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MOVEMENT MADE VISIBLE

Marey and Lecoq

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Introduction

To describe Etienne Jules Marey (1830–1904) as a French physiologist would be like describing Leonardo da Vinci as an Italian painter. Marey devised mechanisms capable of capturing movement as it travelled through space in time. He developed the sphygmograph, chronophotography, and, ultimately, cinema. His work made possible groundbreaking analyses of animal locomotion, air currents, wave motion and trajectories of moving objects. It advanced the development of aerodynamics, athletics, ballistics, computer-generated imagery (CGI), neuroscience and scientific management, among other disciplines. Yet, today, his name is known mainly by enthusiasts of early cinema and specialists in the fields he influenced. As Marta Braun, photographic historian and author of a seminal book on Marey’s work, says: ‘Marey’s discoveries became so much a part of general knowledge that we have largely forgotten who discovered them’ (Braun, 1994: 350).

Jacques Lecoq (1921–99) grew up in a world saturated with the effects of Marey’s work (which he mentions in his own writings, Lecoq, 2006: 36–37). His pedagogy was shaped by the consequences of Marey’s studies.

Both Lecoq and Marey operated from the conviction that the study of movement is fundamental to developing an understanding of the world we inhabit. Each devised ways to transcribe and reproduce these movements – Marey, using technology; Lecoq via the medium of the human body. ‘As he scrutinized what was real, he also saw what was possible, and understood how close the one was to the other,’ writes historian and philosopher of life science and medicine, Claude Debru (2004); ‘Analysing and developing what is real makes what is possible come true.’ Debru is referring to Marey, but his words might equally describe Lecoq. In this chapter, some threads connecting Marey and Lecoq are drawn out and links between the work briefly explored – in particular, connections between Marey’s chronophotographs and Lecoq’s pedagogy of fixed point, neutral mask, movement analysis and the fundamental movement principles that motivate all living creatures.

Movement capture

Marey’s early instruments transmitted movements via tubes and wires to a stylus, which transcribed them onto a turning cylinder. The resulting traces ‘gave physical expression to the
time in which the movement occurred and allowed Marey to show the relation of time and space which is the true form of any movement’ (Braun, 1994: xvii).

However, Marey’s connecting tubes and wires interfered with delicate movements and defeated his purpose. How could a bird fly naturally when weighed down and restricted by the transcribing apparatus?

In 1881, Marey saw the instantaneous photographs of a trotting horse taken by the Anglo-American photographer Eadweard Muybridge (1830–1904). He invited Muybridge to present these images to selected scientists and friends. Seeing the results, as projected via Muybridge’s Zoöpraxiscope, Marey realised that the camera was the perfect non-invasive, graphing instrument he was looking for.

The following year, Marey established a research institute in Bois de Boulogne and, two decades later, the Marey Institute alongside it. Here, he sited cameras above, beside and in front of a specially constructed, three-sided hangar, lined with black velvet to absorb light and reduce reflection.

Subjects dressed in all white were photographed as they walked, ran, jumped, skipped or flew through this black box. The resulting images were only partially successful. Limitations of early camera technology resulted in blurring, which made accurate analysis of movements difficult.

Some attitudes are maintained longer than others. [..] They are recognizable in the photograph as the ones which have left the most intense impressions on the sensitized plate — in fact, as those which have had the longest exposure. Thus in [the image], which represents a fencer in the act of lunging, most of the impressions are indistinct or confused, while two of them stand out as well defined positions. The first of these is when the man is preparing for his thrust, and the second is when his arm is extended to its utmost limit after he has executed the lunge.

(Marey, 1895: 178–179)

Movement from stillness

The two impressions Marey identifies as standing out in the picture of the fencer are points of stillness around which the movements are executed. Marey calls these ‘positions of visibility’ (Lecoq describes them as ‘fixed points’).

Fixed point

Marey’s chronophotographs render ‘fixed points’ visible. Lecoq’s teaching highlights their function: ‘there is no movement without a fixed point; movement highlights the fixed point’ (Lecoq et al., 1997: 100). Lecoq draws out the importance of the fixed point not only in individual gestures and movement sequences (such as throwing a discus, discussed below), but also in collective movements: ‘If everybody moves at the same time on the stage, the movement disappears because it lacks a fixed point. The action becomes incomprehensible, indecipherable’ (Lecoq et al., 1997: 100).

For both Marey and Lecoq, a fixed point is that around which coherence is structured. In order for there to be a fixed point, the body must be in equilibrium. However, the fixity of the point is not to be understood as something rigid or static: ‘the fixed point itself also moves’ (Lecoq et al., 1997: 100). A fixed point can be seen as ‘a fulcrum point, a point that transfers energy’ (Evans, private correspondence, 2015). In other words, dramatic tensions
and dynamics spring from the interplay between disequilibrium and balance in transitions between fixed points. Fixed points bring action to life.

**Movement made visible**

In order to minimise blur and to obtain clearer images, Marey had his subjects dressed half in black and half in white. Only the white parts of the body would show up on the photographic plate.

Marey subsequently refined this approach. He had subjects covered entirely in black. White lines or discs were attached to the limbs and joints of subjects whose movements he wanted to examine.

Lecoq was aware of Marey’s chronophotographic studies. He draws attention (Lecoq, 2006: 37) to the connection between Marey’s ‘black body stocking with white stripes’ and the costumes of the performers in late-1940s mime drama *L’Usine* (*The Factory*), based around people performing machine-like movements, created by the great French mime artist and director Etienne Decroux (1898–1991). As Mark Evans (2009: 38) points out, Decroux here plays on the connection between Marey’s methods and subsequent practices of industrial management.

*Figure 8.1 Moving parts: performers in Etienne Decroux’s man-as-machine performance, *L’Usine* (circa 1948). © Etienne Bertrand Weill.*
Lecoq himself wore a white-lined body stocking, similar to the one ‘that Marey made his test subjects wear in order to see the body’s postures more clearly’ (Lecoq, 2006: 37). A series of photographs taken in the late 1950s by Liliane de Kermadec (Lecoq, 2006: 12) shows Lecoq demonstrating movement in just such an outfit.

Movement essentialised

The pictures Marey obtained through this method, which he called ‘geometric chronophotography’, were transcribed as lines on paper. Three-dimensional bodies, transiting through time, were thus translated into two-dimensional images.

Figure 8.2 Demonstration of movement: Jacques Lecoq, circa 1958. © Liliane de Kermadec. Jacques Lecoq’s collection.

Figure 8.3 Geometric chronophotograph: jump with bent knees. © Collège de France – Archives.
Movement made visible: Marey and Lecoq

Figure 8.4  Lines of action: Marey’s transcription of geometric chronophotographs of a figure jumping from a chair, with legs flexed to absorb the shock of landing. © Collège de France – Archives.

Movement becomes essentialised: a jump is a jump, with all extraneous detail removed. The body disappears, and only the traces of its movement through space in time remain. Marey was then able to make precise studies of the mechanics of the movements by correlating them against axes of time and space.

Neutral Mask

Lecoq’s use of the Neutral Mask in his pedagogy similarly clarifies movement. Students are presented with themes such as: the Neutral Mask wakes for the first time, the Neutral Mask sees a tree. They must present these experiences simply and without commentary. It is the tree-ness of the tree that is expressed, not the particularity of any individual tree. This is the neutrality of the Mask; it has no intrinsic character or expression: what it touches, what it sees, it is. The performing body endows the Mask with attributes through action: ‘Once the student has become aware of this neutral state of departure, his body will be at his disposal – a blank page on which the writing of the drama can be inscribed’ (Lecoq et al., 1997: 47).

The Neutral Mask helps students to write the world on their bodies, to construct an internal reference grid to which actions, attitudes and emotions can be related and against which
they can be calibrated. Colours, sounds, textures, tastes, as well as events, they discover, can all be transformed into movement. The students learn to sensitise their bodies to the world around them and to translate its movements into performance that can transmit sensations to spectators.

Movement analysis – training bodies

Much of the funding for Marey’s Physiological Station was provided by a French government anxious to improve the physical capacities of its population after the humiliating defeat of the 1870 Franco-Prussian war. The body of the state depended for its health on the fitness of the bodies making up the state – in its moral, political, military and economic spheres.

Working with Georges Demenÿ (1850–1917), his assistant from 1881 until 1894, Marey photographed men (and they were, mostly, men) marching, throwing, working, etc. Soldiers and athletes were among the most photographed subjects.4

The labouring body was also subjected to photographic scrutiny. In 1894, in cooperation with the industrial expert Charles Fremont (1855–1930), Marey initiated the practice of using chronophotography to analyse the actions of workers executing tasks: the two men recorded a skilled blacksmith swinging a hammer.

The resulting images, widely reproduced, encouraged the development of templates of ‘best practice’ in military manoeuvres, sport, the arts and industry. In the United States, chronophotography underpinned Taylorist approaches to scientific management; in the Soviet Union, it was at the core of biomechanical studies.5

Marey’s chronophotography thus became a highly influential tool for movement analysis. It inspired Georges Hébert (1875–1957), who was one of the main proponents of the ‘natural gymnastics’ that underpinned many physical development programmes throughout the twentieth century (and has been revived in our own time by parkour enthusiasts). The combination of physical exercise with sport and games – as advocated by experts such as Hébert – became a core practice of multi-stranded initiatives aimed at stimulating physical, mental and cultural development in France after the Second World War. Lecoq, when he was a young sports physiotherapist, was introduced to theatre thanks to one of these initiatives (Evans, 2009: 51, 108): the cooperative society, Education par le jeu dramatique (EPJD), founded in 1946 by Jean-Louis Barrault (1910–94), Roger Blin (1907–84) and Jean Vilar (1912–71).

Hébert’s style of natural gymnastics was familiar to Lecoq (Lecoq, 2006: 37–38; 39). The movements at its core are those analysed by Marey in his chronophotographic researches: pulling, pushing, climbing, walking, running, jumping, lifting, carrying, attacking, self-defence and swimming. These are also the movements that Lecoq cites as fundamental to his pedagogy (Lecoq et al., 1997: 82), as drawn out by Evans (2012: 166). However, Lecoq is not interested in these movements for their instrumental application to fitness training. His pedagogy encourages students to explore the psychic as well as the physical dimensions of pulling, pushing, reaching, etc. Learning a movement is a way into explorations of images, sounds and emotions that might be evoked or provoked by its essential dynamic expression. For Lecoq, these actions ‘trace – in a responsive body – the physical circuits along which emotions are inscribed’ (Lecoq et al., 1997: 82). This being so, Lecoq’s movement researches extend beyond purely physical analyses. They explore routes to dramatic interactions and are developed into scaffold for creation.
The discus thrower

Discus-throwing was one of the many athletic techniques chronophotographically analysed by Marey. It is also one of the Twenty Movements analysed and explored by students in the first year at L’École Jacques Lecoq – these are described in detail by Mark Evans in his essay, ‘The influence of sport on Jacques Lecoq’s actor training’ (Evans, 2012: 163–177).

Lecoq breaks down the movements of the discus thrower into a sequence similar to that seen in Marey’s chronophotographs (although the technique of the throw is slightly different in the two examples).

Marey’s images are created by camera shutters operating at precisely regulated intervals. Their spacing is time-based. Whether the athlete is on- or off-balance is irrelevant to the camera.

By contrast, Lecoq’s analysis focuses on the stages of dynamic change in the action as expressed through the human body. Each arises out of a fixed point, necessarily a moment at which the athlete/actor is in control of his or her action.

When I attended the school (1981–83), Lecoq broke down the action into stages based around its natural fixed points. Once the students were able to copy this with reasonable accuracy...
accuracy, he interwove the practical demonstration with suggestions intended to draw out the movements’ psychic and dramatic dimensions:

Be as big as possible  
Execute the action standing only on the weight-bearing leg  
Use only the body, not the arms  
Perform the actions to a partner, in order to describe something to them – e.g. the rising and setting of the sun  
Be as big as possible and introduce whatever sound is appropriate  
Perform the action big, as if praying  
Perform the action small and walking as if in a state of prayer  
Make the action as small as possible  
Execute the action through the breathing, barely moving the body

Students are encouraged to discover appropriate justifications for the movement and thereby to transpose it to a dramatic gesture or situation. By changing the relation of the movement to time and space, without distorting its levels of tension or inner dynamics, different impressions are projected to spectators. When executed ‘as big as possible’, for instance, the action
of throwing the discus also becomes slower. It then appears as a formal, hieratic gesture (such as might be used by the chorus of an ancient Greek tragedy). Contrapuntally, when performed at its minimal compass, it seems more nervous, an exteriorisation of an internal monologue of question and resolution (one that would not seem out of place in a naturalistic, filmed drama).  

From movement analysis to performance

Like many of his contemporaries, Marey was fascinated by ancient Greek classical civilisation, in particular its understanding of the human form as expressed in sculpture and painting. When the musicologist Maurice Emmanuel (1862–1938) was preparing his doctoral thesis on ancient Greek dance, he naturally turned to Marey and chronophotography to help him research classical movement. The poses of figures on ancient artworks were mimicked by dancers from the Paris Opéra, who were then asked to devise linking movements between them. The resulting dance sequences were recorded chronophotographically in a series of stills, which were then compared to the original figures on vases and to other representations of dance in ancient art.

The resulting text, La danse grecque antique d’après les monuments figurés (Emmanuel & Collombar, 1896; translated into English as The Antique Greek Dance, after Sculptured and Painted Figures, Emmanuel and Beauley, 1916), ‘became an essential text for scientists, artists and poets alike’ (Fell, 1999). One of the performance practitioners and researchers influenced by this work was Jaques-Dalcroze, founder of eurhythmics. Theatre director and theorist Jacques Copeau (1879–1949) adapted some of Dalcroze’s ideas about rhythm and movement into his own work. These, in turn, were passed on to his actors and students, including Jean Dasté (1904–94). Lecoq worked with Dasté, and his own pedagogical ideas were influenced by him (Evans, 2012: 167).

Through movement to abstraction

It was Marey’s chronophotographs that first suggested to artists this aspect of the underlying dynamics that structure the visible, moving world and that inspired them to uncover these dynamics through what we now call ‘abstract art’. As Marey expert Marta Braun points out (1994: 264–318), Marey’s studies, so accurate in their representation of reality, shattered representational assumptions in art. Chronophotography redefined the single, perspective vision of Renaissance painting. For Marey, this was an unintended consequence. His images, making movement through time in space visible, opened up new ways of seeing and perceiving the world.

Shared poetic reserve

During the first year at L’École Jacques Lecoq, students are encouraged to transpose works of art into movement (not just plastic arts, but also poetry and music). The aim of these exercises is not to imitate artworks on a superficial level (just as the aim of the discus thrower is not merely to mimic a sporting action). To ‘show’ a painting or the subject matter of a poem through gestures that directly copy the original – this is not the goal. Rather, students are encouraged to search for the ‘shared poetic reserve . . . which is lodged within each one of us’ and which Lecoq describes as ‘an abstract dimension, made up of spaces, light, colours, matter, sounds’ (Lecoq et al., 1997: 56–57).
This ‘shared poetic reserve’ is revealed through an analysis of the dynamic relations within the artwork – of shape and colour; of sound and rhythm. As in the discus thrower, these dynamic relations are revealed in the interplay of levels of tension, which can then be expressed through physicalising relations between fixed point and movement. What makes the Sistine Chapel centrepiece of God reaching out to Adam so thrilling is not the formal composition of two hands almost touching. It is the contrast between the positions of the bodies, qualities of stillness and motion, colours – and the balance achieved through the interplay of tensions between them. These same elements are present in non-representational works. The challenge for the students is to register them accurately and transmit them so convincingly that spectators, watching a group of performers transiting an open space, can instantly recognise, not just ‘Rubens!’ or ‘Michelangelo!’ but also ‘Kandinsky!’ or ‘Pollock!’

In Lecoq’s pedagogy, the hitherto unimagined is deliberately made possible: ‘We hunt for ways to express this particular emotion [evoked by the form or movement of a colour, for instance] through mimages [mime images], by gestures that are not to be found in the index of the real’ (Lecoq et al., 1997: 57). His exercises offer ways to uncover unexpected aspects of the life around us; we feel their truth even if they appear in forms we have never before encountered.

Marey and Lecoq – divergences and correspondences

Marey’s physiological studies opened up new possibilities in art, science, technology, psychology, sociology and medicine. Lecoq’s pedagogy continues to enable performers, writers, directors, dramaturgs and artists to find their creative voices in individual and collective works; it can be adapted, as he says, ‘to all artistic education’ (Lecoq et al., 1997: 171). What the work of both men provides is ‘a truth, an authenticity, a base that endures beyond changing fashions’ (Lecoq et al., 1997: 171).

Much of Marey’s scientific work was motivated by his belief that human senses are inherently untrustworthy. His numerous graphing systems were developed in order to overcome the limitations of the senses. Marey transposes movement into fixed and measurable entities by ‘writing’ it on paper, on photographic plates and on film. Actions so captured cease to be unique, three-dimensional and time-based. They become static, two-dimensional and unvarying. They are no longer aspects of being, but objects – things that can be accessed at will and subjected to numberless repetitions.

By contrast, Lecoq’s approach to performance is based on trust in the senses. Gravity, light, sound, motion – people may react to them in different degrees according to individual and cultural factors, but we all perceive them through the same basic physiological processes. The experiences of our senses shape us as individuals while they also connect us to communal realities. In Lecoq’s teaching, shared perceptions allow us access to physical, emotional and psychic shared truths. Lecoq’s pedagogy, in ‘writing’ the movements of the world onto the bodies of the students, highlights the uniqueness of each individual’s response to them.

Alain Berthoz (1939–), as Professor of Physiology of Perception and Action from 1993 to 2010 at the Collège de France (where Marey held a chair), is well-placed to appreciate the contributions to our understanding of movement made by Marey, the scientist, and Lecoq, performance pedagogue. Berthoz writes:

Watching Marey’s pictures, generates in one’s brain what I have called ‘the pleasure of movement’. Psychologists have shown that simply seeing a series of photographs of one gesture produces in the brain a prediction of the movement to come. The
brain is capable of dynamic inferences, even from static figures. Marey’s work reveals the marvellous congruity between natural movement and our perception of it.

(Berthoz & Debbasch, 2006: Foreword)

Marey’s revelation of ‘the marvellous congruity between natural movement and our perception of it’ (Berthoz & Debbasch, 2006: Foreword) is what Lecoq’s pedagogy transmits to his students. Through his teaching of, for instance, fixed point, Neutral Mask, the Twenty Movements, Lecoq extends these physical and physiological congruities to emotional and psychic planes – the ‘shared poetic reserve’. As Berthoz puts it in his ‘Hommage to Jacques Lecoq’: ‘Jacques Lecoq did not simply invent a system for training actors . . . he also seized, in a most profound way, the essential basis of the expression of emotions with the body’ (Berthoz, undated: 290).

Notes
1 The work of the two men has been compared by a number of commentators, including Braun (1994: 350).
2 Lecoq would have known Marey’s institute, at the very least by sight, since, in his youth, he would work out at the Roland Garros Stadium next door (Lecoq et al., 1997: 17).
3 Some of these can also be seen on the website of L’Ecole Jacques Lecoq: http://www.ecole-jacqueslecoq.com/pics_bdd/documentations_photos_en_visuel/BIO-JACQUES-2_1299837051_zoom.jpg (accessed on 14 July 2015).
5 Frederick Winslow Taylor (1856–1915) established time-and-motion studies and is considered to be the founder of the scientific management practices that came to dominate industrial production processes in the twentieth century. His work was developed by fellow Americans Frank (1868–1924) and Lillian (1878–1972) Gilbreth, who refined time-and-motion analysis through the use of chronophotography. They knew Marey’s work.

References
All translations are the author’s unless otherwise stated.


Fell, J. (1999). ‘Dancing under their own gaze: Mallarmé, Jarry and Valery’. Journal of European Studies, 29, 133–156. The online version of this article can be found at: http://jes.sagepub.com/content/29/2/133.citation Accessed on 14 July 2015.

