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This paper discusses an on-going research, and investigates how memory of emotional experience is reflected in ideation of design solutions. It argues that memory of emotional experience is one of the sources for development of conceptual images during the initial stage of the design process. Memory of emotional experience is a distinct kind of memory different from the memory of events or knowledge. Memory of emotional experience triggers emotions that influence decision-making, it influences the formation of the belief and value system of a designer. Memories of emotional experience along with other kinds of experience and knowledge contribute to the construction of the image-banks that serve as a source of design ideas. The study discussed here hypothesizes that the level of creativity of design solutions is associated with thematic impulses triggered during the design process via memories of emotional experiences. A farreaching goal of this research is the enhancement of teaching methods to help architecture students learn to use autobiographical memories as a source of design ideas.

hat role does previous personal experience play in the architectural design process? Knowledge of aesthetics, technology, the history of architecture, of its theory and composition does not necessarily guarantee an ability to produce interesting and meaningful work. The determining factors lie elsewhere in the idiosyncrasies of a particular designer's train of thought (Rugg 1963) and in his or her interaction with others. The complex understanding of space that we owe to our sensual experiences and emotional connections, can never be taught or developed through cognitive processes alone (Langer 1942). Memory registers and stores meaningful experiences and impressions, beliefs and emotions, as well as any modifications that may take place under the influence of new experiences (Conway 1990). Design process, then, can be seen as a symbolic transformation and translation of an architect's experience into new meaningful content. Architects draw knowledge and import from the remembered past: they combine, abstract and distort the past through acts of imagination in order to fuel images of some possible future. In other words, designers utilize the knowledge and emotional impact contained in their memorable experiences in order to assist them in the creative design process (Downing 2000).

To illustrate the above statement, let us look at the following quote drawn from my interview with an architect, describing the way in which she determined an idea for a design:

I think about my experiences of indoor-outdoor space, and cicadas, and sounds of them, and time I spent on the porch thinking, watching the stars. And protected by the cover of the porch, and also being outside and inside at the same time. That's all I am going to do. Just draw a porch, a very simple porch. And then space can develop from there. And the porch can become what the client wants It is the idea. That's it.

In this paper I will to focus on how memory, and memory of emotional experience in particular, influence initial conceptualization and idea development at early stages of the architectural design process.

This paper is based on an on-going study. Data has been collected but not yet fully analyzed. Thus, no definite conclusions can be made at this point. Consequently, the paper will concentrate on the assumptions the study draws from previous work in the field, on preliminary inferences from my experimental work already done, and describe the final goal of the study.

1. Description of the empirical research

Architecture is a multidimensional, comprehensive discipline; it is as much an art as a science. It became obvious to me very earlier in my career that teaching only the technical aspects of design alone cannot produce creative architects. Understanding of space (Langer 1942), development of personality characteristics typical of creative and successful architects (Barron 1969), construction of a belief system (Carroll 2001), and many other aspects that are critical to becoming a creative architect can only be learned through direct autobiographical experience. I believe that we must first understand and then develop methods of teaching that enhance the use of inner personal resources and experiences within the creative decision-making process.

My study consists of three steps: interviews with practicing architects to determine how they employ memories of emotional experience in the conceptualization of design ideas; evaluation of creativity of relevant design ideas, and investigation of whether there is a relationship between the use of memories of emotional experience and creativity of design ideas; and enhancement of teaching methods in order to help architecture students transfer their autobiographical experiences into creative designs. Currently, the research is at the stage of analyzing interview protocols for content, and collecting the evaluations of creativity of the design solutions.

The population sample of the study included fourteen designers from and working in various regions of the USA, ten male and four female, ranging between thirty and about fifty years in age. Professional experience of the designers varied from five to twenty five years, from working in the large architectural firms at different levels (intern and a chief designer) to

independent practice, from designing internationally for big corporations to designing housing for independent clients in the US only. Three of the participants in the investigation had changed from architectural careers to some other careers (real estate, management and visualization). The interview consisted of two parts: thinking aloud while designing, and an unstructured interview to obtain personal information on the participants. Investigation, whenever possible, was conducted in the natural context of individual's architectural design – at home, in the office, or studio – in order to facilitate memories by allowing easy reference to things that might be a usual part of that architect's design process (Connell 1996).

I utilized a "think aloud method" for the study because, as noticed by Gero and Tang (2001, p 284)

studies using concurrent protocols reveal details of sequences of information processes reflecting the designer's short-term memory.

At the same time, interviewees can be involved with concurrent protocols without altering their cognitive processes (Gero and Tang 2001, Ericsson and Simon 1980).

The task I gave to the designers interviewed was to create a space for the author of the following haiku by Masaoka Shiki:

Twilight cicadas – The shadow of the pasania tree Press on my desk

I gave them no other formal information, other than the haiku (not even the name of the author). The task was intentionally open-ended assuming that absence of constraints would allow architects to rely more on autobiographical experiences verses drawing from familiar architectural precedents and architectural knowledge of building types. Concurrent verbalization was tape-recorded, transcribed, coded and is now being analyzed for content.

Unstructured interviews were conducted with each architect after the designing part of the experiment. During the interview, I asked architects to talk about themselves. Information, obtained during such interview supposed to help the me grasp what interviewees think is important about them, and also provide some insight in the past of the designers.

Another group of 14 architects was involved for anonymous evaluation of the conjectures (outline of the thought process was provided if the sketch itself was not explanatory enough), produced by the interviewed architects. Those architects were a random sample chosen from the yellow pages of the College Station and Houston, Texas, area. They evaluated all the conjectures according to the provided creativity checklist on a scale 1 to 5. The checklist was constructed using various existing creativity scales.

1. Design process and memory of emotional experience

1.1 Model of a design process

Because the design process per se is not the main focus of this research, existing models were adopted. All the interviewed architects used different processes, but in general all of them could be described by the model proposed by Jane Darke. In Darke's model the design process is a three-step process: Primary generator - Conjecture - Analysis (Darke 1978). The primary generator is an expression of what is valued, it is a concept or objective that helps to generate a solution, (Darke 1978), and is a component of the designer's cognitive structure. Conjecture is defined as the conceptualization of a possible solution of a design task (Darke 1978). Once a conjecture is produced, it can be tested against project requirements and modified as necessary. If we apply concept of situatedness (Gero 1999a, 1999b), the model is represented as follows:



Figure 1 - An model of architectural design process

Conjectures are generated on the basis of knowledge, as well as subjective judgments, personal systems of values and beliefs (Darke 1978). If memory of emotional experience participates in the design process, it is more likely to serve as one of the sources for conjecture development. My part interest and the concentration of both my research and this paper is the conjecture part of the design process.

1.2 Design process and past experience

Now let's look more closely at the ways past emotional, and autobiographical experience in general are stored in memory, and how memory plays its role in the design process and ideation of new places. First, let us investigate where new ideas originate. As indicated in previous research (Downing 1987, 2000), and supported by my own continuing investigation (not yet published), architects have image banks of personal experiences and professional knowledge from which they construct new

and meaningful forms. This critical source material, or image-bank, is formed from memories of past place-experiences combined with everpresent immediate experiences. During the design process, architects use imagery of places from their pasts as a storehouse of knowledge and as a connection between past-experience and the creation of new places.

The design process begins with belief or belief-like cognition. Both primary generator and gathering relevant information prior to design attempts, are shaped by belief and past experience. We devote ourselves to what we believe (Rugg 1963, Carlson 1995), and any conscious efforts to solve an immediate task will be greatly influenced by our beliefs and past experiences. Past experience of any kind – knowledge, memory of emotional experiences, aesthetic experiences and autobiographic experiences form an information bank, a body of ideas that can be tapped for imagery creation and problem-solving. Creative outcomes are simply a recombination of existing elements (Ward, Smith and Finke 1999, Harnad 2001) in light of a new task. It is important to be able to draw upon all pieces, and it is here that past experience is critical.

1.3 Design process and self-imposed constraints

In the case of the design process in particular, the primary generator is a belief system. Architectural tasks are ill-defined and complex in nature. A designer simply cannot take all the constraints and requirements into consideration at the beginning of the design process. The primary generator is a "way into" the problem, for a designer it is the starting point for the process (Darke 1978). Let us look at an example from my interview with one of the practicing architects:

I am first going just to make some assumptions, so I have something to draw on... That is not an urban setting. It cannot be an urban setting to me. So given that, I want to design an office, work-study space for this person. There is property that comes to the mind. And there is a structure there, a residence. I am trying to simplify. This is the site plan. There is a nice view here. This is come down elevation. And this is the location for project I am designing. So this is a simple site plan...

This example demonstrates clearly that an architect limits himself to one factor – in this case the site - from which he begins the design process.

All the designers I interviewed began their design process by listing strongly valued and self-imposed, subjective objectives that later helped to generate design solutions. In other words, a value system, a belief system of the designer by which he or she orients the project. 1.4 Conceptualization

What about idea generation itself, what about insight? In Rugg's words (1963, p 17)

The flash is not likely to occur unless the work is carried forward under the white heat of enthusiasm and to neglect of all else. It is emotion that shapes the imagination and 'moves' the world; it is emotion that is the basis of the forming process. Actually, the conjecture or brainstorming phase of the architectural design process involves more than just insight. Conjecturing takes both emotional engagement and a conscious attempt to solve the problem. As I mentioned earlier, past experiences of space and places form an image bank that serves as source material for a designer. The interesting fact is that most memorable places (with the exception of favorite historic precedents, learned from books or other sources) are emotionally charged. In a study of place imagery,

all the place images mentioned by the designers... were charged with a fair amount of emotion, (Downing 2002, p 24).

My own research indicates much the same: in the majority, aesthetic judgments and beliefs influence the historic precedents that constitute a designer's image-bank, and emotional experience isolatesthose places in the image bank that are full of meaning.

Following idea development, comes evaluation. Any finding has to be checked against objectives, requirements and constraints. But because architectural design is so ill-defined, the aesthetic values and beliefs of a designer and his or her emotional responses are as much a constructive evaluation criteria as technology and other project requirements and constraints (Harnad 2001).

2. Examples

Now I would like to proceed to observations made during my research and the way in which those observations fit into theoretical issues covered, and then we will return to theoretical issues. The research is not yet finished, so no conclusions can be made at this point. I must mention that in my study I was more interested in how architectural designers produce conceptual ideas, than in the final product. This means that I will concentrate on the primary generator and conjecture phases of the design process, if we use Darke's terminology, or belief system and brainstorming in common language.

The following is a quote from one short "talking aloud" protocol (the sketch produced by quoted designer is presented in Figure 2) that can serve to indicate how my observations fit into theoretical issues.

I was recently in a little place south of Paris couple of weeks ago. There was a building that had an intimate courtyard that had a diagram like this. And there were different things in the courtyard. And what happened was the site came down the road a little bit, then it comes down the hill and drops off. The building sits like this, so it gets protection from the surroundings. And then this is the road that comes right here, and then I think it comes down like this. And the site is pretty wooded. And so there is a lot of privacy, maybe, perhaps, from the sound of the cicadas. And maybe you can capture them inside the courtyard here. And the whole building floats, and the site goes through. And so what you might have then - pasania tree is a fill-in inside the courtyard. Anyway, that was a very beautiful place that you can imagine. This is open landscape, and the town is way down here some place. You can imagine sounds of animals and insects and trees. I was actually here during the evening, the light quality was quite beautifully coming into the space. This is all pretty wooded up here.



Figure 2 - The sketch illustrating first example of conjecture development

This architect believed that site and nature are important and an integral part of architecture, and he began to see the task I gave him through this In this case the belief. site is the primary generator, even though I had not stipulated how he should begin to solve the task. The site that he remembered gave him a beginning—one that he This particular valued. encounter with the design process clearly demonstrates the direct

connection between past place-experience and the development of a new place. Remembrance of one evening in a small place south of Paris and the emotional experience of peace, beauty, and privacy of this particular place is transformed into a concept of a different place. The beautiful quality of light in that particular place is interpreted and transformed into a courtyard-the conjecture for the project at hand.

Let's look at a different example, a quote from a different interview (for the sketch illustrating this conjecture see Figure 3):

...At twilight sound is hollow, at night it is mysterious. From when I was a kid I remember cicadas' noise as very nice that I was falling asleep and waking up under. This is a little muggy, peaceful, mysterious Oregon memory. Cicadas associate with fireflies. It reminds me of summer bible study, gathering wood... First we need to gather information. The senses are see, smell, hear, taste, and touch. Sensory qualities are smelling night, stone, and dried wood, softness, moonlight. The materials or textures will be stone – rough, worn wood, not smooth materials. Lighting is focused, and elegant. Press on the desk - desk is important here - makes me think about peace for creating. So, this is probably is a small intimate place, studio with opened windows. It is a framed space – both interior and exterior or outdoor space. This framed space rests delicately on the site, it is not heavy, and it grows from the site.



Figure 3 - The sketch illustrating second example of conjecture development

Not only the site, but all the sensual qualities of nature served as a prompt for this architect. At this point the image bank o f autobiographical memories spills out and serves as а source for а conjecture. "Muggy, peaceful, mysterious Oregon memory", these are emotionally charged memories, sensual memories. Aesthetic qualities of natural materials, preference

for organic shapes, interior-exterior interaction determines the aesthetics of the future place. Emotional response gives the potential place expressiveness –it is a transformation from memories of an emotional experience of nature, serenity, intimacy, and mystery into the calm and delicate expression of a new space.

These two examples do not really need clarification. They speak for themselves as they reveal how emotional, and autobiographical experience(s) influence the design process, and the way in which past experiences affect the creation of the aesthetics of new places.

3. Memory of emotional experience

From my interviews with architects, as well as from my experience with architectural design, the importance of past experience of places and spaces for the process of designing became clear. I am not referring here to professional experience only, but to experience in general – emotional, sensual, autobiographical, and learning. Common sense tells us that through experience we construct meanings, values, and memories, as well as accumulate the professional baggage of knowledge. The past experiences of an architect, including emotional experience, contribute to the formation of self as a designer (Barron 1969, Conway 1990, Downing 2000, Lawson 1997, Robinson 1996), establishing for that (each?) individual a professional value system (Rugg 1963), and allowing him or her to construct the meaning of a future place.

3.1 Emotion as a different kind of memory

From an evolutionary standpoint emotions are 'older' and faster than other responses. Frequently, we have, if not the answer, then a predisposition toward solving a problem in a particular way before cognition begins to have an effect. This predisposition is due to emotion. In a biological sense, emotions and memory of memories of an emotional

experience are simply different kinds of knowledge, which are "indelible" and different from cognitive knowledge (LeDoux 1992, 1996). This brings us back to my assumption that emotional experience, retained in memory, is as important and as active in the design process as reasoning or cognition. There is even one view, based on neurological discoveries, that cognition is a type of emotion (Cytowic 1993). Emotions are expressions of the way a person understands an experience, because they filter and structure the person's perception of the situation and information (Robinson 1996, Carroll 2001, Orange 2000), they focus attention (Carroll 2001), and they greatly influence construction of memory (LeDoux 1992,1996, Christianson and Safer 1996, Gendlin 1962). If I ask you to recall a place to which you traveled a couple of years ago, up to 80 percent of that memory will be emotionally charged (Conway 1990). For example, you may not remember the layout and details of the hotel room in which you stayed but recall the disgust you felt when the first thing you saw in that room was a giant cockroach. Or, like one of the architects I interviewed, you may remember that Death Valley was shocking, because you had never seen such a wide-open landscape, and you felt so little in this huge place. In other words, memories of emotional experience constitute a separate, valuable and large part of a person's knowledge bank. Unavoidably, then, emotion has to be one of the sources for conceptual ideas in design, as well as for both creative processes and decision making in other fields of science, art and every day life.

3.2 Emotion and construction of meaning

Emotions are central to construction of meaning. Momentary experiencing and the memory of past experiences are essential for the construction of meaning in general (Langer 1980, Gendlin 1962), and of the meaning of a place as a "qualitative totality of complex nature" (Norberg-Schultz 1980). We gain initial understanding of space and place only through direct experience, and emotional connotation of that experience colors such understanding of place. The meaning and understanding of 'place' is essential for architectural design (Downing 2000, Lawson 1997). The training of architects has traditionally involved travel, looking at actual buildings, and learning by doing. Such education provides an architect with rich and direct experience that can be easily drawn on during the process of designing.

Design is an act of understanding and the pragmatic use of past experience to identify, peruse, and imagine possible futures, (Downing 2000, p 83).

Emotions also presuppose cognitive elements like belief (Carroll 2001, Carlson 1979, 1986, Eichenbaum and Bodkin 2000). In common language we call it a 'gut feeling'. We all know that memories of past experience are shaped by beliefs, and beliefs are shaped by memories (Schacter and Scarry 2000). For an architect a belief can mean a preferred choice of design elements, or style (Mann 1979). Belief also determines the outline of a design (Hill 1999) through the primary generator phase and the selection of preferred elements and memories during the conjecture development.

Design can be considered a process of 'imagination' involving the recombination of a person's existing structures of knowledge into new forms, (Webber 1995, pp 97-98).

4. Summary

In this paper I have tried to look at the relationship between memory of emotional experiences and design conjectures. I laid out my assumptions and explained the method used for the study, as well as provided examples from the investigation that support my hypothesis (singular or plural, if plural then it is hypotheses). Since my research is still in progress, no conclusions can be made. The far-reaching goal of my research is the enhancement of design studio teaching methods and the development of tools and techniques to support expert behavior. There is obviously a connection between memories of emotional experiences and the process of design solution conceptualization, and further investigation of these connections is necessary to further our understanding of the design process.

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