Revue *Hybrid*, n° 3

« Digital Cultures: Alternatives »

Deciphering the *Design* of Digital Technologies. A Challenge for a More Reflexive Digital Culture?

Clément Mabi

Clément Mabi is associate professor in Information and Communication Science at the University of Technology in Compiègne (UTC) and member of the Costech laboratory. His current research focus on political uses of the digital and relations between technological innovations and democracy.

Abstract

In order to follow digital developments in a critical way, it seems essential to contribute to the production of a speech that can summarize power relations regarding digital tools and contribute to raise awareness of the necessity to take a reflexive and critical look on its sociotechnical environment among the citizens. To do so, we propose to open the "black box" of tools, to consider their conception logics in a critical way. Here, technology design is thought as the process that "make a political project become technological" and broadcasts some sort of "digital governmentality." By focusing on the concrete analysis of technologies, it is necessary to put emphasis on the way they guide, set boundaries and configure practices by defining possibilities of action, which are then more or less updated in use.

Keywords: civic reflexivity, constraint, design, digital culture, digital governmentality

Full text (PDF file)

Introduction

The development of digital technologies is often seen as inevitable yet providing many advantages. It is presented as a source for the renewal of democracy which would thus be "updated," for a radical transformation of

education, especially through the development of Moocs and of a variety of distance learning methods[1], not to mention the new work forms it introduces[2], or the changes in the cultural industries which it induces.[3] Yet, the wide plurality of its uses and political projects is largely concealed by the use of this unique label, "digital," which prevents one from considering diversity from a critical perspective.[4] Throughout its development, the discourses surrounding the digital have put the emphasis on the development of an "information society," or a "digital culture," an emphasis that has contributed to make the colonization of society by these technical devices appear as natural and "self-evident," as both the bearer of progress and the source of social, political and economic innovations.

Human and social sciences are largely involved in that movement, as they contribute to standardize the technologization of our societies through the proliferation of the studies focusing on the issue of appropriation, which consider the digital technologies as "already here," as unavoidable. Our very disciplines seem to be more and more submitted to the digital imperative, as shown by the late enthusiasm aroused by the development of "digital humanities."

If some condemn the development of the Internet and the digital as the triumph of an imperialist and predatory liberalism serving a few private and governmental interests, especially American ones[5], it feels essential to us to propose another discourse which may give an account of the power relations that start to emerge with regards to digital tools, and that could contribute to raising the citizens' awareness of the necessity to look upon their socio-technical environment from a reflexive and critical perspective. In this respect, tools are considered as technical objects, introduced into a social environment, a force field, affecting both their development and the uses they allow.[6] This reflexive dimension seems to us to be at the heart of a "digital culture" capable of escaping the ruts of evidence and unveiling the political project these technologies are a part of. Since the digital deeply transforms the way we live and think together[7], it is crucial that we do not let the mastery of its design to "those in the know" for they defend interests

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1 Françoise Thibault, "Campus numériques: archéologie d'une initiative ministérielle," *Études de communication*, special issue ("L'intégration du numérique dans les formations du supérieur"), 2007, p. 17-48.

2 Cardon Dominique and Antonio A. Casilli, *Qu'est ce que le digital Labor?*, Paris, Inathèque, 2015.

3 Pierre Mœglin, *Outils et médias éducatifs. Une approche communicationnelle*, Grenoble, Presses Universitaires de Grenoble, 2005.

4 Clément Mabi and Françoise Thibault, "Les politiques du numérique. De la nécessité d'une approche critique," *Socio*, no. 4, 2015, p. 89-103.

5 Evgeny Morozov, *Pour tout résoudre, cliquez. L'aberration du solutionnisme technologique,* Paris, Éditions FYP, 2014.

6 In this perspective, we are in keeping with Françoise Thibault's works and the Vox internet program, conducted by Françoise Massit Folléa, which aimed at studying the governance of the Internet through the analysis of the socio-political layer of technological management.

7 Fabien Granjon, "Du pragmatisme et des technologies numériques," *Hermès*, no. 73, 2015, p 219-224.

that are remote from the democratization ideal of the initial network project.[8]

In order to do so, we offer to open the "black box" of the tools, or in other words to adopt a critical approach to the logics of their design and the way they determine the possible uses. Our proposition is to take the *design* of technologies into consideration, defined as the process of technologizing a political project that would contribute to the distribution of a form of "digital governmentality."[9] By focusing on the concrete analysis of technologies, is the point is to bring out their symbolic dimension, namely through a reflection on the way they guide, drive and configure the practices by setting up action possibilities, which are then more or less updated as they are used. What are the messages conveyed by the designs as they make technical decisions to develop a normative understanding of action and to manage the relationship?

In this case, power does not lie in the capacity to prevent an action, but rather in the way action will be constrained by inviting the user to comply with the prescribed norm. For instance, this is what happens with the *Apple* operating systems which completely configure the use of their users' computer (notably by forcing them to listen to music exclusively *via* their iTunes application, thus pushing them to buy a maximum of tunes on its online shop). One can also mention the Twitter application which, by limiting expression on the social network to 140 characters, invites users to share hypertext links in priority.

Therefore, my proposition focuses on the way technical devices standardize action, although the technical device is not considered as the sole constituent of social use. As shown by the sociology of uses, "users" have more or less leeway to change the initial project to a variable extent.[10]

1. Tools that configure power relations within a digital environment

One of the specificities of action in the digital environment is that it allows for the organization of various ways to control action and power relations. Together with two colleagues, Romain Badouard and Guillaume Sire, we propose the notion of "digital governmentality" to describe how, on the Internet, some stakeholders guide, drive and compel the behaviors of other stakeholders through technical resources, with a view to of serving a predetermined strategy. We have named these three forms according to how the governing party influences the behaviors of those who are governed: to incite, to compel, to drive.[11] When talking about the forms taken by the

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8 Dominique Cardon, *La Démocratie Internet,* Paris, Seuil, 2010.

9 Romain Badouard, Clément Mabiand Guillaume Sire, "Inciter, contraindre, encadrer. Trois régimes de gouvernementalité numérique," Draft paper presented during the DEL network workshop, 12 February 2015.

10 Akrich Madeleine, "Les utilisateurs, acteurs de l'innovation," *Éducation permanente*, no. 134, 1998, p. 79-89.

11 Romain Badouard, Clément Mabi and Guillaume Sire, "Inciter, contraindre, encadrer. Trois régimes de gouvernementalité numérique," Draft paper presented during the DEL network workshop, 12 February 2015.

exercise of power in digital environments, one should not understand the anonymous domination of "machines" over "humans," but rather the power exercised among individuals, or groups of individuals, through tools, resources and digital devices, configured to "make their users act in a specific way.

Like any technique, the Internet constitutes "a tension between the will to widen the sphere of possibilities and the temptation to reduce the environment to a conditioned space."[12] This is why one should question the power relations by considering that possibilities and constraints are interrelated and that communication intentions are "tagged" in the digital ecosystem, both by the possibilities pertaining to the codes, programs, infrastructures and *design* of the tools, but also, because of the space in which the individual is located, by the skills of the individual, their interpretation patterns, the choices made by the creators of the tools they use, the applicable law and economic strategies which concern the individual. In other words, depending on the socio-technical context, the meaning of the produced statement is different, and the control over this environment thus constitutes an important power struggle. However, our perspective is not deterministic. Negotiations are possible, as well as digressions, re-appropriations, evasions. Not all actors can exercise a "power to act" and a "power to make one do," but all have leeway, albeit minimal, to change the course of the processes which concern them.

The notion of governmentality refers to Michel Foucault's works dedicated to the forms of power exercise. This exercise would lie in the capacity of one individual to influence another without using force. According to the philosopher, the evolution of logics and forms of the exercise of state power is apparent in the instruments used by public authorities to regulate the behavior of populations living on their territory.[13] Power can then become "empowering": it is not so much a question of prohibiting certain actions as authorizing others, and setting up the methods of their realization (authorizing the occurrence of an action *in a certain manner*). Some actors can "make use of things, i.e. use tactics rather than laws, or use a maximum of laws as tactics; make sure, through various means, that this or that goal can be met."[14]

When we use this notion of governmentality, which Roland Barthes humorously characterized as a "barbaric yet unavoidable neologism,"[15] we adopt a perspective according which the power is exercised rather than owned, and cannot be applied "merely, as an obligation or a prohibition, unto those who do not possess it; it invests them, uses them and goes through them."[16] The notion thus has the advantage of allowing one "to

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12 Bruno Bachimont, *Le Sens de la technique: le numérique et le calcul*, Paris, Les belles lettres, "Encre marine", 2010. p. 175.

13 Michel Foucault, *Sécurité, territoire, population. Cours au collège de France. 1977-1978*, Paris, Gallimard/Seuil, 2004.

14 Michel Foucault, *Sécurité, territoire, population. Cours au collège de France, 1977-1978*, Paris, Gallimard/Seuil, 2004, p. 103.

15 Roland Barthes, *Mythologies*, Paris, Seuil, 1970.

16 Michel Foucault, *Surveiller et punir. Naissance de la prison* [1975], Paris, Gallimard, « Tel », 1993, p. 35.

think the multiplicity of forms of power which act simultaneously, in interaction, in cooperation or against one another, winning or losing one over the other."[17] We here venture the hypothesis that in a digital environment, specifically the Web, the concept undergoes particular developments. While the architecture of the network is based on the interaction and contribution of the multitude favorable to a strengthening of horizontality, it remains characterized by great inequalities among stakeholders, which reinforces the relationships of socio-economic domination.[18]

The technical setup of the device plays a role in its domination mechanisms. The web metaphor should not suggest a smooth and unencumbered circulation of contents and individuals, where Internet users would simply be guided by their rational choices. The Web is a network, a web, which is structured around "control points"[19] which regulate the behavior of Internet users by managing this circulation. Some stakeholders, those who manage these control points, are thus in a position of domination over those who find themselves *compelled to* use them. Thinking in terms of "governmentality" allows one to question the way these control points, considered as socio-technical devices, more or less affect power relations by configuring the possible interactions among stakeholders. On the Web, the forms of power are diverse as they directly partake in the technical environment in which an action takes place. For us, governmentality is demonstrated in three ways. This allows us to analyze a great variety of actions (focus attention, produce and share content…) which aim at arranging this diversity by linking it to important government issues. How can one apprehend the "conduct of conducts" on the Web?

The first kind of governmentality is exercised through "incentives." We offer to give a communicational definition of incitement, to describe the way in which actions are guided in the different digital environments. On the Internet, we (eventually) incite others and are ourselves (obviously) *submitted* to certain forms of incitement, such as online advertisements and requests to perform an action (illustrated by the numerous orders to take action featured on websites.)[20] In this first kind of governmentality, the power can be found in the capacity that stakeholders have to predict and calculate, stakeholders who must anticipate the actions of others to achieve their ends. However, the leeway to take action, to question the framework, remains relatively important: incitement does not suffice to have an Internet user act, since they can always decide to click elsewhere… Guillaume Sire's work[21] on the relationship between Google and press publishers clearly

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17 Yves Cohen, "Foucault déplace les sciences sociales. La gouvernementalité et l'histoire du XXe siècle", in Pascale Laborier *et al.* (eds.), *Les Sciences camérales: activités pratiques et histoire des dispositifs publics*, Paris, PUF, 2011, p. 73.

18 YannMoulier-Boutang, *Le Capitalisme cognitif*, Paris, Amsterdam, 2007.

19 Yochai Benkler, "Degrees of freedom, dimensions of power," *Daedelus*, vol. 145, no. 1, 2016, p. 18-32.

20 Julia Bonaccorsi, "Approches sémiologiques du web," in Christine Barats (ed.), *Analyser le web en sciences humaines et sociales*, Paris, Armand Colin, 2013, p. 125-141.

21 Guillaume Sire, *Google et la production journalistique*, PhD thesis in IT and communication sciences, Université Paris 2-Panthéon Assas, 2013.

illustrates this kind of interaction: in order to be well referenced by the search engine, publishers must comply with a number of instructions that would ensure them the *best possible place*, with no guarantee to hit the first place. An incitement game thus begins: how long does one have to play by the rules to succeed? This logic, which is close to the theory of games, is at the heart of the liberal development of the Web: those who have the "power to do" give indications to the different stakeholders who "try to do," in order to foster competition and push everyone to go beyond the instructions so as to have an edge on their competitors.

One of the secrets of this method used on the Web lies in the algorithms that stakeholders preciously keep, specifically the GAFA (Google, Amazon, Facebook and Apple). With these powerful calculators which process great amounts of data, these groups provide their clients with increasingly customized services and establish power relations on the Web.[22] Other works have demonstrated that these calculators project a statistical representation of society on which we no longer have any control and which tends to "conduct our conducts" by altering the representation that the social body has of itself.[23]

The second kind of governmentality is that of "obligation," also widespread on the Web. In a digital environment, compelling a behavior often implies the setup of an opportunity to take action: for a technology to force a behavior, it must first render it possible, then ascribe it with a *modus operandi*, so that the action is performed in *a certain way*. The obligation should not be perceived as a prohibition, but rather as a channeling of the action, as a kind of empowerment. The exercise of the power will then be implemented in the design of the tool that will be used to perform the action: a software developer, for instance, exercises a power through the software setup which determines, at least partly, the shape that the software user's action *may* take. Depending on the software that we use (word-processing, presentation, spreadsheet), we write differently, simply because the writing capacities that we are provided with are not set up in the same way. A classic example would be that of *PowerPoint*, which offers a "template-based" writing type.[24] In this kind of governmentality, the technical device features a "script"[25] which imposes the prescribed use through its configuration. It is not so much a question of guiding the action than localizing it, modeling and managing its configuration, like riverbanks. While an individual subjected to incitement may choose to ignore it, the individual subjected to obligations cannot. Thus, unlike incitements, obligations do not depend on their interpretation. They are game rules that are set independently of the player and *a priori* of their action. The player has no other choice than to make do with them or leave the game.

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22 Dominique Cardon, *À quoi rêvent les algorithmes?*, Paris, Seuil, 2015.

23 Antoinette Rouvroy and Thomas Berns, "Gouvernementalité algorithmique et perspectives d'émancipation: le disparate comme condition d'individuation par la relation," *Réseaux*, vol. 31, no. 177, 2013, p. 163-196.

24 Yves Jeanneret and Cécile Tardy, *L'Écriture des médias informatisés. Espaces de pratiques*, Paris, Hermès-Lavoisier, 2007.

25 Madeleine Akrich, "Les utilisateurs, acteurs de l'innovation," *Éducation permanente*, no. 134, 1998, p. 79-89.

The third kind of governmentality identified is that of "supervision." Unlike the obligation approach, which relies on the use of tools to produce behavioral adjustments, this type of governmentality aims at defining standards for action that do not depend on the skills or equipment of the individuals whose conducts are *driven*. In other words, it is not so much a matter of offering modalities of action within a pre-existing digital environment, as of producing a new digital environment, regulated by its own codes, standards and norms. Operating systems constitute a good example of this type of digital governmentality. An operating system is no software that one can handle, it is rather an environment that regulates the way a user interacts with a program and browses contents, *via* an interface that is displayed on a terminal screen. Windows 8, Mac OS X or Ubuntu (Linux) are operating systems. They establish modalities of action and interaction within these environments: on Windows, Mac or Linux, a user will be given several possibilities to browse and use files and programs.

However, these three operating systems rely on similar interfaces, structured around three key elements: icons, which represent programs or folders, windows, through which users access programs or files, and the pointer, the cursor, which enables one to act on the icons and windows within these environments. These three elements constitute the frameworks for action, in the sense that they govern the field of possibilities within the limited digital environment of an operating system. In front of a computer screen, one can hardly act and see beyond the mouse, windows, or icons. However, these three elements are not "natural," for they correspond to a certain graphic representation of digital environments, promoted by Apple throughout the development of home computing, and which have been dominating the IT market since the 1980s.[26] This same logic can be found in the world of videogames[27], where the developer has total control over the environment in which the player moves. Game developers make choices that have a political dimension. This is the case for famous games such as the simulation game *Sim City*, which allows the player to build their perfect town, hence inducing a specific relationship to the environment, by providing infinite natural resources and by offering no development models favoring social diversity, let alone alternative economic models (such as degrowth or collaborative economy).

2. Tackling digital applications through the *design* of devices

These different approaches to power in a digital environment bring out the role of technical mediations in making the relations possible between different kinds of stakeholders, the ones who "make one do" and the ones who act. In order to analyze the logics behind the implementation of these relationships, we consider the materiality of these mediation spaces, by

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26 Benjamin G. Thierry, *Donner à voir, permettre d'agir. L'invention de l'interactivité graphique et du concept d'utilisateur en informatique et en télécommunications en France (1961-1990),* PhD thesis in Modern History, Université Paris-Sorbonne (Paris IV), 2013.

27 Mathieu Triclot, *Philosophie des jeux vidéo*, Paris, La Découverte, 2011.

treating them as socio-technical *artifacts* resulting from a complex process. This process involves a variety of stakeholders, with different strategic objectives that lead the object to embody a specific project. Therefore, we propose to consider the object as a "device" in order to reinstate its political dimension and capture the way it arranges power relations.[28] These devices are then analyzed based on their *design*, in order to account for the way the materiality of the object convey the ambitions of its designers.[29]

For the researcher, this approach consists in questioning the technical choices that are made so as to bring out their symbolic dimension: what do they tell us about their initial mission? The concept of *design* that we put forth is not restricted to the analysis of interfaces and their influence on action as "architexts"[30], rather it invites one to focus on the political project which made this project possible. This entry allows us to take the materiality of devices into account, starting from the choice of the type of expression, to the analysis of the symbolic dimension of the computer code, thus bringing out the social function of technical objects and the political models that they make available. This approach through *design* must allow for the capture of the designers' *intentions* and observation of "the technologization of a political project."[31] In other words, it is a matter of capturing the process through which the designers' strategies are conveyed by a technical *artifact*.

Bruno Latour refers to an "action plan" when describing the social projections onto a technical object, in order to identify what the designers want to "make the users do" by setting up a framework for the possible action. By favoring certain online communication forms over others, this technique gives tangible form to a specific model, by constraining the practices of the public. In the case of digital tools, this dimension is even more important as the technique entirely standardizes interactions, as mentioned previously. Thinking power relationships in terms of constraints management is specific to digital technologies that guide, drive and configure practices.

The objective is indeed to consider the integration of technique into a complex context – a kind of force field – which contributes to substantiate the digital for its stakeholders. To further objectify this phenomenon and confine it to something observable, Foucault's concept of "device" is crucial. By turning the *artifact* into a research object which takes its symbolic dimension into account, it allows to ascribe a complex reality, seemingly unrelated elements, with consistency.

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28 Laurence Monnoyer-Smith, "Le web comme dispositif: comment appréhender le complexe?", in Christine Barats (ed.), *Analyser le web en sciences humaines et sociales*, 2013, Paris, Armand Colin, p. 13-33.

29 Clément Mabi, "Analyser les dispositifs participatifs par leur design," in Christine Barats (ed.), *Analyser le web en sciences humaines et sociales*, 2d edition, Paris, Armand Colin, 2015, p. 33-37

30 For more information on this concept, see Emmanuël Souchier, Yves Jeanneret and Joëlle Le Marec (eds.), *Lire, écrire, récrire*, Paris, Bibliothèque publique d'information, 2003.

31 Romain Badouard, "La mise en technologie des projets politiques. Une approche 'orientée design' de la participation en ligne," *Participations*, no. 1, 2014, p. 31-54.

> What I try to identify with this name [i.e. device] is [...] firstly, a heterogeneous construct, including discourses, institutions, architectural arrangements, regulatory decisions, laws, administrative measures, scientific enunciations, philosophical, moral, philanthropic propositions, well: something said as well as unsaid. These are the elements of the device. The device in itself is the network that one can establish among these elements.[32]

The device thus includes a technical dimension, in the sense that it provides forms of expression; a pragmatic dimension, in the sense that it includes the interactions it allows; and finally a symbolic dimension, as it includes different meanings inducing different axiological scopes.[33] Enhanced by Gilles Deleuze's contribution[34], which emphasizes the "flights" of the device, this approach allows one to study the ability of the subjects, partaking in power relations, to go beyond the device and mobilize their resources to transform it and create a new one. From this Deleuzian perspective, power is no unsurpassable horizon, and the device can be escaped.

3. Toward a reflexive digital culture

Our awareness of the role of these mediations in the construction of our relationship to the digital seems to be crucial if we are to envision a digital culture that would be sufficiently reflexive to allow citizens to understand the obligations that weigh on their online actions. In this respect, one must acquire the means to decipher the operation of digital technologies, to analyze the message they try to convey. To do so, we propose to operationalize the analysis of the *design* of digital applications by inviting our readers to focus on certain points when they are confronted with an application such as a website.

1. **The tools that allow for the production of content.** Through these, the designers make certain actions possible and, in so doing, drive and guide them. These represent the user's "ability to act" and are essentially linked to the production and modification of content.[35] The choices in terms of the technical resources available to perform an action allow to show the nature of the relationship the designers wish to establish with users.

2. **The content layout and content mangement of the platform**. This is the way the sections are arranged and how they establish browsing paths, in order to guide users towards certain information or activities. Which content is highlighted? It consists in studying how the designers plan the browsing of the website and what visibility strategies they adopt.

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32 Michel Foucault, *Surveiller et punir. Naissance de la prison* [1975], Paris, Gallimard, "Tel," 1993, p. 63.

33 See the definition of these three elements in Philippe Ortel, *Discours, image, dispositif: penser la représentation,* vol. 2, Paris, L'Harmattan, 2008, which questions the relationship between arts and device. The introduction offers a full genealogy of the debates related to the conceptualization of the word "device" ("dispositif" in French).

34 Gilles Deleuze, *Foucault*, Paris, Éditions de Minuit, 1986.

35 Romain Badouard and Clément Mabi, "L'apprentissage du numérique théorique. Un levier pour les pratiques politiques en ligne ?," L'Harmattan, *Actes du 9ᵉ séminaire M@rsouin*, 2012, p. 313-325.

3. **The tools that allow the users to interact with one another**. The way the possibilities to share on the site (forums, comment sections, click-based support, etc.…) are designed. How is sharing made technically possible? This criterion allows us to imagine the way the designers have thought *a priori* the conditions for the emergence of a community in relation with the platform.

4. **The designers' methods of intervention**. This criterion prompts us to look, beyond technique, at the editorial resources (such as moderation policies) used by webmasters. The aim is to comprehend the methods for the webmasters' management and hosting of audiences, and the relationship that users have with a designated authority.

5. **How the public is addressed.** Meaning the texts and images which introduce the platform and its uses, and propose a certain acceptation. The editorial dimension is important too: images, logos, sentences and words calling to action are also resources that show how *a certain* idea of involvement is conveyed.

The goal of this grid is to raise awareness on the socially constructed dimension of the available tools, and to "give designers "a place," beyond the technical objects. The latter are put back into a "materialistic" perspective on power relations, according which the medium impacts the construction of meaning and sets up frameworks for the appropriation of contents.

Conclusion

In a digital environment, the way power relations develop is unusual. The context and method of action are entirely standardized through technique, which makes the user take action, in a certain way, depending on the digital application designer's project. We have tried to identify different types of action organization which would form a new governmentality regime, specific to the digital.

It seems to us that these three categories can be operationalized *via* an evaluation grid, with a view to decipher the functioning of technologies and to establish a critical and reflexive analysis. To do so, this article proposes an innovative method for the analysis of the *design* of digital applications, considered as devices, which allow for the expression of their materiality and to reinstate the symbolical and political dimension of the computer code. In this respect, the technical choices echo the designers' political intents.

The objective of our approach is also to open new ways for citizens to re-appropriate the concept of "digital culture" from a critical perspective and complement it with an important reflexive dimension. Our aim is to allow users to understand the functioning of their environment, to detect the place where power relations are negotiated and to *be aware* of their existence and how they develop. This deciphering work demand that users be enabled to "open the black box of the digital world," so that they understand the logics governing its operation. Far from implying that we could all become seasoned hackers, mastering the computer code like IT technicians, this approach tries to train alerted citizens, aware of the possibilities and limits

provided by technique. As one can notice, the issue is both scientific and civic.

Bibliography

Akrich Madeleine, "Les utilisateurs, acteurs de l'innovation," *Éducation permanente*, no. 134, 1998, p. 79-89.

Bachimont Bruno, *Le Sens de la technique: le numérique et le calcul*, Paris, Les belles lettres, "Encre marine," 2010.

Badouard Romain, Mabi Clément and Sire Guillaume, "Inciter, contraindre, encadrer. Trois régimes de gouvernementalité numérique," draft paper presented during the DEL network workshop, 12 February 2015.

Badouard Romain and Mabi Clément, "L'apprentissage du numérique théorique. Un levier pour les pratiques politiques en ligne?," , *Actes du 9e séminaire M@rsouin*, Paris, L'Harmattan, 2012, p. 313-325.

Badouard Romain, "La mise en technologie des projets politiques. Une approche 'orientée design' de la participation en ligne," *Participations*, 2014, no.1, p.31-54.

Barthes Roland, *Mythologies*, Paris, Seuil, 1970.

Benkler Yochai, "Degrees of freedom, dimensions of power," *Daedelus*, vol. 145, no. 1, 2016, p. 18-32.

Rouvro Antoinette and Berns Thomas, "Gouvernementalité algorithmique et perspectives d'émancipation: le disparate comme condition d'individuation par la relation," *Réseaux*, vol. 31, no. 177*, 2013, p. 163-196.

Bonaccorsi Julia, "Approches sémiologiques du web," in Christine Barats (dir.), *Analyser le web en sciences humaines et sociales*, Paris, Armand Colin, 2013, p. 125-141.

Cardon Dominique, *A quoi rêvent les algorithmes?*, Paris, Seuil, 2015.

Cardon Dominique and Casilli Antonio A., *Qu'est ce que le digital labor?*, Paris, Inathèque, 2015.

Cardon Dominique, "Dans l'esprit du PageRank. Une enquête sur l'algorithme de Google," *Réseaux*, 1, no. 177, 2013, p. 63-95.

Cardon Dominique, *La Démocratie Internet,* Paris, Seuil, 2010.

Cohen Yves, "Foucault déplace les sciences sociales. La gouvernementalité et l'histoire du XXe siècle," in Pascale Laborier *et al.* (ed.), *Les Sciences camérales: activités pratiques et histoire des dispositifs publics*, Paris, PUF, 2011, p. 43-79.

Deleuze Gilles, *Foucault*, Paris, Éditions de Minuit, 1986.

Foucault Michel, *Sécurité, territoire, population. Cours au collège de France. 1977-1978*, Paris, Gallimard-Seuil, 2004.

Foucault Michel, *Surveiller et punir. Naissance de la prison* [1975], Paris, Gallimard, "Tel," 1993.

Granjon Fabien, "Du pragmatisme et des technologies numériques," *Hermès*, no. 73, 2015, p. 219-224.

Jeanneret Yves and Tardy Cécile, *L'Écriture des médias informatisés. Espaces de pratiques*, Paris, Hermès-Lavoisier, 2007.

Mabi Clément, "Analyser les dispositifs participatifs par leur design," in Christine Barats (ed.), *Analyser le web en sciences humaines et sociales*, 2d edition, Paris, Armand Colin, 2015, p.33-37.

MABI Clément and THIBAULT Françoise, "Les politiques du numérique. De la nécessité d'une approche critique," *Socio*, no. 4, 2015, p. 89-103.

MŒGLIN Pierre, *Outils et médias éducatifs. Une approche communicationnelle*, Grenoble, Presses Universitaires de Grenoble, 2005.

MONNOYER-SMITH Laurence, "Le web comme dispositif: comment appréhender le complexe?," in Christine BARATS (ed.), *Analyser le web en Sciences humaines et sociales*, 2013, Paris, Armand Colin, p. 13-33.

MOULIER-BOUTANG Yann, *Le Capitalisme cognitif*, Paris, Amsterdam, 2007.

MOROZOV Evgeny, *Pour tout résoudre, cliquez. L'aberration du solutionnisme technologique,* Paris, Éditions FYP, 2014.

ORTEL Philippe, *Discours, image, dispositif: penser la représentation*, vol. 2, Paris, L'Harmattan, 2008.

SIRE Guillaume, *Google et la production journalistique*, PhD thesis in IT and communications sciences, Université Paris 2-Panthéon Assas, 2013.

SOUCHIER Emmanuël, JEANNERET, Yves and LE MAREC, Joëlle (dir.), *Lire, écrire, récrire*, Paris, Bibliothèque publique d'information, 2003.

THIBAULT Françoise, "Campus numériques: archéologie d'une initiative ministérielle," *Études de communication*, numéro spécial ("L'intégration du numérique dans les formations du supérieur"), 2007, p.17-48.

THIERRY Benjamin G., *Donner à voir, permettre d'agir. L'invention de l'interactivité graphique et du concept d'utilisateur en informatique et en télécommunications en France (1961-1990)*, PhD thesis in Modern History, Université Paris-Sorbonne (Paris IV), 2013.

TRICLOT Mathieu, *Philosophie des jeux vidéo*, Paris, La Découverte, 2011.