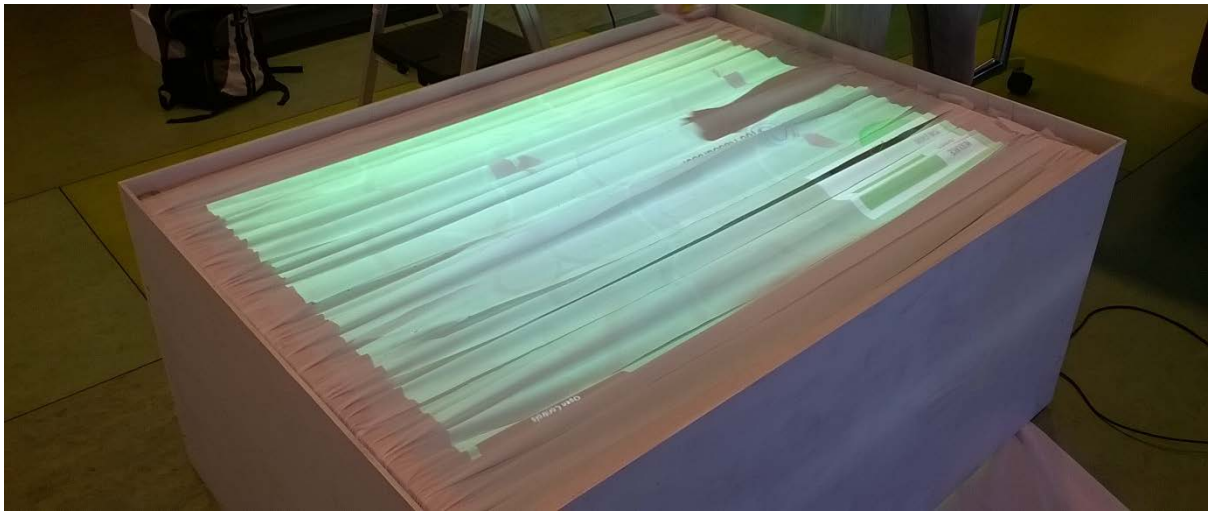
Translating real world actions to effective digital interactions



Reflective Report on Interactive Design Exhibit

Net Profits – Cobalt

Dean Langton - 42911067

16th June 2017

Abstract

This report will compare the interactions in real world scenarios to those replicated digitally and attempt to understand how these digital versions can be improved. Using the concept of affordances and reality based interaction, the installation *Net Profits* is analysed and its effectiveness in this space is judged. Results from a public exhibit of the installation provides relevant data to asses this and determine how better designs from user experience and knowledge could create a seamless real world interaction in a digital form.

Table of Contents

Introduction

The environment for this report, DECO3850: Physical Computing and Interaction Design, aims to teach the rules and principles of interaction design through a semester long project of design iteration and exploration, culminating in a public exhibit of created projects. To fully understand these interactions, our projects are a way for us to explore the design space and understand where these core concepts fit in.

Tognazzi (2014) defines good Interaction Design through a number of standards and guidelines including user expectation and the use of metaphors in design. He states that “good metaphors generate in the users’ minds a strong series of connections to past experiences from the real world”. As technology improves and blurs the line between a real world experience and a digital one, normal interactions in reality are being replicated for their digital counterparts with the hope of capitalising on the users past experience and creating an immersive experience. This raises two main questions: how effective is a digital representation of known real-world physical interactions? and what is lost or gained in this translation?

This report will outline past work and how they shape this design, particularly the concepts of affordances and reality based design. It will use the digital installation *Net Profits* to try and understand how these interactions map to a digital object and how they are perceived with respect to their real world occurrences.

Background

The concept of affordances was first outlined by Gibson (1977) as what an environment offers to a subject, an extension of the verb *to afford.* Even as a purely psychological concept, it raises numerous interesting points on the nature of the environment on the actions of an individual and how we can alter the environment to allow better affordances. These concepts were later refined in the interaction design space by Norman (1988) as a basis of design; identifying affordances in a situation and designing what he calls *signifiers* to highlight possible actions i.e. a pull sign on a door.

As useful as these concepts are, they fall short in analysing how human experience in the real world affects their perception of affordances of digital interactions. Jacob et al. (2008) brings up a framework for the design of affordances in the digital space after real world interactions as Reality-Based Interactions. He outlines these in four facets:

- Naïve Physics; people have common sense knowledge about the physical world.
- Body Awareness & Skills: people have an awareness of their own physical bodies and possess skills for controlling and coordinating their bodies.
- Environment Awareness & Skills: people have a sense of their surroundings and possess skills for negotiating, manipulating, and navigating within their environment.
- Social Awareness & Skills: people are generally aware of others in their environment and have skills for interacting with them. (Jacob et al., 2008)

It is by designing to all of these that interactions can more closely resemble the interactions in the physical world. In theory, a digital environment that has been designed to its real world affordances should elicit the same actions and motions from the user as the non-digital inspiration.

Project

Description

Net Profits is a classroom installation aimed at primary school aged children that encourages students to contribute to a cooperative digital fishpond. Tokens are awarded to students that perform well in class, show improvement in grades or any other positive action that the teacher decides. These tokens can be ‘tossed’ into the digital fishpond and add to the resources that student has to use. Resources can be used to feed the fish, clean the tank and contribute to the overall upkeep of the fishpond. This interaction and the communal nature of the installation is designed to motivate the students to continue their positive behaviour for the benefit of the class. The interactions were chosen for their similarity to real world interactions; to be easily understandable and simple enough for primary school aged children to do. It was important that these interactions be natural and known, so we hoped that the design of a fishpond and the action of throwing a coin into it would be common enough that could quickly understand the representation

Personal Contribution

Throughout the project, I took the lead on the design and construction of the physical components of the installation, as I have knowledge in that area. To replicate the action of throwing a coin into a pond we needed a screen that allowed the coins to pass through and also could hold the projected image of the pond. This permeable interface was the first obstacle that we could see for the project, so a number of smaller scale prototypes were made to test the concept and its viability. These consisted, in several configurations, of strips of material side by side stretched over a frame and held taut by elastic. With some occasional adjustments, this proved an effective and robust solution.

After some tutor and peer feedback, we switched the pond from using real coins to using specific coloured custom tokens. The first of these tokens were too light for the screen and simply bounced off, so a heavier weighted set were made from laser cut discs and steel washers. These tested much better and felt more substantial and connected to the overall installation. These, along with the ‘food’ and ‘cleaner’ container were painted to register with the colour tracking software. Yellow, cyan and magenta were chosen for their contrast, known colour values and difference from the greens and greys used in the projected pond image.

Analysis

The number of school students at the exhibit worked in our favour as we were able to obtain a large sample of experiences with the installation. The coin toss metaphor seemed to translate easily, and once one token was tossed in and the animation played, we found ourselves needing to fish out the tokens faster for kids waiting to try it themselves. The affordances provided by these large coins and labelled containers, along with the visual pond image with its animated fish, led most to accept the function of the installation. The water ripple animation that followed a thrown token only confirmed and solidified this interaction.

The permeable interface we had worked extremely well and conveyed the pond metaphor better than we expected. A number of times, users exclaimed about the coin disappearing and made the connection to a coin disappearing below the surface of the water. This was reassuring to see and validated that piece of design for me as the affordances in the prototype followed directly, those from past user experiences and common real world situations. Often we were asked where the tokens went, which indicated to me that people were interested and engaged, enough to want to understand our installation.

One thing we noticed was the hesitation of most users to interact with the installation, what I believe to be from a lack of *discoverability*. Norman's *signifiers* are key to effectively alerting the user to the affordances in a situation, referred to as its *discoverability*. While a coin and a pond may afford the interaction we expect, the ambiguity and broadness of these objects, coupled with the expectations of the event may have caused many to ask for a demonstration rather than experiment with it.

The use of the food and cleaner containers was an interesting interaction to watch as most people added an action that was never designed. The food container, when held over the tank triggered the food flake animation and a shaking sound effect. The impulse for the user hearing the sound was to shake the container, even though this was not designed or beneficial in any way. Gaver (1991) would refer to this as a *false affordance*, one that the user perceives but serves no purpose or does not

exist, in this case shaking the container to add food to the tank. This is one case of a reality based interaction occurring that we had not planned and proved to us that the user was interacting with the installation, not as a digital exhibit but as a fishpond.

A few times, when people had tossed in a few coins and were handed the food or cleaner container, they promptly tossed that into the pond. I believe this was because of what the user already knew to do and the association of the installation as a digital interaction rather than a physical one; If a coin thrown in will register in this digital system, the food container should do the same. The disassociation of it as a purely digital interaction is needed to make installations like ours effective as replications of real world interactions. In Jacob's Reality-Based Interactions, a further analysis of the Environment Awareness & Skills would allow us to understand how a better design could draw from common experiences and create the real world interaction desired.

Conclusion

Net profits set out to replicate a fishpond in a digital format to understand how effective a digital environment is in engaging with users and how it differs from its real world counterparts. While it was effective in engaging audiences, it lacked crucial visual cues to its function and operation and suffered from a perception problem, being viewed as a digital object instead of as a fishpond.

The difference between our experiences in the real world and those in the virtual world are getting smaller thanks to advances in Virtual Reality and Augmented Reality but the interactions at their core are still rooted in legacy designs. If digital interactions are to be truly immersive they must learn from our real world interactions, not only where and how they are used but why.

References

Norman, D. (1988). *The Design of Everyday Things*. New York: Basic Books.

Jacob, R., Girouard, A., Hirshfield, L., Horn, M., Shaer, O., Solovey, E. and Zigelbaum, J. (2008). Reality-based interaction. *Proceeding of the twenty-sixth annual CHI conference on Human factors in computing systems - CHI '08.* [online] Available at: http://dl.acm.org.ezproxy.library.uq.edu.au/citation.cfm?doid=1357054.1357089 [Accessed 13 Jun. 2017].

Gibson, J. J., (1977). *Theory of Affordances*. In: Shaw, R. and Bransford, J. (1977). *Perceiving, Acting, and Knowing*. Hillsdale, N.J.: Lawrence Erlbaum Associates.

Tognazzini, B. (2014). *First Principles of Interaction Design (Revised & Expanded)*. [online] askTog. Available at: http://asktog.com/atc/principles-of-interaction-design/ [Accessed 15 Jun. 2017].

Gaver, William W. (1991). *Technology affordances*. In: *Proceedings of the SIGCHI conference on Human factors in computing systems Reaching through technology - CHI '91*. [online] Available at: http://dl.acm.org.ezproxy.library.uq.edu.au/citation.cfm?doid=108844.108856