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Annotated Portfolios and Other Forms of Intermediate-Level Knowledge

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In a recent issue of this magazine, Bill Gaver and John Bowers address the role of design practice in academic research and provide a concrete suggestion: "We propose the notion of annotated portfolios as a way to communicate design research. In part, we do this to provide an alternative to accounts that suggest for design to become productive as research, it should engage in some sort of theory formation. While what exactly is meant by *theory* is not always clear, writers usually have in mind some conceptual machinery that can explain and predict" [1].

Briefly, the notion of annotated portfolios entails selecting a collection of designs, re-presenting them in an appropriate medium, and combining the design re-presentations with brief textual annotations. Gaver and Bowers characterize their proposal as a methodology for communicating design research, and more specifically, a methodology that is very familiar to designers as well as artists.

The idea of annotated portfolios takes its departure from a growing sense of discomfort with the way in which design practice is increasingly misappropriated by "scientific" notions of academic research: "Rather than [finding ways for design to contribute to HCI] by mutating design to become more like "real" research, however, we believe it is better to grow design's identity as research from its existing practices and reasoning" [1].

This is a very timely proposal, given the increasing debate on design research and its relation to HCI (see also [2] and [3]). Moreover, the idea of annotated portfolios intuitively appears well grounded as well as appealing. However, the slate is not entirely clean—there are some precedent ideas that address similar concerns, and my sense is that they can be fruitfully related to the notion of annotated portfolios. Thus, my hope is to complement the work of Gaver and Bowers by sketching out parts of the scholarly context, and thereby facilitate the ongoing discussion of the role of design practice in academic research.

Design Practice, Academic Research, and Knowledge

In my opinion, the foundational observation to start from is this: *The essence of research is to produce knowledge, and the essence of design is to produce artifacts.*

It is true, of course, that research can be done for many purposes, such as changing society, curing illness, and furthering economic growth, but I would argue that such purposes are always secondary, whereas the knowledge-production purpose is primary.

If that is the case, then looking at the role of design practice in academic research implies touching upon the question of whether artifacts are knowledge. This is certainly a debatable topic, but as Nigel Cross points out, artifacts themselves can be said to be knowledge in the very simple sense that they answer the research question “How would you design an <X>?” [4].

For example, the MTI demo presented by Jeff Han and colleagues in 2006 that revolutionized the entire mobile HCI industry was in itself an answer to the question “How would you design a high-resolution, high-performance multitouch interaction surface at reasonable cost?” (which I, as an academic supervisor, could very well consider a valid research question for a group of Ph.D. students and post-doc researchers).

It is significant to note here that it was the video of the TED demo talk on MTI (http://www.ted.com/talks/jeff_han_demos_his_breakthrough_touchscreen.html)—providing a fairly rich mediation of the artifact itself—that swept through the HCI worlds of academia and business like wildfire, rather than the previously published academic papers on the project.

As Gaver and Bowers point out, design communities traditionally communicate through the artifacts themselves. Design educations are based on canons, examples, and crits; professional designer networks communicate knowledge through portfolios, exhibitions, design competitions, and awards.

Designers avail themselves of the communicated artifacts to further their own design capabilities, to extend their own repertoires of generative design knowledge. This arguably also holds for designers in academic contexts and for researchers doing competent design as part of their knowledge-production practices—a small group, to be sure, but a steadily growing one. In doing so, however, the whole artifacts are actually not used. A complete artifact is a particular response to a particular situation, and strictly speaking it is not necessarily meaningful in its entirety outside that situation. When encountering an artifact, a designer has to elicit and appropriate key ideas, structures, considerations and treatments that can be incorporated and subsequently used. In other words, *abstraction* has to take place from the level of particular artifacts to a higher level, in order to produce a knowledge yield that is applicable across a broader range of situations.

Levels of Abstraction

<http://www.mah.se/medarbetare/Intern-forskningsinformation/Personlig-webbsida/As> identified by Anna Ståhl in forthcoming work, a dimension is starting to emerge that we can speak of in terms of levels of abstraction—from particular artifacts, which are not abstracted at all, to the fully abstracted level of general theory, which supposedly holds in all situations and under all circumstances. But my point is that this dimension consists of more than the two end points. Treating abstraction as equal to “scope of applicability” is arguably a gross simplification, but in this context it turns out to work quite well.

<Diagram around here. Caption: The dimension of abstraction. File: diagram_1.jpg>

In the annotated portfolios proposed by Gaver and Bowers, I consider the annotations to be examples of constructs residing in the in-between space. For example, they illustrate their work with a partial annotated portfolio of two artifacts exploring technology for older people. One of the annotations is “framing older people as curious and engaged,” and another is “influencing autonomous drift.” When they extend the portfolio with three more artifacts coming out of earlier work in their design-research group, the “influencing autonomous drift” annotation stays, whereas the “framing older people as curious and engaged” is no longer present. By this selection, you can argue that they present the “influencing autonomous drift” annotation as a more abstracted construct, since it is apparently applicable in a wider scope of design situations (which is undoubtedly historically true in relation to the collected body of work from their design group).

Sorting out whether an annotation is *actually* more abstract than another is not really my intention here (and it would probably lead far into the swamps of genre theory), but I would like to make the point that the annotations occupy some territory between the particular artifacts and the general theories. And the territory in question, which has been called *intermediate-level knowledge* [5], represents interesting and important knowledge in design research. I would agree with Gaver and Bowers that general theory is of limited value (even though I cannot subscribe to the rhetorical notion of theory as purely explanatory and predictive—I think it can be generative for design at times), and I fully support their proposal that abstractions add knowledge value to the artifacts themselves.

I also agree with Gaver and Bowers that the designer of an artifact or a collection of artifacts is in a somewhat privileged position to provide valuable knowledge in the form of abstractions (as opposed to the traditional way of “merely” communicating the portfolio and leaving it to the viewers to elicit their own takeaways). The designer has unique access to the original design intentions, the history of how the design space was explored, how the process related to previous work, how different treatments were assessed, what data came out of empirical evaluations, and so on.

Examples of Intermediate-Level Knowledge Forms

I would now like to mention briefly a number of examples of intermediate-level knowledge that have been proposed in HCI research and that span the arc from design practice to academic knowledge production and discourse. The intention is to outline the conceptual neighborhood to which I see annotated portfolios belonging, and thus to provide better foundations for an ongoing discussion of design practice in relation to academic research. The examples are introduced in roughly chronological order.

<Diagram around here. Caption: Examples of approaches to intermediate-level interaction design knowledge. File: diagram_2.jpg>

The most established example of intermediate-level knowledge between particular artifacts and general theories in HCI research is arguably *design methods and tools*. This is an example of

meta-level knowledge, to be sure, since it speaks of the *how* rather than the *what* of design, but still it can be said to emerge from design practice through abstraction and enable other designers to extend their capabilities (including, as before, researchers doing competent design as part of their knowledge production). It is impossible to assign methods and tools to one point in the vertical dimension, since there are examples across the board from near-universal methods to highly specialized tools for very particular design domains.

Design guidelines originated in the early days of HCI as operationalizations of general theories in order to increase their usefulness in design practice. A fine example of this perspective is the HCI-oriented collection *Universal Principles of Design: 100 Ways to Enhance Usability, Influence Perception, Increase Appeal, Make Better Design Decisions and Teach Through Design* [6]. Today we tend to regard design guidelines as a slightly quaint attempt at theory dissemination, but it might be instructive to recall their nature as intermediate-level knowledge residing between particular artifacts and general theories. The same largely goes for *usability heuristics* [7], which are closely related to design guidelines but phrased in the evaluative, whereas design guidelines use generative formulations.

The notion of *patterns* is another obvious example of intermediate-level abstraction, in this case rendered in a fairly stylized format but clearly representing attempts to elicit the key ideas of particular artifacts or families of artifacts. Even though the original 1970s intention [8] was to create languages that would enable more authentic user participation in co-design processes, the idea of patterns was quickly taken over by design communities in several fields as a way to represent and communicate best practice among designers [9,10,11].

To move on, it has been observed that *concepts* can serve as intermediate-level knowledge in a design research context [12]. The paradigmatic example is, of course, Alan Kay's Dynabook, which was formulated as a design concept in the 1970s and served to initiate and inspire much HCI research for decades to come, even though the Dynabook itself was never built, user-tested, or validated in conventional academic-research ways. A recent elaboration is the notion of *strong concepts*, referring more specifically to generative design ideas having demonstrable potential for inspiring subsequent design [5].

Experiential qualities represent a type of abstraction that was first proposed in 1998 in the guise of "use qualities," and which essentially consists of intermediate-level knowledge similar to patterns but pertaining to the users' experience rather than elements of the artifacts themselves [13].

Earlier I stated with Gaver and Bowers that the designer is in a privileged position to provide valuable abstractions. However, that is not the only possible position. The notion of *criticism*, as the companion discipline to creative practice that is found in more or less any mature field of art and design, recognizes the value of erudition and scholarship on behalf of the critic in providing valuable abstractions outside the reach of the designer—by drawing in new frames of reference and new interpretive perspectives. It has been suggested that HCI would benefit from the emergence of an interaction criticism discipline [14,15].

Finally, to come back where we started, it seems clear that *annotated portfolios* can be comfortably located among these other examples of intermediate-level knowledge. To me, a selection of artifacts with generative, artifact-related annotations bears strong relations to the way in which patterns are conventionally treated, and also to how potential strong concepts are advanced. Similarly, when the annotations are concerned with users' experiences (as Gaver and Bowers also demonstrate as an alternative), the approach is closely related to experiential qualities.

Conclusion

In a recent paper going more deeply into the logic of annotated portfolios, Bowers argues that annotations are not abstractions and in fact should be seen as purely indexical and inseparable from their particular artifacts [16]. I have tried here to show how annotations can be seen as abstractions, in the simplistic sense of more abstract entities having wider scopes of applicability. What's more, it must be pointed out that even if annotations are non-abstractions for the originating designer, they may still be appropriated as abstractions by the recipients of the annotated portfolio—a single annotation may serve as an inspirational lever for other designers' original design work in domains far removed from the original one, even though the annotation was never offered as an abstraction. Gaver [personal communication] points out that even if the annotated portfolio might not do abstraction in itself, it affords abstraction (in the sense of extraction) by others.

The observation that annotated portfolios can be located among other examples of intermediate-level knowledge practices strikes me as very positive and potentially fruitful: What it means is that we can collectively add a few more bricks to the bridge between design practice and academic research. Gaver and Bowers argue convincingly for the suitability of annotated portfolios from a design point of view. If the annotated portfolios can be related to patterns, strong concepts, and experiential qualities, then the interlinked web of intermediate-level knowledge in interaction design research can be built stronger and wider.

Moreover, some of the insights and experiences that arise from design research communities trying to come to terms with patterns and experiential qualities can be used to inform the practices around annotated portfolios. For example, Gaver and Bowers suggest that “[a]nnotated portfolios are, perhaps, a way of modestly and speculatively reaching out beyond the particular without losing grounding—and doing this with all the rigor and relevance needed to inform the invention and detailed development of new designs” [1].

If we accept that annotated portfolios are closely related to other attempts at producing academic intermediate-level knowledge, then the ways in which rigor and relevance have been treated there may be of use also in assessing the academic value of annotated portfolios. For instance, the notion of discursive knowledge production impinges on how relevance is assessed [13], and further, it has been suggested that the rigor of intermediate-level knowledge constructs depends on their horizontal and vertical grounding [5].

To conclude, I strongly support Gaver and Bowers in claiming that design practice has a place in HCI research today, and that the researcher can add knowledge value by providing annotations in addition to the artifacts. My own contribution here is to recognize the proposal for annotated

portfolios as an intermediate-level knowledge practice among other such practices. To me, those practices appear to be promising paths toward fruitful academic discourse and collaborative knowledge production that accommodates the nature of design practice without undue “scientific” reduction.

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Endnotes:

1. Gaver, B. and Bowers, J. Annotated portfolios. *interactions* 19, 4 (2012), 40-49.
2. Stolterman, E. The nature of design practice and implications for design research. *Int. J. Design* 2, 1 (2008), 55-65.
3. Gaver, W. What should we expect from research through design? *Proc. Human Factors in Computing Systems (CHI '12)*. ACM Press, New York, 2012, 937-946.
4. Cross, N. *Designerly Ways of Knowing*. Springer-Verlag, London, 2006.
5. Höök, K. and Löwgren, J. Strong concepts: Intermediate-level knowledge in interaction design research. *ACM Trans. Computer-Human Interaction* (in press).
6. Lidwell, W., Holden, K., and Butler, J. *Universal Principles of Design*. Rockport, Beverly, MA, 2003.
7. Nielsen, J. and Molich, R. Heuristic evaluation of user interfaces. *Proc. Human Factors in Computing Systems (CHI '90)*. ACM Press, New York, 1990, 249-256.
8. Alexander, C., Ishikawa, S., Silverstein, M., Jacobson, M., Fiksdahl-King, I., and Angel, S. *A Pattern Language: Towns, Buildings, Construction*. Oxford University Press, Oxford, 1977.
9. Gamma, E., Helm, R., Johnson, R., and Vlissides, J. *Design Patterns: Elements of Reusable Object-Oriented Software*. Addison-Wesley, Reading, MA, 1995.
10. Borchers, J. *A Pattern Approach to Interaction Design*. John Wiley, Chichester, 2001.
11. Van Duyne, D., Landay, J., and Hong, J. *The Design of Sites: Patterns, Principles and Processes for Crafting a Customer-Centered Web Experience*. Addison-Wesley, Boston, MA, 2002.
12. Stolterman, E. and Wiberg, M. Concept-driven interaction design research. *Human-Computer Interaction* 25, 2 (2010), 95-118.
13. Löwgren, J. Toward an articulation of interaction esthetics. *New Review of Hypermedia and Multimedia* 15, 2 (2009), 129-146.
14. Johnson, S. *Interface Culture: How New Technology Transforms the Way We Create and Communicate*. Basic Books, New York, 1997.
15. Bardzell, J., Bolter, J., and Löwgren, J. Interaction criticism: Three readings of an interaction design, and what they get us. *interactions* 17, 2 (2010), 32-37.
16. Bowers, J. The logic of annotated portfolios: Communicating the value of ‘research through design.’ *Proc. Symp. Designing Interactive Systems (DIS 2012)*. ACM Press, New York, 2012, 68-77.

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