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The Medical Drug as a Technological Object

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Abstract: This article considers the medical drug as a technological object in order to determine what philosophy of technology can bring to the study of pharmaceuticals and what the study of medical drugs can bring to the philosophy of technology. This approach will allow us to locate the differences between the medical drug and other objects that usually form the focus for studies in the philosophy of technology, and to discuss the problematic fit of the models proposed in the field for pharmaceuticals. After reflecting on the origins of this problem in both the philosophy of pharmacy and the philosophy of technology, I propose an examination of medical drugs using an analytical schema developed by Andrew Feenberg. I expose several shortcomings of this 'post-phenomenological' philosophy of technology applied to medical drugs. Despite the various problems identified, I nevertheless argue that the philosophy of technology is useful for thinking about medical drugs, particularly because of the emphasis it places on the social and political dimensions of technology. In conclusion, I argue in favour of a more open, eclectic philosophical engagement with medical drugs that puts more emphasis on their economic, social and political dimensions.

Key words: medical drug, technological object, philosophy of technology, efficacy, paracetamol

In his 1958 book *Du mode d'existence des objets techniques*, the French philosopher of technology Gilbert Simondon illustrates his philosophical reflections with the aid of a handful of carefully selected examples, among them diodes, cathode-ray tubes, the windmill, the radio transmitter and the electric turbine (Simondon 2012). While nearly all these technological objects are now obsolete, they would still be respectable illustrations for a book on the philosophy of technology.¹ Heir to a nascent French movement in the philosophy of technology called '*mécanologie*' it would not have occurred to Simondon to cite a medical drug as an example of a technological object. For Simondon, as for the majority of philosophers and historians of technology, the archetypal technological objects are tools or machines--preferably, but not exclusively, machines with moving parts like the large pistons and cogs that serve as visual motifs to illustrate technology, images that have been present in the popular imagination at least since the beginning of the twentieth century.²

The field of the philosophy of technology has changed dramatically over the last forty years and is now dominated by studies dealing with computers, smartphones, robots, the internet, social networks, artificial intelligence and the software and algorithms behind them. Information technology has replaced steam as the paradigmatic technology attracting academic scrutiny. This move from steam to microchip as archetypal symbols of technology certainly makes sense in terms of historical evolution. Just as the first industrial revolution

¹ Some, like the windmill were selected precisely for their historical interest, while others like the diode were chosen because of their contemporary relevance (this book was originally his doctoral thesis, written in 1958).

² Charlie Chaplin finds himself working in the archetypal factory in his 1936 film *Modern Times*, which itself mirrors the futurist vision of the modern world seen in Fritz Lang's *Metropolis* (1927).

was driven by steam power, the post-industrial revolution has been driven by computing and robotics. But there is another revolution that has transformed our lives since Simondon wrote his thesis. Over the last fifty years, average life expectancy has climbed from around 50 to well over 70 years of age.³ This increased life expectancy is due, at least in part, to medical drugs used to treat and to protect against human disease. While it is hard to deny the importance (and ubiquity) of these medical drugs in modern life, studies of the objects themselves remain rare, and philosophical analyses of their nature as medical drugs are almost nonexistent. There is no recognized field of the philosophy of pharmacy, and as with many other medical technologies like organ transplantation or plastic surgery, philosophers tend to engage with pharmacy from an ethical or purely societal perspective rather than reflecting on its nature as a science or technology.⁴

With the goal of making a contribution to the philosophy of pharmacy, therefore, I want to consider the medical drug or medicament as a technological object.⁵ From the perspective of someone with a philosophical interest in pharmacy, an initial question is simply the following: does the medical drug fit the definition of a technological object? Assuming the answer to be yes, there is a corollary to this question: if it is indeed a technological object, why does the medical drug seem so out of place alongside the examples that usually come up in discussions of technological objects?

So what counts as a technological object in the modern understanding of the term? While there is no consensual ‘textbook’ definition of what constitutes a technological object, most of the attempts at providing such a definition emphasise the human intentional aspect of such objects, characterizing technology as any functional object that results from a human intervention guided by such intention. In his overview of the philosophy of technology, Carl Mitcham provides us with the following definition of ‘technology as object.’

Technology as object is the most immediate, not to say the simplest, mode in which technology is found manifest, and it can include all humanly fabricated material artifacts whose function depends on a specific materiality as such. (Mitcham 1994, 161)

Putting to one side the difference, if any, between technology as object and a technological object,⁶ we can say that, based on such a definition, it would be hard to refuse the status of technological object to a medical drug. To illustrate this point, I will take a relatively banal example: the tablet or pill form of a drug like aspirin or paracetamol, physical objects found in homes and hospitals throughout the world. We can see that a paracetamol tablet conforms to the definition cited above; it is a humanly fabricated material artifact, whose function (relieving certain pains such as headaches) depends on a specific materiality (the acetaminophen contained in the tablet). In a sense a paracetamol pill is a better example of a technological object than the oft-cited iron axe, as the material nature of the object (the paracetamol) is essential to the function whereas a ceramic axe, although maybe a little more fragile, could cut just as well as an iron one. Why, then, is it so hard to find any philosophical treatment of such pills or other drugs as technological objects? If we approach this question from the perspective of the philosophy of technology, I believe that the answer lies in the history of the field that I will briefly explore in what follows. Briefly, it has, as I have already suggested, traditionally been oriented towards industrial machines and more recently

³ <http://data.worldbank.org> – accessed 26 May 2017.

⁴ Even from the societal perspective, the most incisive analyses of medical drugs have been historical accounts such as the treatment of amphetamines by Nicholas Rasmussen (2009) or of anxiolytics by David Herzberg (2008).

⁵ In order to avoid ambiguity and confusion, I will use the term ‘medical drug’ throughout this paper although the term ‘medicament’ or simply ‘drug’ would be more appropriate in certain contexts.

⁶ For Simondon, there is doubtless a significant difference, as his principal goal was to understand the unity of the object rather than the sense of technology.

computers and other digital technologies, an orientation that excludes pills, syringes and suppositories. This blind spot is further compounded by the development of the philosophy of pharmacy along the lines of other areas in the philosophy of science. Thus, attempts to philosophize about medical drugs have tended to sideline their existence as objects in favor of thinking only about the active ingredient, and this exclusively in terms of its physiological effects.

To illustrate the second point, concerning the approach to drugs adopted by the philosophy of pharmacy, I will consider François Dagognet's (1964) book on 'remedies,' *Reason and Remedies (La raison et les remèdes)*. In this book, Dagognet, a well-known French philosopher, develops certain theses in the philosophy of medicine concerning a range of remedies, including surgery. He foregrounds a selection of medical drugs (hormone therapies, antibiotics and anti-coagulants) in his discussion. The attentive reader quickly understands, however, that Dagognet is not so much interested in the medical drug as an object as he is in its physiological effects, and leaves the material nature of drugs out of his analysis. In his treatment of anticoagulants, for example, Dagognet never once refers to a specific brand or formulation of a drug; for him, dicoumarol is a physiologically active compound that prevents blood clotting, and his analysis turns around the mechanism whereby the drug disrupts blood clotting. It is, therefore, ironic that despite an introductory analysis of the placebo effect that underlines the complexity of drugs and the global nature and irreducibility of their action, when it comes to deploying his philosophical analysis Dagognet equates drugs with their active ingredients and in turn limits his analysis of these molecules to their physiological activity. That being said, his examination of the pathways of drug action and the synergic relations between different products sets his contribution apart in a field dominated to this day by the treatment of the ethical issues surrounding drug prescription and use.⁷

The tendency of philosophers – on the rare occasions that they do think about drugs – to pass directly to the level of the physiological activity of the active ingredient leaves no room for discussions of pills, suppositories, powders or injectable liquids as technological objects. Conceiving of a suppository or a pill as two interchangeable vehicles for delivering a specific substance (the active ingredient) into the human metabolism excludes the possibility of any philosophical discussion of the material form and mode of administration of the drug. Thinking about a pill as a technological object forces us to consider the drug's form and the particularities of its use. The same argument can be made concerning the social, economic, legal and even political integration of medical drugs into our society—issues that Dagognet does not address at all. We would never find philosophers considering cars as invisible or insignificant vehicles for propelling human beings at a certain velocity. According to this logic, there would be no significant difference between an airplane and a motorbike, a premise that few philosophers of technology would accept, but equally few would see the interest in distinguishing between the injectable and tablet form of penicillin.

From a wider disciplinary perspective, I believe that the absence of medical drugs from the purview of the philosophy of technology is due in large part to the history of the discipline. Today's philosophy of technology is closely aligned with the phenomenological tradition in philosophy, what in American universities is usually loosely classed under the heading of 'continental philosophy', in opposition to 'Anglo-Saxon' philosophy of science which has followed a more analytical, empiricist path. Inspired at its roots by the writings of Karl Marx

⁷ The claim that there is a distinct subfield of philosophy of pharmacy is hard to support in light of the dearth of publications on the subject. Even the more active field of pharmaceutical ethics is not very extensive.

and Edmund Husserl, it is not surprising that contemporary philosophy of technology should have turned to industrial machinery as its model for what constitutes a technological object.

The history of the field has meant that the examples and models of technological objects have been of two types. First, the classic illustrative examples (the stone bridge, the iron axe) have served as a point of entry for thinking about the machines that have transformed the modern world in the period of industrialisation in the nineteenth and twentieth centuries. In the course of the twentieth century, the analysis has broadened from the machines used for industrial production to the products themselves, the second type of object. The most common example of this kind of object today is probably the smartphone, followed by the computer and modern means of transport such as the car or airplane. As I have already remarked, examination of the table of contents of a journal in the philosophy of technology or the programme of a recent conference in the field will immediately reveal the dominance of computing-related objects, particularly smartphones, robots, drones and other ‘intelligent’ artifacts.

If the reader accepts the idea that a medical drug qualifies as a technological object, I can now go on to ask what a philosophical treatment of this kind of technological object should look like. Moving on to this stage raises the subsidiary question of what the philosophical treatment of any technological object does or should look like. As I have already suggested, contemporary philosophy of technology is dominated by the intellectual heritage of Karl Marx and Edmund Husserl, with prominent positions given to Martin Heidegger and members of the Frankfurt School. Despite this common heritage, philosophers of technology have consistently failed to establish either a consensual approach or any shared conception of the field. Indeed, some have argued that the political orientation and motivations of much philosophy of technology have stood in the way of putting any such foundational principles in place.⁸ Rather than reviewing at length the approaches that have been proposed up until now, I want to consider as an example a piece of scholarship from the prominent contemporary ‘post-phenomenological’ school: a concise conceptual framework laid out by Andrew Feenberg in his book, *Questioning Technology* (1999, 202-207). Here, Feenberg presents a schema, clearly informed by the Heideggerian school of phenomenology, consisting of eight interrelated elements, divided under the headings of primary and secondary instrumentalization—intended, as the author explains, to inject more of the social into philosophical reflections on technology. The process of primary instrumentalization covers the less social and more ‘technical’ side of the technological object and includes four analytical elements, starting with decontextualization or de-worlding, the separation of the raw material from the natural world. Decontextualization is followed by reduction, a transformation of the properties of the material in its naturally occurring state into those that make it useful in fulfilling the function for which it is ultimately intended as a technological object. The third element is that of autonomization, which involves making the object independent in its action on the world. The last aspect of primary instrumentalization is ‘positioning,’ which concerns the relationship of the object to the user or consumer.

Secondary instrumentalization opens up onto the more social aspects of the technological object. The first category, systematization, concerns the integration of the object into a global technological system and how its use fits in with the deployment of other objects within a network.⁹ Feenberg characterizes the second element – mediation – as ornamentation, and suggests that this is where we encounter the ethical meaning of the object. The third aspect of

⁸ For a global and optimistic critique in this sense, see Light and Roberts (2000), where the authors cite, among other things, the ‘paradox of continual beginning’ outlined by Elizabeth Ströker (1983).

⁹ Here Feenberg refers to the writings of Bruno Latour (1992), but it is also pertinent to think of the work of Thomas Hughes (1998) in his analysis of large technical systems.

secondary instrumentalization is vocation, which invites us to consider the effects the object has on those who use it. Finally, Feenberg proposes a category of ‘initiative’: here, he suggests, we can locate the room for manoeuvre left for the endusers, who are too often seen as being subjugated by if not the victims of technologies.

As we can see from the last two categories, Feenberg’s model orients the analysis in a certain political direction. Feenberg believes not only that technology use can be subverted, making it possible to resist the dominant powers that exercise economic and political control over it, but also that such subversion is essentially a good thing. This orientation clearly makes sense for Feenberg’s studies of the internet, where dominant groups seek to impose a standard usage through design in order to further their ultimate goals (profit, market-share, monopoly etc.). The situations that have attracted Feenberg’s attention are those in which local users confound the designer’s intentions by using the technology in alternative, more liberatory ways.

Thinking about drugs in similar terms, it is not hard to identify issues involving the subversive use of medical drugs.¹⁰ (and, of course, non-medical drugs, but this is not my subject here. While the issues of prescription drug abuse or off-label use are interesting ones, this kind of subversion does not share the positive political connotations associated with subversions like the development of horizontal user-groups or open-source software that philosophers of technology are so fond of. Consider a drug like Ritalin®, an amphetamine derivative commonly used to treat ADHD (Attention Deficit Hyperactivity Disorder) in children. Many critics claim that the drug is dangerously overprescribed, representing a veritable public health problem, particularly in the US (Chan, Dennis, and Macleod 2012). Furthermore, the drug is widely abused, particularly by young adults, in order to improve intellectual performance. This latter, non-medical use of Ritalin® has attracted the attention of philosophers working on enhancement (Outram 2010). But these two philosophical interrogations – concerning on the one hand the potentially excessive use of the drug to treat ADHD and on the other its off-label use to enhance intellectual performance – are quite independent of one another; the first criticism is directed against the excessive use of the drug in the clinical setting, while the second interrogation has been triggered by the voluntary consumption of the drug for recreational purposes or to improve one’s test score.

Be that as it may, applying Feenberg’s schema (or at least a loose interpretation of it) to a medical drug, has allowed me to identify some key considerations in the conceptualization of drugs as technological objects. I will continue to use the example of the paracetamol tablet to see where a deployment of this schema might lead us. Thinking first about primary instrumentalization, the part of the analysis that covers the conception and fabrication of technological objects, we can see that medical drugs are very similar to any other manufactured goods such as cars or computers. Drugs like paracetamol or aspirin are produced chemically from raw materials. This is the case for the excipients as well as the active ingredients, which are generally the only physiologically active components.

If we consider the American drug *Regular Strength Tylenol*®, for example, the acetaminophen (paracetamol) – the active ingredient – is produced by chemical synthesis, while the majority of the excipients (magnesium stearate, modified starch, powdered cellulose, pregelatinized starch, and sodium starch glycolate) are purified from vegetable extracts.¹¹ The ingredients are combined together in a tablet form with special attention being paid to the amount of acetaminophen in each tablet (324 mg). This production process can be

¹⁰ Of course, the use and abuse of non-medical drug, particularly those that are illegal, is a huge and fascinating domain of study, but here I am only considering medical drugs.

¹¹ <https://www.tylenol.com/> - accessed 15 July 2017.

understood in terms of decontextualization and reduction, with the raw materials transformed chemically and then mechanically to produce a particular advantage for the user. But while the user's advantage is easy to see and even to measure in the case of an automobile (an object that allows people to travel faster than walking or running) or in the classic mechanical examples of the lever or pulley (which allow a person to lift heavy objects with less effort), it is less clear what such an advantage might be in the case of a medical drug. Here, I propose efficacy as the appropriate concept to express this sense of advantage.

In general, a drug's efficacy is considered to be its capacity to treat or prevent an illness or disease. In order to establish this efficacy, comparable individuals suffering from the same disease (raised blood pressure, headache, etc.) are divided into two groups, one of which is treated with the drug under consideration, and the other with a standard treatment or with a placebo. The difference in the evolution of the disease condition between the two groups is taken to be a measure of the drug's efficacy. This is the principle behind a clinical drug trial, which is used to determine a drug's efficacy understood as the advantage that the drug provides to the person who takes it in terms of improving the disease condition compared to the functioning of the unaided body under similar circumstances.

While the lever and pulley makes us think of mechanical advantage, a concept relatively easy to understand and quantify, efficacy is not such a readily accessible concept. Compared to physically lifting a weight off the floor, a pulley with two wheels allows a person pulling a rope to raise the same weight half as high using half as much force over the same time; it gives her a mechanical advantage of 2. Taking a 325g tablet of paracetamol in principle allows someone to get relief from their headache more quickly than if she or he had not taken it. While we might be able to agree that this is a desirable outcome, how could we quantify this advantage on the model of its mechanical equivalent, much less theorise it, particularly in light of the variability of individual responses?¹²

Indeed, in medicine (whether in the context of training or of practice) little time is spent on the conceptual definition of efficacy, which is globally considered to be the capacity of a drug to cure a disease, improve a patient's condition or prolong his or her life. Instead, the training of a medical professional passes quickly on to the appropriate methods for evaluating the efficacy of drugs--that is to say, to the conception, execution and statistical analysis of clinical trials. It is the results of these clinical trials that are used to establish the various figures that define a drug's efficacy.

To tie up my consideration of primary instrumentalization, I now want to turn to positioning, which concerns the position of the subject with respect to the technology. Considering the consumer of medical drugs invites us to think about the complex economics of the multitude of different healthcare systems around the world that form the context for the obtention and ingestion (or not) of these objects. One way to approach this issue is to ask where and how paracetamol, to stick with this example, is produced and where and how it is delivered to the consumer. As the responses to these questions depend almost entirely on the national healthcare system of the country in question, I will limit myself to a few examples. In the US, Tylenol® is just one brand of paracetamol produced by a private pharmaceutical laboratory (Johnson and Johnson) under the indirect supervision of a government agency (the Food and

¹² Today, scientists tend to put the emphasis on the molecular mechanism of action offering explanations in terms of receptors and targets. But the identification of a mechanism provides only a very partial answer to the question of the nature of efficacy. The concept of effectiveness provides a pragmatic alternative to efficacy as it takes into account the real circumstance of the drug's use and not just a theoretical drug-response relationship. While ultimately this effectiveness might be what should interest the health professional in the field, for the sake of a philosophical analysis efficacy will be more useful as a first approach. This will avoid the treacherous conceptual ground of disposition or affordance before it is necessary.

Drugs Administration (FDA)). Tylenol® is distributed and sold through the hospital system or directly to the patient in drugstores or in generalist supermarkets. While in the US, the patient pays for such drugs, the patient's health insurance (whether public or private) can influence the conditions under which the drug is bought (as well as the price that is paid). Tylenol® is not sold in Britain, but there are a multitude of other brands of paracetamol which are sold in pharmacies, corner shops and supermarkets (Pfizer's Anadin® is probably the best known name-brand product in the UK), and generic paracetamol is even sold under supermarket brand names such as Tesco or Waitrose. Only the paracetamol sold in pharmacies, however, can be paid for by the National Health Service, Britain's public social security system. In France, paracetamol is sold under different names again, with Sanofi's Doliprane® leading the sales among name-brand products. Unlike in Britain or the US, however, the sale of paracetamol in France is strictly limited to pharmacies. While the purchase of paracetamol no longer requires a doctor's prescription, a prescription is needed if the patient wants the cost to be reimbursed by the French social security system. From this greatly simplified overview of the positioning of paracetamol in just a few different countries, we can see that the categories of primary instrumentalization already lead us into complex social, economic and legal considerations that depend on state-supervised structures governing the testing, production, sale, and consumption of medical drugs produced by private companies.

The categories of secondary instrumentalization confront us more directly with the socio-political aspects of technology, providing ample material for thinking about the place of medical drugs in the modern world. The medical drug is much more closely monitored than the majority of technological objects that serve as examples for philosophers; moreover, it constitutes a legally defined category overseen by dedicated agencies. European law provides a definition of a medical drug and demands that every drug receive a marketing authorisation.¹³ The European Medicines Agency (the EMA, the European counterpart of the FDA with respect to medical drugs)¹⁴ can grant or refuse such authorisations, as can the appropriate national agencies of member states. This system of marketing approval means that every country has its list of officially approved medical drugs, and we could use this list to provide an extensional definition of medical drugs (in any given country). It would be nice to think that such a list would correspond with the intentional definition given by that country's legislation, but this is never going to be the case. The basic reason is that the term 'medical drug' does not signify any natural group of substances that exists as a group independently of regulatory decisions. It is more reasonable to think that our identification of medical drugs defines what it is to be a medical drug rather than revealing an essential common property shared by these different substances. To justify this nominalist approach to the nature of medical drugs we need only consider the substances that lie on the borders between medical drugs and food, or look at the history of substances that have moved in and out of the group of medical drugs. Historically, chocolate, like alcohol and heroin, was considered to be a medical drug in the past. Certain quantities of vitamins are considered medical drugs under local legislation in different countries. At the border between medical drugs and food, we find the growing sector of 'nutraceuticals' or 'functional foods'. Understood as food that is particularly good for the consumer's health, functional foods do not require the same marketing authorizations as medical drugs, but manufacturers of such foods. In return manufacturers are not allowed to make explicit claims about the medical virtues of their products. The occasional court cases launched when pharmaceutical

¹³ European legislation uses the term 'medicinal product'; for the definition of a medicinal product, see directive 2004/27/EC of the European Parliament and Council dated 31 March 2004.

¹⁴ <http://www.ema.europa.eu/> - accessed 14 December 2018

laboratories contend that food producers have not respected the demarcation between food and drugs help to chart out the uncertain conceptual frontier between the two.¹⁵

Returning to Feenberg's schema, I have already discussed 'initiative' which, I argued, is a category conceived with quite different technologies in mind and has less clear-cut political implications when applied to medical drugs. However, systematization, or the integration of the object into wider technological, social, and political systems, opens up a range of possible approaches. We have already seen some of the systems in which medical drugs function: a healthcare system that may or may not influence the cost of and means of payment for medical drugs, and a legislative system that may or may not grant a monopoly to a specific group for the sale of medical drugs. Like many other objects that directly relate to human health (implants, syringes, ambulances), medical drugs are more closely monitored and more tightly regulated than most consumer goods, and the associated structures like health management and pharmacovigilance systems contribute to the nature and functioning of these objects.

The distinctive identity of drugs also depends on a range of more banal technologies. Just thinking about the packaging of a medical drug allows us to see a variety of technological systems brought into play directly in their production and distribution. Few people have any difficulty identifying a packet of medical drugs just from its appearance. The packaging is characterized by a certain sobriety (to underline the product's serious and scientific nature, following the same logic that guides the invention of scientific-sounding commercial names). This effect requires elaborate packaging and printing techniques, with expensive name-brand products often featuring a sophisticated hologram as a method for product authentication (which also stimulates brand awareness). Pills are usually blister-packed with the brand name printed on the smooth metallic surface. The blister packs are inserted into distinctive cardboard boxes, accompanied by a mandatory information sheet. This neatly folded piece of paper is meant to inform the patient about the drug, its appropriate use and the known side effects. The text is very carefully worded not only to satisfy legal requirements but also to promote the product and to pre-define the expected undesirable side-effects. Manufacturers know that this information can and will be used against them in case of litigation. Without all this packaging and printing, the consumer would not have the same perception of the medical drug. Indeed, a packet of paracetamol that looked like a packet of sweets would be unacceptable to patients, manufacturers and state authorities alike. Furthermore, high capacity, high tech factories (increasingly located in China or in India) deploy advanced machinery to produce and package tablets and liquids in extremely hygienic conditions, with human intervention reduced to an absolute minimum.

I could go on, but suffice it to say that medical drugs exist only as they are inserted into a whole ensemble of systems—not only technical, but also legal, economic, social and political. Even before consulting with a medical professional, people in most countries have already come into contact with the world of pharmaceuticals whether they are aware of it or not. The whole population, sick and healthy individuals alike, is exposed to a range of material from traditional advertising campaigns to articles in magazines or in social media. While this material, be it print, images or video, often stresses the need for newly marketed drugs in order to treat certain conditions (the common cold, hepatitis, etc.) it is not necessarily aimed at promoting the sale of such drugs. At the level of advertising, the state-funded campaigns against the excessive prescription of antibiotics, for example, contrast with

¹⁵ In 2010, a high-profile case was brought against Danone concerning their Activia® range of yogurts. In the settlement, Danone was required to specify that Activia® yogurt was a food and not a treatment or cure for any medical disorder or disease, see <https://www.ftc.gov/news-events/press-releases/2010/12/dannon-agrees-drop-exaggerated-health-claims-activia-yogurt> - accessed 10 September 2017.

high-profile promotional campaigns by manufacturers, such as the massive advertising campaigns in the US for Prozac®, Cialis® and Viagra® and other blockbuster drugs. These presentations of drugs are linked in to prescription practice and serve to situate these objects in the public consciousness even before citizens become consumers of medical drugs. But drug advertising is maybe better placed in the category of mediation than systematization.

In presenting the concept of mediation, Feenberg writes that “ethical and aesthetic mediations supply the simplified technical object with new secondary qualities that seamlessly embed it in its new social context” (Feenberg 1999, 206). Here he makes a reference to Heidegger’s example of the chalice used for communion, and so we can suppose that mediation concerns the sense that such an object assumes for its users, perhaps far from the original function for which it was created. It is clear that medical drugs have very different meanings not only for different consumers but also for the different actors in the health system. Lopressor®, a beta-blocker used for reducing blood pressure, doubtless has a different meaning for a Novartis executive than it has for a patient suffering from high blood pressure, or for the doctor who prescribes the drug. At the risk of oversimplifying, I would say that the Novartis employee sees the drug as a means for developing the company’s business, the doctor as a means for prolonging the life of the patient, or at the very least for doing something in the face of arterial hypertension, and patients usually see drugs as a way to treat their disease. More than this, however, the medical drug integrates doctor, manufacturer and patient into a complex medical system and assumes its meaning in the context of a number of shared conceptions about life, death, health, illness and disease, and the appropriate way to respond to a medical condition. There are some patients who see drugs as life-saving modern miracles and others who consider them only in terms of their unpleasant side-effects. Indeed, there are many (although doubtless a minority) who resist, if not reject ‘modern’ drugs and who instead prefer using ‘alternative’ methods of healing or simply refuse drug treatment altogether.

This reflection leads us on to the category of vocation, which concerns the way the user of a technological object is drawn into social, economic or even political relations through its use. The use of medical drugs has become central to how individuals are integrated into a modern industrial healthcare system. Critics of this kind of system accuse it of ‘medicalisation,’ transforming normal and healthy life events into medical conditions in need of medical surveillance and treatment (Conrad 2007). In this critical discourse, drugs and the pharmaceutical industry feature high on the list of those implicated in, if not responsible for, these developments (Illich 1975). We only need to consider those who refuse to take ‘industrial’ medicines at all and will only use ‘natural’ remedies to see how the pharmaceutical industry and its products are inextricably associated with mainstream scientific medicine. This rejection of ‘industrial’ drugs highlights the situation of medical drugs as symbols of the modern industrial world, and in so doing confirms their place at the centre of the modern medical healthcare system.

For Feenberg, vocation and initiative form a pair of concepts that characterize people’s stance with respect to technological objects. While these objects clearly contribute to who we are, influencing our physical and mental behaviour in innumerable ways, they are also the products of human endeavour, and people have room for manoeuvre both individually and collectively with respect to their reactions. Acceptance, conformity, refusal, deviance are just a few of the possible stances one can adopt. Medical drugs and their use are integral elements of the way we live in modern society. Choosing to take flu medication in order to avoid having to take days off work is just one example of a modern behavior that depends on medical drugs; reciprocally, this kind of social demand is doubtless a driving force behind the development of certain antipyretics. The availability and perception of medical drugs

influence our behaviour just as our behaviour in turn influences what drugs are developed and how they are used.

CONCLUSION

In this article, I have used the categories proposed by Feenberg in *Questioning Technology* to analyse medical drugs as technological objects. It was never my intention to test Feenberg's schema in any profound sense, but rather to deploy these categories to guide my analysis of medical drugs and see where this led. To assess the value of this approach, I want in conclusion to consider not only what it brings to our understanding of medical drugs but also the potential benefits that analysing medical drugs in this way can bring to the study of other technologies.

I was led to consider some important aspects of medical drugs that are rarely dealt with in the philosophical literature, such as the influence of marketing and legislation on the conception, circulation and perception of these products. The breadth of these considerations gives us an analytical advantage when compared to classic philosophy of pharmacy, which tends to reduce medical drugs to the physiological function of their active molecules

Approaching the question of the value of this enquiry from the other direction, we can ask what the philosophy of technology stands to gain from this analysis. One obvious payoff would involve the extension of this approach to a number of other products that have remained outside the purview of philosophy of technology, in particular food, cosmetics and narcotics.¹⁶ As I have already suggested in my discussion of nutraceuticals, the frontiers between these categories, although formalized and regulated, remain unclear in practice. The very abstract definitions of medical drugs only get properly fleshed out in the context of the legal enforcement of what counts as a medical drug and what does not. Objects can change category as a function of political geography or time, a phenomenon that can be seen in many other areas of technology. Thus, the constitution and functioning of frontiers between categories, on the model of food versus drugs, represents another potentially fruitful domain of inquiry for philosophers of technology. The approach outlined in this paper can help us to analyse these mechanisms in action. For example, ecstasy (3,4-methylenedioxymethamphetamine) resembles paracetamol quite closely up to a certain point in terms of its primary instrumentalization, and yet the mechanisms of secondary instrumentalization radically differentiate them, inscribing them in divergent networks of regulation, marketing, sales and consumption, systems in which one is an illegal recreational drug, the other a medical drug. Transposing this interrogation onto more mainstream subjects for the philosophy of technology, like weapons or surveillance systems, can help us think about other categories of technological objects separated by shifting frontiers.

It turns out, however, that some of Feenberg's analytic categories are difficult to apply in the case of medical drugs, notably 'initiative' and 'positioning'. Another criticism I would offer in light of my treatment of medical drugs is that the single category of systematization is too limited in light of the large number of aspects that need to be taken into account. A finer-grained analytical approach would better account for the integration of drugs into different technological, social, economic and political systems than lumping them together under the general heading of systematization. Indeed, the influence of the different stakeholders in the definition and use of medical drugs leads us to reflect on practices as diverse as medical

¹⁶ I use this term here in the American legal sense to cover illegal drugs generally used for recreational purposes and often highly addictive.

prescription and political lobbying, and these are just some of the ways in which different groups influence these objects.

In light of the fact that Feenberg proposed this analytical schema as a very tentative project, it is not surprising that it would need to be elaborated in practice through its application to different domains in order to gain robustness. But the difficulties I encountered in applying this schema were not all of the order of ‘teething’ problems. These difficulties were often conceptual, and linked to the political and philosophical preconceptions that lie behind this post-phenomenological approach. This schema, like many other approaches in the field of the philosophy of technology, is constructed around a particular vision of Marxist or post-Marxist political philosophy, with a focus on the subversive use of technology to resist the strategies of domination put in place by the ruling elite. It is not that I am opposed to this project: quite the opposite. However, the orientation that it gives the analysis is not, in my opinion, the most pertinent for understanding the place and function of medical drugs in society. Nevertheless, despite any weaknesses it may have, the application of Feenberg’s schema does support my more global hypothesis that thinking about a medical drug as a technological object allows us to better understand its insertion into society and the modern economy in very concrete terms, and carries us beyond the classical philosophical vision of a drug as a transparent medium for delivering a physiologically active chemical compound to the body. My contention, however, is that we can think about these aspects of the drug as technology without limiting ourselves to the categories of secondary instrumentalization.

Because of this, I would recommend an open approach that draws on a range of sources, as much on science and technology studies as on the philosophy of technology. Regardless of approach, I would like to insist on the importance of taking into account the social, economic and political insertion and meaning of drugs in any attempt to understand what they are.

The intent of this article was to determine whether there was any value in thinking about medical drugs as technological objects. My conclusion is that, clearly, there is. But the question remains of how best to analyse these objects. Current trends in the philosophy of technology give us a promising entry into the issue, but the analytical schema adopted in the present article is not entirely satisfactory. Once again, I would advocate a more pragmatic, eclectic approach.

Finally, to return to my initial remarks, I believe that the fact that a medical drug does not fit with our intuitions of what counts as a technological object is not a reason to reject this approach, but should instead incite us to interrogate and revise these intuitions. Medical drugs deserve a place in the philosophy of technology and, moreover, are important enough elements of our modern society and its economy to merit more careful philosophical consideration than they have so far received.

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