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\*Corresponding author: Gwenaële Rot, Department of Sociology, Sciences Po, Center for the Sociology of Organizations (CSO), CNRS, 19 rue amélie, Paris, France  
 E-mail: [gwenaele.rot@sciencespo.fr](mailto:gwenaele.rot@sciencespo.fr)

Reviewing editor:  
 Zoe Strecker, Transylvania University, USA

Additional information is available at the end of the article

## VISUAL & PERFORMING ARTS | RESEARCH ARTICLE

# The poetics of automation<sup>†</sup>

Gwenaële Rot<sup>1\*</sup> and François Vatin<sup>2</sup>

**Abstract:** This article compares two examples of industrial patronage in the late 1950s. The first is the 1958 filming of *Le Chant du styrène* by filmmaker Alain Resnais, with a voiceover of a poem by Raymond Queneau, with funding from the Péchiney firm. The second is the 1959 exhibition *Forces et rythmes de l'industrie* (“Forces and Rhythms of Industry”) by painter Reynold Arnould, organized with funding from 12 major French companies. We show how similar these two operations were, from two perspectives: first, the logic behind arts patronage for major firms of the time, and second, the esthetic and social issues at stake for the representation of industry in the context of the debate on automation. An historic and esthetic analysis of Resnais’ film and Arnould’s canvases provides an opportunity to discuss the societal concerns of this period of accelerated industrial development in Europe in the 1950s. We then look at the perspective of these artists in light of the work of sociologists from this period, who were conducting fieldwork in the same factories that Resnais filmed and Arnould painted.

**Subjects:** Social Sciences; Arts; Humanities

**Keywords:** cinema; painting; automation; industrial patronage; art and industry

Industry has not killed poetry, it has rather opened it to a new world.

Achille Kauffman, “La poésie de l’industrie [The poetics of industry],” *Revue de Paris*, July 1853.<sup>1</sup>

### ABOUT THE AUTHORS

Gwenaële Rot is a professor of sociology at Sciences Po, Center for the Sociology of Organizations (CSO), CNRS, Paris, France. She is a specialist of sociology of work, visual sociology, and the history of the sociology of work.

François Vatin is a professor of sociology at Paris Nanterre University and director of the master’s program in Economics and Social Sciences. He is a specialist of industrial sociology, economic sociology, and the history of science.

They work together in the field of the history of the sociology of work, in particular regarding the history of the large collective research projects in industrial sociology in the post-World War II era. They are the curators of an exhibition devoted to Reynold Arnould, “La Poétique de l’industrie” (Le Havre, July–September 2016).

### PUBLIC INTEREST STATEMENT

In the late 1950s, under General Charles de Gaulle, France worked to regain its past glory on the international stage. The idea of “automation” dominated the new concept of the factory. Economists, geographers, and sociologists walked in step with the accelerated processes of reconstruction and reindustrialization in Europe. Artists were also caught up in this wave. They received commissions from public authorities and companies to showcase the new industrial world that was taking shape. This paper illustrates this moment in the history of relations between art and industry by conducting a comparative analysis of two emblematic works from this period. The first is a film, *Le Chant du styrène* (The Song of the Styrene), from filmmaker Alain Resnais on the manufacturing of plastic objects, with a script by poet Raymond Queneau. The second is an exhibit of works by the painter Reynold Arnould on the theme of industry, held in 1959 at the *Musée des arts décoratifs* (museum of decorative arts) in Paris.

Factories usually have a forbidding air to them, and brilliant minds have complained that these modern installations spoil our landscapes and destroy our country's beauty. [...] Modern artists, however, know how to uncover their specific beauty, which is not found solely in the grandeur of their machines.

*Bulletin Péchiney*, July–August 1957, N. 85, “Art et industrie” [Art and industry] section.

1958–1959: the advent of the Fifth French Republic. These were the years of the first major political shift in postwar France. Under General Charles de Gaulle, France became a modern industrial force and worked to regain its past glory on the international stage, which also implied climbing the ranks to its former global dominance in cultural matters. With this goal in mind, General de Gaulle created a “ministry for culture” for André Malraux, a renowned writer who was interested in all the arts and wished to democratize culture. The industrial world, however, was also part of this cultural focus. Already in 1933, when he was a communist sympathizer, André Malraux penned these words in his novel *Man's Fate*: “The factory, which is still only a kind of church of the catacombs, must become what the cathedral was, and men must see in it, instead of gods, human power struggling against the Earth (Malraux, 1934).”

At the end of the 1950s, the idea of “automation” dominated the new concept of the factory. This watch-word, popularized by Diebold (1952), was used on both sides of the Atlantic. Economists, geographers, and sociologists walked in step with the accelerated processes of reconstruction and re-industrialization in Europe. Artists (photographers, filmmakers, visual artists) were also caught up in this wave. They received commissions from public authorities and companies to showcase the new industrial world that was taking shape. However, the relationship between artists and their patrons was not a one-way street, as the former used their esthetic work to contribute to a shift in the way industry was perceived.

We will illustrate this moment in the history of relations between art and industry by conducting a comparative analysis of two emblematic works from this period. The first is a film commissioned in 1958 by the Péchiney company<sup>2</sup> from filmmaker Alain Resnais (1922–2014) on the manufacturing of plastic objects from coal and oil, with a script by poet Raymond Queneau (1903–1976). The second is an exhibit of works by the painter Reynold Arnould (1919–1980) on the theme of industry, funded by major public and private firms, and held in 1959 at the *Musée des arts décoratifs* (museum of decorative arts) in Paris (Rot & Vatin 2015, 2016b). We will look at these two esthetic enterprises in light of the analysis by sociologist Pierre Naville (1904–1993), who conducted his research on automation in this same period. He combined the scientific rigor of a rational thinker with the poetic vision of his past as a surrealist writer (Blum, 2007).

### 1. Industrial communications and corporate patronage

*Le Chant du styrène* (literally, “The Song of the Styrene”) is a short film of 14 minutes with a big budget (more than fifteen million francs), shot on 35 mm film. The Péchiney firm commissioned the film in June 1957 from the producer Pierre Braunberger,<sup>3</sup> with the aim of presenting it in Brussels during the first post-War Universal Expo, 17 April–19 October 1958. According to the letter with the details of the commission, the film was to showcase French engineering in this new industrial activity with “an industrial propaganda film, capable of generating [...] the largest wave of interest possible for plastic materials and the industrial activities associated with it,” and the film should “favorably compare to similar films from foreign firms.”<sup>4</sup> This “informative film, not intended for advertising purposes (Bloch, 1958).” was meant to promote techniques and industrial projects and not the Péchiney brand, even though, of course, the firm would be favorably portrayed. Péchiney was not the sole funder of the film, as it also received support from the *Centre National de la Cinématographie Française*, which had a funding scheme for short films: the “quality bonus grant.”<sup>5</sup> This was not the first foray into filmmaking for the Péchiney firm. In 1954, the company had funded a film by Jean Vénard: *Du sel, du calcaire et du coke* (“Salt, Limestone, and Coke”), primarily filmed in the chemical factory in Saint-Auban (in the Basses-Alpes). In 1958, Péchiney also bankrolled the

production of *Alchimistes* by Edouard Molinaro, a film about aluminum production filmed in Gardanne (Bouches-du-Rhône). These three films were hailed by critics<sup>6</sup> and were shown in the French pavilion of the Brussels Expo.<sup>7</sup> In addition to being aired at the beginning of screenings in public theaters, they were also shown at company events.

Alain Resnais had already made a name for himself with several documentaries when the producer Pierre Braunberger asked him to work on the Péchiney project. *Le Chant du styrène* was the last short film in his cinematographic career. He had already worked with Braunberger on films about art<sup>8</sup>: *Van Gogh* in 1948, which won him an Oscar; *Guernica* in 1950; and *Toute la mémoire du monde* (“All the memory in the world”—on the French national library) in 1956. During the making of these films, Resnais met the people who would become his collaborators in *Le Chant du styrène*: Roger Fleytoux (production manager), Claude Joudioux (lighting), Georges Delerue (orchestral conductor), and, especially, Sacha Vierny, his director of photography and chief cameraman. Resnais had also already delved into industrial themes with a previous short film: *Le mystère de l’atelier 15* (“The Mystery of Workshop 15”). Commissioned by the French national occupational safety and health institute (today known as the INRS)<sup>9</sup> and codirected by André Heinrich in 1956, this film aimed to highlight the preventive role played by company doctors in a chemical factory which manufactured dyes. It staged a short, melodramatic detective story; the music was by Pierre Barbaud, with whom Resnais also collaborated for *Le Chant du styrène*.<sup>10</sup> And, lastly, in 1955, Resnais directed *Night and Fog* on commission from the WWII History Committee.<sup>11</sup> Thus, it was an experienced director with a solid technical team who was called to make *Le Chant du styrène*.

Resnais scrupulously respected the detailed stipulations which Jean Massy, head of the marketing department at Péchiney, sent to Pierre Braunberger, though he was nonetheless able to create a highly personal work. The contract stated that the film should include two parts. The first part should show “the primary applications of polystyrene, with a presentation of finished articles intended for the following sectors: cooling industry—household articles—toys—wall coverings—packaging. In this same section, the corresponding manufacturing techniques should be shown: injection and extrusion molding, stretching, vacuum forming.” In the second part, the film “shall address the different sectors which contribute to polystyrene manufacturing—plastic materials, whose raw materials are products of either the coal or petroleum industries. Coal science: ethylene extraction from coal gas and its purification—benzene production—alkylation of ethylene and benzene to produce styrene monomer. In petroleum science, the steps for manufacturing styrene monomer are practically identical to those used to make styrene from coal.” The letter goes on to say: “This sequence should aim to amaze rather than simply explain, the goal being to make the viewer see the magnitude of the industrial complex necessary for manufacturing polystyrene, rather than a step-by-step presentation of the manufacturing process. An explanation of the product manufacturing should simply be mentioned in off-screen commentary—and all the commentary shall be off-screen.”<sup>12</sup>

Resnais adroitly used these specifications and integrated the two parts suggested in the commission into a seamless cinematic narrative which goes backward from the manufactured object to the “formless matter” (oil or coal), in Queneau’s words. In the manner of Oulipo,<sup>13</sup> he transformed the stipulations of the commission, with a sidelong glance at one of the oldest cinematic tricks: playing the film reel backwards. Resnais also respected, to the letter and perhaps beyond, the requirement to “use the best contemporary color technicians”<sup>14</sup> and the “best material,” by making a film with an audacious use of color evocative of the science-fiction films he admired.<sup>15</sup> Thus, the film must certainly have been a surprise when it was shown to its backers. They took offense, however, not at the images, but rather at the soundtrack, and, more specifically, to the poem in alexandrines written by Raymond Queneau as per Resnais’ request of November 1957. In early January, during a showing of a preliminary version of the film with the soundtrack at the Péchiney headquarters, the company managers expressed their categorical refusal of Queneau’s commentary. Despite Resnais’ furious reaction, they demanded that a new text in prose be written.<sup>16</sup> This was the version that was later shown in Brussels (which explains the flat title—*Styrène*—given to this version of the film). Resnais was nonetheless able to finish the version in alexandrines, later presented at the Venice film festival and which won the

Golden Mercury award. Later, the powers that be at P echiney recognized that Queneau’s poem was a significant part of the film’s impact,<sup>17</sup> and that version eventually got the upper hand.

Some have concluded that Resnais used P echiney and circumvented the requirements of the commission to instead make an ironic film about industry (Lazlo, 2014). This conclusion is most likely a wholesale exaggeration, as Resnais himself said in a 1960 interview for the *Esprit* magazine: “I wasn’t trying to cheat or fool anyone with my shorts. There was a commission, and I was careful to respect that (Alain Resnais   la question, 1960).” As we have seen, he scrupulously respected P echiney’s stipulations, even though he re-appropriated them in a very personal way: “what matters is not the commission itself, but the freedom one has within the commission,” he affirmed in 1964 (Alain Resnais in “Voix off”, n.d.). The feeling of irony, created mainly by Queneau’s text, should not fool us. The use of ironic distance and mixed registers is at the very core of the literary work of this poet and in no way prevents him from simultaneously taking the subject seriously, as evidenced in particular by the scientific references. Indeed, his text is carefully based on two references in industrial chemistry which he read for this work, in addition to the documentation provided to him by the P echiney firm.<sup>18</sup> The legacy of *Le Chant du styr ene*, whose long-term success owes a lot to Queneau’s text (initially rejected by the company), is evidence of the productive potential of industrial commissions for artists and poets in the 1950s.

Reynold Arnould’s story is somewhat different, as the impetus for collaboration came from him and not from a company. At the time, it was common for big French companies to call on painters for their advertising campaigns. For example, the Pont- -Mousson plant (which belongs to the Saint-Gobain group), commissioned a series of canvases from Andr  Marchand<sup>19</sup> for a commemorative publication (Siegfried & Marchand, 1957). Esso-France also called on painters to illustrate its journal, *P trole-Progr s*; Air-France often solicited visual artists; the Shell-Berre oil company organized a major exhibit at the Galliera museum in 1959 called “Petrol in the eyes of one-hundred painters” to commemorate the hundredth anniversary of the first oil drilling operation, and the list goes on (Collective, 1959). Reynold Arnould’s approach, however, was original (Moulin, 1987, p. 257). He asked 12 corporate patrons to fund the preparation and hanging of a major exhibit on the theme of industry (136 oils on canvas, 35 watercolors, 27 drawings (oil on paper or charcoal), and 300 preparatory sketches). Andr  Malraux, just appointed minister of culture by General de Gaulle, effectively presided the inauguration of this exhibit on the 16 October 1959.

The painter received funding to go to factories to observe machines and workers. The companies involved formed a patronage consortium, which met regularly to take stock of the painter’s progress and address logistical questions. This patronage was structured such that the painter retained his artistic freedom and the firms involved were not in competition for advertising that might result. The paintings were not organized by company, and their titles did not always refer to the establishment which had inspired them.<sup>20</sup> As in Resnais’ case, the goal was not advertising, but rather “communication” about industry. Using the eyes of the painter, the aim was to give industry noble credentials. Previously scorned by the antimachine romantic tradition, industry appeared here as a subject worthy of painting, the site of a new aesthetic in the making. By showcasing its beauty, industry became humane and thus civilized.

In an interview given on the occasion of this exhibit, Arnould detailed his aesthetic ambitions: “First of all, there was a format issue that had to be resolved. This led me either to train my eye on one detail at a time: a tool from the foundry, a pair of pincers, for example; or to try to create a synthesis of the machine working in front of me. [...] I also had to reinvent light. And lastly, rhythm, which is the primordial element of the machine.”<sup>21</sup> Arnould’s approach thereby differs radically from that of Fernand L ger, to whom he was often compared at the time. Indeed, using forms and color, L ger introduced industrial imagery into representations of plants and human bodies. Inversely, Arnould took up the factory itself as a motif, equal to any other, and sought to understand its hidden mysteries. At the inauguration of the exhibit, Andr  Malraux was right when he said: “You have done what you set out to do, while L ger, for example, thought he was doing what you did but did not.”<sup>22</sup>

This perspective surprisingly converges with that developed in the same period by the sociologist Pierre Naville. In a break with traditional mechanistic representations of factories, Naville emphasized the “chemicalization” of industry. Indeed, Arnould’s paintings are rife with images of this “chemicalized” industry, where production is the result of combining fluid materials lapped by fire. This is clear in his works with more abstract titles: *Turbulences*, *Ondes de choc* (“Shockwaves”), *Fusion*, *Feu* (“fire”), *Découverte de l’invisible* (“Discovery of the invisible”), *Découverte de la matière* (“Discovery of matter”), *Fleur de métal* (“Flower of metal”), *Nuit et lumière* (“Night and light”)... In addition, many of his paintings take a direct, technical look at fluid industrial operations, such as *Polymérisation en masse de chlorure de vinyle* (“Bulk polymerization of vinyl chloride”),<sup>23</sup> a process also filmed by Resnais during the same era.

Critics were not unanimous in their reception of this esthetic enterprise. Some could not let go of the idea that factories were ugly by nature and found it naïve to think that they could be transformed by art. Furthermore, some saw this as a politically dangerous move, as it took attention away from the reality of industry: human suffering and hard labor. By making this kind of art, the painter was selling out to capitalist interests, and thus, industrial patronage was dangerous in and of itself. Other critics felt, to the contrary, that this art should be displayed widely—in the home and in the workplace. Factories should be beautiful, just like homes and schools, and therefore, the eye needed to be trained for this new esthetic of the machine. The painter’s job was not to give a realistic depiction of industry, but rather to extract new aesthetic material from it, and thereby contribute to the vitally important re-enchantment of the modern world. Undoubtedly, there was also a pragmatic dimension: painters needed to find new patrons, and industrial companies thereby replaced the lords of the Renaissance. In this way, economic necessity was at play alongside artistic concerns, primarily that art must be in step with its time.

As for Resnais and Queneau, Arnould was not guaranteed success just because he chose an industrial subject. Of course, these artists needed to survive, so they took money wherever they could find it. But they likely would have had more commercial success if they had been more attuned to the market, whether in the cinematic world or that of painting, by using themes and aesthetics that were closer to the public’s dominant taste. Their “industrial” artistic work should therefore not be seen as opportunistic; it is truly the work of self-determined authors. Arnould, just like Resnais and Queneau, had tremendous leeway in how he did his work. This is why their work is of interest to us: it provides an original view of industry, shown through the lens of a camera, a pen, or a paintbrush. And yet, these interpretations of industry are comparable to contemporaneous sociological work. This is what we will now show, by looking at two themes: the image of a factory of pipes and the role of labor in automated industry.

## 2. A “pipe concerto:” the allure of a factory of pipes

Resnais’ cinematography shows his interest for scientific imagination and science-fiction.<sup>24</sup> Raymond Queneau, a philosopher with encyclopedic knowledge, was insatiably interested in science, with a particular fondness for math.<sup>25</sup> It was this combination of scientific rigor and lyricism which led Alain Resnais to ask him to write the commentary for his film after other collaborations failed.<sup>26</sup> In 1950, Queneau published a scientific poem in alexandrines, *La petite cosmogonie portative* (“A short, portable cosmogony”), made up of six songs in the style of Lucretius. This poem recounts the story of the birth of the universe, the earth, and mankind’s beginnings on earth. To write it, Queneau delved into specialized texts from all fields of knowledge over the course of the 1940s.<sup>27</sup> The last song of the poem, on anthropogenesis and the history of human techniques, is primarily based on two references: *Réflexion sur la science des machines* (“Reflection on the science of machines”) (Lafitte, 1932) by the engineer and architect Jacques Lafitte<sup>28</sup> and the two-volume *L’homme et la matière* (“Man and matter”) (Leroi-Gourhan, 1943) by the paleontologist and prehistorian André Leroi-Gourhan. Queneau had read Lafitte’s work in the 1930s,<sup>29</sup> and in his research for the cosmogony, he reread Lafitte’s work in 1949 alongside that of Leroi-Gourhan. Leroi-Gourhan’s erudite work is essentially concerned with prehistoric and traditional techniques, while Lafitte’s short, evocative piece is centered on the perspective of automation.<sup>30</sup>



In 1957, when Resnais asked Queneau to collaborate on his film, the poet had additional reasons to be interested in automation. That same year, his friend, the sociologist Pierre Naville, had just begun a major research project on that precise topic.<sup>31</sup> On 15 September 1961, Naville gave Queneau—who was, at the time, an editor in the Gallimard publishing house—a collection of articles which would later become *Vers l'automatisme social?* (“Toward social automatism?”), published by Gallimard in 1963.<sup>32</sup> We have every reason to think that in 1956, when this research project was taking shape, Naville and Queneau discussed this subject. Naville was also a reader of Jacques Lafitte,<sup>33</sup> but the vision he developed of automation is centered on the idea of a trend toward the “chemicalization of industry,” as a break with the mechanical model which dominated in the eighteenth and nineteenth centuries. In this new industrial paradigm, production resulted from the constant contact between materials in a factory of pipes, for which an oil refinery was the archetype. This way of organizing production was difficult for sociologists and writers to depict, and the same was true for filmmakers and painters. It was precisely this question which occupied Naville, Resnais, Queneau, and Arnould in 1958–1959 (Figures 1–4).

A factory of pipes undoubtedly has esthetic dimensions. Very early on, photographers took interest in the play of light and shadows on their intertwined pipes. In April 1957, Péciney actually commissioned the photographer John Craven (1912–1981) to do a photograph documentary of its recently modernized plants in Gardanne and Saint-Auban.<sup>34</sup> These factories glitter like giant ships moored in port under the nighttime sky. In daylight, with a clear sky, the enameled pipes shine in primary colors, the same colors that make up the palettes of Piet Mondrian and Fernand Léger. Alain Resnais indeed stated that he was inspired by Léger for *Le Chant du styrène*.<sup>35</sup> In 1961, Philippe Condroyer made a film on steel pipe manufacturing, *Diamètres*, for the Pont-à-Mousson plant (a subsidiary of Saint-Gobain), with Sacha Vierny as cameraman. In a contemporaneous article, this film director expressed his enthusiasm for industrial beauty: “This world reveals itself to be dramatic, abstract, secret [...] I also worked with the idea of revealing the formal beauty of the machines and their operations all along the different manufacturing steps, so I was attentive to the play of light and color throughout the galleries of this permanent exhibit of modern art in motion.”<sup>36</sup>

Alain Resnais rendered the dynamics of continuous flow chemical plants with abundant travelling shots, which give the impression that the pipes themselves are in motion. In a similar fashion, Reynold Arnould’s highly liquid paint left traces of the paintbrush’s movement on the canvas. Both used techniques from their respective art forms to express the continuous movement that characterizes automated industry. Of course, these approaches have aesthetic references of their own:

**Figure 1. Reynold Arnould, *Craking*, oil on canvas, 98 × 98 cm, 1958–1959.**

Source: Le Havre, Muma, Museum of Modern Art André Malraux, © MuMa Le Havre - photography Charles Maslard.



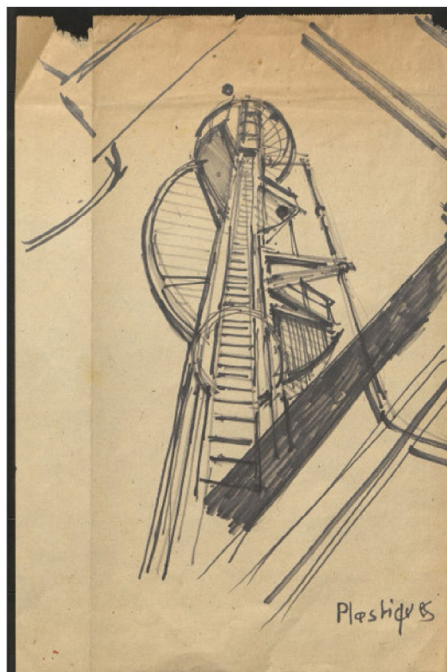
**Figure 2.** *Le Chant du styrène*, directed by Alain Resnais (1958).



**Figure 3.** *Le Chant du styrène*, directed by Alain Resnais (1958).



**Figure 4.** Reynold Arnoud, drawing, 1958, private collection.



**Figure 5. *Le Chant du styrène*, directed by Alain Resnais (1958). Sacha Vierny.**



Arnould was inspired by the way the Futurists depicted movement, and American science-fiction films influenced Alain Resnais.

Color undeniably plays a major role in modern industrial aesthetics. Resnais chose to film *Le Chant du styrène* with the Eastmancolor process, typical of American cinema of the 1950s, but which was new to French audiences at the time.<sup>37</sup> In this way, he highlighted the futuristic nature of his film—just as he did with a reference in his editing notes to the atmosphere of planet “Altair IV” from *Forbidden Planet* by Fred M. Wilcox.<sup>38</sup> In an interview, he clarified his choice of manipulating colors during the filming of *Le Chant du styrène*: “the use of color can be realistic or non-realistic. [...] In *Night and Fog*, I was only looking for realistic color in order to depict a place as faithfully as possible. In *Le Chant du styrène*, on the contrary, there are transpositions and dominants that are used on purpose.”<sup>39</sup>

Resnais thus exaggerated chromatic contrasts in order to depict a futuristic factory, while Arnould, on the contrary, tried to mute them by refusing to use industrial colors: “One finds colors in factories that don’t actually exist or which are atrociously garish,”<sup>40</sup> he stated in one account. The journalist and art critic Guy Dumur criticized his choice of pastel colors, accusing him in the *France Observateur* magazine of trying to “beautify” industry in order to hide its harsh reality: He does not show the emotional meaning, nor the social and political meaning of the world of work. The soft colors could never “depict” the world of sweat, grease, and smoke, which is that of major industrial landscapes. The difficult and often unfair working conditions are also missing. This painter’s stance in the face of this both terrifying and beneficial world, which is working for the improvement and the destruction of humanity, this world of triumphant technology, makes me think of ancient painters who “beautified” the princes and patrons who commissioned portraits from them.”<sup>41</sup> For Georges Limbour, in *Les Lettres nouvelles*, it was the project itself of painting industry which was a dead-end: “It is all adroitly constructed, logical, rational, very dry. And it also gives the impression of déjà-vu. It is a rather monotonous, disinterested report, painted not by an artist, but by an engineer who has a few notions of contemporary art. But can we really expect anything better from machines? [...] I believe that industrial techniques and science are irreconcilable with art, and it would be better to see them as sworn enemies. [...] In my opinion, painting’s mission is rather to save us from scientific rationalism and our own mechanization.”<sup>42</sup>

The sociologist Pierre Naville is of a different mind, however. He visited these same factories, also with the goal of producing a “logical, rational, very dry” “report.” Although these adjectives do indeed describe science, social or otherwise, science cannot help but be seduced by the poetic allure of these sites. This is why, in his private journals, this former surrealist used poetic writing to describe his impressions after his visit to the Esso refinery in Port-Jérôme in the lower valley of the Seine River.

Viridian entrails loom on the horizon  
Stiff intestines in the open air



lace of rusted silver feverish shiver at the slightest doubt  
where the mind finds patient worry  
geometry of the deserts Holà good sirs!  
Tempest under a volcanic dome of filigree  
who of a metal daub tumbles  
This grass snake knotted as a python  
shard of aluminated muslin corset  
lacing where a cold life courses  
suddenly gushing burnt that nothing can stop  
Thermal intelligence  
For the abstract weights of the earth  
commandment of the quartered spider of lathing luster.  
Oh fuel of hope  
how the gestures of your liquid hands follow me to the depths of dreams destupefied by  
your circuit!  
The pronouncement of the entrails to the volcano distilled in holy oils  
bearer of wind of speed of love to moist fingers.<sup>43</sup>

The sociologist was a poet here, and the filmmaker shared his sentiment, using his own techniques. The strength of Alain Resnais' film lies indeed in his ability to give the impression of fluid productivity typical of chemicalized industry. The theme of the pipe is omnipresent in the film, which Resnais himself called a "Concerto for pipes:" "in this sequence of images (fast cuts), pipes become increasingly numerous, increasingly complicated, increasingly tangled."<sup>44</sup> The film aims to show an uninterrupted flow, from oil to the finished object, a process which Resnais shows in reverse. This is a deliberate, edited construction, since Resnais had to film in several different sites all over France in order to capture the entire production chain. The sites where he filmed belonged to Péchiney and its subsidiaries, and also to its suppliers and clients, such as the plastic manufacturing plants of Oyonnax in Ain<sup>45</sup> and Longjumeau (Plaxico) in the greater Paris region, the Ribecourt polystyrene plant in Oise, the Esso refinery of Port-Jérôme in Seine-Maritime, and the Mazingarde coal plant (Ethyl Acetate factory) in Pas-de-Calais (Figures 3 and 4).

Beyond just the geometrical aesthetics of the pipes, the goal was really to understand what was happening in them. What was the best way to depict this modern alchemical mystery? Indeed, the very nature of a factory of pipes is that its networks of pipes mask the product itself and its transformation. This was not just an issue for writers and artists, but also for the workers themselves and the sociologists who tried to understand their experience. Naville emphasized that refinery workers never actually see the oil (Naville, 1963). Alain Resnais and Sacha Vierny's camera provided a fleeting glance into a tank to see what is said to be styrene. And Queneau provided the following commentary:

Styrene was only a liquid of no color  
Somewhat explosive, and not without an odor.  
And take a good look; it's your one and only shot  
To examine what precisely we here have got (Queneau, 1969).<sup>46</sup>

In this respect, painting has an easier job, since it can take more liberties with its subject. Arnould drew pipes; he depicted these networks on his canvases, such as those meant to represent the Esso refinery in Port-Jérôme, the very site where Resnais filmed and Naville did his research. But he let them burst open on his canvas to let out the transforming material within, in the case of his more abstract paintings with titles like *Jaillissement* ("gush"), *Turbulences*, and *Fleur de metal* ("flower of metal"). Georges Combet, CEO of Gaz de France, but also a friend of Léger and a promoter of

industrial aesthetics (Combet, 1972), was delighted to see his factory come to life under the painter's brush: "[R. Arnould] wants to get to the heart of the machine. He is interested not in its external appearance, but in its function. [...] His most important paintings are perhaps those that present a kind of functional dictionary of the machine, an analysis of elementary tasks, those paintings which are simply titled engage, pierce, drill, flatten, movement... [...] When you visit Arnould's exhibit, you can hear the turbine and the forest breathing, singing. Transporters, thrusters, dischargers, compressors: the gas plant is a hive of activity, gas is whistling through the pipes. With his empathetic curiosity, the painter is able to capture that which lies beneath the skin of the machine, what we might call its soul. We are witnessing a spiritualization of mechanical work (Combet, 1959)..."

### 3. Human labor in the gaps between the pipes

Péchiney's commission was not to make a film about factory workers. The idea was instead to turn a new product—plastic material—into a noble one (Barthes, 1957). It is presented as the result of a transmutation at the end of a long journey, starting with the brew of primitive culture, the fruit of the decomposition of living organisms. The film describes the successive steps of this transmutation, which takes on the air of a natural process within the circuit of pipes. Resnais was perfectly conscious of this choice which erased the human labor necessary to this process: "until shot 86, one gets the impression that the factory works 'on its own.'" However, contrary to what Godard claims (he is oddly unobservant in this case), men are not absent from these images. If we track their appearances, we get an idea of Resnais' deft ability to take into account the real nature of work in these kinds of factories, thereby working alongside the sociologist.

Toward the middle of the film, a long traveling shot shows bars which evoke the jail-like dimension of factory work, and behind them, we see 30-odd workers leaving the factory in an orderly fashion. This is probably a nod to a famous shot in *A nous la liberté* (Freedom for Us) by René Clair (1931), and seems to translate Resnais' desire to show the audience that even an automated factory needs human workers. However, at the beginning of the film, where we see operations related to the manufacturing of plastic objects, we only see the hands of the operators who take the objects out of the molds. This first, very discrete human presence hardly seems real, given that only anonymous hands are shown. It gives the impression of a factory that works "on its own." This is all the more striking, in that we are witnessing a Taylorian workplace, where the activity of workers is in time with the machines.<sup>47</sup> When we go further upstream in the process, workers appear in full, but their job is to supervise the work of the machines: precisely the kind of work highlighted in the sociology of automation by Pierre Naville. In a wide shot, we first briefly see a worker who monitors an imposing machine, then a second who checks the quality of the colored plastic nuggets coming out of the machines. In an even more subtle manner, in two brief sequences, Resnais manages to give a cinematic rendering of the nature of supervisory-inspection work. In the first sequence, when the off-screen commentary has just evoked the explosive nature of the material at hand, a worker in uniform seems to come out of nowhere and slides, like a fireman, down a pole (another pipe) to check control instruments whose arrows are quivering. Then, a succession of brief shots of instruments (the first should look "a bit like a mushroom," another "like a robot," the next "like a clown," and the last "very frenetic," according to the synopsis<sup>48</sup>) reminds us of the need for constant vigilance in a production process that is both unpredictable and dangerous. This sequence ends with the only close-up of a person in the entire film: a man in a control room, played by the head cameraman, Sacha Vierny. Resnais made the following commentary about this sequence: "I had asked him to film *Le Chant du styrène* in color and in CinemaScope. I even asked him to appear in one shot, to be the only human being that we really see, facing the camera, center screen. He was very photogenic (Figure 5)."<sup>49</sup>

As we hear alarms going off, we see just the eyes, which move from left to right, of a man facing the camera (the synopsis tells us he is an engineer).<sup>50</sup> The anxiety created by a potential disruption in this unstable and dangerous process is translated here with a break in the pace of the editing, underscored by an *accelerando* in the music and, for just a brief instant, a break in the commentary—as if the commentator is holding his breath. In this way, workers and work are indeed both present in *Le Chant du styrène*. In a move away from the ever-canonical figure of the Tramp caught

**Figure 6.** Reynold Arnould, *Polymérisation en masse du chlorure de Vinyle*, Rouen, Museum of Fine Arts, Inv. 1980.16.24.



in the machinery of an assembly line in *Modern Times*, Resnais was able to depict the work of a supervisor-inspector in chemicalized industry. These men fade to the background when everything is going as it should, but they are constantly present in such factories, and they move to center stage when production is disrupted. With a distinct economy of means, Resnais was able to use his camera to show the logic of modern work which contemporaneous sociologists struggled to render, despite the groundbreaking work of Pierre Naville.<sup>51</sup>

Oddly enough, Reynold Arnould's approach bears some similarities to that of Alain Resnais. He also tried to move away from traditional depictions of work and workers, where suffering and power were combined to render the modern logic of automated production. Just as for Resnais, some of Arnould's subjects come straight out of Taylorian industry: for instance, assembly lines in the Flins Renault automobile plant or in the Philips television factory in Chartres. He chose to depict a panoramic view of the workshop in his paintings, giving a general impression of the assembly line. He did not, however, ignore the specific gestures of these workers, as we can see in his precise renderings in his highly realistic preparatory sketches. In order to portray workers' gestures in his final paintings, he did large charcoal drawings showing hands in action, like those we see at the beginning of *Le Chant du styrène*. Even more compelling, however, is how Arnould worked to show human labor in his oils which are, on first glance, more abstract. Just as in Resnais' film, workers seem to be absent from these images of automated, chemical production. However, just as for Resnais, when we look closer, we can see them: slender silhouettes on guard, in the gaps between the pipes (Figure 6).

#### 4. Conclusion

Since the beginning of the nineteenth century, our societies have experienced conflicting feelings about industry. No one doubts the material advantages it brings, but despite this, industry is regularly denounced for its betrayal of fundamental human values, the same which nourish the humanities. Thus, a critique of industry, initiated by the romantics, has accompanied the development of industry itself. Achille Kaufmann, cited in the epigraph, is one of the few who defended the aesthetic dimension of industry. This debate became shrill in the period between the two world wars, after the trauma of WWI with its massive use of industrial means for destructive ends.<sup>52</sup> Painting and literature from the time abundantly testify to this. In this regard, the post-WWII period in France did not resemble the period following the First World War. The industrial power of armament was indeed again present, but the necessity for reconstruction was predominant: of cities, industrial structures, and society itself. In this context, France united in support of its industry as it had perhaps never

done before in its history. We must understand the mobilization of artists, painters, photographers, and filmmakers in this context, just as that of social thinkers, economists, sociologists, without neglecting, of course, architects and urban planners whose work was front and center.

The three authors that we have studied here—the filmmaker Alain Resnais, the painter Reynold Arnould, and the sociologist Pierre Naville—are emblematic of this moment in French society and culture. The works that we analyzed were produced at the end of the 1950s, at the end of the first reconstruction period, during which the need for reconstruction was at its most urgent and when France regained confidence in its industrial power. However, this period of glory for the social vision of industry was not to last. Even at the time of their publication, the works we studied here were starkly criticized. We addressed this for Reynold Arnould, who was accused of beautifying the factory. Likewise, Pierre Naville’s sociology of automation was denounced by Georges Friedmann, who believed that dehumanizing “assembly-line work” was the sad fate of the working class (Rot & Vatin, 2004; Vatin, 2007). Alain Resnais was spared such criticism, because his critics saw his film as an ironic denunciation of the intentions of his industrial commissioner, even though that was actually not his goal at all.<sup>53</sup> Ten years later, the movement of May–June 1968 broke out and gave voice to a systematic critique of industrial modernity, inspired by the Frankfurt School and Herbert Marcuse in particular. The ecological themes espoused by this movement echoed those of the critics of progress who took center stage in the 1930s. With this, the enchanted parenthesis of industrial poetics of the post-war years came to an end. However, as the preceding analysis shows, the legacy of industry remains an open question. Industry continues to fascinate, for esthetic reasons among others, just as much as it troubles us.

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#### Author details

Gwenaële Rot<sup>1</sup>

E-mail: [gwenaele.rot@sciencespo.fr](mailto:gwenaele.rot@sciencespo.fr)

ORCID ID: <http://orcid.org/0000-0002-9290-7317>

François Vatin<sup>2</sup>

E-mail: [vatin@u-paris10.fr](mailto:vatin@u-paris10.fr)

ORCID ID: <http://orcid.org/0000-0003-0985-7388>

<sup>1</sup> Department of Sociology, Sciences Po, Center for the Sociology of Organizations (CSO), CNRS, 19 rue amélie, Paris, France.

<sup>2</sup> Department of Sociology, Paris Nanterre University, Institutions et dynamiques historiques de l'économie et de la société (IDHES), CNRS, 200 avenue de la République, 92001 Nanterre Cedex Nanterre.

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#### Notes

1. All translations are our own, unless otherwise indicated.
2. This firm started out manufacturing aluminum but diversified its activities, particularly in plastics production.
3. The contract between Pêchiney and Pléiade films was signed on 22 June 1957 (see Braunberger, 1987).
4. Contract details sent by Pêchiney to Pierre Braunberger on 15 January 1957 (Films du Jeudi Archives). Styrene manufacturing was new for the Pêchiney firm at the time, because it had only begun manufacturing polystyrene on 24 September 1952 in the factory of their subsidiary, the Ribecourt *Société des produits chimiques* (in Oise). When Resnais was filming in this factory, the techniques being used were not yet fixed. Indeed, in 1959, Pêchiney joined forces with market leader Dow Chemical, an American firm, to replace their suspension

polymerization process, adopted in 1950, with a bulk polymerization process (Jean-Marie Michel, *Contribution à l'histoire industrielle des polymères en France* [Contribution to the industrial history of polymers in France], Société chimique de France, online).

5. *Prime d'aide à la qualité* – on this funding scheme, see Gimello (2014).
6. These three films all won awards: second prize in documentary for Vénard's short at the Venice Film Festival in 1955, the Golden Mercury for Resnais at the same festival in 1958, and a documentary film prize in the Karlovy-Vary International Film Festival (Czechoslovakia) in 1958 for Molinaro's film.
7. Massy (1958). Resnais' short was projected without Queneau's poem with the title *Styrène* (see below on this topic).
8. On films about art from this period and their economics, see Berthome (2005, 2014)
9. A public body which works to prevent occupational hazards.
10. Regarding musician Pierre Barbaud's work on *Le Chant du styrène*, see Viel (2009).
11. A film on the Nazi concentration camps. Regarding the genesis of this film, see Lindeperg (2014).
12. Contract stipulations sent by Pêchiney to Pierre Braunberger, 15 January 1957 (AFJ).
13. The Oulipo (Potential Literature Workshop) was created in 1960 by founders Raymond Queneau and François Le Lionnais (a mathematician).
14. The technical team, directed by Sacha Vierny, consisted of four grips, seven electricians, and three lighting technicians.
15. Alain Resnais declared wryly that his favorite films were the first ones he had ever seen, at the age of four, projected onto a towel: extracts from *Haunted Spooks* with Harold Lloyd, an episode of “Professeur Mecanicas,” and a film which showed the accelerated growth of a bean plant (Liandrat-Guigues & Leutrat, 2006). The images of plastic objects being created which open *Le Chant du styrène* evoke the latter. Other elements can be found in the *Forbidden Planet* by Fred M. Wilcox (1956).



16. This text, which was perhaps written by Queneau himself, follows the outline of the poem and seems to be a lifeless translation of it.
17. Testimony of Professor François Thomas, whom we thank warmly.
18. In his work on this text, Queneau wrote down specific references to these works (Raymond Queneau Archives, University of Dijon) (Clot & Boulle, 1954; Fournier, 1951; Gibello, 1956).
19. It was this same painter, a friend of Queneau, who did the illustrated edition of his *Cosmogonie portative*, Les Francs Bibliophiles, Paris, 1954.
20. Personalized communication in company magazines.
21. Interview with Reynold Arnoud in *Jardin des Arts*, 1959, n 61, pp. 51–55.
22. André Malraux, *Verbatim*, 16 October 1959.
23. This painting, along with six others from the 1959 exhibit, is part of the collection of the Musée des beaux-arts in Rouen. On this topic, see Rot and Vatin (2017a).
24. See *My American Uncle, Je t'aime, je t'aime*, as well as his interest in Arthur Koestler.
25. He was principal editor for the *Pléiade* encyclopedia.
26. He had already asked Chris Marker and Rémo Forlani, see Rot (2007).
27. Regarding Laffite's book, see Vidler (1999). Queneau systematically noted his readings in his personal diary (Queneau, 1996, p. 1119 and sq.).
28. Regarding Laffite's book, see Vidler (1999).
29. There was a party for Laffite hosted by Paul Vignaux in 1936. In his journal, Queneau mentions a meeting "around Laffite," in particular with the Christian philosopher and syndicalist Paul Vignaux in January 1936 (Queneau, 1996, p. 321). Queneau shared with these thinkers, and also with André Leroi-Gourhan, a certain Christian faith.
30. From Laffite, Queneau especially borrows his "mechanological" typology: "passive" machines (architecture), "active" machines (tools, engines), and "reflexes" (automatisms).
31. Queneau and Naville met in 1924 in classrooms at the Sorbonne, where they were both working on a BA in philosophy. Naville was then the head of *La Révolution Surréaliste*, and he brought Queneau into contact with this literary movement. Their wives are cousins, and they remained close friends their entire lives.
32. Pierre Naville Archives, Musée social.
33. Naville does not cite Laffite, but his reading notes in his archives show that he read this work attentively, which was perhaps recommended to him by his friend Queneau.
34. "The photographer John Craven took photos last April in our Gardanne and Saint-Auban factories. These images are striking for the true beauty of certain specific elements. [...] The new tetrachloroethylene workshop, at night, shows the most beautiful side of petrochemistry. With a slight manipulation of the photographic apparatus, the film records a veritable fireworks display" (*Bulletin Péchiney*, op. cit., p. 5). This photographer was also solicited by Gaz-de-France to photograph its Alfortville plant, a site which Arnould also painted.
35. According to a conversation between Alain Resnais and Prof. François Thomas, kindly reported by the latter.
36. Philippe Condroyer, "Le sens de la mesure". Short film, N. 5, November–December 1961, quoted by François Porcile (1965, p. 217). François Porcile sees *Le Chant du styrène* by Alain Resnais (1958), *Fleurs de feu* by Francis Bouchet (1960) (on glass manufacturing at Saint-Gobain), and *Diamètres* by Philippe Condroyer (1961) as "three essays of industrial imagery which, through their reflection on the wealth of this subject, have made this theme one of the major preoccupations of the contemporary visual arts" (Porcile, 1965, p. 217).
37. Developed in 1949, Kodak Eastmancolor processing spread rapidly in American cinema in the 1950s (Martin, 2013). It was used for the first time in France by Georges Rouquier for medical films in 1951, then for his feature film *Love in a Hot Climate* in 1954.
38. According to the document on the timed sequencing of the film, sent to Queneau so that he could write his text (Queneau Archives, University of Dijon).
39. Alain Resnais à la question, 1960, p. 58.
40. Account by Reynold Arnoud, in *Jardin des Arts*, 1959, n 61, 51–55.
41. Dumur Guy, "Une peinture embellissante" [A beautifying painter], *France Observateur*, 5 November 1959.
42. Georges Limbour, "La machine et la peinture [Machines and painting]," *Les Lettres Nouvelles*, N. 28, 4 November 1959, quoted by Limbour (2013).
43. Original text in French:  
Entrailles virides surgies du plan.  
A l'air libre intestins rigides.  
une dentelle d'argent rouillé frisson de fièvre au moindre doute.  
où l'esprit retrouve une inquiétude patiente.  
géométrie des déserts Holà messieurs!  
Tempête sous une cloche volcan du filigrane.  
qui d'un torchis de métal dégringole.  
Cette couleuvre nouée en python.  
éclat de corset aluminé étamine.  
lacs où circule une vie froide.  
soudain brûlis fusant que nulle autre n'y peut rien.  
Intelligence thermique.  
Aux pesanteurs abstraites de la terre.  
commandement de l'araignée écartelée aux orientes du lattis.  
O fuel de l'espérance.  
comme les gestes de tes mains liquides me poursuivent au fond des rêves dépétrifiés de ton circuit !  
L'annonce des entrailles au volcan distillé en saintes huiles.  
porteur de vent de vitesse d'amour aux doigts moites.
44. Sequencing, Raymond Queneau Archives, Dijon University.
45. This is the site where Roger Vaillant (1955) set his novel, *325 000 francs*, which tells the story of a factory worker in a plastics plant, "Plastoforme" (Vaillant, 1955).
46. Original text in French: Le styrène n'était qu'un liquide incolore.  
Quelque peu explosif, et non pas inodore.  
Et regardez-le bien; c'est la seule occasion.  
Pour vous d'apercevoir ce qui est en question.
47. We might compare this representation of the work of machine operators with that found in *Humain, trop humain* by Louis Malle (1972). Malle's camera associates the gestures shown with a contemplation of the bodies and faces of the operators, thus making the people firmly present, despite, and, to some degree, because of the apparently automatic nature of this activity (Hatzfeld, Michel, & Rot, 2006).
48. These are the terms used in the synopsis to describe the different control instruments (A. Resnais, *Synopsis*, sequence 11, shots 115 to 118), R. Queneau archives, op.cit, synopsis dated 20 November 1957.
49. In Alain Resnais, "Sacha Vierny ou l'élégance," *Positif*, October 2001, p. 44.
50. The close-up of the face does not make it possible, however, to identify the character's profession.
51. Rot and Vatin (2016a, 2017b). This research and our conclusions join those of Blauner (1964).
52. This debate is known in France as the "querelle du machinisme" (mechanization quarrel). See Raimond (2000).
53. Alain Resnais in "Voix off," supplement to N. 92 of *Cinéma 64*.

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