Fitting for Health: the economy of medical technology in Europe and its colonies, 1600-1850
Bibliographical survey – July 2010

Dealing with "medical technology" in the early modern – prior to 1850 – period may be seen as a matter of curiosity and of antiquarian taste. Stanley Joel Reiser, in his path-breaking *Medicine and the Reign of Technology* (1978) argued that the modernity of medicine lay in its tools, especially diagnostic tools – exemplified by Laennec's stethoscope – which helps practitioners to escape from the overwhelming power of the patient's illness narrative. Before 1810, the practitioner had to rely on what the patient could tell to make sense of her disease, to the point that many a patient would write to a physician for advice. Since 1978, the concept has undergone strong revisions: the conference project is to acknowledge recent scholarship on the subject and increase our understanding of the material culture of medicine in the period.

1. What is "medical technology"?

Medicine, studied from "below" or "afar" is no longer associated with "practitioners", ie "physicians", gradually meaning "healthcare" in historical studies. Thanks to many works on early modern European cities, we know that the management of healthcare was in the hands of various medical guilds, unincorporated itinerant and female practitioners, and that patients found immediate help within the household, thanks to domestic medicine. We have a better knowledge of what medical treatment meant for early modern sufferers, which turned to various medicines or nostrums, bloodletting, orthopaedic devices and dental extraction, to take a few examples. Following the routes opened by the science studies, emphasis has been put on medicine as a practice and a practical knowledge.[1]

One condensation of this thinking is to be found in the definition of US Office of Technology Assessment "Medical technology—The drugs, devices, and medical and surgical procedures used in medical care, and the organizational and supportive systems within which such care is provided" (1978). As Carsten Timmermann and Julie Anderson recently pointed out, there is little in medicine that escapes the definition of medical technology[2]. Medical technology thus includes commodities – "drugs" and "devices" –, practical knowledge or procedures and "systems" which provide a general framework of organization or support for medical practice. Such definition can be considered as the result of long-term scholarship in the material culture of medicine, which started off with the curatorship and study of medical collections and historical buildings. Henri Sigerist was among the firsts to note that, for ancient times, "the history of medicine was that of its instruments", as Ghislaine Lawrence reminded.[3]

Among the pioneering study of medical instruments, technological innovation was a key concept, aptly replacing that of "progress". Not precluding results, change in medical science could be lead or followed by transformation in its tools, understood in a broad sense. Stanley Joel Reiser thus closely followed instrumental and theoretical change conveyed by the stethoscope and other modern medical aids.[4] Pioneer studies edited by John V. Pickstone, Ilana Löwy and Jean-Paul Gaudillière, put forward a "new genre of writing on the history of technology, once a field dominated by technical description and/or technological determinism": as Pickstone argued, "the origins of innovations need to be explained, in part by social process; the forms taken, the choices between techniques, and the patterns of uptake are likewise revealed as matters of

[1] Collins et al. 1997.
[2] Timmermann and Anderson, "Introduction", 2006.
[3] Sigerist, 1951, vol. 1, p. 19 cited by Lawrence, 1992.
[4] Reiser, 1978.

economic and social history"[5]. In understanding the theoretical, economic, social, political contexts into which some innovations took place, historians may have a better understanding of change in medicine[6].

Museum studies, with a view to presenting medical items in context, have also shed new light on modern technologies[7]. Tim Boon argued in *Manifesting* Medicine, that new exhibitions were designed "to engage with and represent the social realities of clinical medicine, public health and medical science and to follow the spirit of recent debates by favouring narratives other than those of technical development"[8]. Attention has been put onto analytical and visual instruments which convey images of the body, and to visual elements by which innovations where marketed, like the pill.[9] Historians have thus uncovered a social world behind medical technology. They have highlighted the role of industrialists in medical innovation, the social reconfigurations implied by the use of different technologies, and the major role of users in the promotion and adaptation of technologies[10]. Medicine, as a result, represents a social construction, in which commodities, sites, actors (practitioners, patients, other trades) are reconfigured within or without medical settings. The studies of (bio)medical industry have challenged the idea of a powerful agency of "doctors" – and design a much more complex social and economic framework.[11] For instance, the vacuum aspirator came to supplant the surgical technique of curettage in less than ten years, through legal, professional and economic factors.[12]

Special attention has been given to one commodity which is commonly associated with medicine: drugs. Commodities, products as well as technologies, endowed with efficacious action, drugs have been analysed from different perspectives. Early on, business historians have put emphasis on their marketing.[13] A recent research programme has lead systematic study of drugs and therapeutic agents between the nineteenth and the twentieth century, as a crossroads between medical prescription, industrial production, legal standard, marketing and sale strategies and consumerism.[14] The medical status of drugs is thus the result of an ongoing negotiation among various actors.[15] Another technology which has been successfully investigated is information, either visual[16] or textual, in exploring the construction of the patient's record.[17] In decisively defining medicine as a "technology" or *technè*, John Pickstone has recently invited scholars to reflect on the "ways of knowing" attached to it.[18]

Is "medical technology" modern? Reiser has been particularly keen in equating "modern" medicine with the advent of the stethoscope. Yet, his recent study on *Technological Medicine* is not without contradictions. According to him, technological medicine can be exemplified in the history of birth management, in which the advent of forceps (late 17c) and anaesthesia (mid-19c) reshaped the relationship between mothers, active consumers of these technologies, and practitioners.[19] With others, he argues that the advent of diagnostic and analytic tools were given meaning within the accepted theoretical frameworks constructed by Syndenham's nosography, according to which diseases could be considered as distinct entities, and Morgagni's pathological

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[5] Pickstone (ed), 1992, citation, p. 13 ; Löwy (ed), 1993.
[6] Stanton (éd.), 2000 ; Timmermann and Anderson (eds.), 2004.
[7] Davis, 1981, for innovative curatorship on instruments.
[8] Bud, 1996.
[9] Gossel Peck, 1996.
[10] Fairman, 1998 ; Marland, 2000; Sandelowski, 2000; Oudshoorn & Pinch, 2000.
[11] Löwy and Gaudillière (eds), 1998 ; Schlich, 2002.
[12] Tunc, 2008.
[13] Young, 1960.
[14] Bonah and Rasmussen (ed), 2005 ; Bonah et al., 2005.
[15] Bonah, 2008 and Cassier, 2008 ; Gootenberg, 2008.
[16] Cartwright, 1995 ; Bud, 1996; Dijck, 2005.
[17] Thurtle and Mitchell, 2002; Reiser, 2009, chap. 5.
[18] Pickstone, 2001.
[19] Reiser, 2009, chap. 8.

anatomy, which precisely located disease within the body.[20] In the grand narrative of medicine as a technology, Michel Foucault has offered another starting point: the Enlightenment. According to him, the hospital, and the grounds for a politics of healthcare, as instrument of population control, took their modern shape in the 18c.[21] Studies have supported and nuanced his idea, in space and time, allowing for long-term understanding.[22]

The conference has convened speakers with a view to expanding the discussion on the early modern period. Although most scholarship discussed so far deals with the modern period, trends in the history of science, medicine and technology for the early modern period foster debates in that regards. Although long-term interest in the trades of medicine cannot be ignored, renewed interest in practice and commerce has challenged earlier interpretation of science and medicine[23]. Stepping aside institutional medicine, scholars have taken seriously the multi-facetted social world of healthcare, depicted as a "medical marketplace".[24] The metaphor was first summoned when considering that medicine played a leading role in the birth of a consumer society, which occurred in the 17c[25]. Attention to commerce and exchange has brought new light onto the global economy of science and medicine.[26] The metaphor of the marketplace – used as a loose depiction of healthcare dealers[27] – has been recently investigated in an attempt at understanding the medical economy in early modern Britain. The papers will discuss the economy of "medical technology"– that can be produced, refashioned, exchanged, invented, discarded – and as a "way of knowing".

2. The medical "life of things" in the early modern period

How do things become medical? Recent works in the history of alchemy offer a good example of the medicalization of technology. Indeed, although alchemy could be seen as a pious activity or a "natural philosophy which sought to understand God through his greatest revelation: nature", it was also promoted because of its utility in healthcare and warfare, gaining support from noble patrons[28]. Chemical medicines, in the late 16c, became commodities, whose access and retailing provoked competition. Valentine Russwurin, from central Europe, who travelled to London to sell his surgical services and skin ointments, for various urinary and ophthalmic diseases, proved indeed a threat to young barber-surgeons, whose agenda was to promote chemical medicines: they used legal suing and print to set their medical authority on the commodity.[29] Indeed, all over Europe, one could find entrepreneurs such as Johann Rudolf Glaubert, established in Amsterdam around 1646, whose used books to advertise his *sal mirabile*, as a fertilizer and aphrodisiac, and indeed a remarkable medicine according to Samuel de Sorbière, sent by King Louis XIV to visit him: his *sal*, when added to "seeds of all plants to acquire such a strong attractive power, so that they could then be used for all sicknesses without further preparation".[30] The unprecedented success of these medicines allowed historian Ian Mortimer to explain the sudden acceleration for paying a "doctor" to cure a dying patient, although practitioners remained stable in numbers in East Kent: surgeons had become the main retailers of chemical medicines.[31]

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[20] Reiser, 2009, chap. 7. See also Pickstone, 2004, p. 1117.
[21] Foucault, 1976; Foucault,1994.
[22] Slack, 1981 ; Haines & Shlomowitz, 2000 ; Pickstone, 2006.
[23] Among many works : Shapin & Schaffer, 1985 ; Smith, 2004 ; Roberts (ed), 2007.
[24] Cook, 1994 ; Brockliss & Jones, 1999 ; Pelling, 2003 ; Harkness, 2007.
[25] McKendrick et al., 1982 ; Brewer & Porter, 1993.
[26] Findlen and Smith, 2002 ; Cook, 2007.
[27] For a discussion of the concept, see Jenner & Wallis, 2007, introduction.
[28] Nummedal, 2002.
[29] Harkness, 2002.
[30] Smith, 2004, citation p. 166.
[31] Mortimer, 2009.

A good example of the interconnectedness of medical knowledge, production and use, chemical medicine represents one tool among the varied instruments which were used for healthcare. Patients and practitioners, among others, made use of various materials, which were found fit for their purpose. Thanks to John Kirkup, we have know a better knowledge of the materials of surgical instruments, and their evolution through times[32]: crucible steel was considered apt for blades in the 18c,[33] but readily fallen into oblivion with their handy ebony or wooden handles, when autoclave came into fashion, very rapidly replaced by plated steel and then stainless steel. As anatomy and autopsies became a normal way through which medical knowledge could be acquire, corpses along with visual artefacts in wax or print, became an essential supply to medical practitioners[34]. In that regard, numerous trades were involved in healthcare supply: along painters and draughtsmen, and wax specialists, toyware makers, cultlers, *serruriers*, actively offered items. Artisans adapted new items to medical functions. [35] In 16c Augsburg, patients discharged from venereal hospitals could find various prostheses.[36] Warfare and road accidents brought their lot of invention in that regard, as Paré recalled[37]. With the fitting of injured bodies, with artificial anuses for instance, herniary surgeons invented orthopaedics, the well-conforming of children's growing bodies: the practical "art of having beautiful children"; [38] in the 19c, the balance also transformed the lives of babies.[39] Healthcare preservation featured one of the many traits of technological invention: electricity thus became medical, through the mindful hands of physicists, practitioners and patients.[40] Later, maps have become tools for treating cholera.[41]

3. The trade of medicine: production, commerce or consumption?

Drugs, either chemical or natural were matters of exchange in the early modern period. The search for new plants with curative powers implied transactions between Europeans and knowledgeable natives – by no means peaceful.[42] In the sole VOC, their commerce took place at various scales: a few plants in a sailor's trunk, who was thus allowed to make a small profit, to large-scale plant exploitation[43]. The Fuggers put their expertise as international merchants to order to supply their foundation for pox patients with expensive Guaiacum wood.[44] Getting quality drugs from overseas promoted state administration control over drug trade, such as in the case of the Spanish Empire.[45] Indian marketplaces or "bazaars" proved then incredibly profitable to the surgeons of the English East India Company in terms of medical scholarship and commercial benefits.[46] In the translation process, medicines changed, adapting their use to their new intellectual and practical environments.[47] In commerce, new knowledge, altogether with new commodities, was created, turning plants into medicines.[48]

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[32] Kirkup, 2006.
[33] Evans, 2008 ; Pérez, 2008.
[34] de Munck, 2010 ; Buklijas, 2008.
[35] Van Heiningen, 2009.
[36] Stein, 2009.
[37] Paré, 1575, cited in Gedeon, 2006; Cooter and Luckin, 1993.
[38] *Mémoires de l'Académie royale de chirurgie,* vol. 1.
[39] Weaver, 2010.
[40] Bertucci, 2001 and 2007.
[41] Koch, 2005.
[42] Schiebinger, 2004.
[43] Cook, 2007.
[44] Stein, 2009.
[45] Barrera, 2002.
[46] Chakrabarti, 2007.
[47] Dudley, 2009.
[48] Schifter Aceves, 2000.

The commerce of drugs, indeed, implied leading innovations in the acceleration of the consuming society. As main wholesalers for drugs, apothecaries developed practical knowledge on storage – through the use of majolicas whose production and use diffused from Venice to London at the end of the 16c – and the marketing and display of their commodities, in order to entice their customers' trust.[49] Yet, apothecaries were not the only ones to develop marketing techniques in the selling of healthcare commodities. Itinerants practitioners developed efficient marketing strategies: among them, pricing, packaging, product differentiation, novelty claims, name, effective uses of trade routes and markets and fairs, use of promotional tools in print.[50] By and large, the print media was a main route for advertising medical technologies.[51] Books became a medical commodity by themselves.[52] At the other end, access to medical technology – and information about it – designed varied routes: one surgeon could access to a saw for amputation at neighbour cutler. [53] 18c surgeons of Philadelphia could acquire their instruments at the apothecary who traded them overseas along with other medical commodities, or at a cutler, who could organize a lottery, in order to make a large profit over the sale.[54] Surgeons in Paris hospitals recycled sheets into lint.[55]

There was no single market for drug dealing or medical technology at large: medicines could be made and used at home, as can be accounted from recipe collections that survive, with sometime fairly large distribution networks.[56] They were also produced and used within small institutions, such as convents or hospitals:[57] in the hospice of the Académie royale de chirurgie, administrators turned to the help of apothecary assistant in order to cut down large bills drawn from an apothecary's shop.[58] Drugs were produced and retailed in a complex economy of healthcare, where private and public, commercial and non commercial were blurred. Yet, locating production and consumption sites may help understand innovations: 19c Birmingham charities, in that instance, nicely fitted the Schumpeterian model for innovation.[59] Domestic space was also a decisive of healthcare technology in the early modern and modern period.[60] Yet, the requirements of armies, charities for medical goods and equipments changed the scale of production and consumption. The hospital thus deserves special attention: early modern hospitals invited to economies of scale and thus access to a large number of therapeutic technologies – drugs, baths, surgical instruments, leeches, etc. – which could hardly be afforded by one practitioner or a partnership;[61] consumer of medicine, to a scale which involved new organizational and commercial technologies, it was also an important producer of medical technologies, actively discussing quality of patient consuming goods (milk, wine, etc.).[62] Indeed, maritime companies, such as the VOC, prompted new organizational technologies,[63] soon followed by other instances for provisioning courts, armies, navies, poor charities with apt equipment and services, with the role of 19c world fairs,[64] although part of the innovation process also came from small scale consumption, in noble homes, inviting to also reflecting on

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[49] Wallis, 2008.
[50] Haycock & Wallis, 2005; Gentilcore, 2006.
[51] Jones, 1996; Edmonson, 1997; Harkness, 2007; Horrocks, 2008; Curth, 2008.
[52] Fissell, 2007.
[53] BNF 4-T18121 (356), Pierret de Sansières, *Mémoire pour le sieur Antoine-Edme Callé, chirurgien privilégié à Paris, . . . contre Honoré Leullier, maître perruquier à Paris* (Paris: P. G. Simon, 1768),), p. 36.
[54] Edmonson, 1997.
[55] Académie de médecine (Paris), Ms 17, fol. 51.
[56] Pollock, 1993 ; Leong and Pennell, 2006.
[57] Lafont, 2010.
[58] Académie de médecine, ARC, fol.155.
[59] Reinarz, 2006.
[60] Leong, 2008 ; Marland and Adams, 2009.
[61] Risse, 1986; Wallis, 2006.
[62] Stanziani, 2003 &2005. Lemesle.
[63]Cook, 2007.
[64] Brown, 2009.

the chronologies and dynamics of change. Between the 18c and 19c century, the spread of the vaccine was caused by private networks and ad hoc decisions, while at other times it was the result of enterprises with close resemblances to contemporary centralized vaccination campaigns.[65]

Fitting for health, early modern technology defined medicine, as well as patients, practitioners, artisans and administration saw it fit for its purpose. By following individual items or commodity, historians can uncover the places, social networks and relationships which gave sense to medicine and healthcare in the early modern period. They also have better insight into the trading routes which fashioned early modern consuming societies.

[65] Chamayou, 2008 ; Bhattacharya & Brimnes, 2009 (special issue).