Fake it 'til you find it: Fabulating Unseen Participant Dynamics

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1 The Smart Home from All Angles

*This story will be experienced through the eyes of a range of characters. We will begin with **Jack**, our main character and primary user of the household's technology.*

Jack wakes up and switches off his alarm. His phone calls out to do a randomised set of push-ups, which he complies with. He goes downstairs and switches on the lights using an application on his phone. His mother, Susan, is already downstairs. Jack enters the kitchen and turns on the kettle. Under his feet is a mat designed for balance activities, and he completes the activities while waiting for the kettle to boil. The display presents a happy face, and he finishes making his cup of tea. He makes his grandson's breakfast at the same time, leaving it on the kitchen counter by the kettle. Jack moves to the living room, where he engages with an activity game delivered via Alexa. "Dad, open the fridge!" Jack hears from the kitchen, and opens up the override on his phone, deactivating the lock. As he stops to take a drink, the Alexa unit begins to answer questions asked by Jack's young grandson, Sam. Jack gives up on the game and finishes his drink. He thinks about trying the TV-based fitness game he has installed, but his daughter Ashley is watching the TV and refuses to give it up. He unlocks his smart lock on the front door using his phone, and ushers Sam out the door to go to school, locking the door behind him but leaving the physical key in case Susan needs it.

Ashley is woken up by Jack's phone calling out a target number of push-ups. This is how she is awoken most mornings. She turns on her bedroom light via her phone, from which she has access to a subset of the house lights. She moves downstairs, and goes to make a cup of coffee to go with her breakfast. She stands on the balance mat but refuses to engage, with the display showing a sad face the entire time she stands waiting. She goes to get milk from the fridge for cereal, but her father has installed an RFID-controlled seal on the fridge since the cat learned to open it, and she left her bracelet at work. The override is on her father's phone. "Dad, unlock the fridge!" she yells, and the door swings open. Ashley moves into the living room where her dad is playing a 'Simon Says' style game on the Alexa, and she sits down and turns on the TV while she enjoys her breakfast. Once Sam starts messing with the Alexa with some silly questions, Jack asks if he can use the TV to perform a game. Ashley tells him that this is her one day to have the TV in the morning and that if anything, he should tell Sam to stop messing about. He seems to accept this. Her father and son leave not long after, and Ashley engages in pleasant chit chat with her grandmother while watching TV. Ashley finishes her breakfast, and goes to leave, but the smart lock application has logged her out and she can't remember the

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password to the family account. She takes the physical key, unlocks the door, places the key in her pocket and closes the door behind her, leaving it unlocked for her grandmother.

Sam jumps out of bed. It's sports day at school and he's ready for action. He makes sure to pick up his watch, which makes the doors open, and fastens it to his wrist. He can always take it off when he gets to school. He rushes downstairs, missing a couple steps on the way down, and says good morning to his great-grandmother on the way past. Sam gets the orange juice out of the fridge using his watch, and then runs over to the counter to get his cereal. As he runs, he slips on the mat on the floor and lands on his back, which hurts, but not too much - he'll live. He picks up the bottle of juice, carefully picks up his cereal, and sits at the kitchen table where he enjoys his breakfast. Sam moves into the living room, where he sees his grandad playing with the Alexa, and it telling him to do all sorts of things. He then remembers the show he saw last night on the TV, about lions in Africa, and how he wanted to ask Alexa how long lions live. He does so, much to his grandad's annoyance. "10 to 15 years for males, up to 20 for females' Alexa replies. Cool. After his mum and his grandad fight over the TV, Sam's grandad tells him to get his bag as they're leaving for school. Sam tries to rush out first, but the door is locked tight. His grandad taps his phone, the door unlocks, and they head off for school.

Susan wakes up around 20 minutes before Jack, and makes her way downstairs. She tries to turn on the lights using the physical switch, but they don't come on - Jack must have turned them off with his phone last night, even though he knows she can't use them when he does that. She makes her way to the kitchen to make a cup of tea. She slightly trips over the balance mat, but it aware of its presence and manages to steady herself. She does the balance exercise - Jack says it'll be good for her in the long run - and the little display shows a happy face, whatever that means. She tries to open the fridge to get milk, but it won't move. She remembers what Jack said about her bracelet making it open, and tries with her other hand as the door swings open freely. She moves and sits down in the living room, just in time to say hello to Jack, Sam and Ashley as they pass her in turn. Jack comes back into the room with his tea, and begins talking to the speaker, who shouts back some exercises for him to do. Ashley then comes in and turns on the TV, and soon after Sam comes in to disrupt them both. After some fighting between them, Jack and Sam leave for school, and Ashley leaves for work. Shortly after, Susan thinks about going out for a walk around town. She tries the door, but it's locked. She has to call Ashley to come home from work and bring her the key so she can go out. Ashley complains about her dad's stupid smart lock but relents, telling Susan she'll be home soon.

Momo the cat awakes from a nap upon hearing the door close. She sleepily wanders into the kitchen, and jumps on top of the fridge to give it a try as she does every morning. To her surprise, for once, it opens. She sneaks into the fridge and begins to snack on the leftovers from dinner the night before. What a good morning for Momo.

2 Where Does This Happen - And How Do We Find It?

There are many considerations designers have to make when developing technology, and these considerations heavily depend on the type of user and the type of context in question. Technology for older adults may need certain affordances in the modalities they interact with [2, 3, 13] whereas technology for children may need certain security considerations [11] or for data to be displayed in simplified and engaging ways [8]. This is particularly important when a piece of technology interacts with multiple individuals of different ages and ability levels, as the system must hypothetically suit all of these needs, or have the ability to adjust. It is also not feasible to implement all of this affordances at once, as in some instances this may infringe upon the ability of the device to perform the intended role.

This is especially interesting when looking at the home environment. The home environment is a nebulous concept, made up of many intersecting routines and lifestyles. It's chaotic and unpredictable [6], and contains numerous inhabitants engaging with their home and the word in distinct way [4]. Therefore, there is a particular interest in identifying where these two areas of thinking cross over - the unpredictable home environment is filled with the cross-cutting routines and lifestyles and individuals with vastly different interests and requirements. In the story above, we saw a household that contained four generations: Jack, his mother, his daughter, and her young son. This gives us many different interactions, requirements and actions that could all impact the use of technology. This is especially true as seen in the story above where such technologies are heavily utilised by multiple individuals, such as the multiple interactions with the kettle-adjacent balance mat, or the digital controls to the lights and the front door. However, while this may be a family dynamic of interest to this particular area of research, it is exceedingly difficult to actually observe - only around 2.1% of households in the UK are self-described as multi-generational [7]. That 2.1% must then be further broken down into suitable households, and then further into households who would be interested in the research in question, and further into those willing to partake.

3 Fabulation and Inventing the Multi-Generational Conceptual Family Unit

What fabulation allows us to do in this instance is begin to explore the dynamics of such groups through a narrative exercise. That is not to say the whole activity must be completely fabricated - while this instance was fictitious, there is a potential route in which we engage these generations individually, and perhaps engage certain subsets of a multi-generational unit individually (parents and young children, adults and elderly parents, grandparents and grandchildren) with the intent of exploring the intersections of these findings through a fabulation exercise. In this story we saw a range of very real research topics explored through a certain lens - the balance activity floor mat was explored through the lens of older users [10], the smart door lock through a privacy discussion around children [11], and the smart speaker exercise program through an adult population [5]. Additionally, TV-based fitness programs (Wii Fit, Xbox Kinect, Quell Impact) and RFID-controlled fridges are products that exist, although the latter typically only exists in pharmaceutical settings and exists here as an exercise in creative liberty.

When we engage in research around a specific group or user type, we explicitly choose a lens through which to view the problem space. This then leads to a series of disparate lenses presented in sequence, with any cross-cutting analysis being performed as a responsive piece of work by a completely different set of researchers. There are examples in the literature of features seen as positive for certain users being detrimental for others, e.g. affordances in social media which often benefit users being potentially harmful for autistic users who may find difficulty in navigating the situations these affordances often simplify access to [9]. Fabulation allows us to take initial steps to this cross-cutting analysis, using the multiple partial images of these individual lenses to generate a comprehensive image of the space in question. A benefit of the process of fabulation is that they allow us to "open up and extrapolate the design space, revisiting values and questioning initial assumptions of research and corresponding design directions" [12]. While this is typically meant in the sense of expanding the boundaries of a limited subset of data, it is used here instead as a novel approach to data synthesis, taking distinct sets of data and combining them into a single narrative to view where they may interact. As seen in the story above, floor-based solutions for adults may become trip hazards for children, and security measures intended to keep children out of trouble may then come back to be problematic for older adults unable to engage with the security features in place. There are also user conflicts that go without discussion - fitness programs utilising smart speakers or televisions contend with others in the household wanting to use those

technologies, but these concerns are likely not considered in the relative vacuum in which these investigations take place.

This concept can then be expanded outwards to encapsulate the emerging concept of 'more-than-human' design. Giaccardi et al. [1] state key design issues to be addressed such as 'cutting across messy realities' and 'assembling participation beyond people'. The multi-focus approach used above is applied in this paper from the eyes of users within a hypothetical use case, but can also be applied to the eyes of designers looking into that use case from the outside. Just as each user describes their experience and how the systems in play interact with their specific routine, each designer can describe their ideal or their interpretation of a space, and this process can help to make the conflicts between these interpretations clear, and both processes can be combined to give a voice to the voiceless passive users of a technology, ensuring our practices and our design decisions avoid unnecessary or unforeseen harm.

4 Conclusion

The story presented above is a series of point-of-view stories experiencing a morning routine through the individuals who cross within it. This storytelling process takes pieces of research designed for a specific user group, and applies the outputs to situations outside of this intended group. To design for the home environment - or really any situated environment - technologies must consider not only the target user, but the others who passively experience the same things by reapplying the findings of single-characteristic research in a multi-characteristic environment. This concept can also be applied at a higher level, asking designers or researchers to present their viewpoints as part of a grander narrative, unearthing and negotiating conflicts as a combined effort rather than in response to individual, isolated pieces of design.

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