Tokens: Generic or Personal?
Basic design decisions for tangible objects

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Abstract

One of the key concepts of Tangible User Interfaces (TUIs), as described in *Tangible Bits* (Ishii & Ullmer 1997), is the linkage of digital information with physical objects. Following the "token and constraints" approach by (Ullmer et al. 2005) we refer to these objects as tokens. The way users interact with the underlying system through tokens plays a decisive role in the design of TUIs and needs to be defined early in the design process. However, in this position paper we do not elaborate on tangible objects as containers for digital information, enabling user interaction and manipulation. We concentrate on one essential question arising during the design of tokens: What kind of tokens to choose and design - generic or personal tokens? In this regard, we distinct between individual, personalized artifacts and neutral objects and show the varying personal relations of users to tokens. We illustrate our statements with two interfaces (*ColorTable* and *kommTUi*), both with different complexities and requirements.

1   Introduction

Generic tokens are merely used in groupware- and collaborative interaction systems with complex TUIs. Based on simple and well-known geometric shapes like circles, rectangles, etc., the functionality and the content of generic tokens can be easily decoded by the users. Here the tangible objects represent digital containers, revealing their allocated digital information only in combination with the underlying system. Complex and collaborative interfaces often call for generic tokens due to workspace limitations. The *ColorTable* (Wagner et al. 2009) for example is a tangible tabletop supporting collaborative urban planning and the creation of urban future scenarios of a specific urban site. For the visualization of each urban planning setting a high amount of multimedia content is required. The representation of every single manifestation of an object (shape, material, color) through tokens would have led to spatial problems, so the decision of using generic shapes reduced

the number of tokens needed significantly. Furthermore, the usage of generic objects strongly tied the users to the results of the collaborative interaction and the represented multimedia content, rather than to the tokens. Another and famous tangible interface based on user interaction through generic tokens is the Reactable (Jorda 2010), which also uses various basic shapes to distinguish between content groups on a Meta level.

In the first workshop series of our recent project *kommTUi* (Kommunikation via Tangible User Interface) we included user interaction with generic tokens to see how elderly users cope with tangible interaction and in which ways they interact with the tokens. A key factor for a successful interaction with the tokens was the design of form and shape. Through the affordance (Norman 1988) of the generic objects, many workshop participants were able to decode their functionality. Therefore, generic token design can take advantage of previous experience of users with similar formed objects. However, for many applications it would be desirable to have a connection between the users and the tokens on a more emotional level, providing a stronger link than just the affordance of the object. This can be reached by a more personalized design of the tokens, which aims for the users' personal history, memories and feelings.

As personalized tokens we define objects representing individual meaning to the user. They are linked to the user's biography, personal history and experience and can be created directly by the user: either by attaching a digital marker to an everyday object or by individualization/reshaping of generic objects provided by the designer. The experience and results from the earlier project *ColorTable* showed that a personal relation to artifacts is needed as soon it is used to represent a personal experience, an emotion or a specific statement. Participants enriched the generic tokens by placing individual photos or objects next to it or annotating directly on the tokens to make them more specific. Personalized tokens are not only containers, they transform into "keys". They inhere a very personal, emotional metaphor, only understandable and decodable by the person who created the key. Therefore, personalized tokens are suitable for personalized systems like *Memodules* (Mugellini et al. 2007). *Memodules* includes personal objects (e.g. shell, stone, etc.) in the user interaction, which leads to a strong emotional tie with the tokens. This is done by attaching RFID tags to the objects and storing the specific user data on the tag through a RFID-writer device. The so-formed token represents the objectification of the user's memories and prior experiences. It can help to organize memories, as link to specific persons, situations, emotions, pictures, music, or feelings. In *kommTUi* we tried to figure out a proper mapping between the participant's communication behavior and everyday objects. Therefore, we asked the participants to bring personal items to the workshops, which best symbolize their everyday communication. The results will be the basis for the design of the *kommTUi* communication device, which allows the user to choose the recipients through highly personalized tokens. This integration of personalized objects in the user interaction leads to strong interface metaphors. Through the emotional and shape based guidance, attributes and functionality of personalized tokens can be recognized easier than generic tokens by the individual and provide an opportunity for user groups who have problems using traditional computer systems.

2   Discussion

Developing tangible interfaces calls for grounded design decisions: the context of use including the surrounding space, the amount of multimedia content presented, the number of tangibles for interaction and manipulation and the size of the interface itself. For most applications it is not enough to have a representation of user data, it's also necessary to provide representation of syntax, in which ways the users can manipulate the objects. The general idea to distinguish between generic and personalized tokens rose from numerous discussions during several design processes. Especially when a large number of tokens were used for interaction our observations and results in participatory workshops showed the need to personally annotate or mark the generic tokens. This made the tokens more individual and meaningful for the specific interaction or group creation. Depending on the complexity of a novel interface, designers should therefore consider their metaphor for the tangible design very carefully and decide early if generic or more personalized tokens suit best their interaction modes. If not generally decidable, it should be made clear, if individual annotations or manipulations of the objects itself are essential for an appropriate use. Physical objects vary in their physical characteristics like shape, color, weight, size, texture, temperature etc. Furthermore, tokens trigger different emotions and experience, depending on the meaning and representation for the individual user. In addition to this complexity, the personal relationship between users and tokens has to be further investigated and observed as it plays a role in the design of tokens for tangible user interfaces and feeds back directly into the choice of material, shape, color, size etc.

The personal perspective and the relation between user and object should be considered as design issue for tangible interfaces already during the early design process. This can influence understanding, manipulation and interaction by providing more insights into possible usage barriers, especially when designing interfaces for elderly. These impacts and results are still very preliminary but promising at this point of research, and will be included in our research questions for the next phase of *kommTUi*.

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