

Jun 25th, 12:00 AM

Seeking for Diversity among Young Users: the case of children's photography

Sedef Süner
Middle East Technical University

Çiğdem Erbuğ
Middle East Technical University

Follow this and additional works at: <https://dl.designresearchsociety.org/drs-conference-papers>

Citation

Süner, S., and Erbuğ, Ç. (2018) Seeking for Diversity among Young Users: the case of children's photography, in Storni, C., Leahy, K., McMahon, M., Lloyd, P. and Bohemia, E. (eds.), *Design as a catalyst for change - DRS International Conference 2018*, 25-28 June, Limerick, Ireland. <https://doi.org/10.21606/drs.2018.295>

This Research Paper is brought to you for free and open access by the Conference Proceedings at DRS Digital Library. It has been accepted for inclusion in DRS Biennial Conference Series by an authorized administrator of DRS Digital Library. For more information, please contact DL@designresearchsociety.org.

Seeking for Diversity among Young Users: the case of children's photography

SÜNER Sedef* and ERBUĞ Çiğdem

Middle East Technical University

* Corresponding author email: sedef.suner@gmail.com

doi: 10.21606/drs.2018.295

User-centred design practices in the design of products for children's use has become common, especially in the field of technology design. Although young users are now considered as essential and reliable actors to inform the design space, design research with children still remains focused on the design process itself, and children's role in it. In an attempt to steer away the discussion from how children are included in design to how they are represented in design, our paper focuses on understanding and communicating plurality of the experience among young users to inform and expand the early design phase. For this purpose, we present an overview of the child-centred design practices, discuss how designers of children's products may benefit from an experiential approach for a holistic understanding of the user space; and finally, we present our study on children's photography to illustrate how a commitment to understanding children's perspectives can contribute to eliciting, and representing user diversity through personas to guide the design of meaningful products for young users.

child-centred design, children's photography, user experience, persona

1 Introduction

Children of the developed countries are growing up in a technology-immersed environment. From the moment they start purposeful interactions with their physical surroundings, they get in touch with interactive toys, game consoles, smart phones, tablet computers, and numerous educational and gaming applications. Designing interactive technologies for them has become a separate research field (Markopoulos, Read, Hoysniemi, & MacFarlane, 2008), which brought about intense methodological research on how to design for and with children, accumulating a body of adapted or novel methods, from user testing (Read, 2008) to participatory design (Fails, Guha, & Druin, 2012). Designing for young users can be a challenging task due to intergenerational differences, which potentially leads to a mismatch between adult-designers' conceptions of child-users and the real-life product experiences of children. One source of information designers often refer to when designing for children is the age-based developmental characteristics described by the pioneers of



This work is licensed under a Creative Commons Attribution-NonCommercial-Share Alike 4.0 International License.

<https://creativecommons.org/licenses/by-nc-sa/4.0/>

developmental psychology (Bruckman, Bandlow, & Forte, 2007; Hourcade, 2007). Although biological differences of children from adults can be a useful source to begin comprehension of the needs of young users, developmental approach is based on presuppositions and generalisations about characteristics of children at a certain age (Christensen & Prout, 2002). It focuses on general characterisations about what children can and cannot do, hence overlooks the differences among them.

Another issue that has been occupying the research agenda is how to involve children in the design process. The role of children based on the extent of their contribution in design has long been discussed in the field (Druin, 2002; Yarosh, Radu, Hunter, & Rosenbaum, 2011), and how this contribution corresponds to different phases of design (Barendregt, Bekker, Börjesson, Eriksson, & Torgersson, 2016). Putting emphasis on the methods and degree of involvement was criticised by Iversen, Halskov, & Leong (2010), suggesting that the focus of inquiry should be on integration of children's values in design, rather than how and to what extent they take part in design activities. Although useful in guiding the design process, the strong focus on the age-based developmental characteristics and methodological inquiries to involve children evident in the HCI tradition prevents us from understanding the diverse interests and expectations of children from designed artefacts, which is needed in the early stages of product design to diversify and expand the design space with possibilities, leading to different design concepts.

Moving from this concern, we propose a change of focus in the inquiry from the process of design and methods of children's involvement in it, towards a comprehension of how products come to being in children's lives. We believe such a perspective will help free us from our vested conceptions of childhood, and notice the plurality of product experience among children, which can be a useful source to enrich the design space. For this purpose, we start with a review of the methodological approaches to designing for and with children. Then, by investigating how representations of children and child-users are relevant in design space, we discuss the experiential approach in design and its possible implications in design research with children. Finally, we present and discuss our field study on children's photography experience to illustrate the potential of an approach that seeks for plurality of experience to enrich the possibilities for designers.

2 Methodological approaches to designing for children

The ways children differ from adults in terms of their interactions with technology has always been a focus of interest in design research and practice for children. From the perspective of designers, who do not have prior experience, the first thoughts come to mind would perhaps be what their interests are, and what they are capable of. Adult-designers are way past their childhood years; hence, referring to past personal experience, a common tactic employed by designers when attempting to understand the needs and concerns of the target users, becomes even less reliable than it is with adult-users (Antle, 2006). This is where developmental psychology has taken part in informing designers of children's products. Developmental characteristics of children have a considerable impact on how they interact with their physical environment. This idea inspired a body of research borrowing theoretical knowledge from developmental psychology to ground guidelines and recommendations for designers. For example, Bruckman et al. (2007) focus on Piaget's theory of intellectual development to illustrate how cognitive and physical characteristics of children impact their interactions with technology. Similarly, Hourcade (2007), who builds his guidelines on the developmental theories of Piaget, Montessori, Vygotsky and Gardner, match developing cognitive and fine motor skills of children with hardware and software interaction. Gelderblom & Kotzé (2009) point out that relying on developmental psychology alone not necessarily results in developmentally appropriate designs, though it decreases the amount of usability testing needed. As much as awareness of developmental characteristics is a way of acknowledging children's differences from adults, if not supported with other sources, it remains to be a generalising approach which overlooks the differences among children.

Druin's (2002) framework on children's role in technology design is perhaps one of the most influential works changing the course of research and practice. Describing the user, tester, informant and design partner roles for children, she introduces *cooperative inquiry* as long-term, sustained collaborations. In cooperative inquiry, children become equal partners of an intergenerational design team together with adult designers, developers and other stakeholders throughout the product development process, during which they participate in several user research, idea generation and elaboration, and prototyping activities. Although it shares or adapts several methods and techniques of participatory design practices with adult-users, intergenerational design teams with child-users offer a more progressive approach to design collaboration in terms of the level and sustainment of user participation. Early involvement of children in design has gained considerable attention in the past years, with a significant interest in methods of inquiry (Read & Markopoulos, 2013). For example, a review of the 2002-2010 proceedings of the ACM conference on Interaction Design and Children¹ shows 37% of the papers concentrated on investigating or comparing methods of design and evaluation with children (Yarosh et al., 2011). Same study shows that 31% of the papers reporting on the design of a system for children involve children as design partners. These numbers undoubtedly reflect only one publication venue, hence not generalizable. However, a common interest in children's role and methods of involvement among interaction design and children community is evident, as similar works continue to be reported by scholars. For instance, Druin's framework was utilised in a review study to describe how families are included in the design of technologies (Isola & Fails, 2012). Similarly, Barendregt et al. (2016) suggested "role definition matrix" as a guide to characterise the contribution of children based on the design phase, and the activities in relation to the designer.

A growing body of research on methods of inquiry is vital for any maturing research field. On the other hand, the emphasis on children's role gives rise to a focus on the design process and the resulting product, rather than understanding children's perspectives and translating them into design solutions. A similar concern was raised by Iversen et al. (2010) towards current participatory design practices with children. Pointing out to the dominant discussions focusing on the methods and degree of children's participation, they assert that the original premise of participatory approach, which is to incorporate user values into design, has gone unnoticed. Although it can be inferred that participation will de facto result in integration of children's agenda into design output, the embedded nature of the research and design with a strong focus on developing the product in question leaves these issues less explicit and untraceable.

An inquiry into children's lives can be a valuable source of inspiration for meaningful design solutions addressing their latent needs and concerns. Generative methods are suggested to be useful particularly in the 'fuzzy front-end', when there is no well-defined brief, the design space is ambiguous, and user input can inspire major design directions (Sanders & Stappers, 2008). Although not as popular as design partnerships in the early design phase, use of generative methods in design research with children is not uncommon. For instance, Gielen (2008) reported contextmapping activities with children to collect information about 'fears' through cultural probes and mappings, timelines and writing letters in generative sessions; investigating the aspects of outdoor play by collages and stickers; and finally, exploring 'water play' with cultural probes and brainstorming activities. In a study aiming to capture the daily experiences of children using prosthetic legs, Hussain (2010) employed write/draw tasks, role playing, and photo-documentation techniques. Such activities are useful in co-constructing knowledge and insights into daily experiences of children, hence boosting empathy and inspiration necessary for designers.

One reservation about contextmapping could be regarding the translation of the rich information into design briefs, since contextmapping activities not necessarily focus on a product, but the

¹ Gathering since 2002, IDC is the only academic conference series fully focusing on designing interactive systems for children. In 2013, the same community began to publish International Journal of Child-Computer Interaction.

general context within which it will be used. According to Töre Yargın's (2013) model of effective communication of user research findings with design teams, guidance is as important factor as inspiration in design process. She bases her framework on the practical and organisational needs of designers, and how they utilise user information during product development process. According to her work, guidance not only supports empathy with the user, but also provides feedback when taking major design decisions. For this purpose, she recommends researchers to concretise user perceptions and behaviours by matching them with related product attributes, highlighting instances of product interactions in a natural setting, and representing diversity among users in order to promote both inspiration and guidance for designers. Long-term design partnerships, as well as contextual exploration through generative methods, require direct contact of designers with children, which may not always be feasible. Therefore, these recommendations are meaningful especially in an industrial setting, where division of labour forces a separation of user research from design practices (van Veggel, 2005). When this is the case, capturing and communicating the richness and complexity of the user context becomes important (Sleeswijk Visser, 2009). The field of designing interactive technologies for children is dominated by the human-computer interaction tradition. Hence, a large number of studies concentrate on engineering and evaluation of a single solution (Jensen & Skov, 2005), and evaluative studies to iterate and improve the designed system still remain to be the dominant form of contribution received by children (Yarosh et al., 2011; Authors, 2016). Although the importance of early involvement of children is often acknowledged in the literature, its impact on expanding the design space by leading to the generation of multiple diverse ideas is relatively less explored (Sluis-Thiescheffer, Bekker, & Eggen, 2007). Similarly, the importance of seeking for differing perspectives of children lies under the need for diversification of the design concepts in accordance with their suitability to the different needs and expectations of child-users.

3 Constructing the child-user

When we design products and systems for adults, we consider their differing needs and expectations based on several factors such as demographics, cultural differences and personal backgrounds, in order to diversify or target our design solutions. However, child users are usually characterised by their developmental traits based on age, or the requirements defined by the institutional actors such as schools or families, who mostly mediate their ownership and use of products. For example, a considerable number of user research studies with children focus on education and 'edutainment' technologies (a term describing playful systems with learning goals). Hence, the 'learner' identity is in the forefront, and meeting the pre-defined learning goals often becomes the merit of successful designs.

A quick glimpse at the consumer products designed for child-users in comparison to adult-user counterparts demonstrates not only adult-designer conceptions of child-users, but also the encompassing contemporary socio-cultural constructions of childhood. To illustrate, we compared the formal product language inscribed in digital cameras designed for adult and child-users (Figure 1). Designers often reflect adult conceptions of children on products, which presumes they would appreciate the use of bright colours, cartoon-like bulky and roundish forms, and that they would identify themselves with famous, pop-culture characters. Although this might be partly relevant due to a shared cultural understanding among the individuals living in the same society, it not necessarily means that they point out to a taste innate to childhood. They rather represent our contemporary cultural norms, which, for instance, contrasts with the behaviourist approach to childhood and learning theories dominated the Western culture until recently, constructing children as "blank vessels" to be filled by responsible adults with required skills, tools, knowledge and experiences (Bruce, 2011).



Figure 1 Examples of cameras designed for adults (left) and children. Product images retrieved from Amazon.co.uk²

Mayall (2000) suggests we should regard children as a social group and childhood as a culture, in order to understand their unique knowledge coming simply from the experience of ‘being a child’. Children, like adults, live in a certain cultural world; they have shared values and concerns, as well as their diversities. These factors, along with product characteristics and the context of use, have an impact on children’s interaction with and expectations from products. This perspective in a way corresponds to the experiential approach in design, the focus of which is to present a holistic understanding of the issues playing a role in user experience by taking into account product, use context and subjective factors. Designers can only control the features of the product, such as form, function and interaction modalities. According to Hassenzahl (2004), this is only the *intended* use proposed and communicated by the designer. The way users perceive and engage with the products, and the emerging consequences through this engagement, always occur in the actual use situation. The context refers to not only the momentary situations such as the physical conditions and the emotional state of the user at the time of interaction, but also the underlying personal, social and cultural factors that effect how the product is experienced (Desmet & Hekkert, 2007). The user experience literature suggests that better comprehension of the aspects of experience is vital to inform the design of pleasurable products, and facilitate experiences meaningful for users. Even though we cannot design experiences per se, we can adjust *design expressions* to be able to influence the experience through formal and behavioural qualities of design by understanding what really matters for users (Fulton Suri, 2003). Hence, an awareness about the constituents of experience beyond the actual product itself will better inform designers about users’ world, and guide the design process accordingly (Hekkert & Schifferstein, 2008).

Examination of the frameworks of user experience points out to an interplay of the product, user, and the use context, and the larger social-cultural world in which the interaction occurs. A holistic comprehension of children’s perspectives requires not only an inquiry into the personal and contextual factors that influence how children interact with products, but also conceptualisation of the subjective judgements regarding how children give meaning to product features based on past experience, concerns, and aspirations. The former can be examined by observation or self-documentation techniques (e.g. cultural probes), whereas subjective constructions can only be elicited through self-report techniques, such as interviews and questionnaires. Although the use of these techniques are not uncommon in research with children, we would like to explore the potential of a research methodology devised to elicit and communicate the plurality of children’s expectations from designed artefacts. In the rest of the paper, we present our study on exploring

² Images retrieved from the first-page results of the Amazon.co.uk search under ‘Digital cameras’ product category, filtered ‘Up to 7.9 megapixel cameras’ for a fair comparison within compact cameras by excluding products for professional use. Cameras designed for children are searched as “for kids” within the same product category and filtering.

children's photography experience, and discuss design implications through persona-like characterisations we constructed from our findings to communicate the diverse product experiences of children.

4 The case of children's photography

Photography is an extra-curricular activity, independent from learning objectives of an educational setting. Although children usually are not camera owners, they are familiar with the concept of photography from their social environment, and to some extent experienced with devices having image capturing functions such as smart phones and tablet computers. Additionally, cameras mediate a multi-faceted experience with both subjective and social aspects. In this respect, we considered photography as a fruitful experience to investigate. The study described in this section is a part of the first author's doctoral research on methodological inquiries into holistic capture of children's product experiences to inform early design process.

4.1 Methodology

We recruited participants via announcements sent to the e-mail listings of the campus housings, and a neighbourhood association located near the campus region. We scheduled meetings with the parents who responded to our call. 26 children (m=14, f=11) aged 7 to 9 years old participated in our study (7 years old=10, 8 years old=9, 9 years old=7).

In data gathering, we used three different cameras. The selection criteria was to present the diversity of the product line, while still keeping the range relevant to children. *Vtech Kidizoom* is designed for children aged between 3 and 8. It has a playful menu with draft filters, game menu, and parental controls. Image quality controls are limited, while the design effort seems to be concentrated on after-photo effects to enhance the 'fun factor' of the user experience. *Nikon Coolpix S33* and *Panasonic DMC-XS1* are compact, 'point-and-shoot' cameras, a term used in photography to refer to the ease of use, but at the expense of limiting the technical capabilities. Panasonic is designed for the use of adults, whereas Nikon comes with two built-in menus, one for adults and one for children.

We constructed a two-step methodology to investigate how children make sense of different camera designs to understand their expectations, and how these products come into existence in a social context. In the first step, we conducted individual interviews with children to discover their constructions about cameras based on their anticipations of product language. Before each session, we administered a parental questionnaire to collect information about the participant's daily experience with technological products. The questions consisted of a list of consumer electronics, asking the ones available in the household, the ones the child had experience with, and an open-ended column for indicating the nature and purpose of use. Twenty-one participants have access to camera at home. 12 of them have not used a camera before, however 6 of these participants have used smart phone or tablet for taking pictures. Interviews consisted of a comparative procedure: we introduced children pairs of product images and asked for perceived differences, we asked which one is the preferred attribute, and why this is important for them. We continued comparative questioning until they cannot come up with new constructs, and then we moved to the next image pairs to repeat the procedure. Each interview lasted 20 minutes in average, and the sessions were video recorded for later analysis.

The second part was conducted as photography workshops. We scheduled five workshops with the participants of the interviews, each consisted of 3 to 7 children. To give a flexible structure to the sessions, we instructed children to experiment with at least four types of photography, namely portrait, texture, nature and architecture. Each child had a chance to use all three cameras for at least 15 minutes, taking pictures at both indoors and outdoors locations of the faculty. Since we wanted to capture both product and social interactions of children, we designed 'magic hats' with action cameras attached on them to record the sessions through children's perspective (Figure 2).

We explained children that these hats will record everything they see, and asked them to keep them on until the photography session ended. Due to technical issues and limited number of equipment, we could record the camera use of 20 participants. Each recorded photography session lasted approximately 45 minutes.



Figure 2 The use of 'magic hats' in observations (left) and how it records the session

We transcribed interview recordings in a spreadsheet and applied content analysis (Krippendorff, 2004) by coding the constructs children mentioned based on product attributes (e.g. black & white > realistic). Then, we thematically categorised these constructs to define the dimensions as perceived by children. For the photography sessions, we coded the videos by noting and describing both individual interactions with the camera, and the moments when the camera initiates social interaction (e.g. exploration of the menu, laughter, sharing).

5 Patterns of diversity in children's photography

Our inquiry unravelled many dimensions related to children's perception and use of cameras. Although several usability issues have also been identified, we will not focus on them for the following reasons: (1) the interviews reflect user concerns based on perceived product attributes, but do not give insights regarding the actual use, (2) observations provided information on usability issues, but they are mostly raised by lack of experience, and seem to be common to our sample rather than being sources of diversity, (3) and we want to highlight the inspirational information to inform the design of diverse product concepts, rather than usability improvement. Therefore, we will present the differences in attitudes regarding expressive qualities of the products, interaction with cameras, and approach to photography.

5.1 Product language

Based on the judgements of the participants, we identified an axis defining the extent the product language meets their expectations from what a camera should look like. The axis extends from *camera-like* to *toy-like*. Note that both ends are positive and negative at the same time; meaning children show affinity towards one end in comparison to the other. This binary is supported by their judgements on product expression, aesthetic appeal, and age appropriateness (Figure 3).

Product expression is described by the associative judgements, comparative to the 'world of cameras'. The borders of this world can be extended towards other product lines that are found relevant by children, such as tablet computers and game controllers. In this sense, product expression is closely related to past experience, as it provides an associative framework for children to assess the product language based on similarities with and differences from their existing mental categories. The more the product is perceived to be realistic, high-tech and contemporary, the more it resembles a camera. On the other hand, the features that are judged to be imaginary, comical and salient makes the product rather toy-like, a quality also favoured by a number of children. *Aesthetic appeal* refers to what children find visually pleasant and appealing. Its major difference from

product expression lies behind its connection to ‘taste’. Some children prefer monochrome colour and simplistic form for the sake of modesty, whereas others favour colour and flamboyance, which makes the product’s presence felt.

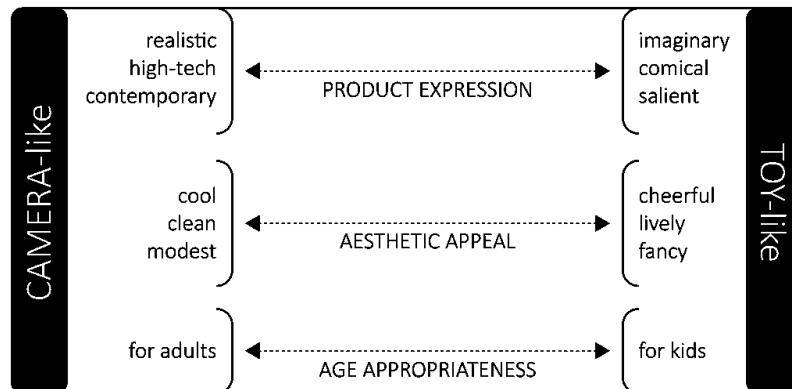


Figure 3 Summary of the constructs related to product language

Product expression and aesthetic appeal indirectly point out to another distinction regarding for whom the product is supposedly suitable. We name this dimension *age appropriateness*, following the genuine assessments of children for products to be “suitable for kids”, “for adults”, and “for babies”. Such judgements imply that children identify a certain self-image through associations with product language. Therefore, it is not only about how they perceive themselves, but also how they want to be perceived by the others. These implications reflect the constructions of designers about ‘child-friendliness’, which is evident in their conscious effort paid to the expressive qualities of the products. The reaction of children implies that the message is received, however not always embraced. Child-friendliness in designer terms might be interpreted by some children as “childish” or “for babies”, as much as it can be interpreted as “fun” or “cheerful”.

5.2 Product interaction and approach to photography

Analysis of the observation material revealed insights into both personal and social aspects of the use context. We observed two main aspects of diversity: children’s approach to photography, and their interactions with cameras. Approach to photography lies in a continuum from *professionalism* to *playfulness*, whereas the latter describes the level of tinkering with what the camera has to offer. We investigate these aspects in relation to the following dimensions emerged from our analysis: exploration of the camera (or, lack of it), quality of the photography, laughter, and sharing (Figure 4).

Exploration refers to the interactions with the camera interface, and it is a trait observed in both professional and playful approach. In *professional exploration*, the child tries to find out the ways to improve the quality of the photography. We observed children seeking out functions such as zoom in/out, flash, preview and delete. Zoom and flash is used to improve *photo quality* when experimenting with capturing different photographs of the subject. Another effort to enhance the quality of the photography is trying out different angles and framings when working with a subject. We also observed some children wanting to see the resulting pictures, and delete the ones they don’t like. However, such sensitiveness was not common to all participants. Some children completed the whole session simply pushing the shutter button, with no apparent enthusiasm to explore the functions offered by the camera. Lack of exploration can be a result of lack of interest, as much as it can be due to lack of knowledge, fear for doing something wrong, and not feeling comfortable to ask for help.

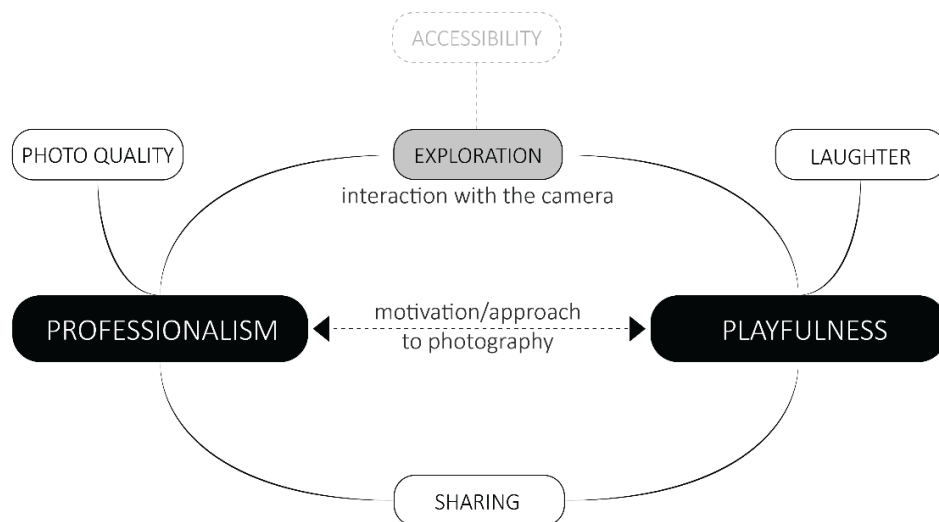


Figure 4 Summary of themes based on observation analysis

We use the term *playful exploration* to describe the behaviour of fiddling with the camera functions with playful motives. Giggling while over-zooming to the subject or previewing the picture of a friend making a silly face, and getting joy from discovering the funny filters are examples of playful interactions with and through the camera. *Laughter* is when such playful interaction becomes more observable. We identified several moments when product interactions led to laughs and chuckles, both in individual and social settings. In the most extreme cases, the camera only serves as a tool to initiate play, such as a chasing game. Such moments are when interaction with the product decreases to a minimum level, and some children end up taking just a few pictures by the end of the session.

Sharing is another dimension observed in both professional and playful approach. It is an indispensable part of photography, which makes it a social experience. Children were observed to show the pictures they took to their peers or us after paying evident effort to capture the desired frame. This is to either get approval, or because they take pride in taking a good photograph. The ones that have a more playful approach tend to capture “silly” or bizarre pictures such as a close-up photograph of a friend or spinning pictures while twirling the camera. If they think the resulting pictures are funny, they want to show them to their friends, which usually results in laughter. Although different approaches to photography have both unique and common dimensions, the manner and the motives lie behind them can be different.

6 Design implications

In order to communicate the differences of preferences and behaviours among our participants, we translated them into personas-like representations. Persona is introduced by Cooper (1999) in interaction design field as a way of communicating the goals and concerns of a user in a hypothetical but concrete way. Antle (2008) proposed child-based personas framework to generate realistic abstractions of child-users. In her framework, Antle suggests childhood needs, developmental abilities and experiential goals as sources of constructing child-user personas. Although more common in designing for adults, the use of child-based personas have also been reported (Moser, Fuchsberger, & Tscheligi, 2011; Wärnestål, Svedberg, & Nygren, 2014). We propose personas as an effective and empathetic source of inspiration for designers to communicate the diversity of interests and interaction styles of children. Our user representations are brief, concrete summaries to demonstrate the product-related concerns and behaviours of the participants, rather than detailed personas. When constructing the persona characters, we utilised the differences in children’s approach to photography (professional vs. playful) and the level of interaction with the cameras (explorative vs. focused). Crossing of these aspects allowed us to define four different

personas, and we also embedded the perception of product language (camera-like vs. toy-like) into this model corresponding with them (Figure 5). We also compared the parent questionnaire responses to the behaviours of children observed in photography sessions for additional interpretations.

Expressive qualities of the product form can communicate the approach to photography. Making use of the camera-like vs. toy-like binary through explorations on product language can emphasize the self-image preferred by children. The more the product resembles a “real” camera, the more professional it will be perceived. A professional look will communicate that the user/owner of this camera should be taken seriously, like grown-ups. Possible strategies to achieve a professional look is to avoid the use of bright colours, and salient forms which are unexpected for a camera. Visual features following contemporary consumer electronics would also contribute to the serious look some children seek for. On the other hand, as the product drifts away from the culturally shared signs of what a camera should look like, it will be easier to integrate playful connotations into the product language. A playful look would perhaps contribute to the self-image, such as accentuating fun or feeling special by owning and using a product designed specifically for themselves (and *not* for adults). Children who prefer a toy-like product language are more ready to embrace eccentric and comical forms, and the use of radiant colours, which we usually don’t expect in a grown-up camera.

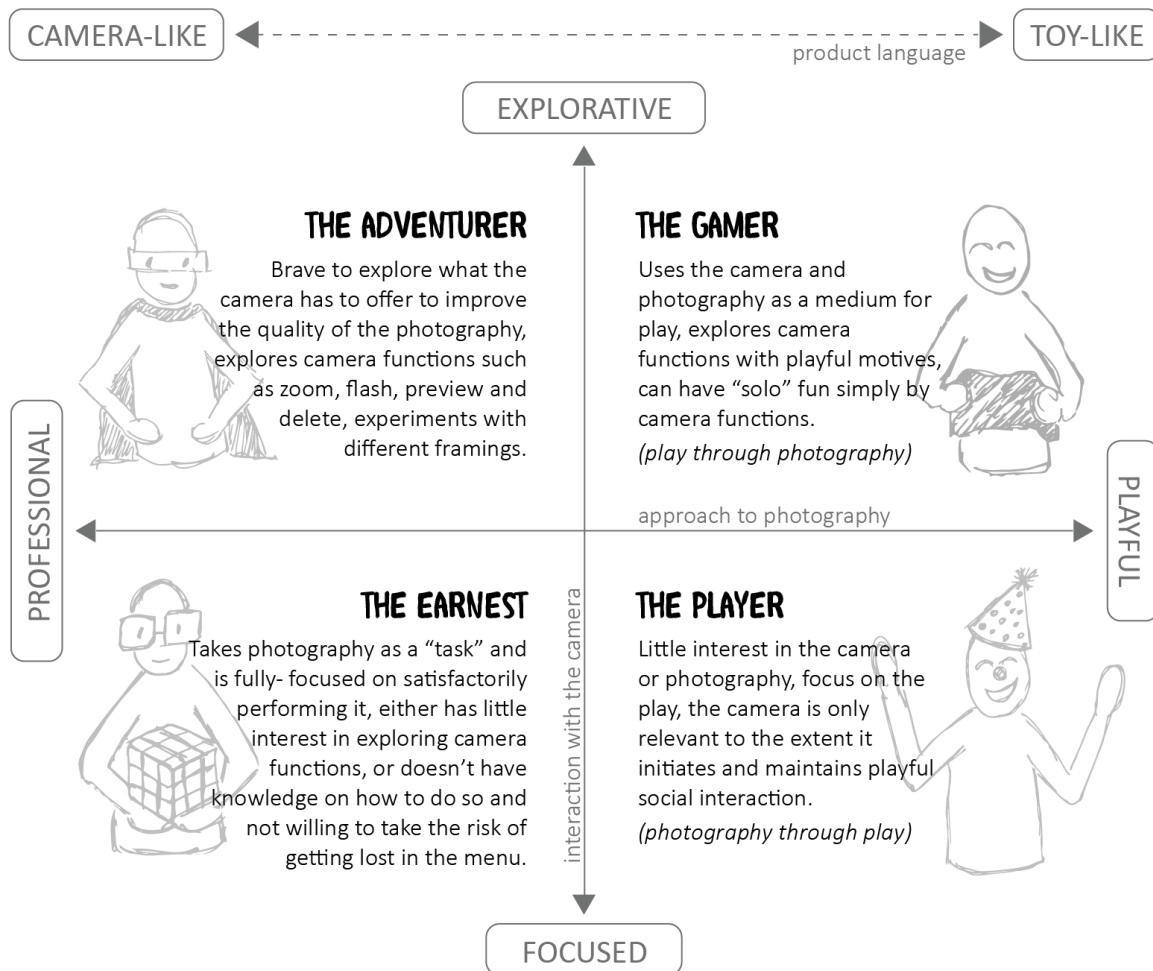


Figure 5 Personas constructed based on the findings of the study

The Adventurer is ready to explore the technical potential of the camera to test what they can do to improve the quality of their photography. Perhaps they laid their hands on a camera before, or they had a chance to observe others using one. This previous experience will encourage them to push their boundaries, and increase their expectations from the technical capabilities of a camera. When

designing for *The Adventurer*, attention must be paid to accessibility of the basic functions related to photo quality.

The Earnest is best characterised by their meticulousness in capturing a good photograph. They have little interaction with their social environment, take their time to decide on the framing, and repeat if they are not happy with the result. Despite their sensitiveness to the quality of the photography, they don't explore the camera functions to see how they can improve it. This may be due to their lack of knowledge or interest; in both cases, they can benefit from simplistic interfaces to encourage them to make the most of the camera functions without the fear of getting lost in the menu.

For *The Gamer*, camera and photography is a medium for play. Their motivation for exploring the camera is mostly playful, with little attention to quality of the photography. They take delight in browsing the menu without photography-related purposes, and display joy by giggling when something unexpected pops up on the screen. Although it doesn't mean that they don't have any interest in taking pictures, they would welcome any opportunity to spice up the photography with a little humour. True to their name, *The Gamer* enjoys video games in free time, hence they are familiar with game-related interfaces.

The Player has little interest in the camera or taking pictures. They enjoy the playful social interaction with peers, in which the camera or photography has a minor role. The sociality of the experience is so central for them that they can end up with taking no pictures at all, unless it has significant value in play. They would appreciate products which could initiate and reinforce playful social interaction, and would embrace playful camera applications which give room to humour and laughter they can share with their friends.

We constructed the personas to inspire diverse design concepts. Although we utilised our findings and observations from the field study by adopting a data-driven approach, we do not propose that each child would strictly fit into one of these personas. For example, even though one dominantly shows the character of *The Adventurer*, they may act like *The Player* for a brief moment of social interaction. Hence, different personas may not only lead to different design concepts, but also different modes and applications of the same camera. In this sense, the personas represent both the diversity of interests among the sample, and differing interests of the same user.

7 Conclusions

The focus of our paper was to examine the potential of a methodological approach, which puts forefront eliciting and communicating the differences in perceptions and behaviours of child-users, to enrich the possibilities in early design ideation. For this purpose, we presented an overview of the child-centred design practices, discussed the benefits of an experiential perspective to our methodological inquiry and how it relates to plural constructions of child-users, and presented our study to demonstrate how such a perspective can contribute to challenge our vested understandings about children and their product experiences.

We are aware that our study poses certain limitations. For example, our choice of cameras undoubtedly effected children's interpretations of the product language. Different set of cameras could have yielded different set of constructs, yet the range of products should be decided based on research questions unique to specific studies. Additionally, even though we wanted to simulate a natural use context, it is still a controlled environment, therefore is not representative of a real-life experience. Also, the duration of the observations allowed us to see the issues raised in short-term user-product encounter, but more comprehensive insights can be gathered in a longitudinal study that examines long-term usage.

We discussed design implications through persona-like characterisations to represent differing needs and expectations of children. We only focused on the issues demonstrating diversity among our sample, and tried to remain faithful to the findings of our study by avoiding any fictional information. Therefore, our characterisations are far from complete, detailed personas. However,

we believe it is an efficient way to illustrate how designers can benefit from a methodological approach that seeks for plurality of experience in order to expand early design ideation phase with user information, hence lead to diverse design concepts. In the future, we would like to assess this approach in terms of its usefulness in generation of multiple concepts in the actual design activities.

8 References

- Antle, A. N. (2006). Child-personas: fact or fiction? In *Proceedings of the 6th conference on Designing Interactive systems* (pp. 22–30). New York, NY, USA: ACM.
- Antle, A. N. (2008). Child-based personas: need, ability and experience. *Cognition, Technology & Work*, 10(2), 155–166. doi:10.1007/s10111-007-0071-2
- Authors (2016) Journal paper.
- Barendregt, W., Bekker, M. M., Börjesson, P., Eriksson, E., & Torgersson, O. (2016). The Role Definition Matrix: Creating a Shared Understanding of Children’s Participation in the Design Process. In *Proceedings of the 15th Conference on Interaction Design and Children* (pp. 577–582). New York, NY, USA: ACM. doi:10.1145/2930674.2935999
- Bruce, T. (2011). *Early Childhood Education* (4th edition). London: Hodder Education.
- Bruckman, A., Bandlow, A., & Forte, A. (2007). HCI for Kids. In J. Jacko & A. Sears (Eds.), *The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies, and Emerging Applications* (Second edition, pp. 794–809). NJ: Lawrence Erlbaum Associates.
- Christensen, P., & Prout, A. (2002). Working with ethical symmetry in social research with children. *Childhood*, 9(4), 477–497. doi:10.1177/0907568202009004007
- Cooper, A. (1999). *The Inmates Are Running the Asylum*. Indianapolis, IN, USA: Macmillan Publishing Co., Inc.
- Desmet, P., & Hekkert, P. (2007). Framework of product experience. *International Journal of Design*, 1(1), 57–66.
- Druin, A. (2002). The role of children in the design of new technology. *Behaviour and Information Technology*, 21(1), 1–25. doi:10.1080/01449290110108659
- Fails, J. A., Guha, M. L., & Druin, A. (2012). Methods and Techniques for Involving Children in the Design of New Technology for Children. *Foundations and Trends in Human-Computer Interaction*, 2(6), 85–166. doi:10.1561/1100000018
- Fulton Suri, J. (2003). The Experience of Evolution: Developments in Design Practice. *The Design Journal*, 6(2), 39–48. doi:10.2752/146069203789355471
- Gelderblom, H., & Kotzé, P. (2009). Ten design lessons from the literature on child development and children’s use of technology. In *Proceedings of the 8th International Conference on Interaction Design and Children* (pp. 52–60). New York, NY, USA: ACM.
- Gielen, M. A. (2008). Exploring the child’s mind – contextmapping research with children. *Digital Creativity*, 19(3), 174–184. doi:10.1080/14626260802312640
- Hassenzahl, M. (2004). The thing and I: understanding the relationship between user and product. In M. A. Blythe (Ed.), *Funology: from usability to enjoyment* (pp. 31–42). Dordrecht; Boston: Kluwer Academic Publishers.
- Hekkert, P., & Schifferstein, H. N. J. (2008). Introducing product experience. In *Product Experience* (pp. 1–8). Amsterdam: Elsevier.
- Hourcade, J. P. (2007). Interaction Design and Children. *Foundations and Trends in Human-Computer Interaction*, 1(4), 277–392. doi:10.1561/1100000006
- Hussain, S. (2010). Empowering marginalised children in developing countries through participatory design processes. *CoDesign*, 6(2), 99–117. doi:10.1080/15710882.2010.499467
- Isola, S., & Fails, J. A. (2012). Family and Design in the IDC and CHI Communities. In *Proceedings of the 11th International Conference on Interaction Design and Children* (pp. 40–49). New York, NY, USA: ACM.
- Iversen, O. S., Halskov, K., & Leong, T. W. (2010). Rekindling values in participatory design. In *Proceedings of the 11th Biennial Participatory Design Conference* (pp. 91–100) New York, NY, USA: ACM.
- Jensen, J. J., & Skov, M. B. (2005). A review of research methods in children’s technology design. In *Proceedings of the 2005 conference on Interaction design and children* (pp. 80–87). New York, NY, USA: ACM.
- Krippendorff, K. (2004). *Content Analysis: An Introduction to Its Methodology*. Thousand Oaks, CA: Sage.
- Markopoulos, P., Read, J., Hoysniemi, J., & MacFarlane, S. (2008). Child computer interaction: advances in methodological research: Introduction to the special issue of cognition technology and work. *Cognition, Technology & Work*, 10(2), 79–81. doi:10.1007/s10111-007-0065-0

- Mayall, B. (2000). Conversations with Children: Working with Generational Issues. In P. M. Christensen & A. James (Eds.), *Research with children: perspectives and practices* (pp. 120–135). London; New York: Falmer.
- Moser, C., Fuchsberger, V., & Tscheligi, M. (2011). Using probes to create child personas for games. In *Proceedings of the 8th International Conference on Advances in Computer Entertainment Technology*. New York, NY, USA: ACM.
- Read, J. C. (2008). Validating the Fun Toolkit: an instrument for measuring children's opinions of technology. *Cognition, Technology & Work*, 10(2), 119–128. doi:10.1007/s10111-007-0069-9
- Read, J. C., & Markopoulos, P. (2013). Child–computer interaction. *International Journal of Child-Computer Interaction*, 1(1), 2–6. doi:10.1016/j.ijcci.2012.09.001
- Sanders, E. B.-N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *CoDesign*, 4(1), 5–18. doi:10.1080/15710880701875068
- Sleeswijk Visser, F. (2009). *Bringing the everyday life of people into design* (Unpublished dissertation). TU Delft, Delft, Netherlands.
- Sluis-Thiescheffer, W., Bekker, T., & Eggen, B. (2007). Comparing early design methods for children. In *Proceedings of the 6th International Conference on Interaction Design and Children* (pp. 17-24). New York, NY, USA: ACM.
- Töre Yargın, G. (2013). *Developing a model for effective communication of user research findings to the design process* (Unpublished dissertation). Middle East Technical University, Ankara, Turkey.
- van Veggel, R. J. F. M. (2005). Where the Two Sides of Ethnography Collide. *Design Issues*, 21(3), 3–16. doi:10.1162/0747936054406708
- Wärnestål, P., Svedberg, P., & Nygren, J. (2014). Co-constructing child personas for health-promoting services with vulnerable children. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (pp. 3767–3776). New York, NY, USA: ACM.
- Yarosh, S., Radu, I., Hunter, S., & Rosenbaum, E. (2011). Examining values: an analysis of nine years of IDC research. In *Proceedings of the 10th International Conference on Interaction Design and Children* (pp. 136–144). New York, NY, USA: ACM.