

# Cahiers victoriens et édouardiens

89 Spring | 2019 :

The Transformative Power of the Arts in Victorian and Edwardian Culture and Society / 58<sup>e</sup> Congrès de la SAES, atelier de la SFEVE, Utopia(s) and Revolution(s)

The Transformative Power of the Arts in Victorian and Edwardian Culture and Society

1. The Interactions Between Science, Technology and the Arts

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## Victorian Arts and the Challenge of Modernity: Analogy, the Grid, and Chemical Transformations

*Les arts victoriens et le défi de la modernité : analogie, 'grille' et transformations chimiques*

FRANCESCA ORESTANO

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### Résumés

Français English

Cet article a pour point de départ les artistes de l'avant-garde du xxe siècle qui, tout en étant conscients de leur modernité, adoptèrent un point de vue intellectuel qui leur donna une vision si large qu'ils purent embrasser à la fois l'art moderne et l'art du néolithique. Parmi eux, T. S. Eliot, James Joyce, Virginia Woolf et Roger Fry réagirent chacun à leur manière aux dessins des artistes magdaléniens ou à l'art d'Homère tout en ayant recours à la science moderne — la chimie, en particulier — pour expliquer des phénomènes littéraires. Leur point de vue est analysé au prisme du pouvoir transformateur des arts dans la culture et la société victoriennes et édouardiennes. L'article se penche tout d'abord sur l'horizon épistémique où science, art et littérature se lient pour modeler l'esprit moderne. À partir de là, l'article suit une progression à rebours afin de suggérer les raisons qui ont pu présider à une telle proximité herméneutique. La stratégie qui permet à ces artistes et critiques d'avancer et de reculer dans le temps se fonde sur une insistance sur l'analogie, ce qui leur permet d'examiner côte à côte le très moderne et le très ancien. Outre l'analogie, la technologie optique leur permet d'évaluer l'art d'un point de vue visuel et ainsi de mettre en valeur la forme: en somme, les outils adoptés ont leur équivalent symbolique et pratique dans le domaine de la chimie. Tels sont les pouvoirs

transformateurs qui promeuvent une dynamique intermédiaire entre les arts; ces pouvoirs remontent à l'époque victorienne où ils apparaissent sous la forme d'une 'grille'. Cette 'grille' est le contenant dans lequel sont classées et organisées les réalisations de la culture, de l'industrie et des arts victoriens. C'est la grille qui donne sa structure au Crystal Palace qui abrite l'Exposition Universelle de 1851 ; la grille est également la structure qui règle la chimie moderne, grâce au tableau des éléments chimiques élaboré par le chimiste russe Dmitri Mendeleïev et publié pour la première fois en 1869. D'après ces grilles, il apparaît que l'origine de l'ampleur épistémique invoquée par les artistes de l'avant-garde — sa capacité de connexion, l'accent conceptuel qu'elle met sur l'analogie dans un éventail d'expériences diverses — remonte à l'époque victorienne et édouardienne.

My article has its point of departure among the artists of the 20th-century avant-garde, who worked with a distinct awareness of their modernity and yet adopted an intellectual vantage point that enlarged their vision, to the extent of allowing them to embrace at once modern art and the art of the Neolithic age. Among them T. S. Eliot, James Joyce, Virginia Woolf, Roger Fry, who variously responded to the drawings of Magdalenian artists, or to the art of Homer, while having recourse to modern science, chemistry especially, in order to explain literary phenomena. Such views are examined by focusing on the transformative power of the arts in Victorian and Edwardian culture and society. The article investigates such a scenario by dwelling first on the epistemic horizon in which science, art and literature conspire together to mould the modern mind. Subsequently the article moves *à rebours*, in order to suggest the possible reasons for such hermeneutic proximity. The strategy that allows the artists and critics to move forward and backwards in time is due to their insistence on analogy, which allows them to examine side by side the very modern and the very old. In addition to analogy, optical technology allows them to assess art from a visual point of view, thus emphasizing formal values: in sum the tools adopted have their symbolic and practical equivalent in chemistry. Such are the transformative powers that promote intermedial dynamics among the arts, and they date back to Victorian times, where they appear under the shape of the grid. The grid is the container in which the achievements of Victorian culture, industry and art are ordered and organized. The grid provides the structure to the Crystal Palace housing the Great Exhibition in 1851, and the grid is the structure presiding over modern chemistry, owing to the tabular arrangement of chemical elements envisaged by Russian chemist Dmitri Mendeleev and first published in 1869. Such grids suggest that the epistemic width invoked by the avant-garde artists—its wide connective capability, its conceptual emphasis on analogy among a variety of different experiences—can be traced back to the Victorian and Edwardian age.

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## Entrées d'index

**Mots-clés** : analogie, chimie, la 'grille', Krauss, arts modernistes, arts victoriens

**Keywords** : analogy, chemistry, the 'grid', Krauss, Modernist arts, Victorian arts

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## Texte intégral

# À Rebours: The Arts Transformed

- 1 In order to analyse the transformative power of the arts in Victorian and Edwardian culture and society, this article offers an inverted perspective, a sort of anamorphosis, as its argument is developed *à rebours* rather than in a teleological move from the past to the future.
- 2 The essay first sets its focus on three famous early twentieth-century artists who were concerned with describing the nature of modern art, and tried to respond to fundamental questions about its essence. The transformations occurring in the arts when artefacts, subjects, styles, and entire periods not previously considered 'artistic' entered art discourse and art criticism, provide the first step in this investigation. By dwelling on statements offered by Virginia Woolf, T. S. Eliot, and the art group around

them, one may catch a first glimpse of the dynamic forces that had been at work shaping the artistic horizon by introducing objects and methods not previously considered artistic, but rather tributary to the field of science. Indeed, the artistic horizon tended to coincide with the epistemic horizon, described by Fredric Jameson as a feature of post-modernity. Thus, when seeking to testify to the external forces that shaped such responses to art, the role of science—and of chemistry especially—comes to the foreground.

3 Exploring further the hermeneutic proximity between art and science, this paper then moves on to detail the occurrences of such an analogy, as tokens of the alterations taking place in the techniques of the observer, and therefore in stereotypical responses to the visual arts. Much had already been suggested by Walter Pater, who had used the analogy with chemistry as a tool to evade the moral issue of beauty in art. Thus, the category of analogy, also invoked by Roger Fry, T. S. Eliot and Woolf comes to the fore as the key concept of the transformative powers shaping in unison literary and scientific culture. Apart from the analogy with chemistry, modern optical technology also affected art criticism, art evaluation, and art history, enhancing the perception of significant forms.

4 Finally, the essay dwells on the 'grid' as the vehicle of the transformations occurring in the arts. The emphasis is on the grid as the apt container of the analogy process, and as a structural, ordering device of Victorian culture. But the grid is also the mark of modernity. By means of examples drawn from its implementation during the Great Exhibition, the essay argues that the grid was the most useful element in the organization of diversity into a cluster of identical spaces wherein objects related through analogy, and not necessarily sharing a common origin, nature, or history, could find a rational place, role and status.

5 The grid is indeed a key concept in this essay, as belonging at once to the forces that shaped modernism and, simultaneously, to the cultural and scientific background offered by the cultural history of the Victorian age. Blurring the borders between art and non-art, the visual and the verbal, the original and the replica, the very ancient and the very modern, not to mention the atomic numbers of the chemical elements ordered by Mendeleev, the grid paves the way for the transformations occurring, in seamless fashion, between the Victorian, Edwardian, and Modernist ages.

6 By adopting a diachronic perspective this essay intends to highlight the transforming forces that bind together two phases in art history, and two discourses—science and art—considered as antagonistic. It aims at offering a *récit* of consistency rather than rupture. Such consistency stands on the discursive implementation of scientific concepts, which becomes possible when the epistemic horizon of science intersects with the horizon of the arts. Such a dialectical relation was described by James McFarlane in his pioneering essay on 'The Mind of Modernism' (1976), and subsequently by Gillian Beer in *Open Fields: Science in Cultural Encounter* (1996).

7 The discursive adoption of scientific tropes seemed to satisfy three requirements: (1) science provided the aptest simile or metaphor through which transformations, whose stages seem esoteric and mysterious, could be described; (2) science seemed to be the reign of a kind of illuminated rationality, a quality energetically sought after by artists refusing the taint of degeneration, and yet standing on the ruins of the principles of causality that had guided nineteenth-century arts; and (3) science seemed to offer some formal tools for analysis, as well as a formalist approach to reality which, while already present in fin-de-siècle aestheticism, would well interact with the scientific *Weltanschauung* of the modern age.

8 One last point accounts for the full import of the admission of science within the field

of art. Both art production and art criticism, often provided by the same author, captured and appropriated the strength of scientific discourse by dwelling on visual evidence, materially embedded and validated by mass visual culture (Crary). Statements about art, critical responses to art works, and visual accounts are used here at once to emphasize to what extent visual technology and mass visual culture allowed modern artists to view the masterpieces of a hallowed tradition side by side with the products of art, industry and commerce. Much seems to stem from the new ways of seeing that were to alter the system of monocular vision, the laws of perspective, and the moral primacy of the eye (Jay 1995).

- 9 When the critical accent fell no longer on realism in painting and literature, the category of analogy was summoned to explain the non-mimetic aspects of art in terms of scientific laws. ‘An unspoken loyalty to traditional notions of causality, even determinism, still persisted, though the mechanics of it were no longer narrowly positivistic’ (McFarlane 82). Behind such choices, there were forces that—already at work in the Victorian era, as I hope to suggest with this *à rebours* strategy—determined the relevant changes, and empowered with epistemic relevance a field—the field of art—that would thus dispose of degeneration and decadence, to galvanize the new century with energetic and vibrant proposals.

## Modern Artists and ‘the proper stuff of art’

- 10 Woolf scholars will notice this borrowing from her famous statement in the essay on ‘Modern Fiction’, where she traces, tentatively, the nature, objects, and elements, not only of modern fiction but of modern art at large (Woolf 1993, 5–12). In fact, artists, writers, critics, fully committed to the avant-garde attitude, in the first decades of the new century faced the question: is twentieth-century art very modern or very ancient? Is art invested and transformed by progress, like science and technology, or is it static, unchangeable, classical, secluded in the pure specific domain of its own form? The response to the question—‘what is a masterpiece?’—is the first step in my *à rebours* argument.
- 11 Photographic reproductions enhanced to an unprecedented degree the field of interaction between aesthetic discourse and the evidence of visual culture, owing to the wealth of images made available by modern technology (Orestano 2011; Fawcett 1986). As Benjamin argued in his famous essay, technological reproduction deprived the artwork of its aura, whilst shaping a new concept of masterpiece standing on its visual popularity across the media, rather than on the presence of the masterly hand (Benjamin 19–56). In *Museum without Walls* (1947), André Malraux added that art reproductions deprived objects of their material qualities, ‘such as texture and scale, and [fostered] an analytical and comparative approach to every kind of art that undermines traditional hierarchies of aesthetic value’ (Malraux 302).
- 12 The history of the avant-garde contains plenty of statements that challenge traditional art hierarchies by suggesting different analytical and comparative approaches. Virginia Woolf, on first seeing in 1918 a painting by Cézanne (Fig. 1) bought by John Maynard Keynes, was baffled by a work of art that looked, according to her, like a chocolate slab:

... [t]his morning I went to Gordon Square with [Roger], and there we met Nessa and Maynard. ... Nessa left the room and re-appeared with a small

parcel about the size of a large slab of chocolate. On one side are painted 6 apples by Cezanne. Roger very nearly lost his senses. I've never seen such a sight of intoxication. He was like a bee on a sunflower. Imagine snow falling outside, a wind like there is in the Tube, an atmosphere of yellow grains of dust, and us all gloating upon these apples. They really are very superb. The longer one looks the larger and heavier and greener and redder they become. (Woolf 1976, 230)

**Figure 1—Paul Cézanne, *Apples*.**



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- 13 Beside the chocolate slab simile, in order to account for Cézanne's apples, Woolf uses the romantic conceit of the bee on the sunflower; then she evokes yellow grains of dust, like a storm of sublime perceptions investing the group. In the scene she describes, the painters Nessa and Roger discuss the oil colours employed in the painting, while Woolf compares the sensation created by the apples with the wind in the London tube. To her, Cézanne's apples exceed all realistic comparison insofar as they seem to grow in size, weight, colour, thus escaping all traditional perception and response in terms of flat mimetic appreciation. Some unknown force is latent in them—indeed sublime. A similar strategy is used in 1930 by Woolf to describe the art of her sister in 'Foreword to *Recent Paintings by Vanessa Bell*': Nessa's paintings are made of 'masses and passages and relations and values of which we know nothing' (Woolf 1993, 97–100, 99).
- 14 T. S. Eliot's 1919 essay on *Tradition and Individual Talent* offers another interesting statement on the relationship between different materials that escape all traditional periodization, extending the field of art to unknown eras and distances:

The poet must be . . . quite aware of the obvious fact that art never improves, but that the material of art is never quite the same. He must be aware that the mind of Europe . . . is a mind which changes, and that this change is a development which abandons nothing *en route*, which does not superannuate either Shakespeare, or Homer, or the rock drawing of the Magdalenian draughtsmen. (Eliot 39)

- 15 Prehistoric shelters had been discovered both at the Abri de la Madeleine, in Dordogne, and in Spain at Altamira in 1879 (Fig. 2). Named Magdalenian, after the French place, they were dated to the upper Paleolithic.



**Figure 2—Altamira, bison.**

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- 16 The discovery of the prehistoric caves opened up an immense patrimony of images that were to unsettle in a profound and disturbing way not only the visual arts, but also criticism and literature. In 1936, Benjamin would comment on art history, dwelling on two polarities, ‘the artwork’s cult value and its exhibition value’ (Benjamin 25). Such tension, compounded within the critic’s simultaneous vision, would amalgamate the magical cult value of prehistoric art with modern methods of technological reproduction that enhanced its exhibition value. The magic of prehistoric art would thus achieve artistic merit owing to its exhibition potential—in fact, owing to its visual dissemination in the museum without walls of modernity, where primitive artefacts could find their allotted space, side by side with the classical, and with the contemporary. Eventually T. S. Eliot’s simultaneous vision of the prehistoric past aligned with the present achieves order and sense owing to the analogy with the chemical process, which prevents the critic from taking the past as a ‘lump, an indiscriminate bolus’ (Eliot 39), while salvaging the poetics of impersonality:

It is in this depersonalization that art may be said to approach the condition of science. I shall, therefore, invite you to consider, as a suggestive analogy, the action which takes place when a bit of finely filiated platinum is introduced into a chamber containing oxygen and sulphur dioxide. . . . When the two gases . . . are mixed in the presence of a filament of platinum, they form sulphurous acid. . . . The mind of the poet is the shred of platinum. (Eliot 40–41)

- 17 Such an extended simile brings to the foreground the importance of science, chemistry specifically, as a system providing the means for containing apparently disparate elements:

The . . . elements which enter the presence of the transforming catalyst, are of two kinds: emotions and feelings. . . . The poet’s mind is in fact a receptacle for seizing and storing up numberless feelings, phrases, images, which remain there until all the particles which can unite to form a new compound are present together. (Eliot 41)

- 18 The analogy between art and the chemical process was extended by Eliot to include the pressure conditions under which the fusion of elements takes place. *Mutatis mutandis*, it feels like meeting a modern critic who looks at the past with fascination and longing, as if he were a kind of Dr Jekyll discovering not without horror and dismay that the Hydes who painted the Magdalenian caves were indeed full-fledged artists. T. S. Eliot appreciated the Metaphysical poets because they ‘possessed a mechanism of sensibility which could devour any kind of experience’ (Eliot 64): John Donne could deal with love and loss, and at once feed his lines with notions of astronomy and metallurgy, geology, geometry, and optics.
- 19 Finally, in ‘Ulysses, Order, and Myth’ (1923), T. S. Eliot argues that the novelist finds in myth form, order, and significance, even though Joyce’s use of ancient myth ‘in advance’ of his time seems to displace the conventional timeline of fiction:

It is here that Mr. Joyce’s parallel use of the *Odyssey* has a great importance. It has the importance of a scientific discovery. . . . If it is not a novel, that is simply because the novel is a form which will no longer serve; . . . In using the myth, in manipulating a continuous parallel between contemporaneity and antiquity, Mr. Joyce is pursuing a method which others must pursue after him. They will not be imitators, any more than the scientist who uses the discoveries of an Einstein in pursuing his own . . . investigations. It is simply a way of controlling, of ordering, of giving a shape and a significance to the immense panorama of futility and anarchy which is contemporary history. (Eliot 177)

- 20 Modern artists, members of the acknowledged literary avant-garde, of the Bloomsbury clique, tried to include in their vision the modernity of Cézanne and the antiquity of Magdalenian cave drawings. In order to come simultaneously to terms with the contemporary and the immensely ancient, they resorted to the field of science as to the epistemic *terra firma* wherein not only the anarchy of history but also the chaos of perception, its aberrations and volatile oscillations, could find an anchor, a rational status. To describe this chaos as a shower of atoms involves a decided step toward the superior order of science:

Examine for a moment an ordinary mind on an ordinary day. The mind receives a myriad impressions—trivial, fantastic, evanescent, or engraved with the sharpness of steel. From all sides they come, an incessant shower of innumerable atoms; (Woolf 1993, 8)

## Art and Science: Analogies

- 21 The statements by Woolf, Eliot, and Joyce, when read within the epistemic horizon of science that they invoke in order to come to terms with the questions posed by modern art, are part of a two-way reciprocal epistemic process, insofar as ‘new concepts in science more and more took on the nature of poetic conceits’ (McFarlane 84). While notions of unpredictability, ambivalence, a-logicity, a-causality affect scientific thought, together with visual perception—and the perception of the artwork, resorting to the tools of optical science seems infected by the same lack of control. The experience of the aesthetic critic, as described by Walter Pater in the Preface to *The Renaissance: Studies in Art and Poetry*, had provided a useful precedent insofar as both Pater, Woolf’s ‘absent father’ (Meisel), and Roger Fry, her mentor and father to a generation of modern artists, after acknowledging the primacy of perception, had moved to the analogy with science in order to explain their response to art. Pater is worth quoting as he provides the background instance in this analysis, and because Woolf would

attribute to Pater's example Fry's ability to shape the new vocabulary of the modern art critic. In the Preface to *The Renaissance*, Walter Pater had described the response of the aesthetic critic to the art of the Renaissance as a chemical process leading to the discovery of some new element:

And the function of the aesthetic critic is to distinguish, to analyse, and separate from its adjuncts, the virtue by which a picture . . . produces this special impression of beauty or pleasure, to indicate what the source of that impression is, and under what conditions it is experienced . . . as a chemist notes some natural element. (Hill xx-xxi)

22 In *Roger Fry. A Biography* (1940) Woolf had remarked that Fry was not 'a born writer' and that 'there were no words' (Woolf 106) to describe modern art. Commenting on Fry's prose, Clive Bell had added: 'If such terms as "plastic sequence", "plastic unity", "inner life", "structural planes" keep cropping up, that is because they are the only symbols available for subtle and complex things' (Bell 1956, 75). Thus Roger Fry—the guru of the Bloomsbury group who promoted the art of Cézanne and organized the Post-Impressionist exhibition of 1910—fashioned a new language to account for modern aesthetics out of Pater's chemical analogy.

23 In *Vision and Design* (1920), Fry's essay on 'Art and Science' (1919) seems relevant to my argument. Fry intended to strengthen the value of his own theory, whose goal was 'the perfection and complexity of the unity attained'. Science came into the picture as the logical analogy capable of connecting the concept of significant form with the desirable formula:

The aesthetic value of a theory is not really adequate to the intellectual effort entailed unless, as in a true scientific theory (by which I mean a theory which embraces all the known relevant facts), the aesthetic value is reinforced by the curiosity value which comes in when we believe it to be true. But now, returning to art, let me try to describe rather more clearly its *analogies with science*. (Fry 70; my emphasis)

24 The rhetorical figure of analogy provides the conceptual link between two domains; actually 'analogy' is Fry's keyword, with all its comprehensive power to combine heterogeneous experiences in perception and emotions, with the will to control, to order them, to give them significance and status, and eventually 'truth'. By focusing on science Fry maintains that '[b]oth of these aspects—the particularising and the generalising—have their counterparts in art. . . . None the less, perhaps, the highest pleasure in art is identical with the highest pleasure in scientific theory' (Fry 70, 73).

25 The consequence of such a position can be seen in the fact that Fry includes in *Vision and Design* essays on 'The Art of the Bushmen', 'Negro Sculpture', 'Ancient American Art', side by side with essays on 'The French Post-Impressionists', 'Paul Cézanne', but also 'Giotto', 'Claude', and 'Renoir'. The effort of including complexity in a unified whole is remarkable. The analogy between the art of the Bushmen and the Altamira drawings is solved in formal terms, through the timeless visual category of significant form. As for T. S. Eliot, Magdalenian art poses a challenge to the critic, who has to decide where, in his account, periods and artists have to be correctly placed, whether among the immensely modern or the vertiginously old.

In the caves of the Dordogne and of Altamira in Spain, Palaeolithic man has left paintings which date from about 10,000 B.C., in which, as far as mere naturalism of representation of animals goes, he has surpassed anything that not only our own primitive peoples, but even the most accomplished animal draughtsmen have ever achieved. Fig. 7 [Fig. 3] shows in outline a bison from Altamira. The certainty and completeness of the pose, the perfect rhythm and



the astonishing verisimilitude of the movement are evident even in this. The Altamira drawings show a much higher level of accomplishment than those of the Bushmen, but the general likeness is so great as to have suggested the idea that the Bushmen are descendants of Palaeolithic man who have remained at the same rudimentary stage as regards the other arts of life, and have retained something of their unique power of visual transcription. (Fry 81–82)

**Figure 3—Outline of a bison from Altamira in *Vision and Design*.**



- 26 *Vision and Design* is enriched by illustrations that are meant to stimulate the reader's visual perception and aesthetic response to formal values, that acquire unprecedented importance because, as Fry argues,

... the emotion which accompanies the clear recognition of unity in a complex seems to be so similar in art and in science that it is difficult not to suppose that they are psychologically the same. ... the unity-emotion ... may not improbably be of an identical kind in both art and science. (Fry 73)

- 27 The element of visual perception cannot be overemphasized. Enhanced by photography, itself a product of chemistry, as testified by the wet-collodion process that permitted excellent reproductions of artworks, it was considered indispensable in the art classroom. Magic lantern slides were of capital importance for art critics like Jakob Burckhardt and Heinrich Wölfflin (Orestano 2011); these optical tools transformed their art discourse determining a move away from biography and anecdote, and a focus on form.

- 28 Magic lanterns and art reproductions fostered new trends in art history based on formal appreciation assessed on a wide horizon of visible artefacts (Witcombe 2008; Pehlivan and Karaaziz Şener 2014). An acknowledged masterpiece could be shown side by side with an anonymous object of common everyday use, provided there existed a formal quality suggesting an analogy of structure, a possible sequence, and unity in

diversity. In the context of this essay, a letter by Roger Fry, requesting in 1912 a magic lantern in order to deliver his lecture on art, acquires a special significance.

29 Thanks to modern technology, significant form—a concept promoted by Clive Bell and Roger Fry—did take precedence over the orthodoxy of conventional periodization and national borderlines. An immense panorama of diversity would be opened up, in which owing to analogies of form elements of diverse provenance and unequal value would be equally considered.

30 This essay owes to Krauss's *The Originality of the Avant-garde and Other Modernist Myths* (1986) the suggestion that the grid provided structure, emblem, icon and concept to the multiplicity of heterogeneous objects that characterize modernism. The modernist grid would also open up the lumber room of Victorian culture, where—this is my point—grids of momentous importance were conceived, realized, and implemented. The inclusive energy of the grid operated for the mind of modernism both in a spatial and a temporal way. It helped enclose in analogous slots the original and the replica, high art and base imitation, craftsmanship and the mass production of industry; within the temporal dimension, it allowed aligning on a simultaneous plane instances of the extremely old and the contemporary, Homer and Joyce, Magdalenian art and Picasso's drawings.

31 Krauss's concept of the grid motivates the third step backwards in the following paragraph, where two grids of kindred importance for the discourses of science, art, and culture are examined. These two grids, which are indeed products of the Victorian age, are to shape dramatically, with their huge transformative energy, not only the arts but also the entire epistemic horizon of the twentieth century.

## Grids and Transformations: From Paxton to Mendeleev

32 Two grids seem deeply connected with the mutually enhancing analogy between art and science. One is purely material, architectural and visual, as it translates the Victorian thirst for universal knowledge, the increasing demand for spectacular shows, and the economics of capitalism. Such is the project and plan of The Great Exhibition of Arts, Commerce, and Industry of All Nations, that took place in London in 1851. The Great Exhibition, as well as Joseph Paxton's Crystal Palace housing it, can be considered as agents of transformation because of their sheer size and inclusivity, which mark both projects—container and contents as well—as resulting from a kind of epistemological bulimia, of political imperialism, of shrewd contaminations, in the name of commerce, between art and a myriad of mass-produced artistic objects (Briggs 1988; Orestano 2015).

33 The Great Exhibition is an international affair because of the number of exhibitors, and the sheer variety of the exhibits, arranged according to categories, such as: 'Raw Materials; Machinery; Manufactures; Textile Fabrics; Metallic; Vitreous and Ceramic; Miscellaneous; and finally, Fine Arts'.

**Figure 4—George Cruikshank, print, 'All the world going to see the Great Exhibition: 1851'.**



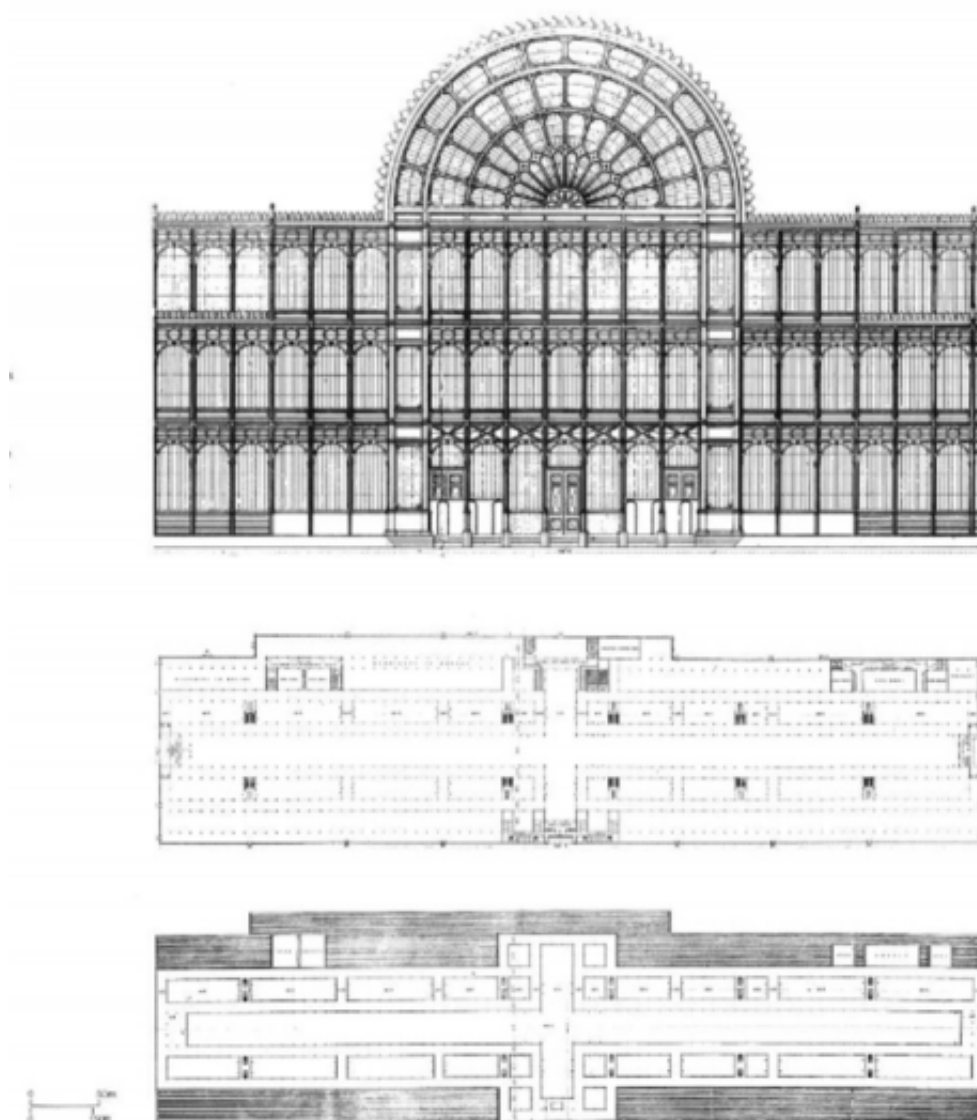
**Figure 5—Plan of the Crystal Palace.**



<https://journals.openedition.org/cve/5059>

or a grid, in which the many stands occupying the Crystal Palace are detailed. The Crystal Palace itself looks like the materialization of a grid, a giant synecdoche of its systematic inclusive nature:

**Figure 6—Crystal Palace, design and plan by Joseph Paxton.**



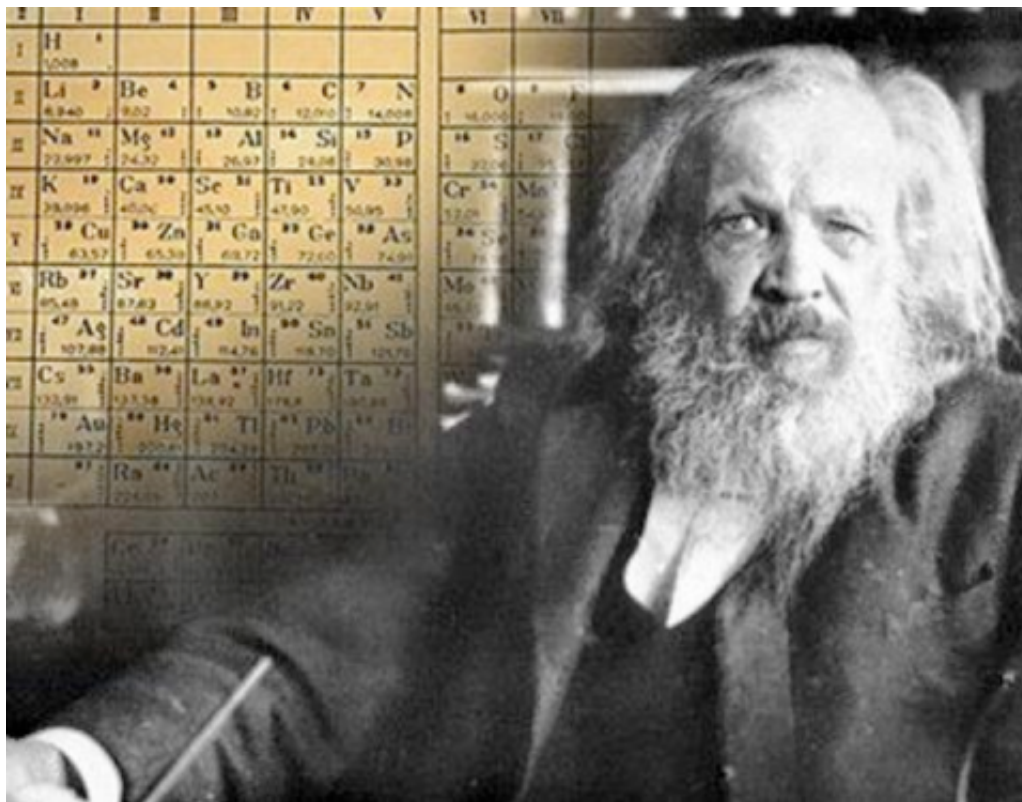
Wikimedia Commons

- 35 Visual technology—the Crystal Palace and its contents were represented in Baxter’s newly patented colour prints, in the engravings for the catalogue, in stereoscopic images and magic lantern slides—amalgamated commerce, industry, science and the arts of industrial production. The items on display, whilst providing evidence to the progress of technology and industrial machinery, were also tokens of the recent achievements in chemical knowledge (Briggs 1988; Orestano 2015). Chemistry proved fundamental to the entire project, both in the production of its many visual accounts, and in the manufacturing of modern objects on display, such as cheap replicas of genuine marble and porcelain, electroplated material, printed carpets, metal casts of all sizes and shapes. But chemistry did not only affect whatever was on display within the grid: it would acquire unprecedented importance owing to its intrinsic grid. Arguably the leading science of the Victorian age (Schatzberg *et al.* ; Weininger), chemistry

moved into modernity owing to a grid structure.

- 36 Such is the periodic grid, which provided a tabular arrangement of the chemical elements, ordered according to atomic weight, electron configuration, and recurring chemical properties, and whose adopted structure shows periodic trends. Russian chemist Dmitri Mendeleev first published the periodic table in 1869 (Fig. 7). Soon scientific institutions all over Europe acknowledged his work. In 1882, he was elected a Foreign Member of the Royal Society (ForMemRS) and awarded, in 1892, the Davy Medal from the Royal Society of London (Gordin 2004).

**Figure 7—Dmitri Mendeleev and his periodic table.**



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- 37 Importantly, the organization of the periodic table not only indicates existing relationships between the properties of already-known elements, but it also *predicts* chemical properties and atomic potential of yet undiscovered elements. These unknown elements are to fall within the blank spaces provided by the grid, whose periodical structure can harbour what is yet undiscovered, yet predictably existing.
- 38 Thus two products of the Victorian age, the Crystal Palace that was to house the Great Exhibition, and modern chemistry whose products had to fill its stands, would at once mutually enhance—owing to the grid—not only scientific notions, but also the dissemination of culture, and the appreciation of art. While the Great Exhibition, from the point of view of architecture, organization, representation, and for the efficient staging of the visitors' experience, stands upon the model of the grid, lending universal energy to the imperial metaphor of Cruikshank's 1851 engraving (Fig. 4), the leading science of the age, chemistry, regulates the knowledge of all the known elements according to its periodical grid. Mendeleev's table establishes the primacy of chemistry as one of the leading sciences of the Victorian age, which conditions and shapes not only scientific thought, but also all notions and the lexicon proper to the processes of transformation, combination, fusion and amalgamation that are going to condition what McFarlane defines as 'the mind of modernism', where science and poetical conceit



operate simultaneously (Weininger 1998; Gordin 2015).<sup>1</sup>

39 Thus one may also infer that the statements and analogies offered by the avant-garde artists, quoted in the first part of this essay, have their foundations in the Victorian past, and not just in the grids of the Great Exhibition and of Mendeleev's periodic table, but in the conceptual use of the grid that intellectuals and critics were to make of them.

40 The Victorian past would include the statements by John Ruskin who, while admitting that 'no progress more triumphant has been made in any science than that of Chemistry' (XXII, 147), was concerned that in his age 'there is no God but Chemistry' (XXII, 262). Ruskin used the comparison with chemistry not only to discuss crystallization and geological strata, or to digress on the economic and social value of its products, but also to argue that the imaginative and associative faculty of the mind is analogous with the simultaneous action of chemical elements. In addition to this, he used the chemical analogy to describe the character of Gothic art and architecture, and its impure nature; Ruskin finally compared chemistry with the soul of art, thus hinging on its transformations of psychology and emotions (Orestano 2015).

Let us go back for a moment to our chemistry, and note that, by defining a mineral by its constituent parts, it is not one nor another of them, that can make up the mineral, but the union of all. . . . So in the various mental characters which make up the soul of Gothic. (Ruskin 1903-1912, X, 183)

41 Literary discourse no less than art criticism adopted such analogy, inasmuch as the grid metaphor would prove conducive to the kind of modern awareness needed to grasp and make sense of the complexity of the modern world and its heterogeneous nature (Hagen and Vibe Skagen). In 'Pan's Pipes' (1881), while evoking an ancient figure of myth to focus on the modern mind, Robert Louis Stevenson remarked again on the 'elective affinities' of his age: 'The world in which we live has been variously said and sung by the most ingenious poets and philosophers: these reducing it to formulae and chemical ingredients, those striking the lyre in high-sounding measures for the handiwork of God' (Stevenson 125).

42 Vernon Lee in 1884 referred to chemistry to describe the Renaissance, as a period when magic and religion, antiquity and modernity, had created strange reactions and new compounds:

And the Renaissance has interested and interests me, . . . for the manner in which the many things . . . acted and reacted upon each other, united in concord or antagonism; forming, like the gases of the chemist, new things, sometimes like and sometimes unlike themselves and each other; producing now some unknown substance of excellence and utility, at other times some baneful element, known but too well elsewhere, but unexpected here. (Lee I, 7-8)

43 Like other writers, Lee imposed form on the formless and fragmentary period by adopting the analogy with chemistry, as it offered her a model, a structure—albeit evanescent like a gaseous reaction—that allowed to describe the transformative energies at work within the field of art. Indeed, the category of analogy, materialized by the structure of the grid, empowered scientists, artists and critics alike by ordering the potentially unlimited number of elements, objects, and artefacts that could be controlled by means of the grid.

44 As pointed out at the beginning of this essay, and traced backwards in its dénouement à rebours, the transformations taking place in the realm of art, and in literature, have their origin in Victorian times and in the epistemic width of its organizational knowledge, at once scientific and intensely technological and visual.

Thus, the fixed limits of art became blurred or extended, just like the fixed limits between gases and elements in general. One same structure would include the centre and the margins, the valuable and the cheap, the well-established theory and the hypothesis. The grid allows Virginia Woolf to describe as atoms the immensely varied experiences of a single day; under the umbrella of analogy, Roger Fry contemplates the art of the Bushmen, Cézanne and the Magdalenian drawings. In similar fashion, T. S. Eliot compares the discoveries of Joyce and Einstein. Such forces transformed the epistemic horizon, and allowed the arts to mingle with science—each providing its transformative energy owing to analogy and the grid.

## A Post-modern Post-scriptum

45 As a final comment on the contents of this essay, I should like to insert a quote from Vladimir Nabokov's *Speak, Memory: An Autobiography Revisited* (1947), despite the fact that his reflection stands out of the timeline of my argument. Nabokov, as a child, was fascinated by the magic lantern; subsequently, as a novelist and entomologist, by the microscope. In his memories he speaks of both instruments, and the powers they contain and symbolize:

... [h]ow tawdry and tumid they looked, those jellylike pictures, projected upon the damp linen screen ... but, on the other hand, what loveliness the glass slides as such revealed when ... raised to the light—translucent miniatures, pocket wonderlands, neat little worlds of hushed luminous hues! In later years, I discovered the same precise and silent beauty at the radiant bottom of a microscope's magic shaft. In the glass of the slide, meant for projection, a landscape was reduced, and this fired one's fancy; under the microscope, an insect's organ was magnified for cool study. (Nabokov 130)

46 Both instruments contain worlds of beauty: a single glass slide is in itself a memorable experience. There is an energy in it, which visual technology and science had generated in close conspiracy with the arts, a golden section of beauty where all kinds of transformations could take place: 'There is, it would seem, in the dimensional scale of the world, a kind of delicate meeting place between imagination and knowledge, a point, arrived at by diminishing large things and enlarging small ones, that is intrinsically artistic (Nabokov 130–31).

47 This final comment seals my argument, which is dedicated to Laura Minici Zotti, and to her outstanding passionate activity as lanternist and collector of magic lantern slides.

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## Notes

1 In his historical overview of the development of chemical signs, Weininger discusses the central role of the Table as a representational device; the intensely iconic and symbolic language of chemistry mimics many features of natural languages, including the ability to construct fictional worlds. Mendeleev arrived at his discovery through a search for the 'grammar' of the elements, based on the principle of isomorphism (Weininger 1998, 3-27).

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### Référence électronique

Francesca Orestano, « Victorian Arts and the Challenge of Modernity: Analogy, the Grid, and Chemical Transformations », *Cahiers victoriens et édouardiens* [En ligne], 89 Spring | 2019, mis en ligne le 01 juin 2019, consulté le 24 juin 2019. URL : <http://journals.openedition.org/cve/5059> ; DOI : 10.4000/cve.5059

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## Auteur

### Francesca Orestano

**Francesca Orestano**, Professor of English Literature at the University of Milan, is the author of a book on John Neal and the American Renaissance (*Dal Neoclassico al Classico*); on Revd. William Gilpin and landscape aesthetics; on the picturesque and nineteenth-century literature. She has edited with Michael Hollington *Dickens and Italy*; with Norbert Lennartz *New Bearings in Dickens Criticism*; she is the author of essays on Dickens and American landscape, on Dickens and Virginia Woolf, and the reception of Dickens in Italy. She works on the connection between Victorian literature, taste and science; on John Ruskin; on literary Impressionism. With Michael Vickers she has edited *Not Just Porridge: English Literati at Table* (2017)—a gastronomic history of English literature. Her essay on Dickens's *Little Dorrit* is forthcoming in *The Oxford Handbook of Charles Dickens*.

**Francesca Orestano** est professeure de littérature britannique à l'Université de Milan. Elle est l'auteure de plusieurs ouvrages consacrés respectivement à John Neal et à la Renaissance américaine (*Dal Neoclassico al Classico*), au Revd. William Gilpin et à l'esthétique du paysage, et au pittoresque et la littérature du XIX<sup>e</sup> siècle. Elle a co-dirigé *Dickens and Italy* avec Michael Hollington et *New Bearings in Dickens Criticism* avec Norbert Lennartz. Elle a publié des articles sur Dickens et le paysage américain, sur Dickens et Virginia Woolf ainsi que sur la réception de Dickens en Italie. Elle travaille sur les liens entre la littérature, le goût et la science de l'époque victorienne, sur Ruskin et sur l'impressionnisme littéraire. En collaboration avec Michael Vickers, elle a co-dirigé une histoire gastronomique de la littérature britannique, *Not Just Porridge: English Literati at Table* (2017). Enfin, elle a écrit un chapitre sur *Little Dorrit* de Dickens pour *The Oxford Handbook of Charles Dickens* (à paraître).

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