

# THE MEANING OF BIOTIC ARTIFACTS - STUDIES ON FRUIT AND VEGETABLES

DOCTORAL CONSORTIUM

JOHANNA KLEINERT

RESEARCH ASSISTANT / INDUSTRIAL DESIGN

TECHNISCHE UNIVERSITÄT MÜNCHEN

JOHANNA.KLEINERT@TUM.DE

## ABSTRACT

This paper presents the plan of a research project that started in April 2015. The topic of this study are agricultural crops and their property of being both natural and artificial at the same time. To describe such living organisms at the intersection between the natural and the artificial world, one can use the terms “biotic artifacts” or “Biofakte” in German (Karafyllis 2003). This paper defines the state of research that is the basis for my work. Additionally, I explain the research design, the questions, methods and goals of this study. In the end, I give an insight into the first results of a photo study. In the research project I want to explore the meaning and materiality of biotic artifacts from a designerly perspective. The divergent meanings of biotic artifacts, viewed from the perspectives of various stakeholders will be made visible in a model. Additionally, I want to develop scenarios for possible future ways of dealing with biotic artifacts.

## INTRODUCTION

Agricultural crops like grain, fruit and vegetables have always been designed things: Their growth, form, taste and the time for harvest have been influenced by humans over thousands of years. Since the industrialization of agriculture however, this influence has expanded exponentially. With modern biotechnology, the possibilities of purposeful and broad intervention into living organisms are becoming even more numerous.

The objects that are produced with the help of those technologies can hardly be classified in our traditional categories of man-made, inanimate artifacts and given, living nature. One aim of the research is therefore to develop a new interpretative framework for biotic artifacts. This study is part of a research network of six separate research projects. The different disciplines that are taking part are sociology, history of technology, philosophy of science and sociology of science. All these research projects will be about the materiality and semiotics of agricultural crops. The precise research subjects are mainly grain like corn and wheat. For the design research project however, I want to investigate fruit and vegetables – as they normally don't come to market in a processed form, but they are immediately experienced as objects.

## THE PROCESS

In the first step of my research project, I want to examine the materiality of fruit and vegetables through a photo study on several varieties. Afterwards I want to explore the meaning that biotic artifacts have for various stakeholders – such as consumers, merchants, producers and plant breeders. On this basis I want to develop a model that shows the various perspectives on the meaning of agricultural crops. This model will be based on few examples in the field of fruit and vegetables, but it should express insights that apply to agricultural crops in general. In a third step I want to develop scenarios that show possible future ways of dealing with artificiality and naturalness of crops.

## BIOTIC ARTIFACTS AND DESIGN RESEARCH?

Why should biotic artifacts be a relevant topic for design research?

Biotic artifacts are especially interesting concerning materiality and meaning, and how the two concepts relate to each other. Answering this question for the complex field of biotic artifacts seems promising to gain insights that apply to other fields of design.

In recent years, designers are more and more working with digital media or doing conceptual work. So the outcome of this work is becoming more immaterial. Yet when it comes to food, we are faced with fundamentally material objects. We can explore the materiality of fruit and vegetables with all human senses: We can see the shape, colour and surface, we can feel the skin, if it is soft or hard, and of course we can smell and taste the fruit. Product designers are trained to work with the materiality of products and conceptualize new products in all their material aspects. So I expect that the exploration of the materiality of fruit and vegetables can be fruitful also for the work with other material objects.

Additionally, the search for the meaning of industrially produced things is one of the fundamental questions of design. Designers continually adapt products to the requirements of stakeholders, that continually shift according to the meaning of the products. Biotic artifacts are especially interesting when it comes to meanings, because they are ambivalent objects: They question the established distinction between inanimate artifacts and living nature. Traditional interpretative frameworks are dissolved and this leads to tensions and conflicts. One example can be the protests of European consumers against the cultivation of transgenic plants. At this point, a broad discourse is required, where new interpretative frameworks and new meanings of biotic artifacts can be negotiated. I want to explore, what designers as experts of visualization and communication can contribute to this discourse.

One main issue concerning the uncertain meanings of biotic artifacts is the material intransparency: The technical intervention is no longer visible in the appearance of the product. For the consumer, the artificial part of the product remains hidden, as do most of the other characteristics of quality. So the need for visual evidence of quality remains unsatisfied. Concerning the materiality and meaning of biotic artifacts I want to explore the question: What are the consequences of this non-visibility of the characteristics of quality? Defining an objects' characteristics and making those visible are fundamental design tasks. So I hope that exploring the consequences of non-visibility will lead to insights that can be transferred to other fields of design.

## STATE OF THE RESEARCH

Nicole Karafyllis, a philosopher of science and technology, brought up the German word "Biofakte" as a term for a new category of objects. In English, the term can be translated to "biotic artifacts". Biotic artifacts, in the understanding of Karafyllis, are composite beings with both natural and artificial shares. They are brought to life through a purposeful action of humans, yet they have the capacity to grow by themselves (Karafyllis 2003). So, both traditionally

bred plants or animals, as well as cells or organisms manipulated with the help of modern biotechnology can be called biotic artifacts.

Karafyllis divides biotic artifacts into three different categories, depending on the moment the technical action interferes with the organism (Karafyllis 2006).

So, the term of "Biofakte" stems from the discipline of philosophy of science. Still, from the side of history of technology and agriculture, there is one trend called "evolutionary history". It deals with the modelling of agricultural crops and animals as industrialized organisms. (Schrepfer & Scranton 2004).

Biotic artifacts, according to Bruno Latour, can be seen as hybrids: They are composite beings that are neither purely natural nor purely cultural. Therefore they provoke uncertainties and fears. Latour describes the expansion and multiplication of hybrids as a phenomenon of the modern age, that has only been made possible through the negation of the bare existence of hybrids. As a solution, Latour proposes to acknowledge the ambivalences of hybrids in order to slow down their multiplication (Latour 1995).

In his Actor-Network-Theory, Latour describes every subject and object as an actant in a network. Every actant is considered to possess agency. In this spirit, biotic artifacts are incorporated into the various networks of science, society and also nature. They are not only the results of these networks, they also constitute their own networks. So these two approaches by Latour can be used as a basis for this research.

In the sector of design or design research, I could not find any projects on the topic of the materiality and meaning of agricultural crops so far. This is not surprising, since the discipline of design normally is concerned with the development of industrially produced consumer or producer goods. Designers normally design artificial things instead of natural things. So, natural food is not a traditional design topic.

Biotic artifacts are definitely quite an unconventional topic for design research. Yet today, agricultural produce can be understood as industrially produced consumer goods. Because of that, I think the engagement with this topic can be worthwhile from a designerly perspective.

One standard work of design theory is the „theory of product language“, that was developed amongst others by Jochen Gros in the 1970s (Gros 1976, 1 & 2). Since then, the theory of product language has been continually developed further by many design theorists, amongst others by Dagmar Steffen (2000) and Bernhard E. Bürdek (2005). The theory systemises the diverse functions of products, focusing especially on the non-practical functions. For fruit and vegetables, those non-practical functions are particularly important. And as fruit and vegetables are perceived not only visually, but also through touch, smell and taste, the product language

is especially complex here.

Also building on the theory of product language, Klaus Krippendorff developed the theory of “the semantic turn”. Here, he explains how the form and function of a product more and more take a back seat, compared to the meaning the product represents to its stakeholders. In addition to this, Krippendorff describes a set of methods, that can enable designers to elaborate new meanings for new products in a dialogue with the future stakeholders.

So both approaches, the theory of product language and the semantic turn can be important links for the work with biotic artifacts and their meanings.

## PROBLEMS, METHODS AND GOALS OF THIS STUDY

In this research, I want to explore the following two working hypotheses:

1 The non-visibility of the characteristics of biotic artifacts leads to ambiguous meanings. The superior questions of this research are: What are the consequences of this non-visibility? How do people deal with this lack of perceptibility? What strategies are developed to identify the characteristics of biotic artifacts?

2 As designers work with visual tools, they are able to illustrate ambivalences. Thus they can contribute to discourses that allow to develop new interpretative frameworks for technological products with divergent meanings.

In the following section, I want to explain the three steps of my research project.

### 1 MATERIALITY

Question: How do fruit and vegetables look like? How do artificiality and naturalness express themselves in the materiality of fruit and vegetables?

Method: Photo study on six varieties of fruit and vegetables. Five exemplars of each variety will be bought at different merchants or producers. Then they will be photographed. I will keep written record of the weight, price, origin, date of purchase, and information about the variety.

Goal: I want to develop an understanding of the materiality of biotic artifacts. My goal is to uncover characteristics of fruit and vegetables that suggest artificiality or naturalness. In addition to this, I want to generate photo material that can be used as a basis for the stakeholder interviews.

The results of this first step will be briefly explained below.

## 2 PERSPECTIVES AND MEANINGS

### 2.1 QUALITATIVE INTERVIEWS

Question: What do biotic artifacts mean to diverse relevant social groups (consumers, merchants, producers, breeders, ecological groups etc.)? What is important to whom; and why? How do the stakeholders link materiality and meaning? What are the problems, risks and wishes that are associated with biotic artifacts?

Method: Stakeholder analysis, qualitative stakeholder interviews, analysis of the meanings of biotic artifacts to the individual stakeholders.

### 2.2 MODEL OF MEANINGS

Question: How can the analysed meanings be made visually accessible to the broad public? How can a model facilitate debate on this topic?

Method: Iterative design of a multi-perspective model on the meaning of biotic artifacts, public presentation of this model in an exhibition or on an online platform, discussion of the model with the public, further development of the model.

Goal: Design of a multi-perspective model on the meaning of biotic artifacts that is comprehensible to laymen and contributes to the public debate on biotic artifacts.

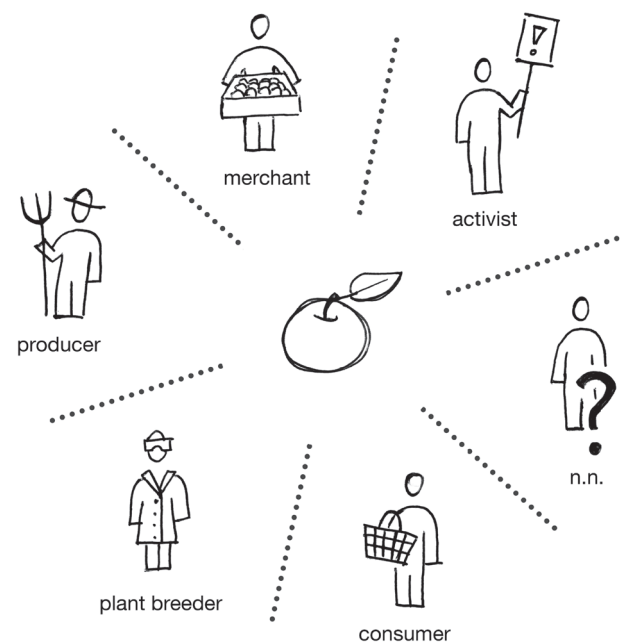


Figure 1: Diverse stakeholders and their perspectives on an apple

## 3 SCENARIOS FOR A FUTURE WAY OF DEALING WITH BIOTIC ARTIFACTS

Question: How can a future way of dealing with biotic artifacts look like? How can we facilitate more transparency and conscious decisions for citizens?

Method: Analysis of the requirements and wishes of the individual stakeholders concerning biotic artifacts, iterative design of scenarios for a future way of dealing with agricultural crops, elaboration and visualization of the scenarios using the example of fruit and vegetable species.

Goal: Development of scenarios for a more transparent and conscious way of dealing with biotic artifacts as a basis for a public discourse.

According to the competencies of designers, I want to apply both analytic and synthetic methods in this research project. In every step I want to generate knowledge, yet in various ways.

**MATERIALITY: THE PHOTO STUDY**

In the end, I want to give an insight into the results of a photo study that I already mentioned earlier.

The study is about naturality and artificiality in the materiality of fruit and vegetables. The following picture was found on a blog on organic food – obviously it is not a photo, but a result of picture editing. It shows what organic consumers would like to see:



Figure 2: This result of picture editing shows an imagined perceptibility of genetically modified organisms many consumers demand.

When looking at it, I wondered if one can really see those differences. To find it out, I went to five different merchants that represent the possibilities of buying fruit and vegetables in Germany. I went to one discounter, one supermarket, one farmer’s market, one organic supermarket and one Demeter market. As not everybody knows Demeter, here’s a short background information: Demeter is a very ambitious organic label founded by Rudolph Steiner. Demeter producers grow bio-dynamic fruit and vegetables. On the German market, people who care most about naturality, buy Demeter produce, that are rather expensive but also high quality. I bought all these fruits, took photos of them, kept record of weight, price and origin and made a graphical summary.

The goal of the study was to get to know the materiality of fruit and vegetables better, and to recognise characteristics in the materiality that suggest naturality or artificiality.

But, as you can see below, this is not as easy as expected: Looking at the cucumbers, one can see the biggest differences concerning the origin: The vegetables come from Spain, from Italy, from the Netherlands, and from Germany. The prices vary considerably: The Demeter cucumber costs more than five times the price of the discounter cucumber. The two cucumbers from Germany, so the ones with the shortest distance of transport, are the most expensive ones at the same time.

Yet, physically, the cucumbers are quite similar. The cucumber from the organic supermarket is of a different variety, that is why it looks different concerning size and surface. The other four cucumbers are of the same type and are quite similar in weight and size.

The Demeter cucumber looks special because of its uneven, bumpy, scarred surface. So visually, it seems to

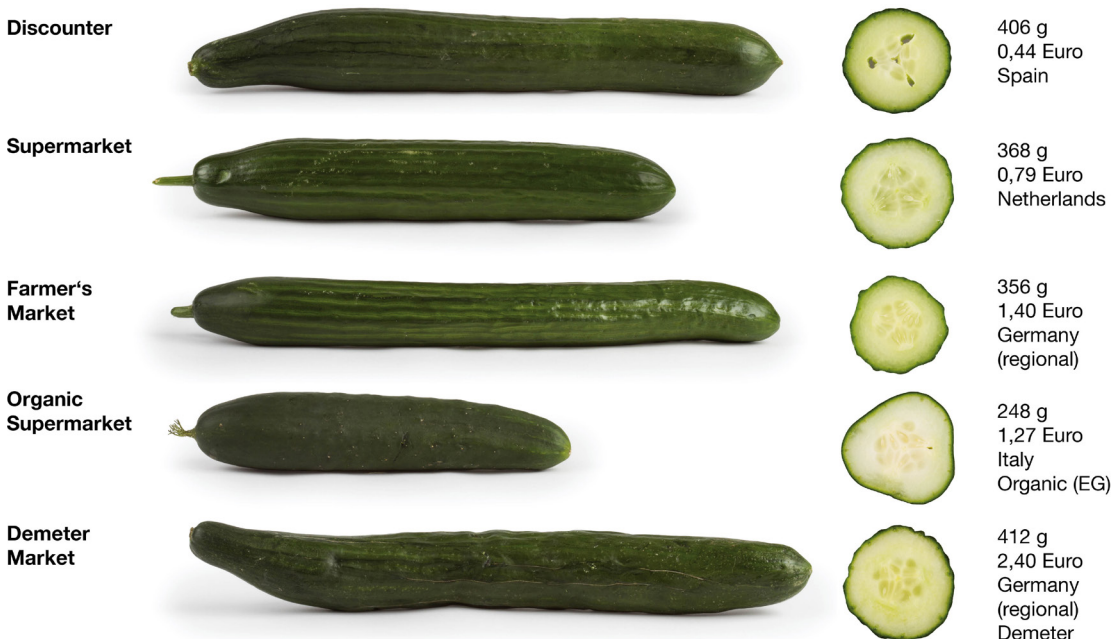


Figure 3: An overview of five cucumbers in comparison

be the most natural one.

The three cucumbers from the discounter, from the farmer's market and from the supermarket slightly differ in length, diameter, surface, texture and color, yet concerning naturalness and artificiality, I couldn't distinguish any differences.

These are also my first insights:

- Naturalness and artificiality are even less visible, than I previously expected. The fruits seem homogeneous.
- The most obvious differences of the fruits concern origin and price.

#### METHODOLOGICAL QUESTIONS:

To define the research design more clearly, I need to answer the following methodological questions:

- Which social groups are relevant for the study? Which interview partners do I have to acquire in order to develop a complete model?
- Which questions do I have to ask my interview partners, in order to be able to precisely analyse their perspectives on biotic artifacts?
- Which topics have to be shown in the model? How abstract or how concrete do I have to visualize the content?
- Do the scenarios have to be provocative and therefore more stimulating for discussions or shall I try to elaborate a compromise of all the requirements?
- How can I integrate tangible methods? Which ones would stick to the formulated research questions?

#### QUESTIONS WITH REGARD TO CONTENT:

- Is the main goal of the research more of an empirical-analytical or of a normative type?
- The first version of this paper concentrated more on the meaning of biotic artifacts, whereas in recent time the question shifted in the direction of the role of materiality. How can I explore the materiality in an appropriate manner?
- What is my specific strength as a designer in this research project? How can I do the research designerly?

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## IMAGES

Figure 1: drawing by the author

Figure 2: <http://www.agriculturenewsnetwork.com/2014/05/31/greek-eu-presidency-promotes-gm-crops-europe/> [Online]. [Accessed 21.1.2015].

Figure 3: photograph by the author

