

# The Ebb and Flow of Creative Design

Paul Murty

*Design Lab, Faculty of Architecture Design & Planning, University of Sydney, Australia  
paul@arch.usyd.edu.au*

**Abstract:** Flow has been described as a general optimal experience involving a merging of action and awareness, possibly associated with intrinsic motivation, or what Mihaly Csikszentmihályi describes as *autotelic* personality traits. Although not of-itself creative flow is valued in relation to creativity, but its role in settings like designing and whether designers are autotelic, are unclear. This paper considers discovery experiences and possible associations with flow in the statements of designers who participated in a recent interview study. The investigation found indications of three types of flow-like experience and that aspects of respondent behaviour, called action styles, appeared to involve goal driven metacognitive features, like Csikszentmihályi's autotelic traits. The paper also foreshadows the prospect of further insights into an ebb-like behaviour referred to as *latent preparation*, and flow, emerging from neuroscience research into a mental state known as transient hypofrontality.

**Keywords:** *Creative Design, Flow, Insight, Neuroscience*

## 1. Introduction

The association of *flow* and *creativity* has become familiar in recent years, supported by evocative writing on both topics by Mihaly Csikszentmihályi. To describe flow Csikszentmihályi refers first to mundane experiences complicated by distractions and contrary impulses and then considers alternatives, like skiing down a slope, or becoming immersed in some other pleasurable or absorbing activity, when in his words [1];

*...consciousness is full of experiences, and these experiences are in harmony with each other... These exceptional moments are what I call flow experiences. The metaphor of "flow" is one that many people have used to describe the sense of effortless action they feel in moments that stand out as the best in their lives. Athletes refer to it as "being in the zone," religious mystics as being in "ecstasy," artists and musicians as aesthetic rapture.*

Csikszentmihályi defines flow as a general optimal experience any individual might feel in any activity in which they are preoccupied, not only creative people, or creative activities. However, flow-like experiences have long been valued in relation to creativity. Artists commonly speak of *flow*, or being *in the groove*, or the *zone* when, absorbed in the practice of their creative skills, expression occurs effortlessly. Csikszentmihályi attributes the origins, or likely onset of flow in an individual, to clear goals, equilibrium between skills and challenges, mental concentration, merging of action and awareness, increased sense of control and reduced self-consciousness. All

are thought to contribute interactively, to flow and to development of an *autotelic* personality and its associated attributes. Autotelic, coined by Csikszentmihályi, literally means self-goal; so that an autotelic activity is one undertaken for its own sake. An autotelic person, with a disposition towards flow experiences, acts for intrinsic reasons, not simply to achieve some further goal, and possesses related skills such as attentiveness [1].

Statements so far associate flow with relatively continuous creative or pleasurable experiences. The relevance of flow and the autotelic personality to designing, characterised by ill-defined and wicked problems, or the discontinuities and conflicts of professional practice are unclear. However, in a recent interview study of 45 professionally accomplished architects and designers practicing in Sydney, Australia, several key indications of ebb and flow, and designerly traits that may be interpreted as autotelic, or at least conducive to flow, were observed.

## 2. Summary of the Interview Study

The aim of the interview study, also described in the 2007 IASDR Conference, was to assess the extent to which conceptual designing, by accomplished practitioners, is an *insightful* activity [2]. Semi-structured interviews focused on how individual respondents, mostly architects, managed their creative activity and on discoveries made throughout conceptual design. Open-ended questions to elicit pertinent revelations without leading, progressed from the general to the particular, through stages as follows: 1) Introduction, focused on career, challenges, strengths, weaknesses, and success attributes. 2) Designing and Designers, shifted focus to design philosophy, values, design processes and *progression*. The last being one of a group of attributes referred to as *action styles*. 3) Working and Discovery patterns, explored further action style attributes, including *incessancy*, *quick versus reflective*, *creative catalysts* and *reactivation*. Action styles are described in more detail later in the paper. Respondents were then asked if they can recall and describe breakthroughs and discoveries during conceptual design. Further detailed questions were asked about these recollections. 4) In the Completion stage, respondents were asked about their experiences of design ideas coming unexpectedly when not designing. The interview was then completed, with two general queries to elicit crucial unstated thoughts that may have been missed, or may have emerged during the interview.

Assessment of insightfulness involved 3 indexes. (1) *Insight experience*, based on indicators associated with Gestalt psychology and related models of problem solving; namely *preparation*, *fixation*, *incubation*, *restructuring* and the "Aha!" sensation that typically accompanies an experience of insight. [3, 4, 5, 6] Individuals received a score of one for each indicator affirmed, when describing a discovery, or referring to their discoveries generally; for a maximum of 5. (2) *Cold discovery experience*, evaluated discoveries made outside of the normal times, places and activities of designing, called *cold discoveries*, in relation to discoveries made during active design sessions, called *hot discoveries*. The evaluation was based on stated indicators of discovery *frequency* and *importance*, and degrees of hotness (called *hot-time*) and coldness (or *cold-time*); for a maximum of 4. Hot time is associated with temporal proximity of a discovery to earlier designing, or problem-solving activity. A discovery made after a design session, while still seething with thoughts, was not regarded as a cold discovery. Cold time is associated with qualitative aspects of times, activities and events, other than working. A discovery that occurs at the workplace, which is totally unrelated to current design activity would earn a cold

discovery point, while one that occurred away from work, but in a de-facto work activity, like designing on the train regularly to, or from, work, would not. (3) *Insightfulness of cold discoveries*, was based on the extent to which respondents explicitly attributed greater insightfulness to cold, than to hot, discoveries, on a scale of 0 to 3. Terms such as *clearer, more creative, have the essence, more resolvable, or stronger* were acceptable indicators of greater insightfulness.

The most immediately evident and surprising finding was the diversity of the respondents. They articulated a wide range of beliefs, priorities and behaviours. It was apparent that, from the outset of designing, they proceeded in different directions, attempted different things and adopted different strategies and methods. However, most (39/45) affirmed that insights assisted design conceptualisation. While a few were unable to recall a particular experience, only two directly affirmed that their designing was intentionally based on a rational incremental process and that unexpected discoveries and insights were rare. Also evident were different levels of insightfulness and qualitative differences in the discoveries. Further details of the background, methodology and findings of the study may be found in the following papers [7, 8, 9], the originating PhD thesis [10], and by contacting the author.

### **3 Insightfulness and Flow**

As the research findings accumulated it became evident that three levels of insightfulness could be identified, with the incremental respondents, representing a base level. Nearly one third (13/45) of the respondents experienced insights as *hot* discoveries situated within the times, places and intentional activities of designing. They were categorised as Insight Level 1. However, twice that many, 26 confirmed insight experiences in varying situations, including *cold* discoveries out of the normal times, places and activities of designing. They were categorised as Insight levels 2 or 3. The Insight Level 2 designers, a little more than one third (16/45) did not distinguish hot from cold discoveries. But others (10/45), categorised as Insight Level 3 designers, affirmed that their cold discoveries were more insightful than their hot discoveries.

Respondents also described qualitatively different types of insight experiences. Four broad categories were identified, *clarity, fluency, recognition* and *ideas*. Clarity experiences, typically a sense of realisation, rather than a specific idea, were relatively evenly distributed among respondents in the three insight levels. Fluency experiences, typically a succession of ideas, were most commonly associated with insight level 1 respondents. Recognition typically occurs when a designer encounters something seen or thought before and perceives, in it, something not appreciated earlier. This appears to be more strongly associated with insight Levels 1 and 3. Idea experiences, typically classic "Aha!" events, may be a specific solution to a problem, or a generator upon which a design can be based. They are more commonly experienced by Level 2 and Level 3 (cold discovery) respondents. Figure 1 shows the distribution of respondents by Insight level and Discovery experience. Each column represents the numbers of respondents, in each Insight Level group, who associated themselves with one of the four discovery experiences. The next sub-chapters consider the discoveries in more detail and highlight likely associations with flow experiences.

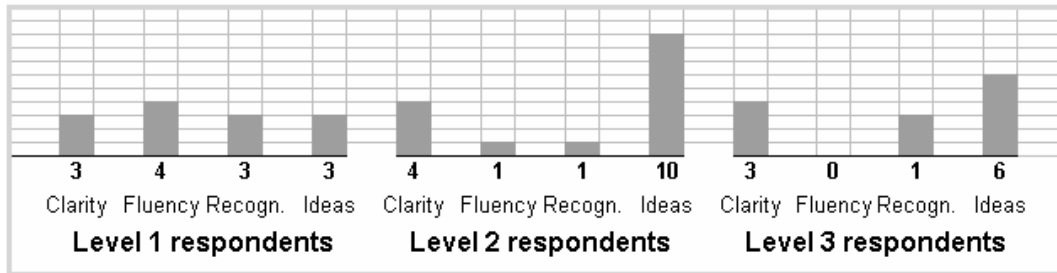


Figure 1: Insightful Discovery Categories by Insight Level

### 3.1 Level 1 - Hot Discoveries - Likely Association with Flow

Hot discoveries, typically associated with a peaking of design activities or simultaneous experiences, have been described in a number of protocol studies. Akin & Lin observed that in six, out of eight times a novel design decision was made, the subject alternated rapidly between three activity modes; *examining, drawing and thinking* [11]. Suwa, Gero & Purcell proposed that unexpected discoveries were more likely to happen when a designer is simultaneously attentive to multiple items that had never been addressed together previously [12]. Csikszentmihályi's description of flow, and its association with a *consciousness full of experiences in harmony with each other* [1], suggests that the peaking circumstances of the typical hot discovery of insightful level 1 designers might also be regarded as a flow experience. The interview respondents described different insight experiences. While the descriptions were often imprecise, and experiences varied from event to event, it is possible to convey a sense of these discoveries from respondent statements covering the four categories of clarity, fluency, recognition and ideas.

A clarity experience, typically a realisation, rather than a specific idea, appears to share features with classic Gestalt conceptions of insight, especially Wertheimer's notion of *having insight into the problem* and Kohler's *awareness of new relations among problem components* [13, 14]. One respondent described his recovery from an extended mental block after deciding to relax, by playing classical music, and to draw up what he had.

*... Even though I was in a very distraught state, I managed to become a little more peaceful, listening to this music and draw. And draw...with a little more care and a little more detachment, right? And I drew it, right? And then I thought, suddenly, "I had broken through". And I thought, "Well, I can make this so much better".*

A fluency experience is typified by a flow of ideas. In a clear cut case one respondent described how, instead of sketching, re-sketching and progressing by trial and error, the design of an award winning house flowed from mind to paper, as he drew continuously, without corrections, while at the beach.

*... I drew it in my sketch book, a section of it... and I thought, "that's it!" ... just drew, came from nowhere... practically the first time I tried to draw what I was thinking about.... It was a Saturday afternoon... I got off the beach and I went straight to the office... and I tried to draw it and I couldn't... so I enlarged it on the photocopier... put a piece of tracing paper over the top and traced it and that's the section.*

The initial drafting failure indicates that fluency occurred without clarity or revelation. It was necessary to make a scaled photocopy, which could be traced whole, to draft the design.

A Recognition experience typically involves encountering something previously seen, or thought, but perceiving in it something not appreciated before. In one instance, plans were developed that the clients were expected to like, but the respondent was dissatisfied:

*... it was just a default... it just didn't seem to me... to be unique and I want something to be quite different...*

The respondent liked a brush-railing form sketched days earlier; one of many. On this day sketches were reviewed. Both the respondent and her partner liked the railing image and the latter made a 3D computer model of it. Later, when manipulating the model, a screening solution for the façade was recognised, and this subsequently became an important visual element of the design.

Idea experiences; are typically classic "aha!" discoveries that may be a solution to a problem or a generator upon which a design can be based. It is assumed that ideas are sufficiently familiar to readers to not require examples.

### **3.2 Levels 2 & 3 - Cold Discoveries - Possible Association with Flow**

Both Insightful Level 2 and Level 3 designers experience *cold discoveries*. Typically these emerge, apparently spontaneously, like the outcome of a flow experience, but following an ebb of design activity. To convey a sense of the cold discoveries the examples below focus on statements about their origination.

Clarity experiences - The first respondent distinguished the hot and cold settings by observing that discoveries when working are likely to be influenced directly by the work and that drawing has a cathartic effect. He associated discoveries when not working, with reverie, adding;

*... really your mind never stops working on things, ... I'm working on things all the time, not deliberately, but, you know; you've got things to solve, they're always there...*

Other respondents offered the following views;

*... I think a lot of ideas, or clarity of thinking, probably comes when you're not actively trying to make it come...  
... in the middle of the night... I might wake up and have resolved something which had been really bugging me... it's almost like your brain is already working overtime...*

Fluency experience - This respondent's statements indicate an acceptance that her way of designing involves unnoticed mental activity while she is doing other things.

*... you'll be out hanging the clothes on the line, or something and ... it strikes you that there's a solution for something and then that just snowballs and pulls everything together, and I find that happens a lot for me.*

Recognition experience - One respondent associated breakthroughs with getting away from a job and described the incubation process explicitly, as very valuable

*... It won't come by working at it... I believe there is an incubating process. I think there is a subconscious process that is very valuable, which is, moving away from it and going and doing something totally different.*

Idea experience - A respondent described a *cold* discovery when designing a house.

*... I just believe that your mind is a very powerful instrument and you've got to feed it well and... let it think things through on its own... then suddenly things will emerge...*

## 4 Autotelic or Flow Conducive Action Styles

One group of designerly variables, referred to as *action styles*, are indicative of autotelic or flow-conducive behaviour. Three concepts, *progression mode*, *incessancy* and *reactivation*, are outlined below.

### 4.1 Progression Mode

Progression mode refers to the pattern of ebb and flow in an individual's creative or productive output. Respondents were asked whether their designing progresses in a steady and incremental manner, or fluctuates and to describe their experiences. Relevant expressions of the alternative responses are: 1) Fluctuating - inconsistent, fits and starts, uneven, or getting stuck, or 2) Steady - consistent, methodical, incremental. Responses were distributed almost equally between fluctuating (16/45), steady (16/45), or a declared mixture of both (13/45).

Statements by respondents who described their progression as fluctuating suggested a range of perceptions, from fatalistic views of discontinuity, as essentially uncontrollable, to a more assertive view of fluctuations as an aspect of nature that can be harnessed, or ridden; like surfing a wave. More fatalistic instances included viewing the intermittent process as routine, associating getting-stuck with writers' block, or temperament, or attributing progress to acquisition of ideas, which come in, or as, chunks. Respondents, who described their progression as sometimes fluctuating and sometimes steady, expressed similar views and also referred to situational factors. More assertive, and possibly flow-conducive responses, included positive views of discontinuous progress as a natural process, or a necessary outcome of the exploration of ideas:

*...You've got to come up against things... then you either test that, you go around it, or you find another way...*

*... We fluctuate for external reasons. Jobs go off the boil.*

The steady respondents also attributed fluctuations to situational factors. Many referred to the need to meet the demands of their occupation, to work quickly and to moderate, or attempt to moderate, their fluctuations.

It is proposed that meta-cognitive self-awareness that enables practitioners to acknowledge individual attributes, as positive facts of life, or as characteristic they can moderate, may be regarded as indicative of a designerly flow-conducive, if not autotelic, trait.

### 4.2 Incessancy

Respondents were asked to assess the extent to which they are always a designer. In comparison with output-related Progression mode, Incessancy represents patterns of front-end or input-related ebb and flow which is more subject to interests and intentions, but not necessarily greater control. More than two thirds (35/45) affirmed they were incessant practitioners, in being always the designer, or always on the case or both, as in the examples below.

Statements exemplifying, *always the designer*

*... My children are embarrassed by my tapping walls etc., always enquiring.*

*... The majority of the conversations, when we go on holidays, are about architectural things.*

... *You are always an architect. It's inescapable... it's constantly with you.*

Statements exemplifying, *always on the case*

... *When I get a new job I don't stop thinking about it until I have worked it out. It might take 4 hours or 4 weeks.*

... *We are perpetually looking for the best possible solution... We are not billing the client for this.*

Among the remainder, some could be described as situational. Others advocated a break for productive reasons.

It is proposed that one may interpret the high levels of positive responses, in both forms of incessancy, as autotelic in being a reflection of high levels of motivation and a widely held sense that being a practitioner is a vocation in life, undertaken for its own sake, and not simply a job.

### **4.3 Reactivation**

Respondents were asked how they cope with getting stuck, or being unable to resolve a tricky design problem. Getting stuck may be regarded as an ebb in progression, which may result from mental fixation. A few respondents (5/45) opted to persist until a solution was reached. But for the vast majority (40/45), disengaging from designing and doing something else, or re-engaging with the project in a different way, were the preferred actions. Some respondents would choose either, according to circumstance, but most (36/45) had a definite preference for one or the other as outlined below.

*Disengage:* Nearly half (21/45) of respondents exhibited confidence in their capacity to solve problems, if they were stuck, by disengaging in one or more of several ways. Disengagement options included;

- An unspecified alternative activity; eg. *put it aside*, domestic or office chores, or other projects.
- An activity away from the workplace; such as swimming, walking, or creative activities such as painting.
- Distancing one's self from the problem, place, or situation of frustration; eg. leaving it, or going home. Some respondents advocated as stimuli, different modes of travel, such as driving, flying, or train journeys.

*Re-engage* - One third (15/45) of respondents stated that, when stuck, they adopt an alternative means of engagement with the project. Cited methods included;

- Shifting from an output activity to an input activity; eg. looking at related precedents, or exploring design publications, in order to get excited, or inspired, or to invoke creativity.
- Representing the task in a different medium, different scale, level of abstraction, or degree of detail.
- Conducting a more dynamic, active and free ranging interrogation of the main concerns of the project, intentionally taking a different approach, either alone, in conversations with colleagues, or by workshopping.

*Either* - A few respondents (4/45) affirmed a willingness to alternate between disengagement and re-engagement approaches, and to change tactics as necessary to keep moving forward.

*Persist:* The remainder (5/45) stated that they persist when stuck. Two were frank and pragmatic about continuing until they found something. Another, with an ability to visualise and retain his thoughts, said that he could design anywhere and that he was reluctant to stop if something remained unresolved.

It is proposed that the diversity and emphatic reactivation statements, while not clearly autotelic, are likely to be conducive to discovery.

## 5 Discussion

Three possible associations with flow were identified in Section 3, as follows; 1) Peaking and simultaneous perceptual circumstances associated with design session *hot* discoveries are indicative of a form of flow experience, in the situation of active designing. 2) Fluency experiences, analogous to flow, in the sense of a flow of ideas, are more commonly associated with the Level 1 hot discovery respondents (4/13). These experiences can also emerge when an individual is not working, although this appears to be uncommon (1/26). See Fig.1. 3)

An association of flow with *cold* discovery is proposed. Cold discoveries appear to be an outcome of some process, but without the obvious signs associated with hot discoveries. The realisation of solutions to problems, after ceasing efforts to solve them, is commonly attributed to *incubation*. But, there is considerably wider acceptance of the effects of incubation, than of its fundamental workings. Incubation is attributed to either, an unconscious, but active constructive agency or process [15], or a variety of conscious processes [5]. It is proposed that this conscious-unconscious dichotomy is false, as the evidence of this study points to shades of grey. During interviews the respondents described mental activities such as reverie, the mind working overtime, not actively trying, ideas kind-of there, forming, never stopping and so on that are variously unplanned, uncontrolled, undirected, unnoticed, or perhaps forgotten, happening at any time or place and suggesting a range of states exist, between highly attentive consciousness and deep sleep. Use of the term *latent preparation*, to represent these states, was begun with the intention to include both unconscious incubation and the mental activities, described by the respondents, that appear to be associated with a range of perceptual levels. [2, 8, 9].

It appears possible that latent preparation and flow could both be instances of a broader category of altered states of consciousness (including meditation, dreaming, and hypnosis) that, in recent years, have been the subject of interest within the neurosciences. One hypothesis, proposed by Dietrich [16, 17] is that altered states of consciousness may be associated with a trade off between the brain's cognitively flexible explicit system and its more efficient implicit system. The explicit system is associated with higher cognitive functions, while the implicit system is associated with skill-based knowledge. Dietrich identifies the flow state as a period during which a highly practiced skill, represented in the implicit system's knowledge base is implemented without interference from the explicit system. This, he proposes is made possible by a temporary suppression of the analytical and meta-conscious capacities of the explicit system, a category of states known as transient hypofrontality.

If flow and the discovery experiences of the respondents described above are analogous, one might expect to find indications of autotelic traits in respondent descriptions of their *action styles*. In Section 4.1 Progression Mode there is evidence of metacognitive awareness, when practitioners acknowledged individual characteristics, either as a positive fact of life, or as variables they can moderate. This could be flow conducive. The evidence of high levels of goal driven motivation in 4.2 Incessancy, and both metacognitive awareness and motivation in 4.3



Reactivation, is more clearly autotelic. While the research was not framed to consider this question it is clear that many of the respondents were strongly motivated by a personal desire for achievement in their work.

## 6 Conclusions

Wide variations in design approaches and actions were found among the respondents. The majority affirmed that their designing involved insightful discoveries and were able to recall specific instances. There was diversity in the types of insights and discovery experiences described, accompanied by three apparently different forms of flow experience. Surges and peaking of design activity, observed in protocol studies shortly before designers make, what are referred to as *hot* discoveries, appear to be one designerly version of flow. Discoveries occurring when individuals are in an apparent ebb state, or not designing, referred to as cold discoveries, may be associated with another class of relatively undirected flow experience, called *latent preparation*. A third variation, referred to as a *fluency* experience, is different again. Fluency experiences are arguably more like the flow experience of artists, in being continuous. They may follow design activity, in the manner of a hot discovery, and they may also precede or actuate designing, like a cold discovery. They need not be associated with a particular realisation, recognition, or awareness, until afterwards, when the designer becomes aware that something significant has been happening.

Some action styles of the respondents appeared to involve goal driven metacognitive features, like Csikszentmihályi's autotelic traits. But whether action styles are associated with discovery experiences and latent preparation, in the way that autotelic properties have been associated with flow, remains to be investigated.

Like flow, latent preparation could belong in a category of altered states of consciousness that, in recent years, have been the subject of interest within the neurosciences. If so, both flow and latent preparation could be outcomes of transient periods when highly practiced skill and knowledge, represented in the implicit system, is implemented without interference from the explicit system. This proposition, not anticipated when commencing this paper, appears to warrant further investigation.

## Acknowledgements

Sincere thanks are owed to Terry Purcell for his encouragement and advice, and to the forty five respondents, who willingly offered their time and shared their personal revelations.

## References

- [1] Csikszentmihályi, M. (1998). *Finding Flow: The Psychology of Engagement With Everyday Life*. Basic Books, New York.
- [2] Murty, P. and Purcell, T. (2007) Designerly reflective and insightful ways of designing, in *Proceedings of the International Association of Societies of Design research - Emerging Trends in Design Research. School of Design*, CD ROM IASDR07, Hong Kong Polytechnic University.

- [3] Wallas, G. (1926) *The art of thought*, Harcourt Brace Jovanovich, New York.
- [4] Duncker, K. (1945) On Problem Solving, *Psychological Monographs*, 58, 270.
- [5] Kaplan, C. A. and Davidson, J. E. (1988) *Hatching a Theory of Incubation Effects*, Carnegie-Mellon University Technical Report: C.I.P. #472.
- [6] Mayer, R. E. (1995) The Search for Insight, in R.J. Sternberg and J. E. Davidson (Eds.) *The Nature of Insight*, MIT Press, Cambridge, Mass.
- [7] Murty, P. and Purcell, T. (2006) Levels and Experiences of Insightful Design, in Y.S. Kim (Ed.) *International Design Research '06: Proceedings of International Design Research Symposium*, Sungkyunkwan University, Seoul, Korea, pp 245-256.
- [8] Murty, P. and Purcell, T. (2006) The Latent Practitioner: Latent discovery processes in designing, in S. Shannon, V. Soebarto and T. Williamson (Eds.), *Challenges for Architectural Science in Changing Climates: Proceedings of 40th Conference of the ANZAScA*, CD ROM, University of Adelaide, Australia.
- [9] Murty, P. and Purcell, T. (2007) Latent Preparation - Do great ideas come from out-of-the-blue? In *CAADRIA2007, proceedings of the 12th International Conference on Computer-Aided Architectural Design Research in Asia*, Schools of Architecture, Southeast University Press, Nanjing, China, pp 509-517.
- [10] Murty, P. (2007) *Discovery Processes in Designing*. PhD thesis available in the Sydney eScholarship [Online PDF]. Available at: <<http://ses.library.usyd.edu.au/handle/2123/1809>> [Accessed 23 August 2009]
- [11] Akin, O. and Lin, C (1996) Design Protocol data and novel design decisions, in N. Cross, H. Christiaans and K. Dorst (Eds.) *Analyzing Design Activity*, John Wiley & Sons, New York.
- [12] Suwa, M., Gero, J. S. and Purcell, T. A. (1999) Unexpected discoveries: how designers discover hidden features in sketches, in J. S. Gero and B. Tversky, (Eds.), *Visual and Spatial Reasoning in Design*, KCDC&C, University of Sydney, Australia.
- [13] Wertheimer, M. (1959) *Productive thinking*, Harper & Row, New York.
- [14] Kohler, W. (1929) *Gestalt psychology*, Liveright, New York.
- [15] Poincare, H. (1908) Mathematical Creation [Online PDF]. Available at: <<http://www.ias.ac.in/resonance/Feb2000/pdf/Feb2000Reflections.pdf>> [Accessed 3 June 2009]
- [16] Dietrich, A. (2003) Functional neuroanatomy of altered states of consciousness: The transient hypofrontality hypothesis, *Consciousness and Cognition*, 12, pp 231–256.
- [17] Dietrich A. (2004) Neurocognitive mechanisms underlying the experience of flow. *Conscious Cognition*. 2004, 13(4), pp 746-61.