One thing led to another - how analogies make improvisation possible

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Similarities

The brain is constantly busy linking thoughts that have similarities: I look out of the window and see the snowfall. It reminds me of the last skiing holiday in the Alps, the snow cannon, then climate change comes to mind, then the last hot summer, the fan that kept running, the sleepless nights in Berlin, too many people on the streets, the friend I met while walking etc. etc. The mechanism for this is „thinking in analogies“. This process runs automatically and continuously. „Fabricating similarities is not kept within any limitations. In principle, everything can be set into a correlation of similarity with everything else.“[1] Sometimes the combinations of thoughts surprise us: How did I come up with this now?

In their book „Surfaces and Essences. Analogy as the Fuel and Fire of Thinking“ Douglas Hofstadter and Emmanuel Sander have presented this „thinking in analogies“ as the fundamental process in our brain [2] (. The opposite is causal thinking, which examines reality according to logical and constant relationships, that is to say with regard to cause-effect and purpose-means relationships, and which is used as the basis of all scientific methods. Analog thinking is not only dependent on language or images. Haptic, olfactory or gustatory experiences like melting the snow in my hand, sunshine on the face, the smell of fresh coffee or the taste of strawberries stimulate analogies and associations. „Every sensual quality can become the starting point for a connecting thought process as a moment of experience.“[3]. Analog thinking is an essential mechanism for improvisation. It enables different materials or techniques to be “repurposed” so that they can be used for a new application framework, as the following example shows.

Foto: Margit Schild

Similarities of shape

In the photo you can see a paper clip that is used to repair eyeglasses. The owner of the glasses found an ad hoc solution to a sudden grievance and improvised with the materials immediately available to him. That a paper clip is used as a paper clip and every now and then for other occasions, e.g. as an eyeglass repair device, toothpick or key replacement, shows that there is a kind of core or basic similarity of different functionalities. Due to its shape and formability, the paper clip can be used in a variety of ways. The similarity of shape or the easy deformability of the paper clip is the basic prerequisite for the fact that it can be used as a makeshift object. In a way, its function as a tool for many other situations is already recognizable within it.

In addition to the unspectacular repair of eyeglasses, the following example shows very impressively to what extent the principle of similarity offers possible solutions even for highly specialized equipment or situations. Since mankind has been building spacecraft, everyone involved has been striving for perfection. Scientists, engineers and computer scientists test every spare part, they calculate every gram of fuel, plan every minute of flight. Astronauts are handpicked experts who are drilled for months to master unpredictable situations. They are highly gifted natural scientists, welltrained, disciplined, with photographic memory and perfect teeth. Emergency training comprises 120 hours, from repairing a leak in the ventilation system to extinguishing a smoldering fire. Through this tedious work, sources of error are eliminated, nothing should be left to chance. There are routines for the most unlikely situations. Therefore the process details of improvisation can be understood here under laboratory conditions.

In the US Space Mission Apollo 13 from 1970, a group of scientists and engineers managed to square a circle in an emergency situation: Three astronauts in space are in danger of suffocating because of an exploded oxygen tank and a defective air filter. Despite all precautions and careful planning, the engineers are faced with the problem of finding a way to connect the air filter systems of the space shuttle and the lunar landing craft (one of which is circular and the other square) and succeed by using basic tools. In the high-tech showpiece space shuttle, the three astronauts' lives are saved with the help of a provisional solution, made by the following materials:

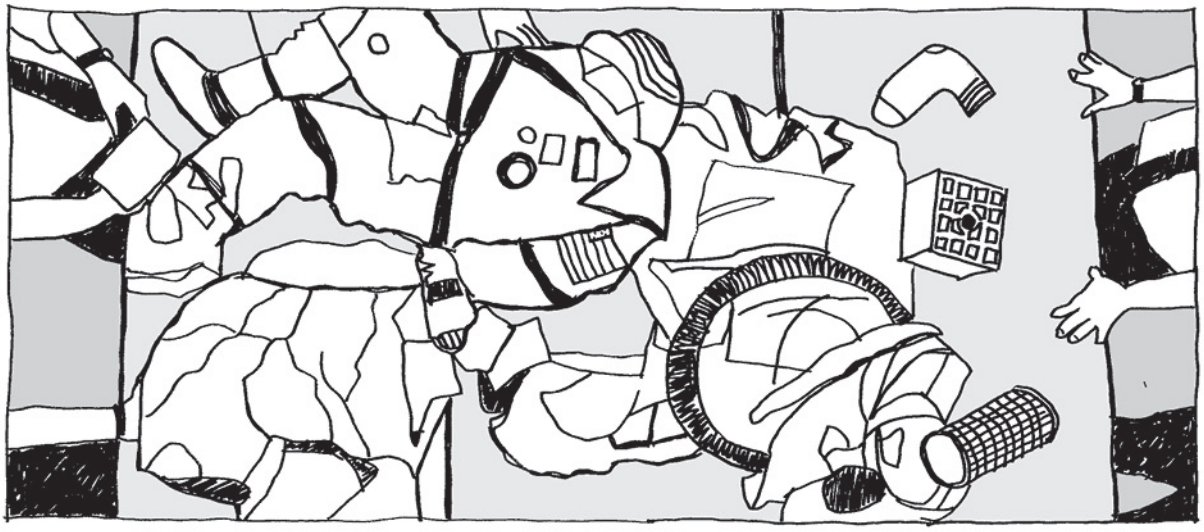
- a piece of cardboard,
- a urine pouch,
- a hose from a spacesuit
- adhesive tape and
- a tennis sock.

„I suggest you gentlemen invent a way to put a square peg in a round hole. Rapidly."

Szene aus: Apollo 13, Film von Ron Howard, 1995, Zeichnung: Margit Schild

Improvisation

This story was filmed and directed by Ron Howard in a Hollywood movie, a 1995 American drama and space adventure, with Tom Hanks and Kevin Bacon. In a scene where the crew realizes that they have to abort the plan to land on the moon, the flight director Gene Kranz says: „I want you to forget the flight plan. Now we are improvising a new mission!“ In the case of the air filter destroyed by the explosion and yet so urgently needed - the carbon dioxide was toxic for the crew - there was only one option. An attempt had to be made to build it with the materials available on board. At the ground station in Houston, Texas, where there was an exact double of the space shuttle, it happened that the technicians threw all the available materials on a table and then tried to reproduce the filter - in other words, to combine the square with the circle - „using nothing but that!“.



„The people upstairs handed us this one, and we've got to come through. We have got to find a way to make this fit in the hole for this, using nothing but that.“

Szene aus: Apollo 13, Film von Ron Howard, 1995, Zeichnung: Margit Schild

„We have an unusual procedere for you here.“

Szene aus: Apollo 13, Film von Ron Howard, 1995, Zeichnung: Margit Schild

This scene illustrates the mechanism of improvisation, it is a perfect setting: A sudden problem no one has expected, there is a danger to life combined with precious little time which creates a great deal of pressure, along with a limited access to materials, and no stock of spare parts.

Consequently, a working solution based on the means available in the given situation had to be found. There is also the motivation to act in an unforeseen emergency and the decision: this is how we're going to tackle this problem for the time being.

A much quoted if less spectacular example is the nylon stocking doubling as a fan belt in engines of older model cars. In the case of the torn fan belt we see the same necessity for spontaneous action in the situation - you want to continue your journey - as well as the use of 'misappropriate' means to provide a temporary solution to an emergency.

„One sock!"

Szene aus: Apollo 13, Film von Ron Howard, 1995, Zeichnung: Margit Schild

The creators of the air filter in Apollo 13 experimented with a variety of materials, they came across a tennis sock and knew how to use it. In other words, the crucial factor for such a rather unconventional process is the expertise and the precise knowledge of the exact functioning of an air filter. The underlying mechanism is thinking in similarities: The sock's fabric is similar to the fabric of a filter material. The technicians of the Apollo 13 mission were able to adapt their frame of reference to the emergency situation and to assign the sock to the „air filter fabric" category. In combination with all the other objects, the engineers succeeded in replicating the essential function of the filter similar to the original.

Given the emergency situation and facing the need for improvisation, flight director Gene Kranz said: „I don't care what anything is designed to do, I care about what it can do." (Apollo 13, Ron Howard 1995, 1:09: 15). It is no longer important in which frame of reference things have worked or should work in the past, but in which they could work. This request enables the engineers to free themselves from their own expectations and protocols and to rethink the process. In doing so, they check the available materials for similarities in terms of their functionality and usability in the present crisis scenario.

Categories and Analogies
The following list from Hofstadter and Sander‘s book illustrates and explains this underlying mechanism:

Artifact, industrial product, consumer article, fragile object, glass, item of dishware, drinking glass, water glass, transparent object, recyclable object, piece of freight, piece of merchandise, item for sale, unsold object, casting object, unsellable object, dust-gatherer, discounted item, purchase, glass for cold drinks, wineglass, spider carrier, knickknack holder, toothbrush holder, sugar bowl, home for tadpoles, vase, piece of construction material, fragile object, recyclable object.[4]

This list shows the different purposes for which a simple drinking glass can be used for example. Instead of purpose, you can consider: The drinking glass can be assigned to a wide variety of categories, depending on the context or the situation of the viewer. Things, situations, phenomena belong to the same category if they show similarities. Hofstadter says: “A category pulls together many phenomena in a manner that benefits the creature in whose mind it resides. It allows invisible aspects of objects, actions and situations to be „seen“. Categorization gives one the feeling of understanding a situation one is in by providing a clear perspective of it, allowing hidden items and qualities to be detected” [5]

As soon as the glass appeared, for example, in a completely new environment, the list could be expanded. And: „all objects, actions, and situations“ can be „moved from one categorical „box“ to another.“ [6] Based on experiences and changing contexts, situations or necessities, perceptions are always reevaluated, ordered and categorized. „Categorization pervades every facet of our existence and is never fixed, even in the most mundane of circumstances.“ [7]

The creation of a category is similar to the creative understanding of situations. In other words: If you consider a drinking glass to be a drinking glass only, you will never use it as a spider carrier. But if you can relate a glass to various other purposes by creating similarities, analogies, you are shifting a category.

This mechanism in our brain not only explains that things can be used for completely different purposes than intended - it is also an indication that each situation may contain a variety of alternative courses of action that have merely gone undetected. We are very often forced by emergencies, accidents and the resulting provisional solutions to think in alternatives or to look at things differently.

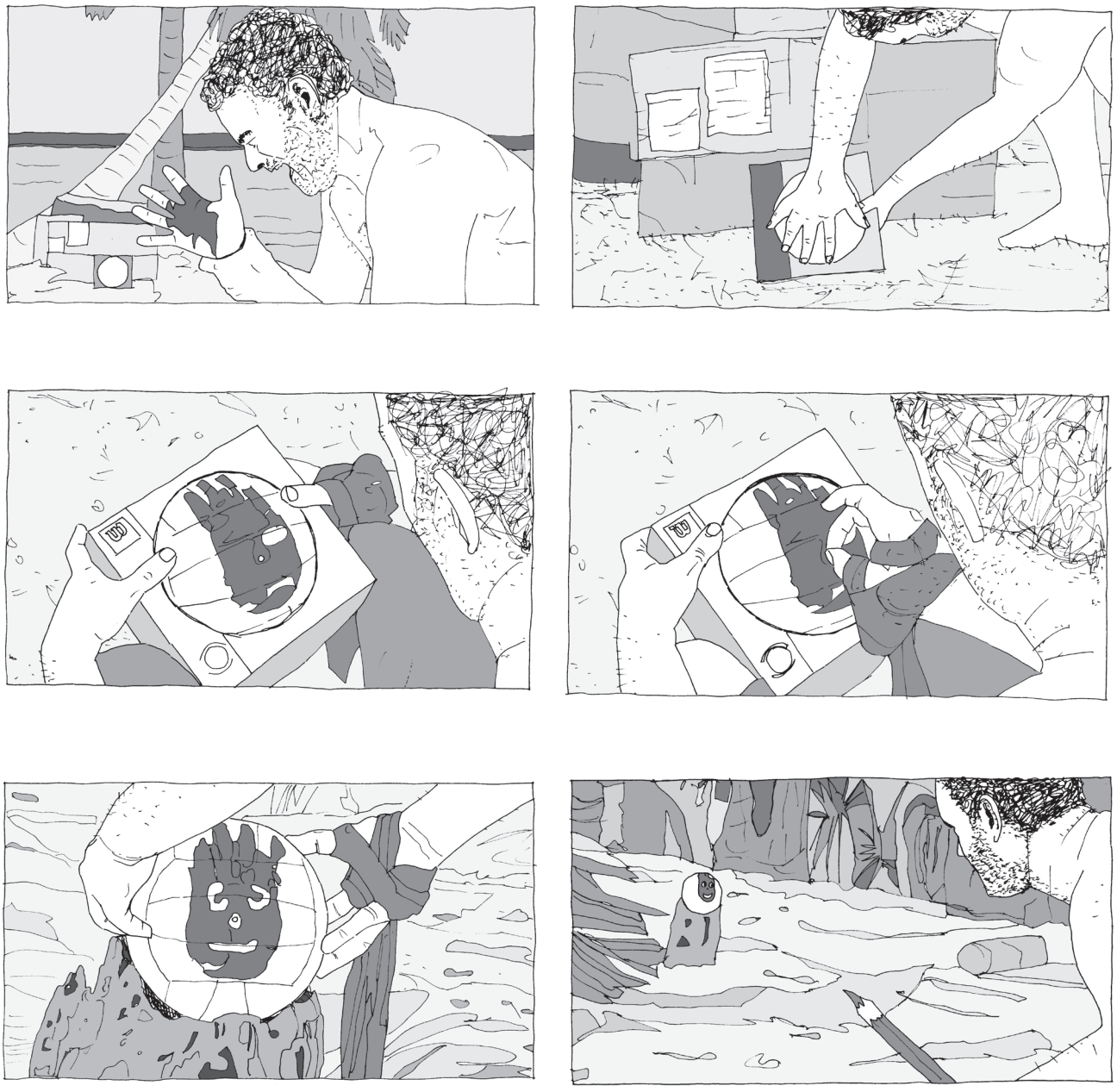
Human perception is also very complex and evolutionarily focused on movement and sudden changes. People‘s attention is focused on new or moving things. All other parts of the environment are hidden as soon as they become routine. These routines enable people to experience their environment as stable, despite a very large discrepancy between the optical senses and their experience: “The color, shape and brightness of things seem to us to be largely constant, although we naturally change in perceiving connection with distance, lighting, angle of view and the like.” [8] While maintaining these relations, the world can be experienced as a „fixed frame of reference“.

We initially experience the world only in relation to our own expectations and previous knowledge. We can only “see” and understand what we know or that we think we know. Perception becomes stimulated when the relationship between observation and expectation is irritated because the preconceived expectation and the actual impression are not congruent. If the perspective on something becomes uncertain, people use their adaptability and ability to learn in response: after a shock, they place what is recently learned into

the existing categories and thus include them in their fixed reference system. This ability to recognize similarities in situations, structures and functions and to expand your own frame of reference is of great importance for improvisation. Essential is also the process of constantly reviewing and checking the correctness of found categories.[9]

Category shifting

Another example of creative category shifting is in the movie Cast Away, also with Tom Hanks. This is an American survival drama directed in 2000 by Robert Zemeckis. The film depicts a FedEx employee marooned on an uninhabited island after his plane crashes in the South Pacific and his attempts to survive on the island using remnants of his plane‘s cargo. He spends four years on the Island and must relearn all essential actions: how to make a fire, to hunt, to sew clothes, etc. He also has to pull a tooth out of his mouth with a provisional construction.



Filmstills from „Cast Away“, by Robert Zemeckis (2000), with Tom Hanks.
Drawings: Margit Schild

This film explicitly deals with the ability to act by improvising and „repurposing“ all possible materials. In addition to all sorts of useful tools, the protagonist accidentally creates a companion: During a first attempt to make fire, Chuck receives a deep wound to his hand. In anger and pain, he throws several objects, including a Wilson volleyball from one of the packages. A short time later he draws a face in the bloody handprint on the ball, names it Wilson, and begins talking to it.

This example demonstrates that a huge part of what we call improvisation and creativity is related to skills that allow us:

1. to recognize analogies in objects or complex situations and to build up similarity relationships, and

2. to expand categories and to switch back and forth between them.[10]

Having the categorization in mind, we can ask:
Is Wilson a symbol of rage, a doll, sports equipment, the result of a random process, flotsam, creative result, spare part-human, companion, object from the ship, shipment, product of leather, lost article, or just a ball?

We can see that similarities create „a wide field“. They leave “space for an abundance of subjective and individual frames of reference”, including “unconscious and emotional parts in thought processes” and open “the space for thinking away from conventionalized causal relationships, away from identifying thinking, which brings things to clear terms and has a clear relationship to each other. ” [11] “While causal thinking strives for precision and uniqueness, analog thinking is characterized by openness: Similarities relationships are therefore fundamentally open, they use the ambiguity between identities that is not clearly defined and different“ [12]

One thing leads to another - improvisation makes human thinking in analogies visible and shifts categories to become tangible as they arise. The openness and flexibility of analog thinking with its unconscious and emotionally guided parts is a basic requirement for the ability to improvise.

Bibliographie:
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