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Design Learning for Tomorrow

Design Education from Kindergarten to PhD

Proceedings from
the 2nd International Conference
for Design Education Researchers,
14-17 May 2013, Oslo, Norway

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Reds.: Janne Beate Reitan, Peter Lloyd,
Erik Bohemia, Liv Merete Nielsen
Ingvild Digranes and Eva Lutnæs

Proceedings of the 2nd International Conference for Design Education Researchers

14–17 May 2013, Oslo, Norway
Volume 2

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Teaching Constraints, Learning Creativity: Leveraging the Guided Distractions

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Abstract: *Different disciplines require different approaches to education.*
The teaching of formalized sciences (such are physics, chemistry, etc.) requires the study of consolidated and already verified results and is conveniently carried out through lecturing (e.g. lectures or books) while formalisms and techniques are learned together with disciplinary contents. Soft disciplines (such are fine arts, interior design, media production, journalism, etc.) require "learning by doing": the study of facts and techniques that is weakly related to the ability to produce masterpieces or new ideas. Design is in an intermediate position: techniques can be learned (e.g. modelling, representation, materials, colours, etc.), but the ability to design "new meanings", i.e. creativity, is left to personal sensitivity and to teaching by examples. Creativity can be stimulated, and methods can be provided: constraints. In our experience in teaching design (in particular communication and service design) at our university, we combine theoretical lessons with many design activities, together with constraint driven activities. Constraints stimulate the lateral thinking and make students aware of their mental frames that oppose limits to their creative capacities; constraint driven assignments force the students to focus on the technical aspects, distracting their attention from the creative content so reducing "conceptual censorship". This paper presents the methodology we use and some of the experiences we carried out with respect to different design fields (products, communication artefacts and services), both in academic as well as in professional environments.

Keywords: Constraints, creativity, design, education, methodology.

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The notion of constraint

In many courses we held at our university, we repeated the following experience:

a) Students are required to write five short sentences about the concept of communication: they have ten minutes to write about that, and some of them verbally report the results to the audience;
b) Afterwards, students are required to write a short composition, in hendecasyllables, with "enchained rhymes" (ABA BCB CDC ...), an acrostic of COMMUNICATION; again with some verbal report.

The results are unequivocal:

a) The first of two production is usually trivial, and uninteresting, and students quite often write what they think the teachers would be happy to read;
b) The second production present "suffered" writings, with many signs of strike out and changes; the content is often critical, however never trivial and usually deeply personal.

We are convinced that the difference between the products is caused by the use of constraints: in the second case, the attention to technical aspects of the composition reduced the brain censorship, letting deeper thoughts come to the surface and to present itself. Such an experience repeated several times and always with comparable results, suggests that constraints can be employed as a way to unchain creativity. This is confirmed in other fields: e.g. the literary avant-garde OULIPO applied the use of constraint to generate new literary experiences several years ago, and with significant results[1]. Thus, the idea to use constraints to foster creativity in design is natural.

Which constraints?

A constraint requires a specific application field: we can provide a restriction either in the "language"[2], or in the "process"[3], or in some perceptual aspects[4], etc. Of course, the idea of a constraint requires some kind of rule to be broken, or at least a taxonomy of the areas in which the freedom can be constrained.
According to numerous studies in Design (Maiocchi and Pillan 2009), this discipline can be considered as the ability of providing emotions through artefacts; while an artefact is, in general, a support to some function or a solution of some usage, Design is the ability to add communication (meanings and recognisability) to tangible and non tangible products and services. Following the two authors, a design artefact provides, along with functions, some perceptual signs that are able to produce meanings and

[1] OULIPO, acronym of Ovrouire de Littérature Potentielle, founded by François Le Lionnése in 1961, is a literary movement spread from pataphysics experiences: many famous authors were part of the group — Raymond Queneau, George Perec, Italo Calvino, and many others.
[2] For example the experience mentioned above on hendecasyllables and acrostic, or simpler, as "La Disparition" by George Perec, a romance of more than three hundred pages in which the letter "e" (the most frequent in French) disappeared in the book.
[3] Many of experiences of OULIPO are related to "generative" mechanisms, in which algorithms are provided for transforming famous works into new others; examples are antonymic translations (changing texts by substituting each word with its opposite), or the style translation (transforming a picture into an equivalent for a different culture/style). Very interesting examples of the latter are provided in (Queneau 1979).
[4] According to the fact that perceptual properties are related to aesthetic emotions [Ramachandran 1999], many experiences have been carried in constraining perceptual principles, as testified in (Maiocchi 2006).

emotions; this is made possible thanks to the processing performed by the human brain on simple and complex perception signals.

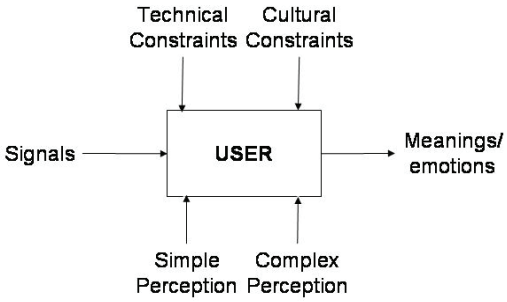


Figure 1. Constraint model.

As referred in works of neuroscientists exploring the nature of the artistic emotions (Ramachandran 1999), simple perceptions are related to some of the characteristics of the signals (exaggeration, contrast, grouping, etc.).

Complex perceptions are related to the ability of those signals to cause the arousal of some metaphoric meanings by analogy (i.e. the structure, the shape and some details of a sport car connect to the concept of young, dynamic, sportive, rich person, etc.) (Lakoff 1980).

Of course, a number of obvious technical constraints influence the perception of any kind of artefacts (the respect of physical laws, cost issues, mechanical properties of the materials, etc.) affecting final perceptual result; on the other hand, other cultural factors can modify perception, such as cultural factors. The latters can make the artefact acceptable or not (as an instance, some countries do not accept at all distinct roles for the genders, while in others it is a common thought, and so on) (Hofstede 2010).

Accepting this model, we have a natural organisation of the constraints: on simple perception, on complex perception, on cultural aspects.

In and out of mental frames: consciousness and creativity

The mind of every human being, by its very nature, organizes memories and knowledge that come from past experiences, into mental frames, mind-sets, automatic decision-making and evaluation references. During each creative experience, these mental frames have the power to condition and bribe each cognitive process and the emotional mix associated with it. Creativity can be seen as the capability to deal with mental frames, surfing through culture traditions, playing with archetypes; producing little or relevant innovation by violation of constraints.

Design as a discipline can be described as the ability to watch at the reality that surrounds us with a new look, and as the capability to see new opportunities in old contexts; for this reason it is very important to ensure that students do some experiences making them aware of the internal barriers which are real obstacles to creativity. We are looking for ways to build awareness and to manage the tendency to stiffness that we tend to underestimate in ourselves.

We believe in the importance of self-consciousness about mental frames and cultural tacit constraints fencing creativity and we fight it through pro-active design experiences. On the other hand, we are investigating the role of external constraints (through over-constrained briefs), in deviating the attention from false priorities with the purpose to unbribe innovative thought.

Creativity and the methods for stimulating it, have been the subject of several researches in the community of designers (Cross 2001, Kruger 2006 and Tonkinwise 2011). Among others, Nigel Cross has indicated a relevant approach to this topic based on a deeper understanding of the cognitive processes that compose the creative experience. On the other hand, Marianella Sclavi in her book *L'arte di ascoltare e mondi possibili* (Sclavi 2006) provides a pragmatic approach based on Bateson's theory about ecology of the mind – to induce self-awareness about the mental frames in young designers. Moreover, brain sciences face a fast development, and some scientists (some of which have been mentioned above) are know spreading their discoveries making them more and more accessible out of their discipline surrounding.

Design as a discipline, traditionally dialogs with human and social sciences and richly refers to perception and cognitive sciences to explain perception phenomena; on the other hand, the outcomes of brain sciences in terms of creativity empowerment and design methodologies are still scarcely investigated and should be explored. As the authors carry on research through design practice and theoretical work with the goal to enhance creativity, this paper intends to offer a contribution to this respect.

The Experiences

In the following chapter, we present a set of experiences carried on with the previously mentioned constraints. For each one, the following elements will be discussed: (i) the context of the experience, (ii) the involved actors, (iii) the given constraints and (iv) the results. The examples will be shown in order of constraints complexity. Many of them have been organized by the design avant-garde association Opdipo (Lariani 2005).

a. The fool glass

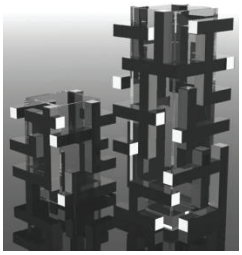
Context: a contest for the production of crystal glasses, organised by Opdipo during the Salone Internazionale del Mobile di Milano, in 2005. Sponsored by Opdipo and a company producing crystal products.

Actors: Designers, professionals and students;

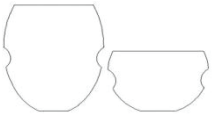
Constraints: Application of the first principle of Ramachandran (Ramachandran 1999): *Peak Shift*. The designers were asked to identify a specific exaggeration effect, inspired by the work of some architect, artistic event or by the style of some specific author, and to isolate and exaggerate the related perceptual factors;

Results: More than 40 designers participated, providing sketches, technical schemes, and in some cases also a prototype. Among the others, some of the results are presented in Figure 2.

Copa-Cabana
Inspired to the samba movements of the Rio Carnival
by Flavia Alves de Souza
Rio de Janeiro - Brasil



Rietveld
The reference to the Rietveld's chair is evident
by José Eduardo Luna Garza
Monterrey - Mexico



Botero
Evident references to the shapes of the persons portrayed by the painter
by Paola Macchi – Milano - Italy

Flute
Based on the joke flute as glass and as musical instruments, you can drink only by closing the holes
by Aldo Spinelli - Milan - Italy

Figure 2. The fool glass results.

Remarks: the effects of the constraint are evident, as well as it is evident the process followed by the designers: (i) first, think of the field defined by the constraint; (ii) next, think of the peak shift; (iii) then, a solution emerge. As an example, the "fat" linearity of Botero would not be possible without the constraint.

b. The Three Ages

Context: a contest for the production of sofas, organised by OPDIPO during the Salone Internazionale del Mobile di Milano, in 2005. Sponsored by OPDIPO and by the company RE-Space, producing beds and sofas.

Actors: fifteen professional designers;

Constraints: the goal of this experience was the translation of the same emotions from one discipline to another, i.e. to have the same feeling when comparing the painting and the produced sofa. We opted to use Ramachandran's principles and choose 5 paintings with the same subject and painted with different styles:

The three ages
Giorgione – 1510 ca.

The three ages
Tiziano – 1510 ca.

The three ages of the woman – Hans Baldung Grien - 1539.

The three ages (part.) – Gustav Klimt - 1905.

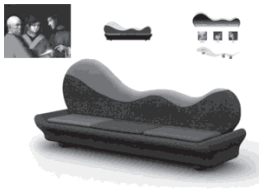
The three ages
Dalì – 1940.

Figure 3a. - Variations on "The three ages"

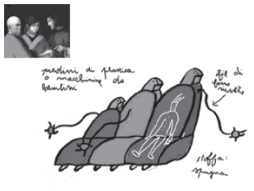
Each painting has been described in terms of the principles of Ramachandran (peak shift, contrast, symmetries, balance, metaphors, ambiguities and grouping); then a brief

for a sofa has been provided for each painting, describing the corresponding perceptual structure as constraints of the sofa – without any reference neither to the painting nor to the painter. Each designer had a couple of weeks to provide a concept and the most interesting projects were prototyped by RE-Space.

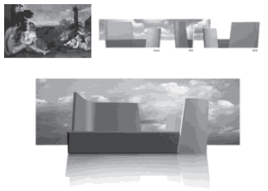
RESULTS:



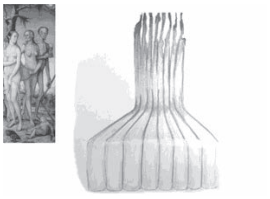
Giorgione –Michele Cecchini, Milano, Italy (prototyped)



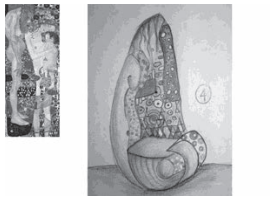
Giorgione –Chiara Rapaccini, Roma, Italy (prot.)



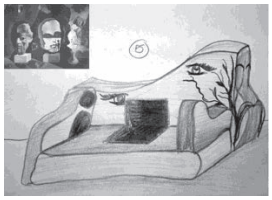
Tiziano - Margherita Colleoni - Studio FT&Associati - Milano –Italy (prot.)



Grien - Amanda Aguilar Boiton - Monterrey – Mexico



Klimt - Amanda Aguilar Boiton - Monterrey - Mexico



Dalì - Amanda Aguilar Boiton - Monterrey - Mexico

Grien - Paolino di Benedetto - Milano - Italy

Grien - José Eduardo Luna Garza – Monterrey – Mexico

Grien - Francesco Civelli - Bergamo - Italy

Figure 3b. - Results on "The Three Ages"

Remarks: The strong net of constraints, most of them based on simple perceptions, was able to convey to the concepts not only shapes and balances, but also a mood – that is explicitly evident in all the "translations" carried on from the work of Grien.

The prototyped pieces were those evaluated as excellent by an independent jury.

They were exhibited in a showroom during the Salone Internazionale del Mobile, and some of them demonstrated success in sales as well.

c. Stereotypes

Context: various courses in Design at our University, both for graduate and post-graduated students. The goal was the design of door handles;

Actors: students;

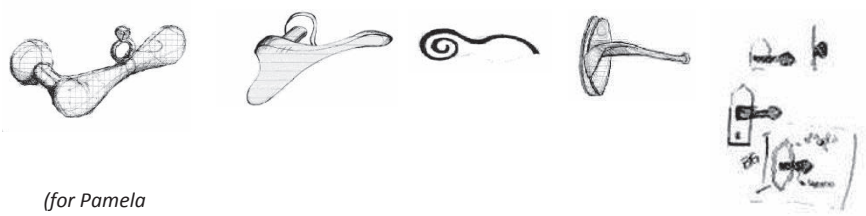
Constraints: we presented several different samples produced by famous designers. We asked the students to classify them as suitable for men/women, rich/normal, professional/employees, young/old, etc.; then we observed that perceptual properties (colour, curves, thickness, etc.) were commonly related to specific characteristics, and

we proposed to correlate them to famous personalities. Afterwards, we asked the students to design their own handles, according to the stereotypes usually associated to them. The chosen handles were:

Sottsass *Fuksas* *Aulenti* *Cini Boeri* *Gregotti* *Rossi* *Mongiardino* *Arad* *Krier* *Kono*

Figure 4. - Several door handles.

The chosen personalities were Mick Jagger and Pamela Anderson.
Results:



(for Pamela Anderson)

(for Mick Jagger)

Figure 5. – Stereotype mock-ups.

d. Metafiring

Context: MSc. thesis "Metafiring: Project Management Techniques for Stimulation of Collective Creativity. The tasks were: (i) to select one of three case studies: Applications of font; Ameliorating Metro User Experience in Italy; and Communication Design for Fukushima nuclear disaster; and (ii) to brainstorm potential solutions with: (a) a person from any profession; (b) two designers; (c) two persons from any profession; (d) four designers; (e) four persons of any profession. In total, 15 experiments were conducted with the purpose of following the generation of creative ideas in mixed;

Actors: Inter-disciplinary and multi-disciplinary student groups with the author as a person guiding the method;

Constraints: Students were asked to choose a problem (from one of the three case studies) and to confront it with XII-step matrix depicted in Figure 6. These XII steps are grouped in 4 conceptual areas - (a) concrete, (b) conscious, (c) unconscious and (d) fantasy. Conversely, each step is suggested to last 2 min ca. and is previously briefly explained. The XII steps are: (i) Empathize - with problem, (ii) Fly on the wall - to

observe a specific moment, (iii) Tag-along - to observe through time frame, (iv) Decode - to perform linguistic/visual/narrative analysis, (v) Distort - to change order, negation, contradiction, (vi) Hybridize - to unite with other possible field, (vii) Emotion portrait - to distance and observe how group feels, (viii) Choose metaphor - to place finding in other context), (ix) Scenography (to model a possible stage), (x) Contradict & oppose (to criticize and use the opposite), (xi) Wild analogy - to test the furthest application and (xii) Live act-out - to perform live storytelling;

Results: In abstract, Metafiring thesis demonstrated that: (i) number of ideas are increasing as the XII steps increase; (ii) potential solutions could be found evenly in XI (out of XII steps), assuming that first step serves to understand better the context of the problem; and finally that (iii) multidisciplinary teams could contribute equally to the problem-solving as well as the teams consisted of solely designers (Radeta 2011). Figure 6. demonstrates several results of the case study on Communication for Fukushima nuclear disaster

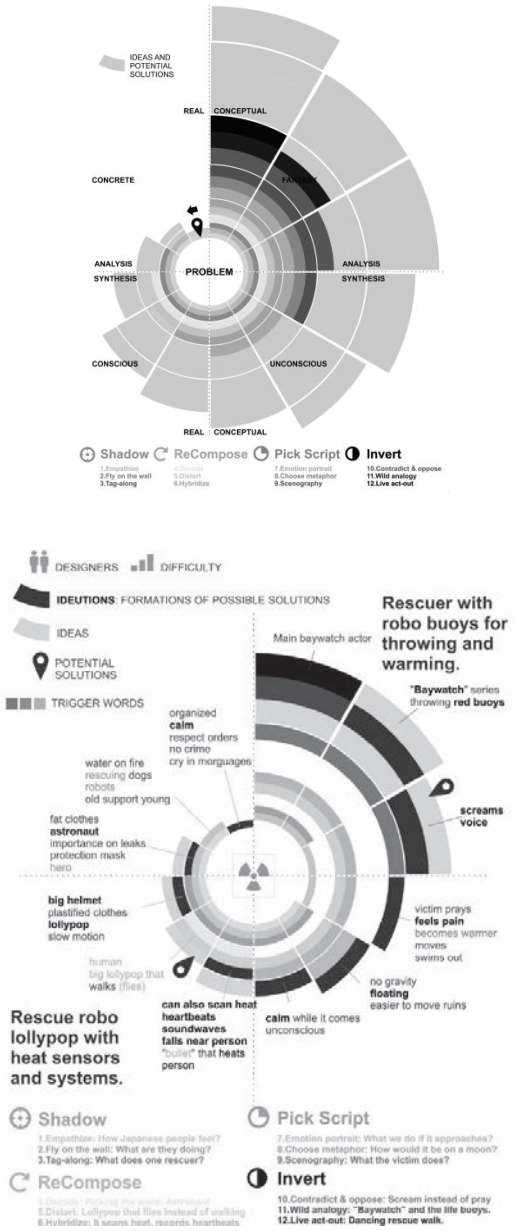


Figure 6. – Metafiring method (top); Applied method for Fukushima disaster (bottom).

Remarks: Although while still on a shallow level – at the time of developing the thesis of Metafiring – several steps (out of XII) were separately conducted in practical applications such as: (i) creation of an exhibition stand for participating in the Clinton Global Initiative University in Miami 2010; (ii) written report of conducted internships in all Ministries of Republic of Serbia that has been given to a Prime Minister.

Figure 7. – Pure Wings team presenting their project about H2- propelled aircraft at CGIU 2010.

e. Other experiences

Numerous other examples could be presented and discussed, but we present just some pictures, without further analysis, however respecting already explained the previous principles. In further we present two examples, one of a designer and other from the course with students.

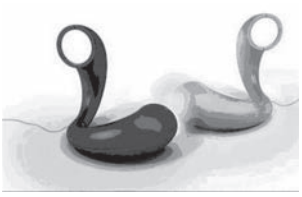
(I) IMITATION OF NATURE OR OF THINGS

A Korean architect and designer took inspiration from nature and things as depicted on picture below.In this case, the constraint is mainly metaphorical, i.e. it refers to the complex perception. For instance, the last two installations refer to the magic world of the nature; in other cases, the peak shift is the effect of the scale change, as in the second picture in second row. It is to be noted that, according to following observations, the change of the scale had not affected the role of toy for constructions. Any pieces put on a floor during some events were occasions for the children to play, build and climb exactly as they were playing with pieces of wood.

Tree chandelier

Book lamps

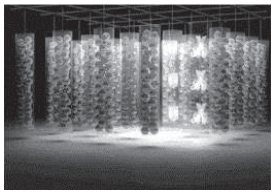
Chinese Spoon seats



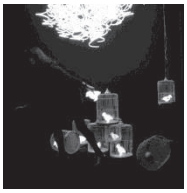
Toy pouff

Cloud lamps

Shell lamps



Forest
(installation for lightning)



Mangrovia and Birds
(installation for lightening)

Figure 8. – Artworks by Youngju Oh

(II) IMITATION OF STYLES

Students had to transform a clip into a single image. After having chosen a specific style, they viewed a video clip of an advertisement about an energetic chocolate, in which there are: a rich and corpulent person is stretching his muscles on his Porsche, a slim "rastaman" eating an energetic bar wants to help him, a conflict of misunderstanding occurs with the end Porsche hurl. On Figure 9. is an original frame from the advertising and on Figure 10. are several interpretations done by students.

Remarks: These experiments had mainly educational purposes while the constraint had the goal of investigating on the stylistic elements able to locate a period or a culture. It has been carried out in a course of Communication Design at our university.

These interesting results demonstrate lucidly not only the style of the chosen context, but also the individual style of the author.

Figure 9. – Frame from advertising

Figure 10. - Interpretations (from left to right): prehistoric, Russian icon, enigmatic, church windows, Maya art, puppets, comics, ASCII art, embroidery, child drawing, Japanese art, disco stamps, urban stencils, heraldic, road signs, LEGO, Greek pottery.

Final remarks

Creativity is the core of Design as a discipline. Acting on functions and appearances (shape of material artifacts, organization and procedures shape for non tangible artifacts such as services), designers provide new and renewed emotional experiences, meanings and metaphors. Design education is aimed to provide technical skills (drawing), cultural bases (about industrial process, economical systems, market,…) and to empower creativity. The last one is of course the most relevant and specific goal, signing the difference with respect to other domains, but also the most critical and worst understood.

In this paper we propose the usage of constraints as a method of gaining more knowledge about the mental processes associated to creativity (through the use of theoretical models coherent with scientific literature), and as a tool to stimulate creativity. We do believe that brain sciences provide knowledge employable as a base to produce new awareness about creative design, but also to invent tools capable to un-bribe creativity. All of the experiences presented above, used constraints and produced significant results that can be summarized in the following:

(i) in professional surroundings: according to the professionals being involved during the experiments, thankfully to constraints, they were able to develop new, unusual ideas and to enhance their creativity;

(ii) in educational surroundings: constraints gave to students more freedom in creation of new proposals; participants to our experiences escaped the usual (and tacit) slavery of demonstrating to the teachers their ability in following the set of rules and methods learned during lectures and previous design labs.

Obviously, most of the above reported design experiences cannot be considered as scientific experiments, since it is only possible to observe that the constraint driven design processes produced interesting results in terms of innovative designed artifacts.

On the other hand, the simple experiments reported in the first paragraph of this paper, shows quite clearly that the introduction of an apparently formal and technical constraint (as an instance the requirement to present a content in hendecasyllables), has the power to modify priorities during the design process, significantly affecting the final results in terms of content. Students participating to the experiments appeared both very distracted by the constraints and surprised by their relevance on the final results.

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