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MAKING UP FOR *TEMPS PERDU* IN PHYSIOLOGICAL AND LITERARY DISCOURSE: HELMHOLTZ, MAREY, PROUST

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The supposed origins in nineteenth-century physiological discourse of Proustian *temps perdu* have been a somewhat peripheral question for Proust criticism. The term does exist in nineteenth-century scientific and medical discourse — most prominently in works by German physicist Hermann von Helmholtz and French physiologist and pioneer of photography of movement, Étienne-Jules Marey — but its discussion in relation to Proust — mainly by scientists and historians of science — has tended to be speculative and biographical, with little reference to Proust's writing. The standard narrative is that the physiological, or more specifically proto-neurological, concept of *temps perdu* migrated from Königsberg via Berlin to Paris in the mid-nineteenth century and was then disseminated in France over the following decades, before plausibly being absorbed by Proust, whose father moved in the same physiological circles as its key French mediator, Marey. Without disputing that narrative, but abstaining from further biographical considerations or concerns with origins for their own sake, this article identifies some resonances between Helmholtz's and Marey's preoccupations and those of Proust's novel, particularly concerning parallels between transmission of (sensorial, sentimental, or intellectual) information across time within a universe of narrative subjectivity, and communication via physiological systems or networks within the body, including those mediated discursively by the use of metaphors derived from technological communications systems.

Helmholtz and Marey

A well-established narrative concerning Helmholtz, Marey, and the notion of *temps perdu* is soon rehearsed. The term first appears in an 1851 communication by Helmholtz to the Académie des sciences de Paris, 'Deuxième note sur la vitesse de propagation de l'agent nerveux', a follow-up to the previous year's 'Note' discussing the measurement of the speed of nervous impulses generated by electric stimuli applied to frogs' legs, and 'le temps qui s'écoule entre l'irritation électrique d'un nerf moteur et la contraction du muscle'.¹ Between application of stimuli

¹ Hermann von Helmholtz, 'Deuxième note sur la vitesse de propagation de l'agent nerveux', *Comptes rendus hebdomadaires des séances de l'Académie des sciences*, 33 (1851), 262–65 (p. 263); Hermann von Helmholtz, 'Note sur la vitesse de propagation de l'agent nerveux dans les nerfs rachidiens', *Comptes rendus hebdomadaires des séances de l'Académie des sciences*, 30 (1850), 204–06 (p. 204).

surprising given Proust's engagements with photography and the prehistory of cinema, the latter emblematically announced in the narrator's account of his disorientation on waking in the novel's opening lines:

souvent, ma brève incertitude du lieu où je me trouvais ne distinguait pas mieux les unes des autres les diverses suppositions dont elle était faite, que nous n'isolons, en voyant un cheval courir, les positions successives que nous montre le kinétoscope.⁷

While the kinetoscope was patented by Thomas Edison following a visit to Marey in 1889, it is highly likely that Proust's narrator alludes also here to Marey's graphic and later chronophotographic images of running horses, widely disseminated towards the *fin de siècle*.⁸ Already discernible in this observation from the novel's outset is a tension between intermittent impressions of discrete phenomena and a fluid overall impression, for which chronophotography and the notion of the moving image provide useful illustration. But the specifically visual context for this phenomenon — discussed by Henri Bergson in similar terms — is not its only one, and, importantly, not even the only one to which Marey's work is significant.⁹ His contributions to photography, cinematography, and their theorization aside, Marey is distinguished for his 'significant contributions to the fields of cardiology, physiological instrumentation, aviation, [...] and the science of labor'.¹⁰ Discussed below are some of Marey's key cardiological and physiological writings, in particular concerning blood circulation, which Proust scholarship has overlooked.

Marey's mediation of Helmholtzian *temps perdu* is typically traced to the term's use in *La Machine animale: locomotion terrestre et aérienne* (1873).¹¹ Herein — as well as presenting images and graphic representations of horses running — Marey discusses Helmholtz's experiments with frogs, exposing their key concepts in the form of an everyday narrative: to illustrate *temps perdu*, he relates a letter's journey from Paris to Marseille; in this analogy, if the duration of the Paris–Marseille segment is fixed by train timetables, the period between the letter's arrival in Marseille

⁷ Marcel Proust, *À la recherche du temps perdu*, ed. by Jean-Yves Tadié, 4 vols (Paris: Gallimard, 1987–89), 1 (1987), II (1988), III (1988), IV (1989), 1, 7. (This edition hereinafter referred to in the text by volume and page number.) Julia Kristeva reads the lengthy sentence immediately following (and for her implicitly announced by) this one — an 'échantillon impressionnant' of 'la grammaire proustienne' — precisely in terms of its 'kinetoscopic' quality; Julia Kristeva, 'Le Kinétoscope des sept chambres: enchaînements et intermittences', in *Le Temps sensible: Proust et l'expérience littéraire* (Paris: Gallimard, 1994), pp. 483–503 (p. 484). Kristeva also reminds us (p. 485) that an earlier draft (Paris, Bibliothèque nationale de France, n.a.fr., MS 16733, fol. 12r) uses the word 'cinématographe' instead of 'kinétoscope'.

⁸ A full account of Marey's development of chronophotography — and of the involvement of other significant figures such as Muybridge and Edison — is provided in Marta Braun, *Picturing Time: The Work of Étienne-Jules Marey, 1830–1904* (Chicago, IL: University of Chicago Press, 1992). On the kinetoscope, see pp. 187–91.

⁹ '[L]a photographie instantanée isole n'importe quel moment; elle les met tous au même rang, et c'est ainsi que le galop d'un cheval s'éparpille pour elle en un nombre aussi grand qu'on voudra d'attitudes successives, au lieu de se ramasser en une attitude unique'; Henri Bergson, *L'Évolution créatrice* (Paris: Alcan, 1907), p. 359.

¹⁰ Braun, *Picturing Time*, p. xiii.

¹¹ See Schmidgen, *The Helmholtz Curves*, p. 162; Thomas Schestag, 'Retrouvé: du temps perdu. Note sur l'origine du *temps perdu* dans la *Recherche* de Marcel Proust', *Philosophia scientia*, 7 (2003), 115–27 (p. 120); and Marco Piccolino, 'A "Lost Time" between Science and Literature: The "temps perdu" from Hermann von Helmholtz to Marcel Proust', *Audiological Medicine*, 1 (2003), 261–70 (p. 266).

and delivery to its recipient — analogous with Helmholtzian *temps perdu* — is of undefined duration. Marey concludes:

il résulte des expériences de Helmholtz que tout le temps qui s'écoule entre l'excitation et le mouvement n'est pas occupé par le transport de l'agent nerveux; mais que le muscle, quand il a reçu l'ordre apporté par le nerf, reste un instant avant d'agir. C'est ce que Helmholtz appelle *temps perdu*. Ce temps correspondrait, dans la comparaison que nous avons employée tout à l'heure, à la durée du travail préparatoire qui se faisait entre l'arrivée des lettres et leur distribution.¹²

Moreover, 'la variabilité de la durée appartient presque exclusivement à ces phénomènes encore inconnus qui se produisent dans le muscle pendant le *temps perdu* de Helmholtz'¹³ *Temps perdu*, then, would be a period of variable duration occupied by physiological processes involved in further transmission of stimuli via nerves in order to precipitate motor actions. Here Marey discusses Helmholtz's model in terms of its applicability to a generalized 'muscle'. However, it is Marey's work on blood circulation, and on the specific muscle that is the heart, that is potentially much more significant in relation to Proust, in that it discusses *temps perdu* at length specifically in relation to the heart and its functioning, notably in terms of 'intermittences du cœur' and their contribution to — or interruption of — a smooth and constant 'courant sanguin'.¹⁴

Critical responses

While there has been much discussion of the notion of intermittence in Proust — indeed, while 'the concept of intermittence was to become a favourite and staple passage of the *Recherche*', not least since it had been 'elevated' by Proust 'to one of the fundamental psychological "laws" of his novel' — this has been in terms of a general physiological notion of intermittence deriving from one first developed by Xavier Bichat, rather than of the specific notion of 'intermittences du cœur' discussed in Marey's cardiological works.¹⁵ Bichat makes a distinction between a deep 'vie organique', characterized by 'continuité', and a more conscious 'vie animale', subject to 'intermittence' as a general phenomenon, and to individual 'intermittences'.¹⁶ This important theme linked to the mind–body distinction, 'le drame de la division de conscience', of growing significance in late-nineteenth-century

¹² Étienne-Jules Marey, *La Machine animale: locomotion terrestre et aérienne* (Paris: Baillière, 1873), p. 42. Marey mentions the concept earlier, in *Du mouvement dans les fonctions de la vie: leçons faites au Collège de France* (Paris: Baillière, 1868), where the following comment explains a graph representing an experimental measurement: 'Le temps *s m* correspond à ce que Helmholtz appelle *excitation latente* du muscle ou *temps perdu*' (p. 419). The concept is not developed here, unlike in the 1873 work.

¹³ Marey, *La Machine animale*, p. 44.

¹⁴ Étienne-Jules Marey, *La Circulation du sang à l'état physiologique et dans les maladies* (Paris: Masson, 1881), p. 292; Étienne-Jules Marey, *Physiologie médicale de la circulation du sang, basée sur l'étude graphique des mouvements du cœur et du pouls artériel, avec application aux maladies de l'appareil circulatoire* (Paris: Delahaye, 1863), pp. 126–27.

¹⁵ Jennifer Rushworth, 'Mourning and Intermittence between Proust and Barthes', *Paragraph*, 39 (2016), 269–86 (pp. 270–71). For 'intermittences du cœur', see for example Marey, *La Circulation du sang à l'état physiologique*, p. 292.

¹⁶ Xavier Bichat, *Recherches physiologiques sur la vie et la mort* (Paris: Brosson & Gabon, 1805), pp. 3, 31, 32–33.

France, is traced by Anne Henry from Bichat to psychologist Théodule-Armand Ribot via Schopenhauer; its Proustian expression, for Henry, is as ‘manifestation de l’inconscient qui libère des contenus inattendus’; its significance lies in the fact that for Proust ‘le cœur et le corps ont partie liée: ils appartiennent à la même couche de l’organisme’.¹⁷ As Jennifer Rushworth recounts, Proust significantly modified the neo-Bichatian understanding of intermittence, bringing it into ‘the heart of his own theory of the anachronism of emotions’. Whereas Bichat or Schopenhauer ‘connect intermittence to “animal life” and to intelligence, Proust instead sees intermittence as embedded in the body and the emotions’, that is, within ‘organic life’, for Bichat and his mediators continuous, for Proust, ‘richly intermittent’. Proustian intermittence, then, may largely be understood in a sense ‘in which intermittence is typically pathological and relates to the pulse, to circulation and the heart, to fever, respiration and the lungs’.¹⁸

Nevertheless, it is precisely within the cardiological context that a highly specific, technical understanding of intermittence corresponds with a notion of *temps perdu* deployed by Marey that is, as we will see, somewhat different from his widely disseminated neo-Helmholtzian understanding of it discussed above. The more specific medical term ‘intermittences du cœur’, like *temps perdu* in its neo-Helmholtzian or Mareyan understandings, has been discussed mainly in relation to its coincidence as a title — that is, originally envisaged as the general title, ‘qui fait allusion dans le monde moral à une maladie du corps’, of a work bringing together *temps perdu* and *temps retrouvé*, but eventually a section title within *Sodome et Gomorrhe* — rather than in terms of any specific meaning the phenomenon might assume in Proust’s novel.¹⁹ Such discussion tends to be by scientists and historians of science rather than by literary scholars. In a representative example, biologist Marco Piccolino acknowledges that documented links between Helmholtz, Marey, and Proust on *temps perdu* are scant. Piccolino does not explain specifically why he discusses *intermittences du cœur*, without mentioning Marey, he simply acknowledges that it is a term ‘of medical derivation’.²⁰ He nevertheless usefully highlights the intermittences vis-à-vis Proust in relation to sphygmographic representations of cardiac function (pioneered by Marey), to which Proust alludes in a footnote to *Sésame et les lys*: ‘l’œuvre d’art n’est-elle pas pour le rythme caché — d’autant plus vital que nous ne le percevons pas nous-mêmes — de notre

¹⁷ Edward Bizub, *Proust et le moi divisé: ‘La Recherche’ creuset de la psychologie expérimentale (1874–1914)* (Geneva: Droz, 2006), p. 19; Anne Henry, ‘Intermittence’, in *Dictionnaire Marcel Proust*, ed. by Annick Bouillaguet and Brian G. Rogers, 2 vols (Paris: Honoré Champion, 2015), 1, 514–15 (p. 514); Anne Henry, *La Tentation de Marcel Proust* (Paris: Presses universitaires de France, 2000), p. 89. Henry identifies Ribot’s *La Philosophie de Schopenhauer* (Paris: Baillière, 1874) and *Les Maladies de la personnalité* (Paris: Alcan, 1897) as the key works exposing Schopenhauer’s reflections on Bichat in supplements to *Die Welt als Wille und Vorstellung* (1819); Henry, *La Tentation de Marcel Proust*, pp. 88–89.

¹⁸ Rushworth, ‘Mourning and Intermittence between Proust and Barthes’, p. 273.

¹⁹ Marcel Proust, *Correspondance*, ed. by Philip Kolb, 17 vols (Paris: Plon, 1970–1993), xi (1983), p. 257, letter to Antoine Fasquelle, October 1912; Proust, ‘Les Intermittences du cœur’, and Antoine Compagnon, ‘Notice’, in *La recherche du temps perdu*, ed. by Tadié, III, 148–78; pp. 1185–1261 (p. 1226).

²⁰ Piccolino, ‘A “Lost Time” between Science and Literature’, p. 268.

of *À la recherche* via Marey'.²⁶ But we learn no more about that hypothetical transmission, or about the actual meaning, metaphorical manifestation, or symbolic or connotative potential of terms like 'temps perdu' and 'intermittences du cœur' as they relate to the novel, the text of which is not significantly discussed.

An important, less hypothetical, discussion of the cultural impact of Helmholtz's *temps perdu* is offered by Otis, who does not mention Proust, restricting discussion to the nineteenth century and focusing on 'comparisons between physiological and technological communications systems', particularly as means of understanding 'the epistemological role of metaphor'.²⁷ In Otis's account, Helmholtz and Du Bois-Reymond saw the nervous system as a model for modern communications systems (and vice versa), and 'while chemistry and physics offered models that helped one envision the way nerves transmitted information, the nervous system offered an invaluable model to physicists and engineers designing telegraph networks'.²⁸ The metaphorical potential of analogies between the physiological and the technological highlighted by Otis offers, arguably, along with the potential for productive slippage in meaning of terminology employed, a more useful route into potential resonances between Helmholtz and Proust than the highlighting of terminological coincidences or biographical likelihoods.²⁹ This is the approach taken in what follows, starting with two overlooked texts by the previously mentioned commentators' 'missing link', Marey, which discuss technological means of stimulating and recording physiological reactions, and use terminology which can be applied — not least through its potential, shared with intermittence in its neo-Bichatian and Proustian manifestations, for slippage, of which there is a highly significant example — in relation variously to complex technological, physiological, or indeed psychological networks of communication, transmission, and, importantly, of circulation.

Marey, circulation, and intermittence(s): 'réparer le temps perdu'

While discussion of Marey's mediation of *temps perdu* has typically focused on *La Machine animale* and its railway narrative, and while interest in Marey with regard to Proust has tended to centre on their shared interest in moving images, two key works by Marey on blood circulation have received scant if indeed any attention in Proust scholarship: these are *Physiologie médicale de la circulation du sang* (1863) and *La Circulation du sang à l'état physiologique et dans les maladies* (1881). These works both use the terms 'temps perdu' (the 1881 work repeatedly so, and, notably, as will be seen, in two different senses) and 'intermittences du cœur', notions closely related in Marey's exposition of the heart's functioning and of the circulation of

²⁶ Schmidgen, *The Helmholtz Curves*, p. 172.

²⁷ Otis, 'The Metaphorical Circuit', p. 106.

²⁸ Otis, 'The Metaphorical Circuit', pp. 105, 115.

²⁹ We might envisage a similar route into resonances between Bichat and Proust; Bichat, whose writings on intermittences arguably illustrate the epistemological role of metaphor, uses the analogy of the body as an 'horloge', regulated intermittently by the 'pendule' of the circulatory system (Bichat, *Recherches physiologiques sur la vie et la mort*, p. 32); time therefore is central to Bichat's conceptualization of bodily existence, as it is to Proust's novel.

blood within the body. Significantly also, they repeatedly use the word 'courant'; moreover, in two different senses, referring either to the electric current applied to the heart in experiments in order to provoke contractions and measure their effects, or to the 'courant sanguin', the constant flow of blood, regulated by the arteries, which is linked to and in tension with the intermittent beating of the heart, whether this beating is natural — in which sense *intermittence* is a normal state of affairs — or electrically provoked.³⁰ Whereas Helmholtz, and Marey in his other discussions of Helmholtz, are concerned with the nervous system and muscles in general, these works focus on the circulatory system, and on the specific muscle that is the heart. In a section of *La Circulation du sang* headed 'Temps perdu ou période d'excitation latente du cœur', Marey deploys Helmholtz's terminology to explain electrically induced contractions called 'systoles':

Quand un cœur a cessé de battre, on y peut provoquer artificiellement des systoles, en excitant les oreillettes ou les ventricules. Or, ces mouvements provoqués n'apparaissent pas immédiatement après l'excitation, mais présentent un certain retard qui correspond à ce que Helmholtz a appelé le *temps perdu* ou la *période d'excitation latente des muscles*.³¹

The term is used several times precisely in this expressly Helmholtzian sense, in reference either to the heart or to ordinary muscles (not major organs) in the context of artificial stimulation. In another instance, however, the term is used merely to denote the duration of an interruption of the pulse when the heart stops beating, that is, of what is explicitly referred to as 'un cas d'intermittence nerveuse du pouls', and in the caption to the illustrating curve (fig. 166) as an 'intermittence du cœur', which is followed by a 'pulsation' — naturally produced rather than artificially stimulated — stronger than those preceding it, that is, 'd'une systole plus énergique, d'une sorte d'effort du cœur pour réparer le temps perdu'.³² This exact sentence (with the difference that 'contraction' replaces 'systole'), along with the same graphic curve, also appears several years earlier in *Physiologie médicale de la circulation du sang*, predating any discussion by Marey of 'temps perdu' as a phenomenon specifically associated with Helmholtz (not even mentioned); this, significantly, is also the only instance of the use of the term 'temps perdu' in *Physiologie médicale de la circulation du sang*, which adds in the same passage that palpitations arising from the kind of 'intermittence nerveuse du pouls' brought about by a temporary cessation of the heart's beating are particularly associated with 'troubles nerveux', causing 'de vives inquiétudes' in those affected.³³ It is plausibly the case, then, that there is an earlier (yet persistent) *non-Helmholtzian* understanding of *temps perdu* on Marey's part which merely refers to the time-lapse — the

³⁰ For Marey, the regularity of blood flow is maintained by the elasticity of the arteries, their role being to 'supprimer l'intermittence du mouvement donné par le cœur', in other words to effect a 'transformation de mouvement, en vertu duquel les afflux intermittents du sang que pousse le cœur deviennent, au niveau du système capillaire, un courant continu et régulier' (*Physiologie médicale de la circulation du sang*, pp. 126–27).

³¹ Marey, *La Circulation du sang à l'état physiologique*, p. 27; original emphasis.

³² Marey, *La Circulation du sang à l'état physiologique*, p. 292.

³³ Marey, *Physiologie médicale de la circulation du sang*, pp. 240–41.

time which just happens to be lost or wasted — accompanying and coterminous with an ‘intermittence du cœur’, a time-lapse which can be ‘repaired’, made up for, compensated for physiologically, by naturally occurring, internal, implicitly unconscious effort rather than through external, artificial stimulation.

This physiological effort plausibly has a psychological counterpart in the effort seemingly required by Proust’s narrator — by analogy, recalling Proust’s earlier sphygmographic musings in his footnote to Ruskin positing parallels between heart and soul, as it were *une sorte d’effort de l’âme* — to perform a transformational action in the face of his inability to pursue his work, the subject of a long-standing — or former, yet recurring — lackadaisical intention, here recorded in *Albertine disparue*: ‘la persistance en moi d’une velléité ancienne de travailler, de réparer le temps perdu, de changer de vie, ou plutôt de commencer de vivre’ (IV, 173). Despite the narrator’s relative inactivity thus far on this front, the urge to write is still latently present, albeit in half-hearted form. The impulse persisting quasi-latently over what might be presumed to be Helmholtzian *temps perdu* is mere ‘velléité’, of which the subject is vaguely conscious, not up to the natural, internal, unconscious effort required to rectify the *non*-Helmholtzian, that is, Mareyan, *temps perdu*, the ‘intermittence’ interrupting the functioning of the artistic soul analogous with the heart.

Over and above the slippage in meaning in Marey’s use of *temps perdu*, the ‘repairable’ version of which Proust’s narrator appears to have co-opted analogically, the notion of ‘intermittence’ is already an ambiguously slippery one: this is the case not only, as we have seen, in relation to its history, but also in terms of its technical meaning in Marey’s work. On the one hand, a countable ‘intermittence’ — as instance or event — is an irregular interruption; on the other, uncountable ‘intermittence’ — intermittency — is the defining feature of a normally functioning heart and circulatory system: ‘L’action du cœur a été parfaitement définie lorsqu’on a dit que cet organe est une pompe foulante qui, d’une manière intermittente, envoie dans les artères le sang que lui rapportent les veines.’³⁴ The heart’s intermittent beats are transformed, refracted into a smooth and regular *courant sanguin* by the elasticity of the arteries, which effect a ‘transformation de mouvement qui change les impulsions intermittentes du cœur en un courant continu et régulier dans les capillaires’.³⁵ This is parallel to general muscular processes brought about by nerve impulses:

C’est l’élasticité des muscles qui éteint les saccades par lesquelles s’engendre la force musculaire et qui donne à la contraction l’apparence d’un raccourcissement continu, lorsqu’en réalité c’est une incessante vibration formée de petits raccourcissements successifs dont les effets s’ajoutent et se fusionnent entre eux.³⁶

The transmission of nerve impulses to muscles is elsewhere suggestively linked to electricity; Marey enquires of Helmholtz’s work: ‘Cet agent électrique dont on

³⁴ Marey, *La Circulation du sang à l’état physiologique*, p. 21.

³⁵ Marey, *La Circulation du sang à l’état physiologique*, p. 162. In Marey’s 1863 work the ‘impulsions intermittentes du cœur’ are referred to as ‘les afflux intermittents du sang que pousse le cœur’ (*Physiologie médicale de la circulation du sang*, p. 127).

³⁶ Marey, *La Circulation du sang à l’état physiologique*, p. 167.

se sert pour exciter le mouvement peut-il être assimilé à l'agent inconnu que la volonté envoie, à travers les nerfs, pour commander aux muscles les actes qu'ils exécutent?'³⁷ Marey's work on circulation, then, offers a context not only in which the highly suggestive and multivalent terms 'temps perdu' and 'intermittences du cœur' are in some — but not all — instances equivalent and denoting intervals of equal duration, but also in which different physiological systems of transmission within the body are analogous with one other, as well as with technological networks; Marey also implies in the two key works on circulation cited here that processes provoked artificially from outside the body can be precipitated naturally from within by the will. Whether Proust read or was aware of these works, which use both terms repeatedly, cannot be known, but this does not preclude resonances with Marey's (and by extension Helmholtz's) ideas within Proust's text.

Explicit varieties of 'Temps perdu' and 'temps perdu'

When the expression 'temps perdu' is deployed explicitly other than in the novel's title (and in the above-cited example from *Albertine disparue*), it is frequently used — for the most part in *Le Temps retrouvé*, as part of a general reflection on 'le Temps', initially capitalized, presumably, to indicate its newly rediscovered status as a major, meaningful theme — simply to represent a past that is seemingly irretrievable. That is until the narrator realizes the redemptive potential of the *œuvre d'art*, quasi-sphygmographic product of the latent workings of the soul over time ('rythme caché', or indeed as it were *intermittence(s)*, 'de notre âme'), and 'seul moyen de retrouver le Temps perdu' (iv, 478). Or, in an allusion to the latent character of what is sensed before it can be processed over time and eventually apprehended immanently, 'de faire sortir de la pénombre ce que j'avais senti, de le convertir en un équivalent spirituel', in a context where 'vérités' directly received by the intelligence are less meaningful and urgent than those which experience conveys to the self by way of 'impressions', 'comme celle que m'avait donnée la vue des clochers de Martinville', or of 'réminiscences' of significant memory triggers 'comme celle de l'inégalité des deux marches ou du goût de la petite madeleine' (iv, 457). The supposedly redemptive potential of the *œuvre d'art* is closely linked to a realization that any successful attempt to retrieve lost time will be grounded unconsciously in the subject's being, rather than in voluntary, conscious effort. The narrator highlights the privileged, extra-temporal role of 'l'être que j'avais été' at the moment of having 'reconnu inconsciemment le goût de la petite madeleine', that is, a being characterized by involuntary rather than voluntary memory grounded in exertion: 'Seul, il avait le pouvoir de me faire retrouver les jours anciens, le temps perdu, devant quoi les efforts de ma mémoire et de mon intelligence échouaient toujours' (iv, 450). On one hand 'le temps perdu' is seemingly equivalent here simply to 'les jours anciens'; on the other, the subordinate

³⁷ Marey, *La Machine animale*, p. 40.

clause suggests that memory and consciousness are incapable of retrieving lost time; their efforts are doomed to fail because they are conscious, indeed voluntary. Here, 'le temps perdu' has an intangible status and is only accessible immanently.

Elsewhere in *Le Temps retrouvé*, where almost all explicit mentions of 'Temps perdu' or 'temps perdu' occur, they resonate with key themes in *À la recherche*, such as the spatial dimension of time (implicit in Helmholtz's *Zeitraum*): the narrator's dreams bring memories of his grandmother or Albertine to him over 'de grandes distances de temps perdu' (IV, 493); the notion also relates closely to the physical decay over time of people the narrator has known, in a context where time is associated with anxiety over the 'œuvre' that 'cette idée du Temps' is compelling him to produce: 'les visages grimés m'avaient donné la notion du temps perdu' (IV, 612).

Helmholtzian and Mareyan 'temps perdu' in Proust: latency, intermittency, fluidity

Broadly speaking such explicit uses of the term 'temps perdu' — other than in the above-cited example from *Albertine disparue*, discussed further below — do not correspond significantly with understandings of the term as it is used by Helmholtz and Marey, except insofar as they link time with space, and are in certain instances linked to the failure of conscious attempts at remembering, sometimes moreover with circulatory connotations that resonate with Marey's work: 'Car aux troubles de la mémoire sont liées les intermittences du cœur', as the narrator comments early in the section of *Sodome et Gomorrhe* sharing its title with the intervals associated by Marey with *temps perdu*, immediately after an episode of involuntary memory prompting reflection on the difficulty of consciously constructing the reality of 'notre âme totale' from its inaccessible 'richesses' in memory (III, 153). Similarly, returning to the earlier explicit example from *Albertine disparue*, the narrator's persistent 'velléité de travailler, de réparer le temps perdu', leading to an illusion of regained youth, countable among 'des erreurs optiques dans le temps comme il y en a dans l'espace' (IV, 173) is vain because it is conscious, voluntary, albeit half-heartedly so; identification of this 'velléité' comes amidst a reflection on the mutual interference of time and memory loss, the disappearance of 'tout un bloc de souvenirs' relative to Albertine, and the 'modification' of his emotional state, 'préparée sans doute obscurément jour par jour par les désagréments continus de l'oubli mais réalisée brusquement dans leur ensemble'. The effect of this re-aggregated flow of voided memories is 'cette impression [...] qu'éprouve un homme dont une artère cérébrale depuis longtemps usée s'est rompue et chez lequel toute une partie de la mémoire est abolie ou paralysée' (IV, 172). Here, memory, understood in circulatory terms, is physiological, grounded in the body rather than in the soul, and thus subject to failure in the form of paralysis.

Otherwise, the most obvious implicit manifestation of *temps perdu* in Proust's novel is surely just a generalized notion of delay, of varying degrees of complexity. At a simple level, delays are the cause of nervous anxiety, as intermittences are for Marey. This is clearly the case with the narrator's 'heures d'angoisse'

without his mother at Combray (I, 24), but we see several similarly anxiety-inducing ‘retards’ in the narrator’s long waits for Albertine, which are typically associated with concealment. The recollection of such delays persists after her death, as when the narrator recalls — after some considerable lapse of time — a ‘retard inexpiqué’ on Albertine’s part, linked in turn with ‘toutes ces parties de sa vie qui restaient hors de mon cœur’ (IV, 124), that is, which are disconnected from the narrator’s emotional circulatory system. The same association of a delay with emotional distancing or dishonesty, and indeed with what is latent, can be found in Swann’s sufferings concerning Odette, in the ‘excédent de temps’ of whose absences Swann ‘sentait [...] s’insinuer la présence possible et souterraine de mensonges’ (I, 365).

A closer correspondence to Helmholtzian *temps perdu* can be found in delayed reaction times, identifiable from the outset of a novel of which the resurgence of buried ‘souvenir’ is a central subject; *temps perdu* is envisageable as being the period of latent development of a project of which the narrator only realizes the full import many years after most of the experiences and impressions he recounts have transpired. What distinguishes Proust’s model of a delayed reaction from Helmholtz’s is surely that, in Proust, the latent memory’s retrieval is usually triggered by a further stimulus in the narrator’s present, such as the madeleine (I, 44–46), itself subject to retrieval — and revelation of its full meaning — through the stimulus of uneven ‘dalles’ (IV, 445–48), further precipitating the dissipation of doubt about his capacity to produce the *œuvre d’art* and thus to ‘réparer le temps perdu’. The narrator’s meditations on the *œuvre d’art* in *Le Temps retrouvé* are not, however, straightforward, especially in relation to this very issue. As Jean-Pierre Richard has pointed out, the narrator indicates in his relation of the madeleine episode (‘quoique je [...] dusse remettre à bien plus tard de découvrir pourquoi ce souvenir me rendait si heureux’ (I, 47)) that he was already conscious of its later importance; that is, there is ‘présupposition théorique et certitude de ce qu’est la valeur [...] de l’expérience plus tard interprétée’; for Richard, it is thus doubtful that realization of the full import of the work of art should only come about at the novel’s end ‘par un effet d’après coup’.³⁸ We might also see the same implicit ‘présupposition’ in the ‘velléité’ to ‘réparer le temps perdu’ through (the) work (of art); that is, the problematic notion of redemption grounded in what Leo Bersani terms ‘a conception of art as a kind of remedial completion of life’ is not something that materializes suddenly at the end, but is latently, persistently present — and implicitly recognized as being problematic on account of its being a ‘velléité’ — throughout.³⁹ The divergence of Proust’s model from Helmholtz’s

³⁸ Roland Barthes, Gilles Deleuze, Gérard Genette, Jean-Pierre Richard, and others, ‘Table ronde sur Proust’, in Gilles Deleuze, *Deux régimes de fous: textes et entretiens 1975–1995*, ed. by David Lapoujade (Paris: Minuit, 2003), pp. 29–55 (p. 50).

³⁹ Leo Bersani, “‘The Culture of Redemption’: Marcel Proust and Melanie Klein”, *Critical Inquiry*, 12 (1986), 399–421 (p. 402).

in requiring further stimulation does not mean that the models cannot function complementarily in productive tension; nor does it mean that Helmholtz's — of which Proust's amounts to a modification — is not relevant or meaningful, any more than Proustian intermittence's difference from Bichat's makes Bichat's any less important to the novel; nor does it detract from the involuntary quality of memory retrieval, or from the latency over time of the original stimulus received by the perceiving subject's sensibility.

One example of this would be Swann's interior retention of 'la petite phrase de Vinteuil', linked in turn to other stimuli, cultural, physical, physiological, and psychological, also subject to interiorization:

Même quand il ne pensait pas à la petite phrase, elle existait latente dans son esprit au même titre que certaines autres notions sans équivalent, comme les notions de la lumière, du son, du relief, de la volupté physique, qui sont les riches possessions dont se diversifie et se pare notre domaine intérieur. (I, 344)

These 'riches possessions' are moreover akin to the 'richesses [...] indisponibles' of 'notre âme totale' mentioned above (III, 153).

Another example is the delay in apprehension of the full import of a piece of writing, namely Gilberte's note to the narrator in *À l'ombre des jeunes filles en fleurs*: 'Tandis que je lisais ces mots, mon système nerveux recevait avec une diligence admirable la nouvelle qu'il m'arrivait un grand bonheur. Mais mon âme, c'est-à-dire moi-même [...], l'ignorait encore' (I, 491). In both examples, the delay is linked to a process — of undefined duration, like the post-arrival journey of Marey's letter — of interiorization, away from the physiological towards the psychological. In the latter case, in which a distinction is made between the physiological apparatus for the active receipt of stimuli and the immanent site of involuntary apprehension of phenomena (and ultimately of their transformation into art), there is also a discursive dimension: 'Une feuille de papier couverte de caractères, la pensée ne s'assimile pas cela tout de suite' (I, 491). Only once the subject has taken in — by reading and re-reading — the contents of the letter can an effect (in this case 'mon bonheur') be known. It is clear here that perception is far from unmediated, or simultaneous with the manifestation to the senses of phenomena perceived. The narrator says as much in an analogy moreover linking writing and reading with modern communications networks, when discussing the reception by different readers of his article in *Le Figaro*, and how in the act of reading it is easy to fall into the trap of believing

que la pensée de l'auteur est directement perçue par le lecteur, tandis que c'est une autre pensée qui se fabrique dans son esprit, avec la même naïveté que ceux qui croient que c'est la parole même qu'on a prononcée qui chemine telle quelle le long des fils du téléphone. (IV, 149)

It is clear that both in the case of reading and in the telephone analogy deployed here there is some infrastructure where initial stimuli are processed (or modified), before being fully apprehended (or misapprehended). Proust is not the only author to use this kind of analogy; where Proust imagines the 'esprit' as the site of processing, Bergson imagines the 'cerveau' as 'une espèce de bureau téléphonique

central: son rôle est de “donner la communication”, ou de la faire attendre; Proust’s model, however, allows for transformation of what is transmitted.⁴⁰

These two examples posit an analogical relationship between the nervous system and telecommunications infrastructure. In both cases, as where Proust directly discusses the ‘système nerveux’ as distinct from the ‘âme’, there is a delay of unspecified duration, a *temps perdu* during which information is processed (and potentially distorted). Elsewhere, there are similar analogies using other physiological and infrastructural systems, such as when the narrator recounts the pain brought about by words connoting one of Albertine’s absences, here an alleged one with the airman:

À ces mots de hangar, de couloir, de salon, et avant même qu’ils eussent fini d’être prononcés, mon cœur fut bouleversé avec plus de rapidité que par un courant électrique, car la force qui fait le plus de fois le tour de la terre en une seconde, ce n’est pas l’électricité, c’est la douleur. (iv, 54)

Emotional pain would appear to be a phenomenon of the same order as the physical discomfort conveyed by nervous impulses, or indeed by an external, artificially produced entity such as an electric current, applied here to the heart.

Similarly, when the narrator experiences jealous anxiety — long after Albertine’s death — over her reported adventure with a *blanchisseuse*, the image of an intermittent current linking heart and memory is deployed:

Par instants la communication était interrompue entre mon cœur et ma mémoire. Ce qu’Albertine avait fait avec la blanchisseuse ne m’était plus signifié que par des abréviations quasi algébriques qui ne me représentaient plus rien; mais cent fois par heure le courant interrompu était rétabli, et mon cœur était brûlé sans pitié par un feu d’enfer, tandis que je voyais Albertine ressuscitée par ma jalousie, vraiment vivante, se raidir sous les caresses de la petite blanchisseuse. (iv, 109)

Reino Virtanen sees ‘the electrical symbol’ in Proust as ‘the leitmotif of jealousy and pain’.⁴¹ However, in this example (and others), electric current is more than just a ‘leitmotif’; rather, as well as operating as an analogy for pain as a transmissible quantity, it asserts the infrastructural connections between heart and memory, linked in the same network, in which impulses are transmitted over time before being apprehended. The narrator’s jealousy here is also plausibly akin to an electric current galvanizing Albertine back to life, her muscles moreover stimulated to contraction perhaps not directly by the *blanchisseuse* but by that

⁴⁰ Henri Bergson, *Matière et mémoire: essai sur la relation du corps à l’esprit* (1896; Paris: Presses universitaires de France, 1939), p. 26. While this article’s scope forbids fuller exploration of Bergson’s and Proust’s mutually congenial preoccupations, a recent discussion engages precisely with both authors’ critical approach to notions of extra-temporality, the apparent site of redemption through art, germane to the theme of ‘réparation’ of *temps perdu*: Suzanne Guerlac, ‘Proust and Bergson: Fierce Criticality’, in *The Proustian Mind*, ed. by Anna Elsner and Thomas Stern (London: Routledge, 2020), pp. 397–413. Guerlac (p. 403) stresses the human subject’s liberation from ‘l’ordre du temps’ (iv, 451; Guerlac’s emphasis), that is, in Bergsonian terms, ‘spatialized time’, rather than from time itself.

⁴¹ Reino Virtanen, ‘Proust’s Metaphors from the Natural and the Exact Sciences’, *PMLA*, 69 (1954), 1038–59 (p. 1043).

very jealousy. We see, as elsewhere, a suggestive coalescence of the technological and the physiological, in a context where the telephone has just been used in a tortuous metaphor conveying the anxiety brought about by ‘toute la palpitation spécifique du plaisir féminin’ (iv, 108–09). Another less explicit example of an infrastructural network linking heart and memory via pain is that of the narrator contemplating Cottard’s report from the ballroom at Balbec: ‘comme si un chaînon invisible eût pu relier un organe et les images du souvenir, celle d’Albertine appuyant ses seins contre ceux d’Andrée me faisait un mal terrible au cœur’ (iii, 268). Later, following Albertine’s death, Andrée herself inspires jealousy on account of an ‘aventure’, but only in proxy form as ‘une prise de courant qui me reliait indirectement à Albertine’ (iv, 113). Elsewhere, the narrator reports: ‘Comme par un courant électrique qui vous meut, j’ai été secoué par mes amours, je les ai vécus, je les ai sentis: jamais je n’ai pu arriver à les voir ou à les penser’ (iii, 511). That is, an initial stimulus has been received, but has never been fully processed.

If impulses and emotions can be generated in the form of flowing electric current, they can also manifest themselves as intermittence in terms of interruption of a flow (grounded paradoxically in regularity). Swann, for example, suffers an attack grounded in a recurrent lack of willpower, causing a suspension of his capacity to reason concerning Odette, akin to the interruption of an electric current:

Un accès d’une paresse d’esprit, qui était chez lui congénitale, intermittente et providentielle, vint [...] éteindre toute lumière dans son intelligence, aussi brusquement que, plus tard, quand on eut installé partout l’éclairage électrique, on put couper l’électricité dans une maison. (I, 264)

There are numerous other examples combining the circulation of electric current (or its interruption) with either nervous or circulatory terminology from the physiological domain. Common to many is a tension between intermittency as regular flow or recurrence, and intermittency as interruption. At the heart of such imagery is, well, the heart, which, though a physiological entity, has a close moral analogy in the soul, ‘cette âme humaine dont une des lois, fortifiée par les afflux inopinés de souvenirs différents, est l’intermittence’ (I, 581), again recalling the ‘âme’ of which the ‘rythme caché’ is sphygmographically expressed as art. The interesting term here is ‘afflux’, linking memories — seemingly likened to blood corpuscles — with liquid circulatory flow, and a recurring term in Marey.⁴² Moreover, the soul’s susceptibility to sudden floods of memories is in addition to its intermittent functioning.

Very often the psychological sensorium transforms multiple memories or ideas into a single flow, as the arteries, for Marey, transform intermittent *refoulements* from the heart into a uniform flow of blood. This can be seen when Bloch realizes that he has just been introduced to a Rothschild:

⁴² For example, Marey, *Physiologie médicale de la circulation du sang*, p. 127.

Alors étaient entrées subitement dans les artères de Bloch et d'un seul coup tant d'idées de millions et de prestige, lesquelles eussent dû être prudemment subdivisées, qu'il avait eu comme un coup au cœur, un transport au cerveau et s'était écrié en présence de l'aimable vieille dame: 'Si j'avais su!' exclamation dont la stupidité l'avait empêché de dormir pendant huit jours. (II, 795–96)

A flow of what should be processed as discrete, intermittent elements becomes one uniform surge, with overwhelming and embarrassing effects. Again, the moral and the physiological are combined; ideas take on the form of corpuscles circulating in arteries within a network where the brain is somehow analogical to the heart.

There is also a reflection on blood flow in the sequence itself entitled 'Les Intermittences du cœur', linking that other great Proustian preoccupation, sleep, with psychological perception and physiological processes:

Monde du sommeil, où la connaissance interne, placée sous la dépendance des troubles de nos organes, accélère le rythme du cœur ou de la respiration, parce qu'une même dose d'effroi, de tristesse, de remords agit, avec une puissance centuplée si elle est ainsi injectée dans nos veines; dès que, pour y parcourir les artères de la cité souterraine, nous nous sommes embarqués sur les flots noirs de notre propre sang comme sur un Léthé intérieur [...], de grandes figures solennelles nous apparaissent, nous abordent et nous quittent, nous laissant en larmes. (III, 157)

Conveyed here, along with an understanding of organic life and intermittence modifying Bichat's discussed above, is a very strong sense of the subconscious as a labyrinthine entity, a physiological and simultaneously urban infrastructural network traversed and inhabited by the human sensibility; emotions (elsewhere, like 'douleur', comparable to electricity) take on the form of liquids injectable into the bloodstream. Another coalescence of a physiological network of sensibility with the built environment can be found in the Verdurin residence, as apprehended by Swann soon after Odette starts to bring him there:

Et la présence d'Odette ajoutait en effet pour Swann à cette maison ce dont n'était pourvue aucune de celles où il était reçu: une sorte d'appareil sensitif, de réseau nerveux qui se ramifiait dans toutes les pièces et apportait des excitations constantes à son cœur. (I, 223)

Again, the heart is the central muscular organ subject to the 'excitations' transmitted intermittently — that is, constantly — from outside via the network's ramifications, which extend beyond the individual; most important, as elsewhere, is that the heart is imbricated within a network characterized by intermittency.

Conclusion

It has not been this discussion's aim to establish that Proust read Helmholtz or Marey. We can nevertheless compare texts and identify common currents and concerns — among them narrative ones — with the non-immediacy of the transmission or reception of sensations, impulses, emotions, memories. Common to Helmholtz, Marey, and Proust is that between reception and full apprehension of phenomena there are transformative processes at work over time. For Helmholtz and Marey, these processes are physiological, whereas for Proust, the physiological dimension is mainly analogical, as its infrastructural aspect is for all three.

Also common to the three are shifts in meaning mediating a concept that starts out as a problem in measurement of an undefined time-lapse but which becomes extended to circulatory networks of ever-increasing complexity. There is first, in Helmholtz, a shift from 'eine messbare Zeit' to 'Zeitraum der latenten Reizung', and then, via Du Bois-Reymond and the discourse network of international scientific communication, to 'temps perdu'; in Marey, one (Helmholtzian) meaning of 'temps perdu' — 'période d'excitation latente du muscle' — particularizes itself as 'période d'excitation latente du cœur', and also slips into a further, unmarked, non-Helmholtzian meaning coterminous with an 'intermittence du cœur', a loss or wastage of time that can be compensated by intensified effort on the part of the central muscle in the system. In the body, this is clearly the heart, but in Proust's representation of human subjectivity it is the involuntary effort brought about by the soul, rather than any conscious intervention by the outer infrastructure of apprehension, that seemingly — deeper problematics of reparation notwithstanding — rectifies through its own intermittency the 'intermittences', restores the system, retrieves, 'repairs', makes up for, lost time; the involuntary retrieval of memory in Proust, moreover, requires a stimulus in the present, whereas for Helmholtz the initial stimulus makes itself felt after *temps perdu*. 'Intermittence' itself has a double meaning: regularity, or interruption of regularity. Perhaps most important is the evident transferability of phenomena between already interconnected nervous and circulatory systems and, then, by the potential for analogy opened up, to technological communications systems, so that Proust's work exploits all three types of system, which are deployed interchangeably to articulate the complexity of how human subjectivity processes phenomena over time.

It is plausible that something similar happens to successive Helmholtzian and Mareyan notions of *temps perdu* as happens to the Bichatian and Schopenhauerian understandings of 'intermittence', and indeed, one might speculate, as happens to information processed by the human subject in Proust's novel, emblemized in the (frequently fallible) conveyance of the content of written text via the activity of reading (or misreading), likened to the transformative transmission of information via communications networks.⁴³ In the Helmholtzian understanding, *temps perdu* is a delay, germane to 'cet anachronisme qui empêche si souvent le calendrier des faits de coïncider avec celui des sentiments', noted on the same page as 'les intermittences du cœur' (III, 153), the emblematic illustration of which is the narrator's delayed mourning for his grandmother; in the Mareyan understanding, *temps perdu*, grounded in and provoked by intermittence, is something implicitly to be 'repaired', made up for. In Proust it has both these meanings, in which, with Barthes, we might see the first as *lisible* in its denotation of anachronism, and the second as *scriptible* in its imbrication in the complex problematics not only of redemption and reparation, but also of the emphatically temporal (rather than

⁴³ For Adam Watt, a key element of fallibility in the 'mis-tak[ing]' of written text by readers is 'our memory', as is implicitly also the temporal distance between events and their apprehension; Adam Watt, *Reading in Proust's À la recherche: 'le délire de la lecture'* (Oxford: Clarendon Press, 2009), p. 109.

extra-temporal) relationship between subjects designated by Gérard Genette as 'héros' and 'narrateur', who share 'la même vérité', which can 'glisser sans rectification' between the 'discours' of one and that of the other.⁴⁴ Slippage is in fact a central feature of the work, whether this is of the kind undergone by scientific terminology, of terms emblematically misread, of narrative perspectives, or of stimuli received by the human consciousness.⁴⁵

More generally, in Proust's novel, which can be read as an extended case history in *les maladies de la mémoire et de la volonté*, it is possible to observe the transformation, through the potential of metaphor and analogy, of physiological concepts into moral, psychological, aesthetic, and narrative ones.⁴⁶ This is because one of its key features is precisely the delay in response, in reaction, in narrative reframing, in *récitation* concerning episodes experienced in the form of phenomena initially apprehended, whether physiologically or psychologically, then retained or indeed processed by a subjective human sensibility superficially separate from — and yet deeply linked to — 'notre corps', before retrieval and narration at temporal and spatial removes from their occurrence.

⁴⁴ Gérard Genette, *Figures III* (Paris: Seuil, 1972), p. 261.

⁴⁵ See Roland Barthes, *SI/*, in *Œuvres complètes*, ed. by Éric Marty, 5 vols (Paris: Seuil, 2002), III, 120–345 (p. 122).

⁴⁶ Two influential works by Théodule Ribot, *Les Maladies de la mémoire* (Paris: Baillière; 1881) and *Les Maladies de la volonté* (Paris: Baillière, 1886) were instrumental in popularizing a category of illnesses under the heading *les maladies de la mémoire et de la volonté*.