THE IMPORTANCE OF SOCIALITY FOR UNDERSTANDING KNOWLEDGE SHARING PROCESSES IN ORGANIZATIONAL CONTEXTS

NIELS-INGVAR BOER, PETER J. VAN BAALEN, KULDEEP KUMAR

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The importance of sociality for understanding knowledge sharing processes in organizational contexts

Niels-Ingvar Boer [1]   Peter J. van Baalen [1]   Kuldeep Kumar [2]

[1] Department of Information and Decision Management, Erasmus University Rotterdam,
P.O. Box 1738, 3000 DR Rotterdam, The Netherlands
N.I.Boer@fbk.eur.nl / PBaalen@fbk.eur.nl

[2] Department of Decision Sciences & Information Systems, Florida International University,
University Park, BA 250, Miami, Florida, 33199, United States
Kumark@fiu.edu

Abstract

This paper explores how different models of sociality can contribute to a better understanding of the dynamics of knowledge sharing within different organizational settings. It is asserted that the dynamics of knowledge sharing is organized according to a mix of four relational models distinguished by the relation models theory (Fiske, 1991). It is described how each of these models (communal sharing, authority ranking, equality matching and market pricing) have their own implications for understanding and supporting the knowledge sharing process. What model of social relations is in use, is influenced by cultural implementation rules, the kind of activity with its division of labor and the characteristics of knowledge being shared and technologies being used. By knowing according to what relational model(s) knowledge is being shared, one can better understand and consequently better facilitate the organizational and technical conditions for sharing knowledge (and vice versa).

1. Introduction

It is generally agreed upon that knowledge sharing is a crucial process within organizational settings, whether these are for example project teams, formal work groups or communities of practice. One might even argue that sharing knowledge is the *reason d'être* of such organizational settings. After all, due to the division of labor and accompanying fragmentation, specialization and distribution of knowledge, it becomes a requisite to integrate and thus share the diversity of complementary knowledge in order to produce complex products and services. An organizational setting has just been implemented or has emerged since none of the actors involved could produce the collective outcome individually.

Many practitioners and academics assume that since knowledge sharing is so important, people *will* share all the required knowledge without problems. However, many companies and institutions have experienced that the reality is somewhat different. Textbox 1 describes the situation of organizations dealing with repetitive work trying to develop knowledge repositories in order to share their best practices. Textbox 2 addresses the implementation of communities within and between organizations in order to share knowledge among peers. Both examples are commonly encountered in many organizations but also indicate that knowledge sharing is not obvious in practice, whether a codified strategy (e.g. best practices) or a personalized strategy (e.g. communities) has been followed (Hansen, Nohria, & Tierney, 1999).

Hitherto, research has suggested a number of individual factors that may influence this lack of knowledge sharing. One explanation that has received much attention in literature is the epistemological impossibility to articulate all knowledge people have (Baalen, 2002). It is now accepted that we know more than we can tell (Polanyi, 1983). Besides cognitive limits, other individual factors include efficiency rationales, a lack of 'who-knows-what' and the feeling of 'not-invented-here'. Also several organizational factors have been identified in literature that restrict knowledge sharing. Examples of these factors are: an organizational culture that discourages knowledge sharing; the lack of (billable) time to contribute to both knowledge repositories and community activity; badly defined objectives for sharing knowledge; and the fact that technologies supposed to facilitate knowledge sharing are not appropriate. A third set of explaining factors is derived from the knowledge being shared. For example its codifiability, equivocality or heterogeneity

influences the knowledge sharing process considerably.

Textbox 1   Developing best practices and using groupware technology

In an increasing competitive environment, organizations need to operate as efficiently as possible, especially when they are dealing with repetitive work (e.g., doing similar consultancy assignments, processing insurance claims or developing software). Since these organizations employ people who all have acquired particular knowledge in practice, it seems rational to try to benefit from this knowledge, so that every employee can take advantage of prior experiences of their colleagues. It would be inefficient to let people 'reinvent the wheel' every time. Therefore organizations have tried to set up knowledge repositories that contain best practices and other knowledge that could be of interest for other employees. Rationally most people subscribe the usefulness of such knowledge systems. However, in practice many repositories remained 'empty' since the employees did not contribute to the accumulation of knowledge in the database.

Not only within organizations dealing with repetitive work, but also within globally distributed projects one faces situations where technologies for sharing knowledge are not used as intended. Although groupware technology can support transforming the workflow of a project into a text and make it visible to everyone involved in the project, the database frequently remains rather incomplete due to the unwillingness of the project members to contribute to the project repository (Ciborra & Patriotta, 1996).

However, as Granovetter (Granovetter, 1982) has argued, neither an undersocialized perspective of individuals acting in isolation nor an oversocialized view of individuals obedient to norms and culture is adequate to explain behavior. Both the under- and oversocialized perspectives of knowledge sharing, as well as the combination of the two, neglect an important additional consideration: the social relationships among actors. This is an important omission because knowledge sharing is a fundamentally social phenomenon. Knowledge sharing involves a relationship between actors that is also embedded in a structure of other social relationships. These ongoing social relationships provide the constraints and opportunities that, in combination with characteristics of individuals, organizations and knowledge, may help explain the dynamics of knowledge sharing in organizations. In this paper an embedded perspective is adopted where individuals are considered to interact and share knowledge within a network of social relations.

Knowledge sharing behavior is generally explained by just one model of social relations. Whereas some people, for example, assume that people share knowledge without expecting anything in return, others argue that people only share knowledge when they are being paid for it or acquire prestige. Also textboxes 1 and 2 indicate that there exist different social principles according to which people do or do not share knowledge. The

relation models theory (Fiske, 1991) postulates that human relations may be based largely on combinations of four relational models: communal sharing, authority ranking, equality matching and market pricing. By taking these four relational models into account as mechanisms behind knowledge sharing, rather than just one, it is asserted that the understanding of knowledge sharing might improve. The objective of this paper is to explore how these four models of social relations can contribute to a better understanding of the dynamics of knowledge sharing within different organizational settings.

Textbox 2   Implementing communities

The last two decennia, a whole range of organizations have reorganized themselves into team-based organizations, since there was widespread agreement that multi-disciplinary working was essential in the new competitive environment (Orlikowski, Yates, Okamura, & Fujimoto, 1995). While moving from a functionally based company, where experts were located amongst others with similar backgrounds and interests, to one based on project teams, they found out that much cross-fertilization of ideas within disciplines were lost (Blackler, Crump, & McDonald, 1999). An increasing number of organizations have tried to solve their problem by creating communities as a way of maintaining connections with peers, continuing the abilities of specialists to work at the forefront of their own fields (Wenger, 1998). Appealing historic examples (Orr, 1990; Wenger & Snyder, 2000) probably have contributed to the desire of many organizations to implement similar communities within or between organizational settings. Although communities benefit from cultivation (Wenger & Snyder, 2000), their fundamentally informal and self-organizing nature makes a simple managerial implementation almost impossible (management paradox). And indeed, in practice many organizations are struggling with facilitating communities and the expected advantages for the knowledge sharing process do not always come off.

The rest of the paper is structured as follows. First, it is described how knowledge sharing implies a kind of social relation between individuals. Then, the four elementary models of social relations as brought forward by the relation models theory (Fiske, 1991) are described. Consequently, the implications of these four models for the knowledge sharing process are explained, followed by a description of the cultural implementation rules. The next section describes how an infoculture is derived from the relational models and how they reveal themselves in different organizational settings. When people interact according to different relational models or when the assumed relational model of a technology or organizational setting is not consistent with the relational model in use, social conflicts will occur as is described next. The paper concludes with some summarizing remarks.

2.   Knowledge sharing and social relations

In the introduction it has been stated that knowledge sharing is a fundamentally social phenomenon. 'Social behavior is inherently relational in nature: individual behavior assumes social meaning only in the context of human relations. The basic unit of analysis is therefore not individual behavior, but behavior-in-a-relational context (Fiske, 1991). Knowledge sharing always implies a particular kind of relationship between at least two actors. These actors can refer both to human beings and technologies. In the first situation knowledge is being shared between human beings interacting face-to-face, or mediated by technology both synchronous and asynchronous. In the second situation the technology can act as an intelligent machine (e.g. chess computer) or as an passive knowledge repository (e.g. encyclopedia). It is not necessary that the 'other persons' be present or even exist – nor, if they do exist, that they actually perceive the action or perceive it as it was intended. A social relationship exists when any person acts under the implicit assumption that they are interacting with reference to imputedly shared meanings.

The knowledge sharing process has fascinated researchers within a diversity of social disciplines, like philosophy, sociology, cognitive psychology, management science and economics. Within their own domain, each discipline has contributed to the understanding of knowledge sharing by providing different theoretical perspectives and accompanying theories. From this theoretical diversity different approaches for under-standing the knowledge sharing process have emerged.

Knowledge sharing behavior is frequently explained as the product of an individual calculus of benefits and costs. People are assumed to strive to optimize or maximize the ratio of expected benefits to costs, risks or effort incurred. In this framework, all knowledge sharing behavior is seen as merely a means to the ultimate goal of long-run realization of individual self-interest. Knowledge is considered as a commodity that is being shared as a function of market prices or utilities. Not only economists (e.g. transaction costs economics (Williamson, 1975)) have taken these assumptions as their core axioms, but also other social scientists have taken them for granted as implicit assumptions.

However, self-interest realization is not the unique nor paramount motive for knowledge sharing behavior. Rather than assuming that humans are by nature (asocial) individualists, the idea that people are fundamentally social, almost altruistic is another

common idea. This can be illustrated by the emergence of communities, which has received an increasing interest recently. The assumption underlying an 'ideal' community is that people freely share knowledge where they can, without keeping a scorecard of their gains and losses. This assumption about knowledge sharing is dominant within most current knowledge sharing initiatives. However, practice shows that the assumptions of this approach are not valid in all organizational settings (see textboxes 1 and 2).

Usually, only one approach of social relations is taken into account for understanding knowledge sharing. Davenport, for example, primarily relates to the first approach while labeling the second as unrealistic: 'Many knowledge initiatives have been based on the utopian assumption that knowledge moves without friction or motivation force, that people will share knowledge with no concern for what they may gain or lose by doing so (Davenport & Prusak, 1998)'. In contrast, within community thinking one primarily relates to the second approach. When adopting the assumptions of one approach, it is quite hard to understand the assumptions underlying the other approach. The phenomenon of an altruistic community is hard to explain within transaction costs thinking and vice versa. Nevertheless, the dynamics of knowledge sharing cannot be understood nor explained either by solely altruistic motives nor by solely motives of self-interest. Additional approaches, relational structures are required in order to understand those parts of knowledge sharing behavior that remains unexplained so far.

3. Different models of social relations

The relation models theory of Fiske (Fiske, 1991; Fiske, 1992) claims that people are fundamentally sociable. They generally organize their social life in terms of their relations with other people. In general people seek to create, sustain, and repair social relationships because the relationships themselves are subjectively imperative, intrinsically satisfying, and significant. The relation models theory integrates the work of the major social theorists and builds on a synthesis of empirical studies across the social sciences, including anthropological fieldwork. From an exhaustive review of the major thinking on relationships in sociology (such as Blau, 1964; Buber, 1987; Durkheim, 1966; Tönnies, 1988; Weber, 1975), social anthropology (such as Malinowski, 1961; Polanyi, 1957; Salins, 1965; Udy, 1959) and social psychology (such as Clark & Mills, 1979; Krech &

Crutchfield, 1965; Leary, 1957; Piaget, 1973), Fiske argues for the existence of four fundamental forms of human relationships: communal sharing, authority ranking, equality matching and market pricing. The four social structures are manifestations of elementary mental models (schemata). Each of the relational models is now briefly described. Table 1 summarizes some of the major postulations of the relation models theory.

Communal sharing relationships (CS) are based on a conception of some bounded group of people as equivalent and undifferentiated. In this kind of relationship, the members of a group or dyad treat each other as all the same, focusing on commonalities and disregarding distinct individual identities. People in a CS relationship often think of themselves as sharing some common substance (e.g., family ties), and hence think that it is natural to be relatively kind and altruistic to people of their own kind. Close kinship ties usually involve a major CS component, as does intense love; ethical and national identities and even minimal groups are more attenuated forms of CS. When people are thinking in terms of equivalence relations, they tend to regard the equivalence class to which they themselves belong as better than others, and to favor it.

Authority ranking relationships (AR) are based on a model of asymmetry among people who are linearly ordered along some hierarchical social dimension. People higher in rank have prestige, prerogatives, and privileges that their inferiors lack, but subordinates are often entitled to protection and pastoral care. Authorities often control some aspects of their subordinates' actions. Relationships between people of different ranks in the military are predominantly governed by this model, as are relations across generations and between genders in many traditional societies. Although, in principle, in any society or situation, people could be ranked in different hierarchies according to innumerable different status-relevant features, in practice, people tend to reduce these factors to a single linear ordering. When people are thinking in terms of such linearly ordered structures, they treat higher ranks as better.

Equality matching relationships (EM) are based on a model of even balance and one-for-one correspondence, as in turn taking, egalitarian distributive justice, in-kind reciprocity, tot-for-tat retaliation, eye-for-an-eye revenge, or compensation by equal replacement. People are primarily concerned about whether an EM relationship is balanced, and keep track of how far out of balance it is. The idea is that each person is entitled to the same amount as each other person in the relationship, and that the direction and magnitude of an imbalance are meaningful. Colleagues who are not intimate often

interact on this basis: they know how far from equality they are, and what they would need to do to even things up. People value equality and strongly prefer having at least as much as their partners in an EM relationship.

Table 1 Postulations of relation models theory

- People are fundamentally sociable; they generally organize their social life in terms of their relations with other people.
- People use just four relational models (*communal sharing, authority ranking, equality matching* and *market pricing*) to generate, understand, coordinate and evaluate these social relationships; the four social structures are manifestations of elementary mental models (schemata).
- These models are autonomous, distinct structures, not dimensions; there is no continuum of intermediate forms.
- People find each of the models of relationships intrinsically satisfying for its own sake. There is typically an extremely high degree of consensus among interacting actors about what model is, and should be operative.
- People believe that they should adhere to the models, and insist that others conform to the four models as well.
- Social conflicts often occur when people are perceived to be profoundly violating the elementary relationships.
- The residual cases not governed by any of these four models are *asocial interactions*, in which people use other people purely as a means to some ulterior end, or *null interactions*, in which people ignore each other's conceptions, goals and standards entirely.
- People commonly string the relational models together and nest them hierarchically in various phases of an interaction or in distinct activities of an organization.
- Relations and operations that are socially significant in one relational structure may not be meaningful in certain others.
- People in different societies commonly use different models and combinations of models in any given domain or context. Cultural implementation rules (rules that stipulate when each model applies and rules that stipulate how to execute each model) are essential for the realization of any model in practice (domain, degree).
- The four models do not all work equally well in every domain, and each is dysfunctional for some purposes in some contexts.

(Derived from Fiske 1992)

Market pricing relationships (MP) are based on a model of proportionality in social relationships and people attend to ratios and rates. People in an MP relationship usually reduce all the relevant features and components under consideration to a singular value or utility metric that allows the comparison of many qualitatively and quantitatively diverse factors. People organize their interactions with reference to ratios of this metric, so that what matters is how a person stands in proportion to others. Proportions are continuous, and can take any value. The most prominent examples of interactions governed by MP are those that are oriented towards prices, wages, commissions, rents, interest rates, tithes, taxes and all other relationships organized in terms of cost-benefit ratios and rational

calculations of efficiency or expected utility.

It might seem impossible that just four relational models can explain all complex relationships. However, there are four ways in which diversity based on the four models is established. First, there are three variables on which each of the four relational models can vary. They can vary in intensity, from null (ignoring each other) to total involvement; they can vary in the degree to which the participants are relating for the sake of the relationship itself or are using each other as means to asocial ends; and they can vary in the formality (strictness) with which people observe the standards of whatever model they are using.

Second, it is quite rare to find a relationship that draws on only one relational model. People commonly use a combination of models, out of which people construct complex social relations. For example, colleagues may share office supplies freely with each other (CS), work on a task at which one is an expert and imperiously directs the other (AR), divide equally the amounts of carpooling rides (EM), and transfer a laptop computer from one to the other for a price determined by its utility or exchange value (MP). Thus, each of the models is operating simultaneously at different levels of a social relationship.

Third, the relational models in use are not static, but might change over time. Several theorists have described dynamic sequences of transition in which the dominant form of interaction changes from one of the relational models to another. The relationship between a given pair of people or among the members of a particular group is assumed to transform from MP to EM to CS, or from AR to CS, although sequences may vary. In a society, however, most writers suggest a sequence in the opposite direction that is some subset of the ordering, CS $\rightarrow$ AR $\rightarrow$ EM $\rightarrow$ MP, usually over historical spans of time (e.g., transition from primitive tribe to capitalistic society).

The last and most important reason for establishing diversity based on the four models is the importance of cultural implementation rules. Cultural implementation rules are rules that stipulate when each model applies and rules that stipulate how to execute each model. These implication rules are explained after the next section.

4.   Implications for knowledge sharing

The previous section has described the four elementary models of social relations. Before that, it has been asserted that the dynamics of knowledge sharing can be organized

according to these relational models. Since the relation models theory intends to describe the fundamental 'grammar' of social life rather than focusing on the knowledge sharing issue specifically, this section describes how we think that the theory can be specified for knowledge sharing. It is explained how we think that each model conceptualizes knowledge and how each model determines the principles behind knowledge sharing.

Within CS relationships, knowledge is perceived as a common resource, rather than as one's individual property. Knowledge is not personally marked, since it belongs to the whole group. Knowledge is freely shared among people belonging to the same group or dyad, following the idea 'what's mine is yours'. Although knowledge is being shared without expecting anything particular in return, it is still a matter of reciprocity. The underlying assumption of people sharing knowledge within a CS relationship is that they expect an unspecified favor from an unspecified group member within an unspecified time span in return (see table 3). In exchange theory this is referred to as generalized reciprocity (Mauss, 1925). By sharing knowledge within the group or dyad one 'receives' the potential helpfulness of the group in future. The motivation for sharing knowledge is based on intimacy. Knowledge is shared because one thinks that someone else might need it or because someone asks for it. There are no hidden motives for (not) sharing knowledge. The only reason for not sharing knowledge is when one is not capable of sharing or when the desirability for sharing knowledge is unknown.

In order to share knowledge according to CS principles, a bounded group sharing some common substance (e.g. kinship) is required. It is important to realize that this common substance between people can be based on different *objects* of, or different *grounds* for cohesion (Lammers, 1964). Although CS is frequently not the dominant structure for sharing knowledge organization-wide (e.g. object is the university), there might exist some subsets within the organization where knowledge is being shared based on CS (e.g. object is department within the university). Furthermore, people might share knowledge with others according to CS since they feel connected with them based on shared ideological objectives (ideal cohesion, e.g. within a political movement), based on shared activities (instrumental cohesion, like between academic staff) or based on solidarity (social cohesion, like fine working environment).

Within AR relationships knowledge is perceived as a means to display rank differences, whether rank is based on e.g. formal power, expertise or age. The higher a person's rank, the better access to better knowledge. A person higher in rank who shares knowledge with

someone lower in rank demonstrates his nobility and largesse and expects to get authority or status in return (see table 3). A subordinate shares knowledge because either he has to or because he wants to chum up with his superior. In both cases the subordinate can expect a kind of 'pastoral care' in return. In this respect knowledge sharing is motivated by power differences. People are less or not willing to share knowledge when it can change their balance of power negatively. 'Negative' knowledge is frequently withhold by window dressing behavior and a knowledge overload may originate from largesse and sweet-talk.

Within EM relationships knowledge is perceived as a means of leveling out knowledge sharing efforts. The principle behind knowledge sharing within an EM relation is based on the exchange of knowledge for similar knowledge (see table 3). Knowledge is being shared because someone else has shared something similar before or because one expects something similar in return. It is the desire for equality that motivates knowledge sharing. In this respect one can morally obliged a person to share something in return by sharing knowledge oneself. People are less or not willing to share knowledge when nothing similar can be shared in return within a reasonable time span.

Within MP relationships knowledge is perceived as a commodity which has a value and can be traded. Knowledge is being shared because one receives a compensation for it (not being similar knowledge or status). People are motivated to share knowledge by achievement. When the perceived compensation is not high enough, people are less or not willing to share knowledge. In appendix 1 the implications of the four relational models for understanding knowledge sharing are summarized.

Let's illustrate the different knowledge sharing principles for professional knowledge workers. Whereas the university is expected to be a place where knowledge is being shared freely, following the rules of CS, the reality demonstrates that the CS mechanism is hardly present within universities. Of course, scientists are very eager to share their knowledge with other people from the academic community, but only when they are being rewarded for it by prestige (AR) or money (MP). So sharing ideas through scientific publications associated with author names is common practice, just like contributing to a lucrative publication. However, unbridledly sharing knowledge with colleagues in the pre-publication phase (CS) is less obvious to occur. In the day-to-day activities of academics, knowledge is commonly shared with colleagues according to EM principles. Only when they acquire valuable knowledge from colleagues, they will share similar knowledge with them (and vice versa). Regularly, academics feel more cohesiveness with the peers who are

working on their own research topic than with people from unrelated departments or with the entire university. A similar line of reasoning exists for ambitious professional consultants. Since these knowledge workers frequently feel more connected with the consulting profession and their own career than with the consulting firm they are working for temporally, they like to receive intellectual recognition for their own work (AR) more often than a financial reward (MP). In contrast with the academics, consultants are frequently not personally rewarded for their intellectual effort. The intellectual outcome is considered to be 'owned' by the whole organization (CS) and therefore the company name is connected to it rather than the name of the consultant who created it. Some consultancy firms have succeeded to create an intensive ideal cohesiveness, resulting in CS practices of knowledge sharing.

5. Cultural implementation rules

Each of the four elementary models can be realized only in some culture-specific manner. There are no culture-free implementations of the models. Each model leaves open a number of parameters that require some determinant setting. Within CS relationships one have to determine what is shared collectively and what is not (e.g., goods or thoughts). Within AR relationships the important question is whether people are ranked by age, gender, race, inheritance of or succession to office, or various kinds of achieved status. Questions like 'what counts as equal?' and 'what is appropriate delay before recipro-

Table 2 Models of social relations with their implications for knowledge sharing

	Communal Sharing [1]	Authority Ranking [1]	Equality Matching [1]	Market Pricing [1]
Object of exchange for sharing knowledge	None or nothing specified	Respect, loyalty, authority or pastoral care, loyalty	Similar knowledge	Specified value
Timing of reciprocity	No or unspecified	Non-specific	Implicitly specified in (short) future	Direct or specified in future
Breakdown [2]	KS with outsiders	Evaporation of power base	Violation of equality	Exploiting the other
Narrative	"We just all try to do what we can, and that's different for everybody"	" It is not a matter of free will, I have to share my knowledge"	"Now it is my turn to coach the newcomer" " I owe you one"	"As long as they are paying me enough for my expertise, I will share my knowledge"

[1] This relational model occurs both in a dyadic version and in a generalized version.
[2] Obviously breakdowns occur within all models when the timing is violated or when the object of exchange is inaccurate.

cating?' need to be answered within EM relationships. MP relationships have to determine how prices are set, what counts as an offer of sale or bid to buy and when one can acceptably withdraw from an agreement. Furthermore, people in different societies commonly use different models and combinations of models in any given domain or context. Within many western countries the husband-wife relationship, for example, is primarily based on EM, whereas other cultures consider it as normal that the husband dominates his wife (AR). Relations and operations that are socially significant in one relational structure may not be meaningful in certain others. For example, within a CS mindset the idea of private ownership has no meaning at all, whereas within a MP mindset it is hard to understand that people share goods free of charge.
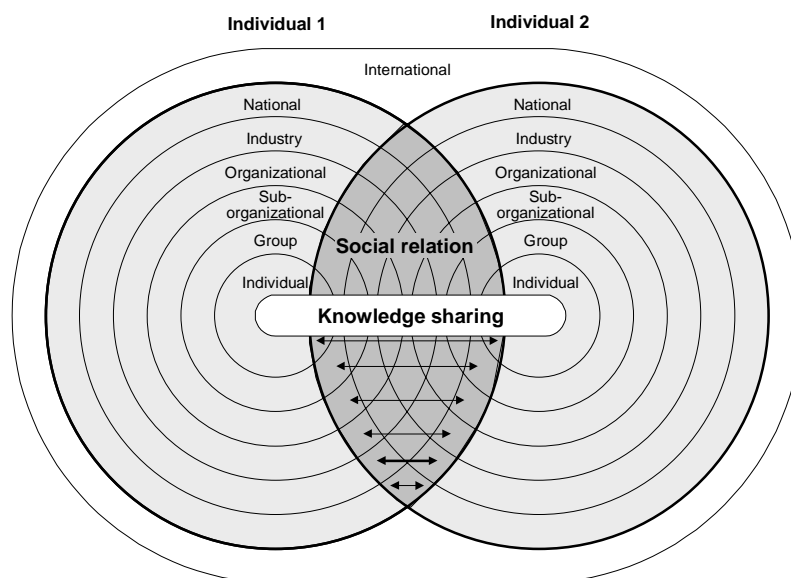
Figure 1 Cultural implementation rules from different contextual levels of analysis influencing the social relation and consequently the knowledge sharing process

Cultural implementation rules are determined by a mix of influences from different kinds of cultures, like group culture, organization culture and national culture. Figure 1 illustrates these different contextual levels as encompassing circles. Two interacting individuals establish a social relation, as is depicted by the dark gray area in figure 1. The cultural implementation rules determine what model of social relation is in use and how it is operating. The knowledge sharing process is, besides influencing individual, organizational and knowledge factors, consequently modeled according to the relational model in use.

This section will end with presenting a research model about the factors influencing the knowledge sharing process. The numbers between brackets refer to the relations as depicted in figure 2. Till so far it has been argued that the different models of social relations determine the mechanisms behind knowledge sharing processes (1 & 2) and that cultural implementation rules are essential for the realization of any relational model in practice (3 & 4). Now it is described how the knowledge sharing process is directly influenced by the characteristics of knowledge and technology, determining *what* is being shared and *how* (5 & 6) and by the characteristics of the activity with its division of labor influencing the *need* for sharing knowledge (7 & 8).
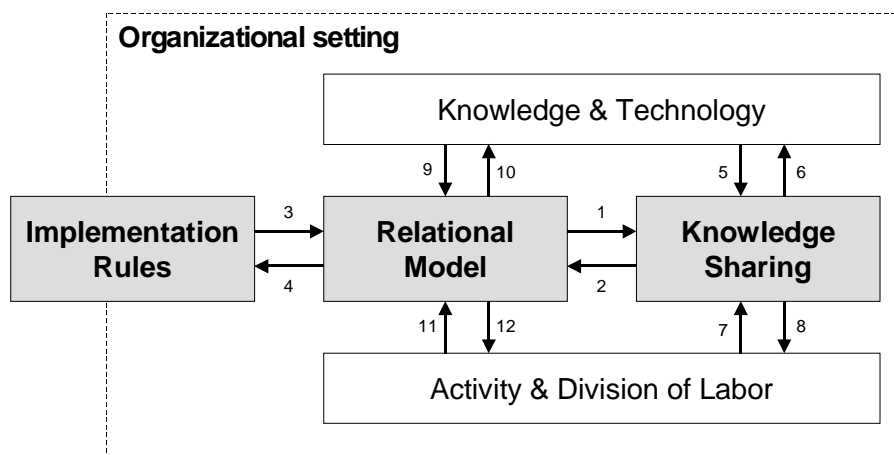
Figure 2 Conceptual model of determining factors on knowledge sharing

The nature of knowledge highly determines how it is being shared, or should be shared (5). Abstract and uncodified knowledge should be shared differently, for example, than knowledge that is concrete and codified (Boisot, 1995). Conversely, by adopting one particular way of sharing knowledge (e.g., lecturing, workshop, reading), the variety of knowledge that can be shared is limited accordingly (6). A similar line of reasoning is valid for the technology being used for sharing knowledge. The media richness (Daft & Lengel, 1984) and functionality of a technology determines the kind of knowledge that can be shared (5) and vice versa (6).

The nature of the activity determines the need for knowledge sharing and to some extent the nature of the knowledge (7). Knowledge (sharing) within a R&D department is different from knowledge (sharing) along an assembly line. A similar line of reasoning is valid for the division of labor that accompanies the activity. A craftsman who creates a

product all by himself does not need to share knowledge, whereas a team of specialists working together on complex products do (7). The more the work of the actors involved depend on one another, the greater the need for sharing knowledge. Conversely, by sharing knowledge in a particular way over time, an activity or division of labor may be established or altered (8).

The described factors are influenced by or influence the knowledge sharing process directly, without taking its social nature into account. By including the relational models as an extra (intermediating) factor, this deficiency can be overcome. Figure 2 illustrates that besides the cultural implementation rules, knowledge, technology, activity and division of labor influence what relational model is in use. In this respect they can be considered to contribute to the implementation rules themselves.

When knowledge is specific and uncodified, it is almost impossible to share it according to MP principles, whereas knowledge that is highly abstract and codified is less obvious to take place according to CS (9). Conversely, when operating according to a particular relational model, only knowledge can be shared that fits in this model (10). The effort to acquire knowledge also determines the relational model to be used (9). 'Low profile' knowledge like knowing how to use the coffee machine is likely to take place according CS, whereas an electronic presentation about a specific subject is more likely to take place according to EM or MP. Finally, not all relational models are suitable for all types of work (11 & 12). These relations are discussed in the next section.

6.   Different organizational settings

Till so far the relational models have been described primarily as the mechanisms behind knowledge sharing between individuals. One can usually generalize such a relationship towards one dominant model of social relations. The relation between a husband and wife, for example, might be primarily based on EM, even when they act according to the other models as well. However, the models can also be used to delineate the knowledge sharing mechanisms within organizational settings. After all, organizational actors are embedded within a network of social relations. When the majority of actors within an organizational setting is sharing knowledge according to one particular relational model, the organizational setting can be typified by that dominant model of social

relations. In this respect, the four models can be seen as different completions of an infoculture (Ciborra & Patriotta, 1996) and in this respect specify this rather abstract theoretical notion. Based on a process of institutionalization not only relationships and organizational settings can be typified by one dominant relational model, but also a country or even a society. Whereas many Western countries are inclined towards MP thinking, for example, many countries from the Middle East are more based on AR.
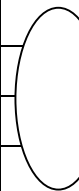
Lets now focus on the significance of the relational models at the level of organizational settings. Different organizational settings could be characterized according to different dominant relational models. The assumptions underlying a community of practice, for example, are frequently based on CS. In a similar way one might argue that people in a formal work group interrelate primarily according to AR and that project members their relationships are based on MP. Partly this can be explained by the time scope of the different organizational settings. The more often people interact, the longer the relationship endures, and the greater the number and diversity of domains in which they interact, the less likely they are to use MP and the more likely they are to relate in a CS mode; EM is in between (Fiske, 1991).

However, even though one can make generalizations about the relational model in use in an organizational setting, one always needs to realize that within such an organizational setting people interact according to the other models as well. Table 3 illustrates this by differentiating different relational models at the interaction level within a particular relational model at the organizational level (ellipse). Although there might be one relational model which is dominant in a particular organizational setting, it is not the organizational setting *per se* that determines according to what relational model knowledge is being shared. For example, even when two collaborating project teams are characterized by MP, their linking pins (individuals of both organizations who embody the collaboration) may share knowledge according to different social mechanisms.

Although it is possible to use any of the four models to organize any aspect of social relations, some relational models are more obviously to occur in particular situations. For example, work organized along CS lines lacks the long-term productive potential characteristic of division of labor based on differentiated complementarity. Whereas EM is widely used as a means of obtaining supplementary labor at times of peak demand or of tasks that require massed labor, it is never the primary mode of organizing the core group for the entire cycle of production. This is probably because a complete cycle of production

can rarely be broken down into tasks that are all the same, and because often there is no great functional advantage in balanced reciprocal exchange of the same task. Market systems governed by prices can be the most efficient mechanism for organizing large-scale production and exchange. In part this is because MP facilitates division of labor and technical specialization, and in part because of its emergent property of conveying information about utilities and costs, permitting the use of this information to guide allocation decisions. On the other hand, many kinds of public goods cannot be produced and allocated by MP alone. Thus, the four models of human relations are dysfunctional for some purposes in some contexts. Furthermore, they do not work equally well in every domain. Let's take a decision making process as an example. Within CS decision-making is based on seeking consensus, within AR relations on authoritative fiat, within EM relations on one-person one vote and within MP relations on rational cost benefit analysis. When quick decision-making is required, AR is more appropriate than CS, since this last model is cumbersome and time consuming.

Table 3 Combining relational models at organizational and interaction level

		Organizational level			
		CS	AR	EM	MP
Interaction level	CS				
	AR				
	EM				
	MP				

7. Conflicting models of social relations

Hitherto, it has been presumed that interacting individuals are operating according to the same relational model and that the assumptions underlying a technology are in line with the relational model of its user. However, in practice the distinctness of the relational models is not always assured, resulting in social conflicts or dysfunctional technologies. In this section both situations are addressed.

Lets reconsider the development of knowledge systems in order to share best practices as described in textbox 1 (A similar argument can be made about the implementation of communities as described in textbox 2). The rationale behind the design of a knowledge

system is based on CS. Knowledge is considered to be a pooled resource that is accessible by every one and knowledge is considered to be freely shared with others where possible. When the people involved do actually interrelate according to the model of CS, then there is no problem. However, in situations where there exists a difference between the assumed mechanism behind the technology and the actual relational model in use, problems might occur. For example, when people's relation is based on AR, they might have difficulties with using a technology that is based on CS. Since, information is accessible by everybody including one's superiors, they avoid the knowledge system and share their ideas informally through other media. People do not want to be adjudicated on the basis of some informal premature documents they have put in the system. People acting upon EM have other reasons for (not) contributing to knowledge systems. A frequently expressed argument is that 'people do not want to bring more than they get'. Especially employees who have no intention to remain in an organization, for example, do not value the importance of retaining experiences for future use by their colleagues. People whose relation is based on MP only contribute to the system when they receive an appropriate reward for it, and therefore do not fit the CS assumptions.

Different ways can be followed to solve these kinds of problems. One can try to change the existing relational model of the user in order to fit the technology to be used, one can try to redesign the existing technology in order to fit the relational model of its user, or a combination of both. The first situation requires a change of culture, which is a time-consuming process, whereas the second situation requires a fundamental reconsideration about the functionalities of the technology. Obviously, in practice it is not an either or choice, but a combination of both. Several technical adjustments of the knowledge system can be proposed. The problem within an AR relation might be solved by implementing a double layer structure in the knowledge system; only the final content is made accessible by everybody, while the rest is only accessible by colleagues of the project team (Ciborra & Patriotta, 1996). In the EM situation, for example, one could redesign the technology in such a way that people can only consult the knowledge system when they also contribute something. In a MP situation people might be stimulated to contribute to the system by providing financial bonuses. These suggestions for changing the technology should be accompanied by an appropriate change of the relational model (infoculture) in use. Thus, reward systems, supporting technologies, organizational hierarchies needs to be in line with the relational models in use and vice versa. It is useless, for example, to reward

people according to MP when they relate to one another based on AR. Many knowledge workers who have achieved a minimum level of income are more sensitive to intellectual acknowledgement than to additional financial rewards.

A second type op conflicts can occur when people have different interpretations of their relationship. A recognizable conflict in organizational settings is the disturbed relation between an employee from the IT helpdesk and a needy manager from another department. Both individuals might think that their relation is based on AR. The IT-er has a technical expertise that the manager is lacking and the manager has a formal power that supersedes the influence of the IT-er. Thus, the variable on which the hierarchy is based is different. Both are acting and sharing knowledge as if they are the higher in rank, ending in a social conflict. The result is that both evaluate the others behavior as inappropriate and both experience a lack of understanding. Similar conflicts occur between young just graduated academics and grown old senior employees.

Let's consider another example where one person thinks that his relation with someone else is based on EM. When this person has shared knowledge with the other and this person does not receive any expected similar knowledge in return with an appropriate delay, a social conflict might occur. This social conflict can be resolved in several ways. The person might continue sharing knowledge with that person, so that the relationship shifts from an EM to an AR model. Due to the imbalance of knowledge, the person implicitly develops a kind of authority or status. Or the person can be inclined not to share any knowledge with that person anymore in future. Additional knowledge needs to be shared in order to resolve the conflicts.

8. Conclusions

Knowledge sharing is considered to be a fundamentally social process, where two or more actors interrelate with one another. There are several aspects of the knowledge sharing process which are not yet fully understood. One important explanation for this is that current thought about knowledge sharing has been guided largely by one model of social relations, whether this is for example one of altruism or one of rational cost benefit analysis. The relation models theory of Fiske distinguishes four elementary models of social relations that are assumed to apply for the knowledge sharing process as well.

Consequently it has been argued that knowledge is being shared differently within each of the four relational models. Cultural implementation rules determine when each model applies and how each model is executed.

It has been described how the nature of the knowledge being shared and the technology being used, together with the nature of an activity with its division of labor influence the relational model and consequently the knowledge sharing process as well. Some relational models do occur more frequently in particular organizational settings than others. However, it is not the organizational setting itself that determines how and if knowledge is being shared, but the different relationships within the organizational setting. When there is a difference between the relational model being actually in use and the relational model people think that is in place, social conflicts may occur.

In order to really understand knowledge sharing, one need to know according to what model knowledge is being shared. Consequently, one can better design technologies that support knowledge sharing and design the structure of organizational settings. On the other hand, by knowing the assumptions about the social relations underlying the technical and organizational infrastructure, one can better understand why knowledge is or is not being shared.

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APPENDIX 1 Knowledge sharing according to different models of social relations

	Communal Sharing	Authority Ranking	Equality Matching	Market Pricing
How is knowledge being perceived?	As a common resource, rather than as one's individual property. Knowledge is not 'marked'.	As a means to display one's superiority; 'Knowledge is power'.	As a means of exchange for other knowledge.	As a commodity which has a value and can be traded.
What are the implications of this perception for the knowledge sharing process?	Knowledge is freely shared among people belonging to the same group; 'What's mine is yours'.	By sharing knowledge one can demonstrate one's nobility and largesse. The higher a person's rank, the better access to better knowledge.	The knowledge sharing process becomes dependent on similar knowledge sharing processes from the past and/ or in the future.	The knowledge sharing process becomes dependent on the value of the knowledge.
Why is knowledge being shared? (push vs. pull)	Because one thinks that someone else might need it; because someone asks for it; Intimacy motivation.	Because it is requested by someone in a higher rank; because the superior has to share it. Power motivation.	Because someone else has shared something similar before; because one expects something in return. Desire for equality.	Because one receives a compensation for it (not something similar). Achievement motivation.
When might knowledge not being shared even though it is desirable?	When one is not capable of sharing it or when the desirability is unknown.	When it can change the balance of power.	When nothing similar can be shared in return within a reasonable time span.	When the perceived compensation is not high enough.
What are hidden motives for (not) sharing knowledge?	No hidden motives.	'Negative' knowledge is withhold; window dressing. Knowledge overload may originate from largesse and sweet-talk.	By sharing knowledge with someone, one can morally obliged this person to share something in return.	By sharing knowledge below the market value, one might create moral commitment.
How are problems resulting from knowledge sharing being solved?	By seeking consensus.	By authoritative fiat.	By one-person, one vote.	By rational cost benefit analysis.
By who is knowledge being shared?	By kinship, minimal groups, national identities (knowledge is not being shared with outsiders obviously).	By people with different hierarchical positions (ranks).	By people at the same horizontal or vertical position in the division of labor.	By the people who receive and provide the compensation.
With what emotion is knowledge being shared?	It goes without saying, based on idealism.	Mostly not spontaneous but based on sense of duty.	Unproblematic as long as the time span between the return is not too long.	Unproblematic as long as the compensation is appropriate.
What moment is knowledge being shared?	Any time when needed.	Immediately when the superior requests it and otherwise when he has time.	When there is a (potential) mismatch in sharing.	When the compensation is high enough.
How is knowledge being shared?	Divers ways, but in a personal way.	Divers ways (brief and short).	In a similar way as before or as expected in future.	In a way it is demanded.
Examples of knowledge that is typically being shared	In principle everything.	Factual knowledge.	Personal background stories.	Functional expertise.

APPENDIX II Manifestations and features of four elementary relational models
(Derived from Fiske 1992; p. 694)

Domains	Communal sharing	Authority ranking	Equality matching	Market pricing
Reciprocal exchange	People give what they can and freely take what they need from pooled resources. What you get does not depend on what you contribute, only on belonging to the group.	Superiors appropriate or preempt what they wish, or receive tribute from inferiors. Conversely, superiors have pastoral responsibility to provide for inferiors who are in need and to protect them.	Balanced, in-kind reciprocity. Give and get back the same thing in return, with appropriate delay.	Pay (or exchange) for commodities in proportion to what is received, as a function of market prices or utilities.
Distribution	Corporate use of resources regarded as a commons, without regard for how much any one person uses; everything belongs to all together. Individual shares and property are not marked.	The higher a person's rank, the more he or she gets, and the more choice he or she has. Subordinates receive less and get inferior items, often what is left over.	To each the same. Everyone gets identical shares (regardless of need, desire, or usefulness).	"To each in due proportion." Each person is allotted a quota proportionate with some standard (e.g., stock dividends, commissions, royalties, rationing based on a percentage of previous consumption, pro-rated strike benefits or unemployment compensation).
Contribution	Everyone gives what they have, without keeping track of what individuals contribute. "What's mine is yours."	*Noblesse oblige*: Superiors give beneficently, demonstrating their nobility and largesse. Subordinate recipients of gifts are honored and beholden.	Each contributor matches each other's donation equally.	People assessed according to a fixed ratio or percentage (e.g., tithing, sales, or real estate taxes).
Work	Everyone pitches in and does what he or she can, without anyone keeping track of inputs. Tasks are treated as collective responsibility of the group without dividing the job or assigning specific individual assignments.	Superiors direct and control the work of subordinates, while often doing less of the arduous or menial labor. Superiors control product of subordinates' labor.	Each person does the same thing in each phase of the work, either by working in synchrony, by aligning allotted tasks so they match, or by taking turns.	Work for a wage calculated as a rate per unit of time or output.
Meaning of things	Heirlooms, keepsakes, sacred relicts that are metonymic links to people with whom a person identifies.	Prestige items and emblems of rank. Conspicuous consumption to display superiority. Conversely, sumptuary laws that forbid inferiors to own these items.	Tokens of equal, independent status, one for each. For example, a car, a bicycle, a weapon, a trophy, a set of tools, or a house when each peer must have one to be coequal with the others.	Commodities produced or purchased to sell for profit; productive capital and inventory. Products developed and presented in terms of marketing considerations. Also, private property valued because of its cost.
Orientations to land	Motherland or homeland, defining collective ethnic identity. Natal and received from the ancestors and held in trust for posterity. Land used corporately as a commons.	Domain, sovereign realm, personal dominion, fief, or estate.	Equal plots for each family. Land-owning or territorial sovereignty as the basis of equality (e.g., when all property owners are eligible to vote, and when each state or nation gets equal representation).	Investment, treated as capital. Purchased for expected appreciation, for lease or rent, or as a means of production.

Domains	Communal sharing	Authority ranking	Equality matching	Market pricing
Significance of time	Relationships are idealized as eternal (e.g., solidarity that is based on descent or common origin). Perpetuation of tradition, maintaining corporate continuity by replicating the past.	Sequential precedence marks status by serial ordering of action or attention according to rank. Temporal priority to superiors, often determined by age or seniority.	Oscillation of turns, of hosting, or other reciprocation at appropriate frequency. Synchrony of action or alignment of intervals to equate participants' efforts or opportunities.	Calculus of rates of interest, return, pay, or productivity per unit of time. Concern with efficient use of time, spending it effectively, and with the opportunity cost of wasted time.
Decision making	Group seeks consensus, unity, the sense of the group.	By authoritative fiat or degree. Will of the leader is transmitted through the chain of command. Subordinates obey orders.	One-person, one-vote election. Everyone has equal say. Also rotating offices or lottery.	Market decides, governed by supply and demand or expected utilities. Also rational cost and benefit analysis.
Social influence	Conformity: desire to be similar to others, to agree, maintain unanimity, and not stand out as different. Mutual modeling and imitation.	Obedience to authority or deference to prestigious leaders. Subordinates display loyalty and strive to please superiors.	Compliance to return a favor ("log rolling"), taking turns deciding, or going along to compensate evenly or keep things balanced.	Cost and benefit incentives – contracts specifying contingent payments, bonuses, and penalties. Bargaining over terms of exchange. Market manipulation. Offering a "special deal" or a bargain: apparent scarcity and time limitations may move people to act.
Constitution of groups	Sense of unity, solidarity, shared substance (e.g., "blood", kinship). One-for-all, all-for-one.	Followers of a charismatic or other leader. Hierarchical organization (e.g., military).	Equal-status peer groups. For example, a car pool, cooperative, and rotating credit association.	Corporations, labor unions, stock markets and commodity associations. Also, bureaucracy with regulations oriented to pragmatic efficiency.
Social identity and the relational self	Membership in a natural kind. Self defined in terms of ancestry, race, ethnicity, common origins, and common fate. Identity derived from closest and most enduring personal relationships.	Self as revered leader or loyal follower; identity defined in terms of superior rank and prerogative, or inferiority and servitude.	Self as separate but co-equal peer, on a par with fellows. Identity dependent on staying even, keeping up with reference group.	Self defined in terms of occupation or economic role: how one earns a living. Identity a product of entrepreneurial success or failure.
Motivation	Intimacy motivation	Power motivation	Desire for equality	Achievement motivation
Moral judgment and ideology	Caring, kindness, altruism, selfless generosity. Protecting intimate personal relationships.	What supreme being commands is right. Obedience to will of superiors. Heteronomy, charismatic legitimation.	Fairness as strict equality, equal treatment, and balanced reciprocity.	Abstract, universal, rational principles based on the utilitarian criterion of the greatest good for the greatest number (since this calculus requires a ratio metric for assessing all costs and benefits).

Domains	Communal sharing	Authority ranking	Equality matching	Market pricing
Moral interpretation of misfortune	tigmatization, pollution, ontamination. Isolation as pariah. eeling of being different, set apart, r not belonging. Victims seek and in support groups of fellow suffers, mong whom the misfortune is a ource of solidarity.	Have I angered God? Did I disobey the ancestors?	Feeling that misfortune should be equally distributed: "Things even out in the long run". Idea that misfortune balances a corresponding transgression.	Was this a reasonable expectable risk or calculable cost to pay for benefits sought? Is this too high a price to pay?
Aggression and conflict	Racism, genocide to "purify the race". Killing to maintain group honor. Riots based on deindividuation. Terrorists and rioters indiscriminately kill all members of opposed ethnic group.	Wars to extend political hegemony. Execution of people who fail to accept the legitimacy of political authorities or who commit lese majesté. Also political assassination and tyrannicide.	Eye-for-an-eye feuding, tit-for-tat reprisals. Revenge, retaliation.	Mercantile wars, slaving, exploitation of workers. Killing to protect markets or profits. Robbery and extortion. War strategies based on kill ratios.
Features				
Some of the features that the cultural implementation rules must specify	Who is "us" and who is "other", including how people acquire and lose corporate membership. What is shared. What kinds of restraint people must exercise in taking from others and what excuses them from giving.	What are the criteria for according rank. What dimensions mark precedence. In what domains may authority be exercised.	Who and what counts as equal. What procedures people use for matching and balancing. How people initiate turn-taking. What are the appropriate delays before reciprocating.	What entities may be bought and sold? (e.g., sex? drugs? votes? people?) (e.g., sex? drugs? votes? people?). What are the ratios of exchange and how do particular attributes affect prices (e.g., how many hours of unskilled weekend labor for one old red bantam hen?) What counts as a cost or a benefit (in either monetary or utility terms).
Characteristic mode of marking relationships	Enactive, kinesthetic, sensorimotor rituals, especially commensal meals, communion, and blood sacrifice.	Spatiotemporal ordered arrays (e.g., who is in front, who comes first). Differences in magnitude (size of dwelling, personal space); plural pronouns for respect.	Concrete operations involving physical manipulations of token or persons so as to balance, match, synchronize, align, or place them in one-for-one correspondence.	Abstract symbolic representation (especially prepositional language and arithmetic). For example, verbal negotiations referring to value-relevant features; printed or electronic price lists; symbolically conveyed information about current market conditions.
orresponding neasurement cale type	Categorical or nominal	Ordinal.	Interval.	Ratio.
Relational structure	Equivalence relation.	Linear ordering.	Ordered Abelian group.	Archimedian ordered field.
Natural selection mechanism	Kin selection according to inclusive fitness.	Adaptive value of submission and dominance behaviors in a linear hierarchy.	"Tit-for-tat" in-kind reciprocity (evolutionarily stable strategy, adaptive initially, resistant to invasion).	Adaptive value of specialization and commodity exchange.
pproximate ge when hildren first xternalize the nodel	Infancy.	By age three.	Soon after fourth birthday.	During 9th year.

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