

Patterns for Creative Thinking

CHRISTIAN KOHLS

Creative thinking can be learned in the same way as analytical thinking. Many creative thinking tools are highly structured and the same methodical patterns occur again and again. This paper is a start to collect and connect the basic patterns of creative thinking. It will not present any new methods but will try to generalize the commonalities of similar methods and approaches. There are many descriptions of creativity methods and tools available. What motivates the description as patterns is the generalization of similar methods, the reasoning for the actual form in terms of forces, and the contextualization and connection of the methods/tools. Very often a specific method implies other methods to follow up or it can be combined with other methods. A pattern language captures such relations.

Categories and Subject Descriptors: **D.2.10 [Software Engineering]: Design – Methodologies**

General Terms: Design, Human Factors

Additional Key Words and Phrases: Design Patterns, Creativity, Methodology, Innovation

ACM Reference Format:

Kohls, C. 2012. Patterns for Creative Thinking. Proceedings of the 2012 Conference on Pattern Languages of Programs.

1. INTRODUCTION

Creativity means the generation of ideas or products that are novel, implemented, valued and socially accepted (Csikszentmihalyi, 1996). There are many collections of creativity methods, techniques and tools: *Lateral Thinking* (De Bono, 1990), *Thinkertoys* (Michalko, 2006), *How to get Ideas* (Foster, 2007), or *101 Design Methods* (Kumar, 2012), to name just a few. While these are all helpful collections many of the methods overlap. A pattern language can help to organize the various methods in a more coherent way. Moreover, patterns do not only describe the steps of a method but also capture the appropriate context of its application, the reasons for the general structure in terms of forces, and the consequences of choosing one way of doing things. Instead of just describing a method, patterns also explain why a method should be selected and why it works. As such, patterns can integrate research on how the creative mind works and link these principles to specific techniques.

There are already some pattern languages about creative learning (Iba, Ichikawa, Sakamoto & Yamazaki, 2011) and creative presentations (Iba, Matsumoto, Harasawa, 2012). Moreover, the 6 Thinking Hats method (De Bono, 1995), referred to in some of the patterns of this paper, has already been described as a design pattern (Georgiakakis & Retalis, 2011).

1.1 Goal of the language

The goal of the pattern language for creative thinking is to connect and interweave the patterns into an accessible language. Instead of laying out the full language at once, the approach will be to evolve it over the next two years. This means that in this process of evolution the patterns will change substantially. Since patterns support each other, we will find new links as the body of available patterns grows. Context and solution descriptions will become briefer once we can refer to other patterns. There will be overlapping patterns that require restructuring of the whole language.

1.2 Creative thinking and patterns

Creative thinking and the development of new ideas and solutions is complimentary to rely on proven solutions as they are generally described in design patterns. It is my belief that design patterns in general foster creative thinking.

I see at least the following connections:

- Patterns are about not re-inventing the wheel. It is hardly creative to come up with something that has been around for years. Knowing the patterns of your domain avoids re-inventing and you can invest your time in developing ideas that are really original.
- Patterns channel creativity. A pattern can be implemented a million times over without ever doing it the same way twice (Alexander, 1979). Knowing a pattern provides all the creativity to unfold it in many ways. Yet by showing the boundaries, obstacles and consequences a pattern it provides clear but flexible directions.
- Patterns can be combined. By the combination of patterns new forms emerge.
- Patterns divide and conquer problems. If you have patterns you can rely on, you can be much more creative to design new parts. You can focus on changing a part or completely substitute it.

So, patterns are already powerful for creative thinkers. But creative thinking can be more effective if our brains are stimulated in the right way. That is what the pattern language will be about. We will start with three important patterns.

1.3 Patterns to change the direction of thought

IDEA TRIGGER is about getting new ideas by pushing your thoughts into new directions. New thoughts are stimulated by MULTIPLE PERSPECTIVES on a topic, by having different views on an existing solution, a proposal or an idea. Each view brings new insights. Another way to push your thoughts into new and unexpected directions is to use a RANDOM IMPULSE.

The patterns follow a simple description structure:

- Name: A vocabulary that can be used in common language to refer to the pattern.
- Sketch: A drawing to represent the pattern.
- Context: A brief description of the situation in which the pattern can be used.
- Problem: The core problem is stated briefly and should be readable on its own.
- Forces: The problem details are discussed in terms of forces.
- Solution: The core solution is stated briefly and provides an answer to the problem.
- Solution details: The detail section provides implementation suggestions and highlights benefits and obstacles of the pattern.
- Method Examples: As each pattern generalizes over similar methods, some popular methods are briefly described.
- Tool Example: Examples of app or widgets to support the pattern.
- Application examples: This section provides examples how the general approach of the pattern can be used to generate ideas. There will be a business, education and personal example.

Each of the patterns should help to generate new ideas, improve existing ideas, or get a better understanding of ideas. "Idea" is a very generic term. What it means to you depends on the field you are working on. An idea can be a solution to a problem, a product, method or process, concept, product name, or marketing campaign.

As the language grows it is my hope to highlight all the links between the patterns. The appendix lists already most of the patterns that I have discovered and I use these pattern names throughout the pattern descriptions to refer to them.

2. IDEA TRIGGERS



Fig. 1. Sketch of idea triggers

2.1 Context

You have explored a problem or an existing idea that should be improved. As you have done so, your mind has been focused and you have a clear picture of the situation. Now your thoughts are occupied with the existing approach.

2.2 Problem

The more you know about a domain, a solution or a concept, the harder it gets to develop new ways of doing things. Old clichés are taken for granted and finding a new path is biased by your current thought patterns. You need a push into a new direction.

2.3 Forces

If you follow a path, it is more likely to take the next step into the same direction than wandering off the path (De Bono, 1990). Without an external push you will follow the old direction.

But where does such a push come from? It is hard to push yourself into a new direction because you are captured by your old thinking. Old thought patterns need to be disrupted. Analytical thinking means that you only derive thoughts within your existing framework. One selects the most obvious and promising solution instead of generating many original alternatives (De Bono, 1990). There is a need to leave the existing path of thought and motion. Even artists are stuck by clichés and conventions as long as they are not forced to take a new direction (Lehrer, 2012).

You will not solve a problem or come up with innovative ideas by only looking harder and harder into the same direction. Looking harder into the same direction might even strengthen your old and biased thought patterns (Michalko, 2001). You need an external source to disrupt your thought patterns. You need a kick to start thinking differently.

2.4 Solution

Therefore, compile questions, challenges, prompts, templates and tables as idea triggers that can be used randomly, as a checklist or on deliberate choice. Use these materials as triggers that bring in a new direction of thought. These triggers help to remember good ways of changing the direction of thought.

2.5 Solution Details

By asking the right questions you are more than half way to your solution. Good questions help to better understand the situation, the problem, its forces, the opportunities and available resources. Questions can lead you to different thought directions, see new things, and provide views from MULTIPLE PERSPECTIVES. A good question or way of viewing gives you the right kick to start thinking.

A typical question template to gather information about a situation is 5W1H: Who? What? Where? When? Why? How? If you ask all these questions you get already much more information as compared to an

unstructured brainstorming. Most important, you don't forget one question to ask. To remember all the different triggers when you are actually working on a solution is hard because you are fully engaged with the direction of thought you are currently following. Having a checklist, templates or a deck of card is quite important to deliberately trigger a new direction. They also help to not forget the triggers or use always the same questions. Triggers can be used one by one (going through a checklist) or you can pickup triggers randomly.

An idea trigger always puts your thoughts in motion. It suggests a new direction of thinking for your current problem. While many of the triggers state obvious questions, these questions are often not in our head when we concentrate deeply on a challenge. By working with a checklist or randomly picking up an idea trigger we are reminded of these important questions. Because they are often very simple they immediately generate new ideas or show a new direction of thought. You can also use RANDOM IMPULSES to trigger ideas.

Since ideas start to popup immediately, a common mistake is to stop too early to search for more. An idea trigger should be used to generate more than one idea. One could even set an IDEA QUOTA to define the minimum of ideas that you want to generate in a PERFECT BRAINSTORM. The judgment about the ideas should be postponed to not stop the flow of new thoughts (SUSPEND JUDGEMENT).



Fig. 2. Examples: From left to right: Random spinner with Osborn tools, idea cards widget for design observations, Whack Pack creativity app, templates to collect ideas, ideaStimulator app.

Idea triggers often benefit from examples and helper questions. For example, one idea trigger is to substitute a part of an existing solution. To trigger thoughts about substituting components, you can ask:

- What parts can be replaced?
- What rules can be change?
- Are there other people, places, time frames or ingredients?
- Can you use other materials or surfaces?

An example can support the understanding or an idea trigger. To illustrate how substitution leads to new ideas one could provide the following example: Instead to dial a number, one can enter the name of the person one wants to call. Instead of typing in the name one could speak the name into the phone.

2.6 Method Examples

There are several creativity methods that provide stimulating questions or directions of thought. Triggers to improve an existing idea, concept, process or product are provided by the SCAMPER method and Osborn's checklist (aka Osborn tools). SCAMPER triggers your thoughts about modifying a solution by trying to apply the following modifications to it:

- S = Substitute: Can you substitute parts of the solution?
- C = Combine: Can you combine the solution with other ones?
- A = Adapt: Can you adapt an existing solution to solve your problem?
- M = Magnify: What can be enlarged?
- P = Put to Other Uses: In which other contexts could the solution be used differently?
- E = Eliminate (or Minify): What could be reduced or simplified?
- R = Rearrange (or Reverse): Could you rearrange or reverse the parts of your solution?

Another compilation of thought triggers is found in Osborn's checklist:

- Put your idea into another context
- Adapt your idea
- Modify your idea
- Magnify your idea
- Minify parts of your idea
- Substitute parts of your idea
- Can you approach your idea differently?
- Can you rearrange the parts of your idea?
- Can you reverse the structure of your idea?
- Can you combine your idea with other concepts?

SCAMPER and Osborn's checklist are very similar and SCAMPER is more or less a derivation of Osborn's checklist (Brunner, 2008). Because these specific sets of triggers are frequently used they are solution patterns of their own.

Moreover, behind each idea trigger there is a whole concept that can be captured as a pattern:

PROVOCATION: Challenge assumptions, conventions and rules.

IDEA COMBINATION: Create something new by combining existing concepts.

MODIFICATION/VARIATION: Create something new by modifying existing objects or parts of them. Could you magnify, minimize, simplify or reshape its form?

SUBSTITUTION: Could you replace parts of an existing object to create something new?

PUT INTO A DIFFERENT CONTEXT: What would happen if you put something into a different context? How could it be useful there? What needs to be modified?

REARRANGE: Can you create something new by rearranging or reversing the parts of an object?

Other idea triggers include:

- Negation of assumption: Use an established concept or rule and pretend that it is no longer valid.
- Negation of goals: Think about everything you can do to not reach your goal.
- What if ...?: Think up different scenarios without taking care for any restrictions or constraints.
- Random Impulse: Use a random word or image to trigger new ideas.
- Exaggeration: Exaggerate a form, effect, approach, or statement.
- Provoke: How can you shock a potential audience?
- Effects of time: Which effects do time or the historical context have to your product?
- Metaphors: Are there metaphors or analogies to describe your solution or idea?
- Parody: Could you think of a parody to highlight clichés about your product or target group?
- Playing around: Are there playful uses, descriptions or re-framings for your idea?

There are many more of these questions and each triggers a direction of thought. You should think about questions that suit to your domain and build your own stack of idea triggers. MULTIPLE PERSPECTIVES also helps as each perspective is a thought trigger. The standardized description fields of design patterns (context, problem, forces, solution, consequences, known uses) also act as triggers. This shows that idea triggers can be used to find new ideas as well as finding existing knowledge.

2.7 Application examples

Business example: You can prepare a PowerPoint presentation that contains different thought triggers on each slide. Each slide would contain a question for the meeting participants.

Education example: Split up a group of learners into small teams and let them use different thought triggers.

Personal example: Create a deck of idea cards by writing stimuli or drawing sketches on index cards. If you are looking for new ideas, randomly draw an index card.

3. MULTIPLE PERSPECTIVES

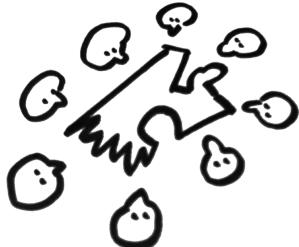


Fig. 3. Sketch of Multiple Perspectives.

3.1 Context

You see things clearly: a problem that seems very hard to solve or even a potential solution to come. It is natural to evaluate a situation or judge a new idea using an existing value system. Value systems lead to specific expectations and assumptions that implicate whether we accept an approach or not. We put our focus on things we value. However, there are always multiple and alternative ways of looking at things.

3.2 Problem

By looking at a thing only from one perspective, you will miss important facts, potential paths and undesired consequences. A single perspective will never reveal everything. You will miss opportunities, alternatives and potential obstacles.

3.3 Forces

If we see an object or a scene most clearly we are convinced that we see it the right way because it is so obvious. But think of a house that is painted red at the front and green at the back. If you look at it from the front you could swear that it is a red house. Anybody who claims to see a green house seems to be weird. Yet both views are correct. A lot of time can be wasted if each party sticks to its position without acknowledging any other possible views (see also De Bono, 2009).

Using your own standpoint as the only reality will soon lead to arguments and conflicts because people from other positions will see different things.

If you want to explore a landscape, then you have to walk around and not stick to a single position. You can use one position to deeply analyze the details but you will only find what is possible to see from that position (De Bono, 1990).

The meaning of a thing or situation always depends on its context. A hammer can be the right or the wrong tool for a given task. By changing the context, we change the meaning of a thing. To understand all the potentials and liabilities, to see new paths and solutions, to give new meanings to a situation, to have original interpretations of a thing, we need to look at it from different angles.

Advances in technology and sciences are often based on noticing alternative possibilities. But possibilities are often not seen if no alternative ways of looking are explored. (De Bono, 1990)

When you are designing it is important to not only take your own desires and wishes into account but to be empathetic about the needs of other stakeholders (Plattner, Meinel & Weinberg, 2009).

Our minds are information processing systems with limited attention areas. Our attention will select and filter information and omit data. There is a bias to stick with positions we first attended (De Bono, 1990). As a passive system, attention will not shift by itself without external stimulus. Rather, any new information is made to fit into the existing perception (Rumelhart & Norman, 1978).

3.4 Solution

Therefore, force yourself to deliberately look at the problem from different perspectives. Focus on one perspective each at a time and find as many details, insights and implications for that view. Make a plan which perspectives should be taken and do not fight potential contradictions between different perspectives. Try to understand and value each individual position.

3.5 Solution Details

By looking at a problem from multiple perspectives you open new alternatives and possibilities (Michalko, 2006). You need to leave your stabilized view to get the full picture.

In the same way as you can walk around a house to see different views, you can look at a problem from different perspectives. To ensure that your perspectives are not biased, you can use IDEA TRIGGERS to take in specific positions and suggest new perspectives.

In a group you should share the same view at the same time. By parallel thinking, all members of the group give their best to elaborate that view rather than defending a single position.

To change the perspective requires some effort because we are often fixed on our current view. Changing the perspective potentially means that we have to adjust our beliefs. The benefit of deliberately changing the perspective is that all views are anticipated. There should be no competition about who has the best or most correct view. Rather, the competition should be who finds the most aspects for each view (De Bono, 1985). By planning to take different perspectives, every view is respected. That does not mean that one's own view is judged negatively. Multiple views can coexist. Once you accept this it becomes easier to move from one position to another.

However, taking many perspectives costs more time. If you are working in a group you can split different perspectives between the members. In this case it is important that all views are equally valued. The purpose is not to proof that one group has the best perspective.

3.6 Method Examples

Disney method

Different perspectives can mean that you systematically change your attitude to an idea. Disney developed new ideas in three steps (Weidemann, 2010): Be first a dreamer, then a realist, and finally a spoiler. First think about any thing you wish, without limits. Forget all restrictions from society, physics or your budget. Think "what if?" Once you come up with fantastic ideas you can start thinking about which ones could be realized and how to achieve them – be a realist. Finally be critical to your plans. Think about any challenges, negative consequences and gaps. Use this view to improve your ideas and select the most promising paths.

Six Thinking Hats

Another way of taking different views on the same idea is to use Edward De Bono's (1985) Six Thinking Hats. Each hat has a different colour and symbolizes a different view:

- White hat / analytical thinking: What information and facts do we have? Which information is missing? How reliable are the data?
- Red hat / emotional thinking: What is your gut feeling? What is your first impression? Express your thoughts without any justification!
- Yellow hat / optimistic thinking: What are the positive outcomes of an idea? Which factors are in favour for a proposal? Even skeptics have to find good points about a suggested solution.
- Black hat / critical thinking: What could go wrong? What are negative consequences? Even if you are convinced of the success of an idea, think about every potential show stopper.
- Green hat / lateral thinking: Think outside the box and generate alternative ideas or derive new ideas from the existing approach.
- Blue hat / moderator: Put on the blue hat to set the goals, decide which hat to use next and sum up the outcomes of a discussion.

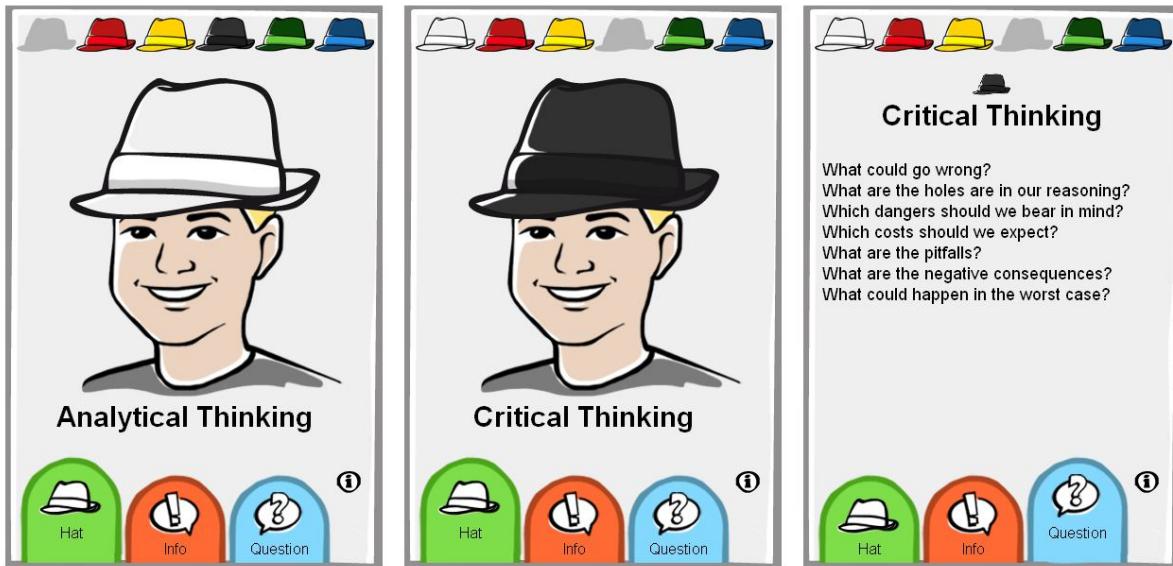


Fig. 4. Example: Widget for Six Thinking Hats with descriptions and questions. (From European research project "iTec-Designing the Classroom of the Future")

Different roles

You can consider a problem or a potential solution from the perspective of another person: What would a cook, gardener, actor, salesman, scientist, barber, secretary or taxi driver do or think? You can also choose your favorite hero, actor, book or movie character and ask for example: "What would Sherlock Holmes do?", "What would Superman do?", "What would Harry Potter do?", "What would X do?" You can also take the perspective of other species or artifacts: What would an alien, an elephant, a wizard, a robot, a tool (hammer, saw, pen), or piece of furniture do or think? By taking in another role you change your perspective at a whole and you start taking new approaches. You can choose your favorite roles or pickup random ones. However, it is important to not always use the same roles, for this would again limit the ways of viewing.

Stakeholders

In a project it is often very important to identify all major stakeholders and slip into each of their roles and views: How do customers, actors, developers, money owners, project managers or designers think about an idea? Would they put the same values to it?

3.7 Application examples

Business Example: A company wants to improve its meeting culture. To assess their current meetings, a group of employee pretends to be from Mars and questions every single activity in a meeting. They wonder why people are sitting in chairs if this makes them tired. They wonder why people make 30 minutes presentations while people get bored. From an alien's perspective it might be more fruitful to stand during meetings and limit presentations to 3 minutes. To still capture everything in 3 minutes, the team comes up with the idea to split a 30 minute presentation into 10 presentations of 3 minutes each, alternating between different presenters and discussions. People also have to get up more frequently and that prevents them from nearly sleeping in their chairs.

Education Example: A university committee discusses the tendency that students try to cheat in exams using smartphones. One member suggests that one could officially allow smartphones in exams to make it fair for all students. To evaluate the idea, the committee puts on the six thinking hats. Under the white hat they collect information how many cases of fraud they know about, which other universities allow smartphones in exams and how many exam questions are affected. Under the yellow hat the group points

out that fast access for facts from the web is a key competence; the group also agrees that web queries still take time and a student can hardly look up all the questions. Under the black hat the same members of the group point out that the students will prepare less for the exams in the hope that they can find everything on the web. They also fear that learning becomes more superficial. Under the green hat the group discusses new question types that actually require some web inquiries during the exam.

Personal Example: A boy wants to design a hamster cage that does not take too much space in his room but provides much space for the hamster. He asks different friends what they think could be the best approach. He deliberately asks friends with different hobbies. His friend Ben is a fan of skyscrapers. Ben suggests that one could build multiple storeys in a cage. Susanne is fascinated by wizards. She suggests that a wizard would just shrink and grow the size of the cage. This leads to the idea that one could design a cage where parts can be pulled out like a drawer. Since hamsters are mostly active at night time when the room's space is not needed, these parts can be pulled out when one goes to sleep.

4. RANDOM IMPULSE

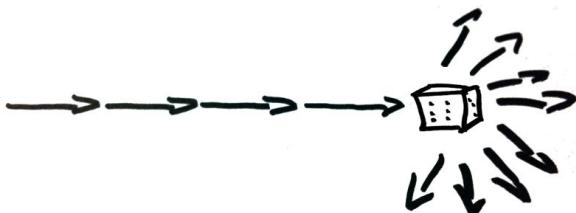


Fig. 5. Sketch of Random Impulse

4.1 Context

The ideas you come up with are predictable and not innovative. You think about using IDEA TRIGGERS or take in MULTIPLE PERSPECTIVES but you don't know which one to choose. There is also a chance that you choose the same perspectives or triggers again and again without producing new results.

4.2 Problem

You are stuck within your current framework of ideas and methods.

4.3 Forces

In order to generate new ideas, existing ideas need to be restructured and combined with new input. Thoughts need to move away from the obvious path and go to a side track (De Bono, 1990). We need to get away from routine.

Often we think everything is fine the way it is but we are blind for hidden problems. We might ignore challenges that not affect us directly or that will have its impact later. At other times we know there is something wrong in the current situation but we cannot think about new ways of doing business. After all – how could things be different than they are now?

It is safe and convenient to follow the old paths but you can easily miss opportunities. For example, you might always take the same route to your house because it is convenient and safe. But you might miss a much better route – one that is shorter, has less traffic or is more pleasant (De Bono, 2009). Another example is the habit of always ordering the same food because you like it so much. But you might miss some meal that is even more delicious (Michalko, 2006).

By nature, we follow our old path of thinking. The human mind relies on routine thought patterns instead of generating new ones. We need a provocation to leave our comfort zone.

The brain is constantly integrating information into coherent thought patterns. It favors data and facts that fit to the current way of thinking. If something unpredictable and unrelated enters this information processing system, it will try to make a connection nevertheless.

4.4 Solution

Therefore, give your thoughts a new and unbiased direction by using random stimuli such as random words, images, or impressions from a walk. Force yourself to concentrate on both your problem and the random stimulus and let your mind work out potential connections between unrelated ideas.

4.5 Solution Details

A random impulse does not have anything to do with what you are currently thinking about. And that is a good thing because it brings in new concepts, new relations, new features, and new similarities. The stable flow of thought is altered by the random and unpredictable impulse.

According to De Bono (1990), random stimulus works because the mind is a self-maximizing memory system. If two unconnected items are held deliberately in attention, these will eventually connect to have a coherent picture again. The mind will fill in all gaps to make sense of it and produce a new meaning (Michalko, 2001). It is important that you actively look for any potential connection.

A random impulse always suggests a new unbiased path of thinking. When you focus on a challenge all your thoughts are associated with solutions you already know – that is with conventional ways of thinking. But if you find something unrelated and force yourself to make a connection, then you will generate something new. Many innovations are the result of COMBINING CONCEPTS. Insights and creative ideas come from the overlap of thoughts when superficially unrelated concepts are combined, transposed or put into new contexts (Lehrer, 2012).

A random impulse can be used

- for combinations with your existing idea
- as an analogy for your existing idea
- as new context for your idea
- as a new way of looking at your idea

Let's say your random impulse is a beach. Then ask yourself:

- Could your current idea be combined with the beach or items found at the beach?
- Can you use analogies from the beach for your current idea?
- Could your idea be used on the beach?
- If at the beach, how would you look at your idea?

Analyze the random impulse and see what any of its parts could mean to your idea. For example, beach relates to holidays, sand, water, swimming, games etc. How each of these concepts relate to your idea?

4.6 Method Examples

To obtain a random word you can:

- Open a book, close your eyes and put your finger somewhere. Move the finger forward to the first noun you encounter and use it as a random word. (Nouns work better because they are more concrete concepts).
- Print out a table with noun words. You can get the words by randomly open a dictionary and use the first word of the page.
- Use a random word generator on your mobile device or on a screen.

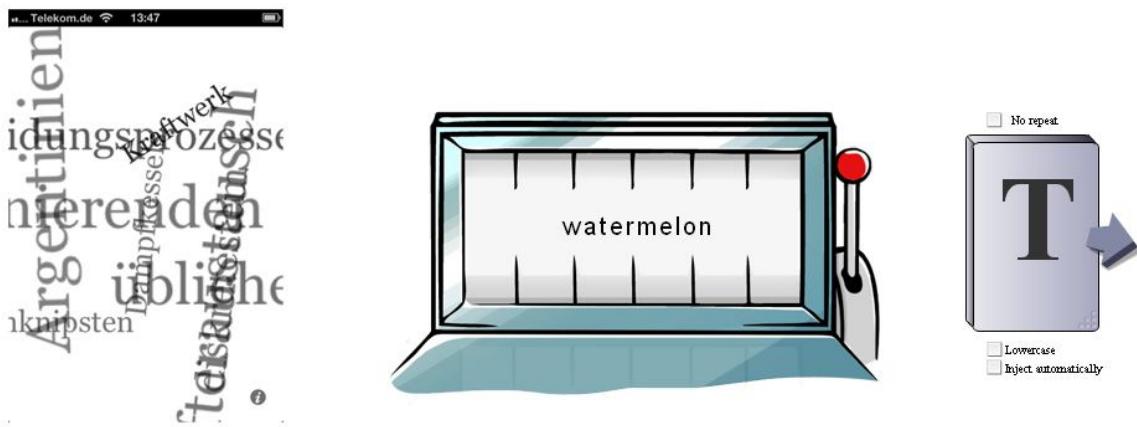


Fig. 6. Examples for random word and random letter generators.

To obtain a random image you can:

- Open a magazine, flip up a page, look for the next ad and blindly place your finger at it. Use the object under your finger as a random impulse.
- Cut out images from magazines and put them folded into a jar. If you need a random stimulus you can draw one of the folded pieces.
- Use Flickr or Wikimedia Commons to get a random image or the image of the day.

Once you picked up a random word or picture, write down the properties of the concept behind it. Use these properties to stimulate new ideas for your original problem:

- Could you transfer one of the properties to your situation?
- Could the random concept be combined with one of your goals?
- What are the similarities, what are the differences?
- Can you use the random concept as a new context for your product, or vice versa?

Once you generate ideas by establishing a relation between the random word and your original concept, try to derive further ideas from that.

If you take a walk you will get a lot of random impulses. What ever you see, ask yourself how does it relate to your current situation, problem, idea or solution?

- If you see a pie in a bakery, ask yourself what is sweet about your idea.
- If you see a packed underground, ask yourself how you can put in more into your approach.

4.7 Application examples

Business Example: A group of managers discusses how to improve the communication in the company. They look up a random word and find "beach". They now write down properties and associations of beaches: Sand, ocean, sun, swimming, cold beverages, waves, walks, a lot of people, barbecue. Some of these items lead to new ideas. Cold beverages: Like a person who sells beverages on the beach someone could walk through the offices and sell the latest news. Barbecue: Organize barbeques, breakfasts or after-work events to foster informal communication. Waves: Thinking about waves you remember how radio waves are distributed and strengthened using several radio towers. Instead of radio towers you appoint team leads as repeaters of messages.

Education example: You plan to run a seminar for 20 students. However there are 80 students who want to attend the seminar. To find a solution, you draw a random word: "luggage". Luggage lets you think of

travelling, packaging, dresses, holidays, being away, airports, baggage claim, lost items, security check... You can use these thoughts for new ideas to solve the problem. Being away: Assign tasks to students to go into the field. One week they will be in your seminar, the other week they will be in the field. While one group of students is in the field you can give a seminar for another group. This way you can double the number of participants. Travelling: If there is another seminar with less applicants, let students rotate between different seminars. Security check: Set standards what you expect from your students, e.g. skills or pre-exams. Only students who pass these checks will be allowed for the seminar.

Personal Example; You want to spend less money on dresses. You pickup the random word "Management". A manager sets goals, approves budgets, and controls spending. Be your own manager and formally improve every investment into a new dress. Develop some sort of an application form that you have to fill out for yourself if you want to buy a new dress. The application form could require some arguments why the investment is needed. Do not directly make the decision but wait some days. Then have a look at the application and decide whether the arguments are still reasonable.

Not all of the generated ideas are fruitful. But that's not the point. The random impulse should give your thoughts a kick. You should evaluate your ideas later and pick out the best ones.

5. PREVIEW OF UPCOMING PATTERNS

The following sections provide an overview of the creativity patterns that I am currently working on.

5.1 Patterns to understand the situation and your goal

DIVIDE AND CONQUER: Divide your problems into parts. You can focus on each part. You can modify, replace or rearrange parts.

FISHBONE DIAGRAM: Split the main problem into its sub problems.

WHY? WHY? WHY?: Ask recursively why questions.

5W1H: Ask Why? When? Where? What? Who? How?

MIND MAPS: Develop a hierarchical map of associative terms.

CONCEPT MAPS: Draw the relations between stakeholders, products, markets etc. into a concept map.

FUTURE SCENARIOS: Imagine different scenarios, including best, middle and worst case scenarios. Ask what if questions.

SWOT ANALYSIS: Analyze the strengths, weaknesses, opportunities and threats of the situation.

REPHRASE YOUR GOAL: Express your goals or the current situation in different terms. Ask different questions about the situation.

INVERSE VIEW: List all known obstacles or negative issues. For each obstacle find a way to overcome it. For each negative issue define the desired state.

FORCE FIELD ANALYSIS: First list all forces that positively and negatively influence the situation or your goal. Then think about how to strengthen the positive forces and weaken the negative forces.

KNOW YOUR FIELD: The most creative people are those who know their field very well. Therefore, make sure that you know all the concepts, patterns and rules of your field.

5.2 Generate Ideas

INCUBATION: Let your subconscious do the work. Switch between projects, forget about your problem and wait for the Eureka!

MULTIPLE PROJECTS: Engage yourself in multiple projects at the same time. Ideas and experiences from one project will distribute into other projects. Working on one project also means INCUBATION for another project.

HAVE FUN: Humour and creativity are closely related. Do something strange and funny to come up with new ideas. Watch some funny short videos to have a better mood.

IDEA QUOTA: Don't be satisfied with the obvious ideas. Dig deeper!

SUSPENDED JUDGMENT: Don't kill the best ideas too early. Even bad ideas can be used as inspiration.

FOLLOW-UP IDEAS: Use generated ideas to generate even more ideas.

BRAINSTORMING: The classic one plus useful variations, including ABC brainstorming, brainwriting and flashing light rounds.

PROVOCATION: Challenge assumptions, conventions and rules. Feel free to put everything upside down.

IDEA COMBINATION: Create something new by combining existing concepts.

MODIFICATION/VARIATION: Create something new by modifying existing objects or parts of them. Could you magnify, minimize, simplify or reshape its form?

SUBSTITUTION: Could you replace parts of an existing object to create something new?

PUT INTO A DIFFERENT CONTEXT: What would happen if you put something into a different context? How could it be useful there? What needs to be modified?

REARRANGE: Can you create something new by rearranging or reversing the parts of an object?

ANALOGIES: Learn principles from other concepts and draw analogies. Think about metaphors for your current design challenge. What can we learn from nature?

5.3 Evaluate ideas

CLUSTERING: Find categories for the ideas. Check whether you come up with new ideas once you identified the categories.

COMPARISON TABLES: Write down the properties of each idea and compare the ideas.

VOTING: Vote for the best ideas, which ideas should be elaborated or followed up.

RANKING: Compare ideas bring them into a ranking by dragging sticky notes or computer objects around. You cut off all ideas that fall under "priority baseline".

VALUE-FEASIBILITY MATRIX: For each idea evaluate its benefit and whether it is an easy win.

SIX THINKING HATS: Have MULTIPLE PERSPECTIVES on a proposed idea.

PMI – Plus, Minus, Interesting: For the most relevant ideas find all positive, negative and interesting aspects.

PRO-CONTRA-LISTS: What is in favour for an idea and what is a show stopper?

TIMING: Is it the right time for your idea?

STAKEHOLDER'S VIEWS: What would each stakeholder say about your idea?

5.4 Implementing ideas

ELABORATION: You have got a great idea? Now it's time to do the real work. A good idea needs to be elaborated because the details matter.

SKETCH IT: Visual thinking supports your expression of ideas.

JUST DO IT: If it is a good idea you should start today. Get rid of excuses.

NO RISK, NO FUN: Even if you are convinced of your idea you have some doubts. Evaluate the actual risk and compare them to the potential benefits.

MILESTONES: Set yourself goals and check whether you have reached them.

DEADLINES: You hate them? You should like them! They really move you forward.

WORK AROUND OBSTACLES: You have worked out an execution plan. Identify typical obstacles and situations that might stop your execution. Have specific reactions, planned actions or workarounds prepared if you run into such situations.

KEEP THE FAITH: There will be times of disappointment and failure. At such times it is important to motivate yourself again and remember achievements.

SELL YOUR IDEAS: You are convinced of your ideas. That's great! But usually you need support, e.g. resources, money, time, team members that invest time. Therefore it is important to convince other people as well.

PROTOTYPING: Test your ideas early!

VERIFICATION: If something works – fine! If something fails – don't capitulate but learn from your mistakes.

CELEBRATION: Wow, you have done it! (Or maybe just parts of it!). Celebrate it, to motivate yourself and to SELL YOUR IDEA.

5.5 Supportive tools and environments

POWER OF TEMPLATES: What? You have forgotten some of the patterns in this collection? Well, that happens. Therefore, use templates in your meetings or creative sessions to remember the questions, methods, tools, idea triggers etc.

THE RIGHT PLACE: Make sure you feel well in your environment. Make your first (home) and second (work) place comfortable. Look out for third places (cafes, malls) that inspire you.

DREAM TEAM: The right mixture of people is more creative. Team up with people you like. Include in your team experts from your domain but also from other domains.

LIST OF CHALLENGES: Keep a list of the most important challenges. Have a look at this list every morning and every evening. Awareness supports the subconscious problem-solving process.

RELAX: You are more likely to generate good ideas if you are relaxed and in a positive mood.

NEW HABITS: Change some of your habits to get new inspirations. Switch to a new TV channel, read books from different authors, choose a new route to work.

PREPARED MIND: Know your domain and be open to new and unexpected phenomena.

IDEA LOGBOOK: Always log your thoughts and inspirations.

(VIRTUAL) STICKY NOTES: Use sticky notes to rearrange ideas and thoughts. If possible use a digital tool to save alternative arrangements.

REFERENCES

Alexander, C. 1979. *The Timeless Way of Building*. New York: Oxford University Press.

Brunner, A. 2008. *Kreativer denken: Konzepte und Methoden von A-Z*. München: Oldenbourg.

Csikszentmihalyi, M. (1996). *Creativity: Flow and the psychology of discovery and invention*. New York: HarperCollins.

De Bono E. 1985. *Six thinking hats*. Boston: Little, Brown.

De Bono, E. 1990. *Lateral Thinking*. London: Penguin Books.

De Bono, E. 2009. *Think: Before it's too late*. London: Vermilion.

Foster, J. 2007. *How to get ideas*. San Francisco: Berrett-Koehler.

Georgiakakis, P. & Retalis, S. 2011. Design Patterns as guidance for designers of groupware used by teams for the development of innovative products. In C. Kohls & J. Wedekind (Eds), *Investigations of E-Learning Patterns: Context Factors, Problems and Solutions*, Hershey: Information Science Pub.

Iba, T., Ichikawa, C. , Sakamoto, M., Yamazaki, T. 2011. *Pedagogical Patterns for Creative Learning*. PLoP 2011 - 18th Pattern Languages of Programs conference. Portland, Oregon.

Iba, T., Matsumoto, A. & Harasawa, K. 2012. *A Pattern Language for Creative Presentations*. 18th European Pattern Languages of Programs conference. Irsee, Bavaria.

Kumar, Vijay. (2012). *101 Design Methods*. Hoboken: Wiley.

Lehrer, J. 2012. *Imagine: How creativity works*. Boston: Houghton Mifflin Harcourt.

Michalko, M. 2001. *Cracking creativity: The secrets of creative genius*. Berkeley, Calif: Ten Speed Press.

Michalko, M. 2006. *Thinkertoys: A handbook of creative-thinking techniques*. Berkeley, Calif: Ten Speed Press.

Plattner, H., Meinel, C., & Weinberg, U. 2009. *Design Thinking: Innovation lernen, Ideenwelten öffnen*. München: mi-Wirtschaftsbuch.

Rumelhart, D. E., and Norman, D.A. 1978. Accretion, tuning, and restructuring: Three models of learning. In J.W. Cotton, and R. Klatzky (Eds.). *Semantic Factors in Cognition*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Weidenmann, B. 2010. *Handbuch Kreativität: Ein guter Einfall ist kein Zufall*. Weinheim: Beltz.