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Alessia Zanotti ***has just finished her communication design studies at the Macromedia University of Applied Sciences in Munich, where she studied from 2018 to 2022, one semester at the UFV in Madrid. In addition to her studies, she is always working on different design projects that bring her continuously practical experiences. During her studies, she won the 1st prize of a nationwide design competition as well as the Be Social promotional award. In her bachelor thesis, which was supervised by Prof. Dip.- Des.Tanja Schmitt-Fumian, she dealt intensively with today's relationship of children and young people to haptic as well as how today's digital world influences it. Currently she is gaining more work experience in the design field before she will continue with a masterprogramm probably in Haptic- or Eco Design next year. Haptic has always been the most important aspect in her design projects, which is connected with her passion for haptic creative work and the fascination for each individual's perception of haptic in our environment.***

Generation Z: Losing touch

A post-industrial world can only make sense if we shape knowledge, emotions, and meaning, which means improving existing situations. This cannot be achieved without critical thinking and iteration in design. Design requirements and results are determined by the skillful interplay of design processes, digital ethics, and communication to find sustainable solutions to address new kinds of problems.

Key Words*: critical thinking, design, design education, design process, mental models, haptic*

In this paper, we want to look at how the changing artifact in digitality – (1) **the condition of living in digital culture – has changed the design process, where the haptic experience is more and more disappearing. In a second step, we suggest a** (2) **process-driven simulation of this analog experience using iteration, destruction, and construction. And finally, we propose how (3) distance learning in design education trains a new generation of designers dealing with the changing artifact: utilizing the online environment as chance.**

*"**Digitization** is the process of changing from analog to digital form" (Gartners IT Glossary n.d.)*

Design is a generic term that can refer to various sub-areas, but in the following, we use the term design as we do in graduate courses in visual communication design, graphic, industrial, and product design. Besides the visual presentation of this paper, we

will first look at the analog haptic experience, which has been a main sensorial experience in earlier design education.

The haptic, the grasping of materials and shapes, always played an essential role in design. In the field of design, the work of drafting is distinguished from the work of production, which started in the early industrial revolution. In the area of craftsmanship, the material was clearly in the foreground, whereas in designing for industrial services, the focus is on forms, functions, and problem-solving, represented in drawings at first. But here, too, designers have long been dealing intensively with the material when designing, at least in prototyping. It is not empirically screened, but a statement like this: the haptic influences of the basic training of designers more and more eased out in favor of the visual training. Even Moholy-Nagy (Moholy-Nagy, 1929), a defining character of the Bauhaus, saw the sense of touch as an important part of the theory of design and form. He saw the inclusion of touch in aesthetic training as a recognition of individual inclinations and improvements in the tact of designers.

Through the establishment of tactile exercises in design education at the Bauhaus, tactile training gained a scientific position. Due to the dominance of digital design and possible de-sensualizing of material culture, the tactile experience in design education has recently experienced an intensification (Schönhammer, 2001).

Multiple haptic aspects influence design and our perception. The nature of the objects influences our perception and our different senses. When it comes to processing in the brain, only a smaller part of the information that is perceived is processed and selected. Only the content that triggers something in us personally has an effect. We only process the information that our brain considers

relevant and overlook information that we consider unimportant. It is therefore essential that designers know how the viewer conceives design and what content they process (Heimann & Schütz, 2017). Neuroscientist Gerhardt Roth states, „Als Neurobiologen gehen wir davon aus, dass unsere Erlebniswelt - also unsere Wahrnehmungen, Gedanken, Gefühle, Vorstellungen und Erinnerungen – ein „Konstrukt" unseres Gehirns sind."[As neurobiologists, we assume that our world of experience - i.e., our perceptions, thoughts, feelings, ideas, and memories - is a "construct" of our brain] (Heimann & Schütz, 2017, after Roth 2015, p.237). This means that everything we perceive is first processed and formed in the brain into a specific content that we cannot decipher by mere grasping. The processes in the brain are the basis for the inner rules according to which perception takes place and which should apply to designers as design principles.

From a purely technical point of view, we only receive all stimuli that we take in from outside via our sense organs in a certain area. Heimann and Schütz (Heimann & Schütz, 2017) argue that our human perception only includes what is important for our survival, our perception is passive, i.e., adaptive. Designers create something that the viewer, the one who perceives, creates something of their own with the help of their sense of perception. Because designers appeal to the viewer with all their senses, it is initially just a suggestion that everyone uses to create an individual image (Heimann & Schütz, 2017). The perception and impact of a design depend heavily on the tension and expression it provides. We often see ourselves in forms and images or recognize experiences that lead us to perceive designs in a certain way. Our body perception of familiar and human facial expressions and gestures as well as visual experiences of the past plays a decisive role in our inner perception (Heimann & Schütz, 2017). We

interpret feelings of balance in their different formal language and feel a respective balance or imbalance regarding the design: meaning cognitive dissonance. The effect of learned content associations is often more decisive than the formal language itself and determines the effect on the viewer. For instance, horizontal lines often appear less long (Wundt 1858) to us than a vertical line of the same length since we must expend more effort for a vertically upward movement than for a horizontal one due to gravity. Our body feeling and the associations based on our experience give us an indication of the effect of the design, which every designer should consider when creating.

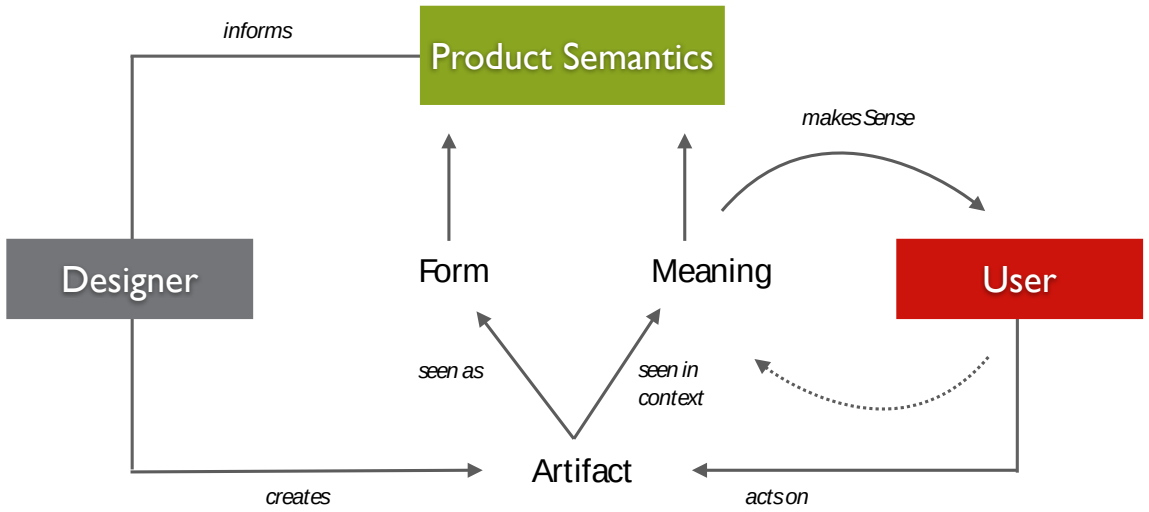
Pictures, figures, and abstract forms immediately have a certain dynamic and structure that makes us curious. This is also reflected in the design area. The perception - visual and touch - of a surface conveys a certain feeling that is automatically associated with the object (Biggs 2004). We transfer our body feeling and our state of mind to designed objects. This is how we often perceive the expression and tension based on our body's feelings. Accordingly, designers have the task of orienting themselves to the principle of ´man/woman as measure´ when designing, since effects and messages can be perceived individually by the viewer. The viewer perceives stability or instability, stillness or movement through the elements and forms he sees or surfaces he feels. Dealing with the material has a great influence on the consciousness of the viewer. By carrying out practical activities with materials, people establish contact with their environment. As Reuter summarizes, practical human activities lead to the development and change of inner structures (Reuter, 2007). It can be observed that fewer and fewer print products are being developed in design processes these days, and more and more work is being done digitally. Print products are often avoided for reasons of sustainability or

efficiency and designed in a digital version. Analog and haptic print products have increasingly shifted to digital because of digitization. They have become part of a `digital first´ strategy: allowing accessibility anywhere and anytime, independent of time and place. Examples of this fact are books that are often only published as e-book versions, travel guides that become online blogs, daily newspapers, etc.

At the same time future product designers are facing new problems, besides the question of form and function due to new technologies, like privacy, ethics, and social or security issues. Product design has gradually shifted from functional needs to human needs (Huang, Shi 2022), including ´design for environment´ approaches in the last decades.

The question arises: if the haptic experience disappears in certain areas which have been important for the designer, how do designers deal with the changing artifact and the changing interaction with the world?

Interacting with designed products influences human thoughts, feelings, and behaviors. At a basic level, such interpretations are based on form and function. More complex responses involve assessing the values that products embody and making judgments about the cultural associations they evoke. Since people attach such meanings to things, designers can develop intentions that the products they design will be interpreted in a certain way. These inclinations shape the resulting products that differ from the intention in many ways unexpected ways. (Crilly, Good, Matravers, Clarkson, 2008)



The relationship between the form produced by the designer and the meaning produced by the user.

The designer creates and the user acts on something received. The designer creates an artifact, which embodies the designer´s meaning as form. The user acts on the artifact and tries to make sense of its form, thus trying to produce meaning.

Figure 1: Krippendorff's & Butter proposed a model of the relationship between designer and user. (Sunde 2017)

In the last century, where we witness a changing artifact, moving from a manufacturing industry to a service industry, we designers see the need for human-driven tools, that enable creative processes, widening our 17inch horizon and reacting to time-based and real-time phenomena. This is when designers create value: intangible products, focusing on the levels of intangible design: knowledge, emotion, and experience.

In Design today, it's not only about products, but also about processes. Products can only meet the constantly changing demands of the world of people and of living together for a short time. They behave statically and must be renewed again and again, so our concept about products has changed since products are changing.

However, if we want to design sustainably, changes must become an integral part of creative thinking. Only then are there no longer

finished products – which nobody will need tomorrow – but connectable processes that make the world a better place in the long term, because processes always imply change and can therefore always be re-adapted to the realities of the world.

When looking at a product design process, it is far more than just looking at the product, it's part of a larger business process. After Nigel Cross the three main areas of design knowledge are People, in our case, the designers themselves – all expert professional Practice, Processes – an abstract high-level working tool to ensure the best proactive and Products, the study of artifacts may reveal the information about the processes that guided their creation. (Research & Education in Design: 2019)

Processes are the key, not the physical artifacts. In retrospect, products can only meet the constantly changing demands of the world, of people, and of living together. Repeatedly, they must be reinvented because they behave statically.

Following this idea, what would this imply for Krippendorffs model shown in figure 1?

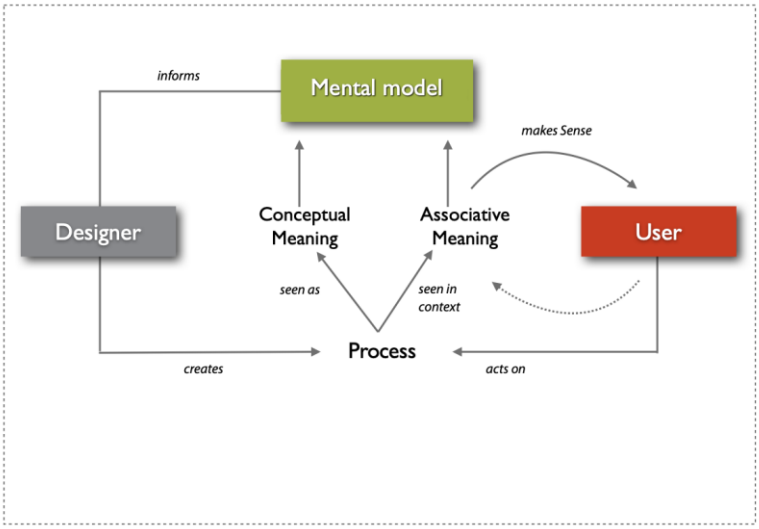


Figure 2: Own presentation adapted model based on Krippendorff's relationship between designer and user. (Schmitt-Fumian, 2022)

As shown in figure 2, "Product semantics" – the study of the symbolic qualities of a human-made artifact – is replaced by "Mental Models" – a cognitis construct built on experience and prediction of a performance (Reinhold & Schmalen 2021)

Designing user experiences with mental models is a key concept. A new workflow strategy is needed when it comes to "digital product or service development," where experience drives cognitive development. Models can be defined as representations of information provided, and design can be defined as a problem-solving process.

"I consciously include training (design education), as designing objects has a lot to do with knowledge and mindset" (Dieter Rams 2021, p. 13)

We need tools to allow the flexibility of iteration and failure and to understand the value of iteration and failure - at an early stage. We need tools to visualize or simulate the process of human imperfection, needs, and desire. There is nothing more meaningful – to us - than looking at scribbled ideas or processes on a whiteboard with tons of iterations. (Krippendorff & Butter 1984). These mental models could fill the gap in the haptic experience. A mental model is a representation of an object or process in the consciousness of a living being.

"Mental models are mechanisms whereby humans are able to generate descriptions of system purpose and form, explanations of system functioning and observed system states, and predictions of future system states." (Rouse & Morris, 1986, p.2)

Mental models are in a way as imperfect, as analog prototypes. People use mental models to understand and interact with things in the real world quickly. The touch experience, described in the first part of this paper also lets us gather information about reality.

As mentioned earlier, the major technological trend facing the world today is digitalization, one of the most significant ongoing transformations of contemporary society. Every aspect of organizational and social activities has been profoundly affected by it. Manufacturing companies must provide product-related services along with tangible products throughout the product lifecycle (PLC) to gain a competitive advantage in the digital business ecosystem. So, the artifact is much more than just a physical object (Xin, Ojanen 2017).

With the COVID-19 pandemic spreading across the globe, online distance education is now more important than ever. (Bozkurt & Sharma 2021) Finally, design education has the chance to include crucial aspects like social-emotional learning empathy, and cultural components. (Matthews, Williams, Yanchar 2017)
Through social and emotional learning (SEL), we learn how to understand and manage our emotions, set and achieve positive goals, feel empathy for others, establish and maintain positive relationships, and make responsible decisions.

Is empathy perhaps the basic ingredient to solving future problems? The complex challenges of our time will not be solved by a few, but by many, who become active with a common value and a healthy understanding of the right thing to do. (Spiegel, Pechstein, von Hattburg, Grüneberg 2021)

In design education as well as the process of learning always involves a form of interaction of our senses. Therefore, distance learning can learn and profit from the fundamental changes in Design Education: understanding the social-emotional component: creating and working with mental models which replace haptic experience.

"The design of our world of things has complex functional, psychological, social and not least political impact." (Dieter Rams 2021, p.13)

Living in a digital culture changes the condition of analog haptic experience and suggests a process-driven simulation of analog experience using iteration, destruction, and construction in a distance learning scenario.

In other words, the process of destroying old ideas and replacing them with newer ones should be the focus of creative destruction (Schumpeter 1942), to deal with the fast-changing world.

Design connects complexity to meaning

At first glance, designers may work with material products or digital interfaces that serve them as material and technical media, but at second glance, it is all about mental models, incorporating suitable representations of how things work and are interpreted.

The use and mastery of these artifacts, such as print, social, multi, or cross-media, are all located in a technical dimension (up to language constructs and codes) the mastery of which we do not count among the core competencies of today's designers. If we look for the core of this objectification to assign its essential function to the designer, we could cite the concept of interaction is

crucial. People interact with constructs, models, and artifacts to understand themselves and the world. In this interaction, we are humans. In other words, instead of modeling physical objects, future designers should model mental models. So, a mental model is nothing more than a framework that represents how the world works, while physical prototypes represent how the products feel and function.

This new sense of modeling fills the gap with the changing artifact today and should be the core focus of distance learning in design education. Taking the virtual classroom as a chance to re-think what we call ´craftsmanship`, what we can see as designing with material artifacts.

If these models contribute to understanding, then designers were at work. Designers who understand people's perceptions and provide them with appropriate means of interaction. This is where designers should learn how to construct and destruct mental models since they are beliefs formed by human minds based on experience, and observation and are always the subject of an ongoing learning process. The process of creative destruction (Schumpeter 1942) is not new, for instance in economic concepts, described by Schumpeter as a "process of industrial mutation that continuously revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one" (Schumputer, pp. 82-83) There have also been interesting theories about breaking mental models as a form of creative destruction to foster social innovation (Marcy 2015).
It means, that mental models and designs resist change as well, as material models do. Creative destruction is an essential step in the design process, as well when it comes down to mental model which has been replacing the haptic experience within the changing artifacts.

So, what is the crucial instance that brings a designer into the world?

People gain access to the world using their senses. The Greek "aisthesis" - perception – is the signifier of our current term "aesthetics". Perception - and thus aesthetics - is thus responsible for our understanding of the things that surround us. This understanding includes, in particular, the ability to orient ourselves to models and also to communicate through them. Whereas in the past it was things like maps, paintings, or visualizations of social and hierarchical identities today it is the intangible side of products like social networks.

In summary the future of design education in a distance learning scenario could have the chance to tackle these new challenges, by focusing on the *intangible* design process: knowledge, emotion, and implementation working with an in mental models, constructing and `creative´ destructing to get the 'haptic' in non-material products!

Just looking at evolution of a mobile phone or laptops, we witness that these products offer extremely similar functionality and hardware design, so the competitive advantage will lay in the intangible value. (Driskill, Bermudez, McMahon, Ullah 2015)

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