THE 10ᵗʰ EUROPEAN CONFERENCE
ON CREATIVITY AND INNOVATION
ECCI *X*
COPENHAGEN 14 – 17 OCTOBER 2007

Languages for creative interaction
- descriptive language in heterogeneous groups

Bengt Olsson, Mälardalen University
Department of Innovation, Design and Product Development
Eskilstuna, Sweden

Abstract

This research study is trying to come to grips with creative activity in an intense group effort, such as when musicians improvise or when a group of industrial designers brainstorm to solve a client's problem. One might say that we are studying the handover of the creative spark from one person to the next, inspiration at best accelerating.

This paper presents two observational studies of types of groups that are supposed to be creative on a collective level: brainstorming groups at two industrial design firms in Stockholm and two groups of temporarily assembled improvising professional musicians.

In the theory of creativity the notion of variety is a fundamental one so that when people with different viewpoints interact, the outcome is potentially innovative. It is all about elaborating interactions where differences fertilize new ideas. But this creatively managed interaction could also lead to a stalemate and even to conflicts where differences and clashes of opinions become strengthened and ingrained.

Each profession has developed its own specific language so that, for example, a designer has refined an ability to spontaneously make rough sketches and a musician uses her instruments to clarify a particular meaning or message. In this study the improvisational musicians had no sheet music, a condition that forced them to formulate their aesthetic intentions with sound, playing and singing.

One aspect of verbal language limitations is articulated in the concept of "verbal overshadowing". When subjects in a study were requested to describe a face, a smell or a taste, their words seemed to overshadow their experience. If words prevent thinking or recollection then we might have to be cautious with verbal descriptions. This also points to the importance of the choice of language for mediating ideas. This paper will be dealing with ***new*** approaches in the process of forming and mediating unfinished ideas.

Introduction

Changeability vs. durability

Schrage (2000) state that too many organizations believe that manageability means predictability. This is probably due to the purpose of organizing at the first place; apart from the division of labour it aims for such noble functions or characteristics as durability, stability, safety and - predictability. Besides, if the world or at both macro- and micro levels, both outside as well as inside the organization is turmoil then we might increase the strivings for stability and predictability? The previous question might not be one that is expected in a text on creativity, improvisation and innovation, nevertheless it is here to give the subjects more balance. The question to be addressed treat the dilemma between building prospering organizations that might need a soil of strong corporate culture at one end of a continuum and

the need to continuously redefine and reinterpret social relations as well as the organizing of work, on the other.

Barret (2000) perceives the jazz group as a prototype for the innovative organization. The members create out of unfinished fragments rather than complete and stable plans where the actions 'emerge' on stage in front of an audience. Furthermore, Bastien & Hostager (1992) understand improvisation to be a spontaneous but conscious social process. It is a collectively approach for innovation where the improvisations' minimal structure gives scope for the members' own interpretations, thus enhancing the possibility for organizational renewal. This improvisational approach allows the structure to be altered continuously through the maintenance of the ambiguity that manifolded interpretations contribute to offer. For example, Kamoche et. al. (2002) maintain that interaction in organizations is analogous to the 'emergent behaviour' of performance arts.

Resnick (Resnick, 1996 in Sawyer, 2001, s.40) also uses the term 'emergent' when arguing against the notion that complex behaviours always have to be centralized governed. The decentralized governance of interaction becomes obvious when one observes how small groups conduct problem solving, discover novel approaches to the management of the unexpected, react on technological, cultural or competitive challenges as well as develop the ability to learn. The analogous connection between improvisation and innovation becomes evident when observing their preference to experiment and discovery, incurring risks and perceiving mistakes as necessary instances of the process of learning (Rawlinson, 1981).

Difficulties in establishing a constructive creative climate in a workgroup have been discussed by Georgsdottir et al. (2003) amongst others. The organization's management expect its members to maintain a comprehensive and flexible perspective on goals and work assignments. Furthermore, achieving this requires a readiness among members to establish co-playing entities in different constellations.

Methodology

Several studies on group creativity have been performed in academic settings where students at different levels and in varying situations were being requested to solve specific problems etc. This paper presents components of a research project carried out in authentic real life settings at two industrial design firms and two different groups of improvisational musicians in Stockholm. Both of the design firms stated that they are using brainstorming as a method in their endeavour to design products suited to customers' purpose.

There are obvious differences between the theories of brainstorming in comparison to how these firms' design and product development processes are structured into several phases from analysis to prototyping and adjustments. They use what they call a brainstorming method during in all of these phases but seldom several such brainstorming sessions in the same project. This fact indicates that the elements in the brainstorming could differ from one session to another or from one project to another. The number of participants, the duration of a session (often about three hours), the formal status and the use of different creative techniques differs also from one project to another.

One might say that their brainstorming sessions mix Rawlinson's (1981) delimited phases into a web of simultaneous evaluation, criticism and free-wheeling. On the other hand, the theory prescribes that criticism must be ruled out and evaluation should be postponed to another session a couple of days later.

Research approach

The collective creativity is characterized by the instantaneity and could be described as 'a fleeting coincidence of behaviours' (Hargadon et al., 2006). The ideal of scientific methodology prescribes that procedures and results can be reproduced. The circumstances

that this study treats may hardly meet such a demand. The validity of the results in this report must be interpreted in the light of similar situations.

One approach is to study activities where during a long time methods, structures and concepts that incorporate approaches characterized by improvisation and iterative processes have been developed. Such concepts and methods are of great interest. How the collective development of ideas is conveyed in the relevant descriptive language is of paramount importance. The method applied involves comparison and translation as to those concepts or processes which are being developed and used in one activity then imposed on another activity. This 'method' could be described as 'analogous thinking' (Hammarén, 1999).

Group creativity might be studied in several different ways. Hare (1982) describes four different strategies or perspectives for the analysis of small group interaction and creative processes: 1) a functional perspective, 2) an interaction perspective, 3) a dramaturgical-interactive perspective and 4) a transactional-functional perspective. This study's approach is a combination of interaction and functional perspectives (Olsson, 2005a).

The sociologist Bales (1979) studied leaderless small groups as social systems. He used a three dimensional approach in his evaluation of interpersonal behaviour. Bales called his dimensions: upward – downward (submissive vs. dominant), positive – negative and forward – backward (expressive and nonconforming vs. serious and conforming). This study has a relational, social constructivist, perspective on interpersonal behaviour (Köping, 2003).

It is likely that there ought to be some kind of translation going on when individuals from different knowledge domains interact. One of the purposes of this research project is to develop a more mindful awareness of such language.

A deeper dimension that might be harder to manage is the reality denoted by the concept of tacit knowledge. Wittgenstein (1953), Gallie (1956), Taylor (1971) and Polanyi (1983) have made somewhat different distinctions for the concept. In this research project the concept of tacit knowledge is used to describe those phenomena that do not allow themselves to verbal descriptions. It refers to the kind of knowledge and skills that is acquired during repeated activity related to a specific practice (Johannessen, 1997; Olsson, 2005b).

Two research question are the main focus in this paper:

Q1) How do the industrial designers formulate and mediate their (unfinished) ideas?
Q2) What kind of depiction facilitates their creative group?

Related research

In the following a selection of relevant theory is presented concerning language, creativity and interaction in small groups.

Language for interplay

There is a considerable number of writers maintaining the positive importance of manifoldness, i.e. that a variety of differences should cooperate. In addition, it is also more or less implied that this composition of individual differences is a basic condition for qualitative and sustainable solutions to occur. The efficient team finds creative solutions to well-defined problems (Stein, 1974; Katzenbach et al 1993; Belbin, 1993).

One aspect to consider is how multitude and mixture of individuals coming out of different professions working to obtain creative results relates to confusion of language (Olsson, 2007). Usually our day-to-day use of language is not regarded as problematic. The meaning of a word is continuously stretched and hardly anyone worries about whether what is said is perceived and interpreted in several different ways (Hammarén, 1999, pp. 160).

An unproblematic view on our use of verbal language might in some situations cause difficulties because each knowledge domain creates its own vocabulary and basic assumptions. Fleck formulated this view by developing the concepts 'thought collective' and

'thought style' (Fleck, 1935). It could be things or conditions that are taken for granted but when challenged for a definition they might be possible to describe verbally.

Creativity in small groups

Hare (1982) summarizes his findings about group creativity in a flow chart (Fig.?). It is a process of well-defined steps where each step is expected to finish before the process can go on to the next steps. He suggests that 'the scientific method', which is characterized by goal-attainment, is the best way to develop a new theory for physical problems. If the problem is of "sensitive social" character the consensus approach is preferable. He defines this as a "non-zero-sum" game in which all players can se some benefit. Irrespective of method an essential part of the creative process is the 'creative shift' that breaks away from a prior state of conformity to older understandings.

> *"This new system or form of relationship is not necessarily what can be true today, but that might be true if people behaved differently" (Hare, 1982. p.178).*
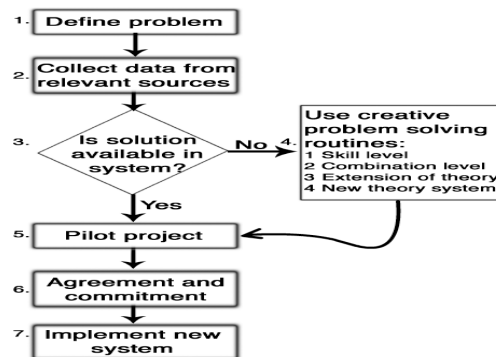

Fig.1 Steps in the Creative Process of problem solving (Hare, 1982 p.175).

Hargadon et al. (2006) have studied problem solving at work. They stress the importance in thinking together as a basic condition for collective creativity and points out that the group members' interactions are critical. Just as the thinking, i.e. cognitive activity, is inseparable from the body, the interaction is the breeding ground for collective creativity (Olsson, 2007).

In order for this collective creativity to emerge collaborators have to view their colleagues' actions as meaningful and interpret them in correspondence with the specific situation. In order to bring about this meaningfulness individuals have to pay strenuous attention to particular interactions with others in the group. To describe this consciously developed awareness Langer (1989) uses the concept "mindfulness". It is about the importance of being engaged in each others and in the activity we are involved in, to really exist in the very moment (Langer, 2003). This notion of mindfulness makes a bridge of analogous similarity with Knudsen's (1998) examples of musical improvisation as 'ideomotoric actions' (Meltzoff et al., 2002). One need to have something to mull over in order to start thinking: action comes first, eliciting the process of thought.

Collective creativity is thus characterized by the instantaneity and could be described as a fleeting coincidence of behaviours (Hargadon et al., 2006). In the process of interaction continuous negotiation is carried out. The activity of interaction itself seems to be the language of creative collectives. This might imply that the genuinely creative collective is capable of leading itself through its mindful character. In the domain of musical as well as theatrical improvisation specific sophisticated ways of interaction have been developed (Berliner, 1992; Sawyer, 2001).

Iterativity and improvisation

That there is a distinction between a goal-oriented process and an iterative one seems to be generally accepted. The goal-oriented process rationale implies that every contribution or activity is justified by the objective meaning that contributions provided are evaluated on the basis of their adhesion to those goals, whereas the iterative rationale could be characterised by quality where the goal-oriented process has quantity as its fundamental justifying criterion. The quality of iterativity is governed by the participants' ways of relating to each other. This quality of iterativity evolves from the participants' attitudes, to what extent they prefer working in an experimental reconsidering process rather than a goal-oriented linear one (Austin, 2003).

The importance of reconsideration in innovation and product development is emphasized through the concept of 'iterative interplay'. These processes should not be regarded as linear in a chain of necessarily dependent phases in a way as the waterfall model usually is described. Instead, the process of iterative interplay stresses the interaction that is rooted in and evolves from continuous collaboration between the individuals and their collective. Hoberg describes how treacherous the waterfall model could be.

> *"... because, that kind of model for development assumes to a great extent that one knows what has to be done and that one can realize those structures that is created on a high level of abstraction" (Hoberg, 1998. s. 103) authors translation.*

Andersson & Rollenhagen (2003) express needs to leave the expert oriented, analytical and linear ideas concerning innovation processes. They maintain that these notions tend to keep the thinking on to and within the frame which might result in constrained solutions being produced. Those solutions or merely pseudo-solutions, are brought forth through the existing analytically focused toolbox.

As an alternative to these 'linear notions' they introduce a collaboration-oriented understanding characterized by so-called 'synthetic iterative' processes. Andersson et.al. develops a methodology in cross-disciplinary groups so-called 'system-groups'.

> *"Thus, on the contrary to rational and sequencial models for problem solutions we uphold that the process of innovation have to come about concurrently with the expansion of knowledge and the ability to imagine and visualize" (Andersson & Rollenhagen, 2003) authors translation.*

Since ideas with high innovative potential are genuinely novel and unique, no one can make precise statements. This condition calls for abilities that allow for descriptions of vague understandings of the problem and skills to depict possible solutions.

The Andersson et.al. methodology for system groups offers a dialectic approach. This process does not advance via well-depicted goals which would tend to mediate notions about a linear process.

The ensemble quality

Austin (2003) has carried out an ambitious study with entrepreneurs from different fields such as software programmers, musicians, glassblowers and industrial designers. The aim of his research was to find what qualities that the paradigm of diversity should strive to maintain. The force of these qualities stands out best in comparison with the industrial paradigm, the assembly line and sequential working processes. He suggests that an artful approach has to be established which is performed through a process characterized by four necessary qualities: Release, Collaboration, Ensemble and Play.

Release – this quality seems to the opposite of control but it is rather a type of control. This control demands genuine preparation that facilitates control – the desired action is reached in an unpredictable way because it follows the 'gravity' of the ensemble.

Collaboration – suggests that conversations evolve through individual freedom; it is a conversation where everyone may contribute ideas. The basic condition for this interaction to occur is the process of reconsideration, which is a concept that substitutes the industrial designers' replication and the politicians' compromise. Those who collaborate reconsider a problem in the light of each and every contribution so that new and unpredictable ideas may emerge. This artful collaboration establishes something that is greater than a group of individuals – an ensemble.

Ensemble – this concept refers to both a name and a quality. A group collaborating in an artful way articulates the notion of ensemble quality. This tautology characterizes artwork that might be one of the causes why knowledge originating out of traditional industrial domains meets difficulties in grasping what mechanisms artful collaboration activates. An ensemble is something qualitatively different from a conventional team.

Play – refers to collaboration and interaction and is the product of an ensemble. In the theatre the play exists only when it is performed. The interaction constitutes the play just as the music exists only when performed. The music or the stage play emerge in the activity itself and this condition is the reason why these activities scarcely may be separated from each other – if you remove one, the other ceases to exist.

Austin's perspective of the process makes it clear that the artful way of working turns away from established planning and precise descriptions of goals, instead turning towards genuine preparation and improvisational interaction. The product is developed in artful activity of collaboration. The product is a result – not a goal.

Observational study I: Jazz Improvisation

One of the studies carried out forms part of a project called IMPROLAB at the Royal College of Music at Stockholm University. The purpose of this laboratory was to establish a stage where collaborators working in different apartments and music genres could get the opportunity to meet and play music together. From the researchers[1] point of view this project was a pilot study that could function as an empirical base for funding applications for further research.

The Survey on Improvisation

The audience at these concerts was requested to complete a questionnaire concerning improvisation in general. There were 83 respondents giving detailed answers. Some of the results are summarized in the following paragraph:

- Improvisation is not an exclusive talent; it may be taught and acquired through training. It is universal in the sense that everyone is doing it to some extent – *"Everybody can do it! It does not belong to certain domains, it is required most of the time"*.
- It is most evident in ordinary repetitive situations. It is something you do when you master it thoroughly – *"It is not easier to follow some template"*.
- Improvisations are performed effortlessly and spontaneously while at the same time there is structure and things to pay attention to – *"in our case it's about thinking as little as possible and rather just let it happen"*.
- Improvisation is basically interaction, it is not an activity one single individual could perform all alone – *"It's about giving the others space and time… … to pay attention and listen…"*

The majority of respondents reported a positive experience in listening to the improvised music. They agreed that this communication between genres contributed positively to making the music fresh and vital. Some respondents were more reserved in their opinions and one respondent reported that he felt an obvious confusion of languages that contributed negatively to his experience.

The Improvisational approach

The improviser exists here and now and is expected to respond intelligently on impulses from co-players. One might say that improvisation is the ontology of "the now". Weick (1993) suggests that the improviser creates meaning retrospectively, he describes how the improviser continuously is looking backwards for meaningful patterns in what has been played, whereas Knudsen (1998) argues that one has to make a clear distinction between retrospection and irreversibility.

Improvisation is characterised by "no-turning-back", there is no possibility to replay anything. This implies that the improviser is continuously interpreting and simultaneously responding to what is happening - by creating. The process might be described as being 'in the now with empathy' whilst continuously making sense of and partaking with ones own actions. As results emerge, it is too late to change anything, there is no other option than to throw oneself into the act.

D: *so… the more one has been rehearsing the more one is able to improvise… the more completely the tune or the lyrics is written the easier one could leave it and create novelty… another obstacle is cowardice, that one doesn't dare, one is afraid that it might turn out wrong…*
S: *… another obstacle is half-rehearsed… that is, one has just started to arrange a form and then never rehearsed it properly… so that no one has the structure vividly in mind…*
D: *… then it would be better not rehearsing at all…*
E: *that's exactly how it was… we had no intention to rehearse but then we realized that we had great time playing together… but suddenly we got afraid that we would get nuts and start to think about why the music did not sound as good as at the rehearsal… but if one doesn't rehearse that much one won't establish an opinion of how it ought to sound… then it would be better without any rehearsal at all…*
D: *… but it didn't result as we had thought anyway… I have been working with different assemblies of musicians and when they are good, I don't mean the ability to play real fast and all scales, but that they have become assured with their instrument and so that everyone in the ensemble is confident in his or her own skill, then it there is no problem… but if there is one who isn't self-assured and trusting his own talent… then he is too hesitant… it's not that complicated, one just has to step right into it… whenever one feels it is right… that's the art of it!*

To Knudsen the collective is central. He stresses the fact that the soloist is first of all a co-player. He points out that the playing is genuine creativity in its own, implying that the ensemble as a unit must be engaged in the kind of feeling the interaction evolves. The performance is not so much a question of memory as it is about consciously being aware of "the now" – then execution comes automatically.

Analysis I: The Rehearsal

A group of improvisational musicians was assembled to rehearse for a concert at the Royal Music Academy in Stockholm. They met for rehearsal for the first time the day before the concert, starting at 7:00 am and finishing at about 10:30 am. For this research project the rehearsal and the concert were captured on digital video for transcription and analysis. During those hours they managed to rehearse ten tunes that were sketched roughly with chord

sequences and a melody on sheet music. This was the raw material that they continuously negotiated around during the rehearsals.

They were informed about such specifics as where and when the concert was to be held and what kind of audience the organizer is addressing. They learnt of the concert title and what kind of advertising had been made.

Probably, they were well aware of the time limit. The concert is to be held the next day and they only have a couple of hours to rehearse. All of them had their own projects going on and when the rehearsal ends each of them rushed off to a concert or a recording studio. Actually, during the whole rehearsal the aspect of time was present and had to be taken into consideration.

Q2a) What kind of depiction facilitates their creative group?

The evolving dialogue was at times very intense. This made the transcription of the dialogue a real challenge. All six musicians had specific opinions that they willing to share with the others. Some of them carried their opinions through relatively purposefully whereas others expressed their ideas without studying how the others received it.

Q: *"when you came to the Royal College of Music to rehearse… several of you presented your individual suggestions for tunes for the concert the next day… some were written down on paper… and you had some sketches that were really rough… so, let's say that your picture of the goal is that 'you are going to give a concert for an audience that has bought tickets tomorrow'… so then, how do you go about this? Would you first start to describe this concert… so that, the more able you are to describe the picture of the goal verbally into words… whatever that could be… do you think that you would have carried out the rehearsal and thus that made it a better concert?"*
I: *"No, I don't think anyone of us would have appreciated if it had been so clear and well defined… it would rather have been perceived as an insult … you see, everyone was really… how should I put it… a skilled performer, capable, conversant and trained musician… they are all experienced musicians and used to provide creativity at rehearsals and in concerts. Experimenting is a habit… when doing it we are not in need of so much… words… and there is also an enchantment to this excitement, this insecurity … it stimulates us to make it work…"*

They are not facilitated by clear verbal descriptions, on the contrary, they would rather regard that as insulting. For these musicians the characteristics of improvisation and their approach to music might be generalized to their behaviour in other areas as well.

B: *it seems as if you give quite scantily worded instructions… is that on purpose or…?*
J: *well… one understands pretty well… how it should be…*
A: *and… it all depends on the condition that we use the same language… this scantly worded language…*
B: *so you won't use pictorial language, metaphors or analogies to describe the character of music?*
A: *No… music is music!*

A: *this reminds me of chamber music except that we use sheet music… you see, it's about this kind of communication… that is like… a radar… it is not explainable… I cant explain what's happens around here somewhere… (waves hands over the head)…*
P: *but yet… you all have sheet music in front of you or?*
A: *yes but… I really don't understand all of it…*
J: *it is just a small fragment of the actual music…*

Fig. 4 A note system - without bars, time, measure just notes and some phrasing.

"The notes on the sheet music is not completely visual but rather something understood (like an ideogram)... an inner vivid picture is eliciting by watching the sheet music... for the experienced musician this is such a matter of course so that he or she perceives it as if the sheet music IS this picture... it is only the knowledgeable that could decide what is mediating meaning and what could be left without notice..." (Sällström, 1991).

Q1a) How do the improvisational musicians formulate and mediate their (unfinished) ideas?

In the musicians' rehearsing session there were surprisingly extensive use of verbal language. This probably has something to do with the subjects discussed. The musicians did not consider musical expressions or what kind of moods they should strive to put their audience in. Rather, there was a continuous negotiation about form and structure such as how many times the different parts of the tunes should be repeated and who should play a solo in different parts. One might say that they compose the overall structure or came to agreements on what frames should limit their joint musical endeavour.

One reason to why they did not talked about musical expression or different moods of the concert they were going to give might be a matter of trust. They were all very experienced musicians with good reputations within the musicians' community so they could safely rely on their co-players' judgement regarding appropriate musical attitude and manner. Another reason might be the limited time allowed for repetition because everyone had other projects such as concerts or studio recordings going on simultaneously.

One could argue that in the first place it would not have been possible to schedule the only rehearsal the night before the concert if the participants had nor been as experienced as they were. In that sense, experience and trust are mutually re-enforcing each other.

This is not to say that everybody always applauded the co-players' contributions or suggestions. On the contrary, there was quite a lot of questioning and criticism especially towards suggestions that seemed to corroborate traditional musical expressions and manners. The musicians seemed to strive to counteract conventional structures and forms.

The striving for the breaking of conventions might be considered as an intellectual way to embrace the joint musical endeavour. Three of the six musicians did express that kind of approach during the rehearsal whereas the other half said repeatedly that they wanted to "just play and let's see what comes out of it". The latter half did not seemed concerned about whether the results were more or less conventional however theirs was primarily a concern with playing together and the evolving music itself.

In that sense one could see roughly two main preferences in this group of improvisational musicians: one characterized by intellectual preferences and the other characterized by 'improvisational attitude'. This 'improvisational attitude' might be described as 'being mindfully in the now'.

Although the dialogue during this music rehearsal consisted of both verbal and bodily expressions such as facial expressions and gestures, there was of course also a musical language consisting of tones and chords by singing or playing an instrument. Thus, it is not only about verbal language. When the singer introduces a new song she continuously shifts back and forth between verbal expressions to singing or sounding back to verbal descriptions again.

The Singer: *so… I also took this "Stormy Weather" that one could do… if that's okay for you… the two first A-parts… one or the two, very slowly in tempo or just… rubato. And then one gives a tempo…* (she hums a couple of tones in the melody)*... let's see what have we got… give me a C…* (she then continues on to the A-part very fast and slows down to sing in normal tempo) *"… all the time..." we will arrive at… and then one gets going then… Hum m mm mm…* (she snaps with her fingers without counting as to simulate the counting and then she hums a phrase of improvised solo) *… if I then try to give a tempo, kind of…*
The drummer: *in the B-part…?*
The Singer: *the B-part, the one just arrived to… so I count… one-two-three-four…* (she continues her scat-singing directly as to show the piece characteristics)
The Bass player: *okay, do you have any sheet music on that or…*
(the singer continues scat-singing while she walks around distributing the paper)
The Singer: *now, let us see… this is it… it is some nonsense written here but that is not anything to be concerned with…*

This example shows how different communications dimensions in can be woven together very naturally. If the singer were to depend on verbal expressions exclusively when doing this kind of descriptions she would probably get exhausted in extensive rewritings using metaphors and analogies. And as a consequence everyone in the group might lose attention and energy. And yet, she might not have mediated anything of what she really wanted to express in the first place.

The development of the musical note system since the 11th century has made it possible to represent certain aspects of musical expression with signs and symbols. The benefit of this possibility for mediating and preservation should be stressed.

In an earlier study (Olsson, 1993) regarding the extent of chord sheets' influence on eight improvisational pianists actually play, pianists were requested to improvise while listening to a pre-recorded rhythm section playing three different styles in a chord sequence of eight to sixteen bars.

There where just three takes of each 'tune'; first they just listened to the rhythm section playing the 'tune' once without looking at any sheet music then, second, they were requested to improvise still without looking at any sheet music just 'playing by the ear', and thirdly they got to improvise a second time but now allowed to read the chord sequence written on a paper of sheet music. A general finding was that the improvisation did change when the pianist was looking at the sheet music with chord sequence.

One would expect that the second improvisation should have been more cohesively built up by longer phrases due to the pianists successively gaining better understanding of the music. Instead, the susequent improvisations had shorter and more abrupt beginnings and endings of the phrases indicating that the phrases seems to follow the sheet music' bars and chord changes to a higher degree when the pianist where reading the paper.

This might indicate that the possible benefits of writing and reading music are not entirely positive. Both the process of creating music and the musicians' way to approach the music are influenced by the sheet music itself. Without any visual representation of the music they have to trust their ears, technical skill and musical knowledge and experiences in order to relate to and respond creatively and adequately. The sheet music seems to come in between the musician and the emerging music and thereby inhibit the improvisational flow.

Observational study II: Brainstorming

The Brainstorming method[2] is considered to have been created by Osborn in 1940. The purpose was to make advertisement idea generation in particular and business meetings in general more efficient. The theory of brainstorming emphasizes cognitive processes and the ability to associate as crucial for the creative process. The method is based on two premises or principles and four rules. The first principle could be formulated "Defer judgement and delay decision-making" meaning that we should avoid anything that puts breaks on the creative mind. Research has found that instructions with minimal evaluation criteria descriptions result in a higher number of suggestions while instructions that involve much-appreciated values descriptions obtain responses with higher quality. Thus, when respondents are requested to be more appreciative their responses got higher quality.

The second principle could be formulated "Quantity breeds quality", implying that the most dominant thoughts are those which are most common or usual and therefore probably the safest and most acceptable. Ideas that are more odd and potentially creative are likely to arise later in the chain of suggestions and can only be reached by producing a higher number of ideas.

- The first rule is "criticism is ruled out". All criticism and evaluation are put off until later. In order to remind the participants of this rule a session leader might ring a bell as soon as someone starts criticizing.
- The second rule is "freewheeling is welcome". The wilder the idea the better for it is easier to tame down an idea than to hot it up.
- The third rule is "quantity is wanted". This rule is a restatement of the second principle.
- The fourth rule is "combination and improvement are sought". One participant's idea might be the stepping-stone for some other's idea. This rule might also work to offset any feeling of embarrassment one might experience from not having been the first to think up an idea.

Analysis II: The 'relay race' of idea development

In the study of variety and descriptive language we have studied brainstorming sessions at two industrial design firms in Stockholm. These sessions last for about three hours and are usually carried out by five to six individuals, the session held in a small traditionally furnished conference room. The participants are a mix of employees of the firm and hired experts or consultants, all depending on the subject field. The whole brainstorming session was captured on digital video for transcription and analysis.

It is a warm, intense atmosphere in the room. The dialogue alternates between relaxed, laid back small-talk about peripheral subjects and even complete silence to an intense and eager dialogue. In those periods in the dialogue several participants flesh out their own ideas and when doing so the tension is gradually increasing. There are several mutually competing solutions living side by side.

Each individual that has contributed with a solution to the problem tend to continue to argue the advantages of hers or his idea by underlining its favourable characteristics while at the same time reminding about the weaknesses and deficiencies of the others ideas.

Y: *I would like to do something about the "bytta" as well… so that one could hold the "bytta" without kind of …* (she gesture with her fingers in the air how difficult it is to get a grip.)

T: *I think that it is … hard to get at … kind of…*

Y: *it is too big… (*with elbow on the table) *… you see, the size are, of course… the profit in… the amount of ice-cream, it is kind of… family-pack… but… it is to big to allow gripping…*

T: *it looks like a little… recess in the bottom so you could actually grasp it…*

---

[2] The text in this paragraph is refering to Stein, 1974.

They use to bring in several physical variations of the products they are to improve. These objects facilitate their thinking process by making it more concrete. When figuring out what they perceive and associate, these permit them to involve a larger part of the body in the dialogue (Utterback et al. 2006).

Another very interesting aspect of this use of physical objects in the dialogue is that it seems to function as a baton in a relay race. The participant that for the moment is holding the object automatically gets attention from the others. One might suggest that the object helps distributing the participants' contributions and thereby lead and structure the brainstorming session.

The dialogue is filled with descriptions of vague ideas by using a very broad language such as animated gestures using fingers, hands, arms and facial expressions. The participants are also frequently using sound effects to emphasize their point of view. And as designers they of course have skills to make rough sketches spontaneously.

K: *... or you can... or at the lid you can have a... down effect... and... "thict"* (sound effects)

B: *yeah... just a long...*

J: *hihi... but how about aaa... we're finding a... to reach a really low angle, and aaam because they always have aaa this can over here, right?*

T: *yeah*

J: *and, and it would be like... I were just thinking like aaa... bottle of aaa champagne, or something like that... when you have aaa the plastic to peel around... and then you have a long stripe and then you can lift... aaa as a top over... that is easier... I can imaging aaa you can have a little... something... which you peel... and then you peel plastic and then it's getting a little bit bigger... and then you have... a long... grip...*

Y: *but it's still...*

J: *and it still fits on it...*

Y: *... it's still looking like... little side grip... like tweezers I mean, ... then, I think...*

J: *no, but aaa... cause like... aaa...*

Y: *... like that "GB-bytta"... Emil, would you pass me the... ice cream box... ... then I think it´s better to have as... aaa... grasped... hihi, I'd go for the wrong concept... hehe... ... it´s like aaa... on the... trunk of your car...*

T: *yeah*

Y: *... you have this hole in the...* (hitting on the ice-cream box' side.)*... in the trunk, so you can put all your fingers in there...*

J: *mmh*

Y: *... and then...* (she opens up the lid)*... because it's... suddenly... a different force...*

T: *yeahh*

Y: *... if... if I can hold this like that... and just...* (opens up the lid again) *... then I'm using like... the strength of my arm instead of my fingers...*

J: *mmh...*

Y: *so if you can make, like... the box... to go... "twåchpt"...* (sound effects)

For the creative process in the brainstorming session one could question how large a number of ideas and deviant opinions the dialogue might succeed to manage constructively. The creative process is supposed to be stimulated by maintaining diversity as long as possible whereas in the innovative process on should focus on one idea and strive for its development.

K: *I have another kind of idea also that... while we already... eeh...*

T: *so... you got... you'd better to cut it off... before, you'd got an export... here... adding grip to...*

K: *here... so... partly... a cut so that... when you press on this... then the tension is released on the whole lid... then it will be easier to... to take away...*

Y: *something like that eeh... lunchbox there... with...*

T: *somehow... I cannot recall, to me this is, this is probably... the stuff is like a great living hinge material... aaa...*

K: *a corner, and then you see a notch, thus… the corner flap here… cut…* (he gets up from the chair and walks to the big sketch-book)
T: *cut like this…*
K: *yeah… no…*
Y: *no*
K: *cut like … this…*
T: *yeah, okay…*
K: *… so it is a bit into the lid… … but when it is closed it is tight… … when you release… then you only have the pressure on that one… … then all the other edges come loose… the pressure is released on every edges… it will be easy to lift… then when you put it back again… this one will stand up, like this… when you lift it again you will only have to… put the lid on, and press this down… "tchutsht"* (sound effects)*… then it is closed… it is… just a tiny pressure here… the whole… an arm of a lever, it is the effect of the lever…* (He walks back to his chair.)
T: *okay*
K: *do you understand? And it… it will make it possible… that one doesn't need… one get the tension out of the lid, so to speak…*
Y: *but then it's probably not as good, to reuse…*

During interaction activities continuous negotiation is going on. It is not an unfriendly or hostile discussion but rather eager ambitions to get one's own ideas across to everyone else. In this process of reconsideration of old ideas or concepts the members' different experiences are woven together in the constructing of new ideas. These interactions are continuously resulting in ideas tying in well with Austin's ensemble concept (Austin, 2003).

Combining and building on each others ideas

This study is trying to come to grips with the inner workings of creative activity in an intense group effort, such as when musicians improvise or when a group of industrial designers brainstorm to solve a client's problem. This handover or building on co-players' ideas is a view on the creative collective that stresses the democratic and even an altruistic dimension. It is about building on group ideas and adapting one's own preferences in order to maintain a comprehensive view of the idea development process. One of the industrial designers:
M: *yeah, of course it could occur but that's not a good brainstorming… because if one presses on something too hard then one is narrowing in… and so there might be quite a lot that will never emerge… so, this is not the right moment for pushing… there is something very democratic and collective about brainstorming…*

Such a session is not a proper forum for breeding and developing one's own favourite thoughts: on the contrary, it demands that participants kill their own darlings willingly. If this is the ideal, observing real brainstorming keeps telling a bit of another story. Quite regularly participants repeat what they have suggested earlier in the session not seldom with emphasis. A Creative Director at an industrial design firm:
T: *aah… this is very important… of course, it's obvious that when certain ideas emerge they will become one's babies, just like that… this is a delicate subject 'cause… well, 'kill your darlings' isn't always that easy, otherwise we would be robots… this adjustment… it tends to be more personal than rational, or what should I call it…*

Sometimes there could be several competing ideas living side by side with antagonist and protagonist arguing for their opinions.
M: *yeah, it's a fact… we had a lot of that in our collaboration too… we had real strong opinions and powerful personalities but… in the end, no matter what, it just had to be a mixture of all our preferences… when it comes to the definite end…*

Q1b) How do the industrial designers formulate and mediate their (unfinished) ideas?

The four professional industrial designers interviewed all agree that the pen is their most powerful tool in formulating and mediating ideas. One of the employees describes inclination towards the visual and aesthetic: it functions as a spark that elicits creative thinking.

E: "I could get very inspired by a beautiful sketch… when it feels like a smart thing… that's when it has aesthetic value… I'm triggered by and pick up expressions of aesthetically characterized ideas… pleasant sketches of good ideas… so, it's not about the ability to express an idea verbally, rather it's some kind of visual appeal that's gets me thinking in new ways…"

The industrial designer is trained to use pen and pencils to develop and mediate ideas. This is their 'power of persuasion'. As a Creative Director describes:

T: "it's hard for the customer to take part 'cause they seldom have these tools… that person seldom dares to stand up and show oneself… sometimes there are engineers who… step forward but say "oh, you will never see what I am drawing… eehm"… then they already are… instead they sit down passively… like this… saying: "hm, hm… okay"… sometimes they could feel like being run over… that's why it's not so easy to involve them into this very… kind of… rapid idea-making, we use our tools… tools that we are trained to use… it's as if we should take part in a meeting with legal experts… starting to draw on different law cases… "yeah, yeah, hmm what am I supposed to do with all this!?"…"

In the beginning of the idea development when the idea is very diffuse they use the pencil to facilitate thinking. One of the employees says:

E: "it's like a chain… first I got one idea... then I sketch something and out of that I might get another idea. It's not as if I would sit and just play around with the pen like this… and oops it is ready…"

The idea grows gradually in that more and more lines are being drawn. The purpose is not to make a clear drawing, just to get ones idea down on paper. The designers talked about this in terms of 'materializing the idea'. The sketch's level of concrete, level of correspondence with the real object is regarded as a proof of idea quality.

E: "it's not a question of the amount of lines… these lines are being placed there by the process, so this is not the result one shows to anyone else… on the contrary, one creates this together with someone else… so, it is not a matter of vagueness or clarity, you see, one has to be there when it is drawn…"

Q2b) What kind of depiction facilitates their creative group?

In the making of industrial designers education stresses the ability to draw with different techniques. But also working practically and physically is a way of liberating creativity:

M: *speaking about freedom, it was quite often that we did get away and kind of began to work… we did something three dimensional and come back really quickly just to see if (it could function)… we didn't work graphically but physically… with carpentry or paper…*

The preference for visual perception is one characteristic of the observed industrial designer doing brainstorming:

M: *… and there are certain people in this house who are very much so, working practically... and they… won't contribute unless you put up some examples to look at 'the proof is in the pudding'… and I'm one of those… I have to DO it as well…*

> *"Visualization could stimulate the creativity in discussions and elicit a rich variety of tacit knowledge from participants"* Utterback et al. (2006).

But for some of them visualization isn't enough when formulating vague ideas:

M: *to me it is difficult to give form to an idea… without this model, you see… because I have almost quit drawing, I'm no good at it… for me, it suit me really well that one could bring in this (model)… it makes me freer… it's better than the strict…*

> *"Prototypes… externalize thought and spark conversation. They're 'bandwith-boosters' and context-creators for both information management and human interaction… they are inherently social media and mechanisms."* (Hargadon 1998 p. 220. In Utterback et al. (2006).

Discussion

Creativity and the concept of descriptive language

When we perceive something we describe it for ourselves first – description and perception is two sides of one coin. This process of sensemaking (Weick, 1993) is dynamic and creative. One of its limitations is that we are only capable of describing those phenomena that we got words referring to. This points to the need for a broader notion of descriptive language. In order to describe more fully what is perceived we need to go beyond verbal language.

In this research, the concept description-language is used to refer to the interaction that a group generating new ideas is engaged in. A description-language for such a creative collective is expected to take into consideration all kinds of obstacles to expressing and mediating ideas. An insufficient way of describing ideas in the group, i.e. failures in getting ideas across to everyone, is a waste of resources and everyone's valuable time.

As Isaacs (2000) points out, for a genuine dialogue to be established the group has to develop and maintain trust. He suggests this to be done by 1) listening with an attitude of compassion, 2) showing respect for the cohesion, 3) being attentive and 4) expressing oneself by striving to give form to new ideas. These might be regarded as the basic skills for dialogues in general.

In a brainstorming session like the one sketched above the dialogue is intense and often characterized by an eagerness to get ideas across. There is also the artistic self-esteem and grandiose narcissism (Köping, 2003) that is logical from an artistic and internal point of view but probably harder to defend in a rationale for commercial life. Additionally, there are external pressures from the assigners' and project leaders' expectations of potentially innovative outcomes within a reasonable timeframe, etcetera.

As if these kinds of obstacles or difficulties were not enough recent research by Schooler et al. (1997) suggest that the ability to describe and retrieve a phenomenon verbally (Meissner et al., 2001) is not unproblematic. This research suggests that the description-language in idea generating groups might have to rely upon other kinds of means to mediate ideas that does not have a shadowing effect on the thought processes.

Do verbal descriptions provide a short cut or a long run?

"If a sketch in whatever form gives the end user an idea about functionality, it may also offer more than a hint of the design language to be applied" Utterback et al. (2006).

In certain fields of musicianship there is an explicit wish to stay within one's own professional language. That is, musicians ought to deepen their ability to express meaning and mediate preferences for specific musical expressions through their particular instrument. To use verbal language in order to mediate abstract musical expressions is to take a detour. In the process of finding verbal expressions for certain characteristics of technical or artful content there is a high risk that the original musical thought gets shaded or even lost completely.

Something similar goes for the industrial designers even though they probably are expected to describe their aesthetical, strategic or functional opinions verbally to a larger

extent than what musicians might be expected to do. Designers agree that their professional language has a form that is mediated by sketching and modelling.

*"Visual thinkers… **draw quickly**… The quickly executed, formative processes of graphic ideation are favored by sketching… concerned more with chief features than with detail**… Graphic ideation is visually talking to oneself**… you can feel free to fail many times on the way to obtaining a solution"* (emphases in original) McKim (1980) in Utterback et al. (2006).

Developing collective understanding

The basic intention in bringing individuals holding divergent notions together is the creative tension this meeting might elicit. The tension serves as the breeding ground for unforeseen impulses. A methodology that aims to facilitate the groups' idea development should encourage the members to counteract vigilantly that their ideas become distorted and forgotten in the groups interplay.

The interaction in itself seems to function as the prevalent means to describe and mediate creative idea development in groups. The activity of idea development is impelled through the process of continuous negotiation. The characteristics of a genuinely creative group's deliberate reflections might indicate how a group obtains the capability to lead itself.

There is a tendency in creative theory to emphasize the benefit of 'tabula rasa', i.e. to reset the mind to zero. This could lead to a fallacy about how creativity relates to knowledge. There must be a distinction between the novice way of drawing a rough sketch or reacting instantaneously on co-players producing music, and professional designers' or musicians' drawing and musical expression respectively.

Of course, without mindfully thinking, the designer as well as the musician could adopt habitual manners and routinely begin making rigid drawings independent of the context or the circumstances. It is therefore of vital importance to the result that the experienced designer adopts an improvisational approach towards his or her knowledge in the relevant field.

To be clear, the crucial point is not whether knowledge corresponds to the novice level or the expert level of the applicable field, or not. The most essential factor ought to be to what extent the professionals have acquired an improvisational approach towards their domain of knowledge.

T: *… I would say that this preference (for reconsideration) might depend on the fact that my education was really process-oriented and not so fixated on the result… I know from colleagues who have been in other educations different from mine… that is, more result-oriented, more vocational… certain schools are for instance good at teaching sketching… but not the process itself…*
… the school I attended was really much more theoretical and iterative… maybe not that analytical but… the line of reasoning was more important than the result… I think that has made me quite secure… I feel secure working under uncertainty…

Do iterative processes provide a short cut or a long run?

T: *… the line of reasoning is more important than the actual results… it is the quality in this discussion… that I'm watching over… to see that there is enough time to reconsider every angle…*

B: *isn't that strategy very expensive?*
T: *yeah, time is money… but that's not the whole matter… the customer must allow us to give answers to all their questions… but sometimes it's obvious that they are impatient… they don't understand that a business plan have to be established… they say: "What the hell does this have to do with design, anyway? Just give us some sketches!"… but we have to draw this picture, we have to scrutinize the subject from every angle…*

B: *you don't use vision or imagine a picture of the result?*

16

T: *I don't like to visualize how things gonna' be… it's more like… let's shoot in this direction, okay… then we put that aside because we have several different alternatives… so we put forward their brand, the function of the product, marketing issues… and then, all of this is put together while we create (maintain) this line of reasoning…*
B: *meaning that it is not the first option that is visualized?*
T: *I realize that there are a lot of problem solvers… they just want to solve the problem, the faster the easier it will get… not over working things… now, this might work… sometimes it could be very good… if you haven't done any other journey then maybe this vision is the best… but the absolutely worst example is when one burns time, energy and resources and everything… and then one finds oneself in a corner… a corner that one can't get out of… prestige, time, money… and then you have to force events so that… you might get at a solution but it won't be the optimal one…*

Conclusions

Knowledge and the improvisational approach

The relation between model and reality could be regarded as closely connected to verbal language and professional modes of working expressions. There seems to be an inevitable gap between musicians' and designers' way to form and express opinions of musical and aesthetic ideas and their use of verbal language. At the one hand there is a tendency to allocate meaning to things or occurrences that had of no importance in the original process of creation and on the other hand there is a tendency to be lead astray resulting in the ignorance of certain crucial aspects when the phenomena are annotated.

Maybe Schoolers' (1997) findings would confirm that there actually is something that gets lost when we try to move a thought from the left hemisphere to the right. Goethe puts his finger on the danger of an absurd ambition for verbal description.

> *"… how hard isn't it to avoid putting the designation in the matters' place, to always have the content vivid in front of oneself and not destroy it with the word!"* Goethe from his Italian travel 1786-88.

There might be an implicit value assumption resulting in the striving for verbal expression distorting something valuable in art or creativity, as if something or some dimensions are better left in silence. As if there is a greater or more profound artistic or creative endeavour when some dimensions escape verbal expressions.

As a piano teacher, the author put an honour in striving to formulate an aesthetic or artistic musical expression verbally but the experience was that this usually was bad use of time and resources. If he was unable to express the aesthetic idea with the instrument or point to someone who could do that, words were of no use either. "We had little help fighting with words – the pupil would seldom grasp the aesthetic idea just listening to my words anyhow".

On the other hand, there is no evidence that the musicians or the designers in this study strive to exclude or avoid using verbal expression. On the contrary, almost everyone were very talkative and really exert all power in trying to mediate their idea verbally. Their use of words seems not to be perceived as an obstacle and there is no obvious boundary between the verbal language versus visual or auditive language.

The eventual gap between the different modes of language might be the place where tacit knowledge has its origin.

> *"One might say that sketches offer an interface between the tacit and the verbally expressed"* (Utterback, 2006. p.217).

Knowledge development and the improvisational approach

The creative director at one of the industrial design firms admitted that they were not more creative today than some years ago. But he did stress that they had developed their ability to think broader. Grooth's research shows that the expert chooses between fewer alternatives than the beginner. This might not be so strange because the novice might believe that everything (or much more…) can be done.

The more knowledge at an expertise level is obtained the fewer choices between alternatives experts regard as possible. This condition makes them search for more parameters that induce the creative process, that is defining the markets, customer segments, strategies etc. By introducing more concepts and alternatives in the development process they maintain a fairly even creative level whilst they continue building more profound knowledge.

One has to consider the important difference between the novice way of thinking in analogies and the experts'. This might be visualized as in fig. 5.
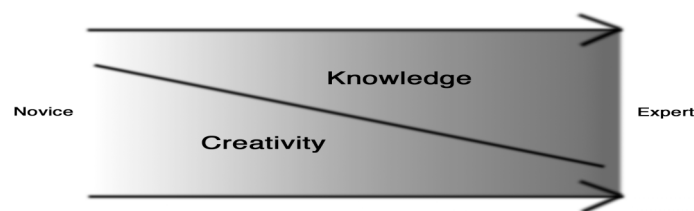
Fig. 5.

One definition of genuine expertise is that through "not playing by the rules" he or she invents new "rules" in a process of establishing qualified combinations he or she is well aware of when the domain specific rules are being broken (Dreyfus & Dreyfus, 1986). Experts, like the rest of us, might also get stuck in their domain's thinking paradigm which to often enough is rewarding but also sometimes dangerously self-confirming (Ford & Gioia, 1995).

The process of creative analogous thinking might provide an example of creativity on the expertise level. To establish genuine creative tension in analogous thinking deep understanding of the fields that the analogy originates from and is applied to is called for. These processes might be visualized as in fig.6.

The improvisational approach builds on a continuous reconsideration between those dimensions which are reasonably accessible to being articulated in words, our knowledge of the matter, and those dimensions which are reasonably impractical to articulate in words, but yet also our comprehension of the subject matter.
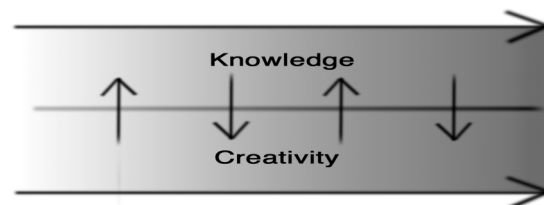
Fig. 6

There seems to exist a notion of improvisation that has to be put in questioned: that one improvises because every other more preferred alternative has either been tried out or eliminated. This stands in stark contrast to the idea of applying an improvisational attitude as the first choice of strategy to get the intended result. As for improvisational musicians and actors, this approach is a specific technique or strategy that could be trained and consciously

selected among quite a few other equally valuable alternatives. It is certainly not the case that they improvise because they have forgotten the sheet music or the manuscript.

The improvisational approach may have significant implications for other domains than creativity. Every human activity that advocates controlling of the future by clear vison of goals might possibly obtain vitality from this approach. The improvisational approach emphasizes the consequence of mindfulness and the importance of being in the now in contrast of the striving to make clear descriptions of the future. Thus, the improvisational view on knowledge might correspond in some degree with Andersson's et al. (2005) concept of the 'synthetic-iterative' process described above.

To change preferences from goal-oriented linear approaches to the benefit of iterative approaches is not performed easily. It might be a process that has to begin with conscious focus on an instructional and pedagogic level throughout the entire educational system fostering security in uncertainty and vistas for eliciting motivation and drive without necessarily well defined and well-phrased verbal formulations.

Keep playing, keep sketching…

Why aren't these industrial designers and musicians using their professional languages to a larger extent?

Using one's professional language ought to prove more efficient and powerful in compared to verbal language. Miller (1996) and Sällström (1991) have described how different fields such as art, music, mathematics and chemistry rely upon different types of depictions to formulate and mediate ideas. It might be the case that our society's confidence in verbal language has influenced our thinking in almost every area and knowledge domain and this alignment seems to be the case for the design and art fields as well. It is as if the verbal language expression is perceived as evidence of constructive thinking. Neuropsychologists Damasio (1994) and Edelman (1992) seem to walk in the same line of thinking about human cognition and the connection between the model and reality.

To develop a better understanding of aesthetical, musical expressions, it is probably not a matter of expanding the ability to use verbal language but rather about expanding our insights of what the specific professional language is and implies. One could start off with the question: "do we need to get involved in the specific domain's language in order to understand and be able to mediate our thinking?"

From a professional point of view I would answer with a resounding Yes! to that question.

References

Andersson, E. R. & Rollenhagen, C. (2005). Systemgrupper och innovativ problemlösning. Lund : Studentlitteratur.

Austin, Robert (2003). Artful Making: What managers need to know about how artists work, USA, Harlow: Financial Times Prentice Hall.

Barret, Frank J. (2000). Cultivating an Aesthetic of Unfolding: Jazz Improvisation as a Self-organizing System. In Linstead, S. Höpfl, H. (eds). (2000) *The aesthetics of organization.* London : SAGE.

Bastien, D. T. & Hostager, T.J. (1992) 'Cooperation as communicative: Implications for organizational learning'. *Organization Science 9/5: 605-622.* In Kamoche, K. N., Cunha, M. P. E., Cunha, J. V. Cunha., (eds), (2002). Organizational improvisation, London: Routledge.

Belbin, R. Meredith (1981). Management teams: why they suceed or fail. Oxford: Butter-Heinemann. In translation "Management Teams – så skapas framgångsrika team". Göteborg: IHM förlag.

Berliner, P. F. (1994) Thinking in Jazz: The Infinite Art of Improvisation. Chicago: The University of Chicago Press.

Buber, Martin (2004). Elemente des Zwishenmenschlichen. I övers. Det mellanmänskliga,

Ludvika: Dualis.

Csikszentmihalyi, M. (1996). Creativity – flow and the psychology of discovery and Invention. New York: Harper Collins.

Csikszentmihalyi, M. & Feldman, David H., & Gardner Howard, (1994). Changing the World - A Framework for the Study of Creativity, Westport: Praeger Publisher.

Damasio, A. R. (1994) Descartes' error : emotion, reason and the human brain. London: Picador. In translation ”Descartes misstag: känsla, förnuft och den mänskliga hjärna”. Stockholm: Natur och kultur. 2003.

Dreyfus & Dreyfus, Hubert L., Stuart E., (1986). Mind over Machine. The Power of Human Intuition and Expertise in the Era of the Computer. Blackwell.

Edelman, Gerald M. (1992) Bright Air, Brilliant Fire – On the matter of the mind, London: Penguin Books.

Edelman, Gerald M. & Tononi, Giulio, (2000) Consciousness – How Matter Becomes Imagination, London: Penguin Books.

Fleck, Ludwick, (1935) Entstehung und Entwicklung einer wissenschaften Tatsache. Einfürung in die Lehre von Denkstil und Denkkollektiv. In translation “Uppkomsten och utvecklingen av ett vetenskapligt faktum. Inledning till läran om tankestil och tankekollektiv”. Stockholm: Symbosion, 1997.

Ford, Cameron F. & Gioia, Dennis A. (eds.) (1995). Creative Actions in Organisation, London: SAGE Publications Ltd.

Gallie, Walter Bryce (1956). Essentially contested concepts. *Proceedings of the Aristotelian Society, Nwe Series, vol.LVI*, 1955-1956. London: Meeting of the Aristotelian Society at 21, Bedford Square.

Georgsdottir, A. S., Lubart, T. I. & Getz, I. (2003). The role of flexibility in innovation. In: L. V. Shavinina (Ed.), *International Handbook on Innovation.* Oxford: Elsevier Science Ltd.

Getz, I & Robinson, A.G. (2003). Vos idées changent tout!, Èditions d'Organisation, Paris. In Shavinina, Larisa V., (2003), *The International Handbook on Innovation*, Oxford: Elsevier Science Ltd.

Ghiselin, Brewster (1952). The Creative Process, New York: New American library

Gordon, W.J.J. (1971). The Metaphorical Way, Cambridge, Massachusetts: Porpoise Books.

Guildford, J.P. (1950). Creativity*, American Psychologist 5: 444-454.*

Guildford, J.P. (1967). The Nature of Human Intelligence, New York: McGraw-Hill.

Hammarén, Maria (1999). Ledtråd i förvandling, Stockholm: Dialoger.

Hargadon, A. B. & Bechky, A. B. (2006). When Collections of Creatives become Creative Collectives: A Field Study of Problem Solving at Work. *Organization Science vol.14 no.4, July-August, pp. 484-500.* New York: Routledge.

Hare, A. P. (1982). Creativity in small groups. Beverly Hills: Sage Publications, Inc.

Hofstadter, D. R. (2007) I am a strange loop. New York: BasicBooks; London: Perseus Running.

Isaacs, W. (1999). Dialogue and the art of thinking together: a pioneering approach to communicating in business and in life. New York: Currency, cop. In translation ”Dialogen och konsten att tänka tillsammans”. Stockholm: Bookhouse Publishing, 2000.

Israel, J. (1999). Handling och samspel – ett socialpsykologiskt perspektiv, Lund: Studentlitteratur.

James, B.J. & Libby, W.L. (1962). An experimental curriculum for studies in administrative innovation. In *Education for innovative behavior in executives. Cooperative Research Project No.975*, Washington, D.C.: Office of Education, US Department of Health, Education, and Welfare.

Janis, I.L. (1972).   Victims of Groupthink,
Boston: Houghton Mifflin

Janis, I.L (1982).   Groupthink. Psychological studies of Policy decisions and Fiascoes, 2:a uppl., Boston: Houghton Mifflin.

Johannessen, K. S., (1997)   Tradisjoner og skoler i moderne vitenskapsfilosofi,
Bergen: Sigma Forlag A/S.

Johnstone, K. (1987).   Impro: improvisation and the theatre.

Kamoche, K. N., Cunha, M. P. E., Cunha, J. V. Cunha., (eds), (2002).
Organizational improvisation, London: Routledge.

Katzenbach, Jon R. & Smith, Douglas K. (1993). The Wisdom of Teams – Creating the High-Performance Organization,
Boston: Harvard Business School Press.

Knudsen, Harald (1998).   4.bind, Sirenene – Jazz og ledelse,
Kristiansand S: Högskoleförlaget AS, Norwegian Academic Press.

Köping, Ann-Sofie. (2003).   Ledarskap och relationer i ett konserthus,
Stockholm: Arvinius

Langer, Ellen J. (1989).   Mindfulness. Cambridge: Perseus Books Group, Da Capo Press.

Langer, Ellen J. (1997).   The Power of Mindful Learning,
Cambridge: Perseus Books Group, Da Capo Press.

Langer, Ellen J. (2005).   On Becoming an Artist,
New York: Ballantine Books.

McKim, R.H. (1980).   Thinking Visually.
Belmont, CA: Lifetime Learning Publications. In Utterback et al. (2006).

Mednick, S.A. (1962).   The Associative Basis of the Creative Process,
Psychological Review 69: 220-232.

Meissner, C. A., Birgham, J.C., Kelley, C. M. (2001)
The influence of retrieval processes in verbal overshadowing, *Memory & Cognition, 29 (1): 176-186, 2001.*

Meltzoff, A. N., & Prinz, W. (ed.) (2002). The Imitative Mind: Development, Evolution and Brain Bases. New York: Cambridge University Press

Miller, Arthur I. (2004)   Insights of Genius – Imagery and Creativity in Science and Art.
London: The MIT Press.

Olsson, B. (1993).   "Improvisation intuition eller vetenskap?: metodiska och pedagogiska konsekvenser av 8 pianisters improvisationer" : Specialarbete 10/93 vid Musikhögskolan, Örebro Universitet. Örebro: Musikhögskolan i Örebro, Book.

Olsson, B. (2005a).   "Leadership in Creative Environments: a descriptive and prescriptive study of perceived norms in leadership". *The 8ᵗʰ International Conference on Arts & Cultural Management. Montreal, Canada, 3–6 July 2005.*

Olsson, B. (2005b).   "Ledarskap och relationer i kreativa miljöer: beskrivningsspråk i kreativpraxis". *Kulturstudier i Sverige: nationell forskarkonferens ACSIS, Norrköping 13-15 juni 2005.*

Olsson, B. (2007).   "The language of interaction: creative tension in heterogeneous groups". Institute for Capitalising on Creativity, The University of St. Andrews, Scotland. Workshop, 21 Mars 2007: 'This Motley Crew': managing 'creatives' and the creative unit.

Parnes, S.J. (1961).   Effects of extended effort in creative problem solving. *Journal of Educational Psychology, 52: 117-122.* In Stimulating Creativity vol.2 Group Procedures,
New York: Academic Press, INC. Stein (1975)

Parnes, S.J. (1976b).   Creative behavior workbook,
New York: Scribner.

Polanyi, Michael. (1983).   The Tacit Dimension,
Gloucester: Mass. Peter Smith.

Perkins, D.N. (1981).   The Mind´s Best Work.
London: Harvards University Press.

Rawlinson, J. G. (1981).   Creative thinking and brainstorming.
Farnborough : Gower, cop. 1981

Rothenberg, A. (1979).   The Emerging Goddess: The Creative Process in Art, Science, and
Other Fields, Chicago: University of Chicago Press.

Sawyer, R. Keith. (2005).   Creating Conversations – Improvisation in Everyday Discourse,
New Jersey: Hampton Press, Inc.

Schenk, P. (1991).   The Role of Drawing in the Graphic Design Process. *Design Studies,
Vol. 12, No. 3, July, 168-181*. In Utterback, J. et al. (2006).
Design-Inspired Innovation, Singapore: World Scientific Publishing Co.

Schooler, J.W. (1997).   Scienctific approaches to consciousness, in *Carneige Mellon
symposia on cognition, Mahwah, N.J.: L.Erlbaum, 199-*

Schrage, M. (2000).   Serious Play.
Boston, MA: Harvard Business School Press. In Utterback et al. (2006).

Shavinina, Larisa V., (2003). The International Handbook on Innovation,
Oxford: Elsevier Science Ltd.

Spearman, C. (1931).   Creative Mind,
New York: Appleton.

Stein, Morris I. (1974).   Stimulating Creativity vol.2 Group Procedures,
New York: Academic Press, INC.

Sällström, Pehr. (1991)   Tecken att tänka med – om symbolisk notation inom musik, dans,
kartografi, matematik, fysik, kemi, teknologi, arkitektur, färglära och
bildkonst. Stockholm: Carlssons.

Taylor, Charles. (1971).   Interpretation and the Sciences of Man, in *The Review of
Metaphysics*, McGill University.

Utterback, J., et al. (2006). Design-Inspired Innovation.
Singapore: World Scientific Publishing Co. Pte. Ltd.

Vedin, Bengt-Arne (1985). Corporate Culture and Creativity Management,
Lund: Studentlitteratur.

Vedin, Bengt-Arne (2000). Innovation och kreativitet,
Stockholm: Alhambras PocketEncyklopedi.

Weick, Karl. (1993).   'Organizational redesign as improvisation'. I
C Huber and W Glickm (eds.), *Mastering Organizational Change.*
New York: Oxford University Press. pp.346-79.

Weisberg Robert W. (1986). Creativity Genius and other Myths,
New York: W.H.Freeman and Company.

Wittgenstein, L. (1953).   Philosophische Untersuchungen. In translation, Filosofiska
undersökningar, Stockholm: Thales.