BIOTEXFUTURE
TRANSITION LAB

CHALLENGING MENTAL MODELS!

INSIGHTS REPORT

28.07.2023

FAU

CONTENT


INTRODUCTION

MENTAL MODELS

Target system:
Algae-based product

Applied mental model:
Algae as a plant

“Mental models are naturally evolving models. That is, through interaction with a target system, people formulate mental models of that system. These models need not be technically accurate (and usually are not).”

1. *Understand the mental model of „algae as a plant“*
2. *Understand how consumers refere to this model when confronted with the traget system „algae-based product“*
3. *Understand how to challenge this mental model to overcome this reference*

Gentner & Stevens, 1983

RESEARCH QUESTION:

HOW DOES INTEGRATING CONSUMER FEEDBACK INTO BIO-BASED NEW PRODUCT DEVELOPMENT FACILITATE THE ADOPTION OF SUCH PRODUCTS?

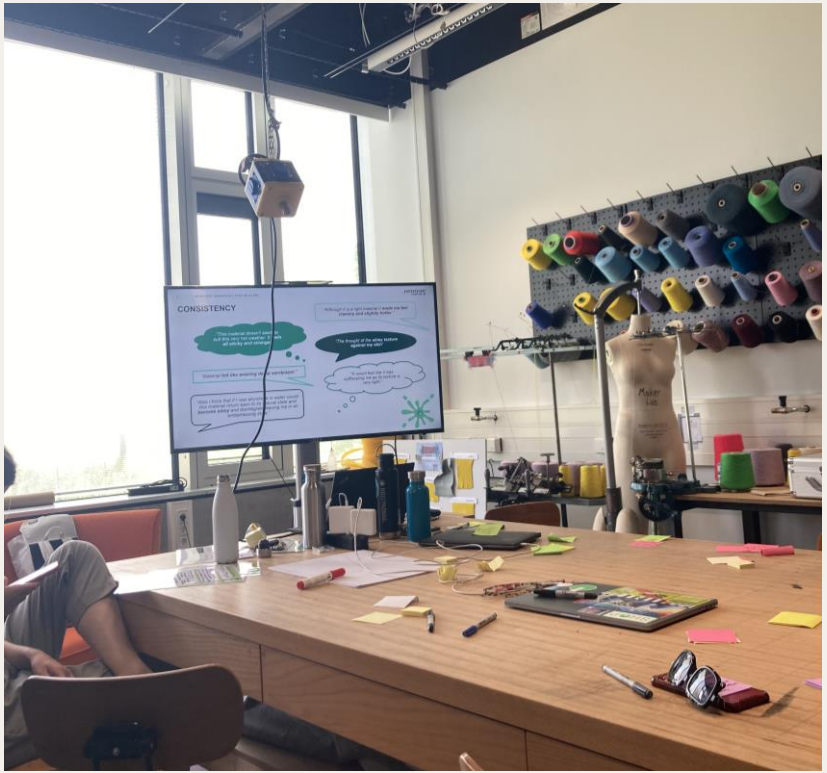

METHODOLOGY

BIOTEXFUTURE TRANSITION LAB

IN 5 QUALITATIVE STUDIES, WE LOOKED INTO THE INFLUENCE OF ALGAE AS A LIVING ORGANISM ON CONSUMER PERCEPTIONS

	Study 1	Study 2 and Study 3	Study 4	Study 5
Purpose of Study	Study 1 serves as a pilot study to explore consumers‘ associations towards algae and textile products made of algae.	Study 2 explores consumers‘ associations towards algae as a living organism. Study 3 deepens the associations with a larger data set.	Study 4 analyzes to what extent the consumers‘ associations towards algae as a living organism influence their perception of the final product (textile) and whether the influence is positive or negative.	Study 5 explores possible product design features to attenuate the negative consumer associations and communication strategies to enhance the positive associations.
Study Design	Consumer Interviews	Focus Groups (FG); Free Association Task (FAT)	Essay Task	Focus Group (FG)
Aim of Study	• Gain a first understanding of consumer associations towards algae and algae-based textile products • Map out a concrete research question that evolves from the consumer interviews	• Identify consumer associations towards algae as a living organism • Develop dimensions of algae consumer associations in order to later draw conclusions as to how relevant the dimensions are when evaluating algae-based textile products	• Identify dimensions of algae that impact (pos./neg.) consumer associations towards the final product (an algae-based textile).	• Develop communication strategies to support the positive attributes of algae • Develop product design features that counteract the negative attributes of algae

QUANTITATIVE RESEARCH: 5 ONLINE EXPERIMENTS


CONSISTENCY


RESULTS

QUALITATIVE STUDIES

BIOTEXFUTURE TRANSITION LAB

IN STUDIES 2 & 3, WE EXPLORED CONSUMER ASSOCIATIONS TOWARDS ALGAE AS A PLANT (N = 200)

STUDY 2 + 3

Dimension	Significant Examples	Mentions
Description	General (plant, nature, life, organism)	48
	Specific (seaweed, food, mold, fungus, moss, weed, bacteria, leaf)	48
Natural Habitat	Coastal (ocean, beach, rocks, sand)	80
	Inland (pond, river, lake)	56
	Other (water, aquarium)	70
Attributes	Appearance (floats, small, blooms, flowy, long, robust, wet)	50
	Consistency (slimy, slippery, sticky, furry)	90
	Color (green, blue, brown, dark)	163
	Associated Attribute (grows in high quantities, edible, nutritious, alive)	25
Attitude & Feelings	Negative attitudes and feelings (smelly, dirty, gross, cold, disgusting, murky, unpleasant, nasty)	57
	Positive attitudes and feelings (natural, cool)	13
Impact	Negative impact (pollution, toxic, bad, dangerous)	21
	Positive impact (sustainable, oxygen, healthy)	23
Related Associations	Animals (fish, frogs, bugs, other animals)	33
	Body (beauty, health)	6
	Specialty Foods (superfoods, sushi)	7
	Nature (nature, sun, summer)	7

IN STUDY 4, WE EXPLORED CONSUMERS‘ RELATIONS BETWEEN THE FEEDSTOCK AND THE FINAL PRODUCT (N = 200)

STUDY 4

Dimension	Significant Examples	Positive	Negative	Total
Description	General (plant, nature, life, organism)	3	1	4
	Specific (seaweed, food, mold, fungus, moss, weed, bacteria, leaf)	1	0	1
Natural Habitat	Coastal (ocean, beach, rocks, sand)	28	7	35
	Inland (pond, river, lake)	1	3	4
	Other (water, aquarium)	1	14	15
Attributes	Appearance (floats, small, blooms, flowy, long, robust, wet)	6	6	12
	Consistency (slimy, slippery, sticky, furry)	6	20	26
	Color (green, blue, brown, dark)	13	10	23
	Associated Attribute (grows in high quantities, edible, nutritious, alive)	4	1	5
Attitude & Feelings	Negative attitudes and feelings (smelly, dirty, gross, cold, disgusting, murky, unpleasant, nasty)	0	39	39
	Positive attitudes and feelings (natural, cool)	24	0	24
Impact	Negative impact (pollution, toxic, bad, dangerous)	0	4	4
	Positive impact (sustainable, oxygen, healthy)	132	0	132
Related Associations	Animals (fish, frogs, bugs, other animals)	0	7	7
	Body (beauty, health)	8	4	12
	Specialty Foods (superfoods, sushi)	0	0	0
	Nature (nature, sun)	20	1	21
	Total	248	117	365

BIOTEXFUTURE TRANSITION LAB

AGGREGATED RESULTS STUDIES 1-4

STUDY 1-4

Dimension	Significant Examples	Consumer Associations
Description	General *(plant, nature, life, organism)*	---
	Specific *(seaweed, food, mold, fungus, moss, weed, bacteria, leaf)*	---
Natural Habitat	**Coastal** *(ocean, beach, rocks, sand)*	**Connectedness to origin of material; good for the beach/ swimming etc.**
	Inland *(pond, river, lake)*	**Material evokes memories of a duck pond (smell, heat, sludge etc.)**
	Other *(water, aquarium)*	**Material not suited for water (e.g., could dissolve)**
Attributes	Appearance *(floats, small, blooms, flowy, long, robust, wet)*	**Durable and long-lasting material**
	Consistency *(slimy, slippery, sticky, furry)*	**Material would feel slimy and sticky on the skin**
	Color *(green, blue, brown, dark)*	**Will always have a green sting to it; would be a green color that resembles algae**
	Associated Attribute *(grows in high quantities, edible, nutritious, alive)*	---
Attitude & Feelings	**Negative attitudes and feelings** *(smelly, dirty, gross, cold, disgusting, murky, unpleasant, nasty)*	**Material could have a bad smell (e.g., of fish; while sweating etc.); material would be disgusting**
	Positive attitudes and feelings *(natural, cool)*	**Innovative and cool material; creates a feeling of empowerment/ purpose**
Impact	Negative impact *(pollution, toxic, bad, dangerous)*	**Unsustainable farming, use of marine resources**
	Positive impact *(sustainable, oxygen, healthy)*	**Sustainability of product and production process**
Related Associations	Animals *(fish, frogs, bugs, other animals)*	**Material could attract animals (insects, fish etc.)**
	Body *(beauty, health)*	**Material is good for the skin / people with allergies**
	Specialty Foods *(superfoods, sushi)*	---
	Nature *(nature, sun)*	**Connectedness to nature; product should be worn in nature**


POSITIVE
ASSOCIATIONS

BIOTEXFUTURE TRANSITION LAB

IMPACT

Insights Study 4

STUDY 4

*"I had heard that it is much more **sustainable and good for the environment**, which was its main selling point to me."*

*"It would be good to wear this clothing everyday if it was **better for the planet** and I would want to encourage others to wear it too."*

*"I would feel pretty good about the presumable benefits, regarding **sustainability, and biodegradability** of such a material."*

*"Changes like this help me become **more responsible to the environment**."*

*"It would encourage me to keep on **living a sustainable life** too."*

*"I couldn't help but feel a sense of pride knowing that I was wearing a shirt made from an **innovative and sustainable material**."*

BIOTEXFUTURE TRANSITION LAB

NATURE & NATURALNESS

Insights Study 4

STUDY 4

"I feel that the algae-based material allows me to do this, ***being kind to nature*** *and feeling better about the planet. By doing so,* **I am at one with the world I wish I was in**.*"*

*"**As the sun beat down on me during my hike**, I couldn't help but be grateful for my new algae-based t-shirt."*

"Knowing that it was made from algae cultivation ***made me feel even more connected to nature***."

"I always explore the nature around us and it would make me happy knowing ***my t-shirt reflects my attitude towards the energy that surrounded me*** *in the moment I stopped."*

"When it has finished its life as a t shirt it will simply bio degrade and ***return to the natural world***."

BIOTEXFUTURE
TRANSITION LAB

COASTAL

Insights Study 4

STUDY 4

*"I feel like as it **comes from the sea** it will naturally adapt to the water."*

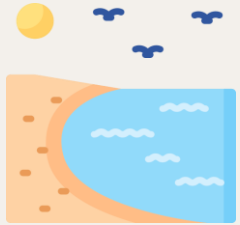
*"**Going down to the beach** in this top will make me feel that I am helping the planet."*

*"It felt perhaps a little silkier than a cotton t-shirt, **as if I held the sea itself in my hands**."*

*"I visited the beach to **be at one with the sea creatures, it allows me to feel closer to them […] even when I am not the same as them**."*

*"I would wear this t-shirt on a summers day out to the **seaside** with my family."*

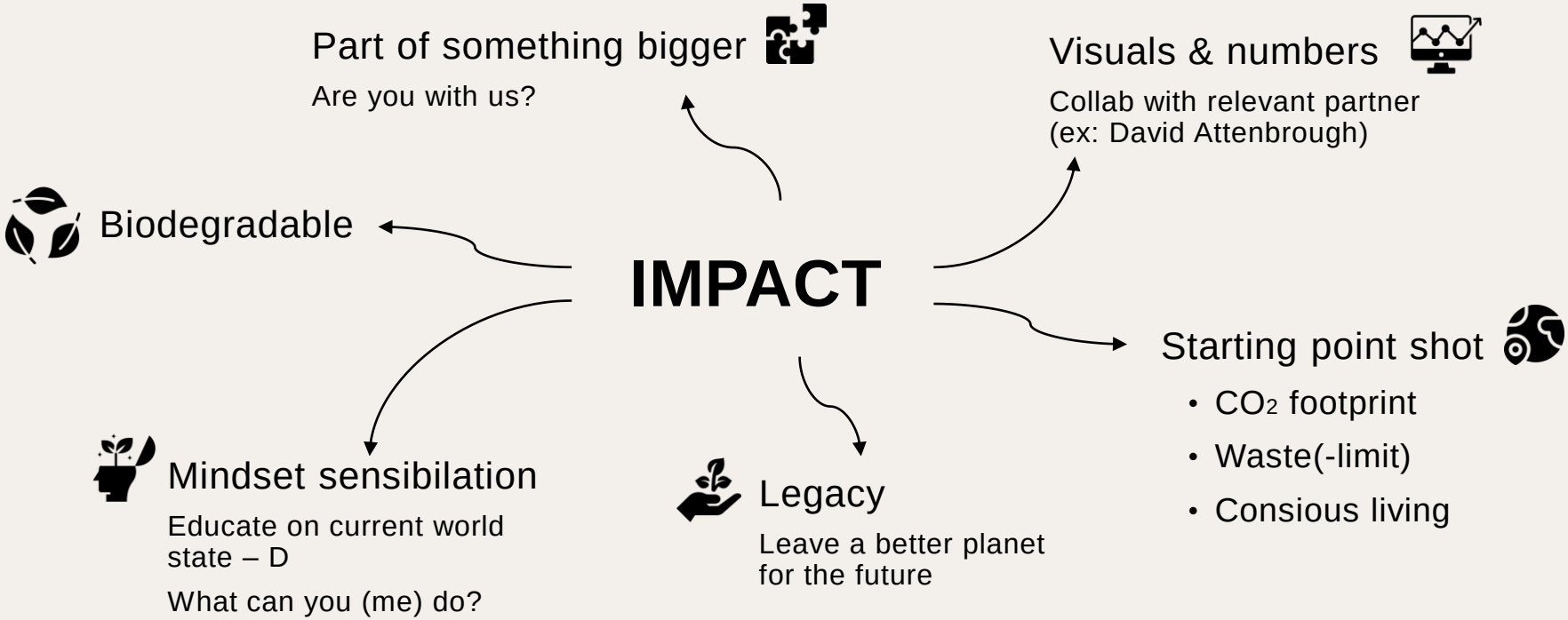
*"Having been **produced sustainably from algae on the ocean floor** would put me in the right mindset to go thrifting for other sustainable and ethically-made clothes to fill-up my wardrobe."*



BIOTEXFUTURE TRANSITION LAB

IN STUDY 5, WE DEVELOPED THREE STORYLINES SURROUNDING POSITIVE ASSOCIATIONS

STUDY 5



BIOTEXFUTURE
TRANSITION LAB

IN STUDY 5, WE DEVELOPED THREE STORYLINES SURROUNDING POSITIVE ASSOCIATIONS

STUDY 5

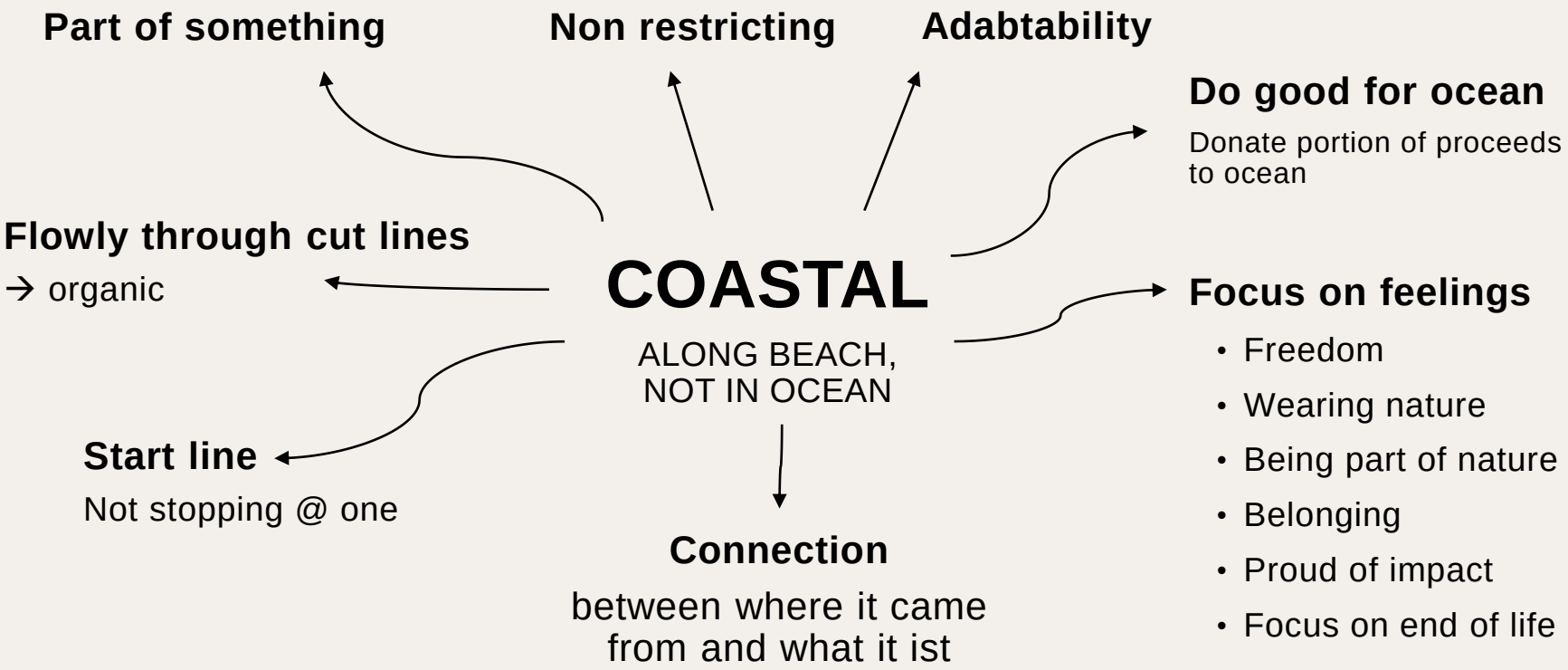
A Forest, Water, no sound (noise cancel)

STORE **B**
- Silent room
- Video installation
- Forest sound

BIOTEXFUTURE TRANSITION LAB

STUDY 5

IN STUDY 5, WE DEVELOPED THREE STORYLINES SURROUNDING POSITIVE ASSOCIATIONS




NEGATIVE
ASSOCIATIONS

BIOTEXFUTURE TRANSITION LAB

STUDY 4

WATER

Insights Study 4

*"I think of a rainy day where I am on my way to an important job interview**. I think algae based fabrics absorb a lot of water and I would not want to be soaked pretty easily like that**."*

*"I have realised that one place you don't want to be wearing it is in the water ! […] **The t-shirt started to dissolve while I was wearing it** , and literally returned back to the water! So don't go swimming in your new algae t-shirt !"*

*"Worst of all I was told it was safe to wear in the water. However when I wore it for sun protection whilst snorkeling **it fell apart and attracted all the most unwelcome kinds of sea life** […]"*

*"I'd be worried of it becoming slimy or **disintegrating in the water."***

*"I would not want to wear an algae based t-shirt, I don't know the durability of it, **I wonder if I go in the water whether it will turn to mush**. Surely this cannot be stronger than normal cotton based t-shirts"*

BIOTEXFUTURE TRANSITION LAB

CONSISTENCY

Insights Study 4

STUDY 4

*"Although it is a light material it **made me feel clammy and slightly hotter**."*

*"This material doesn't seem to suit this very hot weather. It **feels all sticky and strange**."*

*"The thought of the **slimy texture against my skin**"*

*"Material **felt like wearing damp sandpaper."***

"It would feel like it was suffocating me as its texture is very tight."

*"Also I think that if I was anywhere in water would this material return back to its natural state and **become slimy** and disintegrate leaving me in an embarrassing state."*

BIOTEXFUTURE TRANSITION LAB

FEELINGS

Insights Study 4

STUDY 4

*"I just couldn't imagine wearing **something that was once a slimy green plant."***

*"I met my girlfriend for lunch and she came in close for a hug and said **I smelt like the ocean**"*

*„It would probably **smell**"*

*"I would be stressed so maybe excessively sweating and **I would worry that this would cause the t-shirt to smell**."*

*"I don't think that wearing an algae made product would be good to wear indoors at social events, as the smell would be awful, like **a decomposing smell**"*

*"I pulled the t-shirt on and it **had an odd fishy smell** […] but I wanted to give this a chance and see if this sort of material can hold up to day to day wear"*

BIOTEXFUTURE TRANSITION LAB

STUDY 5

IN STUDY 5, WE DEVELOPED PRODUCT DESIGN FEATURES TO COUNTERACT NEGATIVE ASSOCIATIONS

Insights Study 5

Product Design Features	Description
Print	Technical, metallic graphics to indicate performance and innovation
Bright colours	Bright colours, especially those that do not wet out to indicate strength and resistance
Waterproof material	Waterproof materials and water sports products to take up water aesthetics and indicate water resistance
Lightweight and breathable material	Raised textures and materials that allow the air to pass to reduce skin contact area and do not stick to the body
Robustness and durability	Thick and durable materials and reinforcement of seams and details to indicate robustness
Branding or label	Use brands or product categories that inicate performance, add respective labels to transfer performance associations
Stretchy structure	Stretchy materials and structures that highlight this characteristic to indicate high quality and material strength
Responsiveness to environment	Activation of the material, phase change to indicate adaptability, performance
Antimicrobial finish	Antimicrobial finish to indicate freshness and resistance to odors and stains
Additives	Additives (perfumes) to indicate freshness and resistance to odors

QUANTITATIVE STUDIES

BIOTEXFUTURE
TRANSITION LAB

GOING FORTH, WE WILL TAKE THE FOLLWING NEXT STEPS

1. Conduct second **expert focus group** to collect more product design features / verify existing ones

2. **Product Design feature selection process**: select three features to continue quantitative research with different groups of people

3. Verify final **quantitative framework** in experimental studies

BIOTEXFUTURE
TRANSITION LAB

CHALLENGING MENTAL MODELS!

Please reach out for feedback and questions to:

Lauren Anne Mackintosh[a], Hannah Altenburg[a], Christian Baccarella[b], Kai-Ingo Voigt[a]

[a] Friedrich-Alexander Universität Erlangen-Nürnberg, [b] Universität Bonn

Corresponding Author:
Lauren Anne Mackintosh, FAU Erlangen-Nürnberg, Lange Gasse 20, 90403 Nürnberg, lauren.anne.mackintosh@fau.de

Please reach out for full report,
feedback and questions to

Franziska Seehausen
Franziska.seehausen@adidas.com

Bundesministerium
für Bildung
und Forschung

The innovation space BIOTEXFUTURE
is funded by the BMBF

Further information can be found here:
www.biotexfuture.de