

HOW CAN MATERIAL DRIVEN DESIGN CREATE PLAYFUL INTERACTION?

ENGAGEMENTS, RELATIONS

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ABSTRACT

In this paper, a playful artefact is presented as an outcome of exploration in the domain of materials experience. The overarching aim for this research is to delve into how a Material Driven Design approach may be used in the field of playful interaction through research-based design practice. This paper argues for how Material Driven Design can create playful interactions.

INTRODUCTION

‘Material’ thinking is broadening, and we bare witness to its significance in design. Yet, it seems somewhat poorly addressed in the domain of play and playful interaction. Our playful artefact is presented as an outcome of exploration in the field of playful interaction. The artefact was heavily influenced by materials experience in the context of interaction design. Here, the notions of play and playfulness are examined with regard to Material Driven Design. In our design-based research, we seek to unfold the correlation between material experience and playful interaction to gain insights into how Material Driven Design relates to playful interaction.

PLAY AND PLAYFULNESS

In the midst of all definitions and theories about play, there is the notion of play as a quality of experience. It is portrayed as something people feel and experience while they are ‘playing’. Henricks (2008) notion goes beyond play as an activity and instead emphasizes the experience itself—“*a dynamic, ever-changing process*

that is filled with ambiguity and surprise”. Play as an experience, in light of interaction, is what he characterizes as being generous with various kinds of improbability and excitement. For Henricks, no engaging person can predict what meanings will be discovered during such an interactive experience. With this in mind, we consider a ‘playful interaction’ to exhibit distinctive qualities such as the uncertainty in course of action, surprise, novelty and excitement. We draw upon the thought of play by Henricks ‘playfulness’, and we design in symbiosis with it to elicit a more meaningful experience.

Gaver et al. (2004) emphasize various design challenges for understanding how to create an interactive artefact that would support playful engagement. For Gaver et al., the fundamental notion of playful experiences are the qualities of curiosity and exploration. To restate Henricks (2008) notion, we are to be believed that they are open-ended or ambiguous. Consequently, playful artefacts should offer a range of possible actions and meanings for people to explore. For this paper, it means to avoid suggestions of what people *should* do and rather design to entail what they *could* do. From this notion, we aim to allow our material to afford curiosity and exploration of possibilities.

MATERIALITY

For this paper, we are fascinated by the material dimensions of interaction design. Our initial beliefs are to pay close attention to the materials at hand and gain a deeper understanding of how these materials communicate back to us as designers. We believe it to be an important part of the design process. Karana, Barati, Rognoli, and Zeeuw van der Laan (2015) acknowledges past attempts in bringing material thinking to the early steps of designing and to mobilize characteristics of materials in the design process. However, Karana et al.’s. founding method, Material

Driven Design (MDD), is distinguished in its “*experience-oriented perspective*”. MDD aims to support designers to design for meaningful experiences with the material at hand, qualifying the material not only for what it is but also for what it expresses to us and makes us do. Accordingly, this methodology facilitates designing for meaningful experiences when the material is the starting point in the design process. For materials to shape and affect the experience, Karana et al. believe it is necessary to ‘*tinker with the material*’ throughout the design process. For designing with materials, designers need to entail a thorough understanding of the material in order to unfold its qualities. Here, we consider these premises as the basis of our design-based research.

For this paper, MDD will be used to unfold playful interactions through the qualities of our materials. We believe that MDD may be employed to create playful interactions. We considered the following experiential components in our research, as presented by Karana et al.: sensorial (e.g. we think the material is heavy or rough), interpretative (e.g. we think it is modern or high-quality), affective (e.g. we feel fascinated or surprised by the material), performative (e.g. the material makes us tweak it or caress it). These levels, according to Karana et al., articulate an understanding of materials experience, categorizing different experiential qualities that can be elicited by the materials. They are highly interlaced and experienced as a whole, influenced by each other and by the context of use.

In addition to Karana’s components, we consider play sharing an equally important influential factor. In the case study by Wakkary and Hatala (2006), play is expressed to be ‘highly situated’. It is not to be felt separated from the context to the point that it is misleading, for it may elicit more meaningful experiences. For this paper, Wakkary and Hatala leave behind the notion of acknowledging the context in which the play will be played. That said, designers need to consider the situated nature of play to best serve the overall design purpose and to understand the nature and degree of play required. As Wakkary and Hatala continuous, playful interaction lends itself well to integrating with the context and in many cases depends on it. What may feel playful in one context, may feel ‘undesirable’ to engage within a different one. However, in the present design project, we are cautious of attempting to define playfulness. To refer back to Karana et al. (2015), these experiential components, through MDD, provide structure and vocabulary which may reveal new insights and facets of how materials can elicit novel and playful interactions.

DESIGN PROCESS

The design process was divided into six stages; (1) Material Exploration I, (2) Material Exploration II, (3) Field Research, (4) Material Exploration III, (5) DIY Material Exploration, and (6) Playtest. In accordance with MDD, Material Exploration I and II were executed according to its guided steps. In step one the aim was to answer the following questions: *Describe what the material makes you do. Describe what you feel (through touch, vision). Which emotions does the material elicit? Describe your associations with the material.* Five versatile materials were selected (See Fig. 1). Combined with our observation, by having two facilitators present during the user test, we found that imperfect surface qualities of the materials, were embraced, as expressed by one of the participants as a “*Surprising feeling*”, “*Fascinating*” and “*Very fidgeting*”. Participants wanted to poke, fidget and stroke with imperfect surfaces. Interestingly, one of the participants expressed the feeling of caressing the ‘furry’ patch (See Fig. 1 bottom right) even though she explicitly confessed a feeling of ‘disgust’.

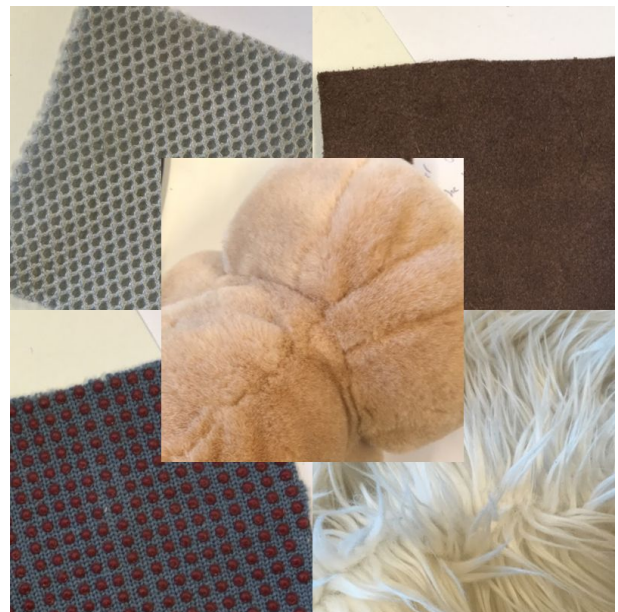


Figure 1: Five entry materials.

According to Karana et al. (2015), understanding the context is a crucial part of MDD. From this notion, we set out to explore contemporary playful artefacts and found which materials may play a ‘playful’ role and what sort of materials were in use. Here, our findings concluded with memory foam being particularly interesting as it was a material that we desired to include in our research. For it shared the characteristics of various of the paddings of contemporary toys in our field research. The memory foam had the preferred density of all the different foams that were tested. Due to the way the memory foam retained its shape when squeezed for a brief time, had a great significance on the

time participants spent playing with it. Even without the other materials present, the foam itself had naturally playful characteristics that the participants enjoyed interacting with.

Our next iteration circle involved the next step of MDD. In Material Exploration III, in accordance with step two, we aimed to answer the following questions: *How would people interact with the material within a playful context? What would the material's unique contribution be? What would it make people do? Would it elicit 'playfulness' from people?* Three new textures were introduced, in a group sharing similar material qualities to the ones previously mentioned. Here, to further explore the qualities of the materials to map potential material applications for our playful artefact "Stitch". For the 'bumpy' patch (See Fig. 2 - second from right), one of our participants expressed "*Interesting and playful*". It could be observed how participants repeatedly stroked and pinched the material, appearing addictive. All participants expressed various degrees of positive feelings and were seen continuously stroking it during the interviews. For the 'black' patch (See Fig. 2 - first from left), participants played with its textural direction in the sense that it was exciting to be able to affect the surface of the material. They, in general, expressed 'soft', 'animal-like' and 'fidgety'. The 'brown' patch (See Fig. 2 - second from left) was viewed as rough in vision, but soft in touch. For comparison, the 'furry' patch, though being enjoyable to a few, was still associated with the opposite qualities of play. Yet, it afforded its own type of interactions. Here, even though the 'brown' patch was expressed to not be as satisfying as the other materials in this stage, participants continued to play with it for an extensive period of time. Participants were scratching the surface, rather than caressing it with their fingers as noted with the 'furry' patch. This, due to the length of hairs on the surface. In accordance with Henricks (2008), Wakkary and Hatala (2006), Gaver et al. (2004), our insights seem to inform different degrees of play in our materials. Although we are being revealed to qualities that seem to constitute playful interaction, some qualities are however the opposite of Henricks (2008) qualities of play.



Figure 2: Three new materials and one entry material.

Based on these findings, we decided to step into the domain of DIY materials experience by Rognoli, Bianchini, Maffei, and Karana (2015). This iteration circle, in accordance with step four, is our understanding of a DIY material exploration. Here, the outcome of our DIY material 'slime' was another of the *must have* filling we considered. Truth be told, the slime itself was not the entry idea but derived from the squishy and jelly-like substances of toys we witnessed from the field research. The DIY method by Rognoli et al. allowed us to create and manipulate something into becoming the output material for this project. We thought of ways to mimic the characteristics of these jellies. When we created slime we tried various plastics to contain it, eventually using the softest one we could find in order to maintain the slime's natural feel. Furthermore, we had to consider how much slime was to be used. Eventually, a users testing led us to the combination of the slime for the belly and 'bumpy' material for "Stitch". We were able to create something that we could tweak, to evoke the effect we believed to be of interest for "Stitch". In comparison to our textile patches, this method allowed us to get to know the material on a different level of understanding. In summary, we observed how people interacted with our materials in what seemed like a playful manner in accordance with the studies presented in this paper. We had identified the interaction they afforded and analysed this information in order to later decide on the placement of the materials on "Stitch". The insights gathered had also been used to later guide the overall shape of "Stitch". By following this process we aimed to identify and apply playful interaction to "Stitch".

The body of the toy was based on memory foam with a lower body part consisted of contained 'slime'. The 'black' material covered the whole toy. It was the base

material and all other textile materials were added on top of it. It afforded mainly stroking. The material on the belly, seen in Fig. 3, was similar to the ‘black’ material in softness but afforded fiddling due to the bumps. Our users expressed liking towards this material, relating it to an animal’s belly. Combining this insight with the slime filling from Fig. 4, we achieved a tender softness. This promoted petting, stroking and careful scratching. The ‘furry’ material promoted fiddling and gave off a ‘cute’ and animal-like impression. This was reaffirmed throughout the user tests and was therefore applied to the ears (Fig. 3). The ‘brown’ material afforded rougher scratching. It was soft to the touch with a rougher base. Therefore, it was applied to the back of the ears as well as the head.



Figure 3: “Stitch” in its hi-fi prototype state.



Figure 4: The making of ‘slime’.

In our playtest, the first participant expressed how playable the artefact looked with its different surfaces, and that it was ‘hiding’ what it actually was. *“The belly is very intriguing because I can not see the whole stomach yet (“Stitch” was on its belly)”*. As the participant lifted “Stitch”, we observed how she reacted to its weight with a surprised-looking facial expression. As she interacted with “Stitch”, we saw interactions of strokes, fiddling and squeezing.

Relating these insights back to Wakkary’s and Hatala’s (2006) ‘playfulness’, playful interactions seem to be expressed in a more nuanced way with the materials situated in the context than before. Though the materials elicited various interactions—it was perhaps not until this point the playful interactions emerged. The second participant had a more ‘energized’ feel to the artefact. We observed how she squeezed the thing with all her strength to explore its behaviour. After a while, she stroked it. Moreover, she lifted it, and expressed *“I love the weight”*. She described it as calming her down. She continued playing with it, pinching it to reveal sweet spots. At some point, she even made noises to it. Voluntarily, she spoke of how the belly made her stroke it repeatedly. She expressed how she was stunned by its new unexplored ‘skin’ after turning it upside down. Likewise, she was squeezing the tummy repeatedly. From the observations, the second participant found herself amazed and smiled throughout the user test whilst interacting with “Stitch”.

CONCLUSION

Our design process was conducted in light of design-based research practice. By employing the MDD framework in our design research, we gained a deeper knowledge of materials and their qualities with regard to evoking playfulness. Consequently, it also increased our iteration circles—allowing us to fully explore our materials. “Stitch”, in accordance with Henricks (2008) notion of play, expressed ludic engagement. This was found in the way the materials elicited possible actions by means of their qualities, even though was not until the last playtest that “Stitch” could be interacted with in its entirety. Play exhibits surprise, excitement and novelty and our insights suggest that materials may elicit such qualities through the experiential levels provided by Karana et al. (2015). However, the work by Henricks (2008) did not uncover the aspect of context but rather indicated how play may unfold itself as an experience. This finding was explained by Wakkary and Hatala (2006). It could also be argued that play and playfulness are highly context-based. Because of that, the interactions made possible in our research were playful to our opinion. On the basis of our insights, we are compelled to conclude that MDD may be used to create playful interaction to the extent of our beliefs.

However, a further study is necessary to confirm the findings in a larger group of participants, both to evaluate the role of MDD in playful interactions and to fully assess 'playfulness'.

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