Incorporating Children's Perspectives into Early Design Ideation Phases through Construct Elicitation

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ABSTRACT
Integrating children's perspectives into early design phase is vital for designing meaningful products and interactions, and liberating design teams from their adult preconceptions on children's experience. Inclusion of end users at several phases of the design process has almost become a norm in technology design for children, bringing along discussions on the methods and degree of user participation. One issue that is rarely addressed is the fact that designers may not always have the chance to directly work with children to have a first-hand understanding about the user context. Taking this issue as a focus, the aim of this doctoral study is to develop a user research method to elicit how children themselves make sense of their experiences with products to be translated to inform early design ideation process.

Author Keywords
Construct elicitation, children, research methods, early design ideation

ACM Classification Keywords
H.5.2 User Interfaces – Evaluation/Methodology, Theory and methods, User-centred design

1. INTRODUCTION

A grand body of work discusses the methods of reflecting children's perspectives in design process, most of which is on the degree of children's participation, the stages in which this participation do occur and in which form. Methods of *cooperative inquiry* [1] aim to ensure the maximum contribution of children through sustained participation, while *informant design* [17] consult to children's knowledge at different steps of the process along with other stakeholders. The design phase in which children are involved is an important indicator of to what extent they are given the chance to influence fundamental design decisions. When involved as early as possible, children will be given the opportunity to contribute to design process with their own perceptions and values [23].

Introducing user context into design has already been acknowledged in literature. Participatory or ethnographic methods take the user context at the centre of the design process by blurring the borders between design and research phases, inviting the designers to step into users' world, and the users to directly contribute to the design process [5]. Ethnographic methods are powerful in enabling designers to gain a deep and rich understanding on user's experiences, which may lead to innovative and relevant product ideas when applied in early phases [9]. However, these two approaches may pose issues of feasibility and communication of user information into design solutions. As pointed out by [18], current participatory design practices dominantly concentrate on the methods and degree of children's participation, while issues on how to incorporate children's values into design process remain relatively unexplored. In addition, although it is quite valuable for designers to gain first-hand knowledge on user context, diversity of the market and current industrial practices based on division of labour may not always allow them to directly contact with the users, which may result in discrepancies between what is reported by the user researchers to design teams and how, and what designers need to know about users to actualize design solutions [21]. Hence, not only capturing, but also communicating the complexity and richness of the user experience to designers to be reflected in design solutions becomes important [9, 11].

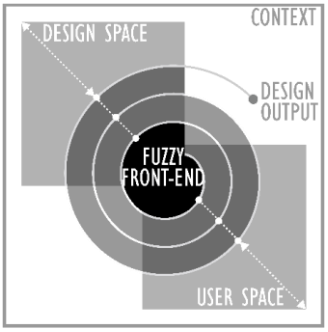

Figure 1. Focus of the study

In my research, I take this methodological question of how to translate children's values and meanings as a source of design directions taken in the development of products designed for children's use. Hence, my focus is on both eliciting a holistic capture of the complex product experience, and also communicate it as a meaningful snapshot for designers so that they can reflect this information in their design decisions by having a better understanding of how children themselves give meaning to their experiences. The diagram presented in Fig 1 summarizes the focus of my study. The diagram consists of three main constituents: (1) *design space*, in which the product is designed, (2) *user space*, where the end product is experienced, and (3) *context*, being the social, cultural etc.

conditions in which both activities occur. The spiral represents the iterative design process, which requires re-entering into user space at several steps. Intersection of design space and user space shows dynamism based on the adapted methodological approach. Participatory methods, for instance, aim to integrate both spaces as much as possible, giving more space to both users and designers to collaborate, hence less need for mediation. The black area, namely 'the fuzzy front-end' is the phase I focus on, which includes the elicitation of children's perspectives and its communication into early design ideation phase.

2. ELICITING PERSONAL CONSTRUCTS

The theoretical grounds of my methodology can be found in Personal Construct Theory (PCT). PCT suggests that each individual has a personal construing system about any event, people, environment, etc. based on previous experiences, which affects how people anticipate in further events [6, 10]. There are a number of tools to elicit personal constructs, one of them being Repertory Grid Technique (RGT). RGT have been utilized in user research for both evaluation of user experience [16] and generative studies to elicit dimensions of user-technology experience [2, 4]. RGT helps researchers to explore design possibilities through user's own mental models [14, 15]. Investigating personal construing helps us to "understand children's understanding", by looking from inside-out to their meaning making [20], which would help designers to understand children's needs and aspires from their own perspectives. Although RGT procedure can be cognitively demanding for children, modifications are suggested to make it more comprehensible [8, 20].

Laddering procedure, which was first devised as a tool within RGT to elicit value-laden, superordinate constructs [7], was utilized in marketing research within means-end chain model to explore consequences and values that users attach to product attributes [13]. In user research, laddering was successfully implemented with children to evaluate the likeability of games [3], and to elicit children's needs in interactive environments [19].

3. STUDY

I conducted a study to explore the potential of a construct elicitation method for gaining a holistic understanding about how children make sense of their product experience. A detailed account of the methodology as well as the expanded discussion of the analysis and results can be found in [22]. For this particular study, I investigated the perceived mobile phone experience as viewed by children, aiming to seek answers to the following questions:

• In which ways can the typical RGT process be adapted to elicit children's constructs of perceived product experience?
• Which aspects of children's perceived product experience can be revealed through the proposed methodology?

3.1. Methodology

Participants of the study were first and second grade students (6-8 years old, n=44) in a local primary school in Turkey. Individual interviews took place at the school library after I was introduced to the children by the teachers in class. During interviews, image cards of five diverse mobile phones designed for either children or adults were used (Fig 2). The products differ in their extent of functions, type of input, as well as form and color.

Figure 2. Product images used in the study

Interview procedure shows differences from typical uses of RGT (Fig 3). Firstly, the elements (cards) were downsized from 5 to 3 to randomize the combination of products in construct elicitation, which was done by asking the participant to rank the elements in the order of most to least liked. The most, the least and the medium liked elements were spared for construct elicitation. Secondly, elements were presented as dyadic configurations instead of triadic, and rating procedure was replaced with ranking. Both dyadic configuration [20] and ranking [8] are suggested to be cognitively less demanding for children. Lastly, to maximise the number of constructs, construct elicitation was distributed throughout dyadic configuration and ranking phases instead of limiting only to dyadic configuration.

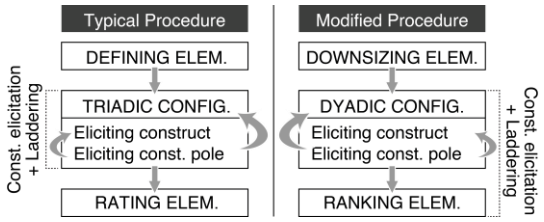

Figure 3. Comparison of the procedure to typical use of RGT

For each elicited construct, laddering procedure was applied by asking *how* and *why* questions. If the articulated construct is a concrete one (i.e. *has bigger screen*), then laddering was pursued to understand the reasons why this feature is important (i.e. *you can play games*), and continue asking until the child cannot come up with another construct (i.e. *fun*). If the first articulated construct is rather abstract (i.e. *for babies*), then laddering questions aimed to understand what features result in this perception (i.e. *looks like a toy*) until it is associated with a concrete product attribute (i.e. *has ear-like parts*).

3.2. Analysis and Results

Interview recordings of each participant were transcribed and subjected to content analysis by open coding of the statements to find patterns among multiple participant statements. Statements for each laddered construct were coded based on both existing terminology in the literature (i.e. accessibility) and categorisations emerged in the data (i.e. age appropriateness). Overall coding process was handled under the following columns:

• Construct: *for kids – for adults*
• Statement: "*It is bad to have these ears. No way has a phone ears! Looks like it is something designed for kids."*

• Talking about: *has ear-like parts*
• Product attribute: *body form*
• Causal: *personification*
• Effected: *age appropriateness*

Coded statements resulted in associations between concrete product attributes and their consequences (causal and/or effected) and as perceived by children. I name these consequences *dimensions of perceived product experience*. These associations were mapped in NodeXL (Fig. 4 & 5), showing the hierarchical relations based on the number of the recurring associations made by children (diameters and links are proportionate to the number of comments). I will explain these maps and briefly discuss some of the findings.

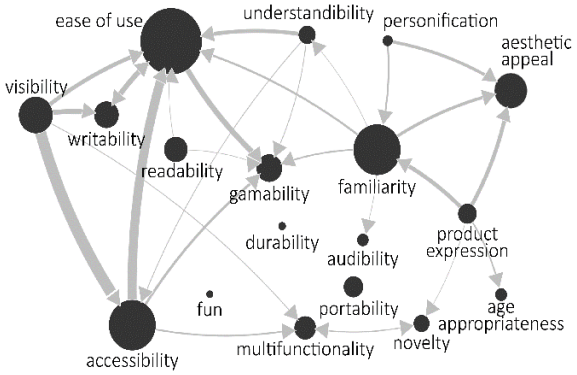

Figure 4. Network of dimensions

Qualitative analysis of the data gathered by laddering procedure resulted in multiple associations for dimensions of mobile phone experience as perceived by children. As mapped in Fig 4, some dimensions have stronger links with others by effecting or being effected by each other, while others are relatively independent. Left side of the map mostly consists of pragmatic concerns related to usability of the mobile phones, such as *visibility*, *accessibility*, *readability* and *ease of use*. Right side of the map, on the other hand, includes hedonic aspects such as *product expression*, *aesthetic appeal*, and *novelty*.

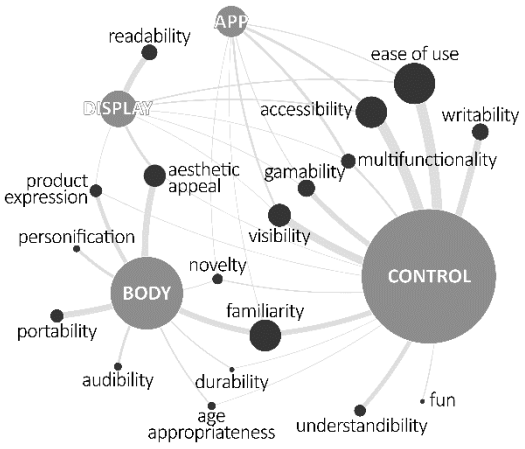

Figure 5. Network of attributes-dimensions

While network of dimensions show how various dimensions affect each other in a multidimensional way, Fig 5 shows associations between product attributes and dimensions. Interpreting the two network maps together gives an idea about how children make sense of experience with mobile phones. For instance; perceived *ease of use* is highly associated with *visibility*, hence *accessibility* of the controls. Similarly, *writability* is linked to control *visibility*, which in return affects *ease of use*. Bodily features, such as form and color, have an influence on the perceived *product expression*, which affects *familiarity* and *aesthetic appeal* of the product. Familiarity seems to be a consequence of both body and control features, hence it was associated with both hedonic and pragmatic aspects.

4. DISCUSSIONS AND FUTURE WORK

Due to limited space, it is not possible to discuss the findings in detail. Instead I will give a few highlights and comment on the methodology along with future work plan. Body features such as form and color are in strong relation to expressive concerns. Judging by the participants' statements, it becomes more evident for the products designed for children's use. The adult perception, which asserts that children favour colourful and 'cute' products, may not apply for mobile phones. This is partly due to the participants' lack of *familiarity* with these products, since they don't exist in local market. Also, for this age group in Turkey, mobile phones are artefacts of desire, and owning one is almost seen as a rite of passage by marking a step to adulthood. This may explain why the participants often interpreted the phones designed for children as "for babies", "like a toy", and "people would laugh at this". Hence, *product expression* is linked to self-expression, which affects their judgement on *aesthetic appeal* and *age appropriateness* of the products. Results also show that participants have a tendency to associate most aspects to concrete product features. *Audibility*, for instance, is linked to the size of the speakers, while *multifunctionality* is judged by the extent of the *visibility* and *accessibility* of the applications, which is linked to screen size, rather than the software qualities. The strong association between the *visibility* and *accessibility* of the controls and applications also supports this tendency. This is also in line with the characteristics of what Piaget [12] defines as 'concrete operational stage', marking the tendency to lean on concrete stimuli in their categorizations rather than abstract features.

The modified RGT procedure was easy to follow by children, as it was observed that they could elaborate on explaining their comments without being further probed for laddering, and take initiative in ranking the image cards after being introduced by the procedure. However, extension of construct elicitation into ranking phase caused repetitions in constructs, increasing the interview duration, hence sometimes causing distraction. Instead of aiming to maximise the number of elicited constructs, it would be a better strategy to improve the laddering procedure with the intent of increasing the depth of the data to achieve value-laden constructs. Another shortcoming of the methodology is due to the selection of products and focusing on perceived

experience. Since children didn't have a chance to explore the actual products, their comments were based on visual stimuli and their limited previous experience. For the same reason, findings lack information on the actual use context, which would have been a better input for design teams to empathise with users. For the next study, I am planning to integrate ethnographic methods into construct elicitation in a way to enrich the conceptual/abstracted models with contextual information to have a holistic picture of the user space by going beyond self-reported aspects, and investigate the usefulness of this information in early design ideation through design workshops for further improvement of the methodology. I am planning to do so by facilitating the conditions for children to explore the products in a natural context before reflecting on their experience. To support designers for better reflecting on children's perspectives in ideation process, investigating the effective forms of communicating user information to design teams is also part of the future study plan.

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REFERENCES

1. Allison Druin. 1999. Cooperative inquiry: Developing new technologies for children with children. In *Proc. CHI '99*, 223-230.
2. Armağan Kuru and Çiğdem Erbuğ. 2013. Explorations of Perceived Qualities of On-body Interactive Products. *Ergonomics* 56, 6, 906-921.
3. Bieke Zaman. 2008. Introducing Contextual Laddering To Evaluate the Likeability of Games with Children. *Cognition, Technology and Work*, 10, 107-117.
4. Daniel Fallman and John A. Waterworth. 2010. Capturing User Experiences of Mobile Information Technology with the Repertory Grid Technique. *Human Technology* 6, 2, 250-268.
5. Elizabeth B.-N. Sanders. 2002. From User-Centered to Participatory Design Approaches. In: *Design and the Social Sciences*, Jorge Frascara (ed.). Taylor & Francis London, 1-8.
6. Fay Fransella and Robert A. Neimeyer. 2003. George Alexander Kelly: The Man and his Theory. In *International Handbook of Personal Construct Psychology*, Fay Fransella (ed.). John Wiley and Sons, West Sussex, 21-32.
7. Fay Fransella. 2003. Some skills and tools for personal construct practitioners. In *International Handbook of Personal Construct Psychology*, Fay Fransella (ed.). John Wiley and Sons, West Sussex, 105-122.
8. Fay Fransella, Richard Bell and Don Bannister. 2004. *A Manual for Repertory Grid Technique*. John Wiley and Sons, West Sussex.
9. Froukje S. Visser. 2009. *Bringing the Everyday Life of People into Design*. Ph.D Dissertation. Delft University of Technology.
10. George Kelly. 2003. A Brief Introduction to Personal Construct Theory. In *International Handbook of Personal Construct Psychology*, Fay Fransella (ed.). John Wiley and Sons, West Sussex, 3-20.
11. Gülşen T. Yargın. 2013. *Developing a model for effective communication of user research findings to the design process*. PhD dissertation. Middle East Technical University.
12. Jean Piaget. 2001. *The Psychology of Intelligence*. Routledge, London.
13. Jonathan Gutman. 1982. A Means-End Chain Model Based on Consumer Categorization Processes. *Journal of Marketing* 46, 60-72.
14. Jouke C. Verlinden and Marc J.J. Coenders. 2000. Qualitative Usability Measurement of Websites by Employing the Repertory Grid Technique. In *Proc. CHI '00*, 143-144.
15. Marc Hassenzahl and Rainer Wessler. (2000) Capturing Design Space from a User Perspective: The Repertory Grid Technique Revisited. *Int J of Human-Computer Interaction* 12, 3/4, 441-459.
16. Marc Hassenzahl and Tibor Trautmann. 2001. Analysis of Web Sites with the Repertory Grid Technique. In *Proc. CHI'01*, 167-168.
17. Mike Scaife and Yvonne Rogers. 1999. Kids as Informants: Telling us what we didn't know or confirming what we knew already?, *The Design of Children's Technology*, Allison Druin (ed.). Morgan Kaufmann, San Francisco, 27-50.
18. Ole S. Iversen, Kim Halskov and Tuck W. Leong. 2010. Rekindling values in participatory design. In *Proc. Participatory Design Conference*, 91-100.
19. Petri Saarinen, Timo Partala and Kaisa Väänänen-Vainio-Mattila. 2013. Little Backpackers – Studying Children's Psychological Needs in an Interactive Exhibition Context. In *Proc. IDC '13,* 415-418.
20. Richard Butler and David R. Green. 2007. *The Child Within: Taking the Young Person's Perspective by Applying Personal Construct Psychology*. Wiley, Chichester.
21. Rob J.F.M. van Veggel. 2005. Where the two sides of ethnography collide. *Design Issues* 21, 3, 3-16.
22. Süner Sedef and Çiğdem Erbuğ. (In press). Evaluation of construct elicitation as a research method to obtain design-relevant data from children. *Journal of Faculty of Architecture.*
23. Wouter Sluis-Thiescheffer, Tilde Bekker and Berry Eggen. 2007. Comparing Early Design Methods for Children. In *Proc. IDC '07*, 17-24.