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Admixed Portrait: Design to Understand Facebook Portrayals in New Parenthood

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ABSTRACT

We report on a design-led study of the photographic representation of self and family on Facebook during and after becoming parents for the first time. Our experience-centered, research-through-design study engaged eight participants across five UK homes, in a month-long deployment of a prototype technology – a design research artifact, Admixed Portrait, that served to prompt participant reflection on first-time parenthood. In addition to pre- and post-deployment interviews, participants kept diaries capturing personal reflections during the deployment, on daily social media use and interactions with Admixed. Our qualitative insights on social media representations of transitional experience and identity for new parents, reveal how their online 'photowork' related to self-expression and social functioning. We contribute design considerations for developing tools to support photographic expression in social media use, and methodological insights about design-led inquiry for understanding transitional experiences.

Author Keywords

Parenthood; Facebook; Photograph; Identity Transition; Research through Design.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous;

INTRODUCTION

Family photography, both portraiture and in the 'home mode' [14] has been used to mark major life events and express self and family identity for more than a century [48]. Increasingly, Social Networking Services (SNS) and other digital media are changing these practices and creating new spaces and opportunities for online self-expression [e.g.4,7,12,18,41,49,56,58,60,61,66,67]. From Facebook posts of ultrasound images [35] to memorialized

profile pages [39] online personal media content, including photographs, may now persist indefinitely, and forms a substantial component of our 'digital footprint' – an inferred representation of an individual's activities combined from associated data records persisting online [28,36]. Such persistence raises concerns and implications for an individual's management of identity over time [25]. Whilst social media is widely adopted [7,11,12,21,66] and valued for personal expression [18,45,56,67], concerns such as privacy, trust, representation [1,12,15,20,21,27,36,61] and managing 'profilework' [52] are commonly voiced. There is therefore a challenge for the Human-Computer Interaction (HCI) research community to understand SNS users' online experiences, and explore how to support digital identity management and digital footprint curation.

Connected to this is a growing recognition within the HCI field of the value of a 'lifespan-oriented approach' for understanding users [22,39]. This considers technology use in the context of changing lives and from a developmental perspective. It also acknowledges the significance of major life events and transitions in technology interactions and data trails, that these transitions may give rise to intriguing design spaces in the context of the life course. The value of this approach is that it focuses on the user as ontologically dynamic and continually developing or in flux, rather than the typical 'snapshot' view of the user with static or fixed attributes. Various life transitions have been studied in HCI from this perspective, including coming of age [11,12,16], ending a relationship [30,50], getting married [38], being transgender [27], managing health [37,62], retiring from work [17], and preparing for end-of-life [39].

Becoming a parent for the first time is a major life event that is receiving broad attention in HCI and related fields [2], especially in relation to social media use [5,24,35,41]. HCI studies of parenthood to date have focused on mothers [e.g. 2,24,35,41,55], although there is a growing body of literature focusing on the study of both parents within the context of nuclear family functioning [e.g. 1,5], which we also engage with herein. Engaging both parents about their experiences of this transition opens up opportunities for the design of products and services to support the online life and social functioning of the newly formed family household. Herein, we report on a design-led study [23,46] in which we empirically explore how first-time parents

portray themselves, each other, and their child, through photo-based SNS interactions as they experience the transition. A review of prior research revealed Facebook (FB) to be a popular SNS for new parents (ibid.), with the arrival of a baby and posting of associated photos significantly impacting regular use [5,24,35]. Our research team therefore chose to investigate new parents' everyday practices and experiences of using FB, and furthermore how they made sense of *photographic portrayals* of self and family that may be posted on FB. To support this study, we developed a design research artifact [46], an 'operational prototype' (ibid) called Admixed Portrait, that displayed a *visual amalgamation* of all the FB photos that its user uploaded or is tagged in. Underpinning this design concept was a simple provocation that the amalgam would, over time, start to resemble the represented child more than the parent. Admixed was designed as an interventional device in our study, deployed in participants' homes to prompt active reflection on the research subject [6,9,51]. Admixed served as a curiosity and a 'ticket-to-talk', fostering dialogue between participants and researchers on the virtual and somewhat ineffable phenomenon of social media [7,60], over a month-long period during the time of major life change. The deployment study incorporated interviews, observations, and participant diary-keeping.

Below we review prior work, and describe our study. We then present our analysis and findings. Our contributions are: (1) insight on the experiences of first time parents, and how these mediate portrayals of self and family on FB; (2) design considerations for developing tools to support photographic self-expression on social media, focusing on supporting SNS users through major life transitions; (3) methodological insights on design-led inquiry to understand transitional experience, using Defamiliarization [9] to invite participant engagement and reflection through dialogue.

RELATED WORK

Meditated relationships in time
Social media, and web-enabled tools more broadly, invite new expressions of identity and new means for connecting to others, in real time and asynchronously [7,36,60]. SNS like FB afford a diversity and fluidity of interactions in time that arguably require individuals to be more *reflexive* in social communication than they may have previously been [e.g.1,2,12,15,18,20,27,28,30,41,45,56,67]. Harper et al introduce the term 'fixity' to describe how FB functionality emphasizes the ever present 'now', with features that produce a *particular temporal ordering of experience*, constraining self-expression [29]. Others suggest that social media invites a central role for photography in *real-time* communication, a departure from traditional photographic practices on family album making [16,49,60].

Recent work such as that by Zhao et al [66,67] has also sought to reframe our understanding of online social media by focusing on how it can help create meaningful personal archives over time, composed across multiple SNS platforms, with significant implications for 'personal curation' keeping media for posterity. Recently, Elsden et al explored how interactions with personal data dynamically shapes the remembering of life experiences [19], for example through use of 'smart journaling' applications [18]. Along related lines, Karapanos et al [33] and Odom et al [44] highlight how meaningful relationships to digital products develop over time; this gains new significance when considering users of systems and services that support the creation of personal media records for posterity.

Digital representation of life and legacy
HCI researchers have also brought a temporal lens to the study of persistent media in terms of legacy and life stories. Gulotta et al [27] explored the complex nature of personal digital legacy creation across and beyond the end of life, highlighting that "by documenting life experiences online, people create indelible and often unmanageable records of their experiences" [27: 977]. In other work, Massimi et al observed how SNS like FB create liminal spaces for ritualistic interaction; helping people to remember, but have a potential to lead to 'disturbing' or difficult transitional experiences [39: 987]. Research on another transition, the break-up of romantic relationships, highlights design challenges on subsequent digital media disposal [30,50].

By framing a lifespan-oriented approach to HCI research, Massimi et al [39] have asserted the relevance of focusing on points of transition when studying technology users. The authors suggest that this approach "has proven to be beneficial … by helping to identify prominent issues associated with a period in the lifespan", to not only understand how to design for that period but also to create insights that may be 'portable' to other life stages [39: 988]. We also see value for our research in the explicitly transitory framing of use contexts, and identifying users as dynamic and 'always becoming' [25,40,63], rather than narrowly framed as static users with fixed attributes.

New parenthood mediated by digital interactions
Becoming a new parent is arguably a major life event and significant self-transition, as individuals adopt new identities (as Parent, Mother, Father). In the social / health sciences, new motherhood has been extensively studied and found to be a challenging [3] and transformative [53] experience, with complex demands on the woman's body [43]; fatherhood has been less scrutinized. Again, in studies of *digital interaction* during this life transition, experiences of new motherhood have received the most attention, whilst fatherhood and digitally mediated co-parenting practices remain relatively underexplored (c.f. [1,5]).

Digital interactions in new motherhood
Morris [41] provides a quantitative overview of new mothers' use of SNS in the US, and a rationale for studying their FB use that is valuable for our study. Based on an online survey of 412 US mothers, Morris reports on how becoming a mother changes SNS use, addressing associated 'evolving societal norms'. In the UK, Gibson and Hansen

[24] report on an ethnography of new mothers' social media experiences, also finding FB the most heavily used SNS. Their insights reinforce Morris' [41]; many mothers posted about *themselves*, understood in terms of socializing to avoid isolation and to assert continuity in self-expression, to be 'more than just a mother' [24: 316].

Extant work evidences how expectant new mothers also use FB to raise questions [24,35,41,43,47], and much social media use by this population involves seeking and sharing information about parenthood (ibid; [5]). This extends across web forums and blogging platforms such as Baby Center (US) / Baby Centre (UK). The reported communication and sense of online community is self-efficacious, fostering emotional support, friendship, entertainment, even if it wanes over time due to changing interests, circumstances [35]; FB mediated communication with *family* remains the most resilient over time [12]. Suh et al [55] developed a prototype that uses SNS to track developmental milestones, opening up a design space for supporting mothers' mediated interactions, and reimagining traditional *maternal* rituals for documenting family.

Digital photography and parenting practices
Mothers reportedly remain the main family photographer and curator of photo displays [16,48], although the transition to digital photography is seemingly impacting these maternal practices [16,34,49]. Becoming a new parent traditionally signaled an increase in photo taking and sharing by mothers [48], which has apparently not changed with the adoption of social media [5,24,41]. One survey of US FB use in the transition to parenthood by both mothers and fathers [5] found a perceived increase in use by mothers, and greater social engagement and social anxiety in photo-mediated communication. The existence of web apps such as Unbaby.me demonstrate that new parents' baby photo posts can leave some online audiences feeling bombarded [41]. Such phenomena introduce a tension on self-expression at this life transition that we were motivated to explore further: that the experience of being online as a new parent involves managing the multiple interests of online audiences when posting baby photos.

Recently, Kumar and Schoenebeck [35] report interview findings about US mothers sharing baby photos on FB, highlighting careful practices of online impression management as an 'enactment of good mothering' in the creation of a child's digital 'footprint'. The authors introduce the concept of 'privacy stewardship', analyzing social responsibilities connected to such practices and thus informing our analysis in this paper. They contribute valuable insights about how new mothers balance or negotiate needs and desires to share photos to multiple FB audiences with the perceived risks to privacy. However, what is not considered, and beyond the scope of their work, is to report on new mothers' accounts of transitional experience. In another important interview study, Ammari et al [1] report on how US parents work together to share

the responsibility of managing their child's identity online (for children aged 0 to 18), also exploring gender roles in online disclosure management, finding that "mothers share more and more often than fathers" on SNSs and tend to do more 'parental disclosure management' work. This highlights the perceived shared nature of this work (ibid). What remains underexplored in the HCI literature however is how new parents account for photographic expression on SNS as a process of identity management and expression over time, during the transition into new parenthood, both as individuals and within the family unit.

Finally, we also highlight the design challenge of supporting new parents to create, curate, and communicate identities through ever-growing volumes of media capturing their family. Thinking about photographic SNS expression, we find it curious that media collections are typically engaged with through 'streams', 'feeds', 'threads', or by scrolling through or zooming in on image browsers (e.g. [32]). Previous HCI work, considering the *summative* and amalgamated presentation of such collections, and the design of navigable summarizations, mostly predates SNS (e.g. [8,26], c.f. [13]), but informed our current study. We were also interested to explore the design potential of computer vision and algorithms that create representations of individuals based on face recognition, and image categorization [57], for handling growing photo collections.

DESIGN-LED STUDY

Aims and objectives
Our study formed part of a UK project, Charting the Digital Lifespan (CDL), exploring how individuals create and manage digital identities as they live through major life events including first-time parenthood. CDL aimed to understand how people make sense of online representations that they make, or that are made of them by others, to inspire HCI design for supportive technologies.

Our current study focused on the following questions. (1) How do new parents experience a sense of self during this life transition that is shaped by social media use? (2) How does social media support and constrain them in self-expression and identity management as part of their transitional experience? Motivated by our understanding set out in the last section, we chose to study FB use and photographic representation. Our team combined expertise in design, psychology, computer vision, and cultural studies, influencing us to pursue practice-based inquiry using creative methods that foster cultural engagement.

Experience-Centered Design approach
An Experience-Centered Design (ECD) methodology was adopted for considering the felt life and experience of individuals engaging with FB [40,63]. ECD conceptualizes experiential engagement in terms of self-other relationships; 'selfhood' – one's felt sense of self-identity – is understood as relational by functioning through dialogical exchanges *between* people and things and also *within* the individual

[e.g. 16,42,62]. The self is made up of multiple 'voices' and is fundamentally socially engaged. ECD views these voices and their relations as dynamic and evolving to reflect how people live [25], serving our interest in a transition-focused study, providing conceptual resources for studying sensory engagement with the material properties of things [25,63].

Defamiliarization for fostering reflection
We sought to conduct situated research activities in new parents' homes to generate experiential insights, especially given that much of new parents' time is spent at home, (e.g. while on Maternity / Paternity Leave) [2,5,24,41]. However, we did not assume participants would find it easy to adopt a reflective stance on their daily experiences when immersed in them, nor easy to take a perspective on their social media use that sets it in the context of their transitioning lives and possible futures. Bell et al [9] suggest a Defamiliarization strategy in field-studies, to 'open up' design spaces for 'active reflection', to challenge both participants' and researchers' assumptions on domestic technology use. Designed artefacts have previously been used for inviting such reflection at home [e.g. 16,44,64,65].

Research through Design
Our design research artifact [46] (Admixed Portrait), served a similar strategy in our design-led study. We drew on the material language of design to create a defamiliarizing context for engaging participants with their FB accounts: amalgamated, 'admixed' FB facial images associated with a user were displayed on a standalone device (minimally framed to pull focus on the digital content). The prototype was field-deployable, as an intervention in participants' homes, providing an *unfamiliar* view on their FB activity to prompt reflection. As an operational prototype (akin to a technology probe [31] or provotype [10],) Admixed served two HCI research functions: (i) it formed the outcome of a design exploration of new technology configurations for visualizing photographic data, which could be field-tested; and (ii) it supported the social scientific and cultural study of transitional experience mediated by FB use.

Admixed Portrait

Admixed Portrait (Figure 1) is an encased digital display that offers a dynamic 'portrait' of how its user is depicted online, captured by the Facebook photos that this person uploads or that others tag them in. The portrait is an animated, *amalgamated* image generated by a Python program working in real time with Facebook content. An algorithm extracts all of the 'faces' it finds associated with the user, stacking these, and averaging their RGB values pixel by pixel to create a resultant amalgamated 'face'. The portrait is live in the sense that the amalgam changes as new, relevant faces are found by the algorithm; the displayed image is therefore subtly animated (as depicted in the video accompaniment to this paper). As the amalgam is an average of all the faces it finds, the addition of a new photo in a large 'stack' makes an incremental change to the portrait, whereas an upload of many photos at one time

creates more perceptible change. In households with both a mother and father participating, Admixed juxtaposed *two* portraits, of its two users, in a single frame, to enhance the relational view on Facebook use between them, an additional prompt to inter-personal dialogue (see Figure 1).
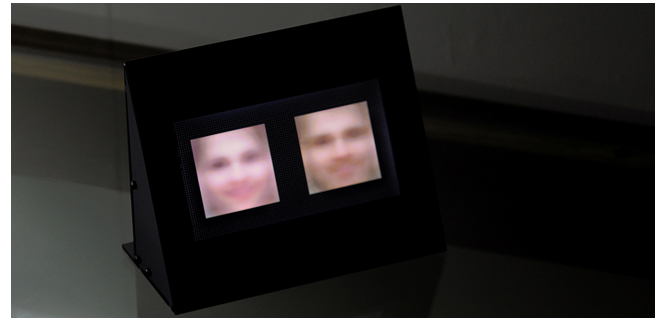

Figure 1. Admixed Portrait deployed in Household 2.

Our rationale for compiling amalgamated imagery from personal data over time was to create an unfamiliar, temporal lens on this data, and, in the context of a home setting, to sensitize participants to the idea of digital identities emerging from interactions between personal image data and online 'others'. This included the algorithms that may process this data, and the algorithmic representation of individuals through face recognition and image categorization [13,57]. Admixed was physically situated in familiar environs whilst providing the *unfamiliar* window onto Facebook activity *taking place elsewhere* (i.e. online). This design feature – to render the display passive – was again intended to defamiliarize [9] by pulling focus on the material qualities of the digital image as something appropriable, mixable, and that can proliferate, (e.g. beyond the SNS platform to the site of traditional photo displays in the family home). The conceptual design and fabrication of Admixed is documented fully in [59], illustrating how it creates visual amalgamations. In sum, the 'defamiliarizing' context prompted new perspective-taking informed by participants' *heightened felt sensitivity* to the algorithmic handling of their photos, ordinarily imperceptible.

Field Deployment
Admixed was designed to connect via wireless Internet with a server processing participants' FB collections to then display the 'live' portrait (Figure 2). The final configuration resulted from iterative development and testing with the project team (comprising itself three recent first-time parents who tested it at home). The study received ethical approval from the lead institution's Ethics Committee.

Admixed was deployed during a first visit to the home of each participating household. Following introductions and installation, we held a semi-structured interview with open questions on first-time parent experiences, histories of social media use, and anticipated future uses of it. We gave each participant a paper diary, with the invite to describe daily experiences of FB use inspired by living with their portrait. The diary incorporated the following prompts:
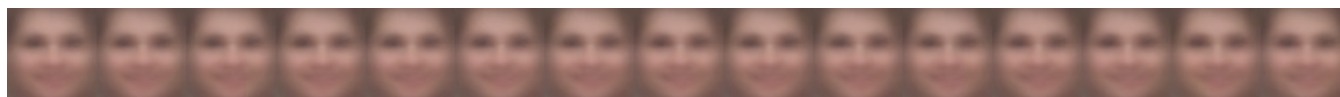
Figure 2. An extract of 15 frames from the animated Admixed Portrait (Elise, PH1) just after deployment; the amalgam is updated 'live' as new photos tagged with the user are posted to Facebook.

"Have you been on FB today, what did you do?" "What do you think about the portrait today?" "Any thoughts on your social media use today?" Following a first visit, we kept in interim communication, returning after four-six weeks, for an 'exit interview' on experiences of living with Admixed.

Recruitment

The study involved five UK households. Participants either became new parents during the study, or had a first child aged up to 12 months. Recruitment was guided by our study methodology and interest in idiographic experience. Criteria included the following: one or both parents per household must participate; one or both must be a FB user; the home must have wireless Internet. Snowball sampling leveraged FB groups to circulate an invitation to participate.

Our participants are pseudonymized. **Household 1 (H1)** comprised Peter (30) and wife Elise (28), both participated. Elise was on Maternity Leave, and was an expectant mother at the entry interview and a new mother with baby Theo (4 weeks) at the exit interview. Peter and Elise also moved house during the deployment. **H2** comprised Matt (28) and wife Rose (35), with Gabi (1). Rose was transitioning back to work after Maternity Leave at both interviews. **H3** comprised Michael (28) and wife Anna (30) and Lisa (1 month). **H4** comprised Isabel (29) and husband James (a FB user who opted out of the study), and baby Ryan (8 months). Finally, **H5** comprised Helen (30), husband Brian (not on FB, not in study), and baby Isla (6 months). Households had differing socio-economic status.

We conducted 16 semi-structured interviews (two per household, each 70 minutes long), including six dyadic interviews where both parents participated. Interviews were informal and conducted with children present, and audio-recorded for later transcription. With permission, we configured Admixed to capture and log data, that is: every photo added to FB since account creation and during the deployment (n=10,907), marked with time and date. We also captured every Admixed 'portrait' that was made and all of the individual 'things' that the Admixed program recognized as faces. We collected diary entries made over the deployment (n=21), inviting participants to refer to their diaries at the exit interview to help recall their reflections.

Analysis

Interpretative Phenomenological Analysis (IPA) was used to make sense of our data because it aligned with our ECD approach, determining a qualitative, idiographic orientation to participants as a small, diverse group of individuals [53,54]. Analysis involved a two-stage coding procedure of the interview transcripts and diaries, to (1) understand how each participant was making sense of their experience

within the deployment context, and (2) make sense of the participant's account in relation to the research questions. We coded the interviews to generate initial themes; these were later developed in a collective analysis, also analyzing the data collected from Admixed – relating logs of photo-posting to user interpretations on the portraits. We developed insight about each participant's FB practices in the transition to parenthood, plus their reflections on that use through reading the Admixed displays. We identified similarities and differences in expression and sense making across the sample; we then produced representative themes that capture both unique voices and shared sentiments.

FINDINGS

Introduction:　Reflecting on a social media image

At exit interviews participants described Admixed Portrait working as a unique and constructive prompt to self-reflection: "It picks out the main points of what your life is made out of, which I think is lovely" (Elise, H1); "it did cause me to think about how I use Facebook as a parent, which is really good" (Rose, PH2). Participants viewed Admixed in conjunction with making daily diary entries and reflecting on their FB use in new ways, with a focus on *how images communicate*, as with Matt (H2):

When I was writing the diary, it was a pure reflection on the (Admixed) image, and I'd be online thinking, 'oh yes, that photograph's going to be updating in the frame, so that's going to make you look a lot different, or less like me'. It's kind of weird. It totally changed the way I looked at the photographs and uploading things because, I mean, it was also the social media image of what you see and, it was more to do with a visual thing.

Matt described how engaging with the portrait every day sensitized him to what FB photos conveyed about his self-image during the life transition. As an intervention, Admixed made him focus on his 'social media image' in a predominantly visual way that worked to de-familiarize and invite new ways of seeing. The amalgam created intrigue: "Given the proportions of my daughter's head, the bit around my eyes is all skin, like it's been pressed out of a mold" (Matt); "this may be our son in the future" (Isabel). However, there was a mixed response from one of the five households (H3): Anna and Michael became less engaged with the device after having technical problems getting the display working; this is understood as a potential issue using such field interventions [31,46], underlining need for robust operation for the intended field engagement.

For the other participants, interpretations of Admixed were seen to shape, and were shaped by, their experiences as new parents interacting with FB. In Elise's words: "it's a

summary of photos and images I have on Facebook, so a summary of my social life." The physical presence of the display worked to prompt daily engagement. In Helen's words: "It was like a little presence in the corner, this ghostly face that I would check now and again throughout the day." Admixed therefore worked to invite participants to entertain alternative perspectives on both their FB content and home lives. We now present our key themes.

Facebook photo collections reflect a multifaceted self

Parents create partial images of themselves on Facebook
Facebook photographic portrayals were understood by our participants at entry interviews to only partially represent their new parenthood experience; they present a preferred image of the experience. In Isabel's words: "On Facebook you're not actually seeing the person for who they are." Some participants understood their FB 'image' to reflect *part* of who they are, as one of many expressions of self in parenthood. At exit interview, Matt suggested: "My image on Facebook is not really me as much as it has become me as Gabi's dad." And this is due to photo-tagging, as Matt added: how he was portrayed on FB reflected how he was tagged in photos by his wife, Rose, along with friends and family who captured him as a new father: "I don't take and post many photos myself; Rose does all the ones of Gabi."

Working as an intervention, Admixed prompted its users' reflection on the content of FB photos associated with them and their family household, in a particularly *holistic* sense, providing the aforementioned 'summary' (for Elise) of 'who' is represented in one's FB account. Helen described this when making sense of her portrait at the end of the deployment: "There's a lot of photos of me on Facebook, but then now there's even more photos of my daughter on there, so if they're amalgamating together, then she's in the portrait as well." As such, Admixed sensitized the parents to how the content of their FB photo *collections* was somewhat holistically changing with the posting of new baby photos. This sense of the 'baby's image' becoming more salient in one's FB presentation of self was also anticipated by Rose, at the start of the deployment.

"I imagine that this picture frame (Admixed Portrait) is just going to start looking almost exactly like Gabi because a lot of the pictures of us are of her and me or of the three of us. I'd say probably 70 or 80% are just her at this point."

Participants described how photo collections reflected their child being 'part of them'. Comments on posts of children could shape a parent's self-image, as with Rose describing value judgments she had made concerning photos of her daughter (Exit): "*You judge yourself against how cute your child is next to others, or how much people think of your child: 'that photo I put up of Gabi, she got 20 likes, Brilliant!'*" We interpret this as Rose seeing images she posted of her child as an extension of herself and her self-worth. Also implied here is FB's quantifying of positive / negative responses, shapes one' senses of personal identity.

Facebook images are a performance of self
Leading from this, Rose described effortfully 'curating' her profile to manage the increase in her baby-related posts.
"I try to curate Facebook a little bit because I don't want people to hide me because they're sick of seeing baby pictures, which I was quite nervous about at the start until it got to a point where some of my friends said, 'You never post any pictures, we want to know what's going on'. So I said, 'Okay', and I started. I eased into it and then got really into it because Gabi was my whole life for a while."

Here we observed Rose feeling the need to keep different FB audiences interested, while addressing various people's interests. She achieved this through careful triage: "*I try and keep it interesting so that when people look at pictures on my Facebook it's new and interesting pictures, not just 16 pictures of Gabi doing the exact same thing.*" This managing of content formed a careful *reflexive* process, as Rose further implied: "*I think a lot about how I'm portrayed on Facebook, because at least once a week I go to my own page and I think to myself, 'if someone were to come on to here, what would they see, what would their impression of me be?'*" At her entry interview, Isabel captured the concern (voiced by all the *mothers* in this study) about posting *too* many baby photos on FB, especially whilst on Maternity Leave: "My Facebook photos probably portrayed me as having a lot of time on my hands and I get a bit conscious of people thinking I'm posting a picture all the time of Ryan - 'Crazy mum'."

Participants also talked about *other* mothers' performances of self. In Elise's words: "*You could have a terrible labor and then you could go on Facebook and say 'It was so easy and it was great, I enjoyed it'.*" Mothers in our study described wanting their own performances to be more relatable to others, as in Anna's words, "*You don't want to be too prim on your Facebook profile – I want to look like a human,*" and with Rose, "*I've curated my profile page in such a way that it shows that I'm not perfect.*" Michael was the only father in the study who shared this strong curatorial sensibility for actively managing a FB self-image: "It's a very curated one, very false – well it's not actually false, it's very selective." He added: *"I just feel like being a parent is part of my public identity, my generic standard one. There's the one I use in games, and there's one I use in anything I don't want associated with me, but I wouldn't separate the parent one from my general one on Facebook."*

The other two fathers did not express this concern to enact multiple selves online; Matt was passive about it, and Peter was unkeen to appease others: "I've not set Facebook so that it's how I want to be seen, it's very much how I am"; "If you don't like how I'm portrayed on Facebook, you probably won't like me full stop" (Exit). It was the mothers who expressed concern for managing impressions on FB.

The developing self is revealed by photographic trails
Our data analysis of the entry interviews revealed how 'becoming a parent' was understood to be a process of

developing, and learning as a person, and of engaging with past lives before parenthood began. Isabel described how FB reflected her transition to parenthood by leaving a media trail of what she used to do: "before I was a parent, I used to do a lot of travelling, and now it's all Ryan". And whilst talking about becoming 'Gabi's dad' on FB, Matt described a similar sense of transition being observable through FB because the site retains a trail of his past self as "a former student"; "there are still plenty of student photos up there", he said. Isabel and Matt, along with Michael, Elise, Anna, Rose, described digital footprints of 'other' past lives composed of photo-posts that persisted on FB.

The developing self was also expressed on FB through social interactions with photos reported by our participants at the exit interviews. Helen described her FB use reflecting her full embrace of motherhood, as it was largely engaging with photos of children: "I see myself primarily as a mum now, so that's probably just how I will come across on Facebook; that's all I talk about really." She framed this temporally: "I've got more friends on Facebook that have got children now, so my Facebook is definitely more based around Isla now than it was; it's definitely changed." We also found significant change in Elise's FB orientation during her study participation. At entry interview she had expressed "self-disgust" from posting about her pregnancy on FB ("I always look down upon people who talk about their pregnancies all the time"), at her exit interview she identified with an online community of new mothers and had changed her posting behavior: "My use of Facebook has changed; I've started checking Facebook for baby news and I have actually posted, whereas before I didn't."

Representing the life event of becoming new parents on FB was a tense subject for Peter and Elise. At the exit interview they compared their two Admixed portraits, which both looked similar and more like Elise (see Figure 3). Engaging with the portraits, the couple discussed what profile picture they each chose after Theo was born (which happened during the deployment). In Elise's words:

"I've put my profile photo as Theo in the first two weeks or something and noticed that Pete has also changed his profile to a photo of him sitting, smoking a cigar in Cuba. And I was wondering whether he was making a statement subconsciously, like 'I'm not going to be soppy, I'm still independent and I'm still me'?"

Peter replied in defense:

"I just decided that I needed to change my photo. Men who have photos of their babies as profile pictures are I think a little bit odd, a bit weird. I think it's fine for women, and acceptable as the kid gets older, but when they're newborns, having that as a profile picture is a bit creepy."

Peter reflected that new fathers may be judged by their choice of profile picture. His comment about feeling the 'need' to do some impression management sits somewhat in tension with his earlier statement about his FB portrayal

being 'very much who I am' rather than 'how I want to be seen'. In response to Peter's comment, Elise suggested to him that the photo under discussion was expressing "something not Theo-related to show you're still a human, not a dad – not just a dad." We found these different views of the couple to be encapsulated in Elise's reading of Admixed, because it juxtaposed the display of her portrait with Peter's. Elise said her portrait became increasingly "distinguished" from Peter's over the deployment, which was interpreted in terms of her changing posting habits and posts about her new baby – that Peter did not make.

On being answerable through Facebook photos

What Peter touched on in his statement above – about what he considered "fine" for women to post (versus men), is a sense of social accountability about FB use, and what he considered to be normative. Similarly, Elise voiced expectations of how her husband should portray his new parent news. We use the ECD concept of *answerability* to draw together a distinct set of findings about the sense of being morally accountable to others. This includes being empathic but more than that of feeling an *ethical weight* and social obligation to communicate with others online and offline, with news about the new child arriving and developing, and also with news about transitional experiences within the new family household. We found this sense of answerability to be shaped, and shaped by, online photographic expression and the Admixed portraits.

The content of photos reinforces social connections

Figure 3. Admixed Portraits of Elise (L) and Peter (R) of Household 2, captured on the last day of the deployment.

Our participants talked about how the nature of self-other relationships on FB, for example whether they are weak- or strong- tie, was often expressed through the site's photo-tagging features, which could reinforce social connections. Admixed worked to sensitize participants to this phenomenon. Elise talked about the "strong links" between Peter and her that the content of her photos showed, and that Admixed depicted at the deployment-end (Figure 3): *"We looked at the two photos and couldn't distinguish which one was Peter's and which one was mine, because I think they both look like me more. I guess it shows that we have pretty strong links, Peter and I, between our Facebook things. The (Admixed) frame has pulled out that I am attached to Peter and that he is my partner, that his image is reflected in my Facebook whether I want it to be or not."*

Peter agreed, asserting: "The only person that I saw in the portrait really would be Elise, probably because a lot of photos with me in have Elise in and vice versa." Visually, Peter's portrait was paler and less defined than Elise's (see Figure 3), which invited a symbolic reading of the nature of the participants' mediated connections, what they represent. Peter and Elise were tagged in so many photos amalgamated by Admixed, that the most recent posting of baby photos, in Elise's view, didn't much affect the animated displays because of their relatively small number: "I've spotted Theo, but I guess with him not being long on Facebook, and photos of him, it hasn't really made that much of a difference." Rose said something similar. An effect of Admixed was that the portraits drew participants' attention to the size and length of their digital footprints on FB, as trails of accumulated data, and the extent of their FB photo histories and how these were connected with others'.

Elise, (along with all the participants) felt she could discern the features of other friends and family in her portrait: "At some points I could spot some features of my friends in there as well." Given that they changed in real time, the portraits also reflected a perceived change in the expressed connection over time, hence Elise commenting in the last section about her portrait becoming slightly distinguished from Peter's over time. All the participants voiced this, which we interpreted to show FB users' appreciation for the ebb and flow of online interpersonal connections.

Bolstering extant work, all participating mothers described using FB photos to seek empathetic connection with other new mothers along with practical advice, which made them feel good and at times comforted. Rose described proactivity in creating this connection (at Entry interview):

"I formed a Facebook group for new mums, for us to share information, get together and do things. I felt good about doing that. Now, my good friends that I've met on there, we've kept the group going and we post almost every day about what our kids are doing, and photos, which is nice."

The function of this group changed as the mothers got to know each other; it became about socializing and photos were a key form to express this. The social contact had been particularly valuable for Rose in the transition back to work, to address her felt loss of her 'Mum self': "Just being able to check in with a group that's actually interested."

Reflections like these were not about the Admixed 'portraits' but were prompted by the study context and the Admixed visualization of posting behaviors. Rose's husband Matt didn't use FB or any other online service to make contact with new fathers about fatherhood, nor indeed did the other fathers, Peter and Michael. Their transitional experiences in new parenthood were visible through changes to *other* mediated connections.

Parents post baby photos to meet expectations
Much photo-mediated expression through FB was about *keeping in touch* with friends and family about a child's

development. All participants had close extended family living at geographical distance and wanted to update them, as well as *feeling obliged to*, as Helen described: "A lot of the time I know photos are going to end up on Facebook because we live far away from all my family and it's a really good way of keeping them updated with how she's growing." FB afforded this contact with ease: "It's a lot easier being a new mum not having to individually send pictures", said Rose whose parents live in the US. But posts for family could present dilemmas for managing others' interests. Participants also voiced tension on feeling obliged to keep others updated with photos *when they would otherwise not wish to* (e.g. the mothers' concerns reported above about over-posting), related to self-representation.

Fathers would also upload baby-related photos to FB for family to see. Peter was particularly interested in the potential to record his child's development, whilst keeping his remote parents up-to-date: "We've started an album entitled Theo, so hopefully will have a collection of photos of him growing up." For Matt, posting about developmental milestones was expected by family, as it was for all 'major events': *"Well you've got the classic 'When I held her for the first time,' which I don't need to write on Facebook but I'm gonna have to anyway because it's just the way, that's how much a part of your life Facebook is for all major events really."* Sometimes significant moments were captured in an unfolding thread, as Matt added: "every moment, when I first thought Gabi was starting to smile, I took a photo to try to get evidence; it ended up on FB as whole thread – 'is *this* her first smile? Or is this?'" Matt 'read' this into his Admixed portrait and Gabi's face merging with his ("the image was becoming a lot blonder").

Parents conveyed responsibility for future selves
When discussing posting photos at exit interviews, participants showed social awareness, associated with responsibility for their child. Akin to Matt's extract above, participants collectively expressed an obligation to comment on others' major life events: "You feel obliged with wedding photos, baby photos; you feel rude if you don't say anything" (Elise). Participants were sensitive to the social appropriateness of posts. Isabel was mindful of baby-related posts for those unable to have children ("Facebook might be a bit insensitive"), and Rose about posting photos of other parents' kids ("I am cautious because I'm trying to be more aware of people not wanting their kids to be on Facebook").

Parental responsibility was expressed about what posting baby-related posts will mean for the children they capture:

"I've got friends who have babies and they're like, 'oh, I don't really want to put pictures of a baby on the Internet because what if they get used for bad things.' But as long as you're sensible then it's just really important to do it so they can look back when they're older" (Helen).

Isabel reflected: "I'm in control but Ryan isn't; it might be bad for him in the future but, as long as you are careful

what pictures you put up, that's fine." However, Rose said: "I'm wondering if, when the kids are older, they will have some sort of retaliation: 'We don't like that this happened to us when we were children, we're victims of this'." The desire to 'post for posterity' was often self-serving. Helen described watching her FB Look Back video: "It was quite emotional, because for most of last year I was pregnant so it was pictures of my bump when it was tiny, then as it got bigger, the first pictures when Isla was born." For Rose, "Facebook is the most complete collection of photos that I have", and for Isabel, "Facebook will bring back memories of the different stages of my life, the important memories." But Peter was concerned about being on FB too much: "If you're constantly having to tap stuff into Facebook about what your children have been doing, you're detaching yourself from being part of their growing-up experience."

For our new parents, then, FB media formed a valued, multi-faceted record about transitional experience while affording social connection and exchange (with positive and negative effects), making the parents feel answerable to their child for how he/she may be *represented by others* on the site and elsewhere, at the current time and in the future. The experience of living with and reading the Admixed displays prompted participants in particular to reflect on: (1) how baby photos posted by them or others reflected a changed sense of self-understanding through the life transition; and (2) how the persistence and amalgamation of this media became constitutive of their interpersonal relationships and expressions of parenthood.

CLOSING DISCUSSION
Our design-led field study generated new understanding about first-time parents, revealing interconnections between their transitional experiences, FB use and photographic expression. We consolidate our insights below.

Mediated expressions of new parent experiences
We contribute to a very small but growing number of studies of FB use by both mothers and fathers as new first-time parents. We offer new insight about how this FB use mediates transitional experiences, from a UK perspective.

Negotiating identities and social ties during times of change
We found our participating *mothers* to express a profound transformation in their sense of self as they experienced being new parents, captured through their changing posting behaviors and changing affinities to social groups, mediated by FB. They described portraying through FB photos a *more negotiated sense of self* than has been previously reported in the HCI literature; posting photos was linked to wanting – and at times needing – to be *relatable* to others as they experienced change. Tensions on expressing multiple, differing identities [15] or life modes [45] (e.g. Work Self, Mum Self), to connect and find affinity with particular others, were worked out through the salient performance of one identity or another*, for certain periods of time*. This negotiated presentation formed a curatorial endeavor that necessarily had a temporal dimension.

We found participating fathers to be more interested than the mothers in expressing *continuity of self* on FB during the transition. However, our analysis presented a nuanced picture; these fathers *didn't* show *less* concern than mothers about how they were represented as parents online; indeed, Michael, Matt and Peter did post baby photos to their FB profiles and saw doing so as part of managing their self-image on FB. Specifically, they *didn't* seek online communities of fathers/ parents to be part of – to self-identify with (as the mothers did). There was certainly a gendered experience of FB use in our sample that would be interesting to explore more in future research.

Reflexive engagement with SNS for self-development
What we identified in both mothers' and fathers' accounts is that the curatorial endeavor was also deeply reflexive. Accounts reveal a complex and challenging handling of posted media, in efforts to make one feel good, cope, be responsive, and be responsible. Participants demonstrated considerable reciprocal awareness in curating media, *as both an expression of who they are and to function in the world with others* [25]. New parents' FB profiles inevitably incorporated representations of their child because, even if the parent didn't post and tag photos of their child, others would to make a mediated connection. After Baym [7] and Ammari [1], we find SNS culture deeply enmeshed in interpersonal relations engaged in new parenthood. Of note is that participants' sense of self was challenged and shaped by their FB interactions; they absorbed influences in the reflexive shaping of their representations.

Concerns for persisting data and the social media image
We found participants to share photos via FB during the transition to parenthood, that was, in part, obligatory or socially expected. Some of this media was posted for communication and not necessarily for posterity [48,60]. Yet Admixed revealed the accrual and *persistence* of FB portrayals over time and this was voiced as a concern; participants were sensitized through Admixed to how photographic representations on FB effectively form a 'social media image' of them online (similar to the 'profilework' concerns observed amongst online music sharers [52]). Participants also voiced concerns about both the temporal bounds of photographic media on SNS and the shaping of future identities of those being documented. They showed considerable sensitivity to the future selves of their child and how the child might feel in the future being represented online in various (potentially compromising) ways. This idea challenges assumptions about how users should orient to SNS 'updating' and the ways in which we either orient to the present (as discussed in relation to the concerns of Fixity [29]) or we save content for posterity in a way that is concomitant with archiving. Evidently, many people now also think about what they might be doing (potentially adversely) to the future representation of self of others online – a future-focused orientation that has previously been underexplored in relation to SNS use.

Supporting new parents' social media interactions
We have identified design opportunities from our study.

New tools to support photographic expression
We build on extant work on managing identities in different contexts (e.g. [15] on FB and [35] on new motherhood), by newly focusing on '*intra*-personal dialogue' [25] (e.g. the conflicted self) in a domestic-familial context. The new parents expressed frustrations and challenges around their SNS use, including for presenting content to specific audiences. There is an opportunity to design greater, fine-grained *Dynamic audience control* when posting and sharing media, to (a) 'toggle' or 'filter' what individual others can see from feeds, (b) reconfigure who sees what as relationships change or (c) to maintain an identity or resolve intrapersonal conflicts in *changed circumstances*. The current FB model of working with groups is arguably insufficient because users have highly overlapping groups (e.g. colleagues to share certain kinds of content with). Even where groups don't overlap there may be individual reasons affecting the appropriate sensitivity of who sees certain content. This implies a need to rethink notions of 'photowork' [34] in dynamic, communicative terms.

Equally, to support such audience control may require *Reciprocal lensing of feeds*. In face-to-face interaction, the reciprocal nature of communication means we have self-awareness for how someone will 'see' us. This is perturbed in many SNS contexts; current FB algorithms automatically edit and curate much of the real-time and asynchronous media feeds we see. Understanding FB media that others see 'of us' is important for shaping our behavior and performance of self, to function socially as new parents negotiating multiple identities. Connecting with broader literatures on identity management and profilework [e.g. 12,15,18,20,27,28,45,52,56,67], we highlight scope for SNS tools that allow users to better understand how others may see them through these channels.

Our participants' concerns also shape ideas on *Temporal locking of media*. Sharing media content as a new parent supports sociality and wellbeing, but is, in part, obligatory or socially expected. Admixed revealed the accrual and persistence of FB content over time, voiced as a concern. SNS users still lack control to personally distinguish what is to become part of a digital footprint, of them or their partner or child; algorithms determine this for them. Yet such control is required to enact parental responsibilities like privacy stewardship [35]. Developing work on lifespan and legacy, and temporality, and transition in design [e.g. 16,19,22,27,28,30,37,44,50], an interesting design direction is to allow users greater control over the longevity of posted media so that it can be embargoed from public record after certain dates thereby acknowledging changing relationships to data in one's digital footprint over the lifespan.

Opportunities for admixed photo displays at home
Evidently, the 'admixed portraits' were compelling to participants by amalgamating photographic content. The portraits also articulated and foregrounded *transitions* and accumulations in the 'social media image' (in participant Matt's words) that may be assembled and persist – and also evolve; manifestations of digital footprints which otherwise may not be grasped. This points to the potential role of new kinds of service and technology that would support such perspectives be taken. Importantly however, the *situated* nature of the Admixed displays also raised a design possibility. The concept of the domestic digital photo frame came and went. In many respects, it was SNS and mobile devices that largely disrupted the market for these before it even opened up. But arguably there is untapped design potential to explore 'admixed' forms of display that experientially offer something more than the literal representation of photographic media, for the 'aesthetic of home' [64]. Admixed alternatively serves as a digital media art piece exploring both the repurposing of such media for home display, plus algorithmic interpretation, supporting the novel *aggregation* and *summarization* of content in poetic ways that also foreground transition and change.

Methodological reflections
In closing, we critically reflect on the design-led methods adopted for this study. As a 'defamiliarizing' intervention into people's homes, Admixed was inevitably disruptive. With no small irony, the arrival of a new baby in our participants' lives meant that they were already subjected to major disruption; the deployment became part of that. But in this context, the defamiliarizing strategy [9] worked to meaningfully 'frame', in material terms, and engage participants with abstract concepts like 'digital footprint'. The 'admixed portraits', whilst peculiar – indeed the amalgam produced an animated, holographic effect on-screen, could be meaningfully interrogated and interpreted by participants. We suggest this is partly because the underlying algorithmic behavior of Admixed that created the portrait was simple enough to explain to participants, so that they understood 'what it was' they were looking at, and how their FB use could change the display in real time.

Also, the conceptual resources of ECD on *dialogical interaction* [40,63], and how this may form a basis for reflexivity and self-development [25], guided the design of Admixed to prompt both interpersonal and intrapersonal dialogue in the field, and also in the later data analysis. We explored the nature of personal reflection, self-growth and social understanding based on cultural mediation. The dialogical perspectives reported herein arguably contribute a new ECD case to the HCI discourse on design for reflection [6,51]. Our idiographic findings have illuminated a rich picture of transitional experiences, plus potential lines of inquiry in HCI, on visualizing photo-data to support the expression and development of multiple identities.

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