



# Encountering the Unknown

– Interactions Between People and Digital Products

Robots that take blood samples, manmade clouds that one can walk around in, and interactive hydroscopes that take you on underwater journeys of discovery – products with integrated digital technology often offer new types of functions that we are not prepared for. This situation frequently requires an entirely new understanding that challenges our expectations of the role of design. In a new Ph.D. dissertation from Kolding School of Design, Thomas Markussen addresses the issue of interactive design products and systems and offers a theoretically founded analysis of the encounter and interactions between user and product.

By Mads Nygaard Folkmann

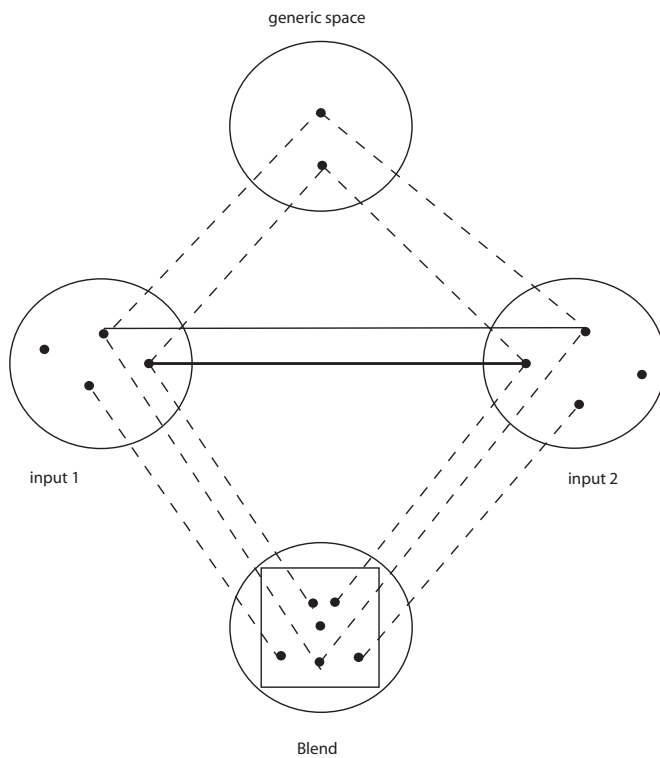
When Marco Polo travelled east to Asia in the 1200s and encountered the black rhinoceros on the island of Java, he did not know what it was but attempted to match it to what he already knew. And what he knew was not based in reality but rather in myths and legends. The rhinoceros was so alien to Marco Polo that the closest comparison he could come up with was the unicorn.

This anecdote opens Thomas Markussen's Ph.D. dissertation, *Conceptual Blends in Interaction Design. Toward a Cognitive Semiotic Framework for Online Meaning Construction and Embodied Interaction*, as well as his Ph.D. defence at Kolding School of Design on Friday 23 April 2010. The point is that our cognitive activities, i.e. thinking and perception, are affected when we encounter something that we lack preconceived concepts for. We categorise the novel encounter in relation to what we already know.

## The Challenge of New Technology

This issue is particularly relevant with the advent of new digital technologies that create new types of products with intellectually and physically challenging forms of interaction. The technology is no longer restricted to a screen that is physically removed from us but may require touch, like an iPad touch screen, for example. Or it may come in the shape of a mobile digital hydroscope, as described in Thomas Markussen's dissertation, simulating an underwater perspective and encouraging exploration through physical interaction.

"I wanted to offer an insight into the way in which we interpret new functions in digital artefacts," Thomas Markussen explains.



An important element in Thomas Markussen's Ph.D. dissertation is Gilles Fauconnier and Mark Turner's theory on conceptual integration, often referred to as the *blending theory*. The theory addresses basic principles of human cognition, which come into play, for example, when we encounter something novel and thus have to develop new categories for making sense of the experience. The model illustrates how new meaning, a "blend", is always the result of a complex conceptual exchange where, for example, "input 1" and "input 2" also interrelate.

Model based on Gilles Fauconnier and Mark Turner's book *The Way We Think: Conceptual Blending and the Mind's Hidden Complexities*.

"In many cases, using interaction design is like discovering new species in the universe of artefacts: We have to deal with something novel that lies outside what we already knew," he says.

### Quality in Design Solutions

Thomas Markussen says that designers have traditionally attempted to introduce new and unknown technologies under cover of something familiar.

"The widespread success of the Personal Computer in the 1980s was possible because people found it straightforward to operate it using the graphic icons for folders, documents and other everyday workplace objects. But the design of today's digital artefacts requires something more than that," he says.

Thomas Markussen points out that many products are designed with the specific objective of challenging the familiar and our conventional notions.

"These are products with their own aesthetics, functionality and material properties that provide a new type of interaction with the products by engaging many more aspects of the user experience. With my dissertation I wanted to develop a theoretical framework to describe our encounter with today's interaction design," he says. As basic research the project thus contributes knowledge about the factors that ensure quality in design solutions.

### Interpretation of New Experiences Through Blending Theory

In his efforts to describe what happens when our understanding is challenged in the encounter with something novel, Thomas Markussen applies theories from cognition research. In particular, the theory of *conceptual integration networks*, also known as the *blending theory*, has been a key tool in the development of a new conceptual framework.

The blending theory was interesting to Thomas Markussen because it offers an interesting set of ideas about our way of interpreting and understanding novel experiences.

"I wanted to describe in words what actually happens when we encounter something novel. And here, the blending theory, which was developed by Gilles Fauconnier and Mark Turner, offers a new approach. They demonstrate how the encounter with unforeseen events in everyday life involves a complex exchange between the novel and the familiar. Rather than one being transferred onto the other, a conceptual integration takes place that provides a new framework of explanation and understanding. Various meanings cross-connect, and that explains how we're able to make sense of an ever-changing world and experience it as coherent," Thomas Markussen explains.

### Focusing on the Body

Thomas Markussen also wanted to highlight the fact that today's interaction design has moved up close to the human body.

"Today, interaction design often requires a much more complex physical interaction than it used to. Therefore, to me, a key issue for current studies of interaction design is to understand how people construct meaning based on their embodied interaction with technology," says Thomas Markussen.

### A Robot that Takes Blood Samples

One highly body-oriented product that Thomas Markussen has explored in depth is a range of robots for taking blood samples that is being developed under the name *RoBlood* in a collaboration that involves Kolding School of Design, Robocluster, Vejle Hospital and the New Odense University Hospital. The background for the project is that blood tests are widely used in diagnostics, that an ageing population means a greater demand for blood work, that the task is routine and physically demanding, and that there will no doubt be less staff available in the future to take blood samples. Thus, a robot may be the way to go.

### Safe in the Robot's 'Hands'?

"RoBlood operates in a cross-field of function and emotion. There can be something scary and threatening about robots; just think



The Dolphin prototype uses the organically shaped arm rest to keep the patient's arm in the right position without actually fixating it and to conceal the needle in order to prevent the sort of 'visual stress' that can be associated with seeing the needle go in. With soft materials, the arm rest aims to make the patient relax, both in order to ensure a positive experience and in order to make the blood flow more freely. Thus, there is a deliberate effort to address the incongruence between the 'hard' robot and the desire to provide a 'pleasant' experience.

"With the blood sample robot it is important to address the culturally charged expectations. Thus, the RoBlood project and the resulting prototypes, Sessio and Dolphin, are characterised by an effort to produce an organically shaped arm rest that provides something resembling an embrace of the arm," says Thomas Markussen.

*Design: Kolding School of Design 2007 (Torstein Helgason, Nils Koster, Johan Kristiansen & Michael Larsen)*

of the portrayal of robots in films like *Terminator* and *The Matrix*. We are used to seeing robots manipulating inanimate objects such as the assembly line in the automotive industry or in the form of a rolling vehicle on Mars, while many find it anxiety-provoking to imagine robots intervening directly in the human body," says Thomas Markussen.

"With the theoretical tools from my project, the project can be characterised as having a built-in *sensory incongruence*. On the one hand, it involves something unpleasant and inorganic, and on the other hand it has the clear objective of making the robot appealing and aims to utilise the fact that we associate an embrace with something pleasant. This sensory incongruence leads to a complex process of interpretation, which is mental as well as bodily, and which my approach may help describe more precisely by means of models from the blending theory. The models draw a picture of the experiential elements that designers must bear in mind if they wish to alter future patients' expectations of and behaviour toward robots," Thomas Markussen explains.

### Theoretical Research

In an environment where the main focus is on design praxis and practice-based research, Thomas Markussen's dissertation stands out by having a strong theoretical focus. This puts the project in the category of basic research, which essentially is about seeking new knowledge and understanding.

"In the project, I was particularly interested in the theoretical discussion in order to look behind some of the factors in interaction design. Theoretical research can be seen as the development of a series of mental scenarios that can subsequently be tested, for example in cooperation with students," says Thomas Markussen.

In his job as an assistant professor at the Aarhus School of Architecture, Thomas Markussen now faces a phase of empirical testing.

"I'll be applying the theory in a generative fashion, that is, I'll investigate how we might be able to operationalise and systematise the theory to make it a useful instrument for designing user experiences in interaction design. Ultimately, this is about creating more aesthetic and richer sensuous experiences through digital products," says Thomas Markussen.

On Friday 23 April 2010 at Kolding School of Design, Thomas Markussen successfully defended his dissertation *Conceptual Blends in Interaction Design. Toward a Cognitive Semiotic Framework for Online Meaning Construction and Embodied Interaction*.

#### Evaluation committee:

- Professor Ellen Tove Christiansen, Aalborg University
- Associate Professor, Ph.D. Johan Redström, Interactive Institute, Kista, Sweden
- Associate Professor Hans Feldthusen, Aarhus School of Architecture

#### Supervisors:

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Cover: Blur Building at Expo.02 by Lake Neuchâtel in Switzerland plays with the conceptual framework that we activate when we encounter architecture. Instead of the traditionally solid structure and massive appearance of a building, Blur Building consists of water that is pumped up from the lake and then finely distributed through 31,500 high-pressure mist nozzles. The building produces a new type of space that requires a reorganisation of our understanding.

*Photo courtesy of Diller Scofidio + Renfro*

### DANISH CENTRE FOR DESIGN RESEARCH

The Danish Centre for Design Research DCDR comprises the design researchers at the Aarhus School of Architecture, The Danish Design School, Designskolen Kolding and the Royal Danish Academy of Fine Arts, School of Architecture. The DCDR aims to contribute to establishing a strong design research environment in Denmark and to strengthen the exchange of knowledge about design research and facilitate the identification of potential areas of collaboration for researchers, schools and enterprises, on a national as well as an international level.

### MIND DESIGN

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