THREE LEVELS OF PRODUCT EMOTION
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ABSTRACT

This paper introduces an approach to emotion driven design that was based on the process that underlies emotional responses to consumer products. Three levels, and nine associated classes of product-evoked emotions are discussed, which are each the outcome of a unique pattern of eliciting conditions. The approach is based on two main propositions. The first is that all emotional reactions result from an appraisal process in which the individual appraises the product as (potentially) harming or favoring his or her wellbeing. This appraisal is a non-rational sense-evaluation of the product's relational meaning. In this perspective, the appraisal is considered a key-parameter that determines if a product evokes an emotion, and if so, what emotion is evoked. Three main appraisal types are identified: an usefulness appraisal, a pleasantness appraisal, and a rightfulness appraisal. The second proposition is that products can generate at least three classes of emotional stimuli: stimuli with a product-focus (i.e. the qualities and properties of the product); with an activity-focus (i.e. when using the product), and with a self-focus (i.e. consequences of using the product). The three appraisals and three levels of person-product relationships combine to a framework of nine sources of product emotions. The framework is used as the basis for an approach to design that aims for three levels of emotional product appeal.

Keywords: Emotion, Design Psychology, Design Theory

1. INTRODUCTION

The heart of emotion – in all of its multifaceted manifestations – is that we feel good or we feel bad [1]. This applies as much to the emotions towards products as to those we experience in social encounters: products elicit feelings that are good and/or feelings that are bad. Evidently, we generally want to design products that elicit good or pleasant feelings – not feelings that are bad or unpleasant. Good feelings have all kinds of likable effects: products that feel good, are bought, are bought a second time, are talked about in a positive way, contribute to brand image, and are forgiven for design imperfections. Bad feelings, vice versa, generate disappointed users, complaints, brand damage, shrinking sales. In the last decade, several explanations of product emotions have been introduced, discussed, and applied. Three often referred to approaches are: a pleasantness approach [2], an appraisal approach [3], and a process-level approach [4]. Jordan used a psychological pleasantness-framework to explain various types of product pleasantness, Desmet used cognitive appraisal

theory to explain the process of product emotion, and Norman explained product emotion with a neurobiological emotion-framework that distinguishes several levels of information processing. The current paper discusses a framework that was assembled by combining some of the basic underlying assumptions and theoretical considerations shared by these three approaches. The framework represents a psychological view on product emotion because it is based on the cognitive mechanisms that intervene between seeing, using, owning, or thinking about a product, and the emotional outcome. The first part of the paper discusses some key insights in human emotions; in the second, the link between emotions and product design is made; the third formulates some initial ideas for a practical approach to emotion-driven design.
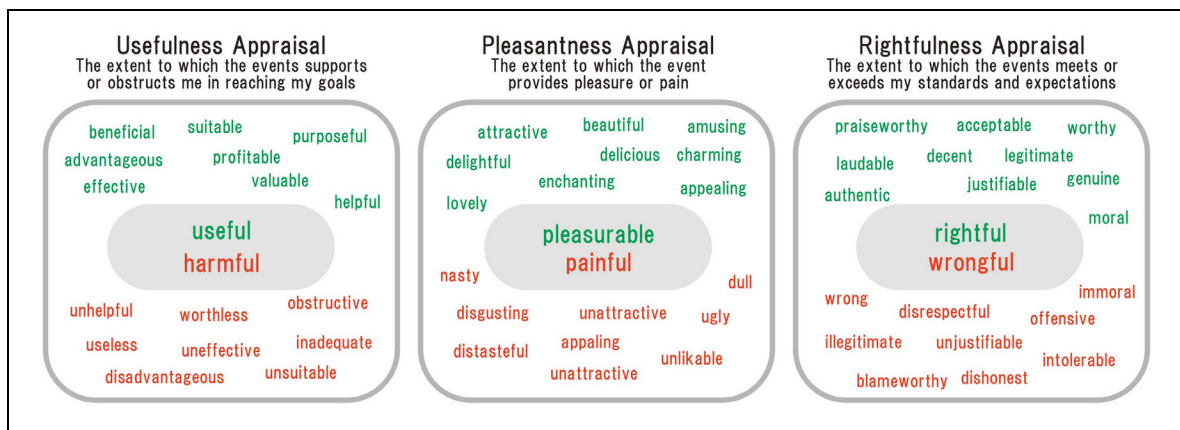
2. EMOTION

2.1. Passionate Nature of Emotions

Feelings, as mentioned in the introduction, are a key feature of emotions. A second key feature is behavior [5]. Emotions are geared to actions: angry people (have the tendency to) shout and fight; sad people (have the tendency to) fall silent and withdraw from social situations; people in love (have the tendency to) act eccentric and focus all of their attention on the subject of their love. The function of emotions, and of this emotional behavior, is to safeguard our wellbeing in our relationship with the world and with everything that happens in it. We are in constant interaction with things around us; with people, with objects, with environments, with situations. In these interactions, occurrences can happen that endanger our wellbeing (someone makes an insult; a fire alarm starts; a loved one falls ill), and occurrences can happen that support our wellbeing (we achieve a goal; we receive a kind gift; the sun shines). Our emotional behavior is directed towards adaptation to these occurrences: aiming to establish or strengthen relationships with those things that contribute to our wellbeing (positive emotions), and to influence, weaken, or terminate relationships with those that threaten our wellbeing (negative emotions). This means that all of our emotional behavior is driven by relational aims and oriented towards a desired or ideal future state of the relationship [5]. When our friend behaves unreasonable, our anger will fuel us to confront him in order to restore the social balance. When something threatens or safety, our fear will fuel us to flee in order to ensure our survival. When someone gives a compliment, our joy will fuel us to open up to the situation and to strengthen the relationship with this person. The emotional tendencies to strengthen or weakening relationships have many manifestations, or 'modes of action readiness,' depending on the adaptive requirements. Some examples of these modes of action readiness are: To approach, to withdraw, to dominate, to possess, to hurt, to shut off, to savor, to undo, care for, depend, explore, focus, or savor [5].

2.2. Three Main Emotional Forces

Emotions are not random unprompted actions but responses to perceived changes: something happens; someone says something; some object comes into sight, a thought pops up. It is important to note that emotions are not elicited by these perceived changes as such, but by the 'situational meaning' of these changes [5]. As was stated before, emotions arise in response to events that are important to the well-being of the individual. The individual therefore has to grasp this importance in some way; he or she has to appraise the event's

relevance for their wellbeing. Appraisal is (in this context) a nonconscious sense-evaluation that 'diagnoses' whether an event has adaptational relevance to the individual. It is this personal significance of an event, rather than the event itself, that causes the emotion [6]. Because appraisal mediates between events and emotions, different individuals who appraise the same event in different ways will experience different emotions. Often, three main appraisals types are distinguished [1]: a usefulness appraisal (the extent to which an events is supports or harms me in reaching my goals), a pleasantness appraisal (the extent to which an event provides pleasantness or pain), and a rightfulness appraisal (the extent to which an event meets or exceeds my standards or expectations). These appraisals, which we consider the three main forces that drive emotional experience and behavior, can manifest in a wide variety of valuations; see Figure 1 for some examples. Positive usefulness appraisals value the situation as helpful, purposeful, advantageous, or beneficial, whereas negative usefulness appraisals value the situation as harmful, disadvantageous, obstructive or ineffective. Positive pleasantness appraisals value the situation as delightful, lovely, beautiful, or charming, whereas negative pleasantness appraisals value the situation as appalling, unattractive, dull, or unattractive. Positive rightfulness appraisals value the situation as fair, legitimate, legal, or sensible, and negative rightfulness appraisals value situations as unfair, wrong, unreasonable, or intolerable.

Figure 1: examples of positive and negative manifestations of three key appraisal types.

These key appraisals are universal emotional forces that hide behind all human emotions. Every perceived change is appraised in terms of: is it useful, is it pleasurable, and is it rightful? A situation can thus elicit a good feeling because it is useful, because it is pleasurable, or because it is rightful. Vice versa, a situation can elicit a bad feeling because it is harmful, because it is painful, or because it is wrongful. This applies to all of our relationships – with things, with people, with situations, thoughts, the world in general, and ourselves.

2.2.1. Usefullness Appraisal

Goals are the things we want to maintain (e.g., I want my family to stay healthy; I want to keep my job), want to get done (I want to write a book; I want to loose weight), or want to see happen (e.g. I want my soccer team to win the match; I want the sun to shine this weekend). Achieving a goal, or an event that helps us to make progress towards achieving a

goal, are appraised as useful and elicit positive emotions. We value these events as advantageous, constructive, or profitable, and our emotional behavior will be directed towards initiating or strengthening the relationship with the object of our emotion. Events that block, threaten or delay goal achievement are appraised as harmful and elicit negative emotions. We value these events as obstructive, disadvantageous, or useless, and our emotional behavior will be directed towards weakening or terminating the relationship with the object of our emotions. Examples of emotional behavior associated with the usefulness appraisal are: walking away from a dangerous situation, investing energy in talking to people at a network event, the tendency to start exercising when being confronted with a weight gain.

2.2.2. Pleasantness Appraisal

We have sensitivities, likings and dislikings, for particular tastes, colors, facial feature, activities, and etcetera. These are stimulations that are pleasurable in itself, we take pleasantness in, independent of our goals or motivational state. Examples are I love chocolate; I love cats; I love dancing; I love to fantasize about my vacation; I love to listen to music while commuting). Stimulus events that match these sensitivities are appraised as delightful and elicit positive emotions. We value them as enchanting, beautiful, delicious, tasteful, and our emotional behavior will be directed towards initiating or strengthening the relationship with the object of our emotion. Stimulus events that collide with these sensitivities are appraised as unattractive or painful and elicit negative emotions. We value them as distasteful, ugly, or dull, and our emotional behavior will be directed towards weakening or terminating the relationship with the object of our emotions. We all have experienced the behavioral emotional tendencies that accompany pleasantness emotions: the tendency to touch a beautiful sculpture in order to absorb its shape (hence the "do not touch" sign); the tendency to stroke or play with soft fabrics; the tendency to turn the head away from ugly things; the tendency to linger in pleasurable situations. Other examples of emotional behavior associated with the pleasantness appraisal are: savoring the taste of a delicious piece of cake (delight), being captivated by a beautiful painting (in awe), spitting out bad milk (disgust), surrendering to the embrace of a warm bath (relaxation).

2.2.3. Rightfullness Appraisal

Expectations and standards are our beliefs and social norms or conventions of how we think things should be and behave. Whereas goals refer to the state of affairs we want to obtain, expectations and standards are the states of affairs we believe ought to be. These can be abstracts norms like 'I should respect all living creatures' or 'nations should strive for peaceful autonomy,' but can also be concrete and implicit expectations. Examples are that we expect someone to wear formal dress for a job interview, or that we expect the newspaper to arrive on time. Stimulus events that exceed our standards or expectations are appraised as rightful and elicit positive emotions. We value them as admirable, worthy, genuine, or fair, or praiseworthy, and our emotional behavior will be directed towards initiating or strengthening the relationship with the object of our emotion. Stimulus events that do not meet our standards or expectations are appraised as wrongful and elicit negative emotions. We value them as illegitimate, intolerable, or unfair, and our emotional behavior will be directed towards weakening or terminating the relationship with the object of our emotions. Examples of emotional behavior associated with the rightfulness appraisal are: being angry with

someone for not sticking to their promises; resenting fishermen for using methods that cause dolphins to drown; being proud of wining an award; admiring a charismatic leader; being ashamed for not being able to suppress a smile when someone makes a naïve comment.

These three emotional forces help us in understanding why different people have different emotional responses to a given situation. We all appraise the usefulness, pleasantness, and rightfulness of situations, but we don't all have the same goals, sensitivities, and standards. Much of our interpersonal emotional conflicts can be explained by differences in concerns. All people feel good about things that are rightful, but because some have other ideas about what is fair than others, their emotional responses are not the same. The three forces also help us in understanding why we sometimes experience mixed emotions because they form the root of much of emotional complexity and internal conflict. Eating this pie is very enjoyable, but I did want to loose weight. I love the soft texture of this fur coat, but I should not contribute to the fur industry. Moreover, people have conflicting concerns. We aspire personal autonomy, and at the same time belongingness; we want to be responsible and to be spontaneous. Emotions can result from one concern and clash with another. The incompatibility of simultaneous satisfaction of all one's concerns is one of the most prominent features of human nature. It underlies powerful emotions, like self-anger, guilt, remorse, regret, and spite [5].

3. EMOTIONS AND PRODUCTS

3.1. Situational Meaning of Products

The next question is how the above described key insights apply to emotions elicited by product design. It was mentioned that the function of emotions, and of emotional behavior, is to safeguard our wellbeing in our relationship with the world and everything that happens in it. Occurrences that we appraise as endangering our wellbeing elicit negative emotions, and those that we appraise as supporting our wellbeing elicit positive emotions. These appraisals manifest in valuations of useful or harmful, pleasurable or painful, rightful or wrongful, with associated emotional behavior of rejecting, approaching, ignoring, opposing etcetera. These valuations and emotional behaviors also apply to products. We can appraise a product as delightful, and desire to own it, as useless and wanting to dispose of it, as ugly and wanting to hide it in a closet. The main clue of the process of emotion is that it motivates us to engage in and strengthen relationships that support our wellbeing, and to weaken or terminate relationships that endanger our wellbeing. Examples of emotional tendencies are to touch or taste a product, to buy, to turn away from, discard, approach, reject, to examine, to stop using the product, to retry interactions, to use more force, or to yell at the product. With respect to products there are (at least) three levels of relationships that are affected by product design [4]: relationship with the product (product focus), with the activity that is facilitated or enabled by product usage (activity focus), and with the life in general (self focus).

Firstly (product focus), products are objects that we perceive – see touch, taste, hear, and feel, and because perceiving something is an event in itself, products can elicit emotions 'as such.' The emotional impact of a product depends on its material qualities, purposes, meanings, expressions, and on what it does or fails to do. For example, the TV does not

respond to the remote control, the oven starts to produce a scent of freshly baked cookies, the alarm clock sets of, a drawer runs unexpectedly smooth, some signal light starts to blink on the car dashboard, and so on. Note that that this context of experience includes not only those emotions we experience in response to actually perceiving a product, but also in response to thinking of a product, of hearing about a product.

Secondly (activity focus), products are used to enable or facilitate all kinds of activities. Products are instruments that are used to 'get something done' in some situation: activities that can be useful (e.g. organizing my documents), pleasurable (e.g. ice-skating with friends), or rightful (e.g. washing the car). Individuals will respond emotionally to these activities because they have concerns related to the activities. The emotion is not directed to the product, but the product does play a role because it enables the individual to engage in the activity that evokes the emotion. Examples are: I am excited by making a hiking trip in the snow (which is facilitated by my warm coat); I enjoy talking to my friends (which is facilitated by my mobile phone).

Thirdly (self focus), owning and using products have an influence on one's identity; they affect an individual's self-perception and how they are perceived by others. An expensive buggy enables someone be a good parent, crayons enable someone to be creative, and an SUV car makes someone look irresponsible. People are emotional about who they are and how others perceive them, and thus also about the effects of products on their identity. Examples are: I feel awkward because I have to use crutches; I feel secure when wearing a fashionable new suit.

3.2. Nine Sources of Product Emotions

When combining the three key appraisals with the three levels of human-product relationships, a matrix with 'nine sources of product emotions' is generated, see Figure 2. The examples in the matrix represent concerns that are touched upon by interacting (seeing, using, owning, thinking about, etcetera) with products.

	usefulness appraisal	pleasantness appraisal	rightfulness appraisal
self focus	What I want to be I want to be a good parent I want to be reliable	What I enjoy being I enjoy being creative I enjoy having peace of mind	What I should be I should be responsible I should be flexible
activity focus	What I want to do I want to listen to music I want to drink a cup of tea	What I enjoy doing I enjoy ice-skating I enjoy talking to friends	What I should do I should not watch TV I should work out in the gym
product focus	What I want the product to be File organiser Route planner	What I enjoy the product to be Smells fresh Is elegant and stylish	What the product should be Easy to clean Not break easily

Figure 2: Nine sources of product emotion; adapted from [4]

3.2.1. Usefulness Appraisal (goal driven emotions)

Products can be appraised as useful: (potentially) helpful for reaching goals. In these cases, we experience emotions that motivate us to acquire, share, personalize, restore, discard, or repair a product. When seeing a particular pair of shoes, one may feel the desire to acquire them, and also the disappointment when hearing that the required size is out of stock. When using products, people are involved in goal directed behavior sequences. If this sequence is blocked in the interaction, people will typically experience frustration. One can be frustrated by product packages that are impossible to open (e.g. pre-packed slices of cheese), satisfied with products that are easy to operate, and pleasantly surprised by the accurate response of a stereo set's volume to the remote control. The consequence of (using or owning) the product, can be appraised as facilitating goal achievement (e.g. being satisfied by an alarm clock because one is perceived by as reliable), or frustrating goal achievement (e.g. being dissatisfied with the new mattress because it increases instead of decreases the backache).

3.2.2. Pleasantness Appraisal (sensitivity driven emotions)

Products are objects, and all objects (including their properties and features) are appraised as pleasant or unpleasant. As a result, one is attracted to a sensuous shape of a perfume bottle, feels aversion towards the off-colored leather suitcase, or enjoys the taste of sweet and cold ice-cream. Manipulating the product can also involve sensations that are appraised as pleasant or unpleasant. The gestures that are required to operate an espresso machine, the expressive movements of playing the violin, and the forces that are felt when driving a motor cycle are appraised as intrinsically pleasant or unpleasant. In those cases the act of using the product rather than the product as such generates sensations that are pleasing or displeasing. The consequences of (using or owning) the product can also be delightful or unattractive. For example, the consequence of eating too much cake is an unpleasant feeling in the stomach, the consequence of looking at art is a pleasant feeling of inspiration, and the consequence of using a massage device is the pleasant feeling of relaxation.

3.2.3. Rightfullness Appraisal (standard driven emotions)

We have standards of how products should be, and how they should be designed and produced. One can admire a chair for being more eco-friendly than a conventional chair. In those cases the products are appraised as the outcome of the action of some person or institute, and that particular action is appraised as either praiseworthy or blameworthy. The second stimulus level involves expectations of how products should behave when they are used. For instance, one shouldn't hear a rattling sound when driving a brand new car, a computer should not crash without a warning – and if so, we experience emotions like anger or disappointment. Or we can be delighted when the product behavior exceeds the expectations. The third level is related to the consequence of owning or using the product. One can admire one's perfectly mown lawn, a consequence of using a high quality lawn mower, or one can feel contempt towards some person's run down car. We also appraise the integrity of our own behavior with reference to internal standards, our internalized moral code or self-concept. These standards represent the self-ideal and are central for the experience of the so called self-reflexive emotions, such as pride, guilt and shame.

4. EMOTION DRIVEN DESIGN

The next question is how the framework in Figure 2 can be used in design projects. In line with the three levels of human-product interactions, we propose that there are three levels of emotional appeal: an object appeal (the degree to which the product is appealing), an activity appeal (the degree to which the activity I am engaged in is appealing), and a self appeal (the degree to which I am, or my life is, appealing). In this context, the word 'appealing' is used for stimuli that correspond with the three basic human forces: usefulness, pleasantness, and rightfulness. In emotion driven design we can aim for establishing these three levels of appeal, see Figure 3. On the basis of this proposition, four steps in design for emotion are formulated. An airplane breakfast meal design case that was designed with this approach by KVD Amsterdam for KLM Royal Airlines and the author, see [7], is used to illustrate the approach.
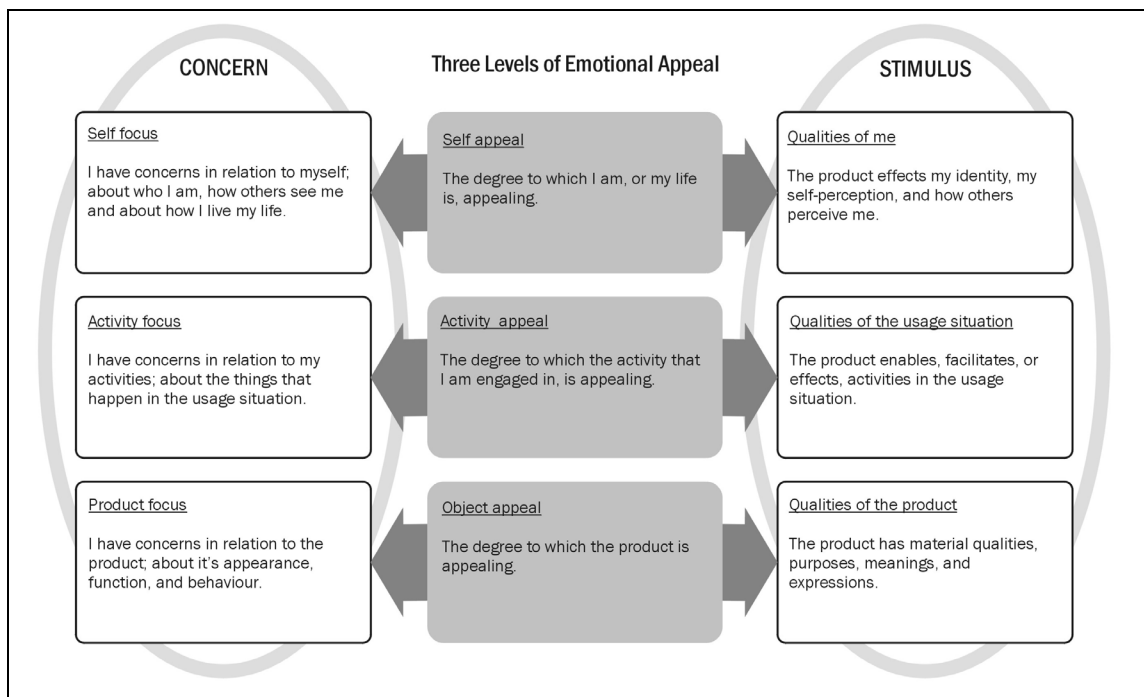

Figure 3: three levels of emotional fitness

4.1. Step 1: design theme

Identify the product (functionality), the user group, and the situation in which the design will be used. The theme is defined in terms of a user group engaged in an activity in some situation. Examples are: policemen using a communication device when at work in the neighborhood, or caretakers using a bottle when feeding a toddler at home. In the airplane case, the theme was 'economy class passengers using eating their breakfast in an intercontinental flight'.

4.2. Step 2: concern profile

Formulate a concern profile to represent the intended user. This profile is considered to be the point of reference in the users' appraisals. Because the amount of concerns is infinite in

any given situation, the challenge not to aim for completeness, but for a concise profile that is both relevant and inspiring. The profile includes general life concerns, concerns in the usage situation, and concerns given the product design. Key questions helpful in selecting general life concerns are: what do the users expect from themselves in life? What are the standards that they want to live up to? What are the their general life goals and aspirations they pursue? What are the experiences and activities they enjoy? Examples are: I should be fit, I want to be autonomous, and I like listening to music in my garden. Key questions in formulating concerns given the situation, are: what do the users expect from themselves in the usage situation; what are their usage standards? What do they want to accomplish in the usage situation; what are their goals? What are the activities and interactions they enjoy in the usage situation; what are their usage sensitivities? Examples are: I should be patient with my clients at work, I want my son to enjoy himself at school, and I like encouraging interactions. Key questions in formulating concerns given the product design are: what are the users' expectations and standards about the product? What kind of object properties do they enjoy? What do they want to accomplish with the product? Examples are: A remote control phone should be strong enough not to break when I drop it, I like my table to be made of honest materials, and I want to be able to use my phone when it is raining. In the airplane breakfast case, the following concern profile was formulated: I should respect my body, I want to be healthy, and I like to be curious (general concerns). I should keep my seat tidy, I want to feel cared for by the meal, and I like entertaining interactions (concerns in usage the situation). I want easy to digest food, the meal should be hygienic, I like to have a choice (concerns about the meal).

4.3. Step 3: product profile

The third step is to create a product profile that represent the designer's vision on how to align with the concern profile – specifying three qualities: the product's significance, intentions, and character. Significance represents the key consequences that we want to design for; e.g., I have many friends, I am relaxed, my baby is happy, or I am inspired. The intentions of the product are defined by the purpose it will be designed to have, such as, the product enables me to talk freely, enables me to meet people, to be spontaneous, or to be at work on time, and the interaction personality with which intends to fulfill this purpose; such as, the product stimulates me, invites me, seduces me, or forces me. The character represents the product's appearance, such as, the product is sexy, rough, delicate, natural, or colorful. The product profile is used to formulate a product statement. Some examples are: a delicate product that enables me to have a relaxed life by seducing me to talk freely. A tough product that enables me to have many friends by forcing me to open up to others. The concern profile and product profile can be used as a reference in all stages of the design process in order to safeguard the emotional fittingness of the final design. In the airplane breakfast case, the product's significance was formulated as: "I am refreshed as if I have made a morning walk in the park." The purpose and character of the meal was formulated as: "a nutritious and dedicated meal that engages me to awaken myself." The purpose and character of the package was formulated as: "an accessible and bright product that encourage me to explore".

4.4. Step 4: product design

The fourth step is to design a product that fits with the product statement. The airplane concept that was selected is shown in Figure 4: 'morning tapas.' The idea was to combine two breakfasts in one: a balanced union of a heavy and a light breakfast. A combination of a warm and a cold beverage have a prominent position in the meal. The cold beverage is an iced herbal tea that is used to 'awaken the taste buds' after sleeping in an environment with air-conditioning. Cold and warm elements are selected for the combination with the beverages (like tapas). Elements are to be combined in a non-prescribed manner. With this tray design, passengers have sufficient additional space on their table to order objects like cutleries and napkins. Besides the beverages, the breakfast consists of four main elements: on the left side a warm savory (e.g. tortilla) and sweet element (e.g. rice pudding), and in the right side a cold savory (cheese) and sweet (e.g. fruit) element. The elements in the middle part are condiments, such as, nuts, honey, and chocolate sprinkles, that can be used as a topping for the main elements. The lid of the package explains that the passenger can experiment with these toppings to personalize their breakfasts.

Figure 4: New design airplane breakfast.

After introducing the new breakfasts, it was found that they elicited an overall more positive and less negative emotional response than the conventional breakfasts [7]. In the current state, the approach is still abstract and somewhat indefinable. The next step will be to make it more explicit by means of explorative design applications, and to explore application opportunities in other domains than product design, such as, service and interaction design. The main contribution is that it enables the design team to formulate a mutual design vision with respect to the emotional impact of the design. Although it does not objectify this process, it does offer some steps that facilitate the communication between team members and with the client. In addition, in the design case, it was found helpful in ensuring that emotion was considered at the start of the project, and in enabling the design team to illustrate the layered nature of product emotions to the client, stressing that the emotional impact is not only determined by appearance, but also by the significance of the concept and the intentions of the interactions.

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