INSTITUTIONAL CHANGE AND PROFESSIONAL PRACTICES: THE CASE OF FRENCH DOCTORAL EDUCATION

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Abstract

Based on empirical research on the effect of doctoral schools in French university, this paper analyses under which conditions the implementation of a new institution impacts work practices i.e. the ways by which individuals and collective actors perform their activity. It focuses on the micro-practices of actors, in order to shed new light on the micro-level works which put the new institution into action.

The paper contributes to existing theory in three different ways. First, it shows that institutional change does not generate new practices per se. Institutional change impacts work practices if the pre-existing practices are close to the new desired norm as promoted by the new institution. It thus emphasises proximity as a main mechanism of new practice diffusion, when actors are interdependent on each other. Second, in professional contexts based on practices distant from the new desired norm, actors adopt the new institution and change their practices if they are able to solve unaddressed problems. Such a dynamic is mainly based on the creation of new organisational arrangements or tools which mediate and enable problem solving activities. Finally, it proposes a delayed and indirect effect of the introduction of the new institution. By generating new interactions among actors, the new institution creates opportunities for comparisons across professions, legitimating one amongst the several existing norms in the field. Comparison amongst actors or disciplines leads to some categorising themselves as deviants, who lose legitimacy and power in the organisation.

Keywords: professional practices, institution, institution change, university.

INTRODUCTION

The concept of diffusion is central to institutional theory. When studying professional associations, standards or organisational forms (Durand *et al.*, 2005; Greenwood *et al.*, 2005; Greenwood *et al.*, 2002), the process of institutionalization is described as the diffusion of innovation process, the object being first recognised by few actors and then widely diffused and accepted. Lawrence and Suddaby (Lawrence *et al.*, 2006) note that for many years, the archetypal form of institutional research has been to examine the diffusion process and the factors that have led organisations to adopt particular structures or practices.

Drawing on Lawrence and Suddaby (2006) call for opening up the 'black box' of diffusion, this paper analyses the conditions under which the implementation of a new institution impacts work practices *i.e.* the ways by which individuals and collective actors perform their activity. It focuses on the micro-practices of actors, in order to shed new light on the micro-level works which put the new institution into action. The first section of the paper reviews the interplay between institutions and practices. On the one hand, institutions are based on legitimated and maintained practices. On the other hand, institutional change influences the way problems are formulated, the notion of efficiency and the organisation of day to day work. Therefore, evolution of practices may be a result of institutional change.

The second section presents the institutional change under review, the diffusion of doctoral schools within French Universities. They were introduced in 1992 and made compulsory for all universities in 1999. The diffusion is thus completed, but the actions and effects of doctoral schools vary from one school to another. We study the effects of the institutional workings of five doctoral schools within the same university, *i.e.* the same local institutional and organizational context.

The discussion section highlights the contributions of the paper to the existing theory. The study of the impacts of institutional change on work practices reveals three main results. First of all, it shows that institutional change does not generate new practices *per se*. Institutional change impacts work practices if the existing practices are close to the new desired norm promoted by the new institution. Proximity is thus emphasised as a main mechanism diffusion of new practices when actors are interdependent on each other. Interdependency may be intrinsic to the scientific activity (division of work, sharing of equipment or key resources)

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and organisational (collective decision making process, common scientific policy, etc.).

Second, in professional contexts based on practices distant from the new desired norm, new practices linked to the new institution diffuse only if they are able to solve a problem not addressed beforehand. Actors adopt the new institution and change their practices if it can assist them in solving existing but unaddressed problems. Such solutions are likely to be based on the creation of new organisational arrangements or tools which mediate and enable problem solving activities. In contrast, the diffusion of new practices proves difficult if not impossible without such a mediating arrangement: A common tool or arrangement creates an opportunity for action which may correspond to the norm promoted by the new institution. Common tools or organisational arrangements channel the actor's strategy. It thus suggests complexity beyond the 'heroic' character of the institutional entrepreneur (Dorado, 2005; Garud *et al.*, 2002; Maguire *et al.*, 2004; Munir *et al.*, 2005), allowing a diversity of actor strategies around the adoption of the new institution. Finally, it proposes a delayed and indirect effect of the introduction of the new institution. By generating new interactions between actors, the new institution creates opportunities for comparisons across professions, legitimating one norm amongst the several existing norms in the field. Comparison amongst actors or disciplines leads to a self-categorisation as deviants who loose legitimacy and power in the organisation. Comparison amongst actors or disciplines leads to some categorising themselves as deviants, who loose legitimacy and power in the organisation.

INSTITUTIONS AND PRACTICES

1.1. Institutions are not frozen

The institutionalist perspective is based on the idea that there are enduring elements in the social life called institutions that have profound effects on the thoughts, feelings and behaviour of individual and collective actors. Scott (Scott, 2001) has underlined how organizational behaviours are shaped by institutions *i.e.* taken-for-granted, resilient social prescriptions, sometimes encoded in laws which specify the boundaries of the field, its membership rules and the role of identities and appropriate organisational forms in its constituent communities (Roa *et al.*, 2003). Hargrave and Van de Ven (Hargrave *et al.*, 2006) define institutions as "humanly devised schemas, norms and regulations that enable and constrain the behaviour of social actors and make life predictable and meaningful. They distinguish institutional actors (or entities) from institutional arrangements, with the term

institutions referring to the latter. Institutional arrangements may apply to a single institutional actor or more broadly", (p866). The enduring dimension of institutions brings about the paradox of change that is obviously also a part of institutional life. As Scott notes (2001:187), "in highly institutionalized systems, endogenous change seems almost contradictory to institution."

The paper focuses on institutional change *i.e.* a difference in form, quality or state over time of an institution. When studying institutional change, scholars usually examine the origin of change. Oliver (Oliver, 1992) and Dacin *et al.* (Dacin *et al.*, 2002) seek to identify the locus, processes and drivers of institutional change. Greenwood and Suddaby (Greenwood *et al.*, 2005) underline how new ideas come from the margins of the field where organisations are less embedded, less privileged and more exposed to institutional contradictions. They also analyse the types of organizational responses to institutional change (Oliver, 1991), or the role of actors in the transformation of existing institutions through the study of institutional entrepreneurship (DiMaggio, 1988; Maguire *et al.*, 2004). Lawrence and Suddaby (2006) propose to consider institutional work *i.e.* "the purposive actions of individuals and organizations aimed at creating maintaining and disrupting institutions". They propose entering the 'black box' to document, analyse and understand the practices through which actors create or maintain institutions. In doing so, they shed light not only on the diffusion side but also on the adoption/adaptation process through which actors implement and adapt institutions.

However, beyond the process of institutional work, remains the question of the effect of institutional change on day-to-day activities and work practices, *i.e.* of the performative effect of institutions on the ways in which individuals or collective actors perform their jobs. The relationship between practices and institutions is two-fold. On the one hand, institutions are based on existing routines and practices which form enduring elements of social activity. Lawrence and Suddaby review the role of practices in the institutional field (2006). The notion of practices refers to situated actions performed by actors in order to achieve a result. Simlarly, professional practices are actions performed by actors to achieve their mission in their professional environment. The definition of practice is based on the works of Pierre Bourdieu (Bourdieu, 1972) (1980). Bourdieu insists that "practice is both necessary and relatively autonomous regarding a given situation, because it is the product of the dialectical relationship between a situation and a habitus." A habitus is "defined as a system of enduring and transposable dispositions that, integrating every past experience, functions at each

moment as a matrix of perceptions, appreciations and actions, and enable the completion of infinitely diverse tasks, thanks to analogic transfer of schemes enabling the resolution of problems related to shapes, and thanks to the ongoing corrections of results that are obtained, dialectically produced by these results." Therefore practices stem from a series of trials and errors, have been proved efficient by those who are using them, and are transmitted by proximity rather than explicitly. Practices are a very deeply rooted ways of doing things that has been working efficiently so far, in terms of the problems that have to be solved.

On the other hand, institutional change influences the ways that problems are formulated, the organisation's definition of efficiency (Baden-Fuller *et al.*, 2000) and the organisation of day to day work. Institutional change promotes new norms, new criteria of performance. Therefore, evolution of practices may be a result of institutional change which influences values, rules, myths, representations. How does the shift from one way of doing things to another happen? What are the impacts of institutional change?

1.2. Institutional change and the evolution of practices

Two main contributions to the articulation between institutional change and work practices have been identified. Phillips *et al.* document the emergence of common practices when actors from different fields collaborate. As participants to collaborative efforts belong to existing organisations, they will bring with them sets of ideas and practices that are institutionalised in their respective fields (Bourdieu, 1988). Early actions in the collaboration process will begin to establish the practice standards that will guide their efforts. Phillips *et al.* (2000) argue that dominant coalition members are likely to impose their rules and practices on other members. Practices are borrowed from the fields of dominant members, who have the power, legitimacy and critical resources to influence the design of solutions to problems. Boxenbaum and Battilana (Boxenbaum *et al.*, 2005) qualified these results as they found that inter-organizational mobility was an important enabling condition for the transposition of managerial practices across fields. Finally, Phillips *et al.* reintroduce the notion of practices within institutional theory, analysing the travels of practices, but not their evolution in a context of institutional change.

Robertson *et al.* (Robertson *et al.*, 2003) examine the effects of institutions on micro work practices in the specific context of professional service in knowledge-intensive firms. They show that institutional context is more likely to operate in three arenas: relative professional work autonomy, the epistemic base of the discipline, and the formation of professional

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practitioners' identity. First, following Abbott (Abbott, 1988), they underline different institutions that influence work practices. Professional institutions (such as lawyers' or physicians' associations) cover both technical (standardizing expertise and differentiating from other commodities) and social means of professionalization (Baer, 1986). The definition of the profession's rules and resources, and its maintenance through standards, norms and regulations, secures the profession's control of particular work activities.

Secondly, they identify the epistemological base of the profession as a second institutional context feature. Halliday (Halliday, 1985) distinguishes between the scientific professions (engineering and medicine) that rely primarily on judgements of fact, normative professions (the clergy and the law) that rely primarily on judgements of value, and syncretic professions (the military and academia) that rely on an amalgam of scientific and normative foundations. The different epistemological bases of the scientific (experimental science) and legal professions also coexist within academia. In experimental sciences, claims to knowledge are legitimised by the application of the scientific method (principally experimental) to natural and biological phenomena. Scientists work to generalise and replicate through instrumentations and scientific methods, validated by the scientific community, to produce claims which transcend particular contexts. In contrast, knowledge production in the legal profession remains linked to the context, and extends only to particular jurisdictions and particular points in time. The structure of knowledge production within scientific disciplines appears to be more important than its academic organisation. Thus, across different professions such as the law and science, and across different scientific professions, distinctive 'epistemic cultures' can be found (Knorr Cetina, 1999).

The third feature of the professional context, labelled by Schein (Schein, 1978) as the formation of identity, defines professional identity as the relatively stable and enduring constellation of attributes, beliefs, values, motives and experiences in terms of which people define themselves in a professional role.

Robertson *et al.'s* work examines the influence of institutional context on work practices, but doesn't examine through which mechanisms practices change, nor question the influence of institutional context in change situations. Studying the way practices are influenced by institutional change lead us to analyse the ways by which institutions are adopted and implemented within a given organisation, focusing on the implementation mechanisms of institutional change. Our study focuses on the implementation of doctoral schools as a new institution within one university. It analyses the ways in which the introduction of doctoral

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schools influences scientific practices of academic scholars in France, mainly in terms of recruitment and of the supervision of PhD students. Change does occur because of a variety of factors, and there is rarely a direct and visible impact from one event on another. Nevertheless, we examine how institutional change accompanies, prevents or facilitates changes in practices.

Given the aims of the study, the research questions were designed to explore interrelationships rather than test propositions. By selecting different doctoral schools in the same university, we aim to create a comparative dimension within one organisation and one institutional setting to analyse the evolution of the practices of scientists.

DATA COLLECTION AND METHOD

The context of French universities

Doctoral schools in France were instituted by a decree in 1992. At the time, the text is just an outline of what a doctoral school should be in terms of shape and missions. Moreover, it did not have a mandatory character. Doctoral schools were progressively implemented throughout universities, their existence and characteristics depending greatly on local conditions. They finally became mandatory in 1999. New decrees (2002, 2006) followed, becoming more and more explicit about the shape and missions of the new entity. Each research department must now belong to a doctoral school, and the doctoral training it provides to their PhD students must take place in this frame. As a result, doctoral schools are today the only entry point for doctoral studies in French universities. As they are compulsory, the diffusion process is not an issue : from 32 doctoral schools in 1990, they became 208 in 1996 and are 314 today. However, there is a large diversity in the actions of different doctoral schools (DGRT, 2001). Doctoral school have to provide students with a doctoral training curriculum, including particularly professional training. They also are the main channel for the allocation of public scholarships (given by the Ministry of Higher Education and Research) to research departments. Nevertheless, they remain a flexibly shaped entity, and have not been

institutionalised in the same ways in different contexts. Therefore, it was important to study various disciplines in one single institutional and organisational context, such as one university, in order to locate variations of response to institutional change[2]. That is what fostered the choice of one university, covering the whole spectrum of scientific disciplines with five doctoral schools. This will allow us to understand the adoption of a top-down innovation and its impact on the evolution of practices, and to address the following questions: do institutional changes influence scientific practices? By which mechanisms? Do new institutions cross the epistemological bases and professional communities of practice?

Case study

These questions guided the design of our enquiry. We adopted a looser design rather than a precise hypothesis-testing model, but not a grounded research strategy (Suddaby, 2006). The research protocol outlined an explicit comparative case strategy, by analysing five doctoral schools in the same university, located in a large town in the west of France. Research takes place at the university in all disciplines. Some 25000 students are trained (from license through doctorate); around 200 PhDs awarded each year. Doctoral schools there typically include 10 research departments (except for one that has 40) They train 250 to 300 PhD students each, and have 100 to 200 potential supervisors.

We used a qualitative approach to construct five case studies (Stake, 2005) to understand the qualitative changes in practices that followed the emergence of doctoral schools. As we seek to analyse the influence of institutional changes on practices, our interpretative methods address questions of process *i.e.* the study of evolution of behaviour within organizations, focusing on how organisational context, activity and actions unfold over time (Pettigrew, 1997). Such research is field-based, involving interviews to capture the observations of various stakeholders. We used the narrative strategy of qualitative research (Langley, 1999) to make sense of our data.

Table 1: Main characteristics of the doctoral schools

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[2] To know more about the French university system, see Musselin C. 2005. *Le marché des universitaires: France, Allemagne et Etats-Unis*. Presses de Sciences Po: Paris

Doctoral schools	Engineering sciences	Mechanics, Thermics, Urban engineering	Chemistry Biology	Law & social sciences	Literature language & civilizations
Doctoral students	210	208	250	320	248
Research departments	9	9	40	10	14
Professors and researchers	280	n.a.	n.a.	170	209
Including: PhD supervisors	120	100	233	90	79
PhD completed/year	50	40	50	31	30
Average PhD completion (year)	n.a.	3.51	3.65	n.a.	4,63
Public PhD scholarship (2005)	20	17	15	8	8

n.a. : not available

This paper is based on archival sources, such as the decrees that instituted the doctoral school, and qualitative interviews. 50 semi-structured interviews were conducted with members of the scientific boards, supervisors, students, administrative staff at all five doctoral schools, to give participants the opportunity to speak in their own voices, and introduce and reflect on the issues they perceived to be relevant.

We began with the scientific board members at the chemistry-biology doctoral school, where we interviewed all the members of the scientific committee. We then extended the field to the other schools by a "snowballing" method. Interviews were organized around informers' activity (as managers, teachers or supervisors) and participants were invited to reflect on their practices within doctoral schools. They were asked to describe the PhD track, from the recruitment to the day the dissertation is awarded. The object was to understand what a doctoral school is about (its day-to-day missions and activities; the set up of common rules regarding grant distribution, student recruitment, supervision norms if they exist, and links with higher levels in the university: presidency, ministry, etc.), and what supervising is about. It also aimed to draw attention to any change mentioned by informers, to tensions, problems and issues tackled in the set up of the doctoral school, or more generally in the practice of

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their activity.

Five interviews were performed with the university management/presidential team[3], focussing on their activity in general, the role of doctoral schools from a university governance point of view, what kind of expectations were invested in the project, and the history of the set up. Seven interviews were also performed with doctoral students, where our interest focused on how they found their scholarship if any, how they chose their topic, their supervisor, what they are doing in terms of research or any other kind of work.

Interviews were transcribed and analysed so as to highlight the main categories of informers' perceptions and practices. Verbatim responses were then sorted along two main categories, to highlight scientific practices and their evolutions.

- The first category concerned the recruitment of PhD students. What was considered a good profile? What were the issues related to the distribution of grants in a several-disciplines scientific board? How was a common arrangement for judgement constructed, etc.?

- The second categories focused on the activity of supervising, examining what supervisors defined as their practice, what skills they wanted to transmit, and what did they think was important for becoming a professional scientist (Andrews *et al.*, 1967)? We also searched for possible norms regarding the number of students per supervisor, the rules a supervisor imposed on himself before accepting a student, (for example, can a supervisor supervise on a topic he does not know or that is not his specialty?) What is supervising? What is being supervised? What is a PhD student, what is his function for the research department? Finally, what is a PhD for: is gaining a diploma seen as a personal achievement, or as the first step in a professional career?

These two categories are considered as variables taking different values across time and disciplines. The comparison between values would allow us to measure and describe differences as well as changes in practices in supervising and training future researchers, which clearly have links with scientific practices.

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[3] Although some actors were interviewed primarily as university managers or doctoral school scientific council members, the subject of supervising practices was systematically explored whenever relevant.

The fieldwork allowed us to select situations involving evolution or non-evolution of practices and suggest categorizations into different cases (Becker, 1998). We distinguished cases where:

- The situation reflects evolution *vs.* non evolution: We labelled a practice as "new" when actors feel the need to justify and legitimate it, with a discourse that is still foreign enough to them that they need to mention it. Beside situations where evolution of practice can be located, we have encountered situations where a practice doesn't evolve in spite of pressure from the institutional context. We have labelled this situation as "non-evolution", to express the fact that it can only be characterized and identified in comparison to "evolution".

- The institutional field (professions) concerned were close to *vs.* far from the norm: Following Haliday (1985) and Robertson *et al.* (2003), we distinguish between two institutional contexts, based on the epistemological base on the disciplines. On the one hand, experiment-based, collectively organized disciplines which are close to the norms suggested by the new institution (mandatory funding, duration of PhD roughly matching the desired norm of 3 years, collective research projects, connection with the industry, etc.). On the other hand, individual based disciplines, with independent research programs, that find themselves far from the promoted norms (80% of students are not funded, duration of PhD exceeds the recommended 3 years, the main source of funding is the State, etc.). We hypothesise that the reactions to institutional pressure will differ along two factors: closeness to the desired new norm makes the adoption of new practices easier and more likely, as it involves merely adapting existing ones; resource dependency can be a strong driver to adopting new desired practices, from the perspectives of enhancing, or at least not reducing, current resources.

- The evolution of practices is a direct response to the new institution, *vs.* not specifically related. Some of the evolutions – or resistances – are obvious responses to the set up of the new institution. Actors describe their evolution as a direct result of either a demand of, or an opportunity offered by, the new institution, while non-evolutionary responses, are explicitly described as resistance to institutional pressure. By contrast, there are evolution and resistance limiting changes promoted by doctoral schools, but that are not directly related to it, such as professionalisation. Evolution happened before, outside, or without the new institution, or non-evolutionary situations existed before and are not described as resistance to the new institution.

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RESULTS

Doctoral schools impose formal obligations, such as a collective decision making process for recruiting, or the requirement to set up a doctoral training curriculum. How do supervisors respond to these institutional pressures? How does that impact practices? Through which mechanisms? We now examine these questions on two particular missions where the doctoral schools are intervening: recruiting and supervising.

Recruiting doctoral students

What does the reform do?

Doctoral Schools are changing the rules that govern the access to a critical resource *i.e.* scholarships for PhD students. Before doctoral schools were set up, grants were given by the Ministry of Research (a discipline-based bureau) to the director of Masters programme, who decided which students would received them, generally the best in the class. Since the institution of doctoral schools, grants are given by the Ministry to the doctoral school, that is, to the assembly of research departments. What was formerly an individual procedure has become a collective one. With this change, the Ministry intended to concentrate resources on one point of decision, and foster the building of a more consistent scientific policy for making choices between projects and priority definitions within the group of teams. As a result, the scientific council of each doctoral school has the task of setting up a common scientific policy and a common set of rules for organizing the distribution of grants among research departments.

Consequences: organisational response to institutional change and new practices

In the experimental science doctoral schools, setting up common grants distribution procedures has led to the adoption of two practices:

- opening recruitment to students from outside the university

- funding being directed towards a project rather than a student

Opening recruitment to students from outside the university

Supervisors were used to relying heavily on interpersonal relationship with students in deciding who they want to work with.

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> Would you take the risk of working with someone for three years without having heard him beforehand? Without having seen him? Well, I think… no, I don't think it could be an option… (nan-dir-bio-CS-CB-1)

All supervisors underscore how important it is for them to know the candidate personally, to have seen him at work, to gain critical information they could never obtain from an oral examination. They need to know how the student integrates and reacts within a team. They have learnt how to distinguish a student who is good for research - that is, curious, autonomous but with a sense of team – from a good student – someone who can synthesise and repeat existing knowledge but does not necessarily show creativity and curiosity. This is how they gain confidence or trust in their future PhD student.

> We spend a lot of time, particularly with Master's students. This is when the student and the supervisor get to know each other and become a "couple", which is meant to last, to my opinion, during the 3 years of the PhD. If things are going well, I mean, the "chemistry" is not an easy thing to get, if this is happening, I think it is interesting to keep that couple, student and supervisor. […] I think we should not destroy that first step between a Master's student and his supervisor, if there is a possibility of funding. (nan-dir-bio-cs-cb-14/1-2)

However open recruitment, to comply with Ministry requirements, would mean that supervisors had to recruit people they would not know beforehand. How to replace (or do without) that irreplaceable source of knowledge about people: observation in everyday situations? They did so by organizing a competition open to all students, by projects. They were reluctant to take the risk of recruiting a student they would meet only once, and hear in oral examination, but at the same time, they hoped to "please the Ministry" (because of the number of grants that were at stake). They also acknowledged that this new procedure would give them the opportunity to enlarge the pool of recruitment and have access to better students than if they were limited to those from within the university. Finally, it was seen as a "a good thing" if mobility across research departments and universities could be enhanced. In the end, very few students from the outside were recruited in the first year of the competition, but enough to create a precedent, and the procedure and the justification could now be seen as in existence, and as legitimate.

Funding being directed towards a project rather than a student

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In fact, this practice already existed in some professions, such as in chemistry. Biologists, on the other hand, described the relationship between a student and his supervisor as a "moral contract" (Stephan *et al.*, 1997), from the outset of the Masters course.

> Grants used to be targeted only on the student's merit. If a student was the first in his Master's class, he would get a grant in the research department where he was working. OK? That was the rule. So the problem was, the deal was utterly a moral one between the future PhD student and his Master's supervisor. The latter would do anything so that his student would be the first in his class, so as to get the grant. Then, he did not have any trouble financing him for his PhD. (nan-dir-bio-CS-CB-1)

Making a collective decision across disciplines and ranking students from different disciplines has proved to be a major problem.

> Ranking students from completely different background, with completely different curricula etc… is far from simple… Ranking biology students and chemistry students… I don't know who can do that, probably no one…(nan-dir-chi-cs-cb-6/3)

The shift from asking the best student to choose among predefined projects, to choosing projects that will be funded and then recruit a good student - not necessarily the best – to staff it, requires agreement as to the choice of projects, or at least on ways of selecting relevant projects.

Doctoral schools have managed to avoid establishing cross-discipline criteria about projects or students by relying on objective, measurable criteria, such as the size of the research department (reflecting its capacity of training), or their level of accreditation (reflecting institutional recognition from the Ministry). These criteria are thought to represent the quality and the reputation of the labs. On the top of these, the rule of "tour de role" persists: in any discipline, it is a basic principle that grants should not always go to the same labs.

> My point [as a member of the board] is not to run for my team. I represent the doctoral school. All I ask for is that we take the history into account. That the grants do not go always to the same labs. (nan-dir-bio-cs-cba-17/6)

As in the case of opening recruitment, funding a project rather than awarding a student means giving up recruitment practices such as a direct personal relationship with the student. However, supervisors do acknowledge that "it is not for students to decide the scientific

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policy", thus justifying the primary targeting on projects, and the effort on their part to rely partly on impersonal criteria to recruit students, such as establishing a minimum rank in the student's Master's degree (in the top 30% based on marks). Finally, while supervisors have the last word on recruitment, it is seen as legitimate for doctoral schools to set up minimum quality standards for candidates.

As a practice, such collective decision making processes generate additional effects, leading to discussions about what is a PhD for, who is a good candidate, who are we recruiting for? Scientists never talked about such matters before, or compared their selection and recruiting across disciplines.

Within the recruiting process, new practices have appeared and spread. However, the shift from asking the best student to choose among predefined projects, to choosing projects that will be funded and then recruit a good enough student to staff it, requires agreement on scientific priorities. Doctoral schools have had to write documents to define and agree on their scientific policy, which supposes that the school is able to define its policy. However, the legitimate level for defining scientific priorities is the research department. As doctoral schools are multidisciplinary, it is difficult to find consistency between research programs, especially in disciplines where researchers do not traditionally work on a collective basis, with a weak degree of interdependency (such as history, literature, law etc.). In disciplines with higher degrees of interdependency (such as experimental sciences) it is easier to define projects of research, but the difficulty then is prioritising projects from different disciplines. As a result, scientific policies made at the doctoral school level tend to be a collection of what already exists, rather than a plan for the future. Interdisciplinary research projects tend not to emerge from the new institutional arrangement: while everybody acknowledges that they now know their colleagues from other disciplines better, this has not yet shown in common research projects.

Despite the existence of a written scientific policy, members of the schools' boards have managed (as in the past) not to assess their colleagues' projects on scientific quality grounds. Instead, they have continued to justify their assessments of research departments by such quality signals as the department's administrative status, the number of potential PhD supervisors involved, etc.. No common currency *i.e.* well accepted set of criteria to prioritise research projects has been established between doctoral school colleagues, and some previously-existent practices, such as "tour de role", coexist with new funding practices.

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Supervising doctoral students

What does the reform do?

As far as supervisors of doctoral students are concerned, the introduction of Doctoral Schools has established two new requirements; the introduction of a written contract between student, supervisor and the doctoral school, and the introduction of professionalized training.

First, the introduction of a written contract, to be signed between the student, the head of the research department, the head of the Doctoral School and the supervisor, formalizes the existence of the official link between all these parties, whether there is a funding or not. It sets rules regarding the PhD: 3 years duration, mandatory funding, and a mediation procedure in case of problems. The charter was introduced by decree following an initiative from life science PhD students seeking to have their status recognized and protected. It is based on norms that are generally applied in experimental, equipment-based disciplines.

All students sign the contract. While it already matches the existing practices in experimental sciences, it has not been a normal routine in human and social sciences. However, some supervisors underline the fact that this structure is not suitable for them, especially with regard to the necessity of funding and the duration of the PhD.

> Everyone [amongst human and social scientists] thinks that the Charter of PhD is often poorly adapted to specific doctoral schools' culture. (nan-dir-droit-cs-ds37/27)

Through setting requirements for competition for public grants, Doctoral Schools are sometimes imposing additional rules and norms regarding supervising, such as:

- a limited number of students per supervisor to enhance the quality of the supervision and to reduce 'mandarinal' behaviour;

- A limited amount of public grants per supervisor at any one point in time, to allow different scholars to benefit these grants and work with PhDs.

- The authorization of the Doctoral Schools is required for students to register beyond the third year, which reinforces the "3 year norm".

Second, doctoral schools have to organize doctoral training as required by the administrative act instituting them. This concern is related to the need for professionalization.

> There was, to start with, a direction from the ministry, to set up in priority professionalizing training sessions. The

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> idea is that not every doctor is going to be a teacher or a researcher, and that we should have them adapting to the job market outside academia. This means training about relationships with the enterprises, how it works within a firm. (nan-dir-bio-cs-cb-4/19-21)

Thus all Schools organize training, usually of three kinds:

- Professionalizing training: Students learn about writing a résumé, strategies to build a professional project and looking for a job, etc.. They learn about the job markets, and the possible positions they could think of after their PhD

- Discipline-oriented training: These sessions are usually about giving students from one discipline insight about another discipline, to encourage or facilitate cross-disciplinary projects in the future, or simply, to create a dynamic inside a multi-disciplinary school

- General topic oriented training: these sessions aim at improving English writing skills, or methodologies such as database, bibliography, etc.. They can also be organized around general topics of concern for scientists, such as the relationships between science and society.

These training sessions are open to all PhD students, to mix those from different disciplines. However, practices across Schools remain different; the three experimental science Schools have made the doctoral training mandatory, setting a number of training hours necessary for the student to gain a PhD, while in human and social sciences the training remains optional. In addition, except for those few scholars involved in organising the training, very few supervisors actually integrate it as a new resource for their students. Attitudes clearly go from "it is a waste of time, it is bad for the work" to "it is an administrative obligation, why not, but I don't see the point" to "students have to do it, we will check that they are doing it". Only rarely does a supervisor wonder how to build a relevant training program for his student, based on his intellectual origin and his professional project.

Organizational response to institutional change

The content of supervision does not seem to have changed over time, in any discipline, and the core of supervising practices has not been affected by the introduction of Doctoral Schools. No mention of such a change is found in the interviews, and the duration of PhDs

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seem to have remained similar, even when it exceeds the norm of three years. Those changes that are mentioned by informers - using expressions such as "today…" "Nowadays…" or "it is not the way it used to be…" - relate mostly to the themes of professionalization and mobility.

In terms of professionalization, if the thesis remains the main output of the PhD, the PhD work has been enriched. For most supervisors in experimental science, it is important that the PhD is part of the student's professional project. The PhD is not considered as a goal in itself, but as an exercise a step towards reaching a higher level in a profession, that of a researcher. Most supervisors are also aware that the majority of their students will not find a job in the academia, research or teaching position.

> Supervisors used to tell PhD students, if you're doing well, you will get a position in academia. We don't talk like that anymore. Positions in academia are extremely scarce. They may find a job in research in industry or in administration rather than research. It is not easy to say. (nan-dir-bio-cs-cb-17/4)

Therefore, PhD needs also to be a training for the wider job market, and recognized as such by future employers. Professionalizing the quality of the PhD is also a concern in the human and social sciences, although less central and less systematically mentioned. Interviews show awareness about the topic, but also a feeling of helplessness. Some supervisors discuss with their future students the issue of professionalization and the scarcity of opportunities.

The second feature that is changing in supervising activity is the attention given to the need for mobility. Many informers say that "today, one cannot make a career without mobility", arguing that it is important to see how other people work in other places, in France or abroad. Supervisors recognise that students should be encouraged to do the first or second year of their Master's internships in a different research department. PhD students often gain great benefits from post-doctoral appointments abroad, and senior researchers also think researchers should change laboratory after a decade, to keep their interest fresh. However, again, mobility is not seen as an issue in the human and social sciences.

The new features we noticed, such as the necessity of adding elements of professionalizing, scientific and general culture to a PhD, and the need for mobility, were not created by the emergence of Doctoral Schools, but have been facilitated by them. In Schools where professionalization and mobility were already highly valued, the School's organisation was used as a tool or frame to encourage these ideas and facilitate their realization. In Schools

where such features were not valued, no particular system seems to have been set up to encourage them.

Table 2 gives an overview of the evolution of practices. Reactions to change as far as practices were concerned is similar within given epistemic communities, as noted by Halliday (Halliday, 1985) and Robertson *et al.* (2003). The level of interdependence with the environment (in terms of resources and output), and the degree of instrumentation involved, polarise scientific practices and the representation scientists have of their own activities.

The collective dimension is very strong in biology, physics, chemistry, where research is carried out through teamwork and cannot make sense at the individual scale. In the epistemic community where knowledge production is based on instruments and experimentation, norms tend to diffuse by proximity, as the level of interaction amongst actors is high. The recruiting process has been affected, in terms of projects rather than students being funding. As far as supervising is concerned, the core of this activity has not changed, but professionalization and mobility are now stressed, although the doctoral school is not mentioned or used as a resource in fostering these two dimensions.

The individual dimension can be found where science is based on personal thinking and manipulation of existing (generally written) material: law, literature, philosophy, mathematics. In the epistemic community where knowledge production is not so much based on instrumentation, doctoral schools have not fostered new recruiting practices. But they are acknowledged as a legitimizing institution for new kind of actions, such as solving supervising problems between students and supervisors. The spread of a new norm, even where it is not followed, generates a feeling of awkwardness and a self-categorization as deviants by the members of these disciplines.

Table 2: Evolution of practices

Evolution of practices		Non evolution of practices	
Response to doctoral schools	Non related	Response to doctoral schools	Non related

Experiment-based, collectively organized disciplines High interdependency Close to the norm	• Funding project rather than students • A move toward professionalisation	• Mobility • Increase of co-supervising	• No evolution of supervising core activities	• No inter-disciplinarity. • Absence of common currency across disciplines
Individual based disciplines Low interdependency Far from the norm	• Limited evolution of practices: Intervention in case of problem between supervisor and student, drawing on the legitimacy given by doctoral schools • A weak move towards professionalisation		• No evolution of supervising core activities • Resistance to co-supervising	• Absence of common currency across disciplines

DISCUSSION

The analysis of the evolution of doctoral schools shows that the emerging institution has not generate new practices, but rather has legitimized some existing practices and diffused them through three mechanisms:

- *Proximity* when interdependence amongst actors is high

- *Problem definition, i.e.* a situation emerges as a problem *when* the new institution is able to propose a solution

- *Comparisons* made possible where overlapping fields are accompanied by a common institutional shape, result in the emergence of a particular norm, and creating a new category of deviant individuals . Their practices did not change, but their position in their professions did: thus they became deviants (Becker, 1963).

Proximity when interdependence amongst actors is high

New practices are diffused and adopted by proximity, in a professional environment where there is a high level of interdependence. Factors fostering such interdependence can be internal (i.e., they come from the practices) or organisational (coming from arrangements set up to comply with the new institution). Experimental sciences are characterized by a

collective mode of knowledge production. Scientific practices are organised within teams, working along shared scientific program, instruments and workplaces (Hackett *et al.*, 2004). Research work can be divided into sub-units interdependent on each other. Beyond the team, researchers are part of a larger international level 'competition' between labs. Amongst other factors, as work can be divided in parallel subtasks, the size of the workforce assigned to a project determines the speed of discovery, (a critical asset in being competitive in the field): the larger the team working on a subject, the quicker it will be likely to perform experiments, produce and publish results, and thus gain recognition. PhD students are a workforce for the team and they are paid for their research as it is part of a common project. The reward for recognition is being able to get credits to pursue further research more easily: "one lends money to the rich", as a chemistry professor puts it.

By contrast, human and social sciences produce knowledge in an individual mode. Each researcher has their own program of research, which are not interdependent with one another. Networks do exist, across disciplines or universities; but are not necessarily team-based. The tasks performed in every day work are not interdependent. Collective work does exist in this research, but not in a stable, organisationally or administratively predetermined frame. The notion of a team is "blurry". This independence of the individuals in the group is reinforced by the fact that they usually work outside the university, and therefore there is no justification for common, negotiated rules. Practices are defined at the individual level, although a somewhat collective dimension starts to develop as soon as interactions arise.

Funding is not mandatory in those disciplines - in fact, the number of students is higher than the number of scholarships available. These are mostly Ministry grants, with some coming from the local government, enterprises, etc., and as a result, 80% of students are not funded during their PhD. They usually need a job to finance their studies, which is often given as the explanation for the longer time they take to complete their PhD (often 4, 5 or 6 years).

Collective and individual knowledge production come together in the representation of what PhD work is. In the collective context, it is a prescribed job, part of an industrialised process of knowledge production. For the student, it is both a professional training leading to a job and a diploma (supposed to be) recognized by the job market (Mangematin *et al.*, 2003). In the individual context, the PhD thesis is a personal project designed by the student, with no systematic relation to a professional career outside academia. Since the majority of students are not paid, their PhD is more a personal project than a job. For the research department, PhD work allows it to develop a pool to recruit future colleagues, and provides a source of

scientific production and publication.

The organisation of scientific production in experimental sciences fosters a high degree of interdependence, whereas practices in human and social sciences leave their members relatively independent from the community. Practices diffuse more easily in an interdependent community. This change mechanism may be illustrated by the evolution of selection practices. Selecting a project rather than a student – or more exactly, putting the project at the centre of selection and making the project a primary target of the funding – has been one of the major evolutions. It has been implemented in experimental sciences doctoral schools, where interdependence and teamwork are high, and research departments were already organized by projects. A project is already a practice, as scientific production is managed in projects, and they are used management tools to coordinate collective research activities. The notion of a research program divided into sub-units is a routine to them, and the whole idea of a program of projects, putting results together etc. is taken-for granted, part of every day job practices. Thus, such schools are able to use the notion of project, as it is already an existing tool, and put it at the centre of their organization. In addition, it is coherent with their way of organising scientific life. The new institutional arrangements come as a relevant tool in organising their scientific life.

On the contrary, the notion of project does not already exist in human and social sciences. As research is mainly an individual activity in these disciplines, projects are not formalised. The head of a Literature Doctoral School expresses this sense of the 'foreignness' of collective practices, such as "making research in a team" and doing co-supervising.

> In the sector of human and social sciences, a researcher is first and foremost an individual. The idea of doing research within a team is something blurry. Very blurry. […]
> University management is insisting on co-supervising. That is, a professor and an assistant supervising together a PhD. Sort of an apprenticeship to train assistants to supervise. I believe this is already common practice in hard science. It is totally unknown for us historians.
> (nan-dir-hist-cs-lc-28/4)

It thus appears that practices can travel from research departments to doctoral schools when they already exist. Change is thus a generalisation of existing tools, based on existing practices.

Interdependence amongst actors is a strong mechanism for the diffusion of new practices. As actors have to work together on a regular basis, sharing equipment, resources and workplace,

working on and producing interdependent intermediary results, their practices evolve by interaction, through proximity or capillarity. Interdependence can be intrinsic, because of the nature of the objects which are manipulated to perform scientific activity or organisational, when the rules of resources allocation or the modes of decision are changing. In that way, the creation of new institution enhances practice transformation.

Problem definition

When interdependency is not central, the engine of change of practices is the emergence or the light shed on existing and previously unaddressed problems. The example of Human and Social Sciences Doctoral schools may illustrate this point. As research is pretty much independent of funding - whether there is funding or not, supervisors can perform their research, and can have doctoral students - any institutional arrangement regarding the funding can be overcome, or at least contained in a certain area, and have little impact on the rest of the organization or on practices. The changes in practice seen in human and social science Doctoral Schools are responses to existing problems such as the never-ending thesis. The director of a Doctoral Schools can now use the new rules defining the length of the PhD to ask the supervisors to justify over-long theses. They also offer a tool that allows the School to enter into the bilateral student/supervisor relationship when problems appear. When a problem has been identified, the School may offer an alternative configuration, by calling other supervisors to break the bilateral relationship, or asking for a second adviser or mediation. Given the codification of relationships between academic colleagues, the School director cannot intervene as an individual, but can as a collective entity to unlock the situation.

As pointed out by Bourdieu, practices are meant to solve everyday problems, suggesting that no change in practices will occur unless the actors themselves in the course of their activity identify a new problem. If no problem is identified, or when a suggested new practice is not seen as a solution, the new institutional arrangement will "slip" back to previous practices, and have no influence on activity. This is the case in the two human and social sciences Doctoral Schools, where funding continues to be targeted on students, with the grant being seen as a reward to the best student, and in the case of co-supervising of PhD. Here, new promoted practices are neither seen as legitimate by the supervisors, nor as solving any current problem. Therefore, they will not be adopted and will not lead to further collective practices, until in turn, new problems foster the acceptance of alternative practices.

New desired practices can be adopted if they allow actors or organisations to address new opportunities for action. The new institution gives legitimacy to actors to intervene and solve situations that are now defined as problematic. This mechanism depends on the presence of a micro-level institutional entrepreneur, who is ready to use the new institution as a resource to act.

Comparison, self-categorization as deviant and delayed effects

Because of the creation of Doctoral Schools, scientists from different disciplines are confronting their practices and noticing that they act in different ways. Biologists are astonished that many students in social sciences are not funded. Historians notice that in physics, a scientist cannot exist outside a research department.

Beyond making the comparison possible, the emergence of Doctoral Schools has introduced one type of practice as the "norm". Through the type of norm valued in the new institutional arrangement – scientific policy, targeting funding on projects, asking for annual reports on PhD lengths, ratios of students to supervisors etc., - Doctoral Schools suggest what the desired norm is. A certain type of knowledge production is thus "left outside" the new institutional arrangement. A linguist, who is highly supportive of Doctoral Schools, puts it very clearly by saying that "there is nothing judgmental in categorizing an activity as individualistic; it becomes a problem when one needs to integrate this activity in a research department and moreover a doctoral school". Some activities do not fit into the new arrangement, and in turn, the new arrangement does not answer any of the problems related to that type of knowledge production. Therefore, there is no intersection between the new institutional arrangement and these activities and the professionals involved in them.

Human and social scientists become aware of the new norm, all the more because they are not already involved in it: they notice that the new institutional arrangements are not built for them. For example, the grants distribution deadline implies that the Schools projects shortlist will be ready in June – but human and social science Schools do not yet have their student rankings available by this date, and since they are selecting students, not projects, the deadline makes little sense to them.

Supervisors from human and social sciences tend to categorize themselves as deviant. They do not necessarily see themselves as 'wrong'; rather, they are expressing their worries that the system is not really meant for them anymore, or that the ways they are used to doing things are no longer legitimate.

Self-categorization as deviants is reinforced when institutions have their missions redefined, but professions do not necessarily follow the move. The reform promotes professionalization as a mission, which is highly supported by the University management. But those supervisors whose conception of their profession is built around teaching and research do not see it as part of their mission. Another example concerns the concept of professionalization that the reform puts forward. A professor of linguistic expressed the gap between his definition of professionalization – which includes training in *content*, for jobs in academia – and what the university management means by the term, which he characterises as pressure "to convince students to go and look for a job that has nothing to do with what they have studied".

The self-categorization as deviants as a consequence of the new institution has three main consequences:

1. When the new institution impacts the definition of the missions of actors (PhD supervisors), it also impacts the perception of problems (*i.e.* the definition of a situation as a problem). As previously discussed, it is only when a situation has been accepted by those involved in the activity as being a "problem", that a "solution" can be found. Where researchers see the new arrangements as simply not fitting their case, they are not seeing themselves as 'problems" but instead as "deviants" – requiring recognition, perhaps, but not "solving".

2. Professional identities and practices are closely interrelated, as practices are deeply rooted in the way of doing things, on the way of considering problems. Both are dealing with values, rules, myths, representations. Ferlie *et al.* (Ferlie *et al.*, 2005) argue that a profession is a "self-regulatory and uni-disciplinary machinery [to…] control entry into and exit from professional groups, set and examine training programs, validate research, and enforce professional standards. Professional roles are prescribed sectorally, shaping the identity of individual professionals," (p129). Professional identity may be a barrier to the adoption of new practices if there is a gap between the new institution values and the representation of the professional identity.

3. Where a new institution is adopted by most of actors, leading to the creation of a category of deviants, the fact that these (individual or collective) actors are not behaving according to the "rules" becomes more visible. Deviation from the accepted institutional order can be costly in different ways: economically (it increases risks), cognitively (it requires more thought) and socially (it reduces legitimacy and the subsequent access to resources) (Phillips *et al.*, 2004).

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Comparison and self-categorization as deviant have delayed impacts on practices. They modify ways of formulating problems, the norms and values attached to the professional identity and the power dynamics amongst actors in terms of accessing resources within the organisation.

CONCLUSION

Studying the role of texts in institutionalization Taylor and Van Every (2000)[4] point out that "a text that is not used and cited is not yet a text.". The same goes for institutions : an institution that is not implemented, embodied in practices is not yet an institution. In other words, practices must be distributed, shared adapted by other actors if they are to have organizing properties and the potential to affect everyday activities. This paper shows a how a new institution is implemented and adopted by actors in different ways. Practices may be affected or not, influence can be direct or indirect. Institutional change leads to the adoption and generalization of practices that already exist somewhere in the organisation, as opposed to the creation of new ones.

Based on the case study of French Doctoral Schools, we identify three mechanisms by which a new institution is adopted and impacts work practices. First, in a professional environment where a high level of interdependence fosters interaction amongst actors and standardisation of practices, the adoption and generalization of practices works by proximity. The high level of resource dependency is a facilitating factor. Second, new desired practices can be adopted where they allow the actors to address unsolved problems. The new institution gives legitimacy to actors to intervene and solve situations now defined as problematic. This mechanism depends on the presence of a micro-level institutional entrepreneur, who is ready to use the new institution as a resource to act. Third, in the absence of one of these factors (interdependency, definition of a new problem/opportunity for action), the new institution cannot rely on any concrete device to impact practices, which will therefore tend to remain unchanged. The definition of problems is closely related to professional identity: depending

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[4] Taylor JR, Van Every EJ. 2000. *The Emergent Organisation: Communication as its site and service*. Lawrence Erlbaum Associates: Mahwah quoted by Phillips *et al.* 2004.

on how an actor defines their mission, they will perceive certain situations as belonging, or not, to their scope of action. As a result, some actors will move towards deviance, and become threatened as they lose the grounds of legitimacy. An interesting outcome could be where such deviance is reinforced, with actors turning it into resistance, and it potentially becoming a source of institutional effort to disrupt the new institution. Thus institutional entrepreneurs can be both supportive and disruptive for the new institution.

Finally, as Phillips *et al.* (2004) show about the constitutive relationship among action, texts, discourse and institutions, there is a dialectic dynamic between institution and practices, as institutions are based on existing practices and institutional change generating the generalization of new practices.

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