TO REFLECT ON INTERACTION FORM, IN PRACTICE

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How to teach reflective skills within form in interaction design to students with a background mainly in computer science and only to a small degree in design? As part of ongoing work on answering that question one example of an exercise is presented and concluding remarks made.

INTRODUCTION

Think of a heavy table, a substantial table. And then imagine a light neat table next to it, almost floating through air. These words, heavy, substantial, light, neat and floating, do not really have to describe the actual physical properties of the tables, they may just as well describe how they look. A table can be described as light and neat even though it weight a lot – if it still looks light and neat, i.e. if the form of the table (the way the material constitutes the object) is light and neat.

Within product and industrial design there are examples of how physical forms are described in other words than words we normally relate to physical shape; "*This model from 1984* (a Ferrari Testarossa, my comment) *is charged with a strong expression of high speed which is consistently emphasized in every detail*" (Monö 1997:100). Even though you might not know how a Ferrari Testarossa looks like, you probably have an idea if it is described as having the expression of *high speed*, and if you know that is was made in 1984. You probably do not have the picture of a muscle car in mind, or? But how does actual high speed looks like? Even though I would say that these kinds of expressions have been learnt and relate to people's experiences, and that actual *high speed* is not something inherent in the object itself, there is of course an expression of that physical car – there is of course a form decided and built into it. And why can't high speed be part of a language, a way to talk about that form, probably suitable and fruitfully during the design process? And the question is, couldn't there be a point in talking about similar things also within interaction design, but then regarding *interaction form*? Just as the physical form of the car has properties and expresses things, why wouldn't also the *use* of the car (that is also designed) have properties and express things?

On the notions of expressions, qualities and form cf. related work on *characters* and *use qualities* and *form* by (Janlert and Stolterman 1997), (Löwgren and Stolterman 2004) and (Mazé and Redström 2005).

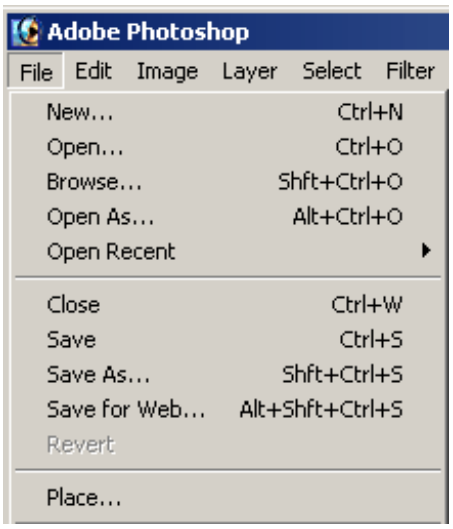
A notion of form concerning how the interaction has or shall be designed, has to deal with both the spatial and the temporal form of the product/system, since use is something that takes place over time. Interaction form therefore refers to how spatial form and temporal form are related to each other in a design, as well as to how interaction and function are related to each other. In other words also to how – what a person does while using something – is related to what that something is doing while being used, cf. (Hallnäs 2004). The properties of interaction form depend on how this relationship has been chosen through the design, i.e. which human actions the thing allows, encourages, discourages etc. – together with what feedback the thing is giving on these actions – together with what the thing actually does while being used. To use the

notion of interaction form is then a way to discuss how these things has been or should be designed and related to each other.

In the car example interaction form thus concerns how the driver's actions are related to the performance and actions of the car. For example how the steering, accelerating etc. are related to the steering-wheel and pedals etc. (things that take place both in time and space). In different cars this is made differently. One can say that there is a difference in the expression of driving different cars that due to the construction of the car. It can for example be made in a more rough way, as in sports cars with manual gearbox where there can be a more direct contact between the interaction and the function, or it can be done in a more indirect way, as in cars with less horse-power and with automatic gearbox for example. To exclude the tachometer and reduce the sound of the engine are two examples of increasing the distance between interaction and function.

Just as a the earth can look flat and can therefore be 'experienced' to be flat, though it is not, there is a difference if a computational object is built in a clumsy way or just is experienced as clumsy. In other words, clumsy can be used in two different ways. It can be a word used to describe how people experience and perceive to use something, for example the user interface of MySpace[1]. Or, it can be something that rather describes the actual form of the product, for example when a user interface has been built in a clumsy way so that mistakes often are made by people interacting with the product. The distinction that can be fruitful from a design perspective to draw, is that in the latter example the interaction form is clumsy even though someone interacting with the product does not perceive it as clumsy. You can for example think that the product/system does something else than what it actually does, unaware of misunderstandings or faults (slips and errors) being made. In a way that was the case when Jas 39 crashed in 1989. The pilot tried to counteract some of the movements of the plane (caused by the wind), and without knowing that his commands exceeded the limitations that were set, he interpreted the lack of response as that the plane where not following his commands, so he reacted even more. Two of the conclusions were that the constructors of the steering system and the pilots should communicate more and the control stick's effectiveness was too high, i.e. the design of it allowed unnecessary big manoeuvres.[2]

In the exercise described in this paper the focus is on two interaction form properties described as fragile and magical (Landin 2006), (Landin 2005). A fragile interaction form property is when the relation between what you do and what the thing does, more or less easily breaks during use. This means that what you do no longer is related to what the thing does, and vice versa. A computer that freezes for example has a clear fragile interaction form. A distinction important to do is whether it is the interaction form that is fragile and not the thing itself, or whether both are fragile. (A product/system that possesses a fragile interaction form does not have to be fragile in itself. It may be so that the thing is constructed in such way that a person may not know how to interact, even though the thing (so called) works as usual. But if a thing is fragile in itself, if it can break, then a person might not be able to interact with it either, then the *interaction form* follows the *form* so to say.)



In Adobe Photoshop one's original file can quite easily be destroyed by mistake if one slips on the Shift-key using the keyboard shortcuts when 'saving as'. The similar keyboard shortcuts for to 'save' and to 'save as' can be said to increase the fragile interaction form, however the fact that in all newer versions of this software it is possible to go back quite far in 'history' reduce some of that fragility.

When the interaction is related to function in a magical way, it can for example imply that a person does not really understand how what he/she does is actually related to what the thing does. Many computational things can be said to possess this magical interaction form property, since people can quite easily learn to use products and see some interaction logic but, can not honestly say that they fully understand how the

[1] http://www.myspace.com

[2] Haveri Provflygplanet JAS 39-1, Utredningsrapport M 1989:1, Juni 1989, Statens Haverikommission.

products actually work. And still, people trust these products. The magical interaction form property is a way of expressing the phenomenon of products that people might let themselves be dependent of, or deceived by. A magical interaction form can be a result of complex products that people can not fully understand and therefore tend to ascribe various behaviours or characteristics to, but it can also be something intended by the designer. Clear examples are products that people do not consider as only hardware and software but also ascribe feelings, like Tamagotchi, Aibo and Furby. This has nothing to do with people being stupid, rather that they just choose themselves to think of the products as having feelings. On people responding to computational products and media as to other living beings see for example work done by Janlert and Stolterman, e.g. (Janlert and Stolterman 1997), or Reeves and Nass, e.g. (Nass, Steuer and Tauber 1994), that writes: "*People have done some amazing things in our labs. They have taken great care not to make a computer feel bad, they've felt physically threatened by mere pictures, and they've attributed to an animated line drawing a personality as rich as that of their best friend. It eventually occurred to us that people were not doing these things because they were childish, inexperienced, distracted or because they needed a metaphor. We had to acknowledge that these responses were fundamentally human, and we had to acknowledge that they were important.*" (Reeves and Nass 1996 p.8)

In the woods of Halland, Sweden, there is a rather big area with no mobile connection except for a parking lot more and less in the middle of nowhere. This results in people visiting the parking lot just to check their mobile phones and make calls. Can dependence be said to be an expression of the magical interaction form property?

More or less all computational products and many non-computational too, can be said to possess the magical interaction form since i) many things are hard to grasp fully and ii) people tend to assign personality to and are dependent on and deceived by not just toys but also many other computational and non-computational products, sometimes consciously, sometimes unconsciously. What differs is often instead to which extent. Video calls can for example be said to have more of the magical interaction form property than a rocking-chair does. An interaction form property, such as fragile or magical, should not be seen as something binary, instead as something gradient that there could be more or less of and in different ways. To design something is therefore also creating how and how much, intentionally or unintentionally.

A product can of course be used and interacted with in other ways than the designer thought of, and in that case the expressions during use might also be other than the thought of. However, expressions during *unthought-of* use depend as much on the product as expressions during *thought-of* use since it is the inbuilt limitations and possibilities of the products in the interaction form that anyhow make the product possible to use and interact with in all possible ways. Intentional ways as well as unintentional ways.

From a design perspective there can be a point in thinking of interaction forms and expressions as something inbuilt into a product. If so, one can not only make the distinction between forms and expressions of physical objects as such, and forms and expressions of interaction and use, but also between the aesthetic experience during *actual* use and interaction aesthetics of the object regarding *potential* use. Since *actual* use and experience cannot be mastered there can be a point in focusing on what can be, i.e. the aesthetics of the object itself, and then designed regarding *potential* use and interaction.

THE EXERCISE

After about 20 minutes of introduction that corresponds to the introduction above, an exercise was given to Master's students in interaction design. Their backgrounds vary but the majority have completed three years of engineering studies in IT or computer science, and all of them have taken a course in HCI. The students had three hours for the exercise.

Credit cards were taken as an example of a product/system with a fragile interaction form in the introduction for the students. Credit card systems (like Visa, MasterCard etc.) have a fragile interaction form in that sense that it is possible for others to use your money, without your allowance and knowing. It should only be the allowed ones, but if someone else gets hold of the critical numbers (through skimming for

example) the relation between interaction and function breaks: the ATM might keep one's card or there might be no money left when one would like to pay, a fragility that is a deliberately taken risk by credit card companies.

A fragile interaction form – it only takes the numbers on a card to be able to pay with someone else's money over Internet.

The example that was given on magical interaction form was the furniture in the Placebo project (Dunne and Raby 2001). Some of the pieces were presented, among them the GPS table: the table that uses GPS to position itself in the world and effectively triggers peoples feelings by showing the word Lost when it has lost the contact with the satellites. *"We like the idea that people might feel a little cruel keeping it indoors"* (Dunne and Raby 2001:79).

The difference between expression and impression was also discussed, where expression was said to be what the designer can work with, focus on and create when making something, while the impression is more difficult to master since it is the subjective impression a person has when interacting with a product. The impression can be due to the expression but many other things will most likely also affect it, like earlier experiences, mood and temper, or what the person had for breakfast and other factors that are more or less uncontrollable for the designer. The important puzzle to complete for the designer, though, is to think of which expressions that may lead to desirable impressions, from an interaction perspective.

Half of the class of 32 students had first two tasks on fragile interaction form and thereafter one on magical interaction form and the other half had the opposite: two on magical and then one on fragile. They worked in groups of about five people. Both versions of the exercise had the same structure which means that the tasks were the same but the interaction form differed. Hence, it was only the interaction form and the examples, within parenthesis below, and some wording that differed. The exercises were introduced and given in Swedish. Here one of the two versions is translated into English.

Exercise: INTERACTION FORM, EXPRESSION AND IMPRESSION

Procedure

1. FRAGILE INTERACTION FORM (max 15 min.)
    a. Write down some products/systems containing computational technology that have a fragile interaction form. Discuss in what way they are fragile.
    b. Discuss and write down how it can be to experience the products/systems as fragile. (Negative? Positive?) What kind of expression exists during use? And what kind of impression among people may this expression lead to? Write down some examples. Does the impression differ whether a person is aware of that the product is fragile or not (for example thinks of it as something robust)? In that case how?
2. FRAGILE INTERACTION FORM (about 90 min.)
    a. Choose one of the below products to do the interaction design for.

        Booking system for train tickets

        A car

        Payment system for Västtrafik (*public transport company in west Sweden, my comment*)

        An mp3-player

        A mobile phone

    b. Try to identify design decisions that will affect whether the product will get a fragile interaction form or not. Write them down.
    c. Consider the consequences for the interaction a fragile interaction form might imply. How will the interaction be affected if the fragility breaks through and is noticed by the user/protagonist[1]? Do you think the person will change the way he/she interacts with the product? (For example, might the person get nervous? May the trust in the product decrease/increase? Might it become

1 Dunne refers to people as protagonists instead of as users in his dissertation Herzian Tales.

more exciting to use the product? And in those cases, do you think it will affect how the person interacts?)

d. Discuss expressions and potential impressions during use (contemplated use since real use does not exist yet since your design hasn't been manufactured and delivered.) Put name to and describe different expressions that a potential fragile interaction form might bring forth. Also write down which impressions among people these might lead to. (Might fragile interaction form lead to anxiety? Suspiciousness? Excitement? Distrust? A relaxed attitude?)

e. Sketch how you will design your product out of the discussion above. Write down some central important design decisions and state reasons.

3. MAGICAL INTERACTION FORM (about 45 min.)

   a. Choose one digital product that all in the group are familiar with. Redesign it so that you increase the magical interaction form. Write down the design decisions that lead to this.

   b. Write down different user scenarios where different persons relate in different ways to the product. Some in a negative way and some in a positive way. (That is, can you make the product magical in such a way that you can take advantage of it?) Discuss how the different ways of relating to/attitudes might affect the interaction and the impression during use.

   c. Now redesign the product so that the magical interaction form decreases. Analyse how this might affect the interaction and impression during use. Write down design choices that decreases the magical form.

AIM

The aim with this exercise is to put focus on the design of the use of products from a design perspective, which means even before there is anything to analyse or test, on so called users. The point is to increase the awareness on how interaction is related to the expression of using a product, and to relate design decisions with expressions – with potential impressions. This might be a way to reflect more on critical design decisions and to support thinking out of the HCI-box, which means from an aesthetic and expressional perspective rather than the perspective of user studies. It is an attempt to put focus on the huge gap between user tests and questionnaires etc. where one focuses on the experience of using something, and the actual design/construction of the object. This is something we think can be extra important when the students have been educated in HCI but are unused to reflect on the design process.

RESULT

Some of the things that were considered by the participants:

One group on magical interaction form chose an mp3-player. They concluded that the interaction form would be more magical if there where no indications on the player of what it was doing, and less magical if the player instead was more transparent. They had some thoughts on whether things with a magical interaction form might gain some kind of respect, more than unmagical things – that unmagical things might be regarded more just as tools while a magical mp3-player may possess *the power* of playing music. They chose to design a magical player by the shape of a teddy bear where one interacted through cuddling. They discussed the experience of a random function that introduces new songs the listener should also like, that one could get disappointed or that one could get in good mood. (Here they focused on the experience of the intentional interaction, not so much on expressions.) In the last task, where the interaction form switched from magical to fragile, they chose a mobile phone. To increase the fragility they suggested that one have to hold the phone in a certain way otherwise it will fall apart, and that the phone will most often not work without the handsfree plugged in. To instead decrease the fragility they suggested not cutting off phone calls even if the money runs out (if 'paying as you go'). They concluded that one can build things in a certain way to give a solid expression but, on the other hand, one can build in fragility to direct users' behaviour.

Other examples of things that were discussed to increase the magical interaction form in an mp3-player, in another group, were that the player should react to how quickly one was using the menu/buttons and having the choice of the music being played controlled by an accelerometer. This last alternative was discussed to be experienced as nice on some occasions

but also annoying if one for example wanted to listen to rather calm music on a bumpy bus-ride.

Another group on magical interaction form chose a car. They thought of how it would be if the car was more like a living being, and a being that wanted to be clean. If soiled and muddy the car would only drive willingly to the car wash. They concluded that a car with a magical interaction form could make people suspicious and thoughtful, and lead to a dissociation.

Another group also chose a car but were looking at fragile interaction form. They thought of different ways of giving feedback and present things. For example of the importance of proper sound feedback when closing the boot, and that the sound when locking/unlocking the car could be done ambiguous – with a time delay or using the same sound for both activities – so that people might tend to check the door by hand every time anyway, and that automatic braking assistance (with the aim to reduce the braking distance) and automatic distance control systems might make people feel insecure instead, depending on how implemented and displayed.

Another group also on fragile interaction form chose a mobile phone, they were discussing how buttons on a mobile phone can feel right and can click and enter just right on time, or feel cheap and making the user frustrated, irritated, anxious and/or annoyed. They concluded that a phone's fragile interaction form can make the user being more careful. They thought about how people like to master things, that a product with a fragile interaction form might be regarded as a professional product since 'foolproof systems are used only by fools'. So the question is: Can one kind of well thought-out fragility support the feeling of being the master? They also discussed another side of fragile form, that users may adapt to the interaction by compromising with their selves.

DISCUSSION

In this exercise the students were encourage to write down several things and the exercise was also handed out printed. The reason why the exercise was held in this way was due to the large number of participants (more than 30 persons) which made it hard to talk properly with all groups during all phases of the exercise. To get the thoughts on paper made it possible to return with feedback afterwards. And the second reason is simply that on this occasion, in addition to the purpose of exercising something, the point was also to collect some material about how the exercise went along, and thus notes were one form of documentation. However, as an exercise as such, the written format can and perhaps even should be abandoned, important though is to make sure that the reflections are formulated and discussed properly anyway even if not written down.

One rather clear thing during the exercise was that it was easy for the participants to fall back on thinking about the material itself, instead of about the interaction form. For example thinking of fragile materials, like ceramics and certain plastics or things with loose screws, instead of for example how a misunderstanding might take place during the use of a product. My impression was that they were slightly unaware of this, that they wrote down fragile things side by side with things with a fragile interaction form. Constant supervision was needed to question what they actually thought of and to re-focus. Probably one contributory cause to this is the unclear wording in the tasks where formulations such as things *have* a fragile interaction form are mixed with that things *are* fragile. Even if one can say that a thing is fragile and aim at the interaction form, this simplification is unnecessary in an exercise. The distinction between the two things is important to make clearer in future exercises, otherwise the point might be missed.

In a way this also was shown in the result of the different tasks. The first task was made for warming up, to elucidate the concept within the group so that they would get more familiar with it and have the same idea of what fragile/magical interaction form is about. That seems to have worked out well. When the groups came to the more comprehensive second task they were more familiar with the concept and had gathered some speed. In the last task, though, the interaction form switched which caused problems for several groups. They were not as familiar with this other notion and were far more confused than during the second task, irrespectively of which interaction form they worked on. In the result of the last task very few groups presented as good/full material as in the second one, which I think due to the procedure/agenda of the exercise and to the limited time, rather than to the task itself. One point in the last task that didn't really come forth was to, explicitly, both consider what might increase and decrease the interaction form.

Lesson learned from this time is that one should probably only deal with one interaction form in one session, and that the exercise above should be extended over several sessions instead, where there should be

time for reflections and open discussions in the class in between.

One should perhaps also refine the exercise, so that the focus shifts from expression to impression in different exercises. This as a way to reduce the risk that the participants only focus on the users' experience instead of on expressions. A clearer introduction might also help. And formulations such as *contemplated* use should instead be reframed as *potential* use, to increase the awareness that focus is not on designing the actual experience but the object. cf. (Redström 2006). This since the object might lead to very different kinds of use than the contemplated use, also to unthought-of use.

There were several occasions where there was a discussion on how different design decisions might affect the expressions of interaction. For example how it might be driving around with different kinds of automatic braking systems, or how a very expensive Chinese vase on the roof of a car – that the car was unable to drive without – would force people to plan ahead when driving and to drive smoother. But one conclusion is though that one should strive to emphasise this more during the exercise, there would be a good point if these discussions on the connection between different design choices and interactions had been brought even further and been more precise. Again, that this wasn't the case was probably also due to the time limit and that the exercise was rather compact.

Several groups chose in task 2e (Sketch how you will design your product out of the discussion above) to make something that would increase the fragile or magical interaction form, though it was not expressed that they would. I wonder if the reason to this has something to do with that they actually found some aspects of the fragile and magical interaction form that could be fruitful.

I think that the participants considered things from a new perspective and in a way might have extended their thinking. An example is the thought of that people like to master things and that this could be regarded in the interaction design process. Or the thought about that there might be a relation between magical interaction form and respect.

I think this is a hard exercise to do, which in a way also showed in the result. But I do interpret the reflections and ideas on form and expressions the participants discussed as indicating that the exercise worked, as a first step. An example of this is the conclusion that a car with a magical interaction form could make people suspicious and thoughtful, introducing distance between the driver and the car. And one thing that is interesting, with this example and with other things that were discussed, is that the things one might regard as people's feelings (e.g. suspiciousness and thoughtfulness) might be regarded instead as interaction form expressions. I.e. that suspiciousness and thoughtfulness might relate to the interaction form itself, and strictly speaking, things one might want to, or might not want to, put into the design, just as high speed. In that case it could be part of an interaction design language where designers can discuss how they could decrease the interaction expression of suspiciousness in for example a car (when for example discussing how different automatic safety systems should work and be presented to the driver).

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