

Distributed, Negotiable and Hyper-Individual: Towards a Definition of Shareable Knowledge

LINDA GREVE
Aarhus University, Denmark

This article presents a definition of sharable knowledge. The study presented in this article shows that knowledge is best shared in the format of high degree of interaction and high degree of use of shared modes. When groups wish to share or co-create knowledge, they often end up exchanging information or experiences instead. This article puts forward the claim, that knowledge cannot be shared like a cake or another physical resource, as it is by definition bound to personal experience. Thus when sharing knowledge, groups are either exchanging knowledge mono-modally, often through language, or they co-create something that none of the group members could have come up with themselves. The latter form of knowledge sharing might actually be knowledge co-creation rather than sharing, but is nevertheless what is sought for in knowledge sharing processes. The article outlines six cases of which three were successful in sharing and co-creating knowledge and three were not. One of the successful cases is submitted to microanalysis and on that basis some fundamental claims are made about multimodal knowledge sharing and -co-creation. The overall conclusion is that multiple modes are not enough for multimodal knowledge sharing to take place. Rather groups wanting to share knowledge must interact as well as make shared use of the available modes. This in turn has consequences for the definition of knowledge sharing as well as for sharing-practices. The study presented in this article thus holds a theoretical as well as a methodological contribution. Further the pervasive idea of knowledge sharing being a question of making tacit knowledge explicit is challenged and developed.

Keywords: Knowledge sharing, knowledge creation, epistemic action, metaphor, multimodality

1 INTRODUCTION

When a group is constructing a shared concept by use of toy bricks while talking and gesturing, is the result due to language, the bricks or the gesture? Would it have been the same, had one of the modes been left out? This article investigates how groups scaffold their knowledge-sharing process by use of numerous modes and argues that knowledge sharing is constituted by the modes available, not necessarily the knowledge available. However, having multiple modes at hand is no guarantee for knowledge sharing either.

Groups of knowledge workers sharing knowledge are an essential part of organizations (Argote & Ingram, 2000). In the context of this article knowledge sharing as a complex negotiation is investigated, as distributed among group members rather than as the sum of knowledge among the group members. Thus the stance taken is that of ecological cognition, regarding cognition as what is distributed in the bio-social environment (Hutchins, 1995; Jensen & Cuffari, 2014; Sterelny, 2010; von Krogh & Geilinger, 2014). Sharing knowledge is related to how a group uses each other, their body and their environment to negotiate a new, shared knowledge rather than making explicit an already existing implicit knowledge. Knowledge in this sense is distributed on a number of individuals and their environment (Hutchins, 1995; Sterelny, 2010). Knowledge sharing moves past metaphors like “the brain is a storage” and thus “knowledge sharing is sharing what is already there” towards “thinking is an interaction” and thus “knowledge sharing is scaffolded interaction”.

Regarding knowledge sharing as distributed further divert from the knowledge conversion model put forward by Nonaka and others (Nonaka, 1994; Nonaka & Takeuchi, 1995), since knowledge sharing is now regarded as a distributed phenomenon and not an explication of tacit knowledge. Knowledge sharing is a creative process of negotiation.

In order to investigate how groups share knowledge as distributed systems (Hutchins, 1995), it is preferable to have more than language at disposal. Having other modes of communication potentially makes the negotiation more explicit as pointed out by Bjørndahl et.al (2015). Further miscommunication and negotiation proves constructive in knowledge sharing and – creation processes. The additional modes in this case are gesture and toy bricks. It could also have been pen and paper, a white board, play dough or other material, providing opportunities for co-creation. The reason for choosing toy bricks is the immense research made on this material already and the ability to then use the results from other projects in research design and analysis (Bjørndahl, Fusaroli, Østergaard, & Tylén, 2014; Greve, 2016a, 2016b; Jacobs & Heracleous, 2006).

The research agenda directing the study presented below is:

How does having multiple modes at one’s disposal influence knowledge sharing in groups and what in turn may that infer about the concept of sharable knowledge?

To answer this question, some fundamental assumptions must be in place. First the concepts complexity, distributed cognition and joint epistemic action are defined and discussed. On that basis six cases are outlined and one is analyzed in depth in order to showcase how distributed knowledge sharing plays out in groups. The results of the analysis are then compared to the knowledge conversion model known and used in numerous knowledge-sharing studies and -theories. Finally a definition of sharable knowledge is presented and discussed in order to push the field of knowledge sharing in a new and more nuanced direction.

2 COMPLEXITY AND DISTRIBUTED COGNITION

The offset for the study presented below is 3rd generation cognition and 3rd generation knowledge theory. It is beyond the purpose of this article to review the theoretical development (see e.g. Wang & Noe, 2010), however it is relevant to state where the presented study is situated theoretically.

In headlines, the three generations of knowledge theory are

1. Knowledge as a dichotomy between tacit and explicit knowledge for the knowledge worker – hence knowledge sharing is to make explicit what is tacit or implicit (Nonaka, 1994; Nonaka & Takeuchi, 1995; Nonaka & von Krogh, 2009; Polanyi, 1969)
2. Knowledge as a hierarchy going from data over information and knowledge to wisdom (Davenport & Prusak, 1998; Rowley, 2007) – implying that knowledge is placed on a continuum between human agency and structuring of knowledge.
3. Knowledge as empowerment of employees (Greve, 2016a; Kastberg, 2010; Qvortrup, 2004, 2006).

The major difference from generations 1 and 2 to 3 is the turn from looking at knowledge as something individual, which needs to come out in order to be shared towards knowledge being something, which is created by a group of people. Thus moving from knowledge as something the individual should share in order for it to be manageable towards a focus on the knower and the interaction between knowers. The concept of the knower shifts from “the knower is a container” to “the knower is an enactor of knowledge”.

The shift from 2nd to 3rd generation knowledge theory has consequences for knowledge management and organizational knowledge communication with regards to whether the knowledge or the knower is in focus. This is not to suggest that one or the other is insignificant, but it is a fundamental change in where to look for knowledge.

This in turn leads to the positioning with regards to cognition. The shift outlined above is also present in the field of conceptions of cognition, going from a focus on the individual towards a focus on the shared and distributed. If cognition is regarded as an individual process, then 1st and 2nd generation knowledge theory would apply better. But if cognition is regarded as a distribution on more individuals and on the interaction between individuals and their environment, then 3rd generation knowledge theory is more adequate. As the study conducted here is a multimodal group study, the conception of cognition is distributed and embedded, enacted, embodied and extended (4e-cognition) (Jensen & Cuffari, 2014). Further the notion of cognition as scaffolded is highly applicable. As put forward by Sterelny (2010), the shift in cognition theory is from the extended mind (A. Clark, 1998; Andy Clark & Chalmers, 1998) towards the scaffolded mind. The first is not false, Sterelny writes; it is just not accurate enough. Understanding cognition as scaffolded rather than extended puts emphasis on what is taking place in the environment and how the environment contributes to the cognitive process. This is also the essential message of Hutchins in his anthropological studies of what he labels distributed cognition:

“The emphasis on finding and describing “knowledge structures” that are somewhere “inside” the individual encourages us to overlook the fact that human cognition is always situated in a complex sociocultural world and cannot be unaffected by it.” (Hutchins, 1995, p. xiii)

The method for analyzing group conversations and thus knowledge sharing as scaffolded and distributed is by necessity multimodal and complex. Complexity in modes and number of participants could in turn lead to an urge to reduce the complexity and focusing on only a number of the elements. However such an approach would risk missing out on the actions taking place in the knowledge sharing process (Cristancho, 2015). Thus the analysis presented below is complex and multimodal (Kress & Leeuwen, 2001), focusing on conversational analysis, gesture analysis and interactional analysis of the co-creation process. These levels of analysis will be unfolded below. As a layer upon the multimodal analysis lies metaphoricity (Cameron & Deignan, 2006; Jensen & Cuffari, 2014) – the potentially metaphorical language used to scaffold the knowledge sharing and –negotiation.

3 MULTIMODAL METHODOLOGY

As knowledge is distributed and scaffolded, understanding the quality of knowledge sharing calls for a multimodal approach to analysis.

The objects of analysis are group conversations conducted in six different Danish creative startups. The conversations took place as semi-structured conversations preceded by a building task inspired by an in lab-experiment conducted by Bjørndahl et al. (2014), (see also Greve, 2015, 2016b). The structure of the experiment was as follows: Participants were asked to build three different abstract concepts in toy bricks (LEGO Serious Play). They were given five minutes for each task. The original study showed that the behavioral coordination between participants involved in the building task predicts the physiological coordination. In other words, if groups are given a shared mode such as toy bricks, the ability to collaborate by use of these bricks will affect to what extent their heart rate align (Fusaroli, Bjørndahl, Roepstorff, & Tylén, 2016). Further the experiment showed that confronted with a picture of their own building in a fMRI-scanner members of the groups show signs of mentalization and social behavior as “vehicles of socially constituted meaning through local cultural practices.” (Tylén, Philipsen, Roepstorff, & Fusaroli, 2016, p. 111). In the conversations described below participants did not wear heart rate monitors and they were not fMRI scanned afterwards. However the approach to the building tasks were meticulously copied and it could thus be inferred that the effects in terms of socially constituted meaning and the benefits of behavioral coordination would be similar.

A third outcome of the initial experiment is a taxonomy of approaches to the building task (Bjørndahl et al., 2014). The article outlines three approaches to building:

1. Illustration: one participant decides what to build and build it alone or with scarce help from others
2. Elaboration: a concept for the building is agreed upon prior to using the bricks, but is elaborated and negotiated during the actual building process
3. Exploration: the concept emerges from the bricks and is not the result of a prior concept.

The participants in the study presented below were asked to build three consecutive buildings. The themes of the buildings were: (1) a dream office, (2) experience and (3) knowledge. All concepts are abstractions and further the last one is letting the groups share the concept of knowledge. The approach is also used in an already published action research study in a different setting (Greve, 2015). After the three building tasks the bricks were put away and a semi structured conversation continued between participants on the topic of knowledge.

The conversations were not natural conversations. The purpose of the study was to replicate the building task from the experiments but in the participants own office space, put the bricks away and have a conversation without the bricks to see if elements constituted in the bricks would move into the following conversation thus making use of the scaffold of the building in their knowledge sharing. This in turn would indicate if a shared concept was created and it would indicate that the shared concept would be present in the same mode and participant or if it would travel between modes and participants. The conversations lasted around one hour.

The interviews were coded by use of Noldus Observer XT directly in the video file (Zimmerman, Bolhuis, Willemsen, Meyer, & Noldus, 2009). Coding for activity in language, gesture and bricks on participant level directed attention towards specific themes and metaphors in the interviews making it possible to follow themes in modes and among participants. To reduce some complexity only the very visible/audible modes of gesture, language and bricks were coded. The outcome of the coding was plotted with regards to the parameters of participants, mode and time, providing an overview of how a theme traveled between participants and modes over time. A plot of the trajectory of a theme through a conversation is presented in figure 1 below. The plots visualizes if a theme is shared and negotiated or not.

3.1 Presentation of the data set

In total six companies were subjected to the process outlined above. They had very different results with regards what they built and what they conceptualized “knowledge” to be. Further they differed in how they approached the task of building and how the building traveled into the following conversation, and thus showed signs of co-creation and knowledge sharing.

Before venturing into the analysis of the case, some information and context about the groups are needed. All groups are part of creative start-ups in Denmark. The demographic data is presented in Table 1:

Table 1: Demographic data of participants

Gender	Educational Level	Age
Male: 13	Bachelor degree: 13	Average: 29.8 y
Female: 12	Master’s degree: 11	Min: 23 y
Population: 25	No finished degree: 1	Max: 60 y

Table 2 presents an overview of the six companies and their approach and results:

Table 2: Demographics, approach and co-creation of companies

C#	Company established	Number of employees	Particip. (owners)	Approach to building	Co-created a shared concept
1	2009	25	5 (0)	Elaboration	Y
2	2011	2 full time 2 part time	5 (1)	Elaboration	Y
3	2013	4	3 (2)	Illustration	N
4	2011	2 full time 2 part time	3 (2)	Elaboration	N
5	2010	7	4 (3)	Exploration	Y
6	2013	7	5 (2)	Elaboration	N

From tables 1 and 2 we see that the groups are relatively homogeneous and as they are given the same conditions in terms of modes, time and instruction, it is noteworthy that only three are successful in making a building that became a shared point of reference. Understanding this in more depth calls for more research on a larger dataset. However it is clear that it is not enough to provide groups with a shared mode in order for them to share and co-create a concept. From this dataset one case, C1, is picked out for analysis below. This case like C2 and C5 is co-creating a shared concept for knowledge and uses it as a shared point of reference throughout the conversation. The participants make use of bricks, gesture and language and co-create and negotiate knowledge as a tower. C1 one is picked out here as it presents a typical example of a successful knowledge sharing process. C2 and C5 are equally interesting but more concepts are negotiated at once. C1 represents a clear case of how a metaphorical concept of knowledge is distributed on modes and participants as well as over time. Figure 1 shows the trajectory plot of “knowledge is a tower” in the conversation.

Figure 1 is a plot of reference to “Knowledge is a tower” distributed on participants (y-axis) and time

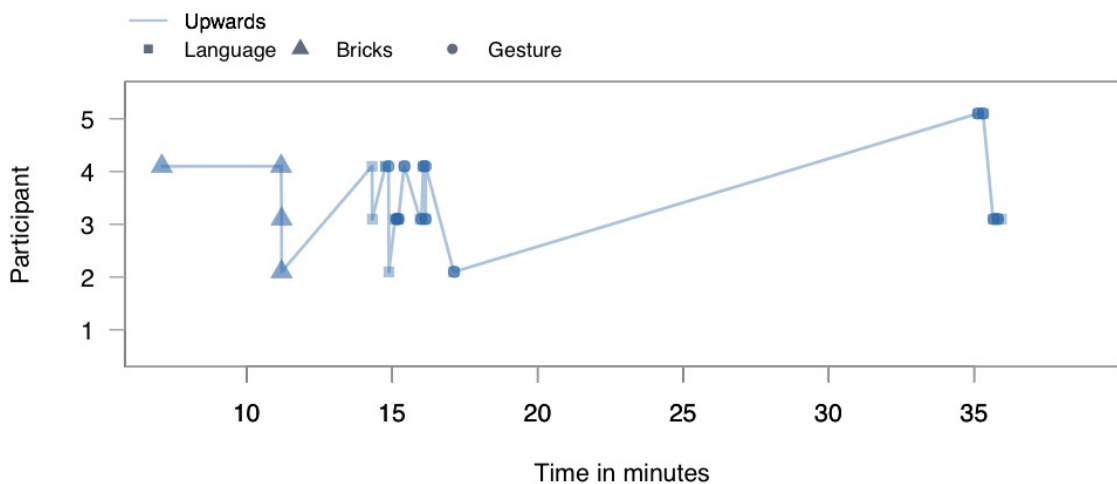


Figure 1: The concept of knowledge as a tower is presented throughout the conversation and in multiple modes also after removing the bricks (at around 15 min.)

(x-axis) and with reference in language, bricks/reference to bricks or gesture. From the plot it becomes evident, that all participants in C1 refers to “Knowledge is a tower” and that they do so in more than one mode.

The micro-analysis shows the three highlighted areas of the trajectory plot in order to better illustrate how exactly this multimodal approach to knowledge sharing takes place.

4 MICRO-ANALYSIS: SHARING ACROSS MODES AND PARTICIPANTS

The case consists of five participants. Participant P3 is the manager of the group and also the prime speaker. The group works together on a daily basis and hold different disciplinary backgrounds and areas of responsibility in the company.

As the topic of the conversation is knowledge, the analysis functions at two levels; what the groups agree that knowledge is and how they share this knowledge about knowledge.

The group is given the task “build knowledge in five minutes by use of the toy bricks”. They very quickly decide upon the overall concept; that knowledge is upwards. The concept is initiated by P3 in language and is then followed by a gesture and a verbal confirmation from P2 and P4, and the gesture is repeated by P3, as presented in figure 2.

The group then builds a tower in the toy bricks. The building can be seen in figure 3 below. Each participant contributed with elements of the tower.

At one point in the building process, the tower is about to collapse (figure 4). This leads to a negotiation of the similarities between the tower and the concept of knowledge. P2 asks if knowledge is really this fragile, thus suggesting that the tower and the concept of knowledge is not the same. While continuing to build and stabilize the tower, P1 states that knowledge is fragile and is supported in this opinion by P3, who makes the claim that the fragility is due to the knowledge worker being hard to replace. P1 takes over the turn and argues that knowledge has to be developed, which in turn makes it fragile. The negotiation of the similarities between the tower and the concept of knowledge ends here and is not negotiated further.

The third time that the building is used in relations to knowledge is towards the end of the conversation. Here the bricks have been put away for about twenty minutes, but the tower construction is nevertheless

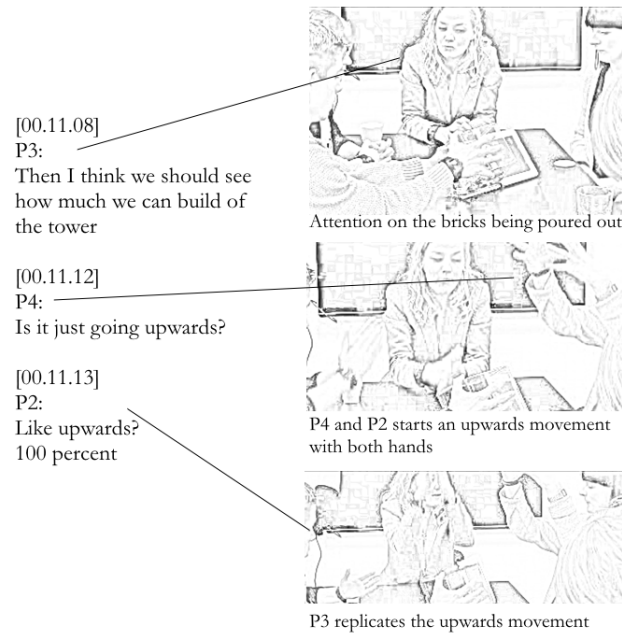


Figure 2: The concept “knowledge is a tower” is initiated.

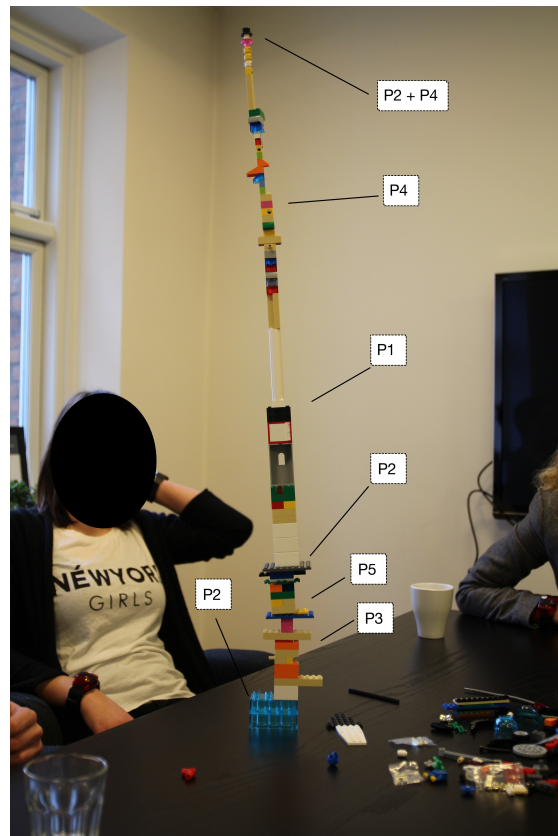


Figure 3: The very tall building of knowledge as a tower with contributions from all five participants (P#.) First presented in Greve, 2016.

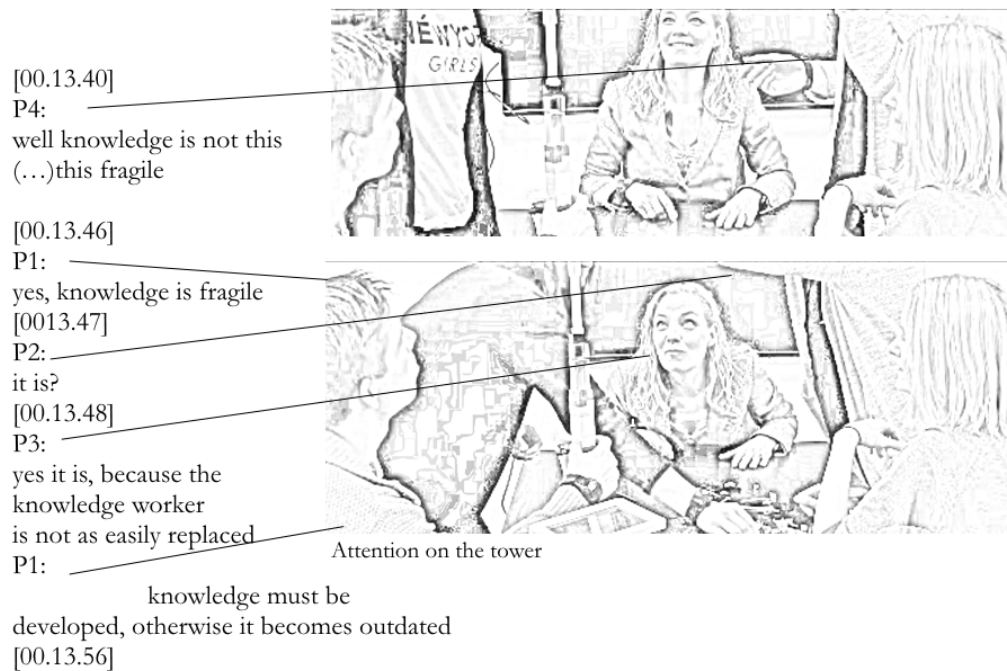


Figure 4: Negotiation of the similarities between the tower and the concept of knowledge. Note that the top of the building is outside the frame of the picture.

still present in the conversation. P5, who did not participate in the upwards gesturing at the beginning and did not take part in the negotiation of the building (see figure 2), repeats the upwards-gesture indicating that the concept of knowledge being a tower is present with her as well (figure 5). She elaborates on the tower-knowledge similarities by saying that the continuing hiring of new employees is what is adding to the tower, making a gesture, pushing something on top of something else with the right hand, holding the left hand steady just above the table.

About 30 seconds later P3 further elaborates on the tower-knowledge similarities by saying that the knowledge of each employee cannot be measured beside each other. While saying this, she makes level-movements with both hands, shifting them up and down besides each other with the palms facing downwards. Rather, she concludes, the employees together are a tower of knowledge, as seen from figure 6.

In conclusion the analysis shows how the concept of knowledge being a tower is initiated in language, supported and repeated in gesture, then built in toy bricks and referred back to in language and gesture later on in the conversation. The concept is created multi modally and negotiated with the concept of the tower as common ground, which is negotiated, defended and agreed upon.

It is evident from this example that the modes of gesture and bricks play a role in the sharing and creation of a concept for knowledge. It would also be fair to suggest that had the group have a different mode than toy bricks at disposal, the concept might have been different – thus this also point to that the group is not externalizing an already existing concept of knowledge but rather it is co-constructing and in that way sharing their conceptualization of knowledge. These findings contradict the traditional 1st and 2nd generation knowledge theory, which will be discussed below.

[00.35.08]

P5: —
 the first was rather flat
 and the other incredible high
 [00.35.11]
 laughter



P5 repeats the upwards-gesture from 00.11.12

[00.35.19]

P5: —
 knowledge
 that because all these new employees
 come in
 more employees come in
 it just builds up
 I think
 P2:
 yes, I think so too



P5 pushes right hand in over left hand further and further up like putting something on top of each other

Figure 5: P5 repeats the upward gesture and elaborates on the tower-knowledge similarities by pushing new employees on top of each other.

[00.35.46]

P3: —
 again in respect for our
 different competencies
 we won't make boxes
 saying where our knowledge
 is bigger (...)
 that depends on the assignment



[00.35.56]

P3:
 together we are a tower of knowledge

Figure 6: P3 argues that the employees together is a tower of knowledge, as their competencies cannot be measured against each other.

5 DISCUSSION: WHAT CHARACTERIZE SHARABLE KNOWLEDGE

Based on the concepts of 3rd generation knowledge and ditto cognition as well as the above presented case, knowledge is best shared multi modally and is not an explication of preexisting schemata or patterns. Rather knowledge sharing is a co-creation in the sociocultural environment and an emergent and highly complex task. What was built and conceptualized about knowledge in cases C1, C2 and C5 in the dataset of this study was not pre-existing. It was emerging from the modes and participants.

Nonaka and colleagues (Nonaka, 1994; Nonaka & Takeuchi, 1995; Nonaka & von Krogh, 2009) are famous for the knowledge conversion model based in Polanyi's concept of tacit knowledge (Polanyi, 1969, 2012). The idea proposed by mainly Nonaka (1994) and Nonaka and Takeuchi (1995) is that knowledge converse between tacit and explicit knowledge and that knowledge creation takes place when making tacit knowledge explicit e.g. by use of metaphor and analogy. Figure 7 shows a representation of the knowledge conversion model.

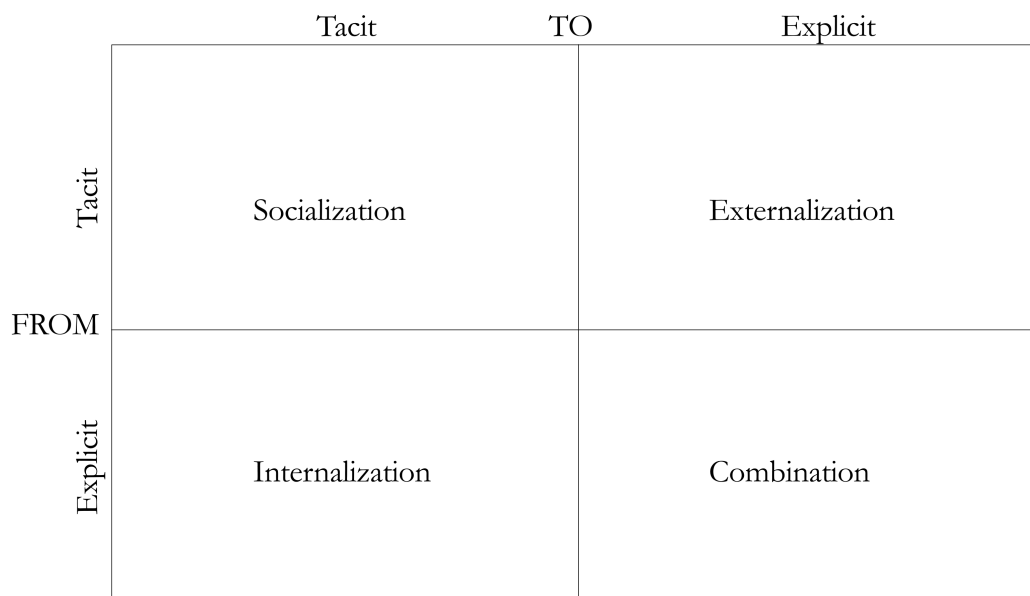


Figure 7: The knowledge conversion model from Nonaka (1994).

Regarding knowledge sharing and knowledge creation as a conversion in this way stresses knowledge as something individual and preexisting. However when looking at the case presented above, there is no evidence of a preexisting concept of knowledge being a tower. Nevertheless this becomes a stable and shared metaphor in the conversation to a degree where the qualities of the tower were transferred to the concept of knowledge (fragility and immeasurability). These qualities of the concept of knowledge come from the bricks and gestures, and cannot be said to be pre-existing. The group simply makes the connections between gesture/building and knowledge because it is co-created and identified as knowledge, just as C2 and C5 in the dataset create their representation and use it for negotiation of the concept of knowledge. In C3, C4 and C6 the building is not a shared project and it is not referred back to, and further the groups never return to the metaphors from the building task in the conversation.

Metaphor and analogy is equally important in this approach to knowledge sharing and –creation as in

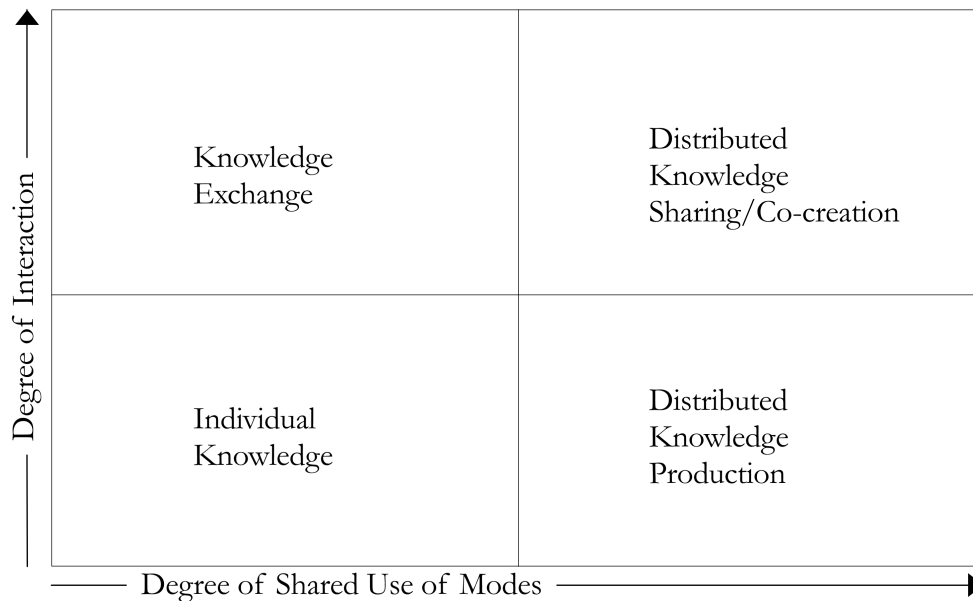


Figure 8: An alternative knowledge model stressing that it is the usage and number of minds and modes determining the degree of distribution, sharing and potentially co-creation.

the knowledge conversion model. But the function is radically different. The metaphor “Knowledge is a tower” from the case above is not an explication of the concept of knowledge present with any of the participants prior to the building task. Had they had other materials at disposal, they would more likely than not have come up with something else. But the tower becomes a point of sharing the attributes of knowledge. This in turn makes knowledge sharable – and the externalization of knowledge is not due to and explication but due to a distributed sharing and hence creation of knowledge. Figure 8 presents an alternative knowledge sharing and -creation model, disregarding the tacit/explicit dichotomy and introducing degree of interaction and degree of use of shared modes as the parameters of knowledge sharing and -creation.

The model presented in figure 8 is divided into four categories in a mapping of degree of interaction on degree of shared use of modes. Low degree of both will lead to knowledge held by the individual and not distributed, here labeled ‘Individual knowledge’. With low degree of shared use of modes and high degree of interaction, knowledge is exchanged. The most common use of mode would here be language – either written or spoken, and participants would provide each other with information and even knowledge, but not make something new out of it. With high degree of shared use of modes and low degree of interaction, it is the individual distributing his or her knowledge and producing knowledge for communication purposes or for brainstorming – the modes being pen and paper, an app, a computer, post-it notes or the like.

When both degree of interaction and degree of shared use of modes are high, there is an opportunity for distributed knowledge sharing and –co-creation. When multiple people work in multiple modes, which they use together, not separately or parallel, they are prone to elaborate or explore each other’s knowledge and thus co-create new knowledge extending the sum of own knowledge. The sum of knowledge being an inference from “the knower is a container”.

Answering the research question proposed in the introduction, having multiple modes available provides the opportunity for a high degree of use of shared modes. However the group needs to pick up on this opportunity and interact with each other as well as the modes in order for this sort of knowledge sharing to take place. The cases C3, C4 and C6 do interact, but do not make use of shared modes i.e. they do not make use of the same metaphors and analogies, they do not make use of the same gestures and they do not elaborate or explore by use of the bricks. Thus they may exchange knowledge but they do not produce, share or co-create. Put differently it is unlikely that they think any differently about the concept of knowledge after the conversation.

In the cases C1, C2 and C5 this is very different and exemplified by the analysis above. They copy each other's gestures, they elaborate or explore concepts through the bricks and they use the building to argue for the qualities of the concept of knowledge. They in turn create a shared representation of the concept of knowledge and by that share and co-create knowledge – which would have also been the case, had they worked on the concept of something completely different.

Thus when evaluating how groups perform in terms of knowledge sharing and –co-creation it is paramount to take into account their use of additional modes, metaphors and analogies. Further when evaluating the degree of co-creation or sharing, it is relevant to see how concepts, words, gestures and use of other modes travel through time and between participants in order to establish if a given concept is a one-person or one-mode phenomenon or a shared one.

This leads to an answer to the final part of the research question; a definition of sharable knowledge in the light of 3rd generation knowledge and –cognition theory. As cognition is regarded as embedded, extended, embodied and enacted and knowledge is conceptualized as hyper-individual, for knowledge to be shareable, it should process the following characteristics:

- Bound to topic rather than facts
- Bound to topic rather than individuals
- Expandable in terms nuance and conceptualization
- Phenomenologically abstract and thus explicable by use of metaphor and analogy.

Thus, if knowledge is factual, it is best shared by use of exchange, e.g. historical facts, economical or demographic facts. If knowledge is bound to the individual it can be exchanged or stay as individual knowledge, e.g. how conditions are in my specific work environment or how I regard or experience knowledge. For knowledge to be shareable it must be: Negotiable in terms of conceptualization and as such a hyper-individual scaffolded interaction.

Further research needs to be done in multimodal knowledge co-creation by use other modes than the ones introduced here. As the setup in the study presented above is semi-experimental, investigating multimodal knowledge sharing and co-creation in organizations, without the pre-defined tasks would add nuance to the definition of knowledge as hyper-individual and negotiable.

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