EXPLORING THE *interplay* BETWEEN *emotions* AND *interaction*

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There seems to be a Catch-22 involved in designing interaction; it's very hard to do it without designing an artifact too. How can we keep our main focus away from purpose, function, form and material in order to put interaction first? This paper presents two design exercises that in combination highlight how emotions and expressions affect each other in design, an how interaction in turn, can be used to strengthen or express an emotion.

DESIGNING INTERACTION?

When designing interactive systems, we are blessed with methods. There are methods for idea generation, like for instance brainstorming, Thinking Hats (de Bono 1999) or more recent approaches like Cultural Probes (Gaver et al 1999). There are methods to find out what the real user wants, e.g. User Centered Design (Schaffer 2004; Leventhal & Barnes 2007) or various observation-and interview techniques, as well as methods to create fictional users, e.g. Personas (Cooper & Reimann 2003) or Extreme Characters (Djajadiningrat et al 2000). There are methods for analyzing an activity by using Task Analysis (Preece 1994), methods for turning ideas into design using for instance Design Patterns (Tidwell 2005, Borchers 2001) or guidelines (Preece 1994), methods, methods, methods.

In almost any case, the design of the interaction *itself* is enclosed in constraints like the functions it should invoke, the artifact it is coupled to, who the users are and what they want – and last but not least the notion that interaction should be transparent, or at least enjoyable. This is not a problem; in most cases this is perhaps how it should be. But sometimes there might be value in starting out by looking at the interaction. Methods doing this are for instance Interaction Relabelling (Djajadiningrat et al. 2000) and Abstract Information

Appliances (Hallnäs and Redström 2002). Is there no need for such methods, or is it just that we are so used to putting the design of the interaction per se in third or fifth or twentieth place? What would happen if we started out by designing the interaction first, for once? And, consequently, how can we avoid putting our main focus on the object that is being designed?

THE INTERPLAY BETWEEN INTERACTION, EXPRESSION AND EMOTION

Even if we do not always consider it, there are strong connections between interaction and emotion, sometimes via *expressions*. An object's expressions define how it presents itself to the user. Typical expressions are visual expressions (e.g. form, color, patterns) tactile expressions (e.g. material, surface, weight, "feel"), expressions of sound and taste and expressions of behavior (e.g. actions, responses, movements). They can affect the user's emotions and thereby their attitude towards an object; product designers have been utilizing this for years. Users' emotions may in turn affect how they interact with it, the most prominent example being a child treating a cute plush dog as a beloved family member – or an anxious patient waiting for a liver transplant nursing her cell phone like a baby; is it in sight, is it on, is it charged? Sometimes expressions affect interaction directly, without detouring emotions, e.g. the big red fire-alarm button covered by a lid of transparent and breakable plastics, or the affording door handle (c.f. Norman 1990 on handles and affordances). Interactions can affect expressions too, e.g. when pressing a link and thus jumping to the next web page. But can they affect emotions? Yes – if we smile we feel happier (Strack et al 1988). How could this be used in design, and can un-usual manners of interaction evoke certain emotions?

MISSION STATEMENT: EXPLORE, EXAMINE, EXCITE

I set out to see firstly, how we can design more or less unusual interaction in such a way that it affects emotion and, secondly how we can design *interaction per se*, focusing on how to express an emotion via the interaction itself. My means of doing this was to design two exercises focusing on the interplay between emotions, expressions and interaction. These exercises were run in a course called "Aesthetics of Interaction"; a small course with ten students of which all but one already had studied interaction design for a full year or more; three of the students had a background in studying industrial design.

Thus, this is a kind of action research project within an education context (cf. Bassey 1998, Carr and Kemmis 1986, Schön 1983 and many others). Data has been collected from course questionnaires, oral presentations, project reports, each student's own reflection on what he or she learned (as comments in e-mails), feedback sessions where student's commented each other's work and the teacher's (i.e. the author's observations whilst supervising. Arguably, none of these data sources guarantees reliability in itself (e.g. a student may well write a flattering comment about an exercise to please the teacher), but the findings I present here are supported by all or most of the data sources. Note also that at this stage it is not my intent to present any design method in particular, nor to draw any brilliant

conclusions, but rather to highlight these two approaches, especially the latter one, as being interesting and worthwhile to spend some time on. I encourage anyone to try them out, alone, in groups or in teaching.

THE EXERCISES

Both of the exercises were carried out individually, and they were scheduled to take five hours, but they probably took longer for some students. Below, I will first describe the two exercises (for a more user-friendly version of the exercises download them from http://www.cs.chalmers.se/~lundsus/lundgren_interaction_emotion_exercises.pdf), where after I report on the outcome and my observations. The order is intentional; I started with the easier task where unusual interaction in combination with material and form should create an emotion, and continued with the (much harder) task that explored how it is to design an interaction expressing an emotion. The exercises are described below, more or less in the way they were given to the students with few additional comments. For suggestions of improvements see the section "Reflections".

DESIGNING EMOTIONS

This exercise aims to explore how an emotion can be created, utilizing aspects of form, material and interaction. In short, the task is to design a ticket vending machine which ether expresses or evokes **angst**.

The exercise starts with an inspiration phase where all participants make Chinese portraits of angst. A Chinese portrait consists of the answers to a number of questions phrased like "If angst was a *sound*, which one would it be?" Apart from sound, I also asked for *tool, color, activity, material* and *natural phenomenon*. The answers should not be thought-out, but spontaneous. Once the questions are answered, one tries to motivate the answers. (*"If angst was an everyday object I think it'd be a huge bill which I am unable to pay, because that would mean that I would have to give up something important in order to save money"*). Then, a group of 2-4 participants compare and discuss their respective portraits.

After this inspiration phase, the individual work continues. Participants analyze the input from the inspirational phase and see how it can be used in a vending machine. Are most of them about evoking or expressing angst? Participants may choose whether they want to design a ticket vending machine that **expresses** angst, i.e. which seems to feel angst, or to instead design one which **evoke** angst, i.e. makes the user feel angst.

Whilst designing, participants are encouraged to focus on as many senses as possible, using the outcome of the associations made in the Chinese Portrait. Behavior, materials and form are of equal importance; it is important not to forget that certain means of interaction can generate angst per se. If needed, it is allowed to stretch the boundaries of what the ticket machine "is" to its environments, e.g. one may design a special booth or room for it.

Deliverables are detailed sketches describing or showing material, form and interaction, plus two scenarios of use and a design rationale.

EXPRESSIONS OF INTERACTION

This exercise aims to explore the connections between the expressions of form and interaction, as well as to work with physical form. In short the task is to design a certain type of interaction, i.e. to start out with a wished interaction and hence design an object whose entire design is adapted to this type of interaction.

At the beginning of the exercise each participant gets a word describing an emotion (e.g. angry, pitiful, happy, etc). Now the task is to create a simple thing (not using any electronics or computational technology) that makes people want to interact with it *in that way*. If the word is "aggressive" for instance, ***the person interacting with the object should appear to be very aggressive.*** Note that they don't necessarily have to *feel* that way! For instance beating a punching bag is an aggressive interaction but one mustn't necessary feel very aggressive when interacting with it. It's up to the designers to decide whether the object also has a function, or if its only function is to be interacted with in that certain way. The easiest way is in most cases to make a device that evokes the certain feeling and then design the interaction accordingly. But if one wants to challenge oneself, one should design an object that is neutral in its expressions but still invites to a certain type of interaction (again, the punching bag is the perfect example).

First, participants need to figure out what signifies "their" type of interaction. For instance aggressive interaction is probably signified by hard grasps, harsh movements, a lot of force, etc. This analysis phase is the key of the project and should not be rushed through.

When designing, any *physical* materials can be used for the object, or a prototype of it. If the prototype is not satisfying, it can be completed with elaborate sketches (including material descriptions and sound descriptions) plus samples of the materials you would like to use in your design, e.g. fabrics, plus a short description of how the object works.

Deliverables are the prototype plus eventual sketches and a design rationale.

OUTCOMES AND OBSERVATIONS

When running these two exercises (out of ten) in my class "Aesthetics of Interaction" these two exercises were the two ones that both myself and the students considered to have learnt the most from. My judgment is based on observations, student's comments, the handed-in material and the discussions in design rationales, the student's judgment as expressed in the course evaluation.

DESIGNING EMOTIONS

This task does not really have any built-in complexity; the issue is simply to skillfully combine form, material and interaction into something that expresses or evokes angst – and be creative in designing unusual manners of interaction! However, some of the students tended to focus on form and on material, leaving the interaction-part behind to take care of itself. This may be because some of them were not that used with working with physical material and form (as opposed to graphic design and form in the computational sense), and therefore

focused on these a bit unfamiliar aspects. However the students got some supervision during the exercise, so this was corrected.

On the upside, this exercise helped students focus on designing emotions with all possible tools; not only via visual impressions but also via sounds, sense, smell and movement. They also utilized feelings such as embarrassment, pity and claustrophobia. As for interaction, the ways to interact ranged from punishing users who too eagerly pressed the change-button, via making primal screams in a hollow pyramid, via filling in endless forms revealing lots of private information, via patting a machine until it stops crying, via hunting down angst-.ridden machines and force-feeding money into a scared-to-death machine. The latter example deserves to be described in detail.

THE MENTAL PATIENT ROBOT TICKET VENDING MACHINE (MPRTVM)

This is a design by Olof Göranson, who decided to design an angst-riddenparking ticket machine residing in a multistory car park. As the name suggests, Olof got his inspiration from how a stereotypical mental patient behaves and interacts. The MPRTVM has only a few ways to interact, or be interacted with. Firstly it runs away from everything that moves (people, cars, or leaves blowing around…) – however not fast enough. It also tends to rock back and forth, preferrably in a corner. This produces a squeaking tormented sound coming from its rusty joints. If the MPRTVM is caught by soemeone who want to buy a ticket, it rocks even faster. In order to avoid being fed coins it rotates its head, and it will also spit them out unless one force-feeds it and holds one's hand in front of the input slot. The ticket emerges trough one of the eye-like openings. With its two arm-like shutters it hides its controlpanel where one can empty it or turn it off. Opening these is very hard; if the MPRTVM is fully charged several people are needed to overpower it.

The mental Patient Robot Ticket Vending Machine

Illustration by Olof Göranson.

The interaction inscribed in this artifact is non-usual and definitely not user-friendly, but still consistent with the general design idea and the task. All of the behaviors and interactions, together with the general look& feel of the robot, cooperate very well in expressing angst.

Interestingly, anthropomorphization was used in three of five cases of expressing angst, and worked well; there was a crying android-like machine (designed by Erik Fagerholt) that had to be comforted, and a delirious alcohol-junkie-like machine (designed by Matthias Klein) desperate for its next booze. As for the other four vending machines – which instead evoked angst – two of them used a hint of anthropomorphization (e.g. letting the shape of the machine vaguely mimic a superior person towering over the user). Here instead, angst was created by creating/evoking secondary feelings like intimidation, fear and uncertainty. In both cases students gave pretty much the same attention for form, material and expressions.

Another observation in relation to the anthropomorphization was that during the feedback discussions we concluded that the anthropomorphic beings would probably also not only express but also evoke feelings when *interacting* with them. In the MPRTVM-case it could be angst and reluctance, since one has to force oneself upon this poor creature. As for the crying android it could be pity, and for the alcohol-junkie reluctance and disgust. Again, we see a coupling between interaction and emotion.

EXPRESSIONS OF INTERACTION

This exercise is by far more complicated than *Designing Emotions*. Its difficulty lies in the fact that it focuses on the interaction *per se*, and not in the usual sense that it should be good/easy/obvious/well-designed and above all adapted to the function it invokes. Normally, interaction follows function (to paraphrase Mies van der Rohe!), but in this task interaction comes first and function – if any – follows it. This enforces an entirely new approach, where one has to direct one's attention to how interaction *expresses itself*. This may seem to be a pseudo task but – if designing something at, say, an amusement park or a museum, don't you want the users to appear as if they are enjoying themselves, not only by the feelings they express but by the way they interact with whatever you've designed? "*How does the wanted interaction appear*?" is the key question in this exercise, and the answer is by no means obvious. Naturally, the emotions the students got influenced the difficulty of the task. One student got the seemingly easy word playful, and spent at least two hours pondering over it. During supervision he said something like: *I can easily design something that can be played with, or that is playful in itself, but what does* ***playfulness*** *look like?* In my (limited) experience the words *annoyed* and *careful* were too easy whereas the words *playful, jealous* and *sad* were perceived as hard. The words *energetic, loving, shy, happy* and *hysteric* seemed to work.

EXAMPLES: SAD, PLAYFUL; CAREFUL AND ENERGETIC INTERACTION

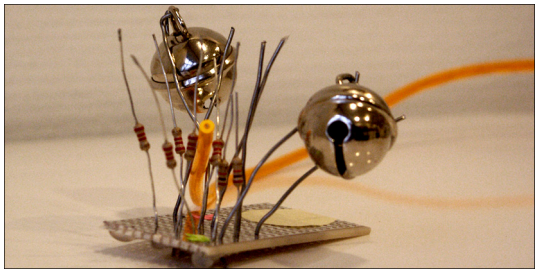
Sad interaction *by Kalle Landin. The idea is that the sight of a wet, dirty, severely burned and mutilated toy would make the user associate to the toy's owner who has been killed in a fire.*

Photo: Sus Lundgren

Playful interaction *by Olof Göranson. Basically this is a long string with a rubber ball on one end and a color to put around one's ankle in the other end. The idea is that the irregularly bouncing ball will invite playful interaction.* *Photo: Sus Lundgren*

Energetic interaction *by Carla Saraiva. The jelly-filled jar also contains a bottleneck. The idea is that three bells hidden in the jelly should be transported through the bottleneck by vividly shaking the jar.*

Photo: Sus Lundgren



Careful interaction *by MinJuan Wang. This is a very small device, and the idea is to thread the orange tube through the "wood" of wires to the goal without causing the bells to ring.*

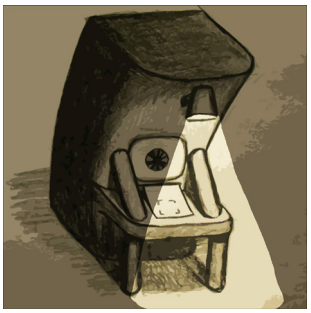
Photo: Sus Lundgren

There seemed to be two approaches to this task. Either, students aimed for an artifact that would express, or make people associate to the feeling, hoping that it would "spill over" to the interaction (e.g. the *sad interaction* plush dog) or a likewise cute little bird hoping to invoke *loving interaction*. Or, students challenged themselves by really looking at the activity of being careful, playful and energetic, and designed an artifact that invited such interaction. The latter is, I think, the most rewarding approach. But then again, this may depend on the emotion that you are aiming to express as interaction. The student who had gotten *loving* complained that he found it very hard to not make an artifact that, apart from invoking loving interaction, also expressed some kind of cuteness or loveliness.

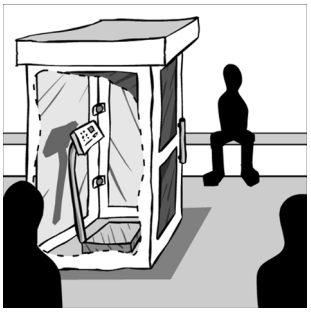
Unlike other exercises this one was feedbacked partly via a guessing contest. The students got the correct words (not giving any words at all, i.e. letting them guess freely was too hard) and were to pair them with the correct artifact, but no one got more than four points out of ten. This highlights how hard the task is – even with given words it was hard to guess. Then again, part of the result was due to the fact that several words were somewhat alike, e.g., loving was embodied by a cute toy bird which was mistaken for playful etc. In addition not all prototypes were fully working, e.g. *hysteric* was a ball with tickling feathers which, if hugged to hard, would hurt the user with hidden needles and additionally would burst and spill disgusting goo. If implemented it would probably have worked very well! However guessing the correct word was not the focus of the task. Hence, the following discussion was very enlightening in the sense that students for once looked only at interaction manners and not at anything else, which was a very insightful experience. For example, students suggested which word they would have chosen if allowed to guess freely, and some of these suggestions were better than the original, e.g. the design for *careful* interaction rather invoked *concentrated* interaction.

STUDENT'S COMMENTS

One of the last events in the course, was an oral presentation where students were asked to describe their most interesting design process(es). Here, one student, Magnus Lorentzon, spoke very vividly about his problems with the task of expressing angst. He had gotten stuck in a vision of the Brezhnev-version of the Soviet Union combined with the all-seeing eye of Orwell's Big Brother as described in the novel *1984*, and he simply couldn't let go. He described it as being "*a painful struggling process, […] didn't feel right at any point.*" Finally, he designed a very inquisitive and superintendent ticket machine, and as he described it, a few days later it struck him – he had designed suspiciousness, not angst! In his portfolio, he later included this suspicious vending machine and added a brilliant angst-evoking vending machine evolving around being naked, weighed and measured in a small semi-transparent booth whose door cannot be locked. To him, I think the task – after all the struggle – really highlighted the connections between interaction and emotion as well as the difference between how different emotions manifest themselves.



The suspicion-expressing Big Brother parking ticket vending machine.



The angst-evoking Spa Ticket Vending Machine

(Illustrations by Magus Lorentzon)

Another student, Kalle Landin, spoke of his adventures when trying to design sad interaction (the plush dog described earlier). Many of his initial ideas all evolved around death, like graves and funerals. He found that sadness was easy to express in an artifact, but not as interaction, partly because it manifests itself in different ways. However an idea struck him in the middle of the night: *"I was going to mutilate and burn a teddy bear!"* Although the damaged toy in itself is a sad creature the idea was to make users think of its burnt to death owner which would hopefully inspire some ad interaction. He then very vividly described the process during which he tried to make his plush dog appear as pitiful as possible – which included setting it on fire outside the school building! To him, I think the task showed the close connection between expressions and how they affect interaction, but it also made him think a lot of interaction per se, since "his" emotion, sadness, was not so easy to transfer to designed interaction.

The students were also asked to comment on the exercises afterwards, and some of the comments on the angst-exercise were:

> *I liked to approach the design by defining colours, natural phenomenons, tools etc. which would be connected to "angst". This strategy seems to be useful, if one wants to express specific emotions with a design object.*
>
> *"Designing the environment (the context) can sometimes be even more important than the actual object/subject being designed"*

Comments on the interaction-exercise were for instance:

> *The exercise clarified how hard it can be to design a specific way of interacting, but it also made me think of how important it is that an interaction designer thinks of the consequences a design will have for the way we will interact with it*
>
> *I learned to think about expressions of interactions themselves.*
>
> *I have problems designing an interaction that expresses a feeling. The more I think of it, the more I get confused. Whatever I come up with is the device itself expressing the feeling (annoyed in my case) through the way it offers interaction with it to the user. […] The thing is, Interaction is not a physical object, so you cannot directly express a feeling by it, but instead, you can design the device being interacted with in a way that offers a certain type of interaction and hence communicates a feeling in that way.*

The last quote clearly shows how some students had issues with separating the interaction per se and the expressions of the artifact meant to interact with, then again this can be related to the emotion one is working with.

REFLECTIONS

I have of course not solved the Catch-22 of separating interaction from the artifact – both of the exercises presented results in the form of artifacts. However I think that both exercises at least do put focus on interaction first and foremost. Although I am rather pleased with the outcome of the exercises I think they can be improved. I will probably change *Designing Emotions* the next time I runt it. Despite my intention, the version presented above had some students getting caught in the catch. Therefore, I will put the focus even more on interaction, making it the main point of the issue as opposed to now, when interaction, form and material were equally important. Ways to manage this is probably to reformulate the task. The questions in the Chinese Portrait could be rewritten, including movement and sport and leaving out color and material. And, more importantly, the task should ask which types of interaction makes a person feel angst? This would encourage participants to explore more non-usual types of interaction, like being naked etc. With this as a starting point, the rest of the vending machine should be designed, i.e. with the interaction as starting point. With this approach it is probably meaningful to only design vending machines that evoke angst, since the next exercise deals with expressing an emotion through interaction. A side note on the choice of angst as being the emotion; I've run this exercise in several incarnations throughout the years, and I have found that angst is a very good emotion to work with, probably because it is a very strong and complex feeling that is closely related to many other feelings; fear, anger, intimidation, frustration, helplessness etc. This seems to be inspiring.

As for *Expressions of Interaction*, it worked very well, but the words/emotions used must be chosen with care. Also perhaps it could be interesting to just present a list and let the participants choose which ever word they want. If several participants pick the same emotion

it could be interesting to compare. One could of course give the same word/emotion to the entire class, but that would limit the oh-so-important post-exercise discussion, I think.

CONCLUSIONS

One may of course ask – what is the point? Well, if you are teaching interaction design I hope it is obvious; here are two exercises highlighting issues of interaction and emotion that can fit into a wide range of courses. If you are not a teacher but instead a designer… well then these tasks and this paper can hopefully inspire you in your design. As mentioned, the aim of this paper was to explore, examine and excite, not to present any explicit results.

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