Designing Human Behavior

How persuasive design methodology translate into the designer work process, and can be used in guiding user behavior for planning sustainable habits

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ABSTRACT

Daily habits for us humans often work themselves into repetative systems and behavioral patterns that can be very be difficult to break. As these behavioral patterns is proven to cause environemental damage that has consequences for the both the loss of biodiversity as well as affecting our common future, the field of intervention design and how to design for more sustainable behavior is developing in a range of different and interdisiplinary areas of study. A statement in this article also express that designers need to become better at coping with super-complexity, since making design that matters means addressing the complex situations in important new design fields where design has the potential to play a crucial role. This article present three different behavioral models coming from connected, but different diciplines to compare and assess them according to how they translate into the designer work process.

KEYWORDS: Behavioral Models,Persuasive, Design for Sustainable behavior, Design process

1. INTRODUCTION

In the emerging field of persuasive design and design for sustainable behavior, the methodology around user mentality and how to change entrenched habits become of vital importance for the designer. There is little question around the fact that over-consumption and human behavioral patterns works in a adverse way; so that the general human lifestyle is in direct conflict with creating a sustainable future for generations to come. The designers role in this complex situation is therefore in a shifting perspective, and one that might need re-evaluation.

1.1 The importance of behavioral change

Proof of the need for behavioral change is clearly stated in The Millennium Ecosystem Assessment (MA), which was initiated by the United Nations and conducted between 2001 and 2005. It is a comprehensive analysis of existing information on ecosystem change from scientific literature, models and data-sets, and with approximately 1350 experts from 95 countries as contributing authors, the MA pinpoint several pain points the human population has to solve in order to just maintain our current way of living. [1]

The linkage between ecosystem services and human well-being is a crucial factor in the MA, and our increasing consumption habits press those ecosystems into performing less and less. As an example, food is considered a

provisioning ecosystem service. Natural resource exploitation and human eating habits have already created a shortage of food to sustain the world population today, and with the current development the problem will only increase in future. [1] Solutions and methods to affect user habit like the distructive eating patterns to more environmentally sound ways is obviously a important field.

1.1 How designers might help

If one acknowledge the idea that designers have the ability to influence user perspective and outlook on life, and might even have a responsibility to do so - then the question naturally becomes: how? A substantial amount of research is developing in this area, and this article will look at some of the models used to explain human behavior and how to design for behavioral change. The focus area is sustainable behavior, and how to create effecient intervention design by activly designing with and around the users mental barriers and facilitators. Human behavior is of course a complex system of concious and subconcious triggers, and the link between psychology and design is therefore a important topic both in the behavioral models and in this article.

As the theoretical models are developed with the intent to aid with persuasive design, they are in themselves also strengthening the natural links between user centered design, designer empathy and the psychology framework.

1.2 Implementing models in a creative design process

The motivation for writing this article is to try to examine what design for sustainable behavior actually means from a designers point of perspective, as well as figuring out how to best implement existing models on intervention design in the design work process.

With a itterative work system, a design process is often messy and the road to a solution can seem random and unhinged, even for the designer himself. There exist a variety of different theories about the creative workprocess, where terms like insight, incubation, illumination and different phases of the creative process is highlighted. As divergent and inconsistent as the individual process might seem, design thinking in it's core is said to be to synthesize; to process a diverse collection of information into a unified whole. [2]

The ability to grasp the complexity of a situation and still distinguish key insights is a important skill in the process. This often require a holistic view, but a practical approach, system or tool to work after. It is interesting to see if the behavioral models presented in this article actually help in this need for both detailed understanding of the overall context, yet practical guidance on the behavioral design strategy. The research topic for this article will therefore be;

- how the models for behavioral change translate into the designers creative work process

- to find common ground in the different behavioral models, by looking for similarities and differences between them

The three different behavioral models presented in this article is ; Foggs Behavioral Model (FBM), The Comprehensive Action Determination Model (CADM) and The Design with Intent Method (DwI). After a short introduction into the field of persuasive design and persuasive technology, as well as design for sustainable design, each of the three models/method will be presented. The models are presented with a detailed focus on how the components in them work as direct predictors of behavior.

A case study on how the three models and the predicting components in them can translate into a active, working design process is then used as en example. The case study had as intent to develop a strategy for behavioral change. In the discussion the three models are evaluated according to similarities and differences, and how they overall translate into the design process.

2. METHODS

This article is written as a literature review of several articles related to the terms of persuasive design and technology, intervention design, ecological behavior, design with intent and how to affect human behavior through design. The three behavioral models Foggs Behavioral Model (FBM), The Comprehensive Action Determination Model (CADM) and The Design with Intent Method (DwI) has been an essential basis for the article, and are used as the main focus point for the research questions and discussion. Other articles are chosen to present the context and field of study that these models come from, as well as introducing other aspects of the creative work process and design for behavioral change.

As a case study, the design process of developing a strategy for commercialization of seaweed products for the Norwegian food market, is viewed through the lenses of the three models.

3. THEORY

3.1 Persuasive Design and the link to Persuasive Technologies

Persuasive design have a initial link to Persuasive Technologies and User Experience (UX). These technology ties come from the design of user interface and how it is possible to customize a user experience, often tailored to create a certain set of user outcome. Typical mediums could be games, applications, mobile phones or electronic devices. Persuasive Technologies are defined as intentionally designed to change user attitude or behavior, and becomes ecspecially efficient when it allow for interaction where the user's need, input or context shapes the output. [3]

The development of Persuasive Technologies have happened rapidly the last decades. Dr. Brian J. Fogg is a pioneer within the field, and coined the term 'captology' [4] in 1996, to describe the study of 'computers as persuasive technologies'. [5] Fogg claimes that as of today,

we are now surrounded by digital products designed to change what we think and do. [6] Evidence of this can be seen rather innocently in how Netflix encourage it's user to watch another episode, [6] and perhaps more alarming in how social network and games can creates user addiction.

Persuasive design systems use psychological principles to influence and utilize consumer and context in decision-making. It consider how to create user engagement and work with emotional and behavioral barriers and triggers to increase the chance for a certain action. It's a holistic design approach, that rely heavily on context based designer empathy and have a user centred point of view. [7] [8][9]

Currently, Persuasive Technologies is seen most commonly in commercial usage like games and webshops. It has however great potential in other areas like healthcare, environmental conservation and edication with its use of context based notifications, actionable information and subtle reward structures. Especially Persuasive Technology in health care has potential for great impact. This can for example be noticed in how the field of gerontechnolgy, which is the technology in service of healthy aging, is rapidly developing. [3]

3.2 What is Persuasive Design? Values, norms and momentarily change

In the same manner as Persuasive Technology, Persuasive Design then becomes something that is intentionally designed to change user behavior or attitude. Design for sustainable behavior in particular can have a broader, social perspective then traditional eco-concerned product design. In a wide sense it can target norms and values like cooperative behavior, personal responsability, health, well-being and democratic participation [10] In these cases one can therefore design for both longterm attitude change, momentarily behavior change or perhaps more likely; a combination of both.
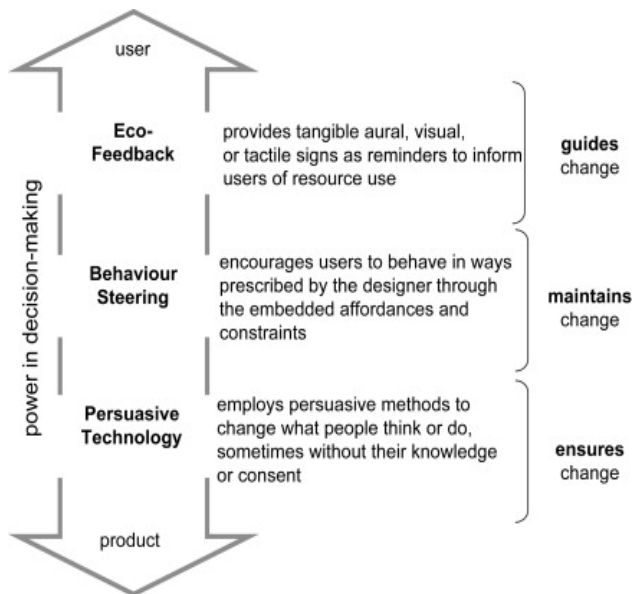
Figure 1: Strategies for designing for sustainable behavior [A]

Diffferent strategies when designing for sustainable behavior, and how to utelize one or a overlapping mixture of them is a important research topic. Mainly because it's important to know how to influence the user most effeciently, but also to maintain a level of personal choice and user in control. Figure 1 show how Debra Lilley classify potential strategies according to the degree of which the user or product has the power in the decision-making. [10] Consideration in this field is important, as persuasive design can be both annoying, intrusive and even ethical challenging since its invasive nature can be used in ways that blurs the lines to individual freedom of choice. [10]

3.3 Design for Sustainable Behavior and Environmental psychology

The link between psychology and design for sustainable behavior has been highlighted before, and in the field of environmental psychology the study of environment and behavior is given a particularly ecological angle. Daniel Stokols claims that they favour a practical approach and put greater emphasis on the utilization of scientific strategies to develop solutions than in most other areas within psychology. In addition, environmental psychology has a interdisciplinary approach [11], which really can benefit design research and create useful tools when designing for sustainable behavior.

One of the behavioral models presented in this article is therefore The CADM, developed within the field of environmental psychology.

3.4 Behavioral model : CADM [12][13]

In his 'A Comprehensive Model of the Psychology of Environmental Behavior – A Meta Analysis' Dr. Christian A. Klöckner presents the most common behavioral theories within the
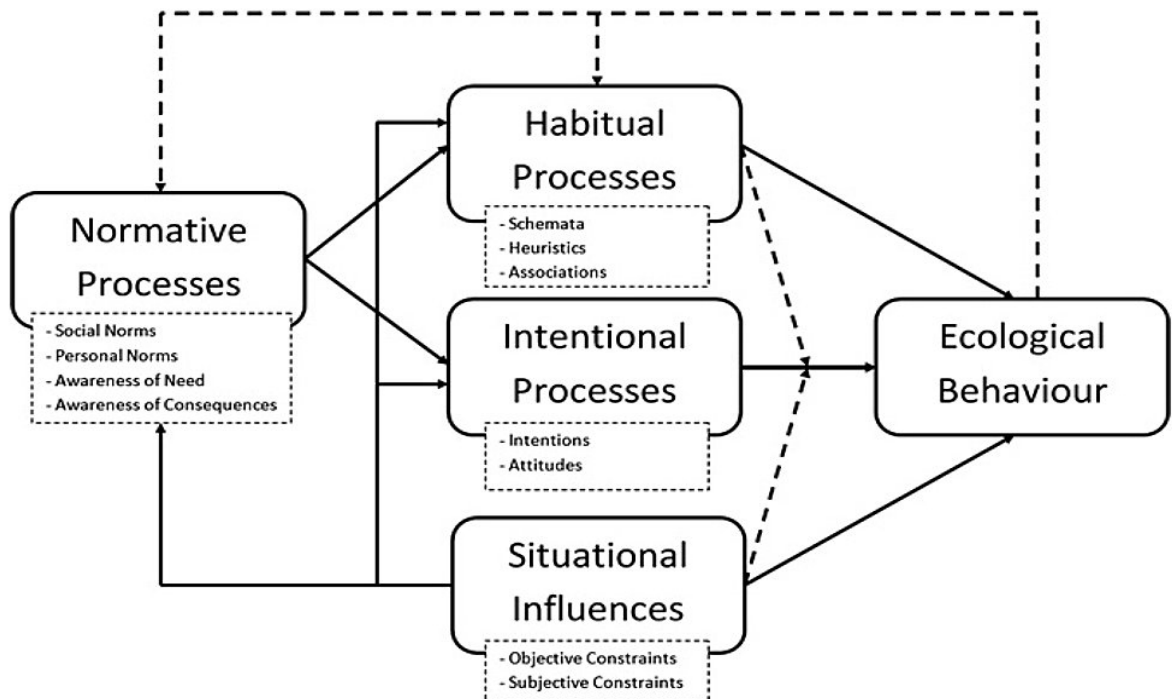

Figure 2: General sketch of the comprehensive action determination model [B]
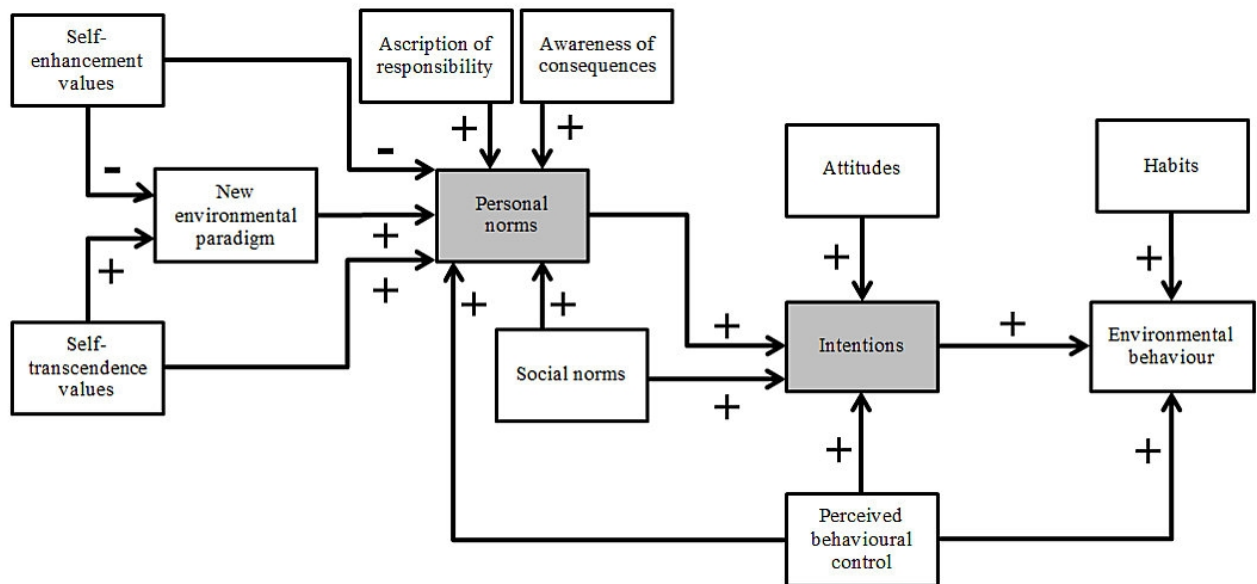
Figure 3:Graphical abstract of CADM [C]

field. These theories are The Theory of Planned Behaviour (TPB), The Norm-Activation-Theory (NAT) and The Value-Belief Norm-Theory (VAT). The theories all empathize different, or variations of different determinants to explain what drives human behavior in various sustainable choice of actions. Based on The TPB, The NAT and The VAT, Klöckner then propose one comprehensive model of the determinants of individual environmentally relevant behavior. [12] Earlier in his research this model was developed together with Dr. Anke Blöbaum from the Ruhr-University Bochum, Department of Psychology, and Blöbaum and Klöckner named the model The Comprehensive Action Determination Model (CADM). The CADM is categorized as a model of ecological behavior that incorporates intentional, normative, situational, and habitual influences. [13]

The CADM is in its essence, a model to show the underlying causes for a ecological behavior. It list habits, intention and perceived behavioral control as direct predictors of behavior. In the first illustration (figure 2) of the model from 2010 the CADM have a different layout, and use the wording of *situational influence.* However, the meaning is similar to the graphical model representation from 2013 (figure 3) where social and personal norms/ normative process are added to explain variation and predict intentions.

3.5 CADM: Habit, Intention and Perceived Behavioral Control [12][13]

This means that the three main underlying components to predict a ecological behavior is, presented in random order; 1) Habit, 2) Intention and 3) Perceived behavioral control. This is also confirmed by Klöckner, when he states that to simplify the model for easier understanding, then a reduced model should focus on these three component with attitudes, social norms and personal norms as determinants of component 2) Intention.

A key insight from the CADM, is that in order to design efficient environmental intervention design; the design can not only focus on attitude campaigns and value based intervention. The design must also focus on how it's possible to break with habit-driven behavior by providing concrete information on how the user can change, deliberately using contextual change and increase the social support in the behavior change. This means that equally important as creating a positive attitude, the design must also create a feeling for the user of mastering the situation, giving him the ability to perform the necessary act with information on what to do and how to do it. The stronger and more frequent a habit is, the more deactivating is needed to break strong habits and then change behavior. A suggestion from Klöckners paper, verified by Verplanken and Wood [12][14] is to utilize context change in the circumstances the habit

normally occurs in. This could be done by actively targeting users in naturally occurring transition phases (like becoming a parent or moving to a new country) or by inducing context change.

The CADM focus on providing a general framework for identifying internal and external predictors for various kinds of environmentally relevant behavior. Klöckner suggest that The CADM can benefit the practical design of intervention strategies since it identifies entry points for interventions as well as underlines how strategies can fail or need to be combined.

3.6 Behavioral Model: FBM [15]

The second model is The Fogg Behavioral Model (FBM) which is a model for understanding human behavior, created to help with analysis and design of persuasive technologies. It was constructed by Dr Brian J Fogg, founder of the Persuasive Technology Lab at Stanford University. The FBM explain human behavior as a product of three factors; Motivation, Ability and Triggers. In order for the target behavior to happen, all of the three factors needs to occur at the same time; the user must have sufficient motivation, be able to perform and be efficiently triggered.

3.7 FBM: Motivation, Ability and Triggers [15]

The three factors all have different subcategories, which for Motivation is the duality scale between 1) pleasure/pain, 2) hope/fear and 3) social acceptance/rejection. Fogg's Ability factor is based on the notion that humans are fundamentally lazy and resist any action that requires personal effort. The design therefore need to make the behavior easier to do, and the simplicity factors are: 1) time, 2) money, 3) physical effort, 4) brain cycles/ need to consider, evaluate or think hard, and 5) social deviance/ how much the user must break with societies norms to be able to perform. As the simplicity profile of each user differ, the most important thing about Ability to remember for a designer is, according to Fogg, situation and timing. This is because simplicity is directly related to what's a person's scarcest resource at the moment a behavior is triggered.

Successful persuasive design need to solve that barrier for the user when he is in the situation.

Timing is again linked to Triggers, which could be a noisy alarm, a sudden hunger, a written note or anything that reminds the user to do the intended behavior at this exact moment. As the joint combination of Motivation and Ability either fail or succeed to put the user above the activation threshold, a appropriate Trigger is the igniting catalyst. The first Trigger subcategory is 1) Spark; which is best used when Motivation is low. The spark could for instance utilize Motivation subcategory 3) reminding people that they can win social acceptance this moment if a certain behavior is displayed now. The second subcategory is 2) Facilitator, best used with low Ability to emphasize that target behavior won't require much effort or resource. A facilitator gives the user a prize (connecting with friends) while not demanding a resource like time (just one click to upload the whole address book). The third subcategory is 3) Signal, which is just a cue to remind about behavior when both Ability and Motivation is sufficiently high from before.

The most important thing about Triggers are correct timing. Triggers need to be given when the user is most susceptible to act, since a Facilitator Trigger displayed at a time when Ability is already high might seem irritating and annoying for the user. In the same fashion a Spark Trigger can seem condescending if the user have Motivation but lack Ability (like money), or if any other ill-timed Trigger is given at a time when user lack a predisponible resource to actually perform the target behavior. On the opposite side; when the combination of Motivation and Ability is customized to suit user in situation, and the Trigger is correctly being associated with target behavior and cued at the right time - then the persuasive design in the FBM is, according to Fogg, very efficient to change human behavior.
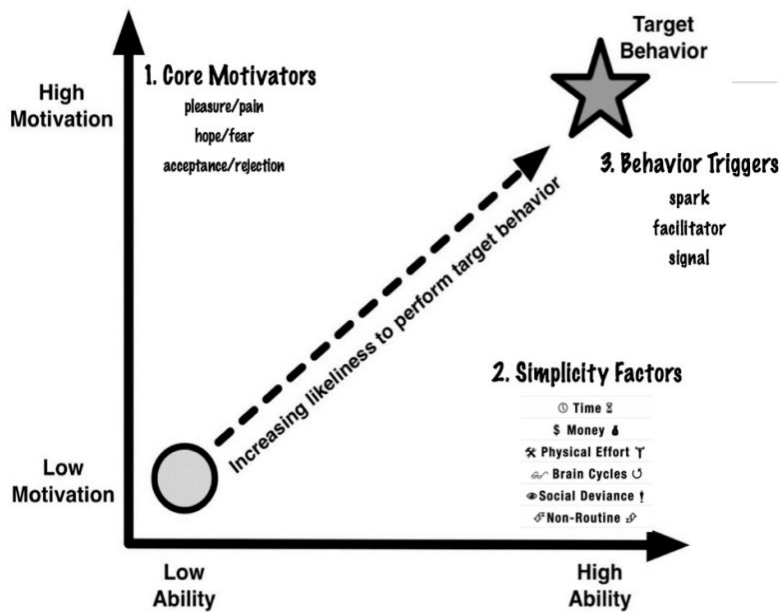
Figure 4: All three factors in the Fogg Behavior Model have subcomponents. [D]

The FBM is illustrated with a two axes system, where Ability form the X-axis and Motivation the Y-ace. Low Ability/Motivation is centered close to origo and high Ability/ Motivation is place at the end of their respectively axes. The chance of a desired user behavior to happen increase with rising Ability and Motivation, and the third component, Trigger is located in immediate distance for the starting position for a user to engage in a target behavior. The star is a illustration of the intended user behavior.

If the Motivation or Ability is low on one axis, then a higher score on the other axis might even the chance of the action. Fogg argues that in most cases, people are not on the extremes as they normally have a modest level of both Ability and Motivation – but a behavior must be Triggered, which is often the lacking piece in the puzzle of behavioral change.

3.8 Behavioral Method: DwI [16]

The third Method is The Design with Intent (DwI), developed by Dr. Daniel Lockton. Of the three systems, The DwI is the only one developed by a designer and Locktons motivation for creating it also originated with the realization that designers often work with behavioral change, but there is little guidance at the concept generation stage for design teams briefed with influencing user behavior.

The DwI draws inspiration from various research studies and fields, amongst others persuasive technologies and environmental psychology. Different to the CADM and The FBM, The DwI is a *method* that tries to gather excisting research on how to design for behavioral change, and regroup and systemize the information into a design toolkit and process working method. Lockton has kept on developing The DwI after paper publication, [17] but this article is based on The DwI presented in 'The Design with Intent Method: A design tool for influencing user behaviour' from 2010. [16]

3.9 DwI: Inspiration and Prescription [15]

The DwI operates with two modes that the designer(s) can chose to work from. The two modes are Inspiration and Prescription. In Inspiration the designer can chose to examine different design patterns on how to change behavior, grouped into six different disciplinary 'viewing lenses'. Presented in random order, these viewing lenses are 1) Architectural, 2) Error-proofing, 3) Persuasive, 4) Visual, 5) Cognitive and 6) Security. The patterns, illustrated with examples from different fields are meant to serve as a creative trigger for concept generation. The viewing lenses and their original design background is presented in figure 5.

The second mode, Prescription, make use of target behavior so that the designers identify a target behavior they hope to achieve through their design. The most applicable design patterns under the umbrellas of the six 'viewing lenses' is then presented with examples to serve as concept inspiration. Different form the Inspiration, the Prescription is based on a wanted target behavior and then 'prescribes' a set of useful design patterns. Prescription mode seem to be based on a diverge-converge pattern, where the designer goes from a specific problem to a general problem (target behavior) to a general solution (the recommended patterns) and back to narrowing it into a specific solution for the original problem.

Architectural lens	The Architectural Lens draws on techniques used to influence user behaviour in architecture, urban planning and related disciplines such as traffic management and crime prevention through environmental design (Crowe 2000; Katyal 2002; see also the Security lens). While the techniques have been developed in the built environment (e.g. Alexander et al. 1977), many ideas can also be applied in interaction and product design, even in software or services; they are effectively about using the structure of systems to influence behaviour
Error-proofing lens	The Errorproofing Lens treats deviations from the target behaviour as 'errors' which design can help avoid, either by making it easier for users to work without making errors, or by making errors impossible in the first place (Shingo 1986; Chase & Stewart 2002; Grout 2007). This view on influencing behaviour is often found in health & safety-related design, medical device design and manufacturing engineering
Persuasive lens	The Persuasive Lens represents the emerging field of persuasive technology (Fogg 2003), where computers, mobile phones and other systems with interfaces are used to persuade users: changing attitudes and so changing behaviour through contextual information, advice and guidance
Visual lens	The Visual Lens combines ideas from product semantics, semiotics, ecological psychology and Gestalt psychology about how users perceive patterns and meanings as they interact with the systems around them, and the use of metaphors (e.g. Saffer 2005; Barr et al. 2002)
Cognitive lens	The Cognitive Lens draws on research in behavioural economics looking at how people make decisions, and how this is affected by heuristics and biases (Kahneman et al. 1982). If designers understand how users make interaction decisions, that knowledge can be used to influence interaction behaviour. Where users often make poor decisions, design can help counter this

Figure 5: Six 'lenses' on influencing user behaviour [E]

4. CASE STUDY

4.1 Case Study: Changing eating habits and introducing seaweed to the Norwegian consumer market

In a cooperation with Seaweed Energy Solution (SES) and Northern Company, the project originally looked at how to clarify for consumer how seaweed products can be easily incorporated into the consumers everyday diet. In a strategic design project, the aim of the project was to arrive at a cohesive strategy for commercialization of seaweed products on the Norwegian food market, against the average consumer. The process towards a relevant strategy meant mapping out and assessing consumer mentality and behavior, to identify possible barriers and arguments that would affect designing for more sustainable consumer habits. The new consumer habit was to introduce and incorporate a unknown, but environmentally friendly ingredient to their already established diet.

The project was carried out as a user-centered design project, where consumer habits, mentality, beliefs and attitudes was charted through a online questionnaire, unstructured interviews and workshops with the intended user group, as well as expert interviews with environmental psychologists on behavioral change. The project also looked at the bigger context; environment, personal health, locally produced food, taste and traditional cuisine, sustainable industry and what resonated best with the user group as arguments for switching to more seaweed in their daily diet.

Seen through the lenses of the three models, the subjects investigated through the design insight phase was;

4.2 According to Fogg Behavioral Model:

- Possible **Motivators**:
  Health, environment, taste, cuisine, supporting local business, ecological

- possible **Abilities:**
  Price, time, access to ingredient, access to recipes, level of difficulty, amount of user investment in; learning recipes, information about ingredient and interest for introducing new ingredients in general to personal diet

- Conceptual 'language' for **Triggers:**
  Humor, curiosity, connotations and associations to summer memories, friends and social gatherings, nature experiences and national stereotypics, guerrilla marketing and 'word of mouth'

4.3 According to The Comprehensive Action Detrmination Model :

- Possible **Habits**:
  Time, price, type of diet, established dishes and go-to food in daily life

- Possible **Intentions**:
  Health, environment, taste, cuisine, supporting local business, ecological, keeping up to date in the social loop/ food trends, ideals and types of characteristics they wished to identify with (adventurous, foodies, wholesome, sustainable, cultural etc)
- Possible **Perceived Behavioral Control**: level of concrete information needed (recipes, ingredient , information) for *wanting* to change, amount of user investment in; learning recipes, information about ingredient and interest for introducing new ingredients in general to personal diet

4.4 According to The Design with Intent Method :

Note: The Design with Intent Method is meant to be used in the concept generation phase. In this project a lot of time was spent on gathering information about consumer habits and beliefs to map out the overall picture, and as a natural consequences the arguments, constraints and targeted user group started to emerge from the research. The Inspiration and Prescription presented here are therefore not according to the DwI method in a traditional sense, but rather a conceptual understanding on how Inspiration and Prescription to a behavioral problem can be solved through concept(s)-development during the research.

- **Inspiration:**
  Analysis of three existing seaweed companies in Northern Europe – identifying sales arguments and company values. These where 1) health as nutritious supplement, 2) wholesome, handcrafted and sustainable, 3) taste, locally produced and targeted cuisine (Nordic kitchen)

- **Prescription:** 'Wholesome'
  User interviews showed that people associated better with a wholesome approach to food and seaweed. In this wholesome-term they naturally incorporated values like locally produced, sustainable, honest 'food for feed' and healthy in a Norwegian,

rugged and natural way. Insights from the expert interview and also according to the CADM, was that habits are easier to change in transition phases. The user group was therefore young adults, 25-35 years old and the persuasion angle was curiosity, adventurous, culture and keeping up with the social loop and food trends.

4.5 The Wholesome concept: Motivation (FBM) and Intentions (CADM)

The Motivation (FBM)/ Intentions (CADM) arguments that the user resonated best with, was therefore local, sustainable, honest and natural healthy. Environmentally conscious or health as nutritious supplement was not motivators on its own, the users wanted the package and surrounding concept of 'wholesome' to be persuaded into trying something new and perhaps change their daily diet.

4.6 The Wholesome concept: Abilities (FBM), Habits (CADM) and Perceived Behavioral Control (CADM)

The constraining Abilities (FBM)/ Habits (CADM) was access to ingredient, access to recipes, level of difficulty in learning new dishes and amount of user investment finding recipes and information. Price and time was underlying drivers, so if the ingredient was too expensive or presented as a accessory rather then a substantial ingredient to the dish then the user would not prioritize seaweed. The time factor was how much time the user would spend on cooking in general in addition to finding recipes and learning it. The perceived behavioral control relates to mastering the introduction of seaweed to their diet, so easy access to recipes and information was vital.

4.6 The Wholesome concept: Triggers (FBM)

A important insight from the research was that the first obstacle for introducing seaweed to the Norwegian consumer market, was the lack of knowledge about the ingredient. People did not immediately associate Norwegian seaweed with something edible. When made aware that established dishes like sushi contains seaweed,

that they've probably eaten it already, that it is sustainable, healthy and it's a natural abundance of it in the Norwegian oceans, then the general opinion was very positive. The focus for the design challenge therefore changed during the process, and the main focus was to raise the knowledge and create curiosity about the product. The user group was still young adults, 25-35 years old and the persuasion angle curiosity, adventurous, culture and keeping up with the social loop and food trends. Guerrilla marketing and 'word of mouth' in urban areas was therefor chosen as the intended trigger platforms.

4.5 The Wholesome concept: elements combined into one strategy

The first goal became to raise knowledge about Norwegian seaweed as a edible ingredient, and the trigger method to bring it into the collective public awareness by a combination of humorous installations, enticing quotes, stencils and unexpected reminders in the town scape. The Guerilla push signals creates interest, allowing the user to discover the connected online information portal where they easily could understand 1) Why they should eat seaweed, 2) How and when they can eat it (recipes, product examples) , 3)How much they can safely eat of it, and 4) Where they can find it (be it in stores, or harvest themselves) As well as providing information for the consumers, this portal should also work as a mirror for the developing industry to see what seaweed people seem interested in, what kinds of recipes they want, and what questions they have. With a direct link to the consumers, the industry can focus on developing relevant products.

5. DISCUSSION

5.1 The need to understand behavior change - discussion

It was said in the introduction that the designer work process can be chaotic and the road to a solution seem random and unhinged, even for the designer himself. The reason for this is the amount of information and various clues that is *possible* to investigate further; all of them being a potential cornerstone in the contextual web that constitutes a design challenge.

The need for modern designers to grasp the complexity of a design problem, and consider the social, environmental and other surrounding aspects of it is an increasing demand. This is supported by the American design theorist Buchanan on a more general level. Buchanan pinpoint a essential part of the context that modern designers must work in, when he describes how traditional design in art schools differs from modern design education :

'(…) their (Art schools of design) vision and effectiveness grow fainter every year under the need for the young designers to have more knowledge and a broader humanistic point of view in order to deal with the complex problems they must face in their professional careers. [18]

The interest and development within the fields of design for sustainable behavior, design with intent, persuasive technologies and ecological behavior is a solid testimony of this change. Also how the genres mixed and transcends into one another to form new directions and find answers to complex problems that span multiple disciplines add to the body of evidence. Locktons Design with Intent Method is a direct response to this need for a multifaceted point of view, acknowledging that many study fields deal with design for behavioral change, but a common ground and method-exchange is favorable for more efficient use of existing knowledge. [16] This is also supported by Prof. Birger Sevaldson when he states that designers need to become better at coping with super-complexity, since making design that matters means addressing the complex situations in important new design fields where design has the potential to play a crucial role. [2]

Returning to the heart of the matter, Fogg also states that the reason so many attempts at persuasive design fail is simply because people don't understand what factors lead to behavior change. Without a rich understanding of human psychology as well as specific insights into the factors that drive human behavior, designers are at best guessing for a persuasive design solution. [15] Two problems then

emerges, which is 1) the need for designers to understand the underlying causes for human behavior and 2) the need to have a shared platform to combined knowledge from different disciplines.

5.1 How the models for behavioral change translate into the designers creative work process [12][13](15)[16]

In the research question on how the behavioral models translate into the designers creative work process, the three models target different aspect of the designers process. The CADM, by focusing on providing a general framework for identifying internal and external predictors for various kinds of environmentally relevant behavior, is helpful in the need for designers to understand the underlying causes for human behavior. It provides a very detailed overall picture on the complexity of human behavior, and underlines the many focus areas one should consider when designing for more sustainable behavior. To some degree the CADM model might even seem too complex when implemented in the design process, since the detailed display of considerations one should take can feel overwhelming and lead to a frustrating lack of creative direction and drive. In the case study, the sheer scope of the project by identifying so many behavioral and mental barriers and facilitators amongst the users, was one of the things that really created the greatest sensation of missing direction with the process.

This is interesting as Klöckner actually underlined simplicity as a reason for unifying the different behavioral models into one (The CADM), because it would be helpful from both a theoretical and practical perspective to reduce the complexity of environmental psychological theory. [12] Klöckner also suggest that The CADM can benefit the practical design of intervention strategies since it identifies entry points for interventions as well as underlines how strategies can fail or need to be combined. By collecting the most successful theories from environmental psychological and then create the CADM model to see how the variables relate to each other is indeed a more practical way of implementing scientific strategies, and to actually affect user behavior

in situation. Viewed through this lens, the feeling of loosing creative drive in the case study has more to do with the fact that one actually are designing in a super-complex environment rather then the model being to detailed.

On the opposite side from the CADM one have the Fogg Behavioral Model, which explains human behavior in a perhaps too simplistic way. The step by step process and explanation of different components in a effective persuasive design is without question a very helpful tool and makes the process of design much more manageable. Categorizing the component in the case study according to the FBM proved a very useful tool to get a overall picture on the different aspects of the behavior. However, by portraying a simplistic version one might also lack the finesse of changing user scenarios.

Another reason why the FBM might not apply directly to the super complexity of changing behavior like dietary change and introduction of a new ingredient like seaweed, is that the FBM was developed for persuasive technologies. Whereas the design for sustainable behavior like changing food habits have to consider external component like stress, work schedules, pick-up from kindergarten, accessibility of ingredient and time as well as internal norms like user dedication to health, environment or other personal values – most persuasive technologies exist within a more closed, easily controlled environment. The level of complexity and consideration in persuasive technologies should not be underestimated, but a legit question is still how well applied the FBM model actually is to behavioral change in real-time and ever changing contextual scenarios. On the other aspect, which is the need for designers to have a shared platform to combined knowledge from different disciplines, the FBM translate nicely into the designers creative work process since it is one of the most developed and tested strategies for design for behavioral change.

Another similarity between the CADM and The FBM is the focus on simplicity and habits, more then intervention design through value based motivation. Fogg clearly states that persuasive design succeeds faster if the focus is on simplifying the behavior rather then trying to

add on motivation. The reason for this, according to Fogg, is that people tend to resist motivational attempts but naturally love simplicity [15]. The CADM is also built up on the same view as it clearly states that intervention to change behavior should not only include attitude campaigns, but also focus on de-habitualizing behavior and concrete information on how to change. That entrenched habits are strong drives in themselves, and that people often do not consciously reflect about their behavior put tend to go for easy, simple and known rather then personal motifs are important factors in any intervention design.

The third strategy, The design with Intent Method is the one who aims to combine existing knowledge within different areas of expertise into one shared platform. From the case study it is difficult to estimate the efficiency of the DwI, since the design process took a different angle and the concept developed during the research more then in a specified ideation stage. But in its aim to combine and showcase different strategies The DwI actually follow the same procedure as the designers in the case study did intuitively. To actively seek out strategies, take inspiration and make general models out of specified solutions of how other solved design for behavioral change is exactly how the final concept and strategy developed in the case study. The design process did so on its own, without the need for The DwI as a concept generation tool but if anything that should be a clue as to why the DwI is probably a very helpful tool. If it is able to efficiently streamline the design for behavioral change, and eliminate the feel of losing creative drive under the magnitude of behavioral information then it certainly translate very well to the designer work process.

The likeness between the case study approach and The DwI approach could be testimony to a shared view amongst designers as well, as The DwI was developed by a designer. In some ways it might even be argued that the ability to grasp the complexity of a situation and still distinguish key insights is the common denominator in most designers creative work process.

What both the CADM and FBM provide to the design process, that is indeed a very helpful tool, is a common platform and jargon amongst the designers in the process. By applying word and terms to otherwise abstract concepts like motivational arguments and deeply entrenched behavioral patterns, they streamline the communication and process of identifying and categorizing the overall context in human behavior. The DwI also contribute to this common jargon as it list and classify existing behavioral models in a easy and accessible way. This common jargon is probably even more useful in interdisciplinary teams, then between just designers, as it create a shared platform of abstract ideas. This intention is also listed by Fogg as why the FBM model could be helpful for teams [15]

5. CONCLUSION

As a conclusion it is important to sum up that the further development of models and methods like The FBM, The CADM and The DwI seems vital, as designers in a increasing degree are faced with the super complexity in new areas and new design challenges. Models and Methods that provide a organized overview on how to categorize behavioral user information can help to find a angle for efficient intervention design. It might be argued that to synthesize and the ability to grasp the complexity of a situation and still distinguish key insights already is the common denominator in the designer work processes, so why should one need more models. However, since the models presented offer a framework to start working from they ease the burden so that designers faced with the brief of changing behavior can start from a joint understanding and build upon tested theories. The FBM and CADM are also behavioral models, made to simplify real-world human behavior into a easier, more recognizable patterns. This provides a framework, but also leave the designer free to customize their design should the design brief differentiate with components in the models. The DwI also forms a base of understanding and common jargon, while additionally providing information on similarities and applicability on different behavioral theories.

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