Negative knowledge, expertise and organisations

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Abstract: There has been a particular emphasis on knowledge and competence as increasingly important resources for successful enterprises. This notion of knowledge is based on 'positive knowledge', which considers knowing as merely a constructive, linear and accumulative process. We will introduce the notion of 'negative knowledge', which involves 'giving up' or 'bracketing' knowledge in certain situations. When experts encounter something that is incompatible with their knowledge, they should be sensitive enough to recognise a new situation by reconsidering or suspending their action. In addition to exploring the idea of 'unlearning', the paper introduces three other aspects of negative knowledge: 'to know what we do not know', 'to know what not to do' and 'the value of failure'. Negative knowledge seems to be possible, useful and even necessary in expert organisations because old ways of thinking or knowing something often prevent us from seeing new potentials.

Keywords: negative knowledge; expertise; unlearning; failure; new sensitivity; postmodern enterprises; creativity; collaboration and action nets.

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1 Introduction

In the last decade, the discourse on 'knowledge management' has suggested that organisations that are able to create and integrate knowledge better than competitors are more likely to succeed in the new economy. This has led organisations to tackle an increasing amount of information and knowledge. It is not just the explicit, codified knowledge, which needs to be 'managed', but also the implicit, tacit knowledge that needs to be identified. Nonaka and Takeuchi (1995) argue that truly innovative companies are those that can modify and expand the knowledge of individuals to create a spiral of interaction between the tacit and explicit knowledge. The interplay of explicit and tacit knowledge has received a great deal of attention in recent years. The role of tacit knowledge is recognised as being especially crucial in establishing expertise for so-called knowledge-intensive services.

While knowledge is considered to be the most important asset in gaining a competitive advantage in markets, knowledge formation is rather uncritically considered in most crucial managerial actions. Focusing on *managing* knowledge rather than on creating knowledge implies that knowledge is something that is already there, which we just have to dig up. This notion of knowledge in knowledge management discourse has been rather problematic because it assumes that knowledge formation largely consists of organising and managing knowledge that we already have.

Thomas Kuhn's famous book '*The structure of scientific revolutions*' (1962) proposed a new and rather upsetting account of this notion of knowledge formation. Scientists work within and against the background of an unquestioned theory, something Kuhn termed a 'paradigm', which produces positive knowledge in this framework (Kuhn, 1962, p.10). Scientists who resist the prevailing paradigm might signal the emergence of a new paradigm, just as Einstein's theory of relativity challenged Newton's concepts of physics. Knowledge of the new paradigm is knowledge that cannot build on that which precedes it. Kuhn came to the conclusion that science is not a steady, cumulative acquisition of knowledge but includes phases, which produce 'negative knowledge' in the context of the prevailing paradigm.

Discussion on expertise and organisational knowledge rarely critically explores the Kuhnian thesis that knowing is not merely 'constructive' and 'cumulative', but also includes paradigmatic changes.[1] In the methodological literature of traditional organisation and management research, knowledge formation follows the pattern of defining, conceptualising, categorising, modelling, evaluating and measuring. Although there may be no paradigmatic alteration in the knowledge basis of management and organisational studies, sometimes – despite all expertise, knowledge and skills – individual experts are not able to obtain positive or desired results. They face the

painful process of unlearning and 'unpacking' old skills and knowledge. In this paper, we will examine the paradox that experts should give up some elements of their knowing in order to understand things more profoundly.

While Kuhn did not use explicitly the term 'negative', 'negative' has belonged to philosophical terminologies since Hegel. Maurice Merleau-Ponty's late philosophy is sometimes called 'negative philosophy' (Madison, 1981, pp.192–196). According to Merleau-Ponty, the world is largely perceived and understood *indirectly* and in a negative manner. There are many things and phenomena, which we do not recognise until they are absent. We do not notice a cleaner's visiting until he/she stops coming and our office becomes dirty. Cleanliness is understood by the presence of untidiness. 'Negative' also has a role in Ludwig Wittgenstein's philosophy of language. According to Wittgenstein, any proposition can be expressed in a negative manner because a natural language is a flexible instrument that radically underdetermines truth.

In addition to philosophers, Christian theologians have also used the term. One branch of theology, the so-called *negative theology* (apophasis), involves the idea that God is best identified in terms of what we cannot know about Him, in terms of 'absence', 'otherness' and 'difference'. It has been influential in modern Christian thought, resonating as it does with the secular notions of absence, otherness and difference developed in recent continental philosophy.

Minsky (1994) introduced explicitly the idea of knowing negatively in his paper 'Negative Expertise'. He points out that competence often requires one to know what one must do, but it also requires one to know what not to do. We more often learn how to avoid disaster rather than how to succeed. In the process of learning, even experts seem to have negative rather than positive goals, namely that we seem to learn what should not be done. Minsky sees positive knowledge simply as an opposite to negative without reflecting analytically on their overlapping. Our purpose is to develop Minsky's ideas further, by analysing 'positive' and 'negative' in more systematic manners and bringing these finding into practice. For instance, when working in close collaboration, experts must ask what they do not know in order to integrate knowledge that they do not have.

In analysing these different aspects of 'knowing negatively' in this paper, our purpose is to challenge the modern conception of expertise and organisational knowledge creation. First, we examine negative knowing and its inherent relation to positive knowledge. Then, we consider organisational knowledge as relational by questioning the asset notion of knowledge. Next, we analyse Dreyfus's positive notion of expertise by attempting to show why negative knowledge is possible, useful and even necessary in postmodern expertise. Then, we discuss negative knowledge and its four aspects by using the game industry as an example. Finally, we reflect on the professional closures of traditional kinds of expertise, and the transition to open expertise and negative knowing.

2   From positive to negative knowledge

As many researchers have pointed out (Nonaka and Takeuchi, 1995, pp.58, 59; Alvesson and Kärreman, 2001, p.1015; Tsoukas and Vladimirou, 2001, p.974), knowledge management tends to consider knowledge as synonymous with information or even data. Alvesson and Kärreman have argued that the conflation of knowledge and management is misleading because usually it is information and people that are managed

rather than knowledge. Knowledge, information and data should be treated as distinctive concepts, though they can be arranged on a single continuum.

Data simply exists and has no significance beyond its existence. It can exist in any form, which may be usable or not. Texts, pictures, figures, recorded sounds and animation can be considered as pieces of data. A datum does not have any intrinsic meaning in and of itself. Information is data, which represents something of significance to a person or an organisation. For instance, the phrase "La Rambla is Barcelona's most famous pedestrian boulevard", is an example of information – as long as it is read or heard by somebody. The data in this sentence merely consists of single letters or series of letters.

Knowledge, which is derived from data and information is essentially related to human action (e.g., Sanchez and Heene, 1997; Nonaka et al., 2001; Davenport and Prusak, 1998). In the traditional view that has evolved since Plato, knowledge is often said to be a true belief, which can be justified. The distinction between true belief and knowledge is a matter of our experience. Knowing involves awareness of the contrast between a current belief, with various inferior beliefs. Knowing is also a state of being in a position to reject doubt, to have grounds for certainty rather than doubt. If knowledge is to be possible, some beliefs must be defensible, that is, justifiable. In regard to the sentence above, and in order to justify it, we should research all of the pedestrian boulevards in Barcelona and compare them to La Rambla to be convinced that La Rambla is indeed the most famous boulevard in Barcelona.

Justification means that we are aware of which streets are not as famous as La Rambla. This implies that positive knowledge, true justified beliefs, also includes the ability to show something that is not true. In creating knowledge, people learn to know both how to achieve goals, but also how to avoid disasters, and they learn what not to do. This implies that in creating knowledge, that is, selecting true beliefs from the wrong ones, people also come to know false beliefs. The example of La Rambla does not reveal one of the main negative aspects in positive knowing, namely the intrinsic reason of why we seek knowledge. We seek knowledge because we do not know something and we are aware of this ignorance.

It seems that positive knowledge presupposes 'negative knowledge' in terms of its definition. Is it possible to discuss 'negative knowing' without positive knowledge? A more relevant question: does negative knowledge include aspects that are useful or even necessary in regarding expertise and organisational knowledge? The term 'negative' usually carries connotations such as harmful and damaging. To characterise negative knowledge, we identify four features of negative knowing. The first two are also relevant in positive knowledge, the remaining two are the intrinsic areas of negative knowledge in expertise:

- *to know what one does not know*: experts are usually aware of their own competence, but they must also know what they do not know and what they should know

- *to know what not to do*: experts must know both how to achieve goals and how to avoid disasters, namely 'learning what not to do'

- *unlearning and bracketing knowledge*: experts may get into a situation when they have to give up some parts of their knowing and 'unlearn' or 'bracket' their skills and know-how

- *failures and mistakes*: experts should also regard the value of failures, disappointments and frustrations as emotions, as well as recognise the creativity that emerges from making mistakes.

Negative is not considered here as the mere empty opposite to the 'positive', but rather we argue that it has its own independent arena, of which we should be more aware. Unlearning, bracketing knowledge, having failures, making mistakes and ignorance are all included in negative knowing. All aspects except the last one are relevant in terms of expertise. Ignorance differs drastically from 'to know what one does not know'. Ignorant persons are not aware of ignorance unlike those who know that they do not know. Persons who do not know something have reasons to seek out knowledge unlike ignorant persons. We argue that positive and negative knowledge can be considered as independent areas, which overlap one another in the following way:

Table 1   Linking positive and negative knowledge

Positive knowledge	Positive and negative knowledge	Negative knowledge
True justified beliefs	To know what one does not know	Unlearning and bracketing knowledge
Constructive, cumulative, paradigmatic	To know what not to do	Failures and mistakes
		Ignorance

3   Organisational knowledge: from asset to action

The discourse on knowledge management suggests that the traditional framework of knowledge is an 'asset'. This asset aspect assumes that the necessary and relevant knowledge exists 'somewhere' and all we have to do is to establish a system effective enough to excavate that knowledge. A process and action aspect emphasises structural and human processes and contexts where the relevant knowledge is negotiated and constructed.

In the history of professionals and experts, problem-solving capacity was long considered to be related to the individual representatives (teachers, lawyers and doctors) of institutions (schools, courtrooms and hospitals). The problems of customers or clients were increasingly classified and solved by institutions, instead of individuals. However, the complexity within 'knowledge-intensive' groups (firm consults, designers) has increased and their relationship to established institutions has loosened. Consequently, knowledge is more individualised than before. Interestingly, when 'knowledge creation' is more dependent on the subjects who know, the asset aspect of knowing is still relevant but more related to individual skills and personal knowing than institutions.

Most new and old professions are considered to be useful and practical as long as they are able to solve special problems for people. Lawyers defend people's legal rights and doctors have medical know-how on how to cure diseases. The knowledge and skills needed in these professions form 'problem-solving systems', which require extensive,

long-term education with both theoretical and practical knowledge. In addition to the theoretical knowledge of diseases, doctors require good judgement skills. By reading patients' symptoms, doctors should have the tacit knowledge to make a correct diagnosis. The tacit aspect is not formulated only in words but rendered visible by presenting examples and particular cases where the underlying rules are concretised. The (rational model of) knowledge presented here is opposed to features such as uncertainty, complexity and instability, that is, 'not knowing for sure', the ability to sketch, form and design lies in one's fingers and eyes. This practical 'bodily' knowledge cannot necessarily be expressed in words or writing (Parviainen, 2002).

Learning to make a diagnosis can be considered to be a habitual process of knowing. Learning is intimately connected to memory, whether it involves bodily memory or conceptual recollection. The difference between 'knowledge' and 'learning' is related to the difference between 'justification' and 'memorising'. People who have learned something can undertake useful actions without the need to recollect all of the phases they underwent to obtain useful skills.

Argyris and Schön (1978) have identified two types of learning, namely, 'single-loop' learning and 'double-loop' learning. Single-loop learning seems to be present when goals, values, frameworks and strategies are taken for granted. The emphasis is on using techniques and making techniques more efficient. Models of organisational learning usually show how competence learning inside organisations easily becomes fixated on achieving the optimal use of allocations and technologies. Single-loop learning as 'rapid learning' tends to exclude the experimentation necessary for discovering good alternatives (March, 1988, p.10). Double-loop learning, by contrast, depends on questioning the role of the framing and learning systems, which underlie actual goals and strategies. It is more reflective and creative, and involves consideration of the notions of good and bad.

Instead of focusing on representatives of an institution, it has become common to speak about expert organisations, organisational knowledge and organisational learning. In discussing organisational learning, Chris Argyris and Donald Schön focus strongly on individual and group interactions and organisational defenses. Organisational learning occurs when employees' own discoveries, inventions and evaluations are embedded in organisational memory (Argyris and Schön 1978, p.19). Learning must be encoded both in the individual images and in the shared maps of the organisational practices. Argyris and Schön describe the organisational learning process in rather mechanistic and technical terms, but the central idea is that in analysing the learning of teams and organisations, we cannot focus on only people but also need to consider the networks and relationships between the people.

Czarniawska (2004) argues that focusing on actors, organisations or their relations is not sufficient: she uses the term 'action nets' to describe the actions between the actors. A standard analysis begins with 'actors' or 'organisations', which overlooks the mobility and movement inherent in contemporary organising. The action net approach allows attention to be paid to the fact that people in postmodern organisations are interconnected through their actions. Action connections can assume a variety of forms: formal contracts, hierarchical subordination, but also friendships and collegial discussion.

Czarniawska's analysis questions the asset aspect of knowing on the individual or organisational level, since knowledge is negotiated and constructed in action nets. She argues that connections between actions produce actors: one becomes 'a publisher' because he/she publishes books. Though Czarniawska's case aims at illustrating action

instead of actors in organisations, we assume that mere action is not sufficient to explain a publisher's expertise. Not all people who publish books can be considered professionals in publishing because they may be involved with vanity publishing.

4   Positive expertise

The modern psychological notion of the expert is focused strongly on an individual who surpasses mere competency in a social domain of knowledge and skills. Hubert Dreyfus's description of expertise is one well-known and widely used explanation of the progression of an individual as a project. Dreyfus (1986, P.21) identified five stages, which experts usually pass through as they improve their skills. These stages are termed novice, advanced beginner, competent, proficient and expert. Many managerial and leadership models follow the same pattern of expertise (e.g., Quinn et al., 2003).

During the first stage of the acquisition of a new skill through instruction, the novice learns to recognise various objective facts and features relevant to the skill and acquires rules for determining actions based upon those facts and features. The advanced beginner learns to consider more context-free facts and to use more sophisticated rules. Moreover, he/she also learns a more important lesson involving a broader conception of the world of the skill. The competent performer no longer merely follows rules designed to enable him/her to operate safely and but works with a goal in mind by making his/her own choices. The two highest levels of skill are characterised by a rapid, fluid, involved kind of behaviour that bears no apparent similarity to the slow, detached reasoning of the problem-solving process of three lower levels. Experts know what to do based on mature and practiced understanding. When deeply involved in coping with their environment, they do not see problems in a detached way and work at solving them. They do worry about the future or devise plans. They usually do not make conscious deliberative decisions when they walk, talk, drive or carry on most social activities. An expert's skill has become so much a part of him or her that he or she need be any more aware of it than he or she is of his or her own body. As Dreyfus notes:

> "When things are proceeding normally, experts don't solve problems and don't make decisions: they do what normally works." (Dreyfus, 1986, pp.30, 31)

There is a progression from the analytical behaviour of a detached subject, consciously decomposing his environment into recognisable elements. Instead of following abstract rules, the expert has combined skilled behaviour based on an accumulation of concrete experiences and the unconscious recognition of new situations as similar to whole remembered ones.

We call the description of Dreyfus's five steps from novice to expert as 'positive expertise', since it mainly discusses expertise as linear progression and succession. Positive expertise seems to increase only in continuous learning. In other words, we should spend our lives acquiring knowledge and learning new skills. As Contu et al. (2003, p.941) points out, this learning discourse is deeply problematic, since learning might encompass anything from reading Derrida to making petrol bombs. Using the term 'positive' here, we address its connotations as 'certain', 'define', 'linear', 'chronological', 'constructive' and 'accumulative'. Accumulative and constructive involve the type of knowing that are acquired by skills and knowledge added to the body of knowledge, some slightly, others more substantially.

Dreyfus' theory of expertise sees the progression as hierarchical, idealistic and individualistic. He assumes implicitly that there are clear standards or principles on how we define various types of expertise such as management, nursing, economic forecasting, teaching or research. We assume we rarely have any targets or definitions of expertise when starting to study something new. The levels of the acquisition of a new skill can only partly be captured through retrospection. In learning or acquiring knowledge, we tend to forget all the details of a messy, non-linear training process, interpolating and generalising about our own skill development. This includes phases where we give up previously adopted points and skills in order to understand something that is incoherent with our knowledge.

Dreyfus (1986, p.167) sees the progression of expertise in an unproblematic manner, though he points out that one can get to stage five without first passing through the previous four and not everyone achieves the level of expertise. Some kind of automatic behaviour is the main characteristic of expertise, but there is a danger in doing things in this manner. When a novice doctor becomes an expert, experiencing himself/herself simply as doing effective and skillful everyday work, he/she easily sees his/her personal ways as meeting a fixed normative standard. When expert doctors are collected for a top team and each understands his/her function and role, their collaboration does not necessarily work effectively. The technical integration of various kinds of expertise is not sufficient for successful collaboration in a team.

Dreyfus's explanation of expertise ignores gender issues, power, social and emotional aspects in this transformation of subjectivity. Modern positive expertise suggests that it is the individual who must take the primary responsibility for his/her capacity or incapacity to cope. For example, experts have difficulty in avoiding stress symptoms when they have to cope with violent clients or aggressive bosses (Newton, 1995, p.2). Expertise should thus be set in a broader context. We go through periods of crisis, renewal, downsizing, returning to school and working on hybrid expertise depending on the situation of the global and local market economy. Though the knowledge of experts should be based on the acquisition of skills, maturing and practiced understanding, there are also 'negative turns', mistaken choices, doubts, failures and errors, which are not owing to ignorance or the lack of expertise.

5   Negative knowledge in expertise

The expertise needed in postmodern enterprises is hardly 'linear', 'monolithic' and 'chronological', but includes aspects of the negative knowing introduced previously. Next, we will consider how four aspects of negative knowledge may function in a postmodern enterprise.

Imagine a small game company that is specialised in producing role-playing games (flarp). The production of a new game requires a multi-professional, interdisciplinary team. In planning a new game, the project manager would need to think about what kind of knowledge the experts have in the company and what kind they *do not have* in order to recruit new staff. If organisations lean on employees' skills and techniques, which have led to success in past, this usually leads to a situation in which employees learn to become better at things they do often and lose competence at things they do rarely (March, 1988, pp.9–11). Organisations, like people, seem to automatically follow habitual manners in doing things. This implies that success in the past may limit success

in the future (March, 1991; Eriksson, 1995). It is important that managers undertake a difficult challenge to reflect on what the game design experts of the company *do not know* and how to develop these missing aspects of knowing.

In working on a new game, the designers of different areas such as scripters, motion animators, character artists, texture artists, cinematic artists, concept artists, environment modellers and technical artists must know how to combine inherently different knowledge bases. In order to do this, they must learn what they *do not know* themselves in order to integrate the knowledge that they do not have themselves. As we stated above, the technical integration of various kinds of expertise is not sufficient for successful collaboration in a team. A motion animator should understand how an environment modeller's expertise fits into the context of his/her own work, enriching and altering what he/she already knew about game designing (Bechky, 2003, p.321). A motion animator's understanding of the product, process and team work is expanded, not merely by the introduction of new knowledge, but by placing that expertise within his/her own locus of practice in such a way that enhance his/her understanding of the work. In the creation of common ground, the members of the group are able to recontextualise personal knowledge, providing the context needed to create shared understanding across different kinds of expertise. The transformation of individual knowing leads to *collective expertise*, which is no longer the sum of the expertise of team members but greater than that.

The second aspect of negative knowledge is that in trying to solve complicated problems in working on a new game, the designers must know what they must do, which is obvious, but they must also must *know what not to do*. It sounds obvious that we try to avoid patterns of doing things that are considered to yield poor results. Avoiding habitual automatic errors – to say nothing of disagreements – is far more difficult than it seems to be. Knowing what not to do requires the sensibility of team members to see the signs of things, which can easily lead to conflicts, dead-ends and errors in the working process. Most people recognise these weak sings as changes in the atmosphere of the team or increasing stress symptoms, but only socially sensible managers can avoid the 'snowball effect' of conflicts and errors at work.

In creating a new game product, it is also necessary to change the working methods and techniques, which the old design team used with previous products. From the senior designers' point of view, their difficult task is to 'bracket' knowledge in certain situations in order to emerge into a new way of thinking. Tacit knowing is frequently a black spot for experts. Game designers have difficulties in applying new ideas to develop a game on the basis of their positive knowledge, which is both tacit and explicit. Owing to rapid development in both hardware and software, changes in game designing during the game production are often paradigmatic. As we have stated above, the new paradigm requires negative knowledge, the unpacking of old beliefs and facts. This implies, of course, that when a new paradigm is established, negative returns to positive. Following Kuhn's thinking in game design revolutions, one virtual world design system is replaced by another. Unlike Dreyfus, novice designers are not just following the rules of designing, they are usually more free to apply the fresh ideas of gaming platforms, because their knowledge is not as tightly bound to one paradigmatic knowledge as in the case of senior designers.

What aspects, then, inhibit the unpacking of certain beliefs, emotions and behaviour? Argyris and Schön (1974) argue that people have mental maps of how to act in situations. In addition to mental maps, we would like to address 'bodily maps', which we also need in action. Learning to play a game with a computer makes this evident. It is a question of

the bodily comprehension of finding the keys without 'thinking in the mind' about the position of the fingers (Parviainen, 1998, p.55). This implies that mental and bodily maps or 'body memory' guide people's actions rather than the theories they explicitly espouse. Argyris and Schön (1978) suggest that in order to change behaviour, we need to focus on our learning processes. Unlearning requires that we should learn not to react to things with skilled automatic action. Does double-loop learning help us in this process since it focuses on considering the context rather than the action itself?

The body has the capacity to learn and remember movements, which makes many types of expertise possible. An activity is learned when the body has understood it, that is, when it has incorporated it into its map (Merleau-Ponty, 1962, p.139). Learning a new thing is, in fact, much easier than unlearning old habits, whether they are mental or bodily maps. In designing a new game, experts should think about how people are used to playing games and how much a new game is able to make those bodily and mental manners more enjoyable. In order to introduce something new, the experts' unlearning requires that they become aware of their own habitual ways of playing. Double-loop learning suggests that they should reflect on habitual bodily behaviour to create new innovative game technology. By trying to act in a new manner, they probably constantly face habitual ways of reacting to things. Since habitual manners are often difficult to recognise, they perhaps need to visit new environments different from virtual words to study new playing experiences.

Negative knowledge involves the kind of attitude that when doing things we have to regard the value of failures, disappointments and frustrations. Organisations usually inhibit double-loop learning because they tend to punish people for their mistakes. In fact, errors can serve as a source of knowledge, not just mistakes, but legitimate errors (Morgan, 1986, p.91). When designing a new game, a legitimate error can provide a potential lesson for the whole team rather than simply causing an embarrassing situation for which an individual should feel ashamed. In analysing the damage caused by errors, the team should be sensitive to see what new opportunities that can be opened by accident. Legitimate errors sometimes provide the potential to discover new creative ways of handling things or finding new solutions, which habitual manners do not bring. Of course, this does not mean that people should be encouraged to make legitimate errors freely, but rather that when they have made one, the value of the errors should be considered carefully.

Negative knowledge as legitimate error and unlearning may be related to what is commonly called 'creativity' (Minsky, 1994). The term creativity is used in a number of different ways. Experts on game design can be called creative because they bring something new into the world, something that has not existed in it before. Creating a new game is hardly the result of following set rules. Playing and experimenting without the ability to question norms and rules rarely lead to new innovations. This implies that old ways of thinking or knowing something prevent us from developing new ideas. Negative knowledge suggests that we should first bracket the knowledge we have of a thing to gain access to developing new ideas around it. Seeing things in unconventional and creative ways is rather difficult without a sense of humour. Humour is usually related to a negative understanding of things; we may laugh at situations that are beyond our understanding. Humour and jokes sometimes depict situations and events, which are often highly unlikely but still resonate with the sting of truth.[2]

Negative knowledge is involved in the forms of thinking that we term 'emotional', such as shame and humour but also includes anger, fear and frustration. Instead of hiding

shameful occasions such as errors in organisational life, a new sensitivity in postmodern organisation theories suggests that we should be more vulnerable and open at work (Chia, 1995, p.109; Hirschhorn, 1998, p.87). Making oneself open to the ideas, thoughts and the feelings of others might help the whole organisation absorb and deal with the uncertainty of its environment rather than trying to avoid or eliminate it.

6   From professional closures to open expertise

Negative knowledge can take a creative and innovative role in the new economy such as in the example of the fast developing game industry, but what about in institutionalised and protected expertise areas? The modern conception of the expert is still discernible in traditional professions such as doctors, lawyers, priests and teachers.

In terms of professional history, Collins (1990) argues that law and theology are two of the oldest and most important professions and expertise areas in the society. It was the Church that created universities, while the connection with the state forms the core of the lawyer's position. Larson (1990, pp.24–45) claims that whenever these professions were challenged, individually or collectively, they withdrew behind the boundaries of their discursive fields and moved towards the protected core of their expertise. Collins suggests that 'self-created problems', 'scientific, objective knowledge' and 'professional terminology' seem to be the most important component of sustaining their social status in the society. Under the protection of symbolic capital, old expertise areas such as law, theology, medicine, economic practices, education and penal institutions have developed professional closures. These professional closures have esteem for a high degree of rigidity, internal homogeneity and a strict cognitive hierarchy between experts and laymen.

In protecting professional closures, practices have defined the high quality standards of expertise and professional knowledge accumulated during a long and demanding education. In sustaining the consensus of know-how standards among experts, they have emphasised positive knowledge based on scientific, objective research. However, appealing to high-quality expertise and scientific knowledge in protecting their social status no longer produces as effective results as before, guaranteeing a high-income level, independence and prestige.

Customers, clients and patients no longer tolerate experts who withdraw behind the boundaries of professional discourses in the face-to-face meetings. They demand useful consulting on their problems and in exchange for their money. As Barbara Czarniawska stated above, professional knowledge is negotiated and constructed in action nets between experts and clients/patients/colleagues. Constructed knowledge does not lean on only a relative basis, since expertise is based on unified education ruled by government and collegial critical discussion on their standards.

Instead of professional closures, customer culture requires 'open expertise' even in old expertise areas such in medicine, law and theology. 'Open expertise' is a customer-oriented activity with the result that experts have only tools or facilities to produce knowledge in action nets with laymen (Saaristo, 2000; Eräsaari, 2002, p.32).

In open expertise, negative knowledge has a more central role than in positive expertise. A doctor may have high-quality medical and practical knowledge on internal disease, but he/she does not necessarily have experience with patients with diseases. In describing their condition, the patients report on their experiential, bodily knowledge

of diseases. As a 'problem-solving activity', knowledge of the nature of the disease is negotiated and constructed in the discussion between the doctor and a patient. Knowledge formation is related to the doctor's ability to bracket his/her knowing, in order to imagine all kinds of possibilities to which the patient's symptoms may refer. In developing a socially sensitive dialogue with his/her patients, the doctor may learn more about medicine than simply by reading scientific literature. Open expertise and social sensitivity would provide a basis for mutual knowledge formation between doctors and patients as action nets.

7   Conclusion

In this paper, we have questioned the traditional notion of expertise by introducing the term 'negative knowledge' and putting it into a practical context. We argued that positive knowing is based on a constructive, linear and accumulative process emphasising an asset aspect in knowledge formation. This asset aspect knowledge is involved in the modern notion of expertise, which sees the progression of experts and their know-how mainly as an individualistic project. Most postmodern organisations function within multi-professional and interdisciplinary teams, which require experts to have specific knowledge but also to have the ability to produce relevant knowledge through negotiation with colleagues, partners and clients.

'Negative' is concerned with 'the reflective turn', which sees unlearning skills, bracketing knowledge, doubt, having failures and making errors as meaningful for expertise, not just as signals of ignorance or the lack of expertise. We have identified four features by which we describe negative knowing. First, we are usually aware of our own competence, but we must also know what we do not know. Second, we must know what we must do, but also know what not to do. Third, negative knowledge involves 'unlearning' or 'bracketing' skills and knowledge. The fourth aspect in negative knowledge is that in doing things, we have to regard the value of failures, disappointments and frustrations. We argued that negative knowledge might have a creative and innovative role in a new economy such as in the fast developing game industry.

In contextualising negative knowledge in collective work, we illustrated potential situations and events where experts know negatively in designing a new game. Unlike fast paradigmatic changes in the current IT-industry, upheavals occur less frequently in the established areas of expertise such as in law and medicine. Established professions, which require extensive education and practical knowledge, tend to form 'professional closures' and 'inner circles'. Professional closures seem to follow the principles and practices, which can be characterised by a high degree of rigidity, internal homogeneity and a low esteem for the individual experiences of clients and customers. We suggested that customer culture requires 'open expertise' and knowledge creation in the action nets in the traditional areas of expertise. It is obvious that experts who admit, 'not knowing' as a part of their expertise become more vulnerable, partly surrendering their social prestige but, at the same time, they also become psychologically more present and reflective at work.

Knowing negatively is related to a new sensitivity at work. Through negative knowledge we may gain a 'reversal' path, which consists of seeing unconventional ways to face our problems in the organisation. As a non-deterministic, deconstructive process,

negative knowledge calls upon cognition, but it also asks questions to which there are no answers at all or questions that are not accessible through knowledge. Thus, it goes beyond cognition itself towards intuition, experimentation and creativity. It beckons to give us understanding about which there has previously been no understanding. When we face difficult, problematic situations to which there is perhaps no simple answer, we should think about the limits of our cognition with a reflective turn. The reflective turn requires that we face up to our own attitudes and positions towards things and people to question our own fixed patterns of behaviour.

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Notes

[1] Kuhn's treatise influenced not only scientists but also philosophers, historians, sociologists and economists, as well as raised considerable debate for and against his thesis. Though many contemporary researchers appreciate what Kuhn did, they believe that it is no longer possible to articulate a monolith of science as Kuhn assumed. Kuhn's theory is criticised as being too abstract and incoherent in terms of the current scattered collection of scientific discourses. However, Kuhn's argument that there are limits to the cumulative acquisition of knowledge is significant regarding negative knowledge.

[2] Several web sides on light bulb jokes can be found on the internet, including questions with ripostes such as "How many economists does it take to screw in a light bulb? None. If the light bulb really needed changing, market forces would have already caused it to happen". http://www.eyrie.org/~thad/strange/lightbulbs.html.