagogik, Industrie und Wissenschaft,” *Jahrbuch für Historische Bildungsforschung* 20 (2014): 47–75; Frederik Herman, Karin Priem, and Geert Thyssen, “Body_Machine? Encounters of the Human and the Mechanical in Education, Industry and Science,” *History of Education* 46, no. 1 (2017): 108–27; Anson Rabinbach, *The Human Motor: Energy, Fatigue and the Origins of Modernity* (Berkeley: University of California Press, 1992); Käte Meyer-Drawe, “Maschine,” in *Vom Menschen: Handbuch Historische Anthropologie*, ed. Christoph Wulf (Weinheim: Beltz, 1997), 726–37; Käte Meyer-Drawe, *Menschen im Spiegel ihrer Maschinen* (Munich: Fink Verlag, 1996).

14 Sharon MacDonald uses the concept of “past presencing” in her book *Memorylands: Heritage and Identity in Europe Today* (Abingdon: Routledge, 2013), 17.

15 Prampolini, “The Aesthetic of the Machine,” 236.

16 For more information on the human and societal “energy question,” see, e.g., Rabinbach, *The Human Motor*; Raf De Bont, “Energie op de weegschaal: Vermoeidheidsstudie, psychotechniek en biometrie in België (1900–1945),” *Belgisch Tijdschrift voor Nieuwste Geschiedenis/Revue Belge d'Histoire Contemporaine* 32, nos. 1–2 (2002): 23–71.

FIGURES 0.3 AND 0.4 Linocuts by Albert Kaiser. Reprinted from *Der tägliche Weg* (1932), 56, 38.

(1892–1973),¹⁷ some of which were published alongside critical articles in the leftist newspaper *Escher Tageblatt* in 1931 (see figs. 0.3 and 0.4).¹⁸ The long working days, the reification of the workers' bodies as mere cogs in the wheel of the machine, as well as the fear of physical and mental exhaustion are addressed in the following text:

The most alarming thing one notices about the workers on their way to and from their shift is their fatigue, their listlessness, their resignation. One realizes that something unheard-of eats away at the core of their being, their vital nerve has been sawed through, their vitality paralyzed. Something has descended upon their humanity, which is worse than a catastrophe, a war, or a calamity: worse because it is not as brutal and jolting but slower, more imperceptible, and therefore all the more sinister and destructive. They have all come under the heel of capitalism, are nothing but a cog in the wheel of the economic process, a lever of the machine, a labor force. For eight long hours, they repeat the same work. They work like automatons. Their actions have become reflexes. They are members in the long chain of production, seconds in the history of a product.¹⁹

17 For more biographical details, see Frédéric Krier, Jacques Maas, Arnaud Sauer, and Denis Scuto, eds., *100 Joer fräi Gewerkschaften 1916–2016* (Esch-sur-Alzette: OPLG/Éditions Le Phare, 2016), 460.

18 These articles, together with the linocuts, were republished in 1932 in a collection entitled *Der tägliche Weg: Reportage aus Arbeiterzügen* (Esch-sur-Alzette: Luxemburger Genossenschaftsdruckerei, 1932). We thank Ira Plein for the reference and background information.

19 *Der tägliche Weg*, 27–28. Unless otherwise noted, all translations are the authors' own.

Two other themes common at the time, which also appear in Kaiser's linocuts, were the mutilation of bodies as a result of industrial accidents (see fig. 0.3) and the nostalgic longing for the country's rural past (see fig. 0.4). From the 1880s onwards, Luxembourg underwent a rapid and massive industrialization process, and Kaiser carefully staged facets of the country's rural past and the industrial present in order to catalyze affective responses, from romanticizing the natural and rural landscapes and glorifying agriculture to loathing the prospering mining and steel industries. By glorifying the past as an alternative way of life and linking this to the pressing contemporary questions of factory life, Kaiser's was a rather skeptical and gloomy "horizon of expectation."

These artistic manifestations, oscillating between celebration, critique, and mourning, fed into an expanding and varied "media ecology."²⁰ Indeed, a dynamic visual-material media ecology developed simultaneously with the rapid industrialization and maturing economy, giving rise to a "visual economy," in which all kinds of representations of the industrial world circulated.²¹ The sheer quantity of visual representations of the industrializing world confirmed its importance as a historical process, while their circulation at the same time actively helped construct this world.²² Starting in the late nineteenth century, different societal groups (e.g., artists, exhibitors, photographers, engineers, and entrepreneurs) with different intentions (e.g., artistic, commercial, and educational) "envisioned the industrial present" and thus contributed to the fabrication of a perceptual field and "horizon of expectation" against the backdrop of rapid changes.²³ The varied and dynamic media ecology, which took shape around Luxembourg's industrial present, made it possible for various audiences to encounter and experience the industrial present, to create meaning and make sense of their experiences. This media ecology—an ever-shifting mass and entanglement of images, objects, and texts (e.g., paintings, photographs, films, postcards, pamphlets, magazines, scale models, etc.)—was an expression of a strong "documentary impulse" and an impetus to create meaning and purpose, and also functioned as a key site for cultural learning or industrial enculturation through which identities were permanently negotiated,

20 Petra Löffler and Florian Sprenger, eds., "Medienökologien: Einleitung in den Schwerpunkt," special issue, *Zeitschrift für Medienwissenschaft* 14, no. 1 (2016).

21 Deborah Poole, *Vision, Race and Modernity: A Visual Economy of the Andean Image World* (Princeton, NJ: Princeton University Press, 1997).

22 Catherine E. Clark, "Capturing the Moment, Picturing History: Photographs of the Liberation of Paris," *American Historical Review* 121, no. 3 (2016): 824–60.

23 Koselleck, *The Practice of Conceptual History*, 126–27. See also Herman and Plein, "Envisioning the Industrial Present," 268–84.

constructed, and disseminated.²⁴ The constant repetition of the industrial motif inscribed the “machine age” and the “age of steel” in the collective memory, transformed industry from something alien into a cultural commonplace, and created “mythsapes” or “lieux de memoires” that helped shape national identity and eventually became a crucial part of the national heritage.²⁵ Therefore, and not surprisingly, industrialization in the period under investigation became a significant catalyst for nation-building, as the young nation tried to shape its own identity both in alignment with and in contrast to its larger neighbors Germany, France, and Belgium and to (re)produce national identifications that justified and legitimized its sovereign existence and fostered economic and cultural self-confidence.

2 The Industrialist and the Camera

Not least the photo and the movie camera would “lead to the creation of a fresh perception on the new world.”²⁶ Indeed, capturing the “machine age” by

- 24 Stuart Franklin, *The Documentary Impulse* (London: Phaidon Press, 2016). For more information on cultural learning, see, e.g., Frederik Herman and Siân Roberts, “Adventures in Cultural Learning,” *Paedagogica Historica* 53, no. 3 (2017): 189–98, esp. 194–95; Löffler and Sprenger, “Medienökologien”; Peter M. McIsaac and Gabriele Mueller, “Introduction,” in *Exhibiting the German Past: Museums, Film, and Musealization*, ed. Peter M. McIsaac and Gabriele Mueller (Toronto: University of Toronto Press, 2015), 3–20; Astrid Erll and Ann Rigney, “Cultural Memory and Its Dynamics,” in *Mediation, Remediation, and the Dynamics of Cultural Memory*, ed. Astrid Erll and Ann Rigney (Berlin: de Gruyter, 2012), 1–11; Paul Hodkinson, *Media, Culture and Society: An Introduction* (London: Sage, 2011); Thom F. Genarelli, “Neil Postman and the Rise of Media Ecology,” in *Perspectives on Culture, Technology, and Communication: The Media Ecology Tradition*, ed. Casey Man Kong Lum (Cresskill, NJ: Hampton Press, 2006), 201–53; Tim Edensor, *National Identity, Popular Culture and Everyday Life* (Oxford: Berg, 2002); Jay David Bolter and Richard Grusin, *Remediation: Understanding New Media* (Cambridge, MA: MIT Press, 1999); Karin Priem and Frederik Herman, “Putting Male and Female Bodies in Their Places: Arenas and Theatres of Educational Reform,” in *Education across Europe: A Visual Conversation*, ed. Catherine Burke, Ian Grosvenor, Béatrice Haenggeli-Jenni, Helena Ribeiro de Castro, Elena Tabacchi, Geert Thyssen, and Pieter Verstraete (Network 17 – Histories of Education, EERA, 2014), 43–46.
- 25 Duncan S. A. Bell, “Mythsapes: Memory, Mythology, and National Identity,” *British Journal of Sociology* 54, no. 1 (2003): 63–81; Sonja Kmec et al., *Lieux de mémoire au Luxembourg: Usages du passé et constructions nationale/Erinnerungsorte in Luxemburg: Umgang mit der Vergangenheit und Konstruktion der Nation* (Luxembourg: Editions Saint-Paul, 2008); Sonja Kmec and Pit Péporté, *Lieux de mémoire au Luxembourg 11: Jeux d'échelles/Erinnerungsorte in Luxemburg 11: Perspektivenwechsel* (Luxembourg: Editions Saint-Paul, 2012).
- 26 Dziga Vertov (the director of *Man with a Movie Camera*, 1923), cited in John Berger, *Ways of Seeing* (London: Penguin Books, 1972), 17. See also Paul Strand, “Photography and the New God,” *Broom* 3, no. 4 (1922): 252–58.

means of the “mechanical eye” was thought to be the ideal pathway to open up new spaces of experience and to shape (collective) memory, making it possible for all to see the industrial cosmos through photographs and motion pictures in a mediated way rather than experience it directly.²⁷ Moreover, mechanical reproduction and mass production enabled the fast and infinite repetition, dissemination, and circulation of photographs across and throughout different media. Luxembourg’s industrialists, or rather the photographers and filmmakers commissioned by them, were key producers of such pictures and gatekeepers of the visual economy. Indeed, the visual media became the means par excellence for corporate communication and the mass dissemination of the entrepreneurs’ ideas and ideologies.²⁸ In their attempt to create a positive self-image in response to the anxieties and reservations about industrialization prevalent in society at large, industrialists were eager to control or even colonize the gaze of the masses. In doing so, they applied similarly futuristic ways of staging, aestheticizing, presenting, promoting, and normalizing the new industrial landscapes, machineries, lifestyles, and production processes.

Made for commercial purposes, the images shown in figures 0.5 and 0.6 are perfect examples of this approach, displaying a quasi-symmetrical and sculpture-like composition of products made by the Luxembourg steel company Aciéries réunies de Burbach-Eich-Dudelange (ARBED). This company,

27 Walter Benjamin, “The Work of Art in the Age of Mechanical Reproduction,” in *Illuminations: Essays and Reflections*, ed. Hannah Arendt (London: Fontana, 1973), 219–53. See also Herman and Plein, “Envisioning the Industrial Present.”

28 David E. Nye, *Image Worlds: Corporate Identities at General Electric, 1890–1930* (Cambridge, MA: MIT Press, 1985). See also Françoise Poos, “A Lived and Living History: The Glass Plates from the Institut Emile Metz as Tools of Corporate Communication,” in *Forging a Modern Society: Photography and Corporate Communication in the Industrial Age (ARBED 1911–1937)*, ed. Marguy Conzémius, Françoise Poos, and Karin Priem (Luxembourg: Centre national de l’audiovisuel, 2017), 40–53; Geert Thyssen and Klaus Dittrich, “Water and Dust: Recovering Washed-Out Pasts of Industry in Luxembourg,” in Burke et al., *Education across Europe*, 63–66; Herman and Plein, “Envisioning the Industrial Present”; Plein, “Beautiful Luxembourg, Steel Works, and a Swimming Pool.” See also, in this volume, Ira Plein, “Machines, Masses, and Metaphors: The Visual Making of Industrial Work(ers) in Interwar Luxembourg”; and Françoise Poos, “Photography as a Space for Constructing Subjectivities: Luxembourg’s Steel Dynasties and the Modern Workforce as Seen through the Glass Plate Negatives from the Institut Emile Metz.” The same occurred in the neighboring countries. See, for instance, Denis Woronoff, *La France industrielle: Gens des ateliers et des usines, 1890–1950* (Paris: Editions du Chêne, 2003); Klaus Tenfelde, *Bilder von Krupp: Fotografie und Geschichte im Industriezeitalter* (Munich: C. H. Beck, 2000); Elvire Perego, “Die Stadt-Maschine: Architektur und Industrie,” in *Neue Geschichte der Fotografie*, ed. Michel Frizot (Cologne: Könemann, 1998), 196–223; Ralf Stremmel, *Industrie und Fotografie: Der “Bochumer Verein für Bergbau und Gussstahlfabrikation,” 1854–1926* (Einbeck: Assendorff Verlag, 2017).

FIGURES 0.5 AND 0.6 Various products made by ARBED Dommeldange. Undated. Digital positives from glass plate negatives.
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which is in many ways the protagonist of this publication, was a global player in the twentieth-century steel and iron business and the country's biggest employer until the decline of the steel industry in the late 1980s. ARBED thus not only shaped Luxembourg's past but also became a crucial part of the country's national heritage.²⁹ Indeed, ARBED became synonymous with the country's social progress and economic prosperity during the first two thirds of the twentieth century and developed into one of the most, if not *the* most important framework of national identification.³⁰ The steel company shaped the economic, social, and cultural identity of Luxembourg, not least through its sophisticated corporate communication strategies and the subtle and ongoing visual dissemination and celebration of the company's international economic successes and social welfare provisions. While shaping its own corporate image, it simultaneously affected and shaped the nation's self-understanding. The incorporation of modern and innovative technologies, such as the camera, played a significant role in the construction of this "corpornate" horizon and was both an expression and evidence of the industrialists' progressivism.³¹

Indeed, from its founding in 1911, ARBED used photography and motion pictures as seemingly objective and powerful media not only to communicate with its clients but also to attract new workers, document and record its history, and familiarize the population with the "machine age" and the social reality of modernity. Photography and film were practices that got institutionalized over time, as the steel company established its own photography department (*service photographique*) that existed until the late 1970s.³² The company's

29 For more detailed information on the history of the company and its different mergers, see, for instance, ARBED, *Un demi-siècle d'histoire industrielle (1911–1964)* (n.p.: n.p., 1964/5).

30 "Between 1913 and 1974 some 20 to 25 percent of the Luxembourg population earned their living working in the iron industry": see Geert Thyssen and Karin Priem, "Brains, Money and Power in Education: Industrial-Intellectual 'Avant-Gardes' and Their 'Social Works,'" paper presented at the International Standing Conference for the History of Education (ISCHE) 35, Riga, Latvia, August 21–24, 2013. See also Antoinette Lorang, *Luxemburgs Arbeiterkolonien und billige Wohnungen, 1860–1940* (Luxembourg: Ministère du logement, 1995), 16–17; ArcelorMittal Luxembourg, ed., *La sidérurgie luxembourgeoise: Un siècle d'histoire et d'innovation/Steelmaking in Luxembourg: A Century of History and Innovation* (Luxembourg: ArcelorMittal, 2011), 8.

31 See Nancy Folbre, "The Invisible Heart," in *Global Dimensions of Gender and Carework*, ed. Mary K. Zimmerman, Jacquelyn S. Litt, and Christine E. Bose (Stanford, CA: Stanford University Press, 2006), 211–16.

32 Karin Priem, "What Happens When Archives and Research Are Transferred into the Physical Space of a Museum? 'La Forge d'une société moderne' and Other Stories," *Thinking*

eagerness to visually portray its industrial cosmos led to the creation of a huge number of images, which until today are scattered all over the country, many not yet discovered. In 2010, a huge holding of some 2,400 glass plate negatives and positives was discovered at the Institut Emile Metz (IEM), ARBED's vocational school located in Dudelange.³³ It was the (re)discovery of this forgotten part of Luxembourg's industrial and educational heritage that triggered the FAMOSO research projects and that is at the heart of several chapters of this book. The glass plates as well as the many visual traces they have left in the course of traveling through time and space—for different spectators, in different contexts, and via different modes of reproduction and media—testify to the company's strong belief in the new visual technologies as engines of societal transformation, as vehicles for mediating modernity, and as a means of establishing a corporate and even national identity.³⁴

(blog), *C²DH*, July 11, 2017, <https://www.c2dh.uni.lu/thinking/what-happens-when-archives-and-research-are-transferred-physical-space-museum-la-forge>.

- 33 The glass plates were donated by the Amicale des Anciens Elèves du Lycée Technique Privé Emile Metz to the Centre national de l'audiovisuel (CNA) in Dudelange, Luxembourg, in 2007, restored by students in restoration from the University of Applied Sciences (HTW) in Berlin, and subsequently archived under the name "HISACS Institut Emile Metz." In the context of the FAMOSO projects, an exposition was organized from June 10 to December 17, 2017, at the CNA and a catalogue entitled *La Forge d'une société moderne: Photographie et communication d'entreprise à l'ère de l'industrialisation (ARBED 1911–1937)/Forging a Modern Society: Photography and Corporate Communication in the Industrial Age (ARBED 1911–1937)* was published in collaboration with the CNA, which contains more detailed information on the holding, the restoration of the glass plates, and the exposition; see Marguy Conzémius, Françoise Poos, and Karin Priem, eds., *Forging a Modern Society: Photography and Corporate Communication in the Industrial Age (ARBED 1911–1937)* (Luxembourg: Centre national de l'audiovisuel, 2017); Poos, "Photography as a Space for Constructing Subjectivities" (in this volume). For further information on the progressive vocational school and associated psychophysiological laboratory, see, in this volume, Karin Priem and Frederik Herman, "'Sensuous Geographies' in the 'Age of Steel': Educating Future Workers' Bodies in Time and Space (1900–1940)"; Frederik Herman and Karin Priem, "The Eye of the Machine: Labor Sciences and the Mechanical Registration of the Human Body." See also Frederik Herman, "Forging Harmony in the Social Organism: Industry and the Power of Psychometric Techniques," *History of Education* 43, no. 5 (2014): 592–614; Herman, Priem, and Thyssen, "Körper_Maschinen?"; Herman, Priem, and Thyssen, "Body_Machine?"
- 34 Bolter and Grusin, *Remediation*; Erll and Rigney, "Cultural Memory and Its Dynamics," 1–11. Reproductions of these glass plates appeared, for instance, in historical brochures, albums, magazines, ARBED promotional materials, and annual reports of the IEM.

3 The Adventurous Human and Social Engineer

Engineering a positive corporate horizon was key at this critical moment in the “age of steel”—a moment when social unrest and workers’ protests and strikes posed a threat to the societal structures and called attention to the risks of societal transformation, modernization, and industrialization.³⁵ Such unrest not only jeopardized productivity and thus maximum profit, but also fuelled industrialists’ fears of socialism, Marxism, communism, and syndicalism and made them engage in a variety of reform initiatives designed to counterbalance or at least soften the negative side-effects of industrialization. The liberal climate that reigned in Luxembourg at the time encouraged private initiative over and above state intervention. ARBED made use of this freedom to position itself as being in the vanguard of social welfare by setting up a number of social works for the benefit of the working classes.³⁶ Anticipating the social question, the captains of industry and their families frequently acted faster on this issue than the Luxembourg government.³⁷ The ad hoc and unstructured nature of many of their reforms testified to the Luxembourg industrialists’ desire to present themselves as pioneers of charity and guardians of the working classes. Indeed, this was seen as vitally important to build workers’ loyalty and gain the goodwill of the new working class at a time when the neighboring countries

35 “The social unrest of the years 1917–1921 that witnessed huge metallurgic strikes, plundering of shops in Esch-sur-Alzette, and a siege of the Chamber of Deputies is evidence of this.” See Gilbert Trausch, “Joseph Bech (1887–1975),” *Nos Cahiers: Lëtzebuurger Zäitschrëft fir Kultur* 20, no. 3 (1999): 48.

36 See, e.g., Karin Priem and Geert Thyssen, “Fragmented Utopia: Luxembourgian Industrialists, Intellectual Networks and Social-Educational Reforms between Tradition and Avant-Garde,” *Jahrbuch für Historische Bildungsforschung* 19 (2013): 106–26; Nadine Schmitz, “Le paternalisme d’Émile Mayrisch,” in Barthel and Kirps, *Terres rouges*, vol. 3, 104–53.

37 It has been argued that ARBED’s social welfare systems and institutions served as models for the emerging welfare state. See, e.g., ARBED, *Un demi-siècle d’histoire industrielle (1911–1964)*, 249. See also Jean Marx, “L’ARBED, un pionier de la formation professionnelle au Luxembourg/ARBED, a Pioneer of Professional Training in Luxembourg,” in Arcelor-Mittal Luxembourg, *La sidérurgie luxembourgeoise*, 161–3; John Castegnaro, “La sidérurgie à l’avant-garde des progrès sociaux/Steelmaking at the Forefront of Social Progress,” in ArcelorMittal Luxembourg, *La sidérurgie luxembourgeoise*, 167–70; Irma Hadzalic, “Sick and Weak but Made of Steel: Luxembourgian Open-Air Schools and Other Responses to the Spread of Tuberculosis at the Beginning of the 20th Century,” *Revista de História e Historiografia da Educação* 1, no. 1 (2017): 44–64; Enric Novella, “Tuberculosis and Political Economy: Industrial Wealth and National Health in the Grand Duchy of Luxembourg, c. 1900–1940,” *Social History of Medicine* 31, no. 2 (May 2018): 308–27; Enric Novella, “Germs, Bodies, and Selves: Tuberculosis, Social Government, and the Promotion of Health-Conscious Behavior in the Early Twentieth Century” (in this volume).

went through a period of massive labor unrest.³⁸ It is, therefore, not surprising that the IEM glass plate holding also contains images depicting a variety of the company's "experiments in factory paternalism," which reached well beyond the factory walls.³⁹ These photographs depicting ARBED's social welfare provisions and progressive-era utopianism became central to its (inter)national corporate communication, masking and counterbalancing the disadvantages of industrialization, urbanization, and migration.⁴⁰

Some of these glass plate images were also reproduced in a booklet entitled *Œuvres sociales*, published in 1922.⁴¹ Presenting and magnifying ARBED's social, educational, and health-care initiatives and achievements, the booklet was partly a response to Catholic conservative circles and a number of socialist and communist workers' associations. Conservative stakeholders had strongly criticized Luxembourg's transformation from an agrarian to an industrial society, with its concomitant rise in immigration and growing social tensions, whereas representatives of the left were mainly concerned about the living and working conditions of the working class. The initiatives listed in the booklet served as a counter-argument, showcasing ARBED's social policy and governance, its industrial and economic leadership, and its innovative (semi-)scientific approaches and management methods, which would "rescue man from the tyranny of the machine."⁴² *Œuvres sociales* lists forty-two institutions and initiatives for children, workers, and their families, all of which had been established by the company (or its precursors) between 1865 and 1920. These included anti-tuberculosis campaigns, open-air schools, sanatoriums, preventoriums, and hospitals, but also scout initiatives and holiday camps, housing projects, sales cooperatives (*economats*), leisure-time facilities, workers' canteens, and a vocational training school. A number of more recent ARBED initiatives—some of which had been set up in cooperation with the

38 The neighboring countries, where the industrial revolution had commenced somewhat earlier, were plagued by social unrest and general strikes in the first decades of the twentieth century; see Anne Steiner, *Le temps des révoltes: Une histoire en cartes postales des luttes sociales à la Belle Époque* (Paris: L'Échappée, 2015). Important strikes in Luxembourg took place in 1912, 1917, and 1921; see Gilbert Trausch, *Contributions à l'histoire sociale de la question du Luxembourg, 1914–1922* (Luxembourg: Saint-Paul, 1974).

39 Eric J. Evans, *The Shaping of Modern Britain: Identity, Industry and Empire, 1780–1914* (Harlow: Pearson Education Limited, 2011), 249.

40 See Elspeth H. Brown, "Welfare Capitalism and Documentary Photography: N. C. R. and the Visual Production of a Global Model Factory," *History of Photography* 32, no. 2 (2008): 137–51.

41 ARBED, *Œuvres sociales* (Luxembourg: Victor Bück, 1922).

42 Mathew Thomson, *Psychological Subjects: Identity, Culture, and Health in Twentieth-Century Britain* (New York: Oxford University Press, 2006), 140.

FIGURE 0.7 Hospital Maison des Enfants in Dudelange— isolation pavilion for children (1923).
 PHOTOGRAPH. © ARCHIVES DE LA VILLE DE DUDELANGE – FONDS JEAN-PIERRE CONRARDY.

Société Terres Rouges, another major player in the Luxembourg steel and iron business—were described in greater detail, such as the open air school (*école de forêt*) in Dudelange, the sanatorium and preventorium (*maison des enfants*) in Kreuzberg (see fig. 0.7), and the Institut Emile Metz, a school for vocational education and professional orientation in Dommeldange. By addressing broader social questions such as urbanization, migration, and health, ARBED's efforts in human and social engineering went far beyond the mere organization of the workplace and solving work-related problems of industrialization. These very efforts aimed to create a skilled, indefatigable, and loyal workforce, redesign the social fabric, and establish new lifestyles, while at the same time targeting the micro-level of the workers' bodies and minds, the meso-level of the factory, and the macro-level of society. They thus affected and colonized all aspects of workers' lives, including schooling, leisure time, consumption, social interactions, family life, and the workplace.

4 The Eclectic Philanthrocapitalist

Œuvres sociales mirrors the contradictory assemblage of paternalistic, elitist, romantic, socialist-progressive, utopian, and traditionalist values and trends that characterized the eclectic mentality of many captains of industry and

their families in the West during the modern era.⁴³ Indeed, the Luxembourg industrialists used elements from multiple philosophies and ideologies to shape and justify their own “corporation.”⁴⁴ Inspired by similar social works set up for the new working classes in the neighboring countries, they appropriated and adapted these existing models while using their national and international networks as critical soundboards and as information, discussion, and promotion platforms. The entrepreneurial families traveled the world to cut economic and political deals and discover “new” cultural, societal, social, and educational reforms and surrounded themselves with actors from the entangled political, diplomatic, economic, artistic, and intellectual spheres.

The Verein für die Interessen der Frau/Association pour les intérêts de la femme, the Décades de Pontigny, the Colpach circle, the Union de la vérité of Paul Desjardins, the Deutsch-Französisches Studienkomitee/Comité franco-allemand de documentation et d'information, and the Entente Internationale de l'Acier/Internationale Rohstahlgemeinschaft were the key networks at the time. Addressing literary-aesthetic, philosophical, political, religious, economic, social, educational, international, and feminist issues, these circles were the most important discussion forums for Luxembourg's industrialists and their families.⁴⁵ Their engagement in these transnational networks, and in feminist

43 See, for example, Evans, *The Shaping of Modern Britain*, 249–50; Harold James, *Krupp: A History of the Legendary German Firm* (Princeton, NJ: Princeton University Press, 2012); Michael Rowlinson and John Hassard, “The Invention of Corporate Culture: A History of the Histories of Cadbury,” *Human Relations* 46 (1993): 299–326; Rüdiger Stolz and Joachim Wittig, eds., *Carl Zeiss und Ernst Abbe: Leben, Wirken und Bedeutung* (Jena: Universitätsverlag Jena, 1993); Meike G. Werner, *Moderne in der Provinz: Kulturelle Experimente im Fin de Siècle Jena* (Göttingen: Wallstein, 2003); John Cunliffe and Guido Erreygers, “The Enigmatic Legacy of Charles Fourier: Joseph Charlier and Basic Income,” *History of Political Economy* 33 (2001): 459–84; Peter Scholliers, “The Social-Democratic World of Consumption: The Path-Breaking Case of the Ghent Cooperative Vooruit Prior to 1914,” *International Labor and Working-Class History* 55 (1999): 71–91; Geert Thyssen, “Between Utopia and Dystopia? Case Studies of Open-Air Schools in Belgium, France, Germany and Italy (c. 1904–1979)” (PhD diss., Catholic University of Leuven, 2009); Geert Thyssen, “Engineered Communities? Industry, Open-Air Schools, and Imaginaries of Belonging (c. 1913–1963),” *History of Education & Children's Literature* 10, no. 2 (2015): 297–320.

44 For a definition and a more detailed discussion of the term “corporation,” see Irma Hadzalic, “Transatlantic Iron Corporations: The Expansion of Luxembourg's Steel Industry to Brazil and the Emergence of Industry-Related Social Welfare in Minas Gerais, ca. 1910–1965” (PhD diss., University of Luxembourg, 2018).

45 Thyssen and Priem, “Brains, Money and Power in Education.” See, in this volume, Klaus Ditttrich, “Buddhism, Business, and Red-Cross Diplomacy: Aline Mayrisch de Saint-Hubert's Journeys to East Asia in the Interwar Period.” See also Cornel Meder, ed., *Toute la noblesse de sa nature: Recueil des écrits publiés par Aline Mayrisch-de Saint Hubert réunis par Cornel Meder avec postfaces des professeurs Frank Wilhelm et Hans Manfred Bock et une chronologie*

circles in particular, encouraged the female members of industrialist families to take part in discussions about Europe's future and to visit social and educational initiatives that were perceived as groundbreaking models at the time.⁴⁶

The reforms pursued in Luxembourg thus have to be understood as a result of various reflections *of* and *on* modernity by various local, national, or even global interest groups (e.g., industrialists, writers, artists, architects, designers, representatives of the medical and educational professions) in various knowledge fields (e.g., economic, medical-sanitary, architectural, educational, aesthetic, ideological, and political) whose constituents and actors mutually influenced each other in and across intellectual networks. By moving within these “glocal” networks, the industrialists became equipped with nuanced and hybrid thought styles—blending, for instance, capitalism, socialism, science, etc.—which made them efficient reformers. By using manifold channels of communication and modern technologies, they could easily outperform government officials, traditionalist church representatives, and political decision-makers.⁴⁷

The industrial-intellectual avant-gardes soon labeled the social reforms they appropriated, initiated, and implemented as the “Luxembourg model” and eagerly displayed their philanthropic endeavors on the international scene. Indeed, they not only competed to thrive on the economic market but also to establish superiority over other companies in the sphere of industrial welfare. The charitable sector became a big business in itself, not least because it further empowered and enriched the industrialists. As a result, the huge investments in philanthropic and social welfare initiatives by ARBED's captains of industry should not be described as pure philanthropy but rather as “philanthrocapitalism”: a “pay out and claw back” arrangement which, in the end, served the economic interests of capital.⁴⁸

(Ehlerange: Cercle des Amis de Colpach, 2014); Hans Manfred Bock, “Colpach als transnationale Netzwerk,” in Meder, *Toute la noblesse de sa nature*, 315–402.

46 See, e.g., Andrée Mayrisch, “Impressions de Moscou,” *Galérie: Revue culturelle et pédagogique* 12 (1994): 201–14; Priem and Thyssen, “Fragmented Utopia.”

47 Guido Müller, “Andrée Mayrisch und Pierre Viénot – ein politisches Paar zwischen Berlin und Paris (1923–1940),” in *Les années trente: base de l'évolution économique, politique et sociale du Luxembourg d'après guerre? Actes du colloque de l'A.L.E.H. du 27–28 Octobre 1995* (Luxembourg: Editions Saint Paul, 1996), 131–48.

48 See Lynn Fendler, “The Gates Foundation MET Research Project as a Case of Philanthrocapitalism,” paper presented at the annual meeting of the Research Community “Philosophy and History of the Discipline of Education,” Brussels, Belgium, November 11–13, 2016; Thyssen and Priem, “Brains, Money and Power in Education.” See also Linsey McGoe, *No Such Thing as a Free Gift: The Gates Foundation and the Price of Philanthropy* (London: Verso, 2015).

5 The Humanist Scientific Manager

While ARBED's captains of industry did not really obscure the class, economic, and capitalist interests they pursued, they felt the need to promote their model of industrial civilization and rational organization of labor in new humanist and scientific terms.⁴⁹ Indeed, they framed the pressing questions that arose with industrialization, urbanization, and migration within supposedly objectified scientific, medical, and educational discourses, underpinned their socio-educational interventions with scientific and ethical rationales, and eagerly made use of modern medical scientific apparatuses to test, train, and rehabilitate their workforce and the working class at large.⁵⁰ Examples for the latter include the many revolutionary testing and training apparatuses used in the IEM's psychophysiological laboratory (founded in 1919) and modern sanitation and bathing equipment, such as the up-to-date ionized water cure equipment used in the hospital of Dudelange (see fig. 0.8), from the 1920s onwards.

FIGURE 0.8 Hydrotherapy installation—ionization by electrolysis (1923).

PHOTOGRAPH. © ARCHIVES DE LA VILLE DE DUDELANGE – FONDS JEAN-PIERRE CONRARDY.

The transition from the “age of mechanism” to the so-called new “age of humanism”—with its strong focus on the so-called “lower subjects” (such as factory workers, prisoners, prostitutes, the insane, disabled, and sick), their bodies and minds, their needs and interests—was triggered or at least advanced

49 Thomson, *Psychological Subjects*, 140–47.

50 See also Novella, “Germs, Bodies, and Selves”; Herman, “Forging Harmony in the Social Organism.”

by various scientific developments, from statistics and social physics to social hygiene; from psychophysiology, labor sciences, and industrial psychology to infection theories and bacteriology; from evolution and heredity theories to social utopian ideas.⁵¹ Progressive industrialists soon saw the advantage of articulating their vast social and scientific ambitions and their positivist faith in scientific management, as the sciences provided them with both an excuse and a medium to intervene in workers' lives, as well as a means to deflect accusations of selfishness.⁵² Indeed, this scientific framing gave industrialists the necessary credibility and allowed them to contribute actively to both the construction of the problem and its solution: the creation of a healthy, indefatigable, skilled, harmonious, and loyal labor force.

The rise of labor, or industrial, psychology also impacted the way the industrial entrepreneurs managed their workers. The latter were seen as trainable subjects who permanently had to be observed, monitored, and studied by the employers' experts (e.g., scientists and health workers) who delivered the necessary information to guide and train them in their learning, working, and living environments (e.g., through vocational training, health, and prevention campaigns). Education and prevention thus became the keystones of ARBED's management interventions, complementing the social welfare provisions that aimed to improve the general working and living conditions of the workers (e.g., by creating workers' colonies, providing accident and health insurances,

⁵¹ See, for example, de Bont, "Energie op de weegschaal"; Rabinbach, *The Human Motor*; Marc Depaepe, *Zum Wohl des Kindes? Pädologie, pädagogische Psychologie und experimentelle Pädagogik in Europa und den USA, 1890–1940* (Leuven: Leuven University Press; Weinheim: Deutscher Studienverlag, 1993); Katja Patzel-Mattern, *Ökonomische Effizienz und gesellschaftlicher Ausgleich: Die industrielle Psychotechnik in der Weimarer Republik* (Stuttgart: Franz Steiner Verlag, 2010); Abram De Swaan, *In Care of the State: Health Care, Education and Welfare in Europe and the USA in the Modern Era* (Cambridge: Polity Press, 1988); Waltraud Ernst and Bernard Harris, eds., *Race, Science and Medicine, 1700–1960* (London: Routledge, 1999); Dorothy Porter, ed., *The History of Public Health and the Modern State* (Amsterdam: Rodopi, 1994); David M. Gordon, *Liberalism and Social Reform: Industrial Growth and Progressiste Politics in France, 1880–1914* (London: Phaidon, 1982); Barbara Weinstein, *For Social Peace in Brazil: Industrialists and the Remaking of the Working Class in São Paulo, 1920–1964* (Chapel Hill: University of North Carolina Press, 1996); Barbara Weinstein, *The Color of Modernity: São Paulo and the Making of Race and Nation in Brazil* (Durham, NC: Duke University Press, 2015); Gudrun M. König, *Konsumkultur: Inszenierte Warenwelt um 1900* (Vienna: Böhlau, 2009); Karin Priem and Christine Mayer, "Learning How to See and Feel: Alfred Lichtwark and His Concept of Artistic and Aesthetic Education," *Paedagogica Historica* 53, no. 3 (2017): 199–213.

⁵² See also Herman, "Forging Harmony in the Social Organism."

or offering medical therapies). It was believed that appropriate training and prevention campaigns in the long run would make other (costly) social welfare provisions redundant or at least less necessary.

Indeed, ARBED applied scientific management as a means of human and social engineering *avant la lettre*. The science-based organization of labor and social reform was said to hold at least the promise of a better future, both for the worker and the employer. Whatever ARBED's motivations at the time (ethical, managerial, economic), the company actively tinkered with and fine-tuned the "social engine" and the "human machine"—and, by doing so, promoted and cultivated the complex metaphors of the body as machine, locomotive, motor, or clockwork, which were already widely used in medical and literary writings.⁵³ The body—be it the social or the individual body—was perceived as and handled like a machine that could be repaired, perfected, energized, and harmonized.

6 The Structure of the Book

As a collection of socio-cultural (hi)stories of technology, industry, and, more broadly, modernity, this book provides insight into the shaping of the modern subject, the harmonization and stratification of the social fabric in the "age of steel," and the entangled thought styles, mechanisms, and materialities that gave birth to the complex of modern life in Luxembourg at the turn of the twentieth century. This anthology focuses on the various rationales and processes of human and social engineering and identity construction (including at the individual, regional, national, international, corporate levels) and on their mediation through various modes of (re)presentation and different media such as photography and film, promotional brochures, corporate albums, and popular magazines, but also scientific practices of experimentation, display, and visualization. Drawing upon cultural and visual theories, the following chapters examine visual and textual (re)presentations of bodies—of

53 Alan Hyde, *Bodies of Law* (Princeton, NJ: Princeton University Press, 1997), 34. According to Hyde, the machine metaphor was used to convey the following ideas (emphasis in the original): "First, the body is a machine because it is *like other bodies*. Because bodies are machines or mechanical, medical therapies that work for one patient should work for another. ... Second, the body is a machine because of the *deadening effects of industrial production*. These machine bodies experience fatigue, wear out, require maintenance. Third, the body is a machine when it is *perfect*."

apprentices, workers, and captains of industry—in the context of a variety of internationally entangled progressive reforms.⁵⁴

The first section of the book, entitled “Modeling Subjectivities,” gathers contributions that deal with visual (re)presentations of individual and social bodies in the “age of steel.” The authors in this section explore how the visual became part of overarching discourses on the making of the new worker and the working class, industrial civilization, and the nation at large; they also ask how it might have played a major role in community- and nation-building processes and identity formation. Their contributions offer insights into how different media played an instrumental role in shaping individual, collective, and corporate identities and subjectivities in times of industrialization. In the first chapter, “Machines, Masses, and Metaphors: The Visual Making of Industrial Work(ers) in Interwar Luxembourg,” Ira Plein analyzes different depictions of labor and especially of the working man’s body. She shows how these motifs circulated and were (re)mediated by different actors, such as the labor movement and industrial stakeholders, in interwar Luxembourg, functioning as instruments of meaning-making and as tools crystallizing and raising awareness of (the ills of) a mechanized and industrialized civilization. In the second chapter, “Photography as a Space for Constructing Subjectivities: Luxembourg’s Steel Dynasties and the Modern Workforce as Seen through the Glass Plate Negatives from the Institut Emile Metz,” Françoise Poos concentrates on the human protagonists and walk-ons in the glass plate negatives of the CNA holding. She argues that the photographs were used to shape the experiences and construct the subjectivities of both the workers and the industrial entrepreneurs, while simultaneously creating and reinforcing corporate and national imaginaries. In the third chapter, “Buddhism, Business, and Red-Cross Diplomacy: Aline Mayrisch de Saint-Hubert’s Journeys to East Asia in the Interwar Period,” Klaus Dittrich takes us on an intellectual and spiritual journey to the East along with Aline Mayrisch de Saint-Hubert, the wife of ARBED director Emile Mayrisch.

54 The theoretical literature includes Arjun Appadurai, ed., *The Social Life of Things: Commodities in Cultural Perspective* (Cambridge: Cambridge University Press, 1986); W. J. T. Mitchell, *Picture Theory: Essays on Visual and Verbal Representation* (Chicago: University of Chicago Press, 1994); Gillian Rose, *Visual Methodologies: An Introduction to Researching with Visual Materials*, 3rd ed. (London: Sage, 2012); Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory* (Oxford: Oxford University Press, 2005); Richard Sennett, *The Craftsman* (London: Allen Lane, 2008); Clifford Geertz, *The Interpretation of Cultures: Selected Essays* (New York: Basic Books, 1973); Benedict Anderson, *Imagined Communities: Reflections on the Origin and Spread of Nationalism* (1983, London: Verso, 2006). On the steel industry and reforms, see Castegnaro, “La sidérurgie à l’avant-garde des progrès sociaux/Steelmaking at the Forefront of Social Progress.”

In her search for alternative approaches to industrialist-capitalist civilization and modern life, the socially active Mayrisch de Saint-Hubert traveled to East Asia in the 1930s, where she also participated in the Fifteenth International Congress of the League of Red Cross Societies in Tokyo in 1934. Focusing on this business trip, her intellectual and spiritual journey, as well as the ideas she shared with her friends from various intellectual networks, Dittrich explores how Mayrisch, in her attempt to become a modern female intellectual, struggled with the tensions between tradition and modernity.

The second section, "Mapping Bodies and Senses," focuses on the professional orientation and vocational training program at the Institut Emile Metz and looks at how the institute used scientific approaches to test and improve apprentices' bodies and their psycho-physical and sensory interactions with the technosphere, thus shaping human-machine relationships more generally.⁵⁵ Both contributions to this section examine various testing and training practices and psychometric technologies that were applied at ARBED's progressive vocational school. In chapter four, "'Sensuous Geographies' in the 'Age of Steel': Educating Future Workers' Bodies in Time and Space (1900–1940)," Karin Priem and Frederik Herman explore the various forms of 'sensory' learning designed to generate body knowledge and embodied professional skills as well as to enhance the workers' emotional well-being and psychological attachment to the technosphere. The authors argue that these sensory learning processes encoded moral values and evoked intimacy and feelings of ownership rather than alienation. In their second contribution, "The Eye of the Machine: Labor Sciences and the Mechanical Registration of the Human Body," Herman and Priem examine how workers' bodies and senses were mapped, measured, displayed, and, in the end, shaped by machine-mediated observation. This fifth chapter of the volume analyzes new experimental settings and new ways of observing and making visible what was once invisible by taking a closer look at the work of Jules M. Amar, a progressive French labor scientist. Amar believed that the new tools of mechanical and structural objectivity would allow him to create a most efficient and indefatigable workforce.

The three chapters of the third section, "Engineering Social Change," zoom in on various social and educational initiatives set up by industrialists in Luxembourg and abroad and on the discourses that allowed the captains of industry to intervene in workers' lives and to shape a new model "worker" and "citizen." In chapter six, "Germs, Bodies, and Selves: Tuberculosis, Social Government, and the Promotion of Health-Conscious Behavior in the Early

55 See also Herman, Priem, and Thyssen, "Körper_Maschinen?"; Herman, Priem, and Thyssen, "Body_Machine?"; Priem and Herman, "Hautnah."

Twentieth Century,” Enric Novella argues that the supposedly neutral concept of health (and science) and the educational framing of social problems enabled the industrialists to intrude into the private lives of the laboring classes and to spread new values, habits, and ways of life. The “homo hygienicus” became the model for the creation of the “new worker” and the “new citizen,” for the benefit of the company and the nation. In chapter seven, “Transatlantic Iron Connections: Education, Emotion, and the Making of a Productive Workforce in Minas Gerais, Brazil (ca. 1910–1960),” Irma Hadzalic looks at a specific case that illustrates how ARBED’s utopian social ideas and economic rationales—and the so-called Luxembourg corporate social welfare model—traveled around the globe and were adapted to other contexts, in this case the Brazilian state of Minas Gerais.⁵⁶ Hadzalic investigates how social and educational initiatives were used as “technologies of power” to create a loyal, obedient, qualified, and productive workforce in Minas Gerais. Finally, the section concludes with an essay by Angelo Van Gorp, which takes a socio-ecological perspective on the history of another industrial cosmos, namely the U.S. American steel town of Gary, Indiana. Gary became a model of progressive education and city planning, but unlike Luxembourg it gradually lost its vitality and viability. Van Gorp thus suggests that one solution to halt Gary’s decline may be to promote social cohesion by fostering community-based social and educational interventions.

This book aims to provide a socio-cultural history of industrialization that draws on a wide variety of sources in a non-hierarchical way. Often-neglected visual sources are given equal consideration as textual sources, which opens up new avenues of research on the human body and its senses, the importance of the material world, and innovative technologies in times of industrialization. We started our research at the national level in Luxembourg. It soon turned out, however, that national particularities and idiosyncrasies of industrialization were enmeshed and entangled with international trends influencing the material-technological, sensory, and mental worlds in the “age of steel.” Most chapters of the book focus on how industrialists and their families addressed a large array of challenges, borrowing and mixing ideas originating in domains such as corporate identity formation, mediatization, scientification, technological innovation, mechanization, capitalism, mass production, medicalization, educationalization, artistic production, and social utopia, while competing with other interest groups who pursued their own goals. Therefore, all these trends are analyzed as interconnected and enmeshed socio-cultural phenomena. This collection of essays does not refer to or elaborate on alienation theories, nor does it focus exclusively on economic change, technological

⁵⁶ See also Hadzalic, “Transatlantic Iron Corporations.”

innovation, and the effects of mass production; it rather combines different and seemingly incompatible focus areas of modernity, and analyzes how humans created, mediated, became attached to, and interacted with the technospheres of modern societies. The editors hope that this book will inspire future research in the history of industrialization.

Sources and Bibliography

- Anderson, Benedict. *Imagined Communities: Reflections on the Origin and Spread of Nationalism*. 1983. London: Verso, 2006.
- Appadurai, Arjun, ed. *The Social Life of Things: Commodities in Cultural Perspective*. Cambridge: Cambridge University Press, 1986.
- ARBED. *Œuvres sociales*. Luxembourg: Victor Bück, 1922.
- ARBED. *Un demi-siècle d'histoire industrielle (1911–1964)*. N.p.: n.p., 1964/65.
- ArcelorMittal Luxembourg, ed. *La sidérurgie luxembourgeoise: Un siècle d'histoire et d'innovation/Steelmaking in Luxembourg: A Century of History and Innovation*. Luxembourg: ArcelorMittal, 2011.
- Bell, Duncan S.A. "Mythscape: Memory, Mythology, and National Identity." *British Journal of Sociology* 54, no. 1 (2003): 63–81.
- Benjamin, Walter. *The Arcades Project*. Translated by Howard Eiland and Kevin McLaughlin. Cambridge, MA: Harvard University Press, 2002.
- Benjamin, Walter. "The Work of Art in the Age of Mechanical Reproduction." In *Illuminations: Essays and Reflections*, edited by Hannah Arendt, 219–53. London: Fontana, 1973.
- Berger, John. *Ways of Seeing*. London: Penguin Books, 1972.
- Blom, Philipp. *Alleen de wolven: Cultuur en crisis in het Westen, 1918–1938*. Translated by Pon Ruiter and Henny Corver. Amsterdam: De Bezige Bij, 2014.
- Blom, Philipp. *The Vertigo Years: Change and Culture in the West, 1900–1914*. London: Phoenix, 2009.
- Bock, Hans Manfred. "Colpach als transnationales Netzwerk." In *Toute la noblesse de sa nature: Recueil des écrits publiés par Aline Mayrisch-de Saint Hubert réunis par Cornel Meder avec postfaces des professeurs Frank Wilhelm et Hans Manfred Bock et une chronologie*, edited by Cornel Meder, 315–402. Ehlerange: Cercle des Amis de Colpach, 2014.
- Bolter, Jay David, and Richard Grusin. *Remediation: Understanding New Media*. Cambridge, MA: MIT Press, 1999.
- Brown, Elspeth H. "Welfare Capitalism and Documentary Photography: N. C. R. and the Visual Production of a Global Model Factory." *History of Photography* 32, no. 2 (2008): 137–51.

- Castegnaro, John. "La sidérurgie à l'avant-garde des progrès sociaux/Steelmaking at the Forefront of Social Progress." In *La sidérurgie luxembourgeoise: Un siècle d'histoire et d'innovation/Steelmaking in Luxembourg: A Century of History and Innovation*, edited by ArcelorMittal Luxembourg, 167–170. Luxembourg: ArcelorMittal, 2011.
- Clark, Catherine E. "Capturing the Moment, Picturing History: Photographs of the Liberation of Paris." *American Historical Review* 121, no. 3 (2016): 824–60.
- Conzémus, Marguy, Françoise Poos, and Karin Priem, eds. *Forging a Modern Society: Photography and Corporate Communication in the Industrial Age (ARBED 1911–1937)*. Luxembourg: Centre national de l'audiovisuel, 2017.
- Cunliffe, John, and Guido Erreygers. "The Enigmatic Legacy of Charles Fourier: Joseph Charlier and Basic Income." *History of Political Economy* 33 (2001): 459–84.
- De Bont, Raf. "Energie op de weegschaal: Vermoeidheidsstudie, psychotechniek en biometrie in België (1900–1945)." *Belgisch Tijdschrift voor Nieuwste Geschiedenis/Revue Belge d'Histoire Contemporaine* 32, nos. 1–2 (2002): 23–71.
- Der tägliche Weg: Reportage aus Arbeiterzügen*. Esch-sur-Alzette: Luxemburger Genossenschaftsdruckerei, 1932.
- De Swaan, Abram. *In Care of the State: Health Care, Education and Welfare in Europe and the USA in the Modern Era*. Cambridge: Polity Press, 1988.
- Dittrich, Klaus. "Buddhism, Business, and Red-Cross Diplomacy: Aline Mayrisch de Saint-Hubert's Journeys to East Asia in the Interwar Period." In this volume.
- Edensor, Tim. *National Identity, Popular Culture and Everyday Life*. Oxford: Berg, 2002.
- Erl, Astrid, and Ann Rigney. "Cultural Memory and its Dynamics." In *Mediation, Remediation, and the Dynamics of Cultural Memory*, edited by Astrid Erl and Ann Rigney, 1–11. Berlin: de Gruyter, 2012.
- Ernst, Waltraud, and Bernard Harris, eds. *Race, Science and Medicine, 1700–1960*. London: Routledge, 1999.
- Evans, Eric J. *The Shaping of Modern Britain: Identity, Industry and Empire, 1780–1914*. Harlow: Pearson Education Limited, 2011.
- Fendler, Lynn. "The Gates Foundation MET Research Project as a Case of Philanthrocapitalism." Paper presented at the Annual Meeting of the Research Community "Philosophy and History of the Discipline of Education," Brussels, Belgium, November 11–13, 2016.
- Folbre, Nancy. "The Invisible Heart." In *Global Dimensions of Gender and Carework*, edited by Mary K. Zimmerman, Jacquelyn S. Litt, and Christine E. Bose, 211–16. Stanford, CA: Stanford University Press, 2006.
- Folgore, Luciano. *Il canto dei motori*. Milan: Edizioni Futuriste di Poesia, 1912.
- Franklin, Stuart. *The Documentary Impulse*. London: Phaidon Press, 2016.
- Geertz, Clifford. *The Interpretation of Cultures: Selected Essays*. New York: Basic Books, 1973.

- Gencarelli, Thom F. "Neil Postman and the Rise of Media Ecology." In *Perspectives on Culture, Technology, and Communication: The Media Ecology Tradition*, edited by Casey Man Kong Lum, 201–53. Cresskill, NJ: Hampton Press, 2006.
- Glesener, Jeanne E., and Frank Wilhelm. "L'image de la sidérurgie dans les romans des Luxembourgeois francophones Joseph Leydenbach, Willy Gilson et Nicolas Ries," in *Terres rouges: Histoire de la sidérurgie luxembourgeoise*, vol. 1, edited by Charles Barthel and Josée Kirps, 71–95. Luxembourg: Centre d'études et de recherches européennes Robert Schuman/Archives nationales de Luxembourg, 2009.
- Gordon, David M. *Liberalism and Social Reform: Industrial Growth and Progressiste Politics in France, 1880–1914*. London: Phaidon, 1982.
- Hadzalic, Irma. "Sick and Weak but Made of Steel: Luxembourgian Open-Air Schools and Other Responses to the Spread of Tuberculosis at the Beginning of the 20th Century." *Revista de História e Historiografia da Educação* 1, no. 1 (2017): 44–64.
- Hadzalic, Irma. "Transatlantic Iron Corporations: The Expansion of Luxembourg's Steel Industry to Brazil and the Emergence of Industry-Related Social Welfare in Minas Gerais, ca. 1910–1965." PhD diss., University of Luxembourg, 2018.
- Herman, Frederik. "Forging Harmony in the Social Organism: Industry and the Power of Psychometric Techniques." *History of Education* 43, no. 5 (2014): 592–614.
- Herman, Frederik, and Ira Plein. "Envisioning the Industrial Present: Pathways of Cultural Learning in Luxembourg (1880s–1920s)." *Paedagogica Historica* 53, no. 3 (2017): 268–84.
- Herman, Frederik, and Karin Priem. "The Eye of the Machine: Labor Sciences and the Mechanical Registration of the Human Body." In this volume.
- Herman, Frederik, Karin Priem, and Geert Thyssen. "Body_Machine? Encounters of the Human and the Mechanical in Education, Industry and Science." *History of Education* 46, no. 1 (2017): 108–27.
- Herman, Frederik, Karin Priem, and Geert Thyssen. "Körper_Maschinen? Die Verschmelzung von Mensch und Technik in Pädagogik, Industrie und Wissenschaft." *Jahrbuch für Historische Bildungsforschung* 20 (2014): 47–75.
- Herman, Frederik, and Siân Roberts. "Adventures in Cultural Learning." *Paedagogica Historica* 53, no. 3 (2017): 189–98.
- Hine, Lewis W. *Men at Work: Photographic Studies of Modern Men and Machines*. 1932. New York: Dover, 1977.
- Hodkinson, Paul. *Media, Culture and Society: An Introduction*. London: Sage, 2011.
- Hyde, Alan. *Bodies of Law*. Princeton, NJ: Princeton University Press, 1997.
- James, Harold. *Krupp: A History of the Legendary German Firm*. Princeton, NJ: Princeton University Press, 2012.
- Kmec, Sonja, Benoît Majerus, Michel Margue, and Pit Péporté, eds. *Lieux de mémoire au Luxembourg: Usages du passé et constructions nationale/Erinnerungsorte in*

- Luxemburg: Umgang mit der Vergangenheit und Konstruktion der Nation*. Luxembourg: Editions Saint-Paul, 2008.
- Kmec, Sonja, and Pit Péporté, eds. *Lieux de mémoire au Luxembourg 11: Jeux d'échelles/ Erinnerungsorte in Luxemburg 11: Perspektivenwechsel*. Luxembourg: Editions Saint-Paul, 2012.
- König, Gudrun M. *Konsumkultur: Inszenierte Warenwelt um 1900*. Vienna: Böhlau, 2009.
- Kohlrausch, Martin, and Helmuth Trischler. *Building Europe on Expertise: Innovators, Organizers, Networks*. New York: Palgrave Macmillan, 2014.
- Koselleck, Reinhart. *The Practice of Conceptual History: Timing History, Spacing Concepts*. Stanford, CA: Stanford University Press, 2002.
- Krier, Frédéric, Jaques Maas, Arnaud Sauer, and Denis Scuto, eds. *100 Joer fréi Gewerkschaften 1916–2016: Contributions à l'histoire du mouvement syndical luxembourgeois*. Esch-sur-Alzette: OGBL/Éditions Le Phare, 2016.
- Latour, Bruno. *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press, 2005.
- Löffler, Petra, and Florian Sprenger, eds. "Medienökologien: Einleitung in den Schwerpunkt." Special issue, *Zeitschrift für Medienwissenschaft* 14, no. 1 (2016).
- Lorang, Antoinette. *Luxemburgs Arbeiterkolonien und billige Wohnungen, 1860–1940*. Luxembourg: Ministère du logement, 1995.
- MacDonald, Sharon. *Memorylands: Heritage and Identity in Europe Today*. Abingdon: Routledge, 2013.
- Marinetti, Filippo Tommaso. "Foundation and Manifesto of Futurism." Translated by R.W. Flint and Arthur A. Coppotelli. In *Marinetti: Selected Writings*, edited by R.W. Flint, 41–43. London: Seeker and Warburg, 1972.
- Marx, Jean. "L'ARBED, un pionnier de la formation professionnelle au Luxembourg – ARBED, a Pioneer of Professional Training in Luxembourg." In *La sidérurgie luxembourgeoise: Un siècle d'histoire et d'innovation/Steelmaking in Luxembourg: A Century of History and Innovation*, edited by ArcelorMittal Luxembourg, 161–63. Luxembourg: ArcelorMittal, 2011.
- Mayrisch, Andrée. "Impressions de Moscou." *Galérie: Revue culturelle et pédagogique* 12 (1994): 201–14.
- McGoey, Linsey. *No Such Thing as a Free Gift: The Gates Foundation and the Price of Philanthropy*. London: Verso, 2015.
- Mclsaac, Peter M., and Gabriele Mueller. "Introduction." In *Exhibiting the German Past: Museums, Film, and Musealization*, edited by Peter M. Mclsaac and Gabriele Mueller, 3–20. Toronto: University of Toronto Press, 2015.
- Meder, Cornel, ed. *Toute la noblesse de sa nature: Recueil des écrits publiés par Aline Mayrisch-de Saint Hubert réunis par Cornel Meder avec postfaces des professeurs Frank Wilhelm et Hans Manfred Bock et une chronologie*. Ehlerange: Cercle des Amis de Colpach, 2014.

- Meyer-Drawe, Käte. "Maschine." In *Vom Menschen: Handbuch Historische Anthropologie*, edited by Christoph Wulf, 726–37. Weinheim: Beltz, 1997.
- Meyer-Drawe, Käte. *Menschen im Spiegel ihrer Maschinen*. Munich: Fink Verlag, 1996.
- Millim, Anne-Marie. "Schooling the Gaze: Industry and Nation-Building in Luxembourgish Landscape-Writing, 1900–1940." *Journal of European Studies* 44, no. 2 (2014): 151–69.
- Mitchell, W. J. T. *Picture Theory: Essays on Visual and Verbal Representation*. Chicago: University of Chicago Press, 1994.
- Müller, Guido. "Andrée Mayrisch und Pierre Viénot – ein politisches Paar zwischen Berlin und Paris (1923–1940)." In *Les années trente: base de l'évolution économique, politique et sociale du Luxembourg d'après guerre? Actes du colloque de l'A.L.E.H. du 27–28 Octobre 1995*, 131–48. Luxembourg: Editions Saint Paul, 1996.
- Novella, Enric. "Germs, Bodies, and Selves: Tuberculosis, Social Government, and the Promotion of Health-Conscious Behavior in the Early Twentieth Century." In this volume.
- Novella, Enric. "Tuberculosis and Political Economy: Industrial Wealth and National Health in the Grand Duchy of Luxembourg, c. 1900–1940." *Social History of Medicine* 31, no. 2 (May 2018): 308–27.
- Nye, David E. *Image Worlds: Corporate Identities at General Electric, 1890–1930*. Cambridge, MA: MIT Press, 1985.
- Patzel-Mattern, Katja. *Ökonomische Effizienz und gesellschaftlicher Ausgleich: Die industrielle Psychotechnik in der Weimarer Republik*. Stuttgart: Franz Steiner Verlag, 2010.
- Perego, Elvire. "Die Stadt-Maschine: Architektur und Industrie." In *Neue Geschichte der Fotografie*, edited by Michel Frizot, 196–223. Cologne: Könemann, 1998.
- Plein, Ira. "Beautiful Luxembourg, Steel Works, and a Swimming Pool: The Corporate Film *Columeta* and the Formation of a Corporate, and National, Image." In *Films That Work Harder: The Global Circulations of Industrial Cinema*, edited by Vinzenz Hediger, Florian Hoof, and Yvonne Zimmermann. Amsterdam: Amsterdam University Press, forthcoming.
- Plein, Ira. "Der tägliche Weg zur Schicht': Aspekte zur proletarischen Kunst Albert Kaisers in der Zwischenkriegszeit." In Krier et al., *100 Joer fräi Gewerkschaften 1916–2016*, 83–97.
- Plein, Ira. "Machines, Masses, and Metaphors: The Visual Making of Industrial Work(ers) in Interwar Luxembourg." In this volume.
- Poole, Deborah. *Vision, Race and Modernity: A Visual Economy of the Andean Image World*. Princeton, NJ: Princeton University Press, 1997.
- Poos, Françoise. "A Lived and Living History: The Glass Plates from the Institut Emile Metz as Tools of Corporate Communication." In *Forging a Modern Society: Photography and Corporate Communication in the Industrial Age (ARBED 1911–1937)*, edited

- by Marguy Conzémus, Françoise Poos, and Karin Priem, 40–53. Luxembourg: Centre national de l'audiovisuel, 2017.
- Poos, Françoise. "Photography as a Space for Constructing Subjectivities: Luxembourg's Steel Dynasties and the Modern Workforce as Seen through the Glass Plate Negatives from the Institut Emile Metz." In this volume.
- Porter, Dorothy, ed. *The History of Public Health and the Modern State*. Amsterdam: Rodopi, 1994.
- Prampolini, Enrico. "The Aesthetic of the Machine and Mechanical Introspection in Art." *Broom* 3, no. 3 (1922): 235–37.
- Priem, Karin. "What Happens When Archives and Research Are Transferred into the Physical Space of a Museum? 'La Forge d'une société moderne' and Other Stories." *Thinking* (blog), *C²DH*, July 11, 2017. <https://www.c2dh.uni.lu/thinking/what-happens-when-archives-and-research-are-transferred-physical-space-museum-la-forge>.
- Priem, Karin, and Frederik Herman. "Hautnah: Materialität der Moderne und sensorische Ansätze in der Berufsbildung im 'Zeitalter des Stahles.'" In *Die Sache(n) der Bildung*, edited by Christiane Thompson, Rita Casale, and Norbert Ricken, 213–39. Paderborn: Ferdinand Schöningh, 2017.
- Priem, Karin, and Frederik Herman. "Putting Male and Female Bodies in Their Places: Arenas and Theatres of Educational Reform." In *Education across Europe: A Visual Conversation*, edited by Catherine Burke, Ian Grosvenor, Béatrice Haenggeli-Jenni, Helena Ribeiro de Castro, Elena Tabacchi, Geert Thyssen, and Pieter Verstraete, 43–46. Network 17 – Histories of Education, EERA, 2014.
- Priem, Karin, and Christine Mayer. "Learning How to See and Feel: Alfred Lichtwark and His Concept of Artistic and Aesthetic Education." *Paedagogica Historica* 53, no. 3 (2017): 199–213.
- Priem, Karin, and Geert Thyssen. "Fragmented Utopia: Luxembourgian Industrialists, Intellectual Networks and Social-Educational Reforms between Tradition and Avant-Garde." *Jahrbuch für Historische Bildungsforschung* 19 (2013): 106–26.
- Rabinbach, Anson. *The Human Motor: Energy, Fatigue and the Origins of Modernity*. Berkeley: University of California Press, 1992.
- Renger-Patzsch, Albert. *Eisen und Stahl*. Berlin: Hermann Reckendorf, 1931.
- Rose, Gillian. *Visual Methodologies: An Introduction to Researching with Visual Materials*. 3rd ed. London: Sage, 2012.
- Rowlinson, Michael, and John Hassard. "The Invention of Corporate Culture: A History of the Histories of Cadbury." *Human Relations* 46 (1993): 299–326.
- Russolo, Luigi. "The Art of Noise (Futurist Manifesto, 1913)." Translated by Robert Filliou. http://www.artype.de/Sammlung/pdf/russolo_noise.pdf.
- Schmitz, Nadine. "Le paternalisme d'Émile Mayrisch." In *Terres rouges: Histoire de la sidérurgie luxembourgeoise*, vol. 3, edited by Charles Barthel and Josée Kirps, 104–53.

- Luxembourg: Centre d'études et de recherches européennes Robert Schuman/ Archives nationales de Luxembourg, 2011.
- Scholliers, Peter. "The Social-Democratic World of Consumption: The Path-Breaking Case of the Ghent Cooperative Vooruit Prior to 1914." *International Labor and Working-Class History* 55 (1999): 71–91.
- Sennett, Richard. *The Craftsman*. London: Allen Lane, 2008.
- Steiner, Anne. *Le temps des révoltes: Une histoire en cartes postales des luttes sociales à la Belle Époque*. Paris: L'échappée, 2015.
- Stolz, Rüdiger, and Joachim Wittig, eds. *Carl Zeiss und Ernst Abbe: Leben, Wirken und Bedeutung*. Jena: Universitätsverlag Jena, 1993.
- Strand, Paul. "Photography and the New God." *Broom* 3, no. 4 (1922): 252–58.
- Stremmel, Ralf. *Industrie und Fotografie: Der "Bochumer Verein für Bergbau und Gussstahlfabrikation," 1854–1926*. Einbeck: Assendorff Verlag, 2017.
- Tenfelde, Klaus. *Bilder von Krupp: Fotografie und Geschichte im Industriezeitalter*. Munich: C. H. Beck, 2000.
- Thill, Edmond, ed. *Charles Bernhoeft: Photographie de la Belle Époque*. Luxembourg: Imprimerie Centrale, 2014.
- Thomson, Mathew. *Psychological Subjects: Identity, Culture, and Health in Twentieth-Century Britain*. New York: Oxford University Press, 2006.
- Thyssen, Geert. "Between Utopia and Dystopia? Case Studies of Open-Air Schools in Belgium, France, Germany and Italy (c. 1904–1979)." PhD diss., Catholic University of Leuven, 2009.
- Thyssen, Geert. "Engineered Communities? Industry, Open-Air Schools, and Imaginaries of Belonging (c. 1913–1963)." *History of Education & Children's Literature* 10, no. 2 (2015): 297–320.
- Thyssen, Geert, and Klaus Dittrich. "Water and Dust: Recovering Washed-Out Past of Industry in Luxembourg." In *Education across Europe: A Visual Conversation*, edited by Catherine Burke, Ian Grosvenor, Béatrice Haenggeli-Jenni, Helena Ribeiro de Castro, Elena Tabacchi, Geert Thyssen, and Pieter Verstraete, 63–66. Network 17 – Histories of Education, EERA, 2014.
- Thyssen, Geert, and Karin Priem. "Brains, Money and Power in Education: Industrial-Intellectual 'Avant-Gardes' and Their 'Social Works.'" Paper presented at the International Standing Conference for the History of Education (ISCHE) 35, Riga, Latvia, August 21–24, 2013.
- Trausch, Gilbert. *Contributions à l'histoire sociale de la question du Luxembourg, 1914–1922*. Luxembourg: Imprimerie Saint-Paul, 1974.
- Trausch, Gilbert. "Joseph Bech (1887–1975)." *Nos Cahiers: Lëtzebuurger Zäitschrëft fir Kultur* 20, no. 3 (1999): 47–59.
- Weinstein, Barbara. *The Color of Modernity: São Paulo and the Making of Race and Nation in Brazil*. Durham, NC: Duke University Press, 2015.

- Weinstein, Barbara. *For Social Peace in Brazil: Industrialists and the Remaking of the Working Class in São Paulo, 1920–1964*. Chapel Hill: University of North Carolina Press, 1996.
- Werner, Meike G. *Moderne in der Provinz: Kulturelle Experimente im Fin de Siècle Jena*. Göttingen: Wallstein, 2003.
- Woronoff, Denis. *La France industrielle: Gens des ateliers et des usines, 1890–1950*. Paris: Editions du Chêne, 2003.