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SUPER-DOCILITY IN ORGANIZATIONS: AN EVOLUTIONARY MODEL

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ABSTRACT

Herbert Simon introduced the term "docility" to define the tendency of human beings to get information from social channels. In this paper, we enrich this first definition with distributed cognition based arguments, and suggest that docile individuals modify the information they get, before passing it on to others. We present a simulation model of *docile* and *non-docile* individuals in organizations, where different docility attitudes (behaviors) are considered. In standard conditions, findings suggest that the above-average docile individuals remain below 20% of the number of workers in a given organization. This way, we outline potentials and limits of this intriguing concept.

***Key-words*:** docility, distributed cognition, external resources, information flows, social interactions

INTRODUCTION

"Docility" is defined here as the tendency to make decisions on the basis of information shared through social channels (see below). We use it as a technical term, in the sense that its meaning is far from common language usage or from what one can find in the dictionary. Is this concept worth discussing? Does it improve our knowledge and understanding of organizational behavior? We answer these questions by presenting a formal model of "docile" behavior through which we discuss implications of this approach for scholars and practitioners.

Despite Simon's major breakthrough in the study of docility (1990; 1993), the model presented in this paper is far from Simon's in the sense

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that it has a very different objective. We want to describe human behavior in organizations, and to analyze the way individuals interact in this small and defined social environment (Scott, 2001).

The core idea of this paper is that individuals show different levels of docility, and that these levels affect the way individuals work and how organizations actually function. Once defined this way, the docile individual might present this trait *below*, *on* or *above* the average of the other docile individuals in the population. We argue that individuals showing above-average docility in the population are needed for a social system to work ("super-docile": *super* derives from the Latin word *supra*, meaning "above"). However, what is their percentage? How many super-docile individuals are needed to guarantee that the system reaches its operating level? Is there any "super-docile number"?

We describe the case for docility as it emerges in the literature (Simon, 1997; 1990; 1993; Knudsen, 2003; Bruderer, & Singh, 1996; Secchi, 2007). Then we re-define the term on the basis of the distributed cognition approach (Hutchins, 1995; Magnani, & Dossena, 2005) and present a model of social interaction in organizations. In the first section, we introduce the notion of docility in relation to altruism, consistent with Simon's thinking, and to the distributed cognition approach. This allows us to generate propositions on which the model and the simulation are based. Then, we outline the model of social interactions in organizations based on information flows (section 2). Implications and discussion of the model are presented in the last section before conclusions.

Before starting our discussion, it is better to briefly outline the role of game theory simulation in describing human behavior and social interactions. First of all, game theory simulation is not used very often in management, while mathematical approaches to organizational behavior started to appear very early in the discipline (Brown, 1967; Cyert, & March, 1963; Simon, 1955).

We find alternative approaches to the main aim of this paper. Among them, for instance, Milgram's six degrees of separation (Travers, & Milgram, 1969), and Malcolm Gladwell's writings about connectors, mavens, and salesmen in *The Tipping Point* (Gladwell, 2000). These two examples introduce a kind of "Law of the few," which may intercept our main concern in this paper. However, the main problem we raise in this paper is quite different for a number of reasons. Above all, we are not going to unveil patterns which are somehow related to any kind of social endemic or trend. This is just a case in point which clearly goes beyond our concern and interest, since we aim at describing those structural features required to make a working organization. Failures or successes are only parts of the broader context of an organization's life.

More generally, game theory simulation is generally used as an *epistemic mediator* (Magnani, 2001; 2007): the term "epistemic mediator" refers to those situations in which an external object (called a "mediator") cognitively helps humans by uncovering new information and tacit inferences that would otherwise remain hidden. A simulation is an epistemic mediator because it allows us to see concepts and ideas *in action* – so to speak. As pointed out by Maynard-Smith (1982, p. 8), game theory models "force us to think about change as well as consistency." What we get out of a simulation is sometimes extremely useful, although it irremediably offers an oversimplified model of the world; its main virtue resides on its *mimetic* features. That is, although a simulation cannot render a certain phenomenon as it really is, it contributes to us an external representation which could not be forged by our mind alone. Conversely, such a forging would require additional efforts not immediately available without the mediation of an external representation that would somehow mimic the main feature of the phenomenon in question.

In our particular case, a simulation, no matter how abstract it is, may help us think in terms of the process that may occur. Rather than the outputs that one can get, it is also important to see *what kind of processes* certain inputs lead to. All that cannot be done within our mind, but it needs additional cognitive capabilities, which cannot be exhibited if decoupled from some external structure appropriately designed. This is an intuitive justification of the reason why we will place more attention upon certain aspects of human behavior at a cost of abstraction. The cognitive virtue of our choice will be shown in the course of the paper.

Indeed, a simulation can only represent *mimetically* (Magnani, 2006) a social behavior or interaction. In devising the model and discussing it, we do not mean that it is a description of what society is. Abstraction is the price we have to pay. However, we maintain this kind of simulation can have a powerful *heuristic* role that we can take advantage of.

DOCILITY AND SOCIAL INTERACTION

From Altruism to Docility

As a matter of fact, the notion of altruism assumes a great variety of meanings depending on the context in which it is actually considered (Khalil, 2004). For instance, it is altruistic to help another human being who suffers or is in danger for some reason. This is a kind of pro-social behavior. Altruism also means to sacrifice one's fitness in a way that advantages another individual's fitness (Becker, 1976; Simon, 1993). Or it can be viewed simply as the intention of benefiting another individual: in this case altruism is a kind of *genuine regard* for others (De George, 1999).

As the reader can see, these meanings overlap in part, since all of them refer to a certain person who is motivated to give something, but gains (or thinks to gain) no return from the beneficiary of his/her action (Khalil, 2004; Simon, 1990; 1993). Roughly speaking, altruism can be described as a *pull-push* mechanism. That is, altruism (and its contrary, namely, selfishness) deals with all those situations in which a person decides to *push* or *pull* towards oneself or others a certain *good* (money, happiness, help, fitness, etc.). If one pulls a certain good towards oneself she/he is commonly described as selfish, whereas if one decides to push it towards others, she/he is described as altruistic.

The concept of altruism has been commonly used to explain, for instance, cooperation (Axelrod, 1984), and all those behaviors that make social living possible. But it is also referred to as a pro-moral behavior that can also be found among animals and insects, for instance (Joyce, 2006).

Although we do not find any fault in this characterization, we maintain that this representation is incomplete, since it reduces an interaction between human beings basically to an exchange of something: it does not address any *cognitive* dimension. That is, interacting with other human beings can constitute the basis for accomplishing various tasks and, ultimately, for making decisions and solving problems. The *social* dimension turns out to be a valuable resource (Etzioni, 1988; Frank, 1988; 2004) that becomes part of our cognitive system and the way it evolves (Humphrey, 1976; Magnani, 2007).

As it will be shown below, our perspective tries to enhance these perspectives since we found that cognitive dimensions provide a better understanding of human nature rather than the concept of altruism. However, we acknowledge that altruism provides a consistent example of a pro-social human trait. Altruism is not a simple selfless act and clearly goes beyond ego fulfillment. Having written that, it is apparent that we to some degree follow Khalil's altercentric perspective since the individual "at least in some occasions, may share income because he is built with a pro-social trait" (2003, p. 102). Our foundation to this social trait is described below, and is indeed the basis of the model's hypotheses.

An enormous amount of information is stored in human culture and becomes available only through social learning. Information is also stored in institutions, language, and other various artifacts we daily cope with (computers, books, etc.). As suggested by Richerson and Boyd (1998; 2005) human beings are *ultrasocial* creatures, because living in large groups becomes a fundamental trait that contributes to shedding light on some human activities, for instance, decision-making and problem-solving. On this tack, Dunbar (1996; 1998) extensively investigated the impact that social complexity – typical of human communities – has had on our brains.

According to the so-called "social brain hypothesis," there was a co-evolution between (a) the human brain and (b) living in larger and larger groups during the history of human evolution. Human beings developed disproportionately those skills which allowed them to better cope with the social complexity and the increasing cognitive demands related to living in larger group size. For instance, language – especially in its social dimension, namely, gossip – appeared to be an extremely successful adaptation: it drastically facilitated various social activities (hunting, division of labor, social organization, etc.) as well as knowledge transmission (Dunbar, 2004). To sum up, all these studies suggest what Wilson (2004, and 2005) refers to as the so-called "social manifestation thesis." As he put it, "individuals engage in some forms of cognition only insofar as they constitute part of a social group" (Wilson, 2005, p. 430). According to that view, cognition is *extended* onto the social setting so that some cognitive abilities are exhibited insofar as a social dimension is available. Thus, our first proposition is:

P1a. *The more the individual exploits external social resources the more she/he fits the social environment.*

P1b. *The individual that makes poor use of external social resources faces fitness deficiencies.*

These two propositions are consistent with trends in social cognition and psychology (Kunda, 1999). In particular, proposition P1b defines the role that the social environment plays in individual fitness. The underlying assumptions follow the idea that individuals are pro-social beings. This proposition branches away from the standard definition still presented in mainstream economics (Mas-Colell, Whinston, & Green, 1995) and in certain areas of management (see for example Porter, & Kramer, 2002; Kotler, & Lee, 2004).

The concept of altruism fairly accounts for the ethical dimension of *ultrasocial* creatures like us, but it is quite lacking in its cognitive component, as just mentioned. More precisely, it does not provide any hints about how *the social* (and cognitive resources embedded in it) contributes to shape the way we make decisions and solve problems.

What Simon did when he introduced the notion of *docility* (first in 1947, and then in 1990 and 1993) was to bridge this theoretical gap. He noted that most of the time people rely on information and suggestions they gather from others. For example, before buying a laptop we usually consult a friend who is thought to be competent in the matter (if we have one). We simply trust his suggestions and we subsequently disregard other kinds of information, for instance the technical advice that a sales assistant gives us. The kind of relationship we have with a given person turns out to be a valuable cognitive resource (Kerr, & Tindale, 2004).

This is the case, for example, of *group loyalty* as a form of altruism. Simon (1993) argued that group loyalties have not only a motivational dimension, but also a cognitive one. He argued that "[t]hey define the boundaries of the group over which 'goods' are to be summed, and they cause particular variables and simplified world models to govern the thinking of group members" (pp. 159-160). Indeed, there are plenty of examples of that kind. Now, the point that Simon makes is that *being open to others,* often labeled as "altruistic behavior," turns out to be a fundamental trait (or feature or strategy) related to how humans face difficulties and overcome their various cognitive limitations to make *satisficing* decisions.

P1c. *The social individual develops cognitive qualities that enhance the probability to fit into a defined social environment.*

Simon calls this tendency to lean on social channels *docility*. Humans are "docile," in the sense that their fitness is enhanced by "the tendency to depend on suggestions, recommendations, persuasion, and information obtained through social channels as a major basis for choice" (Simon 1993, p. 156). Humans support their decision-making capabilities by receiving inputs, perceptions, data, and so on, from the social environment. The social context gives them the main data filter available to increase individual fitness. As a matter of fact, everything we know does not derive from our own experience, but is learnt from those who surround us (Humphrey, 1976; Magnani, 2006). Very often we simply watch what others are doing and imitate them. Imitation is indeed one of the most common learning activities that we may find in everyday life. Just imagine how our life would be if we had to experience everything by ourselves. Then, we argue that the environment and other people's attitudes make the difference in developing such a tendency.

P2a. *The fitness of docile individuals depends on other people willing to provide advice, comments, suggestions, and the like.*

P2b. *The social system leads docile individuals to a better fit if compared to non-docile ones.*

Although Simon never addressed any of these "distributed" conceptions of rationality or human cognition (Hutchins, 1995), it seems reasonable to say that the notion of docility clearly introduces a new element to the theory of bounded rationality. Simon's statement can be fruitfully interpreted that way: humans overcame the limits of their bounded cognitive system by delegating cognitive functions to the environment.

Suggestions, recommendations, and the like are all external resources that are socially available, and that indeed contribute to lessening various limitations. They can provide both short-term and long-term aids to reduce memory load. Within scientific and academic settings, for example, a sound comment from a reviewer can help us to direct our attention to a point we overlooked. An experienced colleague of ours can provide us with knowledge and skills which we can easily adopt upon occasion, for instance, to organize a conference or write a paper. A discussion may unearth new perspectives that were not previously available within our minds. It can be also a very precise system for getting feedback to test some ideas we are not sure about. And so on.

Other people provide external resources, suggestions and recommendations, but also the various objects and tools we are familiar with. For instance, a pen and a sheet of paper are an example of a simple but powerful external cognitive kit that drastically increases our performance when dealing with calculating, planning, remembering, communicating, thinking, and other related activities. More generally, artifacts: 1) support memory (Wilson, 2005); 2) change the representational task we face in terms of more efficient action sequences (Hutchins, 1995; Zhang, & Patel, 2006); 3) facilitate the making of more sound inferences rather than others (Magnani, 2007).

Going beyond Simon, docility can be considered as a kind of adaptation that *facilitates* the process of distributing cognitive functions to the environment, and makes that a major basis for decision making. From our birth we operate this kind of delegation, first to our parents, and then to other people. After that we begin to select between people from whom to learn something important or insignificant, and the importance of a personal role in getting information becomes ever greater. This is also apparent in studies on advice-taking and -giving where scholars found that people discount the information differently if it comes from expert or novice advisors (Harvey, & Fisher, 1997).

Developing Docility: The Active Side

As just argued, a great part of what we know is derived from other human beings and, more generally, from social channels. Just looking around, we can see a great variety of systems that make information transmission possible and let it work as a major basis for choice. Now, we want (and *need*, as shown above) to connect docility to cognition on a broader but definite basis. Hence, we argue that docility is *that* tendency which humans exhibit in any cognitive activity that mostly leans on what is found outside (i.e. external resources).

Recent developments in the so-called distributed cognition domain (Hutchins, 1995) offer empirical evidence to support our claim. According to this approach, the human cognitive system is distributed in the sense that some performance results as a continuous interplay between our mind-brain system and various external resources (Clark, & Chalmers, 1998; Zhang, 1997). That is, people do not hold internally an explicit and complete representation of a given task that they face and its variables. Rather, people continuously adjust and refine their perspective through a further exploration of the environment, which allows them to get a more detailed understanding of what they are doing (Thomas, 1999). Various resources (both animate and inanimate) are *picked up* upon occasion, and external counterparts, namely *external representations*, are created to enhance the quality of their performance.

Having assumed this updated perspective on human cognition, Simon's definition of docility is quite lacking, since it postulates docility as just a *passive* attitude. Conversely, we claim that it also has an *active* side because it deals with the entire process of distributing cognitive functions in which a person actively exploits external resources that are socially available (Clark, & Chalmers, 1998).

Simon argued that some people are docile in the sense that they lean on suggestions and recommendations by others. But we can extend that definition also attributing docile behaviors to *those who provide* suggestions and recommendations. In this case, people are docile because they tend to share with others what they know, namely, suggestions, information, etc. In doing so, they contribute to creating and generating a common basis for communicating and solving problems. Thus we modify Simon's definition as follows:

> *Docility is the tendency to depend on suggestions, perceptions, comments, and to gather information from other individuals on the one hand, and to "provide" information on the other.*

This definition may contribute to the development of a new model of social interaction which is worth investigating. According to Simon's definition, docile people are those who lean on external supports like suggestions, comments, and so forth. As he noted (Simon, 1993), we are all, to some extent, docile because we live in society, and that cannot be discarded. However, Simon's perspective turns out to be oversimplified as well. If humans are basically *social beings*, the degree to which they contribute to society may vary drastically. Moreover, our model (and the simulation) needs to take into consideration this important difference. Hence the following general proposition:

> **P3**. *Active and passive docility cannot be found the same way in each individual.*

The new definition we provided may bridge the above mentioned theoretical gap. As we put it, docility has both an active and passive side. Developing this line of thought, the active side can be further articulated into three main elements; thus, docility can be viewed also as the tendency (1) to share one's own information; (2) to give a *public* and *social* dimension to one's thought/work; (3) to render communication easier by creating, maintaining, and developing standards, or *standard-fidelity*.

Information sharing. This is recognized as one of the main attitudes needed in organizational and social life (Humphrey, 1976), and it may also be characterized as one of the traits of human personality (Digman, 1990). Differences between more active and more passive docile individuals depend on the quality of the information shared. For example, we should write that people with that particular tendency to share information on values, assumptions, beliefs, and expectations show clear attitudes towards leadership (Clawson, 2006). Of course, we suggest that this makes the difference between active and passive docility attitudes.

P3a. *Information sharing makes the difference between docile and non-docile attitudes in individual behaviors.*

P3b. *The quality of the information shared makes the difference between more or less docile individuals. The more the quality, the more the individual is suited to fit in the social context.*

General interpretation of the model indicates a tendency for differences between individuals such that we cannot find a completely non-docile or a fully docile individual. Thus, the sharing of information is related to the tendency to behave more or less cooperatively, i.e. the more the individual shares information, the more he or she shows a docile attitude.

Public and social dimensions. We maintain that docile people *think socially* (Kunda, 1999). As already noted, living in large groups of people drastically contributed to survival and reproduction (Dunbar, 1996). As a matter of fact, the larger the group size, the more it was possible for group members to protect themselves from danger. Indeed, this does come at a cost, because it implies various bounding mechanisms to make collective decisions and manage social complexity. Within this framework, docile people are those who tend to build communities of practice and learning as the basis for sound decision making.

P3c. *Docile individuals need to build communities.*

Of course, trust and commitment play an important role in this process (Goleman, 2007). However, people behave differently as communities evolve, and we argue that active docile individuals tend to build communities while passive docile individuals tend to lean on these communities. As a result, we argue that:

P3d. *Docile individuals who build communities know better than others how to exploit social channels.*

S*tandard-fidelity*. Docile people exhibit the tendency to share information, ideas, etc. That means they are committed to rendering their communication as clearly as they can. Indeed, if one wants to share an idea, it is obvious that he/she must try to make it plain and clear, otherwise he/she would fail in his/her goal of passing on information. That is to say, docile people tend to follow standards. This tendency, which can be called standard-fidelity (Bardone, Magnani, & Secchi, 2006), has important cognitive relevance, because it makes information and knowledge transmission much easier. Consider, for instance, the case of mathematicians, logicians, etc.: as much as possible, they employ ways of communicating and transferring knowledge that are transparent – namely standardizing – to overcome the ambivalent character of natural language. Thus, mathematicians and logicians have to follow the rules and standardized procedures embedded in the channel (or mediator) they use to communicate (Magnani, 2007). Now, it is worth noting that docile people exhibit a tendency to share and use standards, but they are also often involved in redefining them to enhance the transmission of knowledge and to make it more efficient. Since docile people are well-committed to passing on information and distributing cognitive functions to external resources, they focus more attention than others on the social channels, as Simon talked about. However, we argue that there is a difference between people who create and develop standards, and people who *use* and *maintain* these standards. From this perspective we may define non-docile individuals not using standards at all, or using them improperly.

P3e. *Creating and developing standards characterizes higher degrees of docility (active more than passive).*

P3f. *Using and maintaining standards characterizes lower degrees of docility (passive more than active).*

Indeed, it is not possible to have *pure* types of docile people. For instance, pupils can be passively docile when listening to a teacher's lesson, but they are just as docile when they actively participate in the learning process, for instance, when they ask questions or attempt to answer them. In these cases, they cease to be passive and provide information that a teacher can fruitfully take advantage of.

Standard-fidelity is one of the most interesting aspects concerning docility. In order to introduce this notion, let us make an example. Consider the difference between a mathematical theorem and a magic trick; mathematicians and magicians simply differ in the method or the procedure they carry out in order to get the result. A mathematician has to follow rules and procedures that are accepted as objective. For instance, one cannot use theorems that have not yet been clearly demonstrated. Any passage must be justified according to the laws of logic: neither contradiction nor partiality can be accepted. In contrast to that, a magic trick is something completely private – That is to say: first of all, it is not publicly available to everyone who wants to know anything about it; secondly, the procedure through which one can make the trick work is kept secret as well, known only to those within the magic circle; third, there is no standard at all, since any magician can perform tricks on his or her own.

Generally speaking, we may say that the mathematician has to follow certain standards that are the standards of mathematics, accepted within the field. There is some kind of practice, such as proving a theorem or making a scientific experiment, that requires people to follow how (a) certain resources that have been employed by others and (b) the rules embedded in them. In this case, docility is represented by what we call standard-fidelity.

What is the main reason why docile people are supposed to use and share standards? By definition, docile people are those who are committed to share and exploit social channels as a way of solving problems and making decisions. Now, the connection to standard-fidelity is that using standards makes information i) transmission, ii) exploitation, and iii) re-use much easier. In this sense, standard-fidelity explicitly concerns the increasing of standards as a major opportunity to accomplish these three main docility-dependent activities. Consider a scientific experiment: here scientists follow certain standardized procedures that clearly display results and the way to test their presumed validity. That is, standardized procedures lead to results that can be understood more easily and shared better by the community of practitioners (scientists, mathematicians, and so on).

The analysis of standard-fidelity implies making explicit some basic assumptions which are not part of the definition of docility, but which are prerequisites - so to speak. First of all, standard-fidelity assumes that the actors at play posses the skill and ability to achieve clarity as a basic requirement for communicating ideas and thoughts. This is connected to the idea of using language as a public tool normally lacking in people suffering various pathologies related to autism, for instance (REF). Besides that, we also assume that people posses the ability to approve or disapprove of a certain behavior with relation to a rule or a set of rules. Standards can be easily deemed as surrogates of those behaviors which are concerning with approving or disapproving certain acquired ideas. This role is basically played by morality in human societies (Castro and Toro, 2004).

At this point, we are no longer persuaded that the term “docility” is still adequate to represent what we mean by these processes. However, we face the same difficulty Simon faced when he presented the concept for the first time. We haven’t found any better term, so we continue to use this one as a purely technical tool for our and, we hope, the reader’s understanding, too. Since we feel we are docile ourselves, any suggestion of a term we could better use is extremely welcomed.

Moreover, as Bruderer and Singh pointed out, docility relates to "specific learning capabilities" (1996, p. 1324), and we may add that this is in line with the Latin origin of this word (late 15th Century). Docility means "apt or willing to learn," from Latin "docilis," deriving from "docere," i.e. to teach.

Defining the Basic Elements of Organizational Interaction

We developed the notion of docility provided by Simon, introducing what we have called the *active side*. This allows us to put forward a key issue in our preliminary discussion. We may distinguish between those who tend to be passively docile and those who develop the active side more than others. More precisely, we can distinguish between two kinds of persons that we call respectively "docile" and "super-docile."

We postulate that those who belong to the first category simply receive information (suggestions, recommendations, etc.) and pass them on without any modification. Conversely, those who belong to the second group transmit additional information increasing the quality of what they received.

The point here is to try to understand if and how docility might be used in organizations. Docility, as we defined it, is the way people normally behave, and it is focused on particular tasks or operations. Human behavior depends on the environment (cultural, social, economic, political, etc.) where individuals operate (Scott, 2003; March, 1994). This means that, for example, the docile behavior (or an individual showing a docile tendency) might be so in her/his workplace, but she/he behaves differently when, for example, at the Golf Club or in other social settings. Therefore, our view of docility and of the individual is contingent, i.e. it does not define a general behavior, but a specific one: the one that we can find and analyze in a given organization.

THE MODEL

The main objective of this model is to answer the following question: How many super-docile individuals are needed to guarantee that the organization will work? This means that a definition of the "highest" or "best" performance of the organization falls outside the goals of this paper. The general idea underlying the model and the paper connects to the possibility of operationalizing the concept of docility. Thus, we want to explore (a) the way a social system's population can be described through docility and (b) if different docility attitudes at the individual level lead to a general tendency of the system as a whole. Point (a) finds answers in the literature (Simon, 1993; Secchi, 2007; Knudsen, 2003) while point (b) has never been considered before. Broadly speaking, our aim is to define in theory what is the level of super-docile individuals that allows the organization to reach a sort of "equilibrium." Of course, this equilibrium is strongly path-dependant, and is related to the original assumptions.

The Original Model

The model measures the *fitness*, that is to say the probability each single individual has of surviving in a social environment. "The structural ideas developed in the model are taken from the work of Robert Frank (1994, pp. 256ff); the attempt is to match his 'Hawks and Doves' model to Simon's (Frank 1994, pp. 256-257). We switch Simon's docility model of evolutionary change into an interactive game between two players, the *non-docile (nD) and the docile (D)*" (*italics added*, Secchi, 2007, p. 155).

Fitness is measured in terms of the payoffs that each individual gets from the interaction with other individuals, so that:

$$f(nD) = q(nD) \times \left(\frac{P(nD)_w + P(nD)_l}{2} \right) + q(D) \times xP(D) \tag{1}$$

$$f(D) = q(nD) \times yP(nD)_w + q(D) \times P(D) + d(D) \tag{2}$$

where *q(nD)* and *q(D)* are the percentages of population of *nD* and *D* in a given period; PnD_w and PnD_l stand for the payoff of a *non-docile* individual meeting another *non-docile* individual and respectively winning or losing; *P(D)* stands for the payoff of a *docile* individual meeting another *docile* individual; *d(D)* expresses the docility effect.

The model shows that the fitness of a *non-docile* individual depends on the probability she/he has of meeting another *non-docile*. This is in line with propositions P1a, P2a, and P2b: these individuals do not exploit external social resources, and their fitness does not depend on the social system (i.e. their behavior is the same when in social or non-social settings). Hence, they do better when they are not in a social environment. This is measured by the total number of non-docile individuals; the more there are, the less the environment can be defined as "social." In other terms, since these individuals are payoff maximizers and do not care about others, when meeting other *non-docile* individuals they have the possibility to win or lose something. The point here is that they have the potential to be winners or losers (i.e. make poor use of external social resources, P1b).

The second part of the first equation defines that, despite these facts, when a *non-docile* meets a docile individual, she/he gains from the fact that the latter provides enhanced information, i.e. is docile. This fact enhances the *non-docile*'s fitness, measured through payoff additions.

Equation (2) presents the fitness of docile individuals. This depends on the probability that docile individuals meet *non-docile* ones (P2a). Of course, probability is expressed by the number of *non-docile* individuals in the population (in percentages). The fitness of a docile person gains something from this meeting. This is "a sort of side-effect of taking always self-oriented actions, in the sense that even a selfish individual cannot take into account all of the impacts deriving from its behavior. The *y* has a discount effect on the value of the winning selfish payoff" (Secchi, 2007, p. 156).

Moreover, the fitness of the docile individual also gains from meeting another who shows docile behavior (*qD*, and *PD*). The term *d(D)* at the end of equation (2) defines the docility effect, i.e. the major contribution to fitness, deriving from the fact that docile individuals behave in a socially-oriented way (this "effect" takes into consideration P1a and P1c).

This is the basic model that incorporates the first propositions. We now want to improve this with the third proposition and apply it to organization studies.

A New Model of Docile Behavior

The point here is that payoffs, fitness, docility levels, and so on are taken as if the docile individuals were behaving the same way. This is far from reality, in as much as we know that human beings are all different in their cognitive capabilities and behavior (Simon, 1955). And so they are in the case of their docility attitude. As argued in the first part of this paper, docility cannot be regarded only as a *passive* attitude towards external resources (both animate and inanimate). Rather, it deals with the *entire* cognitive process through which human beings distribute cognitive functions to the environment. We developed the original definition introduced by Simon claiming that docility also has what we called an "active" side. Indeed, people lean on external resources (suggestions, information, knowledge, and so on) provided by others. And we suggest that is the most common way of being docile.

The ordinary- and the super-docile

Broadly speaking, we can write that (1) individuals are different, show different cognitive attitudes, behave differently in organizations and, what matters most for our purposes, (2) some people show higher levels of docility.

We want to understand how many individuals must be docile at a high level (i.e. "above average") in order to let the organization live and prosper. The hypothesis here is that few individuals present levels of docility that are "above average." This is an assumption that is realistic since most people simply lean on the information and suggestions they get from friends, from colleagues, and more generally from social channels (Bonaccio, & Dalal, 2006). In other words, they simply adapt to what is available without very much concern about how to enhance, for instance, the communication flow or the efficiency of the channel they are using. They do take advantage of the resources, and their performances are enhanced, but they are *ordinarily docile,* because they aim at getting *satisficing* results, in Simon's terms. More generally, they receive the incoming information from social channels, and they pass it on to others without modifying it from a qualitative or quantitative point of view. We will come back to this point in the next sections.

In contrast to that, people who are "docile to above-average levels" especially develop the active side of docility. As argued above, they do not simply passively adapt to what they find available through social channels, but they actively enhance the information or suggestions they get and, most of all, *the way* they get them. Therefore, they give back information and suggestions, increasing and improving their qualities, and they also try to facilitate the information flow through the social channels. Since they *think socially*, they care for all those steps and procedures that deal with information and knowledge transmission that make their externalizations easier to share.

In summary, conditions for improving individuals' cognitive performance derive from (a) sharing the basic information; (b) creating a cognitive/cultural niche (organizational culture) and making improvements public within the organization; and (c) standard fidelity. It is not common to find all of these attitudes practiced together and to a high level, so we argue that individuals showing high levels of docility (hereafter *super-docile*) are not as numerous as the ones just being docile (hereafter *ordinarily-docile*).

How to define the new model

Returning to the model, we find that among docile individuals, some are *super-docile* while others are only *ordinary-docile*. Some of the docile people behave in an ordinary way, while others do not (this integrates P3 in the model). However, how many of these individuals show a *super-docile* tendency? How many of them do we expect to find in an organizational setting?

Since this is a model based on interaction, we need to find the right weights for every variable. Of course, the arithmetic average between values of the *super-* and the *ordinarily-docile* equals what is presented in the above mentioned model (equation 2).

One of the main assumptions of the model is that the two equations are quite the same; that is because of the fact that the two types of individuals are similar: they are both docile. However, as equations (3) and (4) show, the two kinds behave differently, and interact differently when they meet one another.

$$f(sD) = q(nD) \times yP(nD)_w + q(oD) \times rP(D) + q(sD) \times mP(D) + d(sD) \qquad (3)$$

$$f(oD) = q(nD) \times yP(nD)_w + q(oD) \times zP(D) + q(sD) \times wP(D) + d(oD) \qquad (4)$$

where *q(nD)*, *q(oD)* and *q(sD)* are the population percentages of *nD*, *oD* and *sD* in a given period; $yP(nD)_w$ stands for the payoff of an *ordinarily-docile* individual meeting a *non-docile* one; *PD* stands for the payoff of a docile individual meeting another docile individual, and *z*, *w*, *r*, and *m* are the weights for the four combinations among *oD* and *sD*; *d(oD)*, and *d(sD)* express the docility effect for the *ordinarily*- and the *super-docile*.

These two algorithms substitute equation (2), so that the model acquires a three-players basis. Equation (4) presents the fitness of the *ordinarily-docile* individual, based on her/his payoff. In this case too, when the payoff is more than that of the *non-docile* or of the *super-docile*, then their population grows at a given rate (see below). Individuals with this level of docility exchange information using social channels, but rarely modify data in quality or quantity (P3a, and P3b). Thus, they literally lean on external social resources, and this means that they obtain a huge advantage when they meet *super-docile* individuals and a lesser advantage when meeting the *ordinary* ones (this remains the case for P3e, and P3f). Clearly, the *super-docile* individuals have more to offer, in terms of the quality of the information they provide (P3e, and P3b). This is represented in the model as an enhancement in terms of payoff (*w*).

On the contrary, when an *ordinarily-docile* individual meets another of the same kind, the payoff they get is slightly less than the average payoff *P(D)* (the parameter that diminishes this value is *z*). This derives from the idea that the docile individual exploits social channels, but the fact that other individuals with average docility also do so leads to getting a little less than the average payoff (P3f) in the long run. When people know the channel and the information they can get from and provide to that channel, this becomes routine (also P3c, and P3d). This is what we can call "organizational routine," and it is based on tacit knowledge (in the way we defined it here), as described by Nelson and Winter (1982). Routines are sometimes considered as responses to environmental pressures (Cyert, & March, 1963; Levitt, & March, 1988). Here we try to find their cognitive counterpart and try to connect them to the need people have to create routines and to how they behave in the organization (incidentally, we note that this underlines the importance of P1c). This is an internal perspective on routines that can be easily linked to social psychology's approach to organizations (Fiske, & Taylor 1984; Wood, & Bandura, 1989; Walsh, 1995), to the collective mind perspective (Weick, 1995; Weick, & Roberts, 1993), and to shared cognition (Cannon-Bowers et al., 1995; Klimoski, & Mohammed, 1994).

In summary, routines cannot yield more than standardized information, and routines can improve general knowledge, but they do not enhance an individual's cognitive system on a wider basis (i.e. individuals are not creative).

The last variable in equation (4) is the docility effect of the *ordinarily-docile d(oD)*. As far as we distinguish the payoffs that derive from single interactions, we also need to define different docility effects. This is because the docility effect relates directly to the level of docility the individual has. The more docile individuals are, the more they are able to get from the general social environment (P1a, P1b). Docile individuals are able to get data from social channels, and to shape their cognitive system (and consequently their behavior) through the exploitation of this information (P1c). However, we can define different individuals on the basis of the quality of information they can obtain, and from the fact that they are able to significantly modify these data. In other terms, we argue that some individuals are more embedded in the social organizational system while others are less embedded (Granovetter, 1985). The *ordinarily-docile individuals* are less embedded, and we suppose the docility effect is here above average (P3d).

Equation (3) defines the fitness of the *super-docile* individual. Here, payoffs deriving from interaction between the other two types of individuals are different. The *super-docile* individual does not learn so much from routine (P3e), so she/he gains little payoff from the interaction with *ordinarily-docile* individuals. In the model, we suppose that *r* depresses the level of average payoff for docile individuals. Since they are able to exploit and improve a great quantity of information, and to provide it to different channels, their payoff deriving from interaction with other *super-dociles* is also not that high. In other terms, they are the key to organizational data enhancement, so that they do not need to lean on external resources in that way (this is a corollary to P3a, P3b, P3d, and P3e). The cognitive system they develop is accustomed to these kinds of data manipulation. They let the others (say *ordinarily-docile* and *non-docile* individuals) gain so much from their behavior, but they don't need the same amount or quality of information in return: this is their role in the organization!

Returning to the model, this leads to the fact that the two payoffs of a *super-docile* individual meeting an *ordinarily-docile* individual, or meeting another *super-docile*, are both discounted at the rates r and m. If we stop here, the *super-docile* individual disappears very soon in this game. What makes her/him survive? These individuals survive because of the docility effect (especially because of P3d); they are social beings by definition, and they can survive and prosper in a social setting, such as an organization. Thus, the docility effect, $d(sD)$, is strong enough to put them at the top of the social hierarchy. The docility effect measures the social fitness *strictu sensu*, and *super-docile* individuals develop their capabilities in social environments only.

Of course, we know that we are oversimplifying these points, but we still believe that payoffs could fairly give an idea of human interaction. Again, we don't think of this model as "reality," nor do we think it can fairly represent reality: it is used here as a heuristic to understand the hidden character of human behavior and cognition (indirectly, as we argue in the next pages). As already argued in introducing this paper, game theory simulations are epistemic mediators, since they help us to think of concepts and ideas dynamically.

RESULTS

The next step is that of the attribution of values to variables and parameters. In line with our propositions, we can attribute the following values to parameters and variables of the first two equations: $q(nD) = 0.5$; $P(nD)w = 0.08$; $P(nD)l = -0.1$; $P(D) = 0.008$; $d(D) = 0.04$; $x = 6.3$; $y = 0.01$; $g = 0.02$. The starting point is that population is equally distributed among the two types of individuals: half *docile*, and half *non-docile*. In 46 interactions we find the same values of Secchi's simulation (2007, p.18), and the "system finds the equilibrium with $q(nD) = 3.5\%$" (p. 18). Given the basic model, in which we have *non-docile* and *docile* individuals, we want to understand, on the basis of the propositions, how many *ordinarily-* and *super-docile* individuals fit the organizational social setting.

Therefore, we split the docile population, and keep values that are consistent with our propositions and arguments. To be concise, the values for the two types of individuals have been attributed as follows: $q(oD) = 0.25$; $q(sD) = 0.25$; $P(D) = 0.008$; $z = 0.875$; $w = 1.875$; $r = 0.5$; $m = 0.75$; $d(oD) = 0.038$; $d(sD) = 0.042$; $g = 0.02$.

The model starts with docile individuals (0.5) being equally divided between *super-* and *ordinarily-docile* individuals. Considering the basic model as granted, *non-dociles* are half of the total population. This first hypothesis accomplishes two objectives. On the one hand it follows simulations presented in previous models (Simon, 1993; Secchi, 2007) making it easier to compare results. On the other hand, it also seems the more "neutral" assumption. This might be run as a thought experiment since when it is not known how a phenomenon could actually evolve, the best guess seems to be the one that assumes equal conditions for each individual types under analysis. This is the reason why non-docile and docile individuals start at 50% and ordinarily-docile and super-docile individuals start at 25%.

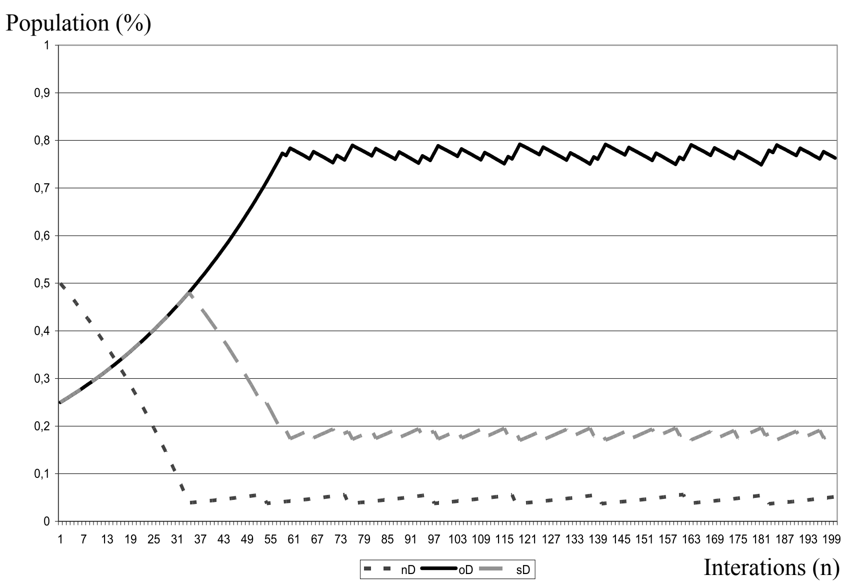
The only payoff that is above the average (*P(D)* = 0.008) is given by the *ordinarily-docile* individual meeting a *super-docile* one (*w* = 1.875). This is consistent with the fact that real improvements in terms of social fitness are gained throughout non-routines only. This input exists in the system and is provided by *super-docile* individuals.

Docility effects are distributed differently among dociles, *d(oD)* = 0.038, and *d(sD)* = 0.042, to express the different degree to which they get something from the social environment at large. This "effect" could also be expressed as a part of the average docility effect, but we prefer not to use discounted or enhanced rations here.

More than discussions on equations and interactions between variables, we think that Figure 1 provides help in the understanding of results. The *x-axis* shows the number of interactions while the *y-axis* shows the per-

FIGURE 1

Trends of *non-docile* (*nD*), *ordinarily-docile* (*oD*), and *super-docile* (*sD*) on the basis of the first 100 interactions



centage of individuals in the organization. As interactions continue, the number of individuals in the organization changes as well. We decided to connect the dots in Figure 1, to give the impression of increasing or decreasing trends for each one of the three categories.

The first 34 interactions present a clear trend, where *non-docile* results go down (as expected), and docile results of both types follow (unexpectedly) the same upward trend.

Individual payoffs lead to the outcome represented in Figure 1. Non-docile individuals decrease constantly for the first 34 interactions since they don't fit in with the system. Since they do not understand the difference between *sD* and *oD*, they don't get any cognitive advantage from that. The only advantage they get, in terms of payoff, is when they solve positively a controversy with other *nD* individuals (see above for values of parameters). This allows them to survive, but it is clear that the payoffs they get are not competitive at a social level. Docile individuals grow at the same rate until non-docile individuals are below 4% of the entire population. Both *sD* and *oD* individuals show consistent increases in the population due to payoff gains vs. *nD* payoff losses. After the 34th interaction, docile individuals cannot take advantage (gain) from *nDs* because the probability to meet one of them is very low.

In fact, once the population of *non-docile* individuals has reached a "point of no return" (i.e. they stay around 0.035), docile ones begin to differentiate. What we called the docility effect starts working here because that is the only value where *sD* exceeds *oD*. Hence, *super-docile* individuals begin a slow-down after the 34th interaction while the population of other docile individuals continues to grow. Trends for *oD* and *sD* break around the 60th interaction when the latter stabilize at c.a. 0.18, and the former at c.a. 0.78. We reiterate the process 1,500 times and find that the following 1,440 interactions show the three classes reaching equilibrium at around 0.035, 0.175, and 0.79.

DISCUSSION

Our aim is to define human behavior in organizations, and the model we describe here represents one specific aspect of behavior, the one defined by docility. One of the main objectives was to define how many individuals must be *super-docile* in an organizational setting.

We discuss here the main results of the model. First we define implications for each one of the classes of individuals, then we try to argue a set of claims on a broader basis. Taking these as key-points, in the next and last section we present some of the main problems that we see in this model, and try to outline future research trends and directions.

Implications for the Three Classes

Organizations deal with non-docile individuals

For *non-docile* individuals, we want to define (a) who these people are, and (b) why they fall down to 3.5% of the population in our model. These individuals do not lean on social channels, and *tend* to make decisions on the basis of information developed on their own. They rely on themselves, first and foremost.

In the real world, these individuals are always suspicious, they appear to be very rational, but they normally fail to understand the real potentials of the social environment and of the information they can get from others. In fact, they are "social fools" (Etzioni, 1988; Sen, 1977), that is to say that they fail to recognize how other people could help them.

Every organization (such as every group of people) has to deal with individuals who demonstrate difficulties of integration in the social system – organizational behavior scholars recognized this very early as a fundamental point for management (see the first part of what Scott describes in his work, 2001). These difficulties emerge in many ways; for example, dissatisfaction regarding the role one has in the organization, disappointment over the boss's behavior, belief they are overqualified for the job, over-criticism of the way the organization is managed, and so on (for more details, see Rahim, 2002, p. 207ff). These behaviors lead to conflict, and it is apparent that the model depicts "one of, if not *the* most pervasive phenomena of organizational life" (Dirks, & McLean Parks, 2003, p. 283). We can see the results of these attitudes in the ensuing behavior of people who feel that way. These individuals tend not to take part in organizational activities in a clear and definite way, or they work in the organization while they are looking for a position in another company, for example. All these (and many other) attitudes leave the person with a distinct cognitive pattern that is not docile, i.e. they do not exploit nor provide information, comments, advice and suggestions from or to social channels when making their decisions. They believe that the organization in which they work is not behaving the right way. Unfortunately, they also believe that they cannot do anything to change it, and behave consistently with this point of view.

We are not stating that conflict may not arise between two individuals who are both docile; instead, we are defining how non-docile individuals contribute to the organization.

Again, they do not take part in routines, nor do they take active part in any organizational activity. This is also the reason why they fall very fast to 3.5% of the population in our model. How can an organization survive with a higher number of people behaving against its formal and informal web of relations (Scott, 2003)? To be more precise, we can see that the rate of *non-docile* individuals in the total population has to be very low, and, in standard operative conditions, the organization accepts this small percentage of the population in a few interactions.

Even in a social context, the fact that non-social individuals do not disappear seems to be very interesting. They fit, on a very small basis, into the social environment. If we try to give a dimensional meaning to the model, we can argue that these non-docile individuals do not find room in small organizations (say, of less than 20 members). The smaller the organization the more difficult it is to be not socially-oriented. As many scholars underline (Lepoutre, and Heene, 2006; Spence, 1999), information exchange and informal networking in small businesses in particular seem to be the core point. Of course, the model gives the general trend, in the sense that we can find 1-2 non-docile individuals in organizations with 50 members, and about 3-4 in those with 100 employees.

In any case, we refer here to very small numbers, and these individuals don't affect the organization in a significant way. However, we can also argue that outsiders (as we can call them) are fundamental for the organization; they force the organization to be dynamic. For example, if hyper-critical individuals (say, *non-docile*) were in the organization, the management would need to take actions in order to limit their influence on organizational goals (Rahim, 2002). This fact leads managers to face many different issues at once, and to act as mediators. Sometimes, they don't even know who these *non-docile* individuals are. Let us present a couple of examples. First, when working in a team we have experienced (at least once) the one individual who never agrees with us or anybody else on anything, and who never gets involved. This individual is not part of the team and provides the group (especially the leader) with criticism and a sense of disillusionment that brings everybody down. This "negative" personality falls into the non-docile category. A second example of the non-docile individual could be the one who has a stable position in the organization but, due to recent changes in the top management, doesn't want to contribute to the common goal anymore. Moreover, she/he is in the job market right now, and shows a low level of professionalism and no interest in organization goals, projects, and plans. From these examples, we can summarize the characteristics of the non-docile individual: she/he (a) minimizes the costs as well as the advantages of collaborative forms of cognition, (b) is extremely critical of organizational plans, strategies, and goals, (c) tries to take advantage of other people's setbacks, (d) doesn't share information of any sort because she/he perceives the organizational environment as extremely competitive in relation to cognitive resources, and (e) is probably on her/his way out of the organization.

In evolutionary terms, this kind of individual does not disappear because they represent potential changes in the organization, so that they could rise in number in a period of crisis or great change, and may become docile with environmental modifications ("co-evolve," we should write; Maturana, & Varela, 1984, and Todd, 2002, p. 55).

Docile individuals: how people really behave in organizations

If we think of interactions among individuals within the organization, we see that, at least at the beginning (i.e. the first 30 interactions), docile individuals behave the same way. This should be a kind of behavioral "template" that aims at reducing as fast as possible non-social (or non-docile) behavior in the organization. Individuals behaving in a non-socially-oriented way are perceived as potential limits or dangers for the organization itself. It seems that this is a "prioritizing mechanism" of docile behavior that leads to limiting non-docile behavior to insignificance (3.5% in the model).

After the 30th interaction (figure 1), we see that docility (as we defined it) becomes a dominant characteristic, but only a few individuals are able to show it at its highest levels. This is the way docility passes from individuals through the system: few individuals (the *sD*) modify quality and quantity of information; the others just lean on them and provide other information on a routine basis. In other terms, and taking the risk of oversimplifying, not everyone could enrich or break the organizational routine. If everyone were to break the routine, the organization could not exist (Nelson, & Winter, 1982; Scott, 2003). Processes are creative only in part, and the model shows which is the part of the "creative mind" that is needed here, and which are the characteristics that define who is going to be creative. This point seems to be "too naïve to be true." We argue that an organization doesn't need too many super docile individuals, because it tries to get *satisficing* results. How can we detail this on a clearer and more operational basis?

Ordinarily-docile individuals need to pass information on a given basis, while the *super-docile* use these channels as the main basis to improve quality and quantity of information. The point here is that the *super-dociles* are able to enhance the routine, which also means that they can change it. We do not state that they *want* to change routines, but they *can* do so through their behavior and thinking. Sometimes they need to change routines, but they do not act as if they know they are going to do that. In summary, while *ordinarily-docile* individuals make decisions exploiting social channels, *super-docile* ones exploit social channels, but they re-project them as they need to pass more and enriched information through them. For example, think of the worker who collects data from all departments to implement a new accounting software. This person has to give feedback to collectors of data (located at the department level) and send appropriate information to the upper levels. This connector-role person (or "liaison", to use Mintzberg's term) can choose between two options: (a) do the job at her best on the basis of available resources, or (b) do the job at her best on the basis of resources that are not ordinarily available (i.e. investing her spare time in the venture). Especially in the first months of operation, the choice (b) reveals that she shows an attitude to work harder than the others and shows that she is fully committed to the goal. The quality, more than the quantity, of information that she is able to compute determines the period of time that the company will need in order to switch from the old to the new accounting software. It is her choice to listen to problems that people from the departments might have one, two or three times, or to collect data one more time, or to call her supervisor to get feedback again. Under choice (a) she believes that time is needed to solve problems, while under choice (b) she thinks that an active role is important to ease the transition. This person is super-docile because of the key-role she has in receiving and sending information. We are not arguing anything specific concerning the efficiency or effectiveness of allocating this responsibility in one hand only; we are just recognizing that this is a typical super-docile behavior.

Who is the ordinarily-docile individual then? What does it mean to be docile in a "standard" way? This is the common way to behave in an organization, according to our model. These are people who execute standardized tasks, those who lean upon others to start working, who try never to find themselves out of formal norms that drive the company, or who give the information that one needs, but give no more and no less than that, and the like. Even we think that for *oDs* examples are superfluous – the organizational workplace is full of these individuals. We take the university case. Every university department sets bylaws for retention, tenure, and merit. Especially in the case of retention, the rules are strict and need to be followed, if someone wants to receive tenure. Nevertheless, norms need to be interpreted and the only way to understand if bylaws are indeed strict or not is to talk to the older colleagues, ask opinions, advice, suggestions, and to listen to stories of the past. The one who strictly follows what is written in the bylaws, but never asks for opinions and only takes them when she/he has the chance to, is ordinarily-docile. The difference from the non-docile is that *nD* looks for a new position elsewhere and doesn't care about the bylaws (she/he probably meets the requisites only because publications and high student evaluations are requested to get a new and/or better position). The ordinary-docile fulfills the requisites but never does more than requested.

Let's consider the formal and informal networks in the organization. As known, routines belong to formal networks, and they are clearly detailed. The way super-docile individuals behave has to deal more with informal channels than formal (and structured) ones so that these individuals act outside formal informational channels to define new ways of interacting.

There is one point that needs to be stated one more time. The model is about interactions; however, we stress information quality more than number of interactions. We agree that the more an individual interacts with others, the more there is the opportunity/possibility to share information; nevertheless, in this paper we focus on the cognitive attitude that underlies that opportunity/possibility. Our point here is that without such a tendency, interactions do not lead to significant differences in the way people use (or process) information. Non-docile individuals interact the same number of time that docile individuals do. The increase in the number of docile individuals might also be read as a sort of adaptive behavior that non-docile individuals show. If the organizational environment is made of a growing number of dociles, non-docile individuals tend to switch to the "docile side." That is to say, it is not the quantity but the quality of relations that is going to make the difference. Within this framework, being super-docile is hard, again, because of the quality of information that super-docile individuals deliver to the other people in the organization. Hence showing this cognitive attitude is viable only for people with a strong sense of commitment to and engagement with the organization goals.

In summary, the model supports the following three points:

(1) Organizational routines serve as social external resources for those individuals who mainly lean on what we called the passive side of docility (*ordinarily-docile*, 0.78 in the model). Thus, docility is the behavior that helps individuals to get the information they need and explains the cognitive meaning of standardized information and practices.

(2) Routines change in relation to the action of a minority of *super-dociles* (0.18) who drive organizational change. These individuals are creative in kind and, while exploiting at their highest potential external resources, they are mediators for the others in the organization. The pro-social trait is well developed, but only a relatively small number of individuals behave as if their personal goals are the same as those of the organization.

(3) Organization behavior can be understood on the basis of information exchange. However, the perspective we used in this paper is fairly different from the usual ones of the field (e.g. Moorhead, & Griffin, 1995). In fact, we use information flows as a core component of individual cognitive capabilities. This is what defines people's behavior, so that our behavioral perspective is cognitively driven, following recent trends in the field (Ilgen, Major, & Spencer, 1994).

From this angle, we find that docility can be fruitfully employed in defining and analyzing human behavior in organizations. The model provides interesting support to a series of variables that characterize organizational behavior. In the next section, we attempt to summarize the variables that we think are the most important.

CONCLUSIONS

Scholars scarcely employ Simon's concept of docility. This, we argue, is based (a) on its basic vagueness, and (b) on the fact that it needs a strong cognitive basis as a support. In this paper we have addressed both points. First, we have re-defined the original concept, bringing it closer to reality (active-passive sides), and we have defined its potentials and limits (information sharing, community building, and standard-fidelity). Secondly, we have provided docility with a sound theoretical basis: the distributed cognition approach. Lastly, we have introduced a theoretical model of docile behavior and defined human interactions on its basis.

In the model, the starting point could be thought of as the "zero time" in a given organization. This "zero time" is the period in which the company is incorporated (starts-up), or could be the period of time that passes immediately after an organizational breakdown or crisis. The hypothesis that the docile and non-docile were at 0.5 could not be the case for a given organization. The number of interactions and the time needed to pass from an unorganized setting to an organized one depends on the definition of this first assessment: the number of docile individuals.

If, for example, we follow mainstream economics and we think that the "world" is made of non-docile (i.e. selfish) individuals, then we can reset the model where 90% of the population is non-docile, and the remaining part is split between ordinarily- and super-docile individuals (5%). We call this the ECO scenario. After 82 interactions, non-docile individuals are reduced to 50% of the population, and after 117 interactions they begin to be at around 3.5% (i.e. between 4.5% and 2.6%). Both ordinarily-docile and super-docile individuals follow the same path until they reach the 116th interaction. After that, they begin to behave differently, the same way we observed in the regular model.

Let's consider a second scenario that we call the SD scenario. What happens if super-docile individuals are only 1% of the population while ordinarily-docile are 49% and non-docile 50%? In this case things go differently for a while until we arrive at around the 147th interaction where super-dociles repeat the same pattern we have found in the model presented in this paper (they occupy around 17.5% of the population). Something is different in this case, because we have the first 34 interactions in which the ordinarily docile grow to be 94% of the population while the non-docile population decreases to 3.5% and super-docile individuals increase at a very low rate. Between the 34th and the 147th interactions only the docile population changes dramatically to reach the equilibrium we know from the basic (or neutral) model.

In summary, if interactions within organizations are defined the same way (i.e. *ceteris paribus*), the ECO and the SD scenarios show that the only change is time lag to equilibrium. The model can be adapted to represent different starting points or different organizations. We don't believe that the starting point for super-docile is 25%, 5% or 1%: this relates to the dynamics we want to represent. However, it is worth noting that the model describes an organization that leans on docile individuals and that probably cannot exist without them. We can also change parameters and rules of interaction between the three categories, but this is another story, another model, yet another paper.

This point is very important from the operational point of view. Moreover, the model, which helps scholars and managers to define the organization, could be shaped to work more effectively. For example, one of the dimensions that could be added to define a better model is that of organizational size. We deliberately overlooked this variable to keep the model easier, but we understand this is a fundamental variable that needs to be fully addressed in further analyses. It defines relations among individuals, but is developed from the docility point of view. This means we have to keep it clear in our mind as a very peculiar and definite perspective. In fact, we stress *information flows* as a way to measure and define human interactions in organizations. From the organizational angle, the model describes an individual's attitudes towards others, and her/his chances of success in a social environment. For this reason, docility might be thought of as a pro-social trait (Khalil, 2004), and this defines how to consider and treat it. In relation to this point, some of the main findings are derived in a way that is useful to future analyses:

- The model describes trends in an organizational setting, but we cannot argue anything regarding whether super-docile individuals are leaders or not. Nevertheless, we imply that showing an above average tendency toward docile behavior is highly recommended for leaders, at least in the long-run. What is the relationship between docility and leadership?
- We can relate the level of docility to the tendency toward work longer hours than others (with or without adequate extra-salary: the so-called *workaholics*; Robinson, 2007). If this interpretation is correct, we argue that the organization doesn't need high numbers of this kind of hard workers, but top managers must learn how to deal with them.
- Docile or non-docile tendencies are not absolute or definitive characteristics of individuals, but they depend on the way our

cognitive system works. We can, for example, (a) develop a super-docile behavior in the place where we work, but (b) be non-docile when at home. This leads to the fact that managers may want to change people's attitudes inside organizations, trying to reach the population ratios that this or another *ad hoc* model suggests.

- In organizational settings, relations between individuals are not based on a static basis, and parameters and variables of the model can be defined differently, in relation to the organization one wants to analyze. For this reason, we think that the model fits many different organizations.
- The characteristics of the three types here defined (*non-docile*, *ordinarily-docile*, and *super-docile*) may be linked to well-known analyses of personality traits (Digman explicitly refers to the term "docility" in relation to the second dimension of the five personality traits; 1990, p. 424), or new development in rationality issues (Gigerenzer, & Selten, 2001).
- Docility dynamics could also tell more about organizational knowledge, how it is maintained or lost depending on the number of individuals with docile or non-docile attitudes. This point shows significant potentials and needs to be analyzed further in future research.
- One of the implications of the balance between ordinarily- and super-docile individuals in an organization might be mirrored in its general performance: does the organization with more super-dociles gain a comparative advantage? Is it important for organizational survival? These and other points need to be addressed in future research.

Together with individuals, many other points are here implicitly defined. Of course, we are not arguing that human beings are strictly divided into these three classes, and that they cannot move from one to another. On the contrary, it is possible (and we should say, it is likely) that individuals move from one to another of the classes depending on situations they face. The fact that the equilibrium we get in the model varies around a central value means that people usually migrate from one to another class, behaving in more or less docile ways, or not being docile at all.

We want to mention another important limitation of the model, which is not considered in the paper. We address here dynamics that are internal to the organization. However, there are many external environmental variables that do affect the organization and the way people behave. In any case, we consider these relationships between internal and external systems to be mechanical or automatic rather than uncertain and complex.

Nevertheless, we needed to start from somewhere and we decided to keep the internal status of the organization as a starting point. Future research will address more carefully how the cultural, institutional, political, social, etc. environment affects docility behavior in organizations. Broadly speaking, we see this point as particularly "hot" and important when related to cultural issues such as corruption, fairness, reputation, trust, and the like. For example, consider how the individual level of docility could change if the organization operates in a corrupt society: is docility the same thing we analyzed here or not? How does it work? Do individuals behave in a docile fashion using corruption as a medium? And if we focus on corrupted organizations: Are mafia-style organizations full of super-docile individuals? How does docility work in a corrupted context?

The paper is one of the first exploratory studies on docility (after Knudsen, 2003, and Secchi, 2007), and our findings suggest that the concept – as well as the model – is meaningful. In particular, it could be of help to scholars in the organizational behavior domain. Introducing the special issue on "organizational behavior in the electronic age" of the *Journal of Organizational Behavior*, Gephart is very clear when he writes that "organizational scholars need to treat human meaning and sensemaking in work settings as a central focus for organizational research […]. This focus on *meanings* and *interactions* in the workplace is important because the basic dilemmas of managerial and work life 'revolve in one way or another around the meaning of work' (Jackall, 1988, p. 194)" (*italics added*, Gephart, 2002, p. 328). What docility allows us to better analyze – human interactions and sensemaking though social channels – is indeed core to organizational behavior studies.

Finally, we found answers to the questions that led this paper: how many super-docile individuals are needed in a given organization? We want to underline, once again, that the simulation we ran is meaningless if not defined in a broader cognitive and social context. Within this framework we think that the results we discussed are significant. Docility brings something innovative, in the sense that it re-organizes and gives a new unity to many of the perspectives in conflict, communication, and human resources management. Moreover, it ties together the advice by joining literature with cognitive approaches, and by adding rationality to its social and cognitive dimensions. This also frames organizational behavior in its interdisciplinary value.

The answer to the question we raised at the very beginning of the paper is then positive since we believe that the docility approach could shed new light on organizational studies and provides a meaningful systematic and holistic view of human behavior and social organizational phenomena.

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