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Changing food behaviors in a desirable direction

Hendrik NJ Schifferstein

Affluent societies face several challenges involving the relationships between people and their food, including the rise of welfare diseases and the huge amount of food wasted. These problems are partly due to the operation of the market economy, in which companies develop products that cater to momentary desires of individual consumers. To tackle societal problems, we need to develop different approaches in line with people's long-term goals and providing benefits to the community, the environment, and society. To achieve enduring changes in behavior, designers can create series of interventions that address all stages people typically go through. In addition, designers, companies and users should be prepared to share the responsibility associated with the potential impact of new product introductions.

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Introduction

Given the large and increasing incidence of welfare diseases such as obesity and diabetes in many countries in the world, it is clear that societies face a major challenge to improve the health and wellbeing of their citizens [1,2]. In addition, food production takes up a large amount of natural resources, while at the same time a large quantity (>30%) of food is wasted [3]. If we could change people's behavior in beneficial directions (e.g. eat healthier, waste less food), these societal problems might be diminished substantially.

Pleasing consumers

The driving force in providing food supplies in most current societies is a market economy system: Companies produce products and services that people are

willing to pay for. In saturated markets companies compete for market share, and customers are likely to buy the products that offer the best value for the lowest price. To persuade people to buy their food products, companies try to optimize the sensory pleasure that people can derive from them. These seductive foods tend to be full of flavor, are typically either high in salt or sugar, and are often high in fat [4]. And because foods seem to be available anytime, anyplace, anywhere in many affluent societies [5,6], this makes them hard to resist. In times of emotional distress, consumers may use foods as a source of temporary relief and comfort due to their pleasurable sensory qualities or because specific foods remind them of former times or their home countries [7,8]. We should be aware that some companies have also studied how food preferences change with repeated consumption [9]. This enables companies to promote products of which consumers will eat and thus buy more. Furthermore, companies can make foods more accessible by delivering them at home and facilitating payment services (e.g. by using credit cards or smartphones) and the widespread availability of these foods is likely to enhance any adverse effects on people's health.

The information and education that government campaigns provide on healthy nutrition may serve to make people aware of what entails a healthy eating pattern. However, these cognitive interventions are unlikely to be effective in counterbalancing the everlasting, continuing stream of persuasive advertising and product offerings that people are presented with in their everyday lives [10,11], no matter how motivated they are to eat healthy. Companies could take up their societal responsibilities by developing healthier alternatives that are in line with nutritional guidelines and support their acceptance through packaging design and marketing campaigns [12,13]. However malevolent companies can also take advantage of any opportunities to deceive consumers [14]. For instance, a guideline that fruit juices are better than soft drinks may be misused by offering fruit juices with added sugar for children, whereas adding sugar eliminates the health benefit. Analogously, any strict rules on ingredient labeling and health claims may be surpassed by creative renaming of ingredients, rephrasing the intended health effects, or suggestive packaging images [15,16]. Hence, even packaged products that may look healthy may not be as healthy as they suggest. And, of course, even the relatively healthy food items in the end may have an adverse effect on health if people eat too much of them.

Aiming for societal impact

In their book ‘Designing for Society’ Tromp and Hekkert [17**] suggest that many of the problems that current societies are facing find their roots in companies’ focus on the desires and wishes of the consumer during the development of new products. It is important to realize that we, as food scientists, marketing researchers, product developers and designers, are partly to blame for the current health and environmental problems related to food. We are the professionals who helped companies optimize their food products and seduce potential customers to buy their products. Therefore, it is also imperative that we help companies and governments to develop new ways to support people’s healthy lifestyles, in a way that offer a sustainable future to all people involved and the communities they are part of.

Given the many stakeholders and processes that are involved in food production, distribution, preparation and consumption, we need to take this complexity into account and approach the food context as a system [18,19]. It is important to involve designers in transforming the food system, because they are explicitly trained to handle complex problems, in which only a desired value (why) can be specified, but both the means needed (what) and the process or working principle that will lead to the desired end value (how) are unknown. By examining the paradoxes in a specific field and taking a broader view on the issues at stake, designers can take a different perspective on the matters and create a new frame to tackle current challenges [20,21]. Seeing existing problems in a new light can help generating new types of solutions that were out of scope in the original problem framing. Designers have been trained to deal with situations with seemingly conflicting demands [e.g. eating whatever gives pleasure versus cooking in a socially responsible way] [22]. In contrast to other experts who may become discouraged by a situation with multiple conflicting demands, designers tend to regard the tension created by conflicting concerns as inspiring. Besides trying to resolve the conflict, designers may attempt to develop a strategy to moderate or deliberately trigger dilemmas in the design process [23].

Tromp and Hekkert [17**] distinguish between two main dimensions when comparing user-centered design versus society-centered design: (1) a shift from momentary, short-term concerns to long-term benefits (time dimension) and (2) replacing individual concerns by collective concerns of a larger group or society as a whole (people dimension) (see Figure 1). The time dimension will now first be discussed by examining approaches to support behavior changes that provide individual health benefits. Subsequently, moving from the individual level to the collective level is discussed by considering consumer behavior in relation to food waste. The final section of this paper is dedicated to ethical considerations that concern society-centered design.

Changing behavior to obtain long-term health benefits

Changing one’s behavior is a challenging task, as anyone who ever attempted to stop smoking, reduce alcohol consumption, or lose weight can testify. Even though many smartphone apps have been developed to improve food choices, their effectiveness in developing a healthy lifestyle is highly doubtful [24]. Although the end goal of the desired behavior change may be clear, it is unclear for people how they can get there.

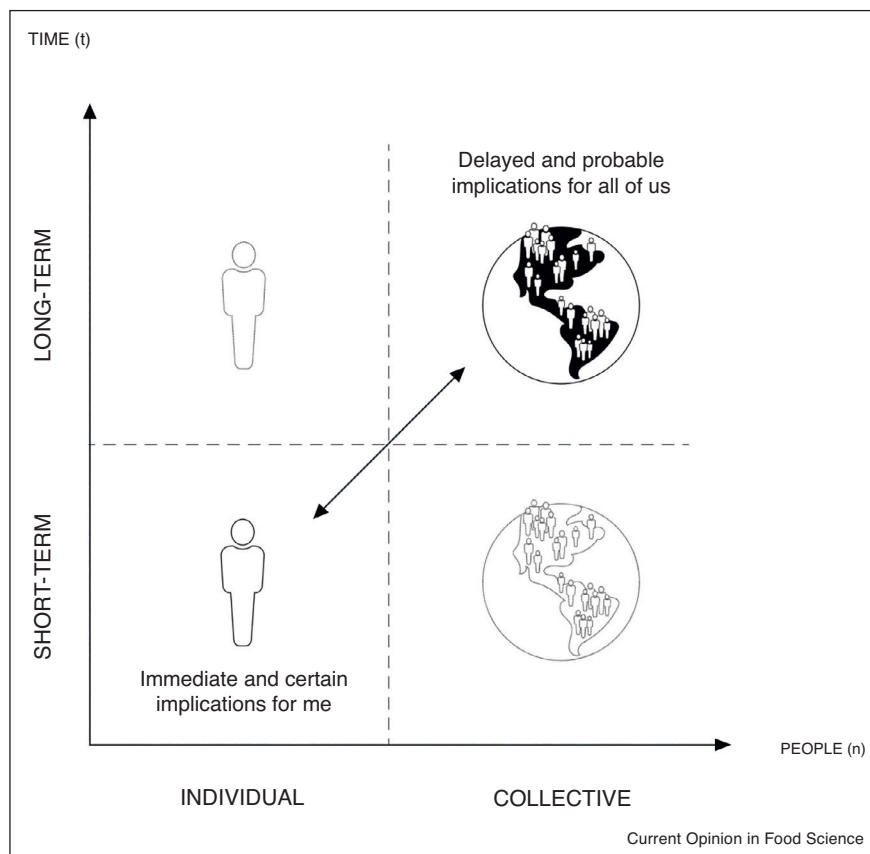
Because the process is challenging and complex, simple single step interventions are unlikely to result in long-term changes in behavior. Therefore, health professionals have developed behavior change models that describe a process of multiple stages. Each stage is characterized by a particular state of mind, and a subsequent step that can be prepared. Hence, in each stage we can offer interventions that will facilitate the transfer to the next stage. To obtain an enduring change in behavior, we need a coherent program of interventions addressing all stages, to optimally support transformation. The intervention programs health professionals have developed in this way typically include lifestyle guidelines and coaching sessions, and in some cases also eHealth applications using websites, smartphone apps, or chat and email functions [25]. Designers could supplement these with additional means, like graphical images, objects, and additional digital products (e.g. games) that guide people through stages of change [26].

Following this line of thought, Ludden and Hekkert [27,28] defined four consecutive design aims on the basis of the stages in the transtheoretical model of behavior change [29]:

- 1 Raise awareness about the problematic behavior
- 2 Enable to make the right choices
- 3 Motivate to maintain the changes or find new possibilities for change
- 4 Support fading out of the intervention

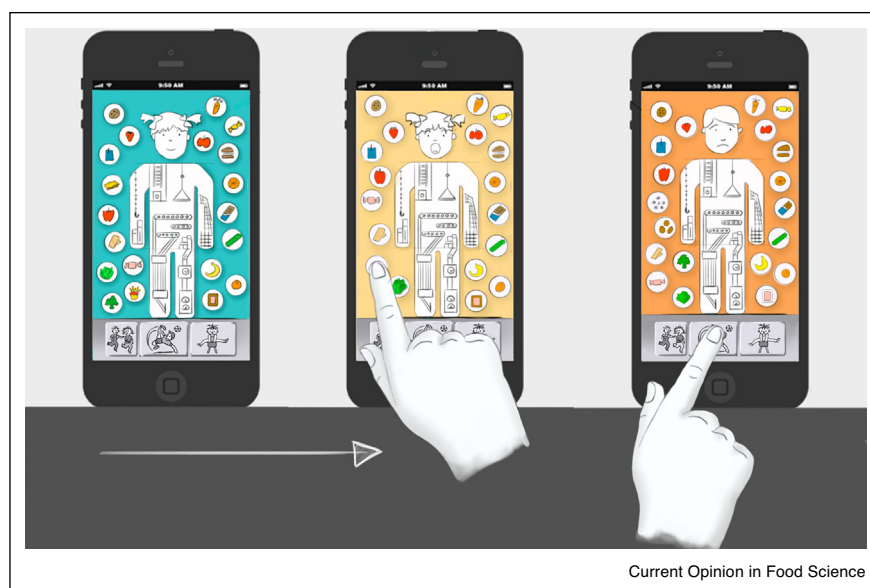
Ludden and de Ruijter [30] used this approach to develop interventions that support children and their parents to adopt healthier snacking behavior. ‘My body is a factory’ introduces children to the idea that the body only works well if it receives healthy foods. To raise awareness (aim #1) children receive a mobile application, in which they can feed a virtual child the snacks they have eaten. The virtual child appears happy and energetic after eating healthy snacks, and sad and tired after eating too many unhealthy snacks (Figure 2). To enable healthy behaviors (aim #2) children receive a book that describes little workers that clean up the factory (i.e. the body) and they can play with healthy snacks on a plate that displays the

Figure 1



Dimensions relevant for moving towards designing for societal impact (from Tromp and Hekkert, p.39 [17**]; reprinted with permission from Bloomsbury Visual Arts).

Figure 2



Mobile application showing that healthy food provides building blocks for the human body (from Ludden and de Ruijter, p.6 [30]; reprinted with permission from the Design Research Society).

factory (Figure 3). The motivational intervention (aim #3) consists of a tower where parents can store snacks. The child is free to take food from the lower sections of the tower, but has to ask permission to access the upper sections (Figure 4). In this project, no intervention accompanied the fading out process (aim #4). In line with the different aims of the interventions, parents indicated in a small-scale evaluation study that their children would probably enjoy playing with the different concepts, but only the tower would directly affect their children's snacking behavior. Ludden and Offringa [31] used the same design approach in a case study persuading people to replace beverages that contain sugar by drinking water.

Shift from personal health to societal context

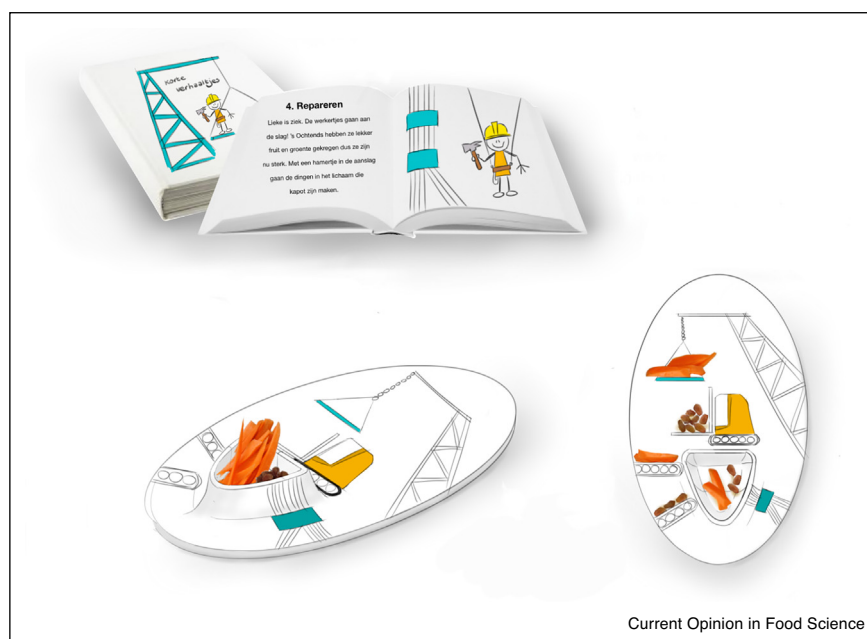
Even though many behavioral interventions target the individual, their success depends on the context, in which they operate (e.g. family members and peers, house layout, places passed on the way to work or school, modes of transportation). For example, the Dutch government would like to ban unhealthy items from school canteens, so that young people are presented with healthy food options while they are at school (see www.gezondeschool.nl). However, if only schools are involved in the program, beneficial effects can be easily surpassed by stores or restaurants in the vicinity of the school that offer tasty but unhealthy options. Hence, in designing interventions for behavior change, it is important that the consumption of

food is studied in its context, addressing also the society and the cultural environment, in which it takes place.

In this respect, it may be fruitful to study food consumption as part of particular social practices [32]. This theoretical approach allows connecting consumption to food preparation, food production and trading, by studying the distribution of resources and power relations between people involved [33]. In this way, also the environmental aspects of food production and consumption can be taken into consideration.

An increasing number of nutrition and public health professionals suggest that future dietary guidelines should also include insights from environmental sciences to reduce the impact of food production on the environment [34–37]. Implementing such a diet could involve the following four behaviors: reducing overconsumption, reducing the consumption of energy-dense foods with low nutrient levels, replacing animal-derived foods with plant-derived foods, and reducing food waste [34,38*,39]. The first two of these behaviors address nutritional aspects, whereas the latter two address sustainability aspects. However, consumers find it much more logical to link food to sensory pleasure and health than to environmental issues [38*]. For consumers healthiness and caring for the environment only seem to come together in the concept of naturalness, because this is associated with using less chemicals and preservatives [38*].

Figure 3



Intervention enabling children to try and explore foods in the context of building a healthy body (from Ludden and de Ruijter, p.6 [30]; reprinted with permission from the Design Research Society).

Figure 4



Tower containing healthy snacks, where some parts are freely accessible, but others require parents' permission (from Ludden and de Ruijter, p.6 [30]; reprinted with permission from the Design Research Society).

Possibly, consumer behavior in the home environment may have a larger impact on the environment through the food people waste than through the type of food they consume. However, reducing the amount of food waste in households would also require a substantial change in consumer behavior practices and could thus also benefit from a design approach addressing multiple stages of the behavior change model [40**]. For instance, to promote awareness of the amount of food wasted, smart technology in fridges may serve to keep track of its content, cameras can capture images of food thrown in the bin, or people can keep a diary that records the food wasted [41–43]. Sharing such data with other users may evoke feelings of guilt and might persuade consumers to reduce the amount of waste. Lim *et al.* [44] use smart technology that allows a group of consumers to log and track available ingredients as well as their wasteful behaviors through their kitchen appliances. Moreover, by suggesting recipes the system encourages the cooperative use of highly perishable ingredients owned by different individuals.

However, food waste is not only due to irresponsible disposal behavior in consumer households. A large amount of food is also discarded in retail stores. Audet and Brisebois [45*] identified four symbolic processes that are responsible for the generation of food waste at the retail–consumption interface through the interactions and practices of the various actors within food systems: the economization of waste, the construction of edibility, the construction of freshness, and the moralization of waste. These concepts are key in developing new and

different ways, in which food products can be offered to consumers, in order to reduce the amount of waste. For instance, retailers are experimenting with dynamic pricing concepts, where the price of food decreases as the ultimate consumption date approaches [46].

Who will decide what changes are needed?

If product developers and researchers should no longer listen to what individual consumers want but to what society needs, who will then decide what their design goals should be? Society is built up from many individuals and it may comprise many different opinions. How can product developers determine what is best for society? Does the government know what is best? How can they decide upon the path to follow? And should they be held accountable for the decisions they make?

According to Tromp and Hekkert [17**] a product's impact on the world is not determined by the product as such, but by the way, in which the product is used in its environment. Hence, product developers/companies and users/consumers together share the responsibilities for how food products influence the world people live in [47,48]. However, it may be extremely hard to predict what effects products may have on the world, especially for products that do not yet exist. The effects may reach much further than any product developer could imagine, because people may be very creative in finding new ways to use products, and new products may appear on the market that have a substantial effect on their application.

For instance, although the microwave was introduced as a tool to heat up foods, it has also had a major effect on how people eat their meals, the division of labor in families and the social cohesion among family members [17**]. Because meal preparation did not require elaborate cooking skills anymore, women did not need to spend a lot of time in the kitchen anymore and family members no longer needed to consume meals together. Eventually, the coherence in families decreased, and the decreasing number of joint family meals has resulted in an increasing number of children getting into trouble at school or developing an addiction [49,50].

It is important that designers and companies take their share of the responsibility for the effects their products have in the world. In order to carry this responsibility, Tromp and Hekkert [17**] suggest that product developers should preferably base their decisions on scientific evidence, because it can provide facts and insights in mechanisms that provide the best available basis for decision making about the expected effects. These authors [51] developed and tested an empirical method that tries to determine the influence of design manifestations on human behavior in order to counteract social issues.

In situations where science provides no clear-cut answers, moral reasoning will be needed to make decisions. In this case, Verbeek [47,52] suggests to perform a mediation analysis for making an informed prediction of the potential mediating role of a new design. This assessment addresses the intentions of the design, the way it mediates the interaction with the user, and any possible effects of using the design. By imagining multiple scenarios including a variety of possible stakeholders, comparing their consequences and connecting them to their possible contributions, it is possible to make the best informed choices.

An illustration of how good intentions can raise a lot of consumer concerns is the case of the use of e-numbers for food additives in the European Union. Although e-numbers indicate that additives have been thoroughly tested and have been found safe to use in foods, the explicit mentioning of e-numbers in ingredients lists raises suspicion and distrust among some consumers. Haen [53] suggests that controversy in this debate persists mainly because food scientists and policy advisors fail to consider the wider range of ethical, aesthetic and cultural concerns that consumers may have regarding their food. By focusing on the values that are at stake in the design process and by making these values transparent to clients and users, designers can be more assured that their endeavors will have the intended effect in society [54].

Conclusion

Current societal challenges require new ways of looking at the existing paradoxes that lie at the basis of these

challenges. Designers have acquired skills that are instrumental in creating these new frames [21,55] and can work with other professionals (food scientists, food marketers, public health authorities) to tackle challenges in the food realm. In addition, designers have been trained to provide solutions in cases where consumer concerns or values seem to be in conflict [17**,23]. Design methods and tools have been developed to support designers and to create new solutions for the world's food challenges [56]. Given the complexity of matters, a variety of interventions may be necessary that together constitute a consistent program, rather than separate interventions. These intervention programs can make use of design approaches that build on the elements of existing theories of behavior change [27,57]. In addition, the professionals who develop these interventions must be prepared to take responsibility for the decisions they make in order to serve the common interest [47,54].

Conflict of interest statement

Nothing declared.

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