

Chapter 6

MULTI-DIMENSIONAL CREATIVITY

Designing is closely associated with creativity. Design firms often claim to rely upon various, sometimes proprietary, creative or ideation methods, brainstorming being one method that figures prominently.

We have already encountered a number of techniques for enhancing creativity and generating new ideas, or variations of existing ones. When later, in Chapter 6, more in detail discussing sketching, we will underline that sketches should preferably be rough early on, holding more creative potential, and numerous, so as to inspire thinking in alternatives; likewise for early, frequent, speedy prototyping. When ‘broadening the scope’ in the next chapter, we will open the vistas for a wider input and, again, for the generation of ever more viewpoints and alternatives. We also saw, e.g., when in the introduction discussing the effects of native language on thinking, that diversity in a design team is highly preferable.

There is a healthy body of research and a great number of books on the subject of creativity, including many recommendations for generating wonderful ideas – sometimes without the necessary corollary that ideas are not born wonderful; no, a seemingly brilliant idea is never enough since it has to be realized to be of any utility; the proof is only in the

pudding. This chapter will attempt to sum up some important dimensions of idea generation more closely associated with design work.

Creativity methods

Here, as already indicated, brainstorming is bound to be brought up. Most often, established wisdom does not take into account the circumstances when applied specifically to design, where it is frequently performed by the same team regularly. This is something quite different from the 'standard model' for brainstorming, with an ad hoc, temporary assembly of contributors. One rule that is important for ad hoc brainstorming is 'no criticism', but this may be substituted by 'constructive criticism' within a design team. A more sophisticated further development of brainstorming is Synectics, which, among other dimensions, focuses on constraints, sometimes lifting such. This is an avenue that might be pursued without necessarily keeping to the particular Synectics rigor. Among several more formalized approaches, we find, e.g., TRIZ*, with its origin in an analysis of patented solutions, that proposes a number of fundamental laws in science and technology and which can be built upon to generate alternatives systematically. Brainstorming may be supported by a set of alternative generators (make larger, smaller, turn upside down, combine, eliminate, etc.); whereas one of several formal methods of going through possible combinations when the design object is one that can be described in a number of dimensions is morphological analysis.

*Somewhat awkwardly, this is the Latin letter abbreviation of the original Russian: the theory for inventors' problem-solving.

Storytelling

Storyboards are often good tools for capturing essential elements in an experience, as might be more full-blown storytelling. Stories offer stimulating alternatives to other ways of viewing the problem or its context; they also make for a better understanding of the touch-points where a design and its user meet. And they have a prototypical, archetypal power. A particular type of storytelling is establishing several personas, those vivid snapshots of end users that we have tried to envisage when discussing how to approach the user.

Going into a parallel world

Synectics relies also on tools such as role-playing and analogy. Role-playing, theater, and body language belong to media offering additional possibilities for sneaking up on problems in new ways, possibly provoking original solutions. Biomimicry implies borrowing from nature, from its evolutionary process geared at optimization and economy; scene-mimicry would be like benchmarking: going into a situation from another field but with important similarities. Projecting into the future, thinking about how the designed object or service will play out in X years' time or preparing a handful of different scenarios offer yet other opportunities. Visiting the future is one way of creating psychological distance, but there are more, and they, too, have proven to be potent at times.

Diversity

We have underscored the power of widening the scope, returning at length to it in the next chapter; it is something that implies adding inputs from a wider variety of sources. The general recommendation of diversity may be interpreted in manifold ways. In the area of cultures and languages, we have seen the role of language on thought. We have explored age groups and individual ways of thinking (the Myers-Briggs classification may be debated, not the fact that there are several different ways of applying logic – several types of logic, as it were: concrete versus formal thinkers to mention one distinction). And thought styles, as well as various levels of expertise – expert chefs versus children in the kitchen or for designing kitchen tools – and what about designing for animals? Metaphors embody language, and their connotations may become very physical, or physiological, resulting in important caveats and opportunities. Looking for inspiration in new scientific findings and new technologies, not least materials, contributes to diversity in thinking and input.

Creativity enhanced

Creativity methods are sometimes divided into systematic and inspirational, brainstorming an example of the latter. Morphological analysis, a systematic one, attribute listing another one, as is the cross impact-matrix, which means going through all possible combinations of the elements, functions, or components of a system. Though seemingly mechanical, the number of combinations may be so large that intuition is stumped

and an overview is too shallow for a fine-grained matrix. Let us take an old celluloid film-based camera as an example. The components are body, viewfinder, lens, film, and film winding mechanism:

<i>Body</i>	<i>Viewfinder</i>	<i>Lens</i>	<i>Film</i>	<i>Winding</i>
One piece	See-through	Interchangeable	120 roll	Wheel
Bellows	SLR	Fixed	35 mm	Lever
	Twin reflex	Fixed zoom		Motor

This table is not exhaustive (a 120-roll film may give pictures that are $4/5 \times 6$, 6×6 , or 6×9 cm; 35 mm, 24×18 , 24×24 , or 24×36 mm) but serves our purpose of illustrating. The number of combinations is $2 \times 3 \times 3 \times 2 \times 3$ or 108 in total, and morphological analysis means going through them all. Twin reflex plus bellows would be thought decidedly original but, as a matter of fact, twin reflexes with bellows have indeed been produced.

Another method relying upon systemization is to construct an abstraction ladder, where order is established through categorization. Tables would be a category encompassing dining tables, bed tables, etc.; the same for chairs which, on the next level, would name different chairs so an office chair might be distinguished by having wheels or not, be reclining or not, etc., and then, on yet another level, marquee such as Steelcase Criterion, IKEA Markus, etc. If style is important, categories may include, for example, rococo, empire, baroque, etc. As with other types of analysis, the effort inspires new insights and unusual combinations. To move up the ladder and increase abstraction, one may ask

why? or *why else?*, to go down and become more concrete, the questions would be *how?* or *how else?* Several more methods for systematizing and tweaking the system exist, such as attribute listing; the series of questions like: doing the job differently?, doing an adjacent job?, avoid the job completely?, doing it under different circumstances?, complementing it?; their applicability always contingent upon problem and situation.

TRIZ is based upon an exhaustive set of scientific and technical principles, compiled in a 39×39 contradiction matrix (for 39 engineering parameters) and 40 principles for problem solving. There is a whole body of teachings, including an entire language or terminology, such as distinguishing between administrative (having to do with needs versus abilities), technical (trade-offs inducing), and physical (inherent) contradictions. A specific problem is abstracted to the level of a general one, where a general solution can be sought, then resulting in a specific solution. This rich source of knowledge also contains, among other results generated, trajectory laws for how technology evolves.¹ Just examining patents aiming at delivering a particular function closely can be genuinely illuminating and inspiring (though it might seem discouraging at first: all these ingenious solution and... the result?).

Brainstorming has been tried, tested, and developed by, among others, researchers and practitioners associated with the Creative Problem Solving Institute with close links to the New York State University in Buffalo. A basic principle developed there is that what is perceived as a problem is often not the fundamental one; solution-seeking starts with

a ‘mess.’ To arrive at the problem to be solved, questions like ‘in what ways may we...’ should be posed. Reframe the problem!

This is something that we have touched upon previously trying to find out what is the real competition, for money or for time or, perhaps, other activities or allure, rather than the seemingly obvious: another firm in direct competition. Looking for a hole rather than a drill is another example belonging to this category. Industries and companies often operate on formulas that are taken for granted; the classic example is when Toyota figured how to compete with General Motors or Ford with just a tiny production without much of regular economies of scale. Another example is when the Swedish latecomer in the field of hard metals, Sandvik, emerged as the world leader because it changed the established business logic and concentrated on *teaching* customers the benefits of hard metal tools compared to steel. In Europe, Ryanair has up-ended passenger air transport. They are shunning regular airports in favor of also-rans that want to establish themselves and their larger regional constituency; they are not even no-frills – they have the passenger do much of the job; 25 minutes for the on-the-ground turnover; no connecting flights, pure point-to-point. An important conclusion is that the very problem that constitutes the ‘mess’ may well generate a whole ensemble of sub-problems with a potential for addressing the issue initially perceived.

A thorough study² of industrial designers in work sessions, and also, as a comparison, of improvising musicians, has gained deeper knowledge on how ‘brainstorming’ or, perhaps, rather ‘idea development’ can take

place. Designers can both offer criticism and hold on to pet ideas as well as they can playfully decide to leave such a pet idea on the side for a while. What makes for constructive criticism is that a design team feels at ease since there is trust built up over time and several projects; there is no prestige or status at stake. When improvising musicians are inspired to achieve creative harmony, relying upon ambiguity and paradox, they ‘rest in the groove’ and experience a happy feeling of everybody contributing; the same can be achieved in designers’ sessions and is an experience of *flow*. In improvised music, ‘errors,’ mistaken departures from the script, are taken as inspirational challenges offering the other musicians triggers for further creative contributions, generating a harmonious whole of profound novelty. Design session participants must, of course, listen carefully to each other – as musicians certainly do! – but since diversity is important, the presence of different thought styles should be respected and built upon, with no attempts made to harmonize or merge these styles.

The huge North American motel chain Motel 6 had no reputation for good design, or even for any design at all. Executives realized that there might be value in a profound redesign effort, and applied something akin to a bench marking or bench-learning project. One of the design firms recruited had been responsible for airplane cabins for Virgin Atlantic and cruise ship cabins for a Norwegian company. The results are striking: carpets have been ripped up, wood-effect flooring gives a spacious look, ambient lights substitute ordinary lamps. Constraints, not least about cost, resulted in smart

design solutions: one unit contains flat-screen TV, closet space, and lighting system. Luggage is stored under the new platform beds.



Verbal language, indeed, tends to make for the overshadowing of thoughts — particularly where verbal descriptions are lacking. Ways around this include mute ‘brainstorming’ relying upon, for example, sketching or body language. It is also important to give freedom for silent or tacit knowledge. One way of doing so is to use the Dialog method where participants are invited to comment on and discuss challenging, rich works from art and literature seemingly with only tenuous relations to the core of the task;³ the discussion should be contentious, meeting the challenges of the text.⁴ Esther Henwood⁵ has used literature as the point of departure for design, asking famous designers to take one book each for which, then, to design an object, and her book cover features, among several objects, Sapper’s whistling kettle. Most products

in the book are pieces of furniture, most books novels, but one that is definitely not a novel is Prigogine and Stenger's "La nouvelle alliance" about dissipative processes.

The more critique is part of the procedure, the more productive it becomes: skills in critiquing and in accepting critique grow. The task is to arrive at a better understanding – jointly. As mentioned, trust is an essential basis for critique to be effective, that is, respect and objective critique, not personal or competitive. It must be clearly understood that the person whose idea is the object for the discussion has provided an important contribution well worth discussing. Timing is essential; never create the feeling of an ambush, and beware of making recommendations – rather, inspire the one whose idea is discussed to come up with what s/he thinks should be alternatives or improvements. Think 'constructive contrarian' and have several people, including the idea champion, take turns playing that role. De Bono's *Six Thinking Hats* must be mentioned in this context.⁶ They legitimize criticism by stating that the hat, now activated or carried, is the black one, offering critique. Likewise, for the other hats, the white aims to go into facts and information, the yellow sees the sunny, positive side, the green encourages ideation, the red delves into feeling and emotion, and the blue takes in the larger picture.

Yet another variation is reverse brainstorming. Here, instead of brainstorming *for* something, brainstorm for its direct opposite. So instead of looking for ways to turn a project into a success, the task is 'how can we make this project a total failure?' Try it, and hostility and

negative feelings are turned into a somewhat weird but productive kind of creativity — it is easier and more fun to think about failures... Then, the list of all factors that would ensure failure can be prioritized and each of them subject to scrutiny to see how they can be avoided. Or try, for a while, to generate profoundly bad ideas — vaunt some such, and enjoy them.

Before the verbal stage, before logic and linguistics, creative thinking is channeled into emotions, intuitions, images, and bodily feelings. Verbal language is mute for music, whereas the piano key is potent. We may try seeing and experiencing with our bodies, seeing with touch. Smell is another trigger, and is often very powerful.

Some of the tools for fostering a process of design inspiration work to support memory, helping people to register and reflect on daily activities: a diary, or some electronic variation of it; perhaps a frustration diary logging everyday irritations, small and large; alternatively, the design team may establish a purported log for ‘a day in the life of the person we design for.’ There should also be inspiration from and assistance for dreaming, and for feeling. In these tasks, images may serve as triggers: people are asked to use collections of images as tools for expression. Results may be products that seduce; trivial mundane objects that normally are kept out of sight may instead be placed in the spotlight because of the delight they inspire.

Sometimes it is a question of seeing, like great artists do: seeing that which is blindingly obvious. Sometimes it is about discovering what is happening at the margins; sometimes it helps being naïve, being a

child, seeing with a beginner's mind. The warm-up for a brainstorming session is important for setting the stage for taking the fresh look, and for being playful. Philips has developed 'Spark,' a fun game to further creativity in brainstorming and workshops, with good results.⁷

Art is not just what it is, but also what it is not, so important questions pertain to what should be left out, discarded, withheld, secreted away, hidden — there are differences between the meanings of these four concepts. The creative stimulus from sketching might be seen as giving opportunities for confrontations between ways of seeing and understanding, with representations provocative in themselves (sketch or mockup versus idea and the mind's eye), in types of representations; for example, mathematical versus verbal, and in dimensions of a task. One such a dimension might be discovery, through connections and associations, sliding from one idea to another, and a dialog between discovery and understanding.

Constraints are part of reality but fiddling with them is, as Synectics demonstrates, a way to ideation, to tweaking the problem. Synectics sometimes lifts constraints, but imposing new constraints or changing them in interesting ways may gain likewise interesting results. What about designing a car as a street lamp; what about drastically reducing the number of parts in the object (a car features some 30,000–50,000); what about applying lean thinking; what about thinking of photos of the invisible, from X-rays or microscopes, or simply printing it out in different or false colors, or starkly accentuated contrasts? With resources scarce, designs need to be better; bloated software demonstrates the

opposite. Martin⁸ underlines that poor design briefs are not necessarily those with many constraints but rather the ones that are posited so as to eliminate any opportunities for surprise and discovery.

In *Design-Inspired Innovation*, we praised Google for its minimalist design — just those 28 words — arousing pure delight and underlining the importance of simplicity. Thus, it is interesting to see Google losing part of the information market for failing to apply the same lesson there, handing the majority of a particular niche to rival Yahoo! When it comes to financial information and news, Yahoo! carries 17.5 times as much traffic as Google. So while Yahoo! is found at the top of the traffic in this category, Google is relegated to a dismal 17th place. Simplicity versus more data and charts, and the outcome is... that over the year July 2008–July 2009, Yahoo! enjoyed a 12 percent increase in traffic, Google just 3 percent.

A strong component in de Bono's lateral thinking toolbox is forced association: generate a random word from an encyclopedia, and try to force a relationship between it and the problem or design object. Or be inspired by all those words that are threatened by extinction, subject to a dedicated Web-based savings effort.⁹ The method can be enlarged: collect toys, materials, components, images, videos that spur fantasy and evoke dreams, anything provoking flights into the unknown.

A way to seeing something from another perspective is to simply dissect, or tear down, an existing product. A number of questions arise related to design choices made, material, techniques, features included and excluded. As ever so often, the devil may be in the details.

Storytelling

Alberto Manguel¹⁰ once said

“... stories can assist us... they can heal us, illuminate us, and show us the way. Above all, they can remind us of our condition, break through the superficial appearance of things, and make us aware of the underlying currents and depths. [...] In ancient Anglo-Saxon, the word for poet was *maker* [...]”

It is often suggested that a company, a brand, should tell a story – a design should do likewise, since it is instrumental in creating the brand image. Often, the story is abbreviated into a brief catchy slogan: Just do it; Connecting people; Taking you forward; Sheer driving pleasure. Ideally, this phrase, together with the brand and its history, evokes a story that is attractive and that corresponds to the values and qualities that create the mutual understanding and expectations between producer-designer and customer-user. So one point of departure might be the story to be told, to be conveyed through the design(s).

The next several paragraphs rely heavily upon the magisterial (not undisputed) work of Christopher Booker who, after perusing a vast amount of literature in the form of novels and dramas, but also myths and sacred texts and even movie plots, has concluded that there are, basically, seven basic plots.¹¹ These are, in an all too brief rendering of a 700 pages book:

- overcoming the monster
- rags to riches

- the Quest
- voyage and return
- comedy
- tragedy
- rebirth

The Monster is a superhuman evil force, holding captive a beautiful princess or a rich treasure, and the hero sets out to fight the Monster. The odds are bad and the hero is almost destroyed, when in the last minute there is a dramatic turning point. As with our attributes for beauty or its opposite, a number of Monster attributes apply: terrible, misshapen, bloodthirsty, ravening, treacherous, vicious, vile, hellish, demonic.

The story develops in five stages: anticipation where curiosity is awakened; dream stage when preparations are made orderly; frustration stage when the Monster reveals all its, well, monstrosity; nightmare stage when all seems lost; and finally the thrilling escape and death of the Monster.

Likewise, 'rags to riches' plays out in five acts: initial wretchedness and 'call'; out in the world, early success; central crisis; final ordeal; final completion and success.

The Quest also starts with a 'call,' and the hero is supported by a number of fellow companions as well as helpers. The journey is an obstacle-race where again monsters, temptations, deadly dilemmas, and the underworld beckons. Here, the five steps are: call; journey; arrival and frustration; final ordeals; and winning the goal.

The voyage and return is a journey quite different from the Quest, sometimes social rather than physical. The five acts are: waking up to something deeply unfamiliar and unexpected; initial fascination with new discoveries; difficulty and oppression; downright nightmare; and escape and return.

Comedy is something else; here, Booker suggests the analogy of the jigsaw puzzle. The key is the transition between two states, and one or two of the earlier plots may be drawn upon. There is a small world where confusion is arising, possibly through the appearance of a dark shadow. Finally, the shadow and the confusion are eliminated and all is happiness. A whole network of relationships is involved, initially knotted because something central has gone wrong. A fundamental feature is concealed, the persons involved blind to it – until the happy resolution.

Tragedy is a story of inversion: falling for a forbidden temptation, trying to achieve a worthy goal but in a forbidden way, the hero is at first immensely successful, then things start getting off the tracks, and eventually the hero is destroyed. Again five stages may be suggested: anticipation and desire – dream and fulfillment – foundations start trembling – things go seriously out of control – outright destruction or death wish. A number of personalities might be involved: the good old man, the rival or ‘shadow,’ the innocent young girl, and the temptress.

Rebirth, finally, evolves somewhat in parallel to the Monster story: a heroine or hero falls under the thrall of a dark force – the darkness

seems to have receded – but darkness strikes and seems to have won; this imprisonment or state of living dead seems to have been established – until miraculous redemption. Darkness has a series of well-known attributes such as coldness, hardness, decay, torment, despair, as has redemption: softness, liberation, growth, hope, and love.

While noting that the last two centuries have seen deviations from the seven plots, though they are still somehow very present, Booker concedes that there are other plots as well, like creation myths and mystery stories. Likewise, there are quite a few novels and films that are composed – designed – to weave several, possibly all seven, plots into them. They may also be decomposed into smaller recurring themes like the amazing escape from death, the conquest over the dark shadow, the union of hero and heroine following upon separation. Booker underlines that these figures, as well as the basic plots, exist in all cultures and, thus, reflect something profound in the human condition, more than touching upon Jungian archetypes and thus Campbell's discussion of myths.

Stories reflect a ground-map of human nature and behavior, following a consistent collection of values and rules. Overcoming the Monster is prototypical, paralleling a development from immaturity to maturity, from incompleteness to wholeness and self-realization, something that can be described almost arithmetically, with the core family, light and dark hero and heroine, a trickster.

Some of the elements that Booker suggests having led to the departure from the basic plots in the last two hundred years have to

do with the egotism of the hero or anti-hero; the story-teller's direct involvement in the story; and the inclusion of sex and violent scenes as such – sensational, but dead ends – in the stories.

Metaphors (which we will meet when discussing on how to communicate in a later chapter, but we will see more of it later in this chapter also) share with stories some qualities such that lessons or messages need not be spelled out in detail or very explicitly. They are easy to remember and it is acceptable if they have diffuse meanings. Metaphors may also be used to question or disrupt received wisdom but with less threatening impact; stories as well as metaphors can have many layers and be sophisticated – stories more, since they are less condensed. Stories help us interpret and understand actions and motives, thus we may learn, bond, remember, and share and embed emotions, persuade, inform, and inspire. Stories have power, embody norms, values, role models, culture, embody trust elements and tacit or silent knowledge.

Powerful stories may help reshape understandings and all-to-set views. But as stories are ambiguous, they can be interpreted in several ways – something useful in the beginning of a design project. Different interpretations help to test what framework applies, how the context should be understood. Stories help to raise problems and incompletely understood issues in an oblique way. They also help gain access to tacit knowledge, inaccessible to precise verbal phrasing. Discussing and developing stories help team members develop a common language. They also serve to establish team members on an equal footing.

Parallel worlds

What about analogy? Bookmarks constitute a concept transplanted from the physical world to that of Internet browsing; how might it transfer to a car, a hand-tool, or a wardrobe? Analogy is another way to achieve what stories do, or part of it, and metaphor does it, in a less formally constrained way than analogy.

One designer confesses to being taken aback at first when he heard a client suggest that “designers orchestrate the obvious”.¹² The obvious? Obvious only after the fact! ‘Organizational capital’ is the catchphrase for capturing the fact that traditional investments alone do not suffice to explain differences in outcome for what overtly seems to be the same action – in fact, outcomes may be starkly different, tacit knowledge often one factor in the equation.¹³ Thus, the designer may be called upon to take a systemic view, to orchestrate a system where ‘soft’ aspects may weigh heavily. In *Design-Inspired Innovation*, we borrowed an example from Marco Iansiti¹⁴ who pointed out that during the downhill World Cup season when Franz Klammer of Austria won every single event, Klammer had the best intermediate time for none of the parts of any one race: he mastered the totality, never sub-optimizing.

This would be yet another broadening of the scope to encompass corporate activities, but it applies also to the product, service, or experience design. If an orchestra is out of sync, individual contributions, however brilliant, result in disharmony and disaster; conversely, in a harmonious orchestra individual members inspire and relate positively to each other, generating positive feedback, increasing marginal returns

in economic lingo. So searching for that key component or expression that guarantees success may be a blind alley: perhaps rules and delimitations must be rewritten, like when IKEA decided that customers do the final assembly.

The parallel world may be very nearby: what about designing not for the product per se, but for the shadow it will cast? Inspiration may be visual, looking at nature or the artificial world – or looking for absence. Ponder a skeleton: nature ‘drills’ holes; it may be conceptual, when we take cues from understanding processes; and it may be computational, possibly through simulation. Simulation or not, in *design dance* a designer’s body movements are translated into a design by a computer; the designer’s movements may represent her interaction with a product, and the computer can deduce the product’s form.

What about designing for animals? Think about it: design embodies culture and cultural assumptions, often relying on visual or language instructions for use. Domestic animals, and sometimes wild, may, in a sense, use products but without any access to these designed meanings – certainly a design challenge. To design also for animals may have a value in itself since even if we overlook it, animals share our space. In addition, it may inspire creativity. So, it is an extra challenge to see animals as end users, and to empathize with them – a pedestrian crossing, say, for hedgehogs, badgers, frogs, moose? It may be very difficult to understand enough to design for people from other cultures so what with animals not being able to share our culture at all?

With the advent of cell phones, countries with less developed or non-existing telephone systems suddenly could leapfrog development. No need for costly landlines; antennas and handsets serving perfectly as substitutes for traditional types of telephony systems. Cell phones in developing countries demonstrate a budding nanomarket for telephone calls: the village phone, hosted by some entrepreneur, often a woman, is used by anyone, who pays per call. There is a growing movement – including a corporate powerhouse such as the General Electric company and a design firm such as frog – acting upon the assumption that some novelty, some pioneering design, will emerge out of developing countries because conditions – constraints – are rather different there from what they are in the developed world.¹⁵ Again, it is a change in perspective, in context, in demands, in boundaries. Frog found it challenging and inspiring to approach a market where they were positively ignorant – easier to pose those so-called ‘stupid’ questions.

Lessons from benchmarking could be applied. A service station at the Le Mans 24-hour car race must always remain on the alert, ready to cope with unforeseen emergencies. How does that compare to an intensive care unit?

One way to spur creativity is to change psychological distance, to create distance to what is occurring now, here, and to ‘us,’ thus making the issue more abstract. “Psychological distance” may be established by changing the ways of thinking about a problem, e.g., taking another person’s perspective, rephrasing the question, or taking the long view, posing the problem in a future context (typically, in several studies, a

life now versus 20 years into the future), alternatively, going *back* in time. A glass of wine may be a pleasant enough sensation, moving away perhaps evokes the picture of participating in the wine harvest, the European wine mountain, sorry, lake, bringing up troubling European Union agriculture policies. Or take results from Lile Jia's group at Indiana University.¹⁶ On a concrete task, where students were asked to come up with ideas about a problem related to other students, one group were tasked with students within an organization on another continent, another group with students at a university nearby. Participants in the first group, thinking "distantly," generated more ideas than the "nearby" group.

Interestingly, Jasmine Cox¹⁷ has designed a 'displacement engine' to provoke the establishing of distance in location. The user informs the 'engine' about her current GPS coordinates and it then guides, disguises as it were, the user to a dislocation, still offering a way back to where the dislocated walk began. In Cox's words, the engine breaks resoundingly with our striving for, well, comfort, or, to quote: "a beautifully uncomfortable object" and "a Displacement Engine is not your friend."

Eliminate distance: run a contest open for all, everywhere. Establish an open innovation gateway over the Internet. Court social media.

What about creating the future in a large multiplayer computer game? This is what the Institute for the Future did in 2008 with Superstruct,¹⁸ an on-line forecasting game, lasting for six weeks. Together, thousands of players created new ideas and solutions to help postpone or avoid the 'end of the world' in 2042. As with good forecasting, several

futuristic game solutions resulted in downright practical actions swiftly implemented. Another example is the game 'Building Futures' developed by Philips Design for a Dutch organization assisting companies to collaborate and shape future-oriented solutions. Here, teams design possible futures interactively and competitively, with ideas as stepping-stones.

Equally intriguing, as the future or geographical distance, perceived likelihood is a 'distance' factor too. If participants in a study think of a problem as highly unlikely ever to happen to them in reality, they are better at solving problems associated with it than if it is felt to be around the corner — we may say that they feel more detached if likelihood is low. An obvious prescription seems to be to travel to far away places, but it might actually be sufficient to *think* about such a journey or just the distant place. It enhances the argument that we should communicate with people who are different in as many dimensions as possible, hailing from different language backgrounds, etc. What about strange music from other cultures, exotic types of drama like the various Japanese theater styles foreign to a European, or exotic food and drink?

Design as animals are designed is something else than designing for them: it is about imitating biology, biomimicry. There is a vast amount of material available¹⁹ to illustrate the power and potential of this source for design and, in fact, engineering advances, so, here, only a few examples will be given. The classic example is Velcro, invented or discovered in nature in the early 1940s by a Swiss engineer, George de Mestral. He took the burrs from thistles, found to stick to his dog's

hair, and looked at them under a microscope: they had small hooks. A successful idea was born!

“Gecko tape” imitates the adhesive behind the lizard’s trick to climb vertically, even upside down. An architecture bureau mimicked termite mounds for an office building. These mounds are self-cooling, and heating/cooling energy consumption was more than 90 percent reduced. The Shinkansen bullet train in Japan had a severe drawback in that it caused a thundering sound when leaving a tunnel, so the chief engineer, an avid bird-watcher, decided to have the train nose imitate that of the beak of the kingfisher. Result: much less noise, 20 percent less electricity consumption at a 10 percent higher speed. Figure 6.1 below shows a Mercedes concept car, imitating the boxfish, featuring an extremely low drag factor: fuel consumption is reduced by 20 percent,

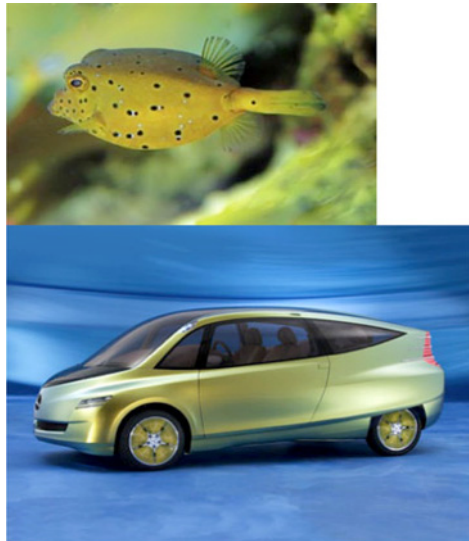


Figure 6.1.

nitrogen oxide by 80. The question asked in both of these transportation cases, the Shinkansen and the car, was whether nature had solved the same or a similar problem, but the question may also be the opposite: what solutions have nature abhorred?

What are the design opportunities evoked by being inspired from nature's fractal structures or, say, meringue? Ticket dispensers at Arlanda airport in Sweden say 'plopp' when delivering a ticket, such as when a soap bubble bristles (no animal here, but nature). And here is a chair mimicking a bubble (Fig. 6.2):



Figure 6.2.

There is the Halcyon concept car purportedly designed to let the driver experience nature, therefore made to resemble an owl. The car body material has a composition similar to that of an owl bone — a rather odd form of biomimicry, no? At MIT, researchers found the human ear and its cochlea mimicking “a super radio with 3,500 parallel channels” so they designed a chip based on that concept, gaining ultra wide-band reception at one percent of the power previously needed.

These (Figs. 6.3–6.4) are cacti-inspired designs in...



Figure 6.3. ... architecture ...



Figure 6.4. ... and chairs ...

Cacti are “designed” for surviving in very dry environments. For a needy design, try the question where nature poses extreme demands, and what solutions have evolved.²⁰ Lotus leaves are resistant to wetting and when the water runs off, contaminants follow. The secret is small

bumps on the leaf surfaces, promising to turn boat and car waxing or windshield wiping obsolete. The publicly most well-known application of biomimicry, together with Velcro, is probably the sharkskin swimming-suits, guaranteeing new sets of records.[†] Refractive paints are based upon extremely thin films, imitating the color effects from a butterfly's wings. No pigments are involved, and the color is dependent upon the exact film thickness. For an ice ax, designer Franco Lodato found nature's best hammer in the woodpecker (25 hits per second), which was translated into a shaft centered under the ax and the spine slightly curved (the bird rests itself on its tail), the pick pitched forward as the beak of the bird. The resulting swing is more balanced, and the blow more efficient.

When working on a theater play, the actors, guided by the director, experiment, try, and try again, rehearse, iterate, and then, in contrast to movie-making, confront a live public whose reactions are monitored. The similarities with design are obvious: subtle signals, interaction and interplay between roles and actors, stage and backstage, interpretation, light effects, music, and scenery, allusions (or not) to current events, to literature...

Why not create a foreign world? Designers from several design firms have learnt a lot from having to design for the Space Station: a cramped space within, a vast one outside, weightlessness, the necessity to keep track of minute tools, components, and details... What, then, of designing for a colony on Mars, in Asimov's Trantor or Robot world, in Farmer's Riverworld? What of designing cars as if they were cell phones or cell phones as if they were farming machines? Airplanes as if they were

[†]Beside the point, but the rules were decided to change from 2010.

pharmaceutical products? What if the product or service was a fruit, a sport, a specific author, an animal? Or a different trajectory than the one history took — IBM being the company saying yes to Chester Carlson’s suggestion about xerography; Xerox using the PARC breakthroughs that became so plentiful and successful but chiefly outside Xerox, such as, among others, the graphical user interface of the Apple Mac and Ethernet? What if Bell Labs had not had such a foresightful manager in Mervin Kelly who brought together the three complementary scientists Brattain, Bardeen, and Shockley to beget the transistor, “ahead of its time”? What if said Shockley had not been so impossible to work with, something that caused eight gifted young engineers in his lab to leave to found Fairchild Semiconductor, a spin-off pattern they and their colleagues then repeated with Silicon Valley as one result? Such speculation may seem moot but could, with appropriate alternative trajectories chosen, generate discussions as to mechanisms associated with current design tasks and the context dependency of the resulting design.

Diversity

“Oedipus Rex” is an opera composed by the Russian émigré Igor Stravinsky who yearned to have a classic theme, and so opted for a two and a half millennia old Greek drama of Sophocles, asking the homosexual French poet Jean Cocteau to write the libretto and then, to underline the work’s classic nature and not distract from the music, have it translated into Latin by a cleric. The American Julie Taymor (with four years in Indonesia and half a year into Japanese theater) has

directed a prize-winning version with the English tenor Philip Langridge in the title role, the black American soprano Jessy Norman as Jocasta (she was intrigued to be directed by a girl, someone who was doing her first opera), the Welsh bass-baritone Bryn Terfel as Creon, and the Japanese Kayoko Shiraishi as the Narrator, speaking in Japanese; scene cast by Kazakhstan-born, Moscow-educated George Tsypin; conductor Sheiji Ozawa (who spent his first nine years in Manchuria), and musicians, dancers are Japanese – what a triumph for diversity generating stunning unity!²¹

There are a number of possibilities for describing individual ways of approaching problems and of seeing the world. Psychologist Howard Gardner²² has proposed that seven different types of intelligence exist (later, he added several more items to the original list). Ludwik Fleck²³ was the first to describe how thought styles define thought collectives and their languages. It has become rather popular to try to describe and to inventory variations between people's competencies, and in some firms there are 'tags' such as pins of different colors to tell what competency or thinking style 'tribe' a person belongs to. Then, there is the disputed Myers-Briggs Jung-based system, and the 'Belbin roles' evolving within a group context. People hail from different cultural backgrounds, and in the *Introduction*, we quoted research demonstrating that "treating chairs as masculine and beds as feminine in the grammar [turns out to] make Russian speakers think of chairs more like men and beds as more like women." Views of gender qualities are transferred to innate qualities of

objects with associations also carried over to a gender neutral language. Likewise for depictions in art.

So: since diversity has proven to beget creativity, there are many ways to induce it. When IDEO spokespeople talk of T-shaped persons, they indicate a preference for those combining special competency with a broader knowledge. These might be people combining several unusual knowledge bases out of, e.g., science, technology, and some of anthropology (e.g., social anthropology), ethnography, economics, and also political science. Most probably there would be artists like a sculptor or a filmmaker present too, and someone who dabbled into the theater earlier in life...

The effects of words are many and surprisingly consequential, something to consider both when words are used in connection with designed products or services and when trying to avoid, perhaps, unconscious mental blocks to creativity. Langer²⁴ reports how psychologists John Bargh *et al.* set subjects to solve anagrams.²⁵ The control group had neutral anagrams, the other anagrams of words associated with old age (e.g., *felorguft* from *forgetful*). After the anagram session, the subjects' short walk to the elevator when leaving was measured. The group primed to old age walked significantly more slowly. Another study: people were asked to sort photos, one group putting them in the categories 'old' and 'young'. This primed again for slow walking. Asking for a regroup of the photos into categories unrelated to age eliminated the priming effect. Priming indirectly for health instead of age with, say, a language proficiency test designed to activate thoughts about a

healthy lifestyle (or the opposite) affects whether the subjects would choose to ride the lift or walk the stairs.

To quote more examples from recent psychology research: power is associated with the direction 'up' – we really look physically up when 'friends in high places' are evoked. Holding a warm or cold cup of coffee influences the feeling about the personality of an individual a test subject meets somewhat later. It works in the other direction too: recalling a bad patch in one's life makes the room temperature feel lower. Touching objects covered with sandpaper makes people doubt that a social situation will be resolved smoothly (inducing self re-enforcement?). Moving pieces from a lower to a higher place makes people feel happier than when doing the opposite. Cleanliness and dirt associate with high and low morality, respectively; a literal washing of hands has the corresponding mental effect. Hardness equates with difficulty, so ideation should preferably be performed from soft chairs!

Therefore, metaphors may help designers get to grips with the new and vague or diffuse problem situations; they may function as stepping stones from the unknown into mentally safer ground. Similarly, Synectics relies upon analogy. Both metaphor and analogy are instrumental in elucidating the unknown and induce creative associations. Thus, if metaphors, expressed in language or physically, are powerful, why not try provoking creativity with mixed or contradictory metaphors or false analogies?

Wine tasting and efforts to describe wine tastes illustrate the limitations of language as well as the many ways out of this conundrum that

have been tried. One element is the fact that there is no agreed-upon mechanism that explains the human olfactory system, which is key to wine experience. Here, metaphors, nay, illustrations truly abound. Fresh grass or black currents: these are pronouncements to convince, not to be monitored with a wine taste meter. Statistical analysis has mapped what words associate with high and low wine prices, but what direction causality? Revealingly, descriptions of expensive wines contain the word 'vintage' six times more frequently than those of cheap wines, which, instead, often are associated with the word 'harvest' on the label; 'steak' versus 'chicken' are meals suggested for the two categories. There is also the proposition that wine tastes find analogies in the world of music, an alternative to words but, in reality, not strikingly successful either.

The male and female bodies, and their reactions under certain circumstances, are different, which has had troubling consequences in the medical field. Ellen J Langer quotes more differences between women and men: women are less likely to die in the week before their birthday but are more likely to die in the week after.²⁶ But men are more likely to die the week before, with no deviation from the normal the week after. The importance on design is, in the words of David Jenkins (quoted by Langer), that men and women 'package reality differently.' Other facts with repercussions for design are qualities related to bones and muscles that are different between the sexes, not just size or proportions. More than men, and taken as a group, women look for benefits rather than features, for the whole experience of a product's function rather than just the product in itself. 'Taken as

a group...’ – but do not forget that there are vast differences between tastes as well as age groups and cultures.

A completely different sort of diversity is the one offered by trying to rely upon different materials. Artists see it as a challenge to make bronze look like wood, wood to be taken for steel, and so on. Coca-Cola in their new drink dispenser, described in Chapter 1, adopted techniques for micro-doses both from inkjet printing and medicine. Unconventional materials are associated with other costs and benefits than conventional ones, possibly allowing for new features and qualities, very possibly with additional costs and complications, such as new manufacturing or service demands. Design firms and design-conscious corporations often have some kind of ‘materials library’ or components showroom where enticing, inspiring, and tickling odd materials, tools, components, and tricks may be experienced. There are also companies set at furnishing such elements, such as Material Connexion²⁷ and Inventables²⁸ (these are just examples). Here two examples out of the repertory of the latter are:

- Temperature-dependent bar code, made from thermochromic ink, makes heat or cold to cause bars to appear and change so a scanner can detect the ‘temperature history.’ If, say, bar coded milk has been handled improperly, this would be discovered at the checkout counter. Currently, such bar codes are used for beverages and to guarantee safety for perishable products; it was first developed for a winery.

- Squishy metal parts look just like metal though they consist of silicone. The first application was a metal effect at the center of the steering wheel of a car: a visually metallic emblem but safe if the airbag has to be activated. Metal looks for running shoes have been suggested, as have (false) metal-ware for restaurants servicing children. Keypads for cell phones and goggles are other such applications.
- Britain's Design Council has provided some more examples: exotic two-dimensional arrays of particles held together just by light; zeolites employed as catalysts for cleaning car exhausts that promise to provide medicine with blood clot and skin infection prevention. And what about tailor-made skin and bones, for burn victims or disfigured patients? Or human cells suspended in a nutrient-rich liquid before being fed into an ink jet printer seeding three-dimensional structures being built up, resulting in tissue scaffolds?

This chapter dealt in creativity, a concept so popular that more than 150 definitions have been suggested. Partly, this is because it applies in so many fields, from poetry and sculpture to science and technology. In technology, we often contrast incremental improvement and *kaizen* with radical departures. But might there not be several flavors of creativity? May such contrasting simplifications lead us astray; may they risk misleading us?

Creativity researcher David Henry Feldman urges us to remember what he refers to as Middle C, in an allusion to the musical

note of the same name. In other words, we tend to talk about Great Creativity, big ideas and radical breakthroughs, or (if we refer to them at all) we talk about the opposite – small creative incremental jumps – as more of an aside. This is despite the fact that, when taken together, many small leaps can make a real difference.

The point of that Middle C is to remind us that we are dealing with a continuum – a continuous, ongoing scale – where what is radical to a greater or lesser degree is in the eye of the beholder, determined by the observer's outlook or vantage point. If a researcher or practitioner focuses on either of the end-points of the scale, there is the risk of being led astray. In reality, how often does an idea actually reach the absolute extreme – high or low?

To refer to innovation instead – radical as opposed to incremental – is, of course, no different at all if we stick to creativity applied to technology or business in a broad sense. Quite reasonably, business idea or innovation competitions encourage what seems like big leaps, while work relating to improvements and sometimes suggestions for improvements – again, *kaizen* – is the preserve of smaller-scale efforts in terms of radicality: middle *i* innovation.

After all, no-one is on the look-out for small advances, no-one competes to achieve modest innovation, and no-one receives recognition for a level of inventiveness that, despite not being low, is still only moderate: mesovation (micro, macro, *meso*). Why so? Do we not, then, run the risk that the best becomes the enemy of the good? Why not also reward mid-level creativity?

The same goes for those of us who are creativity and innovation researchers, and for those who study our/their works. By the very nature of things, it is the radical, attention-grabbing breakthroughs that end up in the spotlight. But what do we thus miss out? What do we lose in terms of a more general understanding that could be applicable at both high and low levels, both at the highly innovative and incremental ends?

As we have seen early on in this book, different languages “see” the world differently, affecting how we see the world also. The Swedish language actually has a word for that which is just right, in the middle — *lagom* — a word lacking a satisfactory translation into many other languages. It would hardly be appropriate to call for an ombudsman or a champion for all that is *lagom*, to inventory the degree of lagom-ness, but wherever an adequate solution is lacking, a niche arises for unique competitiveness. Within the market for goods and services, Middle C and mesovation could be a factor for gaining a competitive edge, while not something that creates its own specific industry. When it comes to research and education, however, the situation is quite different. If a field has not been studied, there are plenty of opportunities for making discoveries that bring their own reward — cited articles, titles, positions, and grants that belong to the realm of scientific endeavor. Think, then, about design — which introduces another dimension to that continuous spectrum of creativity.

Partly the idea behind this line of reasoning came from studying those two books by Umberto Eco: *On Beauty* and *On Ugliness*. However, there are *no works* about *the middle ground* – all that which is indifferent, lukewarm, moderately interesting, or even uninteresting and tiring. But note that Middle C and the mid-level of innovation – mesovation – need not be uninteresting or indifferent; they simply belong somewhere closer to the middle ground when viewed on a continuous scale. Instead of lukewarm or indifferent, try, if not *lagom* then *appropriate*. So do not forget to celebrate moderation sometimes – that which is *appropriate!*

Endnotes

¹A nice overview is found here: <http://www.slideshare.net/craffticonsulting/lean-inventive-systems-thinking-work-book>.

²Olsson, Bengt, 2008. Beskrivningsspråk i och för kreativ praxis: Idéutveckling under gruppession. Doctoral dissertation (in Swedish), Mälardalen University, Eskilstuna.

³A Dialog seminar manual may be downloaded from <http://www.dialoger.se/sida.asp?rubrik=44>.

⁴In Olsson's thesis work above, one of the texts relied upon in the series of Dialog seminars was an excerpt from Hofstadter's book on translating/interpreting. Hofstadter, Douglas, 1997. *Le ton beau de Marot*. Basic Books, NY, NY.

⁵Henwood, Esther, 2009. *Design & Littérature*. Norma éditions, Paris.

⁶de Bono, Edward, 1985. *Six Thinking Hats*. Little, Brown and Company, NY, NY.

⁷http://www.design.philips.com/philips/sites/philipsdesign/about/design/designnews/newvaluebydesign/july2009/playful_innovation.page.

⁸Martin, Roger, 2009. *Design Thinking: The Next Competitive Advantage*. Harvard Business School Press, Boston, MA.

⁹<http://www.savethewords.org/>.

¹⁰Manguel, Alberto, 2008. *The City of Words*. Continuum, London.

¹¹Booker, Christopher, 2004. *The Seven Basic Plots*. Continuum, London.

¹²<http://www.fastcompany.com/blog/steve-mccallion/beyond-widget/creating-consumer-experience-innovation-building-value-metaphors>.

¹³Brynjolfsson, Erik & Saunders, Adam, 2009. *Wired For Innovation*. The MIT Press, Cambridge, MA.

¹⁴Iansiti, Marco, 1998. *Technology Integration*. Harvard Business School Press, Boston, MA.

¹⁵http://www.businessweek.com/magazine/content/09_12/b4124038287365.htm.

¹⁶<http://www.scientificamerican.com/article.cfm?id=an-easy-way-to-increase-c>.

¹⁷<http://www.jasmincox.co.uk>.

¹⁸<http://www.superstructgame.org/>.

¹⁹The Biomimicry Institute is a good source: <http://www.biomimicryinstitute.org/>, <http://www.asknature.org/>, and Janine Benyus herself http://www.ted.com/talks/janine_benyus_biomimicry_in_action.html; <http://hbr.harvardbusiness.org/web/2009/hbr-list/business-of-biomimicry>.

²⁰More at, e.g., <http://www.technologyreview.com/biomedicine/23933/>.

²¹It is available on DVD.

²²Gardner, Howard, 1983. *Frames of Mind: The Theory of Multiple Intelligences*. Basic Books, NY, NY.

²³Fleck, Ludwik, 1979. *Genesis and Development of a Scientific Fact*. Chicago University Press, Chicago, IL (translation from original German, 1935: *Entstehung und Entwicklung einer wissenschaftlichen Tatsache*).

²⁴Langer, Ellen J, 2009. *Counterclockwise*. Ballantine Books, NY, NY.

²⁵Bargh has made a whole series of experiments in the same vein.

²⁶Langer, Ellen J: Op cit.

²⁷<http://www.materialconnexion.com/>.

²⁸<https://www.inventables.com/>.