

Bonjour Tristesse: Study for an art project. Cerdagne, France 2010

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While cycling in the Pyrenees near the border between France and Spain, I came across three different solar energy collectors located close to each other, aligned from East to West in the chronological order of their construction.

It seems to me that these elegant structures signal a route away from consumer society's dependency on destructive sources of energy, and so embody the possibility of retrieving a modernity that is coherent, progressive and more sustainable. Yet they have been overshadowed by the overwhelming predominance of the nuclear industry in France and the fossil fuel industry worldwide.

With energy depletion and climate damage increasingly threatening the bases of society and culture, the marginalization of a peaceful, non-polluting technology cannot be accounted for in purely rational terms. Of course, political and economic decisions support particular ideological positions. But it is as an artist that I am interested in these solar furnaces and my aim here is to sketch out an idea for a new art work that offers an aesthetic experience as an invitation to consider how scientific reason relates to hidden phobias and unspoken desires.

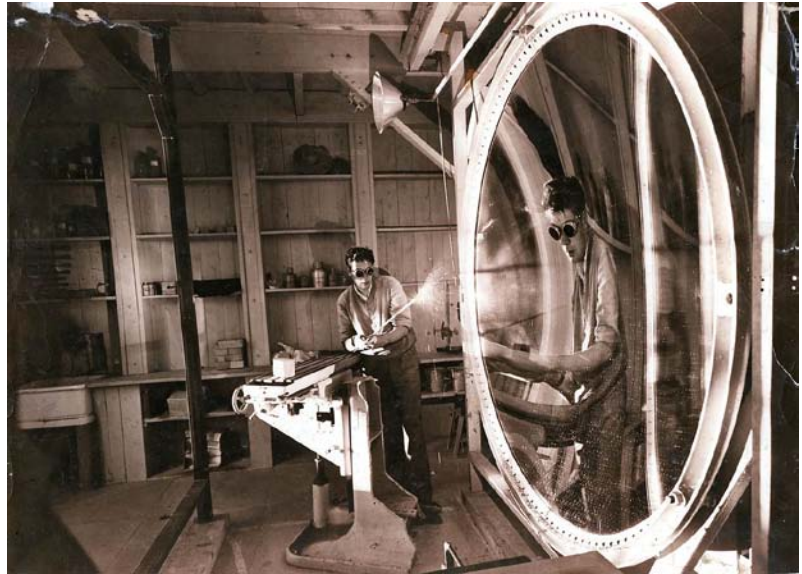


Fig 1. Félix Trombe, Mont Louis, France, circa 1949. Photograph courtesy of Four Solaire Developpement. The world's first double reflection solar furnace was built in 1952 at Mont Louis, France by Professor Félix Trombe, Director of Research, Centre National de la Recherche Scientifique (CNRS, or National Centre for Scientific Research), Paris, in collaboration with Albert Le Phat Vinh and Marc Foëx.¹

¹ Felix Trombe and Albert Le Phat Vinh, 'Thousand KW Solar furnace, built by the National Center of Scientific Research, in Odeillo (France)', *Solar Energy* 15 (1973): 57-61.

Artist and critic Victor Burgin has traced a lineage of pictorial convention from photography back to architecture, observing that the edge or frame of the photograph refers directly to the camera viewfinder, which in turn derives from the picture plane of the easel painting, and ultimately to the post and lintel construction of windows and doors in buildings. But while the idea of photography as an aperture or 'window on the world' does not mean that the photograph is a simple or objective record of events, the connection and analogy between photography and architecture opens up the interpretation of images as constructions that frame events as views from particular positions.

I remembered Burgin's essay, 'Looking at Photographs', in which he draws on film theory to

'identify four basic types of look in the photograph: the look of the camera as it photographs the 'pro-photographic' event; the look of the viewer as he or she looks at the photograph; the 'intra-diegetic' looks exchanged between people (actors) depicted in the photograph (and/or looks from actors towards objects) and the look the actor may direct towards the camera.'²

² Victor Burgin, 'Looking at Photographs', in Victor Burgin (ed.) *Thinking Photography* (London: Macmillan, 1982): 142-153.

In this photograph, Professor Trombe demonstrates the parabolic mirror focusing the sun's rays to a burning point. But the mirror also doubles and reverses, enlarges and distorts the scientist's image, which the camera

renders in perspective as an ellipse, like a cameo. This transformation of his image is an incidental by-product of the scientific research with light and mirrors, and if Trombe sees it, he does not acknowledge it. His protective goggles attract the viewer's attention to his face, which is expressionless, fixated on the point of light where the sun's rays converge. Nor does Trombe acknowledge the camera or photographer, but (despite the intense heat of his experiment) he seems cool and indifferent to his photographic image.

Similarly, the camera itself records an image of the optical processes of reflection, focus and exposure without acknowledging its own relationship to the situation. Yet this photograph is clearly staged and carefully composed to combine the functions of factual document and publicity image. Already separated from the mesmerizing scene by the passage of time, the viewer is positioned by the photograph as a detached spectator rather than someone who might affect, or be affected by the event.



Fig 2. Solar Furnace, Mont Louis, France, 2009. Photograph courtesy of Visocrea SARL, France.

This photograph shows a fully functional reconstruction of Félix Trombe's double reflection solar furnace at Mont Louis. The furnace is the centrepiece of a visitor attraction established and directed by Denis Eudeline, an engineer and committed advocate of solar energy technology for developing countries. At Mont Louis, the sun's rays are directed by a single flat mirror or 'heliostat' onto a convex parabolic mirror, which concentrates an image of the sun into a focal point, instantaneously producing temperatures in excess of 3000 degrees Celsius with zero emissions of carbon dioxide or other pollutants.

As the high temperature solar energy research conducted by Trombe and his colleagues related to materials research around nuclear energy and atomic warfare, it was considered to be of military importance. Consequently, the experimental furnace was installed within the ramparts of the 17th century fort at Mont Louis, which still serves as a military base. The fort was designed by Vauban and has been designated a UNESCO World Heritage Site. (Paradoxically, the World Heritage status of the fort is given as a reason to prevent the use of solar panels on the buildings nearby, as these would be seen to interfere with the visual amenity of the fort.)



Fig 3. Heliostat facing parabolic reflector. Solar Furnace, Mont Louis, France, 2010.

The use of two mirrors facing each other might seem to be a relatively straightforward matter when viewed in terms of physics and optics. Yet an image within an image also has cultural connotations of the *mise en abîme*, of infinite repetition and connection.

In psychological terms, these ideas might resonate with how personal identity forms in reciprocal relation to the others around us, from the family to community and outwards into society. From this springs the possibility of *apperception*: a heightened self-awareness or reflective apprehension in which who we are and what we know are seen as inseparable.

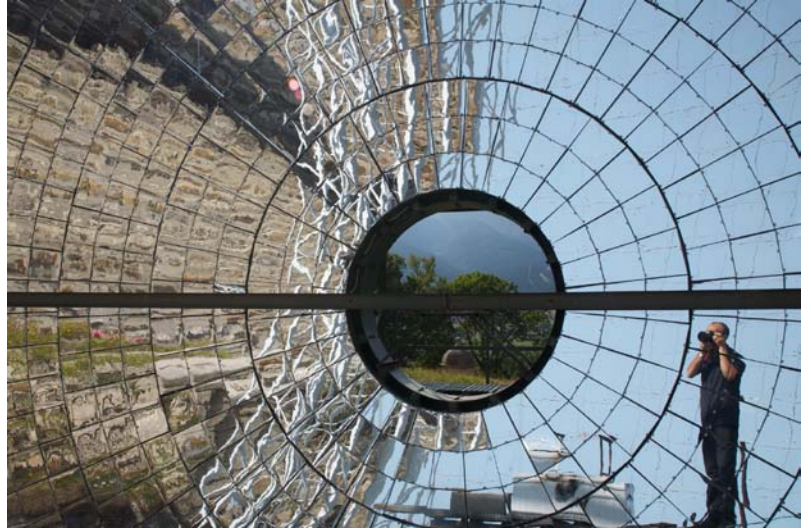


Fig 4. Self-portrait with parabolic reflector. Solar Furnace, Mont Louis, France, 2010.

I love these solar mirrors, though I have to concede that while all technologies are grounded within social relations, none is inherently liberating. Equally, I am seduced by the notion that the camera has the potential to transform thought; though I suspect that within consumer culture, photography is constrained instead to endlessly nuance received ideas.

Facing the parabolic mirror of Mont Louis, I put myself in the picture — an English middle class male in France with a digital camera, my image split into a double mosaic of mirrored reflections rendered in pixel form.



Fig 5. The Félix Trombe Solar Furnace, Odeillo-Font Romeu, France, 2010.

The success of Trombe's experiments at Mont Louis led to the construction in 1968 of the most powerful solar furnace in the world, the 'Grand Four Solaire' at Odeillo. The furnace is run by the CNRS and is used by the international scientific community as a testing facility for space and industry research. The ultra-high temperatures produced by the furnace enable the study of the fundamental science of energy and matter, the behaviour of materials at high temperature, the development of materials for energy applications and the transformation, storage and transport of energy. The applications of this research include the production of industrial gems, the development of aerospace ceramics, the destruction of asbestos and clinical waste, the containment of nuclear waste, the development of photovoltaic cells and the splitting of water molecules for the production of hydrogen.³ Such a range of research, as part of the furnace's historic connection with military and space programmes gives the building an ambiguous symbolic identity, poised between hopes for international harmony and fears of nuclear holocaust.

³ Centre National de la Recherche Scientifique Processes, Materials and Energy Laboratory. See www.promes.cnrs.fr [accessed 5 October 2010].

To take this photograph showing the parabolic reflector facing its bank of heliostat mirrors, I used a standard lens and held the camera at eye level from a position beside the road, created specifically as a vantage point for tourists.



Fig 6. The Félix Trombe Solar Furnace, Odeillo-Font Romeu, France, 2010.

At the scale of grand public architecture, the parabolic mirror at Odeillo inverts and magnifies the image of the landscape and sky around it. But rather than being contained within the building, as with a camera obscura, the brilliant image is on the exterior surface of the building, suggesting a camera lucida.

In the clear sunlight of the mountains, the space-age symbolism of the solar furnace seemed to intensify: this building proclaims that science funded by the state and conducted in the public interest (if not actually under democratic control) is not a utopian fantasy to be dismissed as part of the demise of Modernism.



Parabolic reflector and viewing gallery of the solar furnace, Odeillo, France, 2010.

While taking this photograph I paced restlessly back and forth, distracted by a mental image of London's grey skies, flattened by aircraft contrails and coal fired power station emissions. I tried to focus on the pleasure of composing a positive image, but I kept thinking: 'In Britain, the cuts to state funding for research suggest that the result (and maybe the aim) of the banking scandal is permanent damage to the public sphere.'

Because the focal point of the parabolic reflector is between the reflector and the heliostat mirrors that direct the sun's rays onto it, the furnace structure inevitably blocks part of the solar energy. This is known as 'shadow loss'.⁴

In the place where the furnace tower casts a shadow on the parabolic reflector, the mirrored surface is interrupted by an aperture with a viewing gallery. The scientific observer is thereby situated in a way that inversely echoes the moment when the photographer's own shadow is captured within the image.

⁴ Harald Ries and Markus Schubnell, 'The optics of a two-stage solar furnace', *Solar Energy Materials* 21 (1990): 213-217.



Fig 8. View overlooking Odeillo from Font Romeu, France, 2010.

From up on the hill, I saw the solar furnace juxtaposed with a log cabin. This reminded me of Andrzej Tarkovsky's film *Solaris* (1972), in which the timber house in the forest represents a connection with the earth that serves as a counterpoint to the disembodied experience of space travel. If chalets like the one in this photograph are constructed with sustainably grown timber and are well insulated, then their individual ecological impact should be far less than their conventional equivalents. But while the space age Solar Furnace is organized around a central principle of focus and concentration, the late growth of suburbs on the hillsides is driven by a private impulse of dispersal and isolation.

Here, ecological style masks a deep dependency on the motorcar, the road network and the oil well: the timber building is an image, a screen to hide the underlying structure.



Fig 9. Thémis solar power station. Targassone, France, 2010.

The successful research at Odeillo led to the construction of a solar power station nearby, at Targassonne. Opening in 1983, the centre generated zero-carbon electricity and provided sustainable employment. It was named Thémis, after the Greek goddess of divine order and justice, who was one of the six sons and six daughters of Gaia.

Thinking about the installation as a figure from classical mythology strengthened its likeness to an amphitheatre; I like the idea of associating the shared infrastructure of power with the public space of democracy and culture.

In choosing my position to take this photograph, I climbed up the hill as though I was scouting for a location shot or re-staging a film still, and I imagined how drama and rhetoric might be refracted through memories of cinematic images.

Yet the French Government policy of prioritizing nuclear energy with state subsidies offered the owners of the centre, Electricité de France (EDF), more attractive returns on their investment. In 1986 EDF declared the centre 'unprofitable' and closed it, with the plant scheduled to be demolished, the machinery sold for scrap, and the site razed.



Fig 10. Abandoned heliostat armature. Thémis centre, Targassonne, France, 2010.

When taking this photo, I asked, how does the image of the ruin relate to the idea of progress, if it is the progressive idea that has been ruined?



Fig 11. Heliostats facing the collector tower. Thémis centre, Targassone, France, 2010.

Fortunately, the decision to destroy Thémis was deferred: although the centre was designed to collect energy by concentrating the image of the sun, by realigning its mirrors to concentrate starlight and electromagnetic radiation it could double as an observatory. An international group of astrophysicists and scientists with the Commissariat à l'Énergie Atomique, CAE (Atomic energy Commission) and the Conseil Européen pour la Recherche Nucléaire, CERN (European Council for Nuclear Research) successfully bid to use the giant apparatus as a space telescope. This capacity for reorientation from day to night, from visible to invisible, saved Thémis long enough for a consortium of partners to be gathered who are now preparing to reinstate it as a power station and centre for research and development on solar energy.



Heliostats of the Thémis centre, Targassone, France, 2010.

- ⁵ Fredric Jameson, *Postmodernism, Or, The Cultural Logic of Late Capitalism* (London: Verso, 1991) p. 35.

Fredric Jameson has developed the work of Ernest Mandel to show that under capitalism, each cultural moment embodies the logic of its technological base. Mandel and Jameson examine a series of fundamental breaks or quantum leaps in technology following the original Industrial Revolution: machine-made steam engines, followed by electric and combustion motors, then electronic and nuclear powered devices.⁵

Whereas fossil and nuclear fuels made it possible to instigate the standardized, 'international style' of globalization, a new modernity based on renewable energy would have to respond to geology, landscape and the 'bioregional' variations of vegetation and climate. When material conditions reassert the primacy of geographic difference, what might be the effect on cultural difference?



Fig 13. The heat collector from Thémis exhibited in the grounds of the solar furnace at Odeillo, France, 2010.

During the brief period when Thémis was in operation, its heat-collecting unit served as a kind of large format camera, capturing an indexical image of the sun, registered as thermal energy. When Thémis was decommissioned as a power station, the unit was removed from the head of the tower and put on display as a museum exhibit in the grounds of the Great Solar Furnace at Odeillo. Like a sculptural installation or architectural pavilion, this industrial form separated from its function seems to invite a detached, abstracted contemplation from the visitors, which I echoed by using a telephoto lens from a distance.



Fig 14. Focal point of the solar furnace, Odeillo, France, 2010.

This digital photograph has been manipulated to reduce the contrast between light levels inside and outside, and to show the detail in both shadow and highlight. It shows the view from the solar furnace tower at Odeillo, looking outwards to the parabolic reflector. In a crucible fixed at the circular opening in the screen, scientists subject materials to ultra high temperatures to test their transformation or destruction.

A solar furnace applies the optical phenomena of focus, reflection and magnification to intensify the image of the sun.⁶ As with a photographic camera, the result achieved is a function of focal length, aperture and exposure time. My hope is that while optics form the basis for connections between the solar furnace and the photographic camera, so photography and film theory might enhance the understanding of solar furnace technology by situating it within the cultural sphere. In turn, psychoanalytic exploration of the paradigm of scientific objectivity⁷ could help relate it to the subjective experience that underlies social trends, such as changing public attitudes to research.

I propose to make a new art work that relates the disinterestedness of pure science to the disengagement of 'art for art's sake'.⁸ The work risks a double blow from its audience: while environmentalism is dismissed as reactionary or accused of misanthropy, contemporary art is increasingly vulnerable to the populist charge of irrelevance and waste.

During the time of my visit to the solar furnaces, I was reading *Bonjour Tristesse* or *Hello Sadness* (1954), the novel by Françoise Sagan. Set in a luxurious holiday villa on the French Riviera, the story is told by Cécile, a young woman caught between adolescence and adulthood. Since her mother died when she was two years old, Cécile has enjoyed a life of extravagant socializing with her father Raymond, a suave but vacuous advertising executive with a penchant for young and superficial women. Although Cécile has failed her philosophy exam, she is enjoying a long summer holiday in the villa with her father and Elsa, his latest girlfriend.

⁶ Felix Trombe and Albert Le Phat Vinh, 'Thousand KW Solar furnace, built by the National Center of Scientific Research, in Odeillo (France)', *Solar Energy* 15 (1973): 57-61. See also Felix Trombe 'High temperature furnaces', *Proceedings of the World Symposium on Applied Solar Energy*, Phoenix, Arizona, 1955 (Stanford Research Institute, 1956) pp. 63-72.

⁷ Karl Figlio, 'Knowing, loving and hating nature — a psychoanalytic view', in George Robertson, Melinda Mash, Lisa Tickner, Jon Bird, Barry Curtis and Tim Putnam (eds) *Future Natural* (London: Routledge, 1996) pp. 72-85.

⁸ Gisèle Sapiro, 'Responsibility and freedom: the foundations of Sartre's concept of intellectual engagement', *Journal of Romance Studies* 6: 1 and 2 (2006): 31-48.

But the simple pleasures of days in the sun become complicated when Raymond also invites Anne, whose maturity, creativity and personal integrity give her an authority that Cécile finds both reassuring and oppressive. Raymond makes a surprise decision to reject Elsa and to marry Anne, who then assumes responsibility for Cécile's moral and intellectual development.

Lucid and self-aware, Cécile understands that although the struggle against limitations is a critical aspect of adolescence, the passage to adulthood entails freely chosen responsibility. Torn between enlightened self-interest and self-centred hedonism, she intervenes in the relationships around her. Cécile grasps the psychological dynamics, but underestimates the forces involved. Although the ensuing disaster might have been imagined, it could not have been predicted, lifting the event from a crime to a tragedy.



Fig 15. Bonjour Tristesse Paris: Editions Julliard 1964.

Bonjour Tristesse is an intensely personal narrative, but it can also be read as a microcosm of the historical period when post-war idealism yielded to the consumer society. As such, it raises questions for our own social moment, when the dissolution of the public sphere and the destruction of the earth's ecosystems are emerging from the realm of fantasy to become real possibilities.

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