Critical design in interaction design and children – impossible, inappropriate or critical imperative?

Netta Iivari & Kari Kuutti
INTERACT Research Unit, University of Oulu
P.O. BOX 3000, 90014 Oulu, Finland
firstname.lastname@oulu.fi

ABSTRACT

During past years, an increasing interest has been placed on critical design in Human Computer Interaction (HCI) and design research communities. Child Computer Interaction (CCI) research community, however, has remained quite silent about these recent developments. There are no studies explicitly addressing critical design for, with and by children nor studies explicitly embracing critical research tradition. Yet, there are some works that clearly still can be linked with critical research and design traditions. Those works can be seen to represent seeds of critical design already evident in the CCI community. This paper introduces critical design discourse into CCI research. First critical research and design traditions are presented, after which existing developments in CCI research that can be linked with critical research and design are identified. The paper ends up by proposing a research agenda for future critical CCI research and by discussing associated benefits and challenges.

Author Keywords

Critical design; Critical research

ACM Classification Keywords

CCS → Human-centered computing → Human computer interaction (HCI) → HCI theory, concepts and models.

INTRODUCTION

During last twenty years, growing interest has emerged on critical design in Human Computer Interaction (HCI) and design research communities. Numerous books (e.g. [19, 20, 21, 47]) and articles [5, 6, 7, 24, 46, 63] stipulating on critical design have been published, workshops have been organized [32] and recently also critical reviews of the past developments have been provided together with calls for future action [38, 39]. Child Computer Interaction (CCI) research community, nevertheless, has not yet acknowledged these recent developments. There is a lack of studies explicitly addressing critical design for and with children and

no studies explicitly embracing critical research tradition. Then again, there are some studies that still can be connected with critical research and design traditions. We see these studies as seeds of critical design evident already in the CCI community; based on which more critical work can be build.

On the other hand, it is yet an open question whether and how critical design and critical research will fit CCI research, and this paper aims to open a reflective discussion around the topic. The hesitance to recommend critical research and design for the CCI community stems from the fact that critical research aims at emancipation or empowerment of the oppressed; it is assumed that the existing status quo serves those in power and that there are oppressed groups and conditions in the world, whose liberation from oppression and false consciousness is the task of critical research [38, 39]. In CCI research aiming to truly engage children in research and design processes, it is not yet clear how well critical research and critical design traditions fit children and their skills and capabilities. Questions arise, such as how much children are able to understand about critical research and design, whether children are ready – development wise – to embrace them, and how much good as well as harm is generated when introducing the tenets of critical agenda into the lives of children. Outside the CCI community, research on criticality, empowerment, and children is well established, however. Research has argued for the empowerment and emancipation of children (e.g. [16, 33]) and attacked, for example, patriarchal or capitalist society in studies on the extensive consumerism targeting children [34] or on the gendering of children already in the kindergarten [12]. There is also the strongly emancipatory and rich tradition of Paolo Freire-inspired Critical Pedagogy aiming at liberation of the oppressed [25], towards which CCI research has already started to show interest [14].

Overall, in critical research tradition under criticism often are capitalism, patriarchy, colonialism, racism and heteronormativity, while in critical research there also is wide variety in who the oppressed and oppressors can be perceived to be. In any case, the basic assumption is that there are groups and conditions in powerful position in society, they benefit from this position and wish to maintain the status quo, but there inevitably are also people in power-weak positions, suffering from injustice, marginalization, domination or alienation. Critical research should aim at empowering the power-weak. In the context of children, the oppressors could be, for example, negligent parents,

dominating teachers, excluding peers, abusing sales and marketing, or cultures or institutions advocating heavily gendering or racialized upbringing practices.

However, the concept of empowerment of children can be interpreted in many different ways [45]. Kinnula and colleagues carried out a critical review on the concept and identified critical, mainstream, functional, democratic, and learning and competence development views [45]. The mainstream view sees empowerment as giving some power of decision to the power-weak for the purpose of motivating the power weak to strive for goals of the powerful ones, whereas critical tradition sees that empowerment can not happen through the powerful giving some of power to the power-weak; quite the opposite, empowerment necessitates the power weak to combat the powerful ones and to gain power this way. The functional view of empowerment is about improving life conditions of people, yet maintaining the status quo, for example by offering better tools for people to use, whereas the democratic view highlights people's democratic participation in decision-making in issues concerning them. Lastly, empowerment as learning and competence development stresses development of people's skills and competencies so that they can flourish in their full potential and control their destinies. [45] In CCI research, traces of all these views can be identified, while not all of them link with critical research tradition. Mostly CCI research remains silent about critical research.

The goal of the paper is to introduce critical design discourse into CCI research. First critical research and design traditions are presented, after which existing developments in CCI research linked with critical research and design are identified. Thereafter, the paper explores possible ways by which critical design could be more seriously integrated into CCI research as well as identifies challenges that can be associated with such an endeavor. The paper ends up by proposing a research agenda for future critical CCI research.

INTRODUCING CRITICAL RESEARCH AND DESIGN
Original ideas of critical thinking and research were laid down already by Kant and Marx, and they have been further developed by Frankfurt school of Critical Social Theory and French postmodernists. Currently critical research is a well-established line of thought within most social sciences and humanities, and there is a wide variety of different approaches within it. The essential belief of critical research is that our experiences, opinions and even whole worldviews can be distorted by various reasons related, e.g., to power and culture; these distortions benefit some stakeholders over others. Critical research assumes that through various criticisms it is possible to see through the distortions and to reveal the status quo as well as to emancipate or empower the oppressed [18, 50, 68]. Critical research, hence, is characterized by "*an intention to change the status quo, overcome injustice and alienation, and promote emancipation*" [68: 9]. In critical research important is to provide rich insight and critique on the current situation, but also to be engaged in changing the world: in transformatively redefining the current situation [1, 56].

Critical research and Information Systems
Critical research has already found its way into research on the use and development of computer technology. Particularly Information Systems (IS) and HCI research – being human oriented disciplines interested in the utilization and use of computer technology by people and organizations or in the interaction between people and computer technology – have utilized critical research to address their topics. In IS research there has been interest in critical research since 1960s, although it has stayed in the margins thorough the years [39], yet activating during the last two decades. Critical IS research has managed to offer "*valuable insights into how power, politics, oppression, and domination picture in IS development and use, it has opened our eyes to see the oppressing conditions of the status quo, it has embraced the sensitive, reflexive and personal nature of our research, it has inspired us to question the assumptions that are taken for granted and shown us alternatives, and it has pursued the empowerment of the oppressed*" [39]

The limitation of critical IS research, however, is that it is only weakly connected to design, but it rather relies on the social sciences model of research that is strong in critiquing the status quo, but less interested in an actual change in the sense of liberation of the oppressed. [38, 39] Some emancipatory systems development methods have still been developed. The Scandinavian tradition in systems design, arguably the root of the entire participatory design (PD) tradition, includes elements from both critical research and critical design. During 1960s, the Scandinavian tradition in systems design, inspired by Marxism, emphasized workplace democracy and union and worker involvement in the development of computer systems. The tradition had a hostile attitude towards management-led systems design, emphasizing conflict between capital and labor and empowerment of the labor [10, 22, 29, 48].

Later it has been argued that the original critical and political aims of PD have been lost so that instead of empowering the workers it has started to emphasize the quality of the product and cooperative nature of the design process (e.g., [9, 10]). On the other hand, it has also been argued that the critical tradition and concerns for empowerment, emancipation and democracy still picture strong in the participatory design tradition, while addressing new contexts, forms and participants, e.g. citizens and communities in the context of their everyday life (see e.g., [11, 66]).

Critical research and Human-Computer Interaction
In the traditions of design research and HCI, critical research plays a lesser role, but critical design practice is stronger.

Socially responsible design
In design research, there have been critical voices towards the role of design in society for some time already [38]; however, without a direct connection to critical research

tradition. A central early figure was Victor Papanek [57], who criticized commercial orientation in industrial design and instead argued for socially responsible design. His work can be seen as contributing to design activism movement [26] as well as to the recent trend of sustainable design (e.g. [13]). Design activism emphasizes the central role design plays in promoting social change, raising awareness and questioning the constraints of consumerism and mass production [54]. Sustainable design places emphasis on viable futures from the perspective of environment, health, equality and justice [13]. Hence, in design and also in HCI research communities, there are lines of research that are critically oriented, but without directly drawing from the critical research tradition. [38]

Design avant-garde

An influential opening as regards critical design has been "Critical Design" introduced by Anthony Dunne and Fiona Raby [20, 21]. The central idea of Critical Design is to provide a different direction vis-a-vis "affirmative" mainstream design: to advocate alternative values and rules, explore critical and aesthetic roles of electronic products, and critically scrutinize the relationship between people, electronic products and environments by developing concrete examples of Critical Design (see e.g. [27, 28]).

Critical Design has been influential and spurred an active discussion and debate within HCI, but it is actually not very critical. Although critical research tradition is referred to in the original texts, this tradition does not play a significant role. Instead, Critical Design represents a future-oriented, speculative design tradition that can be labeled as design avant-garde [38, 58] in which the aim is to provoke and to bend and violate cultural norms and rules, show alternatives and deconstruct the existing notions. Recent work on reflective design [64], speculative design [3, 51], ludic design [24], and design fiction [15] continue this development: they are used to consider speculative futures and alternative presents, explore alternative paths and values, provoke the audience and/or criticize current practices and technology [3, 51, 55, 64]. These developments represent critical design of a type, but again without necessarily any serious engagement with critical research tradition.

Critical research inspired critical design

There is also some recent work in HCI and design research communities that has been truly inspired by critical research tradition, although this does not yet form a well-developed line of inquiry. For example adversarial design [19], design against status quo [32], contestational design approaches, such as those utilizing disruption or friction as design strategies [46], design for troubling and queering [49] and feminist HCI [8] represent these developments.

In these studies, critical theory of a sort underlies and informs the work. In adversarial design, political theory and particularly agonism is argued to guide design, agonism referring to "*a condition of disagreement and confrontation – a condition of contestation and dissensus*" [19: 5].

Adversarial design, along these lines, aims at revealing, questioning, and challenging as well as opening spaces for contestation and dissensus [19]. In the context of civic engagement, political theory has been utilized to identify contestational design approaches that aim at encouraging citizens to reveal and question the status quo [46]. Disruption and friction design strategies can be used for arousing protest and civic disobedience [46]. Moreover, queer theory may inspire design work, in which case treating obliquely, crossing, going in adverse or opposite directions, problematizing, mischiefing, clowning, making trouble, or designing, for example, for forgetting, obscuring, cheating, or eluding are foregrounded [49]. Feministic HCI may also utilize feministic theories to inspire design work [8].

As is evident, critical design takes many different forms, some of them linking with critical research tradition, others representing more design avant-garde without much engagement with the empowerment of the oppressed. Many of them still emphasize the socially responsible nature of design. All these developments harness design to advocate some sort of critical agenda.

CRITICAL RESEARCH AND DESIGN IN CCI

Even if critical design has not been explicitly discussed in the CCI community, some developments related to it can still be identified. Next, we will go through these developments.

First of all, the CCI community has always aimed at doing good for the human being – in this case particularly for children, and for this reason tackled important issues such as design for children's learning, social interaction & connectedness, expression, and personal growth [71]. These concerns can be connected with the innate criticism in design research towards the role of design in society that emphasizes socially responsible aspects of design. Along these lines, the CCI community has also been involved in catering for diversity values such as gender equality and inclusion of underserved and special needs children [71]. Topics having ethical import such as sustainability (e.g. [2, 17]), combatting the digital divide [69] and serving and including the marginalized and underserved children and communities picture in CCI community. Also CCI studies discussing ethical issues and the importance of values in design work with children and deriving inspiration from value sensitive or value led design [40, 41, 42, 43, 59, 60, 61, 67, 70, 71] can be loosely linked with critical tradition. Overall, this work can rely more or less on critical research tradition. At least CCI studies on the inclusion of marginalized youth or girls do have an explicit link to critical research literature through the concepts of digital divide, social inclusion, digital inclusion and ICT4D or through reliance on critical feminist or gender studies.

Another noteworthy development relating to critical design and research is the importance CCI community has placed on empowerment of children. One can find numerous CCI studies arguing for empowerment or emancipation of children [4, 23, 42, 43, 44, 52, 53, 60, 62, 65]). However,

even if empowerment is advocated in many CCI studies, it must be noted that the studies address empowerment from very different perspectives. The studies have advocated, among others, children's empowerment to design, to critically reflect on technology, to engage in reading and creating stories, and to decide upon their participation (see [4, 23, 42, 43, 44, 52, 53, 60, 62, 65]). As seen the concept of empowerment can be closely linked with the critical research tradition, but also be used in a mainstream or functional sense that has nothing to do with critical research [45]. In the CCI studies mentioned above, empowerment concept seems mostly to be merely mentioned, not even clearly defined nor linked to critical research in any serious sense. If linked with the different views on empowerment, it seems that functional, mainstream and competence development views dominate the literature: children have been given some power of decision by the powerful ones, they have been given useful tools as well as valuable skills and competences for the future. Only two of the studies address empowerment in the critical sense – referring to the Scandinavian participatory design tradition [42, 43] and not even these studies consider empowerment of children in the sense of encouraging the oppressed to grasp power themselves and to liberate themselves [45] as well as their oppressors along the way [25].

However, the strong reliance on the Scandinavian tradition of participatory design still implies an inspiration from critical research and design in CCI research. Including children's voices in design, allowing children more agency and equalization of power relations between adults and children have also been prominent topics in CCI studies [71] that resonate with critical research tradition. It is important to note, however, that many times the reference to Scandinavian participatory design tradition is mainly made in the sense of cooperative nature of design process – highlighting that children should be invited as equal participants into the design process, without any critical engagement with the issues of power, politics, democracy or empowerment of the oppressed. Quite few CCI studies can be seen as including this type of considerations, even if some can be identified (see [35, 36, 42, 43, 59]).

RESEARCH AGENDA FOR CRITICAL CCI

Next, we propose ways by which critical research and design could better inform CCI research and practice (see Table 1).

Critical design	Current CCI practice	Future opportunities
Socially responsible design	Sustainable design Value sensitive design Value led design Design for learning, personal growth, social interaction, connectedness & expression	Socially responsible design with and by children
Design avant-garde	-	Critical Design for, with and by children; Reflective design for, with and by children; Speculative design for, with and by children; Design fiction for, with and by children
Critical empowering expert led design	-	Adults empowering children through design and technology; Adversarial design for children; Contestational design for children; Queering/feminist design for children
Critical empowering participatory design	Empowerment of children to have a say in design	Children combatting their oppressors through design and technology; Adversarial design with and by children; Contestational design with and by children Queering/feminist design with and by children

Table 1. Research agenda for critical CCI

There is a lot of variety in critical design: it can be accomplished in a diversity of ways. We identify *socially responsible design* as one category of critical design, in which CCI research has already excelled with topics such as sustainability, value sensitive or led design and design for the well-being of children in many senses. However, we maintain that children could be more extensively familiarized with socially responsible design and design activism. Either CCI researchers themselves, they together with children or children themselves can be encouraged to

take action in promoting social change, raising awareness and questioning the constraints of consumerism and mass production [54]. Here, critical research tradition is not necessarily relied on, even if ethical and socially responsible nature of design are advocated. We see a lot of opportunities to educate children to take action here themselves. For example, children can be sensitized to sustainability or equality themes and current problems in the realization of them, and afterwards invited to advocate such themes and to overcome the problems by the means of design and technology. Sustainability and equality as topics both can be addressed without reliance on critical theory – design related to them both can even be carried out purely to serve commercial interests. Hence, we remind that this category of critical design is not very strong as regards the critical aspect.

We also identify *design avant-garde* as a category of critical design, with Critical Design, reflective design, speculative design and design fiction as examples. We also suggest this type of critical design to be utilized in CCI research and practice. This type of critical design is usually heavily expert/designer led – assuming that the expert is capable to see the restricting conditions of status quo, to explore alternative values, to provoke, and to deconstruct the existing notions. Such kind of approach could be taken in CCI research, too: CCI researcher-designers could, for example, along the lines of Critical Design create thought-provoking artifacts for children to encourage them to reflect on their assumptions, practices, values and worldviews. In the case of children, care should be taken in considering ethical issues, however. With adults, issues relating to violence or sexuality, for example, are addressed with Critical Design, while with children less arguable or provoking topics are needed. We also think that children themselves can be invited as designers to experiment with this type of design.

In addition to Critical Design, we also think that reflective and speculative design as well as design fiction hold promise for CCI – to be used either for, with or by children. These design approaches explore and construct speculative futures and alternative presents and they may also aim to provoke the audience and to criticize current practices and technology [3, 51, 55, 64]. Again, if utilizing these approaches, children could be sensitized to some topics of concern, such as gender stereotypes or marginalization of some groups and communities, after which they would be invited to create thought provoking artifacts revealing some taken for granted assumptions, challenging the current situation, breaking cultural norms or rules, and revealing alternatives. They should be invited to consider novel, imaginative, alternative technologies and how they could make a difference. Here important is to remember that any kind of work with scenarios, imagination, and exploration with materials should not be placed under this umbrella [51]. For this work to be labeled critical, it is essential that the current and the future are somehow critically scrutinized, even if this design avant-garde type of critical design tends not to be very critical in nature, but rather the emphasis is on creation of novel, thought proving artefacts.

So far, the critical design approaches discussed have not been too much empowerment focused. However, we position empowerment of the oppressed as one of the main goals of critical design. There are some approaches that can be specifically considered here. We distinguish between *expert led empowering design* and *participatory (or even child led) empowering design*. As for expert led form, for example adversarial design and contestational design provide interesting new openings that can definitely be harnessed by CCI experts for design for the empowerment of children. Adversarial design, inspired by political theory of agonism, aims at revealing, questioning, challenging and opening spaces for contestation and dissensus [19]. Adversarial design for children could be done e.g. from the perspective of gender equality or anti-bullying. Design solutions inviting children to critically exploring the current situation as well as contesting it could be experimented with. For example social media solutions could be considered as spaces for contestation and dissensus but equally for example a gender sensitive robots could be created to be used in classrooms to hostilely address any inappropriate gender related behavior.

Moreover, contestational design has been discussed in the context of civic engagement, in which context it could considered for children, too. Children could be encouraged through design and technology to engage in activist activities [46]. They could be invited to scrutinize the current oppressing conditions of the status quo as well as to encourage action, also among other children. Different kinds of voting systems could be utilized, for example or social media harnessed for campaigning. Arousing civic disobedience may also be aimed at in contestational design [46], while with children, we think that careful adult contemplation on this goal is warranted. The same goes for the exploration of gender issues, if queering as a design method is considered [49]. Feminist theories, then again, provide interesting avenues to explore gender related issues with design and technology [8], also with children.

We also maintain that critical perspective does not need to be limited to expert-led design, but it also opens up fascinating paths for user led, empowering design approaches. Within this line of thought, empowerment of the power-weak is advocated in a more direct manner: the oppressed should be encouraged to grasp authority and agency themselves to empower themselves and combat their oppressors. While CCI research has argued for the empowerment of children to take part in the design process as equals to adults, this approach would go clearly further in empowering children to have a say in their lives – even to combat their oppressors. In the case of adults, different kinds of grassroots movements, activists and amateur artists may be engaging in this type of critical design [38]. Critical making is also very relevant here [30]. This type of critical design necessitates that children in the first place are capable for such design and making by

themselves and they have the will to do so, too. Likely, this type of critical design with children starts by educating the children: in design, making, critical tradition. Afterwards, children would be encouraged to engage in liberating the oppressed – again, the work may address various forms of oppression taking place in children's life world. Paolo Freire's ideas on the pedagogy of the oppressed resonate well with this type of critical design: he argues that it is the task of the oppressed to liberate themselves as well as their oppressors in a strive for humanization, i.e. becoming more fully human [25]. Teachers and pupils are both to be seen as subjects in this struggle – unveiling the reality, coming to know it critically, re-creating knowledge and eventually liberating the oppressed as well as their oppressors [25]. In this type of critical design, however, consideration of many ethical issues is needed before such combatting endeavors are encouraged and accomplished among children.

Overall, we emphasize that critical research and critical design hold promise for CCI is multiple respects and involving children in different kinds of roles (see also [67]). Critical research and design involve specific ontological, epistemological, methodological and ethical assumptions about the reality, about knowledge that can and should be obtained about it, about suitable ways on how to accomplish research and design, and about their underlying motivations. We see children's participation and agency as significant here, but as critical research and design may be challenging to comprehend by children, we also see value in adults accomplishing critical research and design *for* children. In any case, involved adults are needed to begin with to make critical research and design visible for children. The adults naturally need to be informed and inspired by some sort of critical theory or tradition. Critical design and research is strongly driven by particular kind of values, relating to, for example, empowerment, emancipation, agency, democracy, equality, justice and humanization. The adults should do their best in trying to realize them, but it also needs to be acknowledged that adults cannot determine the outcome: the children may or may not become inspired. Their empowerment necessitates them gaining the will to be empowered [31]. Free will of children needs to be respected in any case as well as their choice of not to be included [37].

We think critical research and design aim at and advocate so important goals and values that pursuing them is worth the effect, no matter how successful the attempts are. For the young generations, these values and goals as well as ways on how to try to achieve them should be made visible. Many practical challenges can nevertheless be identified, for example relating to informing children about critical research and design – depending on the age of children, of course. So far, no empirical experiences have been reported in the literature. Hence, it is up to the future research to explore the practicalities and challenges involved. Then again, we are certain that critical research and design can be explained to children in age appropriate manner – at least to an extent. Hence, we think critical research and design can

be done in cooperation *with* children as well as *by* children – to some extent. In these cases, adults need to initially take responsibility of educating children so that they can start acting as informed participants or protagonists. We see interesting opportunities for encouraging children to take themselves the initiative to do critical research and design *by* themselves. This will probably not happen among very young children, but teenagers could be equipped for that. However, their education is critical so that critical research and design are not turned into tools for disobedience just for the sake of it: for protesting against all adults, for arousing hostility against anything the children happen to dislike or for violently combatting all in power vis-a-vis children. Hence, ethical issues play a major role in critical research and design in multiple senses: ethical research and design practice are to be aimed at (see also [67]). Then again, in addition to higher-level contemplation on ethical issues and values driving our work, there is an acute need to concretely experiment with critical and empowering educational, research and design practices with children in practice.

CONCLUSIONS

Increasing interest has been placed on critical research and design in different design oriented research communities, including HCI and CCI. Even if CCI research has not explicitly addressed critical research or design so far, interesting seeds indicating interest towards such topics can be found. This paper introduced critical design discourse into CCI research. The paper discussed critical research and design traditions, after which existing CCI research was linked with these traditions. Naturally, only a limited sample of relevant research could be included in this short review, while the goal was to introduce central studies in relation to the different streams of critical design. The categorization of critical design includes a variety of examples of critical design that are not necessarily equal in significance or directly comparable with each other. The main point was to introduce them for inspiration for critical CCI research.

The main contribution of the paper comes from discussion of the possible ways critical design could be more seriously integrated into CCI research. Challenges that can be associated with such an endeavor were discussed and a research agenda for future critical CCI research proposed. The paper emphasizes that a careful adult contemplation on many ethical and educational issues is needed before engaging in critical design with children. Then again, we think critical design is truly needed in the CCI community, in which socially responsible design and children's participation and empowerment have already been emphasized. We think critical design would offer a highly valuable means through which children could be invited into the protagonist role [43] in which they could critically reflect on our contemporary society, on their own agency within as well as on the role of design and technology therein.

SELECTION AND PARTICIPATION OF CHILDREN
No children were involved in this study.

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