FABRICS IN FUNCTION - EMOTIONAL UTILITY VALUES

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ABSTRACT

In recent years the challenges for the textile industry has changed because of technological development and outsourcing. The consequence is an increased focus on innovation in the textile trade.

This paper describes the objectives in a three year research project. In order to contribute to the establishment of an initial framework for the project it has a focus on how to explore costumers and users emotional experiences with fabrics. The three year research project is based on experimental design research and the textile designer's competences and knowledge. During the research project exploring approaches will be developed and carried out with the intention to involve specific stakeholders within an industrial value chain in the design process.

More specifically this paper reports on a pilot experiment initiated to explore if repertory grid models could be a way to investigate tactile and visual sensing of fabrics in function. It is proposed that tactile and visual sensing of fabrics is a way to investigate and express emotional utility values. The further purpose is to use experiments with repertory grid models as part of the mapping of the entire research project and also as a basis for developing further experiments and approaches based on experimental design research and participatory action research.

KEYWORDS
Textile design, repertory grid, experimental design research, participatory action research

INTRODUCTION

In recent years the textile industry faces several challenges. Among other things technological development and outsourcing has made it possible for manufacturers to produce quality textiles with specific technical specifications at relatively low prices. Technical specifications such as abrasion resistance, pilling and flammability are still important but they are no longer an essential selling point which stands alone in the product promotion. As a consequence many textile companies in industrial settings have increased focus on innovation in the textile trade. Today focus increases at experiences, storytelling and emotions connected to the textiles (Federation of Danish Textile & Clothing, 2005 and The European Technology Platform for the Future of Textiles and Clothing).

Taking the starting point that generally textiles are designed for a certain purpose the three year research project will investigate and explore emotions, experiences and sensuous qualities connected to textiles. The objective is to develop research-based knowledge about how to generate insight about fabrics in function, which can be utilised during the design process. The purpose is to 1) contribute to the development of an interdisciplinary design process within an industrial setting, 2) investigate how the textile design professions competencies can be explored, utilized and further developed through collaborative processes involving other professional groups and stakeholders in the value chain and 3) develop a design approach that actively involve present and future customers and users.

Within other design fields participatory action research have been used for several years (e.g. Greenbaum & Kyng, 1991). Research that specifically is concerned with a textile designer's possibility for contributing to a user-centred and interdisciplinary design process is hard to find. One can say that a textile designer's working conditions and possibilities in general is similar to other designers working in industrial

settings and interdisciplinary design teams. Hence research in other design fields concerning similar issues is relevant in this project. With the special challenges for the textile industry as described above and increased focus on innovation and user-centred design processes in general, development of methods, approaches and terminology through research in the field of textile design can prove to be useful for both industry and the design profession as such.

In the next sections follow short introductions to a company in the textile industry and the textile design profession in general to give an impression of the set-up for the three year research project. Then the research approach is described including an introduction to repertory grids. After that a survey of two projects using repertory grid models in textile design research serves as examples of how the technique has been used in evaluation of fabrics. Finally the pilot experiment planned and facilitated by the author is meticulously described. In the end discussion and main conclusions has been made to propose which course to take in further work with repertory grids.

SET-UP

The three year research project is based on the design process as it occurs at one of the leading Danish textile manufacturers: Gabriel A/S. Starting point for the research is the textile designer's competencies and knowledge. One reason for this is the assumed strategic value of research in this field. Another reason is that the author is trained and has many years of experience working as a textile designer.

VALUE CHAIN IN THE TEXTILE INDUSTRY

The following quotation is an introduction to Gabriel A/S and the value chain:

"Innovation and value-adding co-operation are keywords of Gabriel's mission statement. Gabriel is a niche company which develops, manufactures and sells furniture fabrics and related textile products to be used in fields of application where product features, design and logistics have to meet invariable requirements and where quality and environmental management must be documented."
(Gabriel, 2006, p. 3)

Gabriel's value chain covers all steps from idea to furniture user. This means that the development of textile solutions is conducted in close collaboration within the network of customers, users, suppliers, and competent employees. The four core processes in the value chain is key account management, product and process innovation, logistics and price competitiveness. All four core processes is important in the design process and in addition to these are several supporting processes organised in strategic business units (Gabriel, 2006).

A hypothesis is that development of approaches that investigate, utilize and explore the textile designer's professional and practical knowledge in an interdisciplinary context is of strategic value for the company. As shown in the outline of the value chain Gabriel is already working with stakeholders such as textile designers and customers in the design process. However they want to investigate and explore the possibilities for a closer collaboration with end-users and customers.

THE TEXTILE DESIGN PROFESSION

The educated textile designer's knowledge and competencies into comprehending, developing and communicating tactile and visual characteristics of materials is the basis for experiments, investigations and exploring in this project. The textile designers' knowledge on textile means is based on thorough knowledge about materials, techniques, use and signalling value. All this is supplemented by cultural references and heritage, trends and personal experience. The textile designer uses a mix of visual and verbal means to communicate textile ideas exemplified by samples and prototypes. The training of a textile designer includes the visual ability to formulate and communicate e.g. patterns, colours and colour compositions from practical, aesthetic and theoretical knowledge. Through education the textile designer also achieve expert skills in designing and communicating tactile characteristics of flexible surfaces e.g. texture, structure, drape and the way we touch and handle fabrics. The sensibility to textile characteristics is acquired through design practice, craftsmanship, material and technical knowledge, knowledge of textile construction principles and their properties together with practical and aesthetic considerations (Bang & Nissen, 2005).

An intentional connection between textile design practice, interdisciplinary design process, user-experience and exploring experiments makes it possible through research to utilize, extend and support the professional textile designer's skills and competencies. Emotional utility values of fabrics in function, e.g. experienced by tactile and visual sensation, are individual and subjective experiences. Because of that they are hard to measure and analyse in opposite to technical and functional properties such as abrasion resistance and colour fastness to light or rubbing. Hence all professional groups in the design team including the textile designer can benefit and learn from research in this field.

RESEARCH APPROACH

In the three year research project initial studies are conducted as observations, field studies, experiments and interviews comprising experiences with textiles in a use-context. Experimental design research (Hallnäs & Redström, 2006) and participatory action research (Whyte, 1991) is going to be an essential part of the project.

In the experimental phases as such the project will draw at design research approaches conducted and developed within different disciplines (e.g. Brandt, 2001; Brandt & Messeter, 2004; Habraken & Gross, 1987 and Jordan, 2000) and involve experiences achieved from initial experiments using for example repertory grid models as suggested in this paper (Baber, 1996 and Fransella et al., 2004).

USING REPERTORY GRID MODELS IN TEXTILE

DESIGN RESEARCH
On the basis of two experiments with fabric sensation using repertory grid models (Homlong, 2006 & Moody et al., 2001) and one pilot experiment planned and facilitated by the author it is proposed to use a variant of a repertory grid model in further experiments to investigate tactile and visual perception of fabrics in function.

The repertory grid model must be developed to fit into the present context which is investigating how fabrics manufactured for the contract market are experienced by some targeted user-groups. The goal is to obtain knowledge through exploration and iteration in a series of experiments of how subjective emotional experiences with fabrics in function can be uncovered and explored for use in further research.

When the repertory grid model is used for product evaluation it is a kind of an "experimenting interview". By comparing specified products in a certain way it is possible for respondents to express emotional experiences of e.g. fabrics in function. With qualitative analyses it is possible to elicit underlying factors and inter-relationships from the subjective statements expressed by the respondents (Baber, 1996 & Moody et al., 2001).

WHAT EXACTLY IS A REPERTORY GRID?
A repertory grid is a qualitative method of inquiry (Homlong, 2006). Fransella et al. states that: *"Grids are like people. They come in many shapes and sizes, they ask questions and give answers, they can be studied as a group or individually, on one occasion or successively over time, and they can be used well or distorted out of all recognition"* (Fransella et al., 2004, p. xi). After the invention for psychological use several researchers have developed repertory grid models with the purpose to use the method in product evaluation (Baber, 1996). Repertory grids can illustrate the relationship between the respondent(s) and a range of items e.g. a series of fabrics.

The American psychologist George A. Kelly invented The Personal Construct Theory in the fifties (Kelly, 1991). He proposed that people act on the basis of specific hypotheses or expectations meaning that all individuals are experts in matters concerning themselves and which course of action to take in given situations (Baber, 1996). Repertory grids was created by Kelly to state the theory and were meant to be used as a "tool" by the psychologist to elicit constructs when investigating patients personal relationships and situations in life. He assumed that constructs would exist in terms of opposites defined by the individual (Kelly, 1991).

CONSTRUCTS & TRIADS
To elicit constructs the items (e.g. fabrics) are presented in triads, either chosen at random, planned by the facilitator or chosen by the respondent(s). The idea is that for any three items chosen two items can be seen as having a "similarity" which at the same time makes them differ from the third item. This forms a construct which can be expressed in adjectives or opposites such as *hard* (=e.g. the similarity) - *soft* (=e.g. the difference), *coarse - smooth*, etc. The experiment goes on with new triads until all possible constructs are elicited or as long as the timeframe allows. It is possible to elicit more than one construct from a triad. It is important to plan the experiment in a way so the presentations of the items course the respondents to express subjective impressions. The elicited constructs define the repertory grid. In the next phase of the experiment after eliciting the constructs the respondent is asked to compare all items in the experiment with all constructs elicited from the triads. This can be done in several ways e.g. by a rating on a predetermined scale to state in what extent the "similarity" from the construct is present in the item or simply to note with "1" or "0" if the "similarity" from the construct is present or not in the item (Baber, 1996; Fransella et al., 2004; Kelly, 1991 & Moody et al. 2001).

ANALYSES OF REPERTORY GRIDS
After finishing the repertory grid (constructs and rating) the data is analysed in order to ascertain possible relationships between items to determine inter-relationships that can describe them to be manifestations of the same underlying factor.

The analyses of repertory grids can be conducted in several ways. Basically there are two ways to analyse the constructs elicited from repertory grid models: With the use of computer packages or manual analysis by the analyst. The use of computerised factor analyses forces the analyst to part from the data until the "result" is presented. However it is also a way to analyse a huge amount of data in a relatively short time. The use of manual analysis allows the analyst to "handle" the data and spot problems during analysis.

Baber (1996) presents an approach to manual analysis of repertory grids. A major aim of his technique is to provide the analyst with a vocabulary based on the respondents own terms, and to illustrate the inter-relationship between these terms. Babers examples are about product evaluation (microovens and wrist-rests) and not specifically about evaluation of fabrics. The examples provide an approach of how to handle the complexity of data derived from repertory grid interviews. In his own words the proposed technique of manual analysis *"...may lack the statistical rigour of factor analysis, can offer a quick an easy alternative means of repertory grid analysis"* (ibid. p. 159).

No matter what kind of analysis is used the issue of reliability will require some consideration in the discussion of an experiment. It is very difficult to determine an appropriate measure of reliability for repertory grids since it is a subject to a range of individual differences. (ibid. p. 164).

EVALUATION OF FABRICS
In this section two examples of fabric evaluation using repertory grid models are introduced. Moody et al. (2001) investigate fabrics for clothing and Homlong (2006) investigates how aesthetic qualities in textiles are communicated and perceived.

FACTORS UNDERLYING FABRIC PERCEPTION

Moody et al. (2001) describes two fabric-touch experiments using a repertory grid model. One experiment was carried out with one respondent and another experiment was carried out with 20 respondents. The purpose of the study was to qualitatively record subjective responses to common fabrics for clothing, and through analysis establishes some factors underlying fabric perception and discrimination between fabrics. It was also an aim to learn how the respondents would describe stimuli from clothing fabrics given no other guidelines except a request for adjectives.

In the experiments the facilitators presented 10 different clothing fabrics (Moody et al., 2001). The fabrics varied in texture, colour, pattern and material. The respondents had to select three fabrics at a time and for each triad decide which two were alike and describe with 2 adjectives 1) the similarity and 2) the difference. As described earlier in this paper the constructs defining the repertory grid consisted of these pairs of opposites or positive – negative statements. This was performed in rotation until all possible combinations had been covered. In the next phase after providing adjectives for the constructs the subjects were asked to indicate for all 10 fabrics with a "1" or a "0" if the "similarity" from the construct was present or not.

After the experiment a principal component analysis was used to reduce the subjective data to underlying dimensions providing fewer variables to examine and use as an objective data source. In the final phase some of the respondents and the facilitators were labelling the factors developed from the analysis.

It turned out that the qualitative responses were split in two categories: Surface texture associations and emotional/cognitive/mood associations.

THE LANGUAGE OF TEXTILES

Homlong (2006) has completed a series of what she describes as 70 interviews using the first phase of a repertory grid model. Only the first phase of the method was used because the aim was to discover reasons for judgement and how to describe textile patterns and not to rate preferences or visual expressions (ibid p. 49). The purpose of the study was to find ways to describe and evaluate textile design with a focus on how aesthetic qualities in textiles are communicated and perceived. The study was limited to visual aesthetic qualities in textile design defined as patterns of colours and shapes.

The respondents were shown 7 striped textile patterns in triads. The 7 variations were designed two-coloured as simple, medium and complex stripes printed with blue pigment colour on white cotton. The facilitator designed the triads and the showing order in a way so the fabrics in the first triad had a significant difference in pattern complexity. The purpose of this was to make it easier for the respondents to compare the patterns and express the experience. Each pattern was presented three times in different combinations. The respondents were asked to choose one and reject one textile pattern in each triad giving reasons for their choices using the third textile pattern as a comparing alternative. They also had to tell whether they were thinking of a special product or product type when they made their judgements. Afterwards the subjects were asked to describe what a fabric of their own choice would look like in order to capture more descriptive notions and preferences. The interviews were analysed using a computer programme to structure the qualitative data into different categories.

The aim of the study was to investigate the possibility of establishing a basis for what Homlong describes as a "language of textiles". Through analysis of the interviews four categories emerged from the qualitative data showing that each pattern elicited formal, functional, cultural and emotional content (ibid pp. 57-65). One conclusion in the study was that subjects make their judgements of aesthetic qualities on the basis of these four categories elicited from the repertory grid interviews. Another that *"...many diverse feelings and inner images van be triggered by the same pattern."* (ibid p. 65) The descriptions of aesthetic qualities included mostly common words from everyday language like gentle, messy, clean, harmonious and balanced (ibid p. 78 + pp. 87-90).

PILOT EXPERIMENT

The purpose of the pilot experiment was to clarify if using a repertory grid model could be a way to establish a discussion about tactile qualities contra visual qualities in order to express subjective emotional experiences with furniture fabrics and flexible materials. Which words would the respondents use, and how would they handle the tasks in the experiment? Above all I would like to investigate if a variant of the repertory grid could provide a basis for developing initial experiments about fabrics in function involving respondents such as stakeholders, customers and users in an industrial setting.

The pilot experiment was inspired by Moody et al.'s paper (2001) which introduced repertory grids combined with evaluation of clothing fabrics. Homlongs dissertation (2006) came to my knowledge after the pilot experiment.

FABRICS AND FLEXIBLE MATERIALS

My aim is to investigate and explore furniture fabrics in function and the pilot experiment was planned in respect of that. The chosen fabrics are all mass-produced furniture fabrics for the contract market. The fabrics were supplemented with other flexible materials to give the respondents a possibility to compare furniture fabrics with other flexible materials such as plastic bags and packaging material. The respondents are experienced textile designers working professionally with furniture fabrics. I wanted to investigate if a combination of fabrics and non-textile materials could contribute to a more non-prejudiced evaluation of the fabrics.

6 mass-produced furniture fabrics and 6 pieces of flexible materials with textile characteristics where chosen. All coloured in white, grey or black shades and each piece measuring 30x30 cm. To intensify focus on the tactile perception the 12

materials were same size and ”not coloured” in order to make them appear visually neutral and anonymous when compared to each other. To prevent the respondents from looking at the 12 materials in the first triad each piece were in a black plastic bag.

The 6 furniture fabrics are textured in different ways. They are familiar because they are all developed for office furniture. Five of them are upholstery fabrics and one is a suspension fabric:

1. Classic crêpe fabric. Synthetic.
2. Suspension fabric, translucent. Monofilament.
3. Synthetic microfiber. Fabric feels like suede.
4. Triple shaded tone-within-a-tone effect. Woollen.
5. Slightly textured fabric. Woollen.
6. Satin-like, smooth fabric. Woollen.

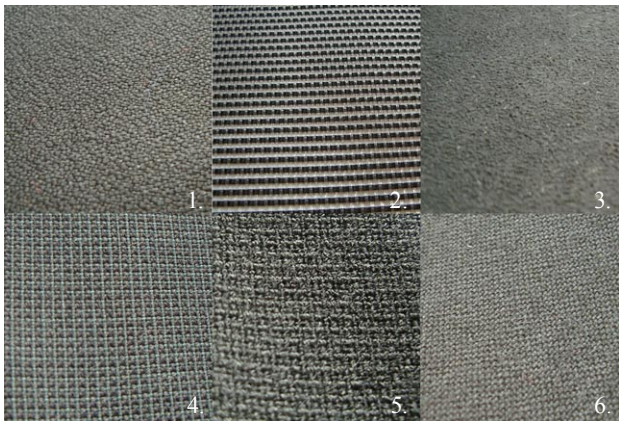

Fig. 1: Furniture fabrics evaluated in the pilot experiment.

The 6 flexible materials are also textured in different ways with a variation from doormat with a heavy plastic pile to thin plastic :

7. Thin smooth plastic from a garbage bag. Black
8. Thin rough plastic. (A water soluble stabilizer). White.
9. Thin foam; packaging material. White.
10. Synthetic non-woven interlay wadding. White.
11. Doormat with a heavy coarse plastic pile. Black.
12. Fine plain woven mesh. Shiny metal.

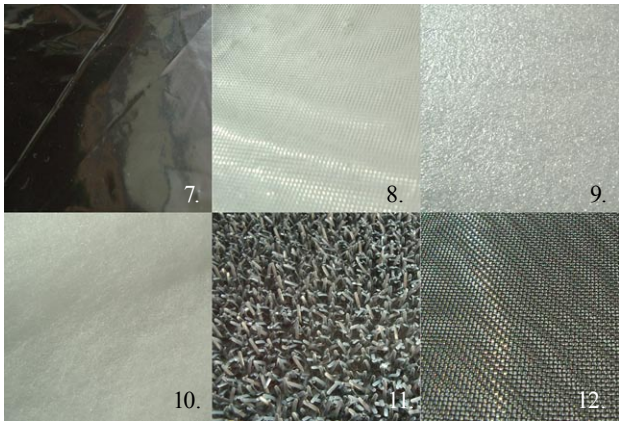

Fig. 2: Flexible materials evaluated in the pilot experiment.

RESPONDENTS

Two educated and experienced textile designers accepted to participate as respondents in the pilot experiment. They where tested as a group and had to agree in all evaluations.

PROCEDURE AND SET-UP

There were two triads in the experiment. It’s called triads because the respondents had to evaluate three pieces at a time. In each triad the three pieces was chosen at random. The first triad was a tactile experiment. The second triad was also based on tactile perception but included visual impression of the fabrics and materials.

In the first phase of the repertory grid model the respondents had to make an agreement of which two pieces out of the three chosen were alike and why, using the third piece as a contrast. They were told to express the similarity between the two pieces with one adjective and the contrast of the third piece using another adjective. They were also told that the two adjectives had to be positive-negative or opposites. These pair of adjectives are the constructs defining the repertory grid. In this experiment only one construct was elicited in each triad.

For evaluation of the fabrics the respondents were instructed to use a touch-stroke. They also had to pretend that the fabrics were mounted as upholstery even though they weren’t. Touch-stroke is defined as touch with flat hand or finger tips (Moody et al., 2001). Because the materials were not upholstered it was very hard not to handle them in other ways to get a complete tactile impression.

Each triad included two phases of a repertory grid model. In the second phase the respondents had to compare all 12 pieces of material with each construct of adjectives and rate them on a scale from 1 to 5. “1” is referring to the adjective which was chosen for the ”similar” pair of materials (e.g. *soft*) and “5” is referring to the adjective chosen for the third material (e.g. *hard*). As an example one of the 12 materials could be evaluated almost as soft as the material which formed the construct and must therefore be rated as ”2”. In the pilot experiment the rating process were a way to express tactile experiences elicited from the materials.

The whole procedure including instruction, 2 triads and discussion took place in the study in the home of one respondent. Facilitator and respondents agreed prior to the experiment that the timeframe was maximum one hour. As it turned out the experiment lasted approximately 45 minutes. The experiment was video-recorded.

TWO TRIADS IN THE PILOT EXPERIMENT

Because of the limited timeframe it was possible to carry out only two triads. Compared to Moody et al.’s (2001) and Homlong’s (2006) experiences with repertory grid models using respondents tested as individuals one hour should be enough time to do several triads. In this experiment the discussion and negotiation during each triad made them last longer than expected from the references (Homlong, 2006 and Moody et

al., 2001).

TRIAD 1
Tactile experiment, no visual perception: During the evaluation and negotiation all 12 materials were lying on a table in black plastic bags. The respondents put their hands in the plastic bags to perceive the three materials chosen at random. In the first triad the respondents didn't know which materials they were going to evaluate and rate. The facilitator knew from numbers on the plastic bags that synthetic microfiber, interlay wadding and metal mesh were chosen at random to define the construct in the first triad. The triad lasted 15 minutes.

Fig. 3: Tactile evaluation of materials in plastic bags

The following transcriptions from the video recording have been translated from Danish to English by the author. The first transcription shows a little of the negotiation when the respondents elicited adjectives. During this conversation the respondents have their hands in the plastic bags with the fabrics and materials:

"A: ...I think they (synthetic microfiber and interlay wadding) are similar because they are flexible, and I think they are similar because they are soft, and I think they are similar because they are man-made fibres.

B: I think 10 (interlay wadding) and 12 (metal mesh) is similar because they are extremely man-made fibres in a stiff way, because both are structured, a knurled texture in opposite to this (synthetic microfiber) which is soft and in that way differs (from the other two)..."

The negotiation continued like this for a while. The respondents used approximately half the time to define the construct. The adjectives finally chosen to describe the construct for the triad was *soft* (synthetic microfiber and interlay wadding) and *hard* (metal mesh). The words that finally defined the construct were selected among other adjectives that appeared during the evaluation such as: Flexible, man-made, construction structure, simple, surface texture, adherent, stiff, knurled.

The rating of the three fabrics on a scale from 1 to 5 shows how difficult it was for the respondents to agree about a construct. The synthetic microfiber is rated as "1" and the interlay wadding is rated as "3" even though they both are described as *soft*. The metal mesh is rated as "5" which in this triad is *hard*.

In the next phase of the first triad during the *hard-soft* rating of the remaining nine materials the respondents experienced again that materials can be *soft* or *hard* in many different ways. Because of that it was very difficult for them to do a fair and distinct evaluation of all materials in just one triad. The following transcription gives an idea of the problems. The respondents have defined the construct as *hard-soft* and have rated the three materials according to this. They are now going to rate material number 11 (the door mat with a heavy plastic pile):

"B:...Oh no! The rating is already insufficient, I think. We have to give it "5".

A: But it is hard in another way. In a way it's also soft. This one...You can sink into it. You couldn't do that with the other one (metal mesh)...(..)...The other one was hard as a plate but in a way it wasn't hard to touch....(...)...This one is hard in another way. It is flexible and hard. The other one is hard-hard.

B: But it is also...If we say that hard-hard is "5", then this one is also a little soft.

A: That makes it "4" (the ranking).

B: Yes. That's it..."

The *hard-soft* evaluation of materials continued in this way with new problems about how to fit the materials into the rating list. When they finished this phase of the triad the respondents were very unsatisfied about the *hard-soft* construct. They didn't think that their efforts lead to a fair and useful evaluation of the 12 materials.

TRIAD 2
Tactile experiment with visual perception: All materials were taken out of the plastic bags after the random selection of three pieces but before the construct of adjectives were elicited. Synthetic microfiber, thin foam and metal mesh were chosen at random. The triad lasted 13 minutes. Again the respondents used approximately half the time to discuss which two was alike and why.

The respondents are aware that in this triad they know the tactility of all fabrics and materials from the first triad. They try very hard to define a construct in the first phase that can manage to give all materials a fair evaluation in the rating phase.

Fig. 4: Touch-stroke evaluation with flat hand

Finally they define the construct as *body-friendly* (synthetic microfiber) and *body-unfriendly* (thin foam and metal mesh). A lot of adjectives came up during the negotiation such as: Softness, closed, hard, rough, coarse, resistance in surface, hard as a plate, uncomplicated, smooth, unpleasant, ambiguous, non-resistant, obliging, authenticity, feel-good, superficial, suction disc, changing character. The construct *body-friendly - body-unfriendly* was defined on the basis of these adjectives.

The following video transcription shows an example from the experiment of how evaluating a plastic-like material causes a more poor evaluation than evaluating furniture fabrics. The negotiation resulted in the ranking "4" instead of "5". The material is number 8, thin white plastic, slightly textured:

"A: ...why don't we like texture?

B: We like texture but...

A: You can't have a softer and nicer texture like this one.

B: No, but then it is a little sticky.

A: If it was upholstered... It is a little thin...

B: The resistance is very nice. But we can't give it "5" (= the most body-friendly). Feel this (synthetic microfiber). In this you can wrap yourself. You can't wrap yourself in that (plastic material)...

A: That's because you know it's plastic.

B: Yes..."

The respondents expressed during the rating process that it was harder to give the plastic-materials a non-prejudiced evaluation compared to the evaluation of the furniture fabrics. The fact that they knew when it was a plastic material influenced the way they rated the materials according to the construct *body-friendly - body-unfriendly*. It was easier and more satisfying for the respondents to rate the materials in the *body-friendly - body-unfriendly* construct than the *hard - soft* construct.

END OF PILOT EXPERIMENT

The discussion between facilitator and respondents after the two triads lasted approximately 15 minutes and was mainly focused on the following issues:

The facilitator told the respondents to sense the fabrics and materials like they were upholstered which they were not. In the experiment it was pieces of materials measuring 30 x 30 cm lying in black plastic bags. There was a discussion about the physical handling of the material and what it means for the data collected in the test that the respondents had to imagine something about the materials they were evaluating. It was very hard for the respondents not to use other ways to sense the materials e.g. squeeze, rotating cupped, multiple finger touch on both sides, two-handed rotation etc. There was also a discussion about what it means to sense with finger tips and flat hands compared to sense with the back of the body like you do sitting in a chair. And how does the visual impression affect the tactile perception?

The subject of the materials anonymous expression was questioned. What does it mean for perception of a group of materials that the they are monochrome in shades of white, grey and black with no "colours" and no dominant patterns present. How does an "anonymous impression" like in the pilot experiment influence the perception. What is the difference between tactile perception and tactile perception with visual impression?

It was also discussed how much the facilitator can "control" the results in the way the test is conducted? There was an agreement that this is always an issue worth to consider when planning experiments.

In the end the respondents discussed which of the two constructs defined in the pilot experiment was the most precise. At first they agreed that it was *hard – soft* because it's easy to say if something is either *hard* or *soft*. Then they remembered that actually it wasn't very easy because materials can be *hard* or *soft* in several ways. They agreed that the other construct *body-friendly – body-unfriendly* was wider and in that way more precise because it was easier to fit all fabrics and materials into this frame. In another way because it was wider it was also more non-specific. Finally they agreed that it was hard to say something about this with experience based on one experiment with only two triads.

RIGHT AFTER THE PILOT EXPERIMENT

It wasn't possible to explore all these questions and experiences in details during the relatively short discussion that ended the pilot experiment.

Right after the experiment my judgement was that it had been a total catastrophe because it didn't at all turn out the way I

Furniture fabrics & Flexible materials												Constructs & Triads	
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.		
Classic crêpe fabric	Suspension fabric	Synthetic microfiber	Tone-within-a-tone effect	Slightly textured fabric	Satin-like fabric	Thin smooth plastic	Thin rough plastic	Thin packaging foam	Synthetic non-woven	Doormat with plastic pile	Plain woven metal mesh		
2	4	1	3	3	3	3	2	2	3	4	5	Soft (rate 1) 3. Synthetic microfiber 10. Synthetic non-woven	Hard (rate 5) 12. Plain woven mesh
2	2	1	4	3	4	2	2	4	3	5	4	Body-friendly (rate 1) 3. Synthetic microfiber	Body-unfriendly (rate 5) 9. Thin packaging foam 12. Plain woven metal mesh

Fig. 5. The repertory grid constructed in the pilot experiment showing constructs and rating of all materials.

expected it to do! I expected that it would be much easier for the respondents to agree about the constructs in the repertory grid than it turned out to be. I expected that there would have been enough time within one hour to do several triads with all possible combinations of the 12 materials. I expected that there would be a more distinct difference in the rating of materials according to the elicited constructs. I didn't expect the respondents to be frustrated because it was difficult to define precise and sufficient constructs.

DISCUSSION & CONCLUSIONS

After a while and several discussions with colleagues I realised that maybe it was not a complete catastrophe just because things didn't turn out as expected. I went through the video recording again trying to dig out some perspectives for further experiments.

In this section conclusions and suggestions for further work are presented.

ANALYSIS OF THE GRID

In the analysis of the pilot experiment emphasis has been on the set-up and how to plan further experiments with repertory grid models. With only two triads it's not possible to elicit underlying factors and inter-relationships like in Moody et al.'s experiments or to sort the expressions in categories like in Homlongs experiment.

During the experiment the respondents expressed that for them both *soft* and *body-friendly* was positive statements. I inversed the rating of the construct *body-friendly - body-unfriendly* in order to show positivity with ratings close to "1". The grid shows that even though the respondents were frustrated about the soft-hard construct 5 of 12 materials have achieved the same rating in both constructs. Only two ratings have a significant difference from one construct to another. (Suspension fabric and thin packaging foam). There is a number of explanations to this e.g. it is accidental, the evaluation of the two materials are more complex to express than the evaluation of the other materials, maybe 5 levels in the rating are not sufficient to show all details, maybe the repertory grid needs to be revised or maybe the two materials really are different from the other materials according to these constructs.

It has to be considered in further experiments what kind of data it is necessary to collect to do reliable and useful qualitative analyses of fabrics in function.

TACTILE PERCEPTION

Even though there was only time for two triads in the experiment a discussion about subjective experiences was established. One of the main subjects in the discussion was what it means to perceive tactile qualities without the visual impression contra the perception of tactile qualities combined with visual perception. Tactile perception was not a subject in Homlong's experiments. Moody et al.'s experiments was about tactile perception but with visual impression in all triads (Homlong, 2006 and Moody et al., 2001).

With only one experiment and no direct references it's not possible to state that tactile perception in experiments using repertory grids increases the attention to the subjective experiences of fabrics. The effect of using tactile evaluation has to be considered in further experiments.

SELECTION OF MATERIALS

As mentioned before the fabrics and materials where "neutral" in the way that they gave an impression of anonymity. None of them were patterned or coloured in a way that attracted special attention. They were textured in different ways but ex-

cept from the door mat with a heavy plastic pile they were not textured in any outstanding ways. It has to be considered in further experiments how the selection of materials influences on the experiment

The following transcription is one respondents view on the selection of materials where she questions the anonymity of the fabrics and materials.

" ... It must be a matter of how you ask the questions. Because if you ask: What fabric do you want on your chair? Then if they (all fabrics and materials) hadn't been so much like the same (anonymous), then you would choose more with your eyes than you would choose with your hands. Because when we were allowed to look (at the materials) then we still used the hands to choose with. It made us more conscious about the material: Was it plastic or not plastic. We don't use the eyes to differentiate them in another way than when we used the hands, not when the surfaces are that anonymous..."

The respondent questions if she would use the tactile perception as much if there were more difference in the visual expression of the fabrics and materials. Obviously she think that it is necessary to use the tactile perception as the "main perception" because the fabrics and materials are so much alike in their visual expression.

As described in one of the transcriptions the evaluation wasn't quite fair to non-fabrics when they were compared with fabrics. In this experiment they were meant to help the respondents to make non-prejudiced evaluations of furniture fabrics. Instead they caused a problem in the evaluation because it was hard for the experienced textile designers to evaluate plastic materials in the same way as they evaluate furniture fabrics.

It has to be considered what non-fabrics can contribute with in order to investigate emotional utility values of fabrics in function.

GROUP OR INDIVIDUAL EVALUATION?

The fact that the respondents in the pilot experiment had to agree about the evaluation instead of making individual evaluations meant compromises and consensus in the negotiation process. Both Moody et al. and Homlong used individual evaluations in their experiments. Baber (1996) states that in his opinion it is clear that the method is designed to be used on individual basis (ibid p. 158). In the pilot experiment there was an ongoing negotiation between the respondents about the definition of the two constructs and also about the rating of the materials. It seems that the negotiation process provides a detailed view of tactile and visual perception of furniture fabrics, and as the first transcription shows it also provides an impression of the subjectivity of emotional experiences. The respondents disagreed on which two materials were alike and they both had convincing arguments for their own opinion. However if further experiments are based on group evaluations the repertory grid has to be organised in another way to contain all the expressions made during the discussion and negotiation. Homlong (2006) proposes a way to organise a grid in her experiments that contains all expressions made about the fabrics during visual evaluation in triads.

It's necessary to consider if individual experiments or group experiments including the negotiation process is to prefer. Pro individual experiments are that it is possible to compare and analyse the individual repertory grids constructed in the experiment. This is very clear in Moody et al.'s experiments (2001) which provide enough data to elicit underlying factors and inter-relationships between the constructs made by individuals. Also pro individual experiments are that it's clearly subjective and individual experiences with fabrics in function that is elicited. Against individual experiments are that there is no natural way to have a negotiation process. The data elicited in Moody et al's experiment is the subjective and individual expressions noted in the repertory grids. The respondents are not forced by a negotiation process to elicit more expressions. Pro group experiments are the negotiation process and the discussions about emotional experiences this bring. Against group experiments is that it can be difficult to analyse the negotiation process in a useful way if the repertory grid is not prepared to contain expressions from the negotiation process. It's also a possibility that some respondents dominate the negotiation and that it's their point of views that have the greatest influence of the decisions made in consensus. Power relations and other conflicts can be minimized by a set of rules for the experiment (Brandt & Messeter, 2004).

No matter how the experiment is planned the design of the repertory grid is very important. The grid must be designed to contain all relevant data for the experiment.

TIMEFRAME

In the pilot experiment the respondents knew after the first triad that they had to do the evaluation of triads only two times because of the timeframe. It caused some frustrations because it seemed to be important for the respondents to express themselves clearly and adequate. If the experiment had been planned in another way they might have had the possibility to continue with triads until all fabrics and materials had been evaluated. In that way they would have had more opportunities to express all their experiences in details.

Another thing to consider according to the timeframe is that in industrial settings "time is money". When stakeholders such as customers and users agree to participate in experiments it must be clear what the commitments are.

FURTHER WORK

Both the pilot experiment and the described experiments (Moody et al.; 2001 & Homlong; 2006) used respondents with professional textile competencies such as textile designers, students and teachers. Homlong also used customers and children as respondents. The purpose with Moody et al.'s and Homlong's research projects was to establish vocabularies about experiences of fabrics. The aim of using repertory grid models in the initial experiments of this three year research

project is to find a way to investigate stakeholder's, customer's and user's individual and subjective experiences with fabrics in function in a way that allows qualitative analyses of the data.

One of the purposes of testing a repertory grid model in a pilot experiment was to clarify if it was an applicable approach to stimulate respondents to express subjective experiences about furniture fabrics in function. Comparing three pieces of fabric and material in the experiment immediately established a discussion about subjective experiences of fabrics and materials.

However it was a big mistake that the respondents had to imagine that the materials were mounted as upholstery. They tried very hard to do what they were told but it was impossible for them not to handle the fabrics and materials in other ways than they were instructed to. In this experiment the respondents were experienced textile designers and as such used to imagine fabrics in all kinds of situations. Yet it would be to overinterpret to say that the experiment was an evaluation of fabrics in function.

In coming experiments with a stronger focus on fabrics in function the evaluation materials must be presented in settings as close to reality as possible.

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