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| Title | タンジブルインタフェースのボリュームと幾何形状のデザイン：発見可能性と認知負荷への影響 |
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Abstract

In our daily life, it is not considered a challenge to interact with our immediate surroundings that comprises of doors, light switches, coffee cups and any other utilitarian objects. Nobody is really questioning the shapes of a tea mug outside of its aesthetics. All objects that are acted upon obey some underlying logics that, even if not visible, are communicated via these objects' forms. This is known as affordance, or the capacity for an object to communicate on its potential usability through its design. If users find themselves in the incapacity to properly use a simple object like a door, it is not the fault of the users. If someone attempt to open a door by pushing on it and nothing happens, the only remaining solution is to pull on it. This is sometime frustrating but not impossible to figure out. This school of idea is applicable to any tangible object, but what about the things that are intangible?

In the realm of interaction design, tangible interface is a bespoke artifact created to offer a physical interface to interact with. It has the same purpose as graphical user interface, to communicate on what is available to the user and how it can act upon digital content.

The subject and purpose of this study is at the crossing of these two ideas: If the mechanics of design (affordance) were to be applied to digital content and tangible interface, what shape would such object take? Could that shape help the user connect better with said object, to have a more enjoyable and engaging experience?

Current works on tangible interface focuses on how they render interaction easier and more natural due to direct physical manipulation. This is being explored in varying ways, either by proposing 1) interpretation of a known subject (physically manipulating a landscape) or 2) creating bespoke object with innovative ways to interact with content (manipulating a toy to learn about complex subjects).

Such object is designed to represent its function(s), but its study focuses on the effect of its tangibility and mostly disregard if the design and aesthetics of the object has some effect. It is a study of objects' function over the possibility to study an ensemble of factors.

The study of design shows that good design should be a combination of practicality and enjoyment, simplicity and strong connection with users.

For this study, several experimental tests were ran, in an attempt to understand if there could be some relationship between the shapes of tangible interfaces and how users would perceive those interfaces. Three experiments were performed, each employing dedicated objects aimed at studying two facets of this study: 1) Can the shape of an object affect how participants would move in space, questioning the relationship participant/object/space. 2) Can participants abstract some mental representation out of an object, how does it affect their perception of said object (what is it for, how could they use it).

For the second part, due to relying heavily on how participant would process cognitive load, three age groups were tested, to verify if cognitive development and age would have an effect on how an object would be perceived and interpreted.

Results suggests that some types of shape would have an effect on how user behave, inviting them to move in predetermined ways (forcing them to look closer, to move their head to either side of the object). It also suggests that across all age groups, users are able to abstract the shape of objects and connect it with potential actions and interactions. It also shows that if visual support are applied, user's focus will shift to the images and affect how they would perceived the same object.

This would mean that, if appropriately designed, tangible interfaces could not only allow user to better connect with their object (physical manipulation) but also guide them in how to use or behave with that interface and offer a geometry onto which they could project its potential interaction(s), reduce the necessary connective process (if the object communicates properly on its potential) and allow for a better enjoyment of the interface.

Keywords: Tangible interface; Affordance; Discoverability; Design study; Interaction design.