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RETHINKING CHILDREN'S ROLES IN PARTICIPATORY DESIGN: THE CHILD AS A PROCESS DESIGNER

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Abstract

Although children's roles in Participatory Design (PD) processes have been more or less stable for the last two decades, the recent academic debates have urged us to rethink these traditional roles in order to aim for genuine forms of participation. In this article, we feed this discussion by exploring a play perspective towards the role of children in a PD process. We report on a case study in which we co-designed workshops together with 60 children aged 6 to 10 and 8 youth workers. The case study – called 'Making Things' – relied on a combination of methods, including participant observations, interviews, sensitising packages and participatory mapping. The reflection on the case study shows how our play perspective provided us with a way of making sense of children's interactions with each other, adults, objects and their context. Our reflections further point to the emergence of the role of the child as a 'process designer'. This role entails the collaboration with children for *(co-)designing* a PD process instead of merely *participating* in it. The implications of our findings, we hope, is that they extend the further debate on how to pursue genuine participation of children in PD.

Keywords: Participatory Design, Children, Roles, Genuine Participation, Play.

1. Introduction

Since the 1990s, an increasing amount of attention is paid to children as user group in design processes. Due to – among other things – the assumptions researchers have about working with children, the child's role in design has historically been minimised [1]. However, in the last decades, researchers such as Druin [2] and Large et al [3; 4] have advocated a child-oriented approach to design. They argue that children have much to offer in the design process [5]. Resulting from this increased interest in designing with children, a growing body of literature has emerged [6]. Once thought to be the academic pursuit of educators and child psychologists, discussions about children's interaction with technology started to appear in academic books and journal publications [1]. Moreover, in 2002, the Interaction Design & Children (IDC) community was launched as international conference, attracting attention from disciplines such as HCI [7].

Today, the research interest in designing with children is primarily driven by design researchers, oftentimes with a background in Participatory Design (PD) [8]. In short, PD is a set of theories and practices related to the concept of involving end-users as participants in the design process [9; 10]. Today, two main strands towards PD co-exist. On the one hand, the functional North-American approach involves children to create better technologies; small teams of children work for several weeks on design projects with adult participants allowing them to develop designer skills [11]. On the other, the Scandinavian approach today still reflects its early ideology and values, i.e. communicating benefits of user-involvement and democratising the workplace. Corresponding to the latter, children are engaged in design processes for the sake of empowerment, taking on the form of large numbers of children collaborating in short, concentrated periods of time [12]. As this fits the values outlined in this article best, we position our work in relation to the democratising values of the Scandinavian tradition. However, this predisposition should not be interpreted as a plea to value one tradition over another.

An ongoing discussion within the IDC community (and beyond) entails the role of children in PD. Druin [1] was one of the first authors in this field to categorise the roles children can take in PD processes. Druin's framework (described below) has been influential for over 15 years and had a positive impact on researchers' awareness of children's involvement in PD processes [13]. This article departs from the stipulation that for the past decade children's roles in PD processes have been more or less stable and rely heavily on Druin's [1] categorisation. However, recently the discussion on children's roles in PD processes has been revived in the IDC community, with contributions from e.g. Barendregt et al [13] and Landoni et al [14]. This article contributes to this renewed interest by rethinking traditional children's roles in PD processes.

Specifically, our contribution lies in the development of a theoretical and methodological play perspective to reflect upon these roles and aim for genuine forms of participation (see section 2). As we will show, play – among other things – can facilitate communication and collaboration between participants [15]. We apply our play perspective to a concrete case study – called ‘Making Things’ – involving 6 - 10 year olds and youth workers (see section 3). Through describing our insights gained from this case study and translating them to PD processes by accounting for Makhaeva et al’s [16] concept of a ‘Handlungsspielraum’ (see section 4), we argue for extending the range of children’s roles identified so far – including Druin’s [1] framework – with an additional role as ‘process designer’, entailing collaboration with children for *(co-)designing* a PD process instead of only *participating* in it (see section 5).

2. Literature review

2.1. Children’s roles in Participatory Design

With her influential framework, Druin [1] argues that children can contribute to the design process of new technologies in four different ways. First, when children take on the role as users, their interaction with an existing technology is being studied to discover design aspects that can be improved. Second, as testers, children test prototypes of a technology before it is released onto the market. Third, as informants, children contribute to the design process, based on when researchers believe they can provide valuable input to feed the design process. Finally, as design partners, children are considered to be equal stakeholders that have a say in the design process. The last decades the different roles that children can play in design processes have been the topic of discussion in the IDC community [14]. Novel approaches, that build further upon Druin’s [1] framework and/or explore different roles, include Van Doorn et al’s [17] investigations into child co-researchers and Salian et al’s [18] explorations of children as heuristic evaluators.

Notwithstanding the theoretical conceptualisations of children’s roles in PD processes, in practice children are mainly involved in limited roles and at times when adults deem their input as necessary [5]. Children are still mostly considered as users but only rarely evaluate the process [14]. And engaging children in a process that expands a prolonged period appears to be anything but evident [13]. Some have claimed that power imbalances between adult and child design partners are hard to overcome [19], while others have argued that true equality in intergenerational design teams can never happen [13].

Practical guidelines for tackling difficulties relating to children’s roles have been created for different phases of the PD process, including having informal fun time together [20; 21]. These tips help researchers to reduce their status as authority figures and make children feel more comfortable in participating as equal design partners [22].

Frameworks such as Barendregt et al's role definition matrix [13] and the bonded design approach [18] have been developed to nuance children's roles and define additional ones. Both form starting points to think about if and how traditional roles of children in PD processes can be rethought and (re)negotiated.

This article explores the premise that through rethinking traditional roles of children in PD processes, we can aim for genuine forms of children's participation. Relatively little attention has been paid in the IDC community to what children's genuine participation means. However, some frameworks have been developed to understand and improve the genuineness of children's participation, e.g. by Chawla & Heft [23]. Although there is a variety in the views on what constitutes genuine participation, it is generally agreed upon that instead of being merely tokenistic, decorative or even manipulative, genuine participation allows children to have a significant influence on decisions and outcomes [24; 25; 26]. According to Iivari et al [24, p. 250], the philosophy behind children's genuine participation is "*that children's participation not only leads to better decisions in child related issues [...], but is important and worthy in itself, as it creates possibilities for learning and development*". Resonating with the early Scandinavian PD tradition, genuine participation should generate knowledge in the children, enable their voices to be heard, impact decision-making and empower them [24; 25; 26].

2.2 A play perspective

To rethink children's roles and aim for genuine forms of participation, we adopt a theoretical and methodological play perspective. PD methods designed for children, such as Mission from Mars [27], often explicitly depart from a play approach. The value of play lies in the way it can generate information and facilitate communication between people with different levels of verbal skills resulting from differences in e.g. age. "*Play helps children to learn and interact with others*" [15, p. 1], which enhances teamwork. Play can function as a vehicle that helps children attain new levels of skill and knowledge [28]. Resonating with Makhaeva et al's [16] concept of a 'Handlungsspielraum' (discussed below), play can also form a way of balancing given structures and freedoms in PD processes. PD methods that incorporate play – such as design games – contribute to levelling stakeholders with different interests, which leads to a more constructive dialogue [29]. They can also downplay possible power-relations between participants, hence improving collaboration [30].

Academic interest in play has increased dramatically in the past 100 years within various fields ranging from biology, psychology to sociology [31; 28]. Play is a difficult concept to define and can be applied to different purposes [32]. Therefore, well-known play theorist Sutton-Smith [33] clarifies that play is ambiguous and all conceptions of play are rhetorical. This means that each discipline that studies play unconsciously drafts the concept into the service of its own perspective. In *The Ambiguity of Play* [33],

Sutton-Smith identifies seven rhetorics that operate as cultural perspectives and encourage practitioners to focus on certain kinds of play.

In our article, we develop a play perspective that relies on Huizinga's *Homo Ludens: A Study of the Play Element in Culture* [34] and Caillois' *Man, Play and Games* [35]. Although oftentimes criticised, both authors are among the most cited play researchers and their ideas provide a structural notion of play [28; 31]. This play perspective forms a first starting point to reflect upon children's roles in PD processes and discuss our case study.

Our play perspective follows Huizinga's [34] non-functional notion of play. In 1938, Huizinga presented a new understanding of play as an activity existing only for its own sake, contrasting previously dominant deterministic and utilitarian notions of play [28]. Huizinga defines play as a free and voluntary act, in which players set their own terms and timing of involvement. He argues that play is an experience of enjoyment without serious goals and is characterised by the fun element. No profits can be gained from it and material consequences are absent. Another characteristic is that play is "*distinct from "ordinary" life both as to locality and duration*" [34, p. 9], meaning it proceeds within its own boundaries of time and space; Huizinga refers to this as 'the magic circle'. Moreover, Huizinga's take on play both honours rules and stimulates distorting them. It integrates rules that are freely accepted but binding.

As for Caillois' work [35], his take on 'paidia' and 'ludus' is relevant for our play perspective. Caillois positions all forms of play on a continuum from structured forms of play (ludus) to free play (paidia), allowing shifting and interacting. They are not necessarily contradicting each other and generally people have the tendency to turn paidia into ludus. With paidia, Caillois refers to unstructured and spontaneous activities, being more free types of play. Ludus encompasses structured activities with explicit rules that clearly define a winner or a loser, such as games. However, according to Frasca [36], it is wrong to assume that paidia has no rules. Although paidia does not end with winning or losing, it incorporates implicit socio-cultural rules that guide players' actions.

Bringing these theoretical insights together, our play perspective departs from a notion of play as (1) a free and voluntary (2) action or activity that has (3) no purpose or (4) gains, (5) is distinct from ordinary life (cf. the idea of 'a magic circle') and (6) exists only for its own sake (because it is 'fun'). In this notion, (7) rules are central and (8) play can be either free or structured. To properly explain our play perspective, it is important to point out the relation between play and playfulness as this will aid in better understanding play. We note that while play is an action, an activity or something that we do, the term playfulness is used to describe an attitude or mood. Play is visible and can be carried out while playfulness is subjective to the player [28; 31]. In this sense, our play perspective relates to play rather than playfulness.

We use this play perspective as a lens to reflect on the roles children performed in our case study and on their traditional roles in PD processes in general. We believe that this play perspective is in line with our ambition to rethink children's roles in PD processes to aim for genuine forms of participation. In this sense, our perspective relates closely to Henrick's [28] statement that through play children identify, confront, and manipulate the elements of the world along lines of their own choosing. Players thus continuously form, de-form, and re-form their own circumstances, including other people, physical objects, and even the players' own bodies. In this article, we will show how this play perspective provides us with a way of making sense of children's interactions with each other, adults, objects and their context through play.

3. Case study: 'Making Things'

This article reports on the 'Making Things' case study that is part of a long-term collaboration with youth work organisation 'Gigos vzw' (the collaboration with Gigos has been on-going since January 2015; the case study started in September 2015 and is being carried out since). The goal of the 'Making Things' project is to design Science, Technology, Engineering and Mathematics (STEM) workshops together with 6 – 10 year olds in the context of FabLab Genk. It is important to note that 'Making Things' is on-going and the findings discussed in this article result from the first explorative phase (September 2015 – May 2016).

3.1. Methodology

A total of 60 children and 8 Gigos supervisors are involved in our case study, together with two design researchers, being two of the authors of this article. The aim of the 'Making Things' project is to let the participating children co-design the STEM workshops before effectively participating in them. This means that, rather than defining the variables of the workshop beforehand, we are looking for ways to 'design' the workshops in a participatory manner together with the children. Pinpointing the importance of play in PD processes involving children, we are explicitly incorporating play into the design of the STEM workshops. Therefore, not only the final design of the STEM workshops but also the methodology we use to come to those workshops integrates play.

To come to a first iteration of the design of the workshops, we engaged the children by applying three, specific methods. Firstly, we conducted participant observations – and additional interviews, to follow up on specific insights – to gain insights in the play activities of the children. Secondly, sensitising packages were designed and handed out to the children to express their ideas about play. The sensitising packages were seen as a 'warm up' for the mapping. Thirdly, a participatory mapping was organised to reflect

upon the children's meanings of play. In what follows, we explain these methods more detailed.

3.1.1. Participant observations (and additional interviews)

On six separate occasions over the course of one month, we conducted participant observations [37] of approximately 60 children (boys and girls, aged 6 - 10 years) as they engaged in diverse activities of play organised by the youth organisation (e.g. playing games or doing arts and crafts) and in self-initiated instances of play. The gathered field notes and audio-visual material (being photographs and videos) provided us with insights in the play activities that the children, Gigos supervisors and we participated in. To follow up on specific insights, semi-structured interviews with several children and supervisors were carried out. The interview topic guide was inspired by theoretical insights and findings from the observations.

3.1.2. Sensitising packages



Figure 1. Completed sensitising assignments.

Next, 20 children – selected based on their age (6-10 years old) and attendance in Gigos' activities – were handed a sensitising package to express their experiences and ideas related to play. Through these packages – containing playful assignments – the children were guided by the Gigos' supervisors to reflect on play in a tangible way. Through drawing, writing or crafting, the children were introduced to the topic and 'warmed up' for the mapping [38]. Each child received two assignments through which they were

asked to: (1) pretend that they were ‘the big bosses’ of the youth organisation for one day and visualise what they would do – in terms of play – that day; and (2) visualise what they would need (e.g. materials, help from adults) to realise that idea. Two weeks before the mapping, we picked up the assignments; 20 children completed the first one and 18 the second one (see figure 1).

3.1.3. Participatory mapping

A participatory mapping [39] was organised with 29 children aged 6 to 10, in which they were asked to reflect on their meanings of play. Twenty of them also took part in the sensitising activity (see 3.1.2), but were now joined by 9 peers for the mapping. The materials used for the participatory mapping contained large (2D) paper background maps (one per group), depicting spaces for ‘play’ versus ‘not play’, and stickers. The stickers used for the participatory mapping represented 6 play-related icons referring to (1) activities, (2) persons, (3) locations, (4) rules/restrictions, (5) objects and (6) times. The first four categories drew on Glenn et al’s research [40], examining meanings of play among children. Glenn et al [40] conducted a study with 30 children (ages 7-9) that showed children consider almost anything as an opportunity for play, saw opportunities to play almost anywhere, and with almost anyone. Finally, they identified various factors that influenced their play opportunities or had a restrictive influence on it (e.g. physical and environmental limitations, parents, and game rules). The categories of play objects and play times were added, based on the findings of our observations (see 3.1.1.) and the sensitising packages (see 3.1.2.).



Figure 2. Two background maps.

The mapping procedure consisted of three successive rounds; in each round, two groups of approximately five children participated on average for 45 minutes. After a short introduction, we distributed a total of approximately 125 stickers upside down on the table, divided into six stacks ('activities', 'persons', 'locations', etc.). Taking turns, each child could then pick one sticker depicting a 'play activity'. Then they were encouraged to discuss, in group, whether they considered that play activity depicted on the card as 'play' or 'not play' and why, before placing it on the map in the corresponding space. Although the mapping of the activities as 'play' versus 'not play' might seem restrictive, we constantly encouraged children to discuss their choices or any doubts that they could have. Next, children were invited to roll a dice to determine from which stack they had to pick three stickers ('play persons', 'play locations', 'play rules/restrictions', 'play objects' or 'play times') and discuss which of the three stickers corresponded best with the play activity they just placed on the map. These activities – i.e. placing a 'play activity' on the map, discussing it in group and relating it to another sticker - were repeated for 40 minutes. For the final 5 minutes, each child received a blank sticker to visualise a play activity that he/she liked most. The mapping resulted in four background maps (see figure 2).

3.1.4. Analysis

For the analysis of the gathered data, we independently conducted qualitative analyses of the documentation, including the sensitising packages, logged field notes and audio-visual material of the observations, transcribed interviews and background maps. Various coding iterations were performed, starting with an open coding, to then look for recurring patterns and relations in the data. While the first open iteration of coding was done based on empirical data gathered from the case study, the next iterations departed specifically from the play perspective (thus relating theory to empirical data). In this way, we aimed to operationalize the theoretical play perspective. The following categories - also used as input for the mapping - were identified based on the (clustering of the) codes. As mentioned above, these categories were partially based on the study conducted by Glenn et al [40], complemented by the results of the data analysis of the observations and sensitising packages. The categories were:

- 1) play activities: the activities that are defined as play by the child;
- 2) persons associated with play (playmates), e.g. (grand)parents;
- 3) play locations: locations where the play activities take place;
- 4) play rules, e.g. game rules or physical limitations;
- 5) play objects that are used during play activities;
- 6) and times, e.g. when or how long the activities took place.

In our analysis of the data, the categories of play activities, playmates, play rules and play objects appeared to be most relevant for the scope of our article. Since the categories of playtimes and play locations provided us with insights that were not

necessarily suitable for reflecting on the role of children in a PD process, we only focus on the former four when elucidating the results of the case study.

4. Results and discussion

In the following part, we discuss the results of the 'Making Things' case study. We clarify our major insights concerning four categories: play activities (4.1.), playmates (4.2.), play rules (4.3.), and play objects (4.4.) (as indicated above).

4.1. Play activities



Figure 3. Observed play activities.

Through the sensitising packages, the children visualised a wide range of play activities including playing soccer, visiting amusement parks, and playing video games. In the mapping, the children stated they did not consider being bored as play. *“Being bored is doing nothing. It’s mostly thinking about ‘I want to play’”* (Isra, 8 years old). This relates to the fundamental characteristic of play as being an activity [41], in contrast to ‘doing nothing’. During the mapping, the children stated that when an activity – such as making jigsaw puzzles – requires a lot of mental concentration, they do not consider it play: *“If there are too many pieces, it [the puzzle] becomes too hard. Then it isn’t fun to do, you’re not playing but learning”* (Bennu, 9 years old). Here, it appeared to be important whether children were told by an adult (e.g. teacher) to undertake the specific activity. If so, the activities become serious and goal-oriented, and can no longer be considered

as play. This corresponds to Huizinga's [34] notion of play as being non-functional. The observations showed that, when engaging in activities of structured play organised by Gigos, children constantly create opportunities to incorporate free play, e.g. by climbing into goalposts during a soccer game (see figure 3). The tendency to turn paidia into ludus is thus clearly present (cf. [35]). As we noticed in the observations, through integrating moments of free play in an imposed play activity, children found a way to engage in activities that they themselves defined as play (which they later indicated in the mapping and interviews). Aligned with Huizinga's [34] notions, our findings showed that play being considered as free appeared to be important to the children.

4.2. Playmates

Regarding playmates, our findings showed that children play with almost anyone, including (grand)parents and friends. The mapping showed that the activity influenced the children's choice of playmates and vice versa. For instance, one child indicated that he only played computer games with his grandmother. This corresponds to Huizinga's [34] claim that players set their own terms of involvement in play activities (namely, the play activity of playing computer games was defined by the involvement of both the child and his grandmother). Additionally, the observations demonstrated that whether children defined a person as playmate was determined by the role that the person in question took. For instance, one supervisor approached the children as a typical adult: quite distantly yet warm, maintaining the role of a caretaker (e.g. taking children to the toilet) and not participating in play activities. In contrast, another supervisor took part in all the play activities and put herself on the level of the children while playing, which resulted in her being seen as a playmate more often. This relates to Huizinga's [34] idea of 'the magic circle' wherein play is distinct from ordinary life. One could thus state that when an adult (being the youth worker who is associated with play) is separated from daily life activities (such as care-taking), the children see him/her as a playmate and thus as being on the inside of 'the magic circle'. In this sense, it could be argued that when distancing oneself from the daily life context, it becomes easier to be regarded (by the children) as being inside of 'the magic circle'.

4.3. Play rules

Regarding play rules, both the mapping and the observations showed that play rules were constant factors that influenced children's play. Even play activities that children started spontaneously were subject to structure and rules. For instance, some rules were inherent to the activities (e.g. counting to 30 while playing hide-and-seek) while other rules referred to the location (e.g. taking off shoes while playing in the ball pit) or time-related situational factors (e.g. coming home before dark when playing outside). This corresponds to Frasca's [36] claim that - what Callois [35] defines as - paidia, too can be subjected to rules. Furthermore, the observations and mapping showed that rules could be imposed by adults (e.g. being careful not to spill water when painting) or

by children (e.g. stealing is not allowed when playing shop). Both adults and children took these play rules seriously, affirming Huizinga's [34] claims that play rules are freely accepted but binding.

4.4. Play objects

'Making Things' indicated that the objects children play with can be almost anything including crayons, cell phones, and climbing racks. The case study showed that when it comes to play objects, a set of restrictions comes into play. For instance, some children indicated that they could not play with certain game consoles because these belonged to their siblings. They had to ask permission to play with such objects, which - when not granted - restricted their play activities. Moreover, the case study showed that several girls, playing tag while wearing roller shoes, implicitly determined their playmates; only other children who wore these shoes could play along. This affirms that play objects can impose implicit socio-cultural rules that guide players' actions (cf. [34]).

5. Final reflections

Through our case study, and more specifically by developing and applying our play perspective, we notice that the moments when the children and youth workers played together could be seen as moments of genuine participation (cf. [24; 25; 26]). This leads us to believe in the importance of incorporating play as a vital element of PD processes involving children, aimed at genuine participation.

Our play perspective provides us with a way of making sense of children's interactions with each other, adults, objects and their context. Specifically, from the case study we learn that play can diminish difficulties for design researchers and child participants concerning the roles they take. For instance, through participating in free play together with the children, we believe that possibilities were created for the adults to avoid being seen as authority figures by the children. We find that through these moments of free play, the design researchers could make their roles to children explicit and renegotiate them, e.g. by letting free play continue or break it up to resume design activities. We also learn that play rules are omnipresent in children's play. Rules are imposed through play objects, both by adults and children, and are often inherent to play activities. Sometimes they are (deliberately) broken, e.g. when children look for opportunities to incorporate free play in activities of structured play.

We can translate this to PD processes by accounting for Makhaeva et al's [16] concept of a 'Handlungsspielraum'; this entails a conceptual creative space in which participants and designers collaborate and creatively think about the design at hand by exploring unique pathways through balancing given structures and freedoms. In this sense, we interpret the findings of our case study as a way to balance given structures and freedom in children's play and as an approach to negotiate children's and adults' roles.

After all, design researchers too establish structures and ‘play rules’ when organising and facilitating PD activities. Methods that are used in PD processes are typically selected and designed by adult researchers. User-involvement usually occurs through ‘workshops’, mirroring the jargon researchers use and not children. Adult researchers typically define the project goals, assign specific rules to participants and guide the design activities. Consequently, the involvement of children in PD processes takes place via a predetermined set of variables [42], which significantly shape children’s roles. To rethink these issues and aim for genuine forms of participation, we argue for a balance to be sought between creative freedom and structure (cf. [16]) and propose to add the role of ‘process designer’ to the spectrum of children’s roles.

5.1 The role of ‘process designer’

Besides taking part in the PD process, child participants can be provided with opportunities to also (co-)define that process and methods used. We refer to Vaajakallio [30] who, in relation to design games, discusses how the design of methods is part of co-design. As many of the outcomes from co-design processes emerge already during designing the game, she pleads for extending the collaboration with participants from playing the game to designing it. Opening up the design of methods to participants can be done ‘on the fly’ by adjusting while playing the game (e.g. by letting participants adapt the game board).

In this line of thought, we argue for extending the range of children’s roles that has been identified so far - including Druin’s [1], Van Doorn et al’s [17] and Salian et al’s [18] contributions - with an additional role that precedes the actual involvement of the child in the PD process. It points to a role that entails the collaboration with children to (*co-*)*design* a PD process instead of merely *participating* in it. For the sake of our argument, we will use the term ‘process designer’ to refer to this role.

We believe that allowing children to (co-)define the process and the methods used can enable genuine forms of participation. For instance, traditional roles of the children (as mere participants) and adults (as researchers, designers and/or moderators) are negotiated; children are enabled to switch roles from participant (partaking in PD activities) to moderator (deciding to - temporarily - end the PD session and initiate play activities). This may result in more opportunities for the children to impact decision-making, cf. genuine forms of participation [24; 25; 26]. Vaajakallio [30] reports that even a minor involvement in adjusting the method has proven to increase the participants’ feelings of empowerment. Moreover, often researchers get more out of a PD project than the participants, as in many cases participants do not see any tangible outcomes of the project. The academic outreach may only be interesting to the academic community instead of also the participants [24]. Through opening up the design of the PD process itself and allowing children to take on the role of process designer,

understanding and communication between the adult researchers and the children can be enhanced, allowing for genuine forms of children's participation.

When relating this role of process designer to the already existing notions of children's roles in PD processes, we state that the role of process designer shares traits with Druin's role of the child as design partner [1], in the sense that the child participants partner up with adult participants in order to design the PD process before participating in it. It also relates to Van Doorn et al's [17] notion of the child as co-researcher, as – similar to this role – the child process designer departs from his/her own practices when designing a process. However, we see the role of process designer as an attempt to rebuild the understanding of existing children's roles in PD processes by extending the spectrum. Druin's [1], Van Doorn et al's [17] and Salian et al's [18] defined notions of children's roles come into play *during* the PD process. In this regard, we believe that these definitions are rather restrictive when it comes to the complexity of PD processes involving children. To truly aim for genuine forms of participation, we believe that the spectrum of children's roles should be extended with the role of process designer that can be positioned *before* - and possibly also *after* - the PD process itself.

5.2 Challenges and future research

We acknowledge that the above-mentioned reflections present some challenges. For instance, it demands time and effort to involve children - as 'process designers' - in the design of PD processes. Allowing children to design a process might also force us, as design researchers, to incorporate methods that we might not be comfortable with. We realise that researchers do not always have the luxury of setting up long-term processes with children. However, taking the time to reflect upon the children's roles is necessary to achieve genuine forms of participation (cf. [24; 25; 26]). We envision this article as a first step towards achieving this. However, more research is needed and will be carried out (e.g. in the continuation of 'Making Things').

First, we acknowledge that the role of the child as a process designer needs be refined and worked out further. When relating our reflections on the child as process designer to our case study, we point out that the next phase of our case study will further define to role of the child as process designer. In this next phase, the children will co-design the STEM workshops, i.e. the final design of 'Making Things'. Then, it will become more concrete how concretely the role of the child as process designer allows for genuine forms of participation. When doing so, and once again highlighting the importance of play in PD processes (involving children), it is also interesting to explicate exactly how play can contribute – practically – to the involvement of children in PD processes and, more specifically, as process designers.

Second, we believe it is worthwhile to research how rethinking children's roles can also aid in negotiating power relations in PD processes involving children. Although the Scandinavian PD tradition has a strong normative basis, empirical accounts of how power and decision-making have been shared between researchers and participants are scarce and vague [43]. Children's participation through design partnering breaks traditional power hierarchies, which is not self-evident when children are accustomed to follow what adults say whereas adults are used to being in charge [44; 1]. Play can form a way of diminishing some of these difficulties and make power relations in PD processes involving children more explicit.

Third, we acknowledge that 'Making Things' is organised by adults - instead of children - and based primarily on structured activities. We felt that this was necessary in order to formulate an applicable starting point for our research. However, we recognise that most classifications of children's play activities have been based upon adults' definitions rather than on children's understandings. Adult researchers often believe that - as they were themselves children once - they understand how children think and behave [19]. If adults' definitions of play are then put into practice, misrepresentations may arise since researchers and children have different assumptions of play [40; 41]. Often, such assumptions go unnoticed because they are shared by an entire community, which pinpoints the importance of being explicit about them [45]. Therefore, in the continuation of the case study, we foresee to leave (more) openness for child-induced activities of play to gain an even deeper understanding of their roles in PD processes.

6. Conclusion

In this article, we extend the debate on children's roles in PD processes by exploring a play perspective towards the role of children in a PD process. We argue that through rethinking traditional roles of children in PD processes, we can aim for genuine forms of children's participation. The reflection on the 'Making Things' case study shows how our play perspective provides us with a way of making sense of children's interactions with each other, adults, objects and their context. Based on our findings we argue for extending the range of children's roles that has been identified so far with an additional role as 'process designer' that precedes the involvement of the child in the PD process. We believe that allowing children to (co-)define the process and the used methods will result in genuine forms of participation [24; 25; 26].

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