
Behind the Lens: A Visual Exploration of Epistemological Commitments in HCI Research on the Home

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Abstract

In this pictorial, we propose an alternative approach to investigating human-computer interaction (HCI) researchers' epistemological commitments in research on the home. While researchers' commitments can be discussed through textual aspects of their research, in this pictorial we conduct a pattern analysis of visual elements as a productive way to further inquire into such kinds of commitments. By analyzing visual elements from 121 works in HCI research on the home, we identify seven types of observers, which can be associated with epistemological commitments in research. We also propose two new complementary observers: the absent observer and the protagonist observer.

Authors Keywords

Home; Epistemological Commitments; Visual Exploration.

ACM Classification Keywords

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

Introduction

For over twenty-five years, HCI researchers have investigated the diverse roles that interactive technologies and systems play in people's homes and have proposed new ways to design for domestic experiences. Researchers have adopted various methods to address the complex, messy and intimate

nature of the home. These range from ethnographic and ethnomethodological studies of current practices in the home (e.g. [3,9,49,52]), to field deployments of newly designed technologies (e.g. [30,38,43,45]), to participatory design (e.g. [41]), to the proposal of speculative visions (e.g. [2,18,53]).

In [13] we reported on a critical literature review that identified genres in HCI research on the home as a starting point to define future complementary directions for HCI research. In addition to looking at genres of research (based on the types of questions researchers were asking and the objects of their studies), we also uncovered five epistemological commitments HCI researchers interested in the home could adopt when conducting and reporting on their research. As part of this work, we had also conducted a preliminary analysis of the visual elements presented in each paper we reviewed. At first glance, we found that often times images of similar quality and topic were clustered in each of the seven genres of HCI research on the home. However, due to the limitations of the standard ACM long paper format, we largely omitted this pattern analysis of visual elements from our previously published paper.

In this pictorial, we provide an in depth pattern analysis of the visual elements (e.g. photographs, line drawings, photomontage, floor plans, sketches, interface screenshots, etc.) included in 121 works of HCI research on the home. HCI is showing a growing interest in visual literacy and in developing new ways to visually represent and communicate research findings (e.g. [4–6,8,16,21]). Our goal is to show how the visual elements chosen by researchers are not arbitrary; rather, they too embody epistemological commitments bound to particular ways of practicing and representing HCI research on the home.

Methodology

We used the same list of 121 works of HCI research on the home as in [13]. For each work, we took screenshots of all the visual elements and we built a library organized by author and publication. To begin the analysis, we printed and cut each individual image. We then started to cluster the images in terms of what was represented on the image (e.g., was it people? an object? a space?, etc.) and in terms of the treatment of the image (e.g., photograph, line drawing, annotated photograph, etc.). We used the two following sets of questions to guide our analysis:

1. Why these types of pictures? What does the observer want to capture and show?
2. Where is the observer? In order to achieve that goal, where does the observer spatially need to position herself or himself?

Using these questions as framing mechanisms for our inquiry, we clustered the visual elements of the 121 works into seven affinity groups that we categorized as seven types of observer. We note that our process was iterative and that certain categories only emerged after spending enough time describing and highlighting details of the visual elements.

Our pictorial

We present seven types of observers in HCI research on the home. In each type, we articulate what we determined to be the answers to the sets of questions we asked. We use clusters of images to show the sub-types of observers and annotations to highlight visual characteristics of the images. We also provide a reflection on our analysis method and on the seven types of observers in addition to offering two complementary types of observers: the absent observer and the protagonist observer.

The Detached Observer

WHY THESE TYPES OF PICTURES?

The observer aims to capture a situation as it is, with little to no trace of intervention or presence. The goal is that what is visible is evidence of a social routine taking place without knowledge or effect of the observer.

WHERE IS THE OBSERVER?

The observer is purposely distant or removed from the situation and scene of the image.

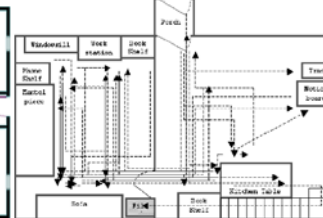
VISUAL CHARACTERISTICS



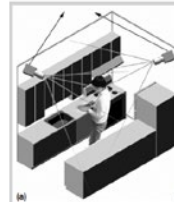
[34]



[35]



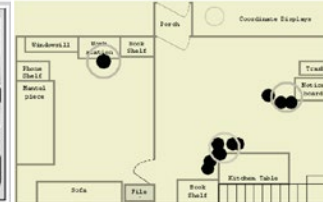
[9]



[31]



[31]



[10]



[54]



[40]



[42]

- Aerial line drawings and architectural drawings sometimes augmented with graphical representations of movement or routines in the home

- Photographs from a distance, like from across the street

The Object Oriented Observer

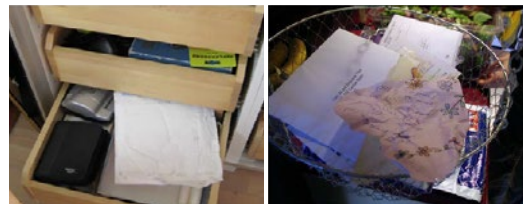
WHY THESE TYPES OF PICTURES?

The observer aims to show how an object is used and incorporated in the context and practices of everyday life in the home.

WHERE IS THE OBSERVER?

The observer is in the home with the participants and actively moves, looks into (e.g. drawers, books) and discusses with participants to understand how artifacts are used. He may also ask participants to perform actions or activities with artifacts as they normally would in order to document that as well.

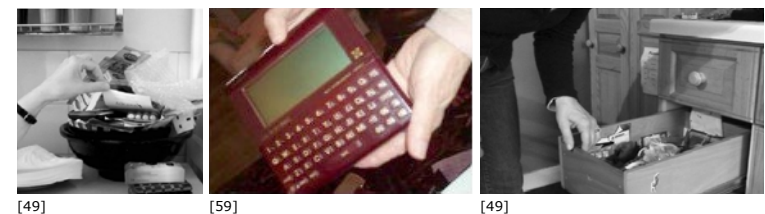
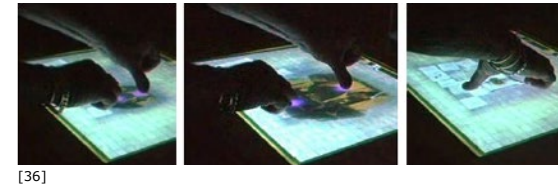
VISUAL CHARACTERISTICS



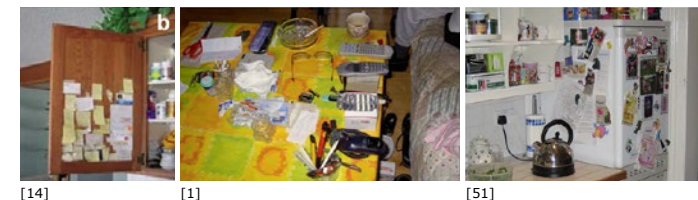
- Tightly cropped artifacts in context, as they were found in the participants' houses



- New technologies or interactive artifacts in the home



- Photographs including at least one hand pointing or touching an artifact



- Collections of similar artifacts in context in the home

The People Oriented Observer

WHY THESE TYPES OF PICTURES?

The observer aims to foreground and emphasize how people use things and technologies in the home.

WHERE IS THE OBSERVER?

The observer is in the home with the participants as they demonstrate, use, or live with artifacts and technologies.

VISUAL CHARACTERISTICS



[57]



[26]



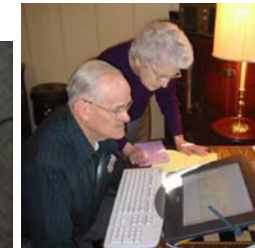
[22]



[20]



[27]



[30]



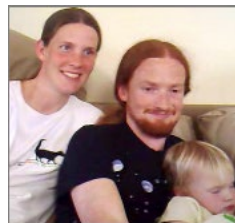
[47]



[45]



[30]



[3]



[46]



Photographs of people performing everyday actions in context

Photographs of people using a new technology in the home. The framing is concerned with the people and the technology first, the physical context second

The Evidence Collector

WHY THESE TYPES OF PICTURES?

The observer aims to gather and document the information that participants themselves have created (e.g., how they populated an app, or how they themselves photographed a thing).

WHERE IS THE OBSERVER?

The evidence collector is removed from the domestic experience entirely, but subsequently collects data that lets transpire participants' experience of the home.

VISUAL CHARACTERISTICS



[39]



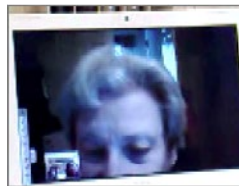
[56]



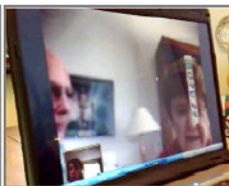
[38]



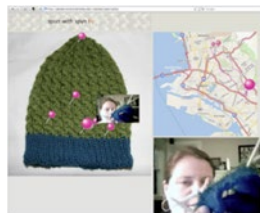
- Relayed photos taken by participants (in self reporting practices)



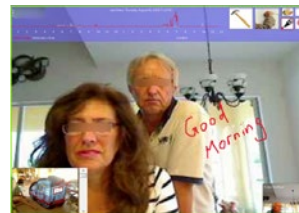
[3]



[19]



[46]



[32]



[47]

- Photographs or screenshots of interfaces in use evidencing how participants used them



[37]



[45]



- Photos of artifacts and notes created by participants

The Gaze Director Observer

WHY THESE TYPES OF PICTURES?

The observer aims to clearly identify and direct attention to a specific item in a photo or portion of the photo.

WHERE IS THE OBSERVER?

The observer is behind the lens when taking the photo, which is subsequently augmented using a computer to shape where the viewer does and does not look.

VISUAL CHARACTERISTICS



- Photos taken in a home, with an item within the room framed in red or in white

- Photos taken of an artifact, with a part of the artifact circled in red

The Composer Observer

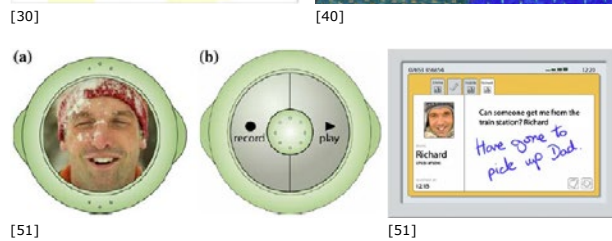
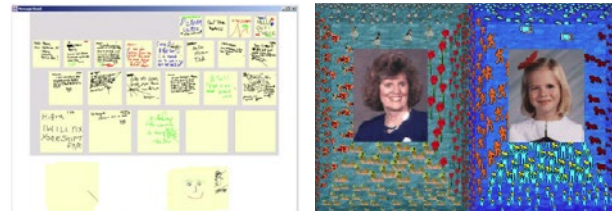
WHY THESE TYPES OF PICTURES?

The observer aims to carefully construct an image to best show what an artifact or a system is.

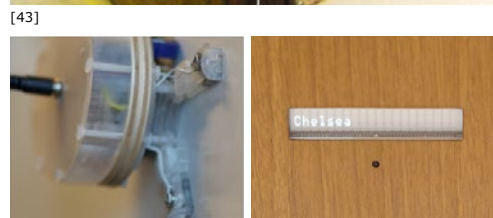
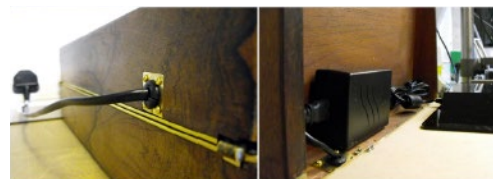
WHERE IS THE OBSERVER?

The observer is behind the camera, but beforehand he sets up the scene to take the photo. The composer observer might also be behind his computer, crafting an interface on the screen which will then be used as a visual representation.

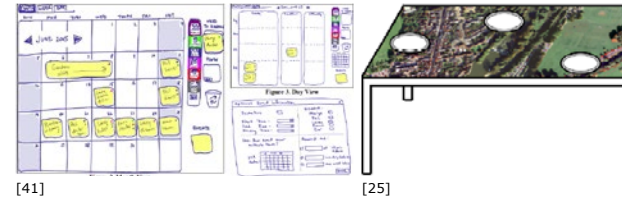
VISUAL CHARACTERISTICS



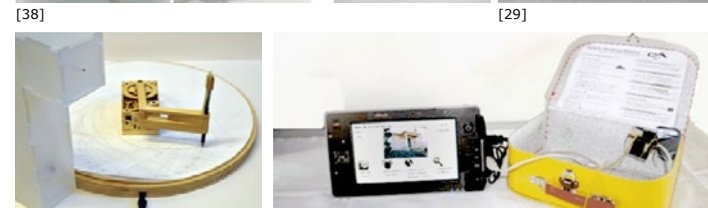
- Screenshot or digitally created images that show an interface's state



- Tightly cropped design details of a new technology or artifact, often where the digital and the computational meet



- Digital or hand drawn sketches of a concept



- Artifacts photographed on a white or uniform background with controlled lighting and framing

The Visionary Observer

WHY THESE TYPES OF PICTURES?

The observer aims to create a representation of a possible future of technology in or around the home.

WHERE IS THE OBSERVER?

The observer is active in constructing the images. He is both 'in front' and 'behind' the camera. And, through carefully crafting the image, he exercises an important authorial role.

VISUAL CHARACTERISTICS



Figure 3: The Strip Vacuum Cleaner



Figure 4: Spreadsheet Cave



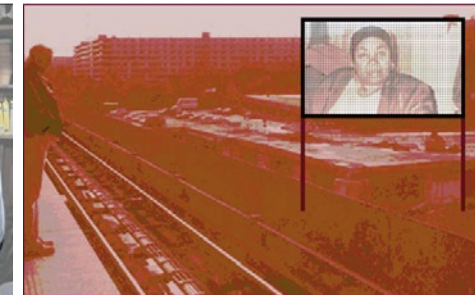
[7]



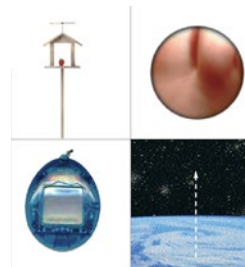
[54]



[60]



[17]



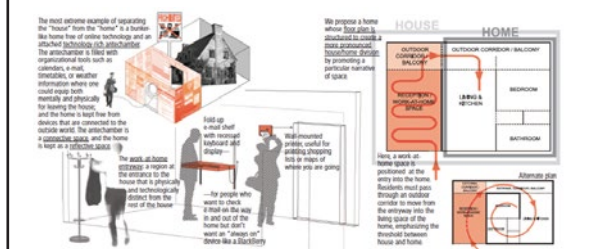
[20]



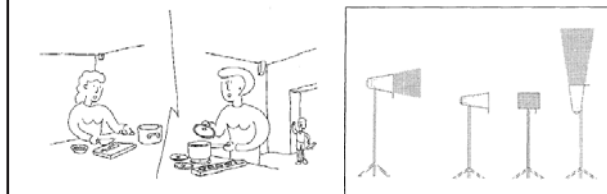
[22]



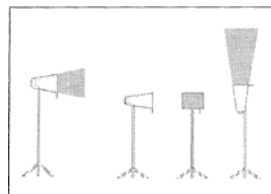
[53]



[2]



[29]



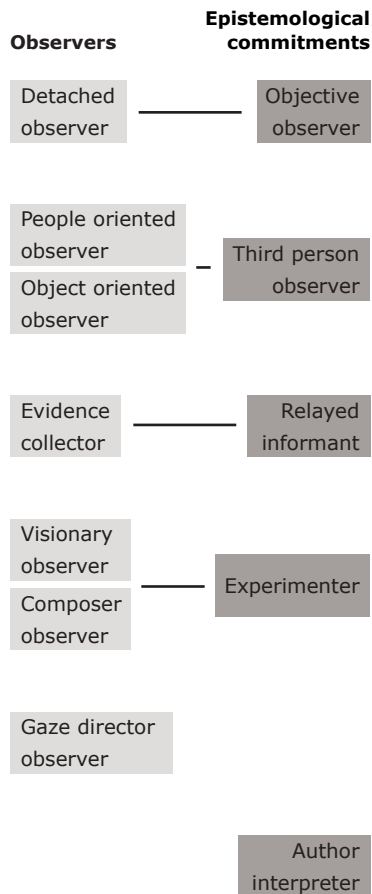
[18]

- Carefully crafted illustrations with an attention to the choice of colors, shades, and thickness of line

- Photomontages combining multiple photos, or addition of line drawing on top of photos. The images have an artistic and inspirational feel to them

Analysis

Matched and unmatched observers and epistemological commitments



In the previous pages, we have articulated the goals of the seven observers as well as their position when creating visual elements in their HCI research on the home. These insights can enable us to better understand the epistemological perspectives researchers take when conducting research in HCI on the home. In our critical literature review [13] based on the same corpus of literature, we identified five epistemological commitments grounded in our analysis. Looking at those five commitments in relation to the seven types of observers, we can see an interesting match between the two (see table). We highlight those relations in our analysis.

- Firstly, the detached observer takes photos from a distance or uses architectural and aerial views to understand ongoing practices in the home. The visual strategies used embody a rigor and a distance imposed between the observer and the situation and this refers back to ethnomethodology as a method and the epistemological commitment of the *objective observer*.
- Next, the object oriented observer and the people oriented observer both refer to the researcher being in the home with participants, doing a tour, asking about artifacts and potentially participating in everyday life. Photographs showing inconsistent lighting, blurriness, or unrefined framing are seen as a result of the rapidity and ad hoc manner in which they are taken and provide visual evidence that the researcher is physically present in the house emphasizing the epistemological commitment of the *third person observer*.
- Thirdly, the evidence collector relies on participants to create visual elements either by asking them to take pictures of their own domestic experience or by using a prototype that will record the participants' actions. The role of the researcher in this case is to collect, curate and relay this data as a way to answer

research questions. This relates to the epistemological commitment of the *relayed informant*.

- Fourth, the composer observer and the visionary observer both carefully construct visual elements and use design to represent a current or future image of what technology in the home could be. This researcher plays an important authorial role and this relates to the epistemological commitment of the *experimenter*.
- Finally, we found that the gaze director observer embodied a strategy that cuts across the other observers and can be seen as an augmentation of other modes of observation through, for example, circling on top of field photographs. The epistemological commitment of the *author interpreter* also did not find a match in our visual analysis. This is unsurprising since this epistemological commitment was largely text based and argument structured.

On the following page we propose two complementary observers that can broaden the perspectives we take in HCI research on the home. First, the protagonist observer offers an alternative to the common 'interpreter' position taken in the detached observer, the object oriented observer, the people oriented observer and the evidence collector. A protagonist observer would be positioned in front of the camera within the domestic experience as a way to encourage first hand experience. Second, the absent observer proposes a complementary view to the generalized anthropocentric perspective to understanding the domestic experience. The absent observer leaves it to non-humans, such as things or pets, to share their own understanding of the domestic experience. This can allow researchers to consider a more egalitarian view in the home and highlight the relations that exist not only between humans and things or technologies in the home, but also the ones that exist between things.

The Protagonist Observer

WHY THESE TYPES OF PICTURES?

The observer aims to understand the experience of the home first hand.

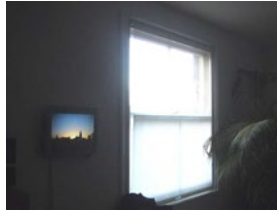
WHERE IS THE OBSERVER?

The observer is positioned in front of the camera, or he points it towards his own experience of the home.

VISUAL CHARACTERISTICS



[12]



[19]

Photographs taken from the point of view of the researcher in his or her home

Still frames captured every minute to create timelapse videos

The Absent Observer

WHY THESE TYPES OF PICTURES?

The observer aims to capture the experience of the home from the perspective of non-humans (including objects or pets in the home).

WHERE IS THE OBSERVER?

The observer is completely removed from the situation and lets non-humans observe and report on the experience of the home. The researcher's role is in creating and installing those new methods enabling non-humans to gather data about the home.

VISUAL CHARACTERISTICS



[33]



[11]



[13]



Photos of everyday scenes, from angles that are new to a human observer

Conclusion



© Lee Friedlander. New York City, 1966



© Lee Friedlander. New York City, 1968

"At first, my presence in my photos was fascinating and disturbing. But as time passed and I was more a part of other ideas in my photos, I was able to add a giggle to those feelings."

- Lee Friedlander [50]

In this pictorial, we have visually explored 121 works in HCI research for the home. Based on the visual elements of these works, we have proposed seven types of observers and two complementary observers for future research on domestic experience. In our future research, we aim to explore how the protagonist observer and the absent observer might operate in HCI research on the home.

The analytical method we used to reveal and communicate the seven types of observers is unique and novel in HCI. Next, we discuss the broader implications of this type of work in the context of the recent interest to visual literacy in HCI research [5,44].

Blevins [4] has articulated the value of visual thinking as a way to explore and make sense of the world through the making of digital imagery. In this pictorial, we illustrate how with visual thinking we were able to investigate and communicate the goals and the position a researcher might have when conducting research. Moreover, the images we used were published by researchers that may

have not been fully aware of the power of their choice of images, the framing they applied, the treatment they gave, or the ways they collected the images. As visual literacy becomes more important in HCI, we hope our pictorial will help support researchers in being more self aware of the visual decisions they make. We take inspiration from the American photographer Lee Friedlander [50], who often acknowledges the presence of the photographer in his photos, where his own shadow or reflection becomes part of the composition of the image itself. With this comparison, we do not mean that the researcher should always become part of the scene he or she is observing, rather we are hoping to invite researchers to question the position they are taking when conducting HCI research on the home and beyond.

Acknowledgments

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References

1. Rikke Aarhus and Stinne Aaløkke Ballegaard. 2010. Negotiating Boundaries: Managing Disease at Home. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM, 1223–1232. <http://doi.org/10.1145/1753326.1753509>
2. Ryan Aipperspach, Ben Hooker, and Allison Woodruff. 2008. The Heterogeneous Home. Proceedings of the 10th International Conference on Ubiquitous Computing, ACM, 222–231. <http://doi.org/10.1145/1409635.1409666>
3. Morgan G. Ames, Janet Go, Joseph “Jofish” Kaye, and Mirjana Spasojevic. 2010. Making Love in the Network Closet: The Benefits and Work of Family Videochat. Proceedings of the 2010 ACM Conference on Computer Supported Cooperative Work, ACM, 145–154. <http://doi.org/10.1145/1718918.1718946>
4. Eli Blevis. 2011. Digital Imagery As Meaning and Form in HCI and Design: An Introduction to the Visual Thinking Backpage Gallery. *interactions* 18, 5: 60–65. <http://doi.org/10.1145/2008176.2008190>
5. Eli Blevis, Elizabeth Churchill, William Odom, James Pierce, David Roedl, and Ron Wakkary. 2012. Visual Thinking & Digital Imagery. *ACM*, 2715–2718. <http://doi.org/10.1145/2212776.2212703>
6. Eli Blevis, Sabrina Hauser, and William Odom. 2015. Sharing the Hidden Treasure in Pictorials. *interactions* 22, 3: 32–43. <http://doi.org/10.1145/2755534>
7. Mark Blythe and Andrew Monk. 2002. Notes Towards an Ethnography of Domestic Technology. Proceedings of the 4th Conference on Designing Interactive Systems: Processes, Practices, Methods, and Techniques, ACM, 277–281. <http://doi.org/10.1145/778712.778750>
8. John Bowers. 2012. The Logic of Annotated Portfolios: Communicating the Value of “Research Through Design.” Proceedings of the Designing Interactive Systems Conference, ACM, 68–77. <http://doi.org/10.1145/2317956.2317968>
9. Andy Crabtree and Tom Rodden. 2004. Domestic Routines and Design for the Home. *Computer Supported Cooperative Work (CSCW)* 13, 2: 191–220. <http://doi.org/10.1023/B:COSU.0000045712.26840.a4>
10. Andy Crabtree, Tom Rodden, Terry Hemmings, and Steve Benford. 2003. Finding a Place for UbiComp in the Home. In *UbiComp 2003: Ubiquitous Computing*, Anind K. Dey, Albrecht Schmidt and Joseph F. McCarthy (eds.). Springer Berlin Heidelberg, 208–226. Retrieved February 14, 2014 from http://link.springer.com.proxy.lib.sfu.ca/chapter/10.1007/978-3-540-39653-6_17
11. Lorenzo Davoli and Johan Redström. 2014. Materializing Infrastructures for Participatory Hacking. Proceedings of the 2014 Conference on Designing Interactive Systems, ACM, 121–130. <http://doi.org/10.1145/2598510.2602961>
12. Audrey Desjardins and Ron Wakkary. 2016. Living in a Prototype: A Reconfigured Space. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM Press, 12 pages.
13. Audrey Desjardins, Ron Wakkary, and William Odom. 2015. Investigating Genres and Perspectives in HCI Research on the Home. Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems, ACM, 3073–3082. <http://doi.org/10.1145/2702123.2702540>
14. Kathryn Elliot, Carman Neustaedter, and Saul Greenberg. 2005. Time, Ownership and Awareness: The Value of Contextual Locations in the Home. In *UbiComp 2005: Ubiquitous Computing*, Michael Beigl, Stephen Intille, Jun Rekimoto and Hideyuki Tokuda (eds.). Springer Berlin Heidelberg, 251–268. Retrieved

- February 15, 2014 from http://link.springer.com.proxy.lib.sfu.ca/chapter/10.1007/11551201_15
15. Jodi Forlizzi, Carl DiSalvo, and Francine Gemperle. 2004. Assistive Robotics and an Ecology of Elders Living Independently in Their Homes. *Hum.-Comput. Interact.* 19, 1: 25–59. http://doi.org/10.1207/s15327051hci1901&2_3
 16. Bill Gaver and John Bowers. 2012. Annotated Portfolios. *interactions* 19, 4: 40–49. <http://doi.org/10.1145/2212877.2212889>
 17. Bill Gaver, Tony Dunne, and Elena Pacenti. 1999. Design: Cultural probes. *interactions* 6, 1: 21–29. <http://doi.org/10.1145/291224.291235>
 18. Bill Gaver and Heather Martin. 2000. Alternatives: exploring information appliances through conceptual design proposals. Proceedings of the SIGCHI conference on Human Factors in Computing Systems, ACM, 209–216. <http://doi.org/10.1145/332040.332433>
 19. W. Gaver. 2006. The Video Window: My Life with a Ludic System. *Personal Ubiquitous Comput.* 10, 2-3: 60–65. <http://doi.org/10.1007/s00779-005-0002-2>
 20. William Gaver. 2009. Designing for Homo Ludens, Still. In (Re)Searching The Digital Bauhaus, Thomas Binder, Jonas Löwgren and Lone Malmberg (eds.). Springer London, 163–178. Retrieved October 22, 2013 from http://link.springer.com.proxy.lib.sfu.ca/chapter/10.1007/978-1-84800-350-7_9
 21. William Gaver. 2011. Making spaces: how design workbooks work. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM, 1551–1560. <http://doi.org/10.1145/1978942.1979169>
 22. William Gaver, John Bowers, Andy Boucher, Andy Law, Sarah Pennington, and Nicholas Villar. 2006. The History Tablecloth: Illuminating Domestic Activity. Proceedings of the 6th Conference on Designing Interactive Systems, ACM, 199–208. <http://doi.org/10.1145/1142405.1142437>
 23. William Gaver, Phoebe Sengers, Tobie Kerridge, Joseph Kaye, and John Bowers. 2007. Enhancing Ubiquitous Computing with User Interpretation: Field Testing the Home Health Horoscope. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM, 537–546. <http://doi.org/10.1145/1240624.1240711>
 24. William W. Gaver, John Bowers, Kirsten Boehner, et al. 2013. Indoor weather stations: investigating a ludic approach to environmental HCI through batch prototyping. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM, 3451–3460. <http://doi.org/10.1145/2470654.2466474>
 25. William W. Gaver, John Bowers, Andrew Boucher, et al. 2004. The Drift Table: Designing for Ludic Engagement. CHI '04 Extended Abstracts on Human Factors in Computing Systems, ACM, 885–900. <http://doi.org/10.1145/985921.985947>
 26. Elizabeth Goodman and Daniela Rosner. 2011. From garments to gardens: negotiating material relationships online and “by hand.” Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM, 2257–2266. <http://doi.org/10.1145/1978942.1979273>
 27. Erik Grönvall and Nervo Verdezoto. 2013. Beyond Self-monitoring: Understanding Non-functional Aspects of Home-based Healthcare Technology. Proceedings of the 2013 ACM International Joint Conference on Pervasive and Ubiquitous Computing, ACM, 587–596. <http://doi.org/10.1145/2493432.2493495>
 28. John Helmes, Alex S. Taylor, Xiang Cao, Kristina Höök, Peter Schmitt, and Nicolas Villar. 2011. Rudiments 1, 2 & 3: Design Speculations on Autonomy. Proceedings

- of the Fifth International Conference on Tangible, Embedded, and Embodied Interaction, ACM, 145–152. <http://doi.org/10.1145/1935701.1935730>
29. Debby Hindus, Scott D. Mainwaring, Nicole Leduc, Anna Elizabeth Hagström, and Oliver Bayley. 2001. Casablanca: Designing Social Communication Devices for the Home. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM, 325–332. <http://doi.org/10.1145/365024.383749>
 30. Hilary Hutchinson, Wendy Mackay, Bo Westerlund, et al. 2003. Technology probes: inspiring design for and with families. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM, 17–24. <http://doi.org/10.1145/642611.642616>
 31. S.S. Intille. 2002. Designing a home of the future. IEEE Pervasive Computing 1, 2: 76–82. <http://doi.org/10.1109/MPRV.2002.1012340>
 32. Tejinder K. Judge, Carman Neustaedter, and Andrew F. Kurtz. 2010. The Family Window: The Design and Evaluation of a Domestic Media Space. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM, 2361–2370. <http://doi.org/10.1145/1753326.1753682>
 33. Chris Keeney. 2014. Petcam: The World Through the Lens of Our Four-Legged Friends. Princeton Architectural Press, New York.
 34. Cory D. Kidd, Robert Orr, Gregory D. Abowd, et al. 1999. The Aware Home: A Living Laboratory for Ubiquitous Computing Research. In Cooperative Buildings. Integrating Information, Organizations, and Architecture, Norbert A. Streitz, Jane Siegel, Volker Hartkopf and Shin'ichi Konomi (eds.). Springer Berlin Heidelberg, 191–198. Retrieved April 3, 2014 from http://link.springer.com.proxy.lib.sfu.ca/chapter/10.1007/10705432_17
 35. Julie A. Kientz, Shwetak N. Patel, Brian Jones, Ed Price, Elizabeth D. Mynatt, and Gregory D. Abowd. 2008. The Georgia Tech Aware Home. CHI '08 Extended Abstracts on Human Factors in Computing Systems, ACM, 3675–3680. <http://doi.org/10.1145/1358628.1358911>
 36. David Kirk, Shahram Izadi, Otmar Hilliges, Richard Banks, Stuart Taylor, and Abigail Sellen. 2012. At Home with Surface Computing? Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM, 159–168. <http://doi.org/10.1145/2207676.2207699>
 37. Hee Rin Lee and Selma Šabanović. 2013. Weiser's Dream in the Korean Home: Collaborative Study of Domestic Roles, Relationships, and Ideal Technologies. Proceedings of the 2013 ACM International Joint Conference on Pervasive and Ubiquitous Computing, ACM, 637–646. <http://doi.org/10.1145/2493432.2493499>
 38. Youn-kyung Lim, Daesung Kim, Jaesung Jo, and Jongbum Woo. 2013. Discovery-Driven Prototyping for User-Driven Creativity. IEEE Pervasive Computing 12, 3: 74–80. <http://doi.org/10.1109/MPRV.2012.57>
 39. Leah Maestri and Ron Wakkary. 2011. Understanding repair as a creative process of everyday design. Proceedings of the 8th ACM conference on Creativity and cognition, ACM, 81–90. <http://doi.org/10.1145/2069618.2069633>
 40. Elizabeth D. Mynatt, Jim Rowan, Sarah Craighill, and Annie Jacobs. 2001. Digital Family Portraits: Supporting Peace of Mind for Extended Family Members. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM, 333–340. <http://doi.org/10.1145/365024.365126>
 41. Carman Neustaedter and A. J. Bernheim Brush. 2006. "LINC-ing" the Family: The Participatory Design of an Inkable Family Calendar. Proceedings

- of the SIGCHI Conference on Human Factors in Computing Systems, ACM, 141–150. <http://doi.org/10.1145/1124772.1124796>
42. Jon O'Brien, Tom Rodden, Mark Rouncefield, and John Hughes. 1999. At Home with the Technology: An Ethnographic Study of a Set-top-box Trial. *ACM Trans. Comput.-Hum. Interact.* 6, 3: 282–308. <http://doi.org/10.1145/329693.329698>
 43. William T. Odom, Abigail J. Sellen, Richard Banks, et al. 2014. Designing for Slowness, Anticipation and Re-visitation: A Long Term Field Study of the Photobox. *Proceedings of the 32Nd Annual ACM Conference on Human Factors in Computing Systems, ACM*, 1961–1970. <http://doi.org/10.1145/2556288.2557178>
 44. Kyle Overton, Omar Sosa-Tzec, Nancy Smith, et al. 2016. *Visual Literacy & HCI*. ACM Press.
 45. Catherine Plaisant, Aaron Clamage, Hilary Browne Hutchinson, Benjamin B. Bederson, and Allison Druin. 2006. Shared Family Calendars: Promoting Symmetry and Accessibility. *ACM Trans. Comput.-Hum. Interact.* 13, 3: 313–346. <http://doi.org/10.1145/1183456.1183458>
 46. Daniela K. Rosner and Kimiko Ryokai. 2009. Reflections on Craft: Probing the Creative Process of Everyday Knitters. *Proceedings of the Seventh ACM Conference on Creativity and Cognition, ACM*, 195–204. <http://doi.org/10.1145/1640233.1640264>
 47. Abigail Sellen, Richard Harper, Rachel Eardley, et al. 2006. HomeNote: Supporting Situated Messaging in the Home. *Proceedings of the 2006 20th Anniversary Conference on Computer Supported Cooperative Work, ACM*, 383–392. <http://doi.org/10.1145/1180875.1180933>
 48. Yolande Strengers. 2011. Negotiating everyday life: The role of energy and water consumption feedback. *Journal of Consumer Culture* 11, 3: 319–338. <http://doi.org/10.1177/1469540511417994>
 49. Laurel Swan, Alex S. Taylor, and Richard Harper. 2008. Making Place for Clutter and Other Ideas of Home. *ACM Trans. Comput.-Hum. Interact.* 15, 2: 9:1–9:24. <http://doi.org/10.1145/1375761.1375764>
 50. John Szarkowski, Rineke Dijkstra, and Lee Friedlander. 2005. Lee Friedlander: Self Portrait. The Museum of Modern Art, New York, New York.
 51. Alex S. Taylor, Richard Harper, Laurel Swan, Shahram Izadi, Abigail Sellen, and Mark Perry. 2007. Homes That Make Us Smart. *Personal Ubiquitous Comput.* 11, 5: 383–393. <http://doi.org/10.1007/s00779-006-0076-5>
 52. Alex S. Taylor and Laurel Swan. 2005. Artful systems in the home. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM*, 641–650. <http://doi.org/10.1145/1054972.1055060>
 53. Alex S. Taylor, Susan P. Wyche, and Joseph “Jofish” Kaye. 2008. Pottering by Design. *Proceedings of the 5th Nordic Conference on Human-computer Interaction: Building Bridges, ACM*, 363–372. <http://doi.org/10.1145/1463160.1463200>
 54. Peter Tolmie, James Pycock, Tim Diggins, Allan MacLean, and Alain Karsenty. 2002. Unremarkable computing. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM*, 399–406. <http://doi.org/10.1145/503376.503448>
 55. Quan T. Tran, Gina Calcaterra, and Elizabeth D. Mynatt. 2005. COOK’S COLLAGE. In *Home-Oriented Informatics and Telematics*, Andy Sloane (ed.). Springer US, 15–32. Retrieved April 3, 2014 from http://link.springer.com.proxy.lib.sfu.ca/chapter/10.1007/11402985_2
 56. Ron Wakkary, Audrey Desjardins, and Sabrina Hauser. 2015. Unselfconscious Interaction: A Conceptual Construct. *Interacting with Computers: iww018*.

- <http://doi.org/10.1093/iwc/iwv018>
57. Ron Wakkary and Leah Maestri. 2007. The resourcefulness of everyday design. Proceedings of the 6th ACM SIGCHI conference on Creativity & Cognition, ACM, 163–172. <http://doi.org/10.1145/1254960.1254984>
 58. Ron Wakkary and Karen Tanenbaum. 2009. A sustainable identity: the creativity of an everyday designer. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM, 365–374. <http://doi.org/10.1145/1518701.1518761>
 59. Susan P. Wyche and Rebecca E. Grinter. 2009. Extraordinary Computing: Religion As a Lens for Reconsidering the Home. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, ACM, 749–758. <http://doi.org/10.1145/1518701.1518817>
 60. Susan P. Wyche, Alex Taylor, and Joseph Kaye. 2007. Pottering: A Design-oriented Investigation. CHI '07 Extended Abstracts on Human Factors in Computing Systems, ACM, 1893–1898. <http://doi.org/10.1145/1240866.1240917>