Making Multiple Uses of the Obscura 1C Digital Camera: Reflecting on the Design, Production, Packaging and Distribution of a Counterfunctional Device

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ABSTRACT

This paper describes and explains details of the design, production and packaging of a counterfunctional device: The Obscura 1C Digital Camera. We further describe a small-scale distribution of Obscura 1C packages into everyday contexts. The paper then reflects on the various types of conceptual, imaginary and firsthand uses made of the Obscura 1C. These include its uses for everyday audiences as a unique camera and as a conceptually usable device. But we also prioritize uses particular to the HCI and design audience. These include using the Obscura 1C to articulate the concepts of inhibitive interfaces, counterfunctionality, and enabling limitations. The Obscura 1C is further used to articulate how abstract ideas can be translated into material forms, to rethink the role of packaging in user studies, and to draw attention to how discursive design objects are packaged and presented.

Author Keywords

Design, research through design, limitations

INTRODUCTION

This paper describes and explains details of the design, production and packaging of an experimental product: The Obscura 1C Digital Camera. We further discuss a small-scale experimental distribution of the Obscura 1C packages for everyday audiences. However, here we do not empirically assess everyday use of the Obscura 1C. Rather we focus on how multiple forms of firsthand, imaginary and conceptual use are made of the device—both for this audience and everyday audiences. The Obscura 1C has been designed to allow the device to "speak for itself". We introduce it accordingly. See Figure 1.

The text from the front of the packaging reads:

"OBSCURA 1C DIGITAL CAMERA / COUNTERFUNCTIONAL DEVICE SERIES."

Text on the reverse side of the packaging reads:

"**Obscura 1C Digital Camera** captures photo, video and audio recordings. In order to access the media files recorded, you must physically break apart the concrete enclosure to reveal the micro SD memory card buried inside. Obscura inhibits access to its contents to offer a digital experience based on uncertainty, patience and surprise."

The Obscura 1C is part of a larger constellation of devices we have designed under the theme of counterfunctionality. Previously we presented the concept of counterfunctionality as a design-oriented concept of creating new functionality by inhibiting or removing common or expected features of a technology [22]. This paper contributes insights and concepts that can inform a clustering of exploratory and critically-oriented HCI research including design-oriented investigations of slow [20,21], reflective [27], adversarial [5] and ludic technologies [9,12], and empirical studies of non-use [2]

Figure 1. The Obscura 1C Digital Camera package.

and busyness [17]. This paper also contributes a detailed example of how design artifacts and their exposition can uniquely contribute HCI research knowledge.

Our original intention in writing this paper was to focus on the Obscura 1C as a concrete artifact that translates the abstract concepts of inhibitive interfaces, counterfunctionality, and enabling limitations. However it quickly became apparent that we needed to help establish a context for this type of work and justify our decision to present a well-developed, field-deployable product in the absence of a traditional user study. Despite recent works in HCI that propose and demonstrate viable alternatives (e.g., [16,19,21]), design-oriented research at CHI still tends to carry the expectation of a "functional prototype" deployed or tested with study participants. We further recognized that in establishing this context for itself, this work could contribute to broader discussions of the use of prototypes and research through design artifacts [23,30].

Consequently, this paper exhibits a somewhat unusual structure. First we disambiguate three important types of "use", and note prior work that emphasizes imaginary and conceptual uses of prototypes. We then describe the design, production, packaging and distribution of the Obscura 1C in detail. The concluding discussion explains how use is variously made of the Obscura 1C, including its usefulness in thinking about packaging and design artifacts.

DISAMBIGUATING USE
In HCI, we use the words "use", "user" and "function" all the time. Yet phrases such as "end user", the "use of a working system" and "functional prototypes" are used with mostly implicit meanings. The result is that it can be difficult to appreciate other uses/users of prototypes and design artifacts more generally. These include the various uses we as researchers make of "functional" and "non-functional" prototypes. (What exactly *is* the difference, then?) This section disambiguates 3 types of use of design artifacts: (**1) firsthand use, (2) imagined firsthand use,** and **(3) conceptual use**. These are offered as heuristic rather than precise analytic categories. (And we omit reference to relevant thought from media studies, philosophy, etc.)

Arguably all use of artifacts begins with some sort of *firsthand use*. For example, using a digital camera to take pictures (a use which most readers will have experienced firsthand). Or actually using the Obscura 1C to take pictures (which presumably very few if any readers have done).

A second type of use makes use of the first. *Imagined firsthand use* involves imagining firsthand use of an artifact. For example, imagining using your digital camera now, or looking at photographs of the Obscura 1C here and imagining smashing it apart (Figure 1, Appendix).

The third type of use makes use of the second. *Conceptual use* has a basis in imagined firsthand use. In this paper, imagined uses of the Obscura 1C will be used to help

verbally articulate concepts such as "counterfunctionality", "enabling limitation", and "conceptual use".

As these last examples demonstrate, an imagined or conceptual use can be taken as a firsthand use. As is hopefully becoming clear, thinking about use recursively in this way can become confusing. Fortunately there is an obvious first choice for establishing firsthand use: everyday use. Since our goal here is heuristic insight rather than analytic precision, we offer a simple operational notion of everyday use as use within an everyday context and with emphasis on familiar, routine, and embodied interactions. "Firsthand everyday use" then refers not only to the familiar firsthand use of everyday things, but also to the firsthand uses of the novel artifacts that HCI researchers deploy and study within everyday contexts such as homes, workplaces and public places.

IMAGINARY AND CONCEPTUAL USE IN PRIOR WORKS
While CHI places a heavy emphasis on empirical studies of firsthand use, this is not the only type of use that is made of prototypes and other design artifacts in HCI. Here we briefly point to some relevant prior works that exemplify a focus on imagined and conceptual uses of design artifacts and, in each case, without the use of a traditional user study. One area of prior work has presented the processes and material outcomes of research through design to reveal techniques, strategies and concepts. A key example is Jarvis et al.'s recent photo-essay paper that depicts details of their design process constructing Indoor Weather Stations [16]. Other examples include Odom et al.'s discussion of the Photobox [21] and Valgaarda's presentation of PLANKS and computational composites [28]. Related to this is Neustaedter and Sengers' observation that prior works have made use of autobiographical studies of systems by their creators [19]. Another area demonstrates that visual/representational artifacts can be presented as polished, final outcomes of a research through design process. A key example is Aipperspach, Hooker, and Woodruff's illustrated design concept booklets [1]. Other related examples include the uptakes of design fiction (e.g., [3,31]) and critical and speculative design (e.g., [6]).

THE COUNTERFUNCTIONAL BACKDROP
Translating between verbal criticism and material things
The inspiration and motivation for this work originates from social and cultural critiques of technology. The types of criticism most directly related to the Obscura 1C center on issues (here negatively framed) such as disengagement, boredom, overload and distraction. Key writings related to these themes include recent essays from areas adjacent to HCI discussing the value of simple communication tools in an age of digital overload [15], the benefits of deleting and forgetting in an age where Facebook and Google remember everything [18], and the literal and metaphorical lack of sleep amidst a 24/7 culture [4]. Writings outside of academic discourse also inspire and elucidate counterfunctional design. An evocative, if not critical, example is a recent collection of essays entitled

"Photographs Not Taken" [26]. Yet another relevant set of works are popular culture writings such as those keyworded with "disconnecting", "unplugging" and "digital detox". Paralleling these writings are a number of recent works in HCI that engage issues of busyness and overwork [20], simple living [13], conflicting cultural discourse surrounding the smart phone [14], and the voluntary non-use and removal of technologies such as Facebook [2].

But we need to be clear about what our reasons for drawing on criticism are, and what they are not. Our goal here is not to directly defend or debate such critiques, but rather to translate critical arguments into material, thingly forms. To make an analogy with user-centered design, we are approaching the intellectual critiques of writers and scholars as we might approach the shortcomings and complaints raised in a usability study or contextual inquiry: as positive design opportunities worth exploring.

Counterfunctionality and Enabling Limitations
Counterfunctionality is the idea that new functionality can emerge (often counterintuitvely) from directly opposing or inverting ordinary or expected functionality. We have previously described the concept of a counterfunctional thing as a "thing that exhibits features that counter some of its own 'essential functionality' while nonetheless retaining familiarity as 'essentially that thing'" [22, p. 375].

As a way of doing design, counterfunctionality articulates a process that involves first identifying common positive features of a particular technology and then designing around the absence or restriction of these features. In the case of the Obscura 1C, a positive and desirable feature that is identified is the immediate access to digital images and video. An ordinary point-and-shoot camera is then redesigned to severely inhibit this positive feature by literally encasing the camera and SD card in cement.

When framed as way of approaching the design process, counterfunctionality has similarities with Gaver, Beaver and Benford's strategy to "block expected functionality to comment on familiar products" [12, p. 239] and Sengers and Gaver's strategy of "stimulating interpretations by blocking expected ones" [26, p. 103]. One key difference lies in our focus on offering counterfunctionality as a salient positive feature of a thing. Put another way, "limitation" is presented to users as a positive design offering. Another key difference is that the counterfunctional things we design function in part to draw

attention to themselves and the concepts they embody and articulate. In this way our counterfunctional cameras also function discursively as conceptual focusing devices.

Related to counterfunctionality is the concept of enabling limitations. This concept articulates a more general feature of human-technology relations and directly builds on philosopher of technology Peter-Paul Verbeek's work on technological mediation [29]. Drawing on the work of Latour, Akrich and Ihde, Verbeek describes how the details of a technology work to both invite and inhibit human interaction, and amplify and reduce human perception.

The concept of enabling limitations shows how objectively negative features of a design (what things *don't* do, c.f. [29]) may contribute to the subjective experience of something positively enabling (a useful or desirable feature). What may initially be considered a technological limitation may also enable new positive possibilities. Conversely, the concept of limiting possibilities articulates how seemingly neutral options can in fact be limiting, even disabling. Consider an everyday example. Electronic hypertext enables the reader to immediately read related texts with the click of a link. Print is much more limited in this capacity. Yet through the lens of limiting possibilities, hyperlinks can be seen as at times distracting the reader from the immediate text. And when seen through the lens of enabling limitations, printed books limit the reader's ability to reference other texts but enable reading without the distracting *potential* to do so. A book can be read as an inadvertent counterfunctional thing. Twitter, Snapchat and phonograph records are some other noteworthy examples to consider for this type of analysis using enabling limitations.

THE OBSCURA 1C DIGITAL CAMERA
In this section we describe in detail the design, production, packaging and distribution of the Obscura 1C.

The Obscura 1C Origins and Its Variational Context
Obscura 1C as focal point
The Obscura 1C has slowly and iteratively developed over the course of approximately one and a half years. Its development has been part of a broader research program designing counterfunctional devices. Instead of viewing the Obscura 1C as the final outcome of this process, it is best viewed as focal point among an array of counterfunctional camera variants. Some of these variants have been presented in prior published works in forms ranging from

Figure 2. Batch-produced Obscura 1C cameras.

Figure 3. Experimental distribution at a boutique vintage shop (left) and community resale shop (right)

simple illustrations and text [24] to physical model and interactive prototypes [22]. We refer to the strategy of generating, refining and formally presenting a range of design variations constrained and held together by a common theme as a *variational design approach*. Below we summarize our prior published work while highlighting important insights leading up to the Obscura 1C package.

Capsule Camera prototypes

The Obscura 1C originated with the concept for an Unviewable Image camera, which quickly led to the variation of a Smash Camera (see [24, p. 133]). This was later renamed and reformed as the Capsule Camera, which was one of 8 counterfunctional camera prototypes presented to participants in [22]. Among these 8 prototypes, the Capsule Camera was decided to be among the most likely to be adopted and used firsthand by everyday users.

Inhibitive Camera Enclosures

In [22] we also presented form studies of "inhibitive interfaces." These consisted of a concrete camera similar to the Obscura 1C and a wooden camera, which we have continued to develop as the Obscura 1W (Figure 5-5b). As designers we found this concrete camera to be an interesting and provocative form to tangibly interact with firsthand. Photographs of the smashed cameras have also functioned well as emblematic images (see Appendix), which in turn help convey the concepts of inhibitive interfaces, counterfunctionlity, and enabling limitations.

Pictorial Counterfunctional Camera variants

In [24] we presented a selection of counterfunctional camera variants in the form of schematic illustrations and textual descriptions. Footnotes offered additional commentary of a conceptual nature. This work was published in the new Pictorial format at the DIS conference (a format being introduced to CHI 2016.) This work shows the power of representational design artifacts to do conceptual work. This pictorial publication was subsequently revised and translated into a product brochure included in the Obscura 1C package (Figure 5).

Operational Prototypes and Batch Production

Following Gaver et al [9], we adopted a batch-prototyping production process. To date we have batch-produced approximately 20 Obscura 1C cameras and plan to produce more. The ability to batch-produce the cameras at low-cost was a primary consideration in our design. The total cost of materials for each camera is approximately $20.

Early operational prototypes included a display that counted up with each image taken ("0001", "0002", etc.). Plans were also made to include a viewfinder. While we have successfully built and continue to develop versions with displays, we ended up proceeding with a simpler version for batch production. This version makes use of an inexpensive digital camera costing approximately $10. To produce the Obscura 1C, the camera electronics are removed and sealed in protective thermoplastic (HMA) and acrylic support pieces. This is then cast in Rocktite™ patching cement

using a custom mold. (Technically, the Obscura 1C is cast in cement, not concrete.) The cast forms are then roughly sanded only to deburr the sharp edges, leaving a distinctly hand-cast look and feel. Next, laser-cut button assemblies are installed. Finally, the cameras are tested prior to physically removing the data pins from the USB charging port—effectively sealing off access to the SD memory card buried inside. The Obscura 1C cameras currently take several hours each to construct. However, we are already developing ways to streamline this process.

Cost, ease of production, and robustness of the end product were the main reasons we opted for a version that did not include a numerical display or viewfinder. This also required us to rely on a low-quality image sensor producing grainy images reminiscent of security camera videos.

Interestingly, while these decisions were initially viewed as worthwhile tradeoffs, they were quickly reconstituted as additional counterfunctional features and advertised as such in the product packaging. The lack of a display and viewfinder added elements of uncertainty and surprise, while the lower resolution camera created images perceptually distinct from normal digital photos (cf. Ultra-Low Resolution Cameras, Figure 5-2b, and [24 p., 136]).

The Complete Obscura 1C Package

In addition to producing a set of operational Obscura 1C cameras, we designed and produced a complete set of packaging and instructional material for distribution. This complete Obscura 1C package (Figure 4), rather than the camera alone, constitutes the core material design outcome of this work. A great deal of thought and care went into the design of the packages. This included concern with the usability and "out of the box experience". This also included concern the device's "conceptual usability".

The high-level goal of the packaging design is summed up with the notion of allowing the devices to "speak for themselves". More precisely what this means is that the packages contain material that both verbally and non-verbally communicate key aspects of its functionality: how to operate it, what its intended and envisioned uses are, and the practical and conceptual intentions of its creators. This in turn helps the devices to be taken more seriously as products similar to, yet distinct from, everyday commercial products. This also allows the devices to be presented for everyday firsthand use without the in-person scaffolding of most user studies, such as a site visits, in-person conversations, data gathering forms and tools, financial compensation, and concomitant social expectations.

Interacting with the Obscura 1C packages

In terms of visual and tactile interaction, the packaging was designed to fulfill several straightforward design criteria:

a. *Showcase the actual cameras*. We especially wanted to showcase the unique material use of concrete. Further we wanted to juxtapose the uniquely hand-crafted forms of the cameras with the modern reproducible aesthetic of the
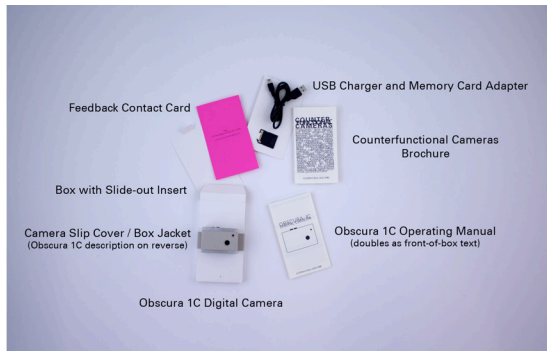
Figure 4. Obscura 1C packages and contents.

packaging graphics and with Electronics as a product genre.

b. *Invite browsing of the instruction manual.* This is especially important because Obscura 1C offers unfamiliar functionality. Easy access to the manual helps explain them.

c. *Stack upright for display.* We wanted the devices to be displayable at storefronts. But we also did not want to rely on hang-tab or other specialized retail display machinery.

The name: Obscura 1C
Names and titles are an important and often initial point of contact for retail products, experimental designs and artistic works alike. Given the emphasis on the representational and conceptual functions of the Obscura 1C, it's worth devoting space to explain the design of its name.

Previously the concept underlying the Obscura 1C has been encapsulated in several differently named forms. However in its present form a new name was desired to help suggest representational and conceptual functions. Obscura 1C serves this function well. Most familiarly to camera geeks, the Obscura 1C references the camera obscura, the technological predecessor to the modern camera. Obscura is a Latin word meaning "dark". Yet phonetically, and stripped if its Latin context, "obscura" has a crisp, modern ring to it. Further, "obscurus" is the etymology of "obscure", which means both to visually conceal and to intellectually make difficult to understand. This name is doubly fitting since the Obscura 1C literally inhibits access to its visual contents, yet the purpose of this may be somewhat intellectually obscure. Taken together, these three references—the perceptual obscurity of the image, the intellectual obscurity of the conceptual intent, and the somewhat obscure historical reference to the camera obscura—have been designed with the possibility (not to be confused with likelihood) of prompting deeper intellectual engagement with the device.

The "1C" portion of the naming references the popular Apple iPhone 5s and 5c. We use 1C as an abbreviation for "version 1, concrete model". This direct reference to the iPhone is, in part, a subtle joke. The source of the joke lies in the Obscura 1C describing itself as a "counterfunctional device" in opposition to the celebrated and "seemingly

endless possibilities [of 'digital technologies']" (Figure 5-1a, 5-1b). Such "endless possibilities" are of course exemplified by the elegantly multifunctional iPhone. But at the same time this iPhone reference is serious in that the Obscura 1C is also designed so it can be taken as a legitimate, functional counterpart to everyday electronics.

At face value, then, the name "Obscura 1C" can be taken as an attempt to associate with a product genre composed of sleek, modern electronic products. But on closer inspection, the reference may create a humorous tension. Is this product presenting itself in a literal, serious manner? Is it trying to sell itself like the iPhone? Or, is it rather trying to ostensibly associate in order to ultimately distance itself from this genre of products? This orchestrated ambiguity mirrors the multiple, overlapping intentions underlying the product. It can be taken as simply a novel and unusual product. Or it can also be engaged with at a deeper conceptual level as a conceptually counterfunctional device.

Clearly this manner of closely reading the Obscura 1C is something that even many academics or designers are unlikely to do. But attention to this linguistic detail is important for several reasons. First, the ambiguous semantic function of the name is "useable" even if only one or two of the references is noted in passing. Second, this discussion emphasizes the possible rhetorical and discursive functions of design artifacts *for this audience* (even of artifacts intended for everyday firsthand use). We expand on this point in the concluding discussions. The following section extends this line of thinking into non-verbal realms.

The hybrid visual and form languages of the Obscura 1C
The visual and form languages of the complete Obscura 1C package draws on those of several product genres:

See Figure 4.

The final packages are designed to present themselves in a way that, if read carefully—and with the proper expertise— can be verbally translated as follows: "You can take me as a mass-market retail product. Or conversely, you can take me as a one-off art project. (But in actuality, I'm an experimental design product produced in limited quantities—a product that intentionally plays into the

genres of both mass-market consumer products and artistic productions." We develop out this translation more below.

The visual and physical form of the Obscura 1C packaging references 5 key product genres:

a. *Sleek, modern product design exemplified by Apple.* Examples: The name "Obscura 1C"; lots of whitespace and a modern sans-serif logotype on the cover (Figure 5-8a).

b. *Lower-end consumer electronics & instruction manuals.* Examples: The layout and language of the manual, such as black headers and a "Caution" message (Figure 5-4a).

c. *Artist's books* (a genre where the particular codec form dovetails with the artistic intention). Examples: The use of high-quality archival paper for the manual and brochure; the tongue-in-cheek uses of the Frequently Asked Questions format (Figure 5-6a); the negative leading of the Obscura 1C logotype and brochure cover (which plays into both "obscurity" and "counterfunctionality").

d. *Zines* (self-published, typically low-cost print publications). Examples: All of the packaging elements can be created with accessible everyday tools without relying on offset printing, injection molding, 3D printing, etc.

e. A *one-off, hand-crafted object* aesthetic of the camera body, which creates a juxtaposition with the industrial aesthetic of everyday cameras and consumer electronics. Examples: The rough, hand-deburred edges of the slightly imperfect rectangular concrete camera bodies.

Each of these product genre references can become an interpretive focus, offering a single stable interpretation of the Obscura 1C (e.g., as a sleek modern product, a hand-crafted artistic object, a zine-like DIY consumer product alternative, etc.). Alternatively, the juxtaposition of these competing genres can encourage a closer reading of the conceptual intent underlying the Obscura 1C package.

Instruction manual & Counterfunctional Cameras brochure
The instruction manual was designed to fulfill the following design criteria: (1) double as the text and graphics for the front of the package, (2) explain the camera operation to support everyday firsthand use, and (3) succinctly describe with minimal jargon the concepts underlying the Obscura 1C and the Counterfunctional Device Series. A brochure of additional Counterfunctional Cameras was also included inside the package box. The document references the genre of a promotional product brochure, and suggests that these might be actual product offerings. However this is left uncertain to encourage representational and conceptual readings. In the spirit of allowing these materials to "speak for themselves", and as a way of simulating the firsthand Obscura 1C package experience, we visually reproduce these materials here: See Figure 5.

Obscura 1C Package Distribution and Exchange
To date we have distributed 10 complete Obscura 1C packages to non-acquaintances. Our primary goal has been

to experiment firsthand with different forms of distribution and exchange. We approach this both as exploratory prototyping (with ties to packaging and service design) and as a means of demonstrating "proof of distribution concept". To be clear, our distribution was explicitly not for data collection, although we offer some revealing empirical observations that have been inadvertently gleaned.

Craigslist Ads
Our initial distribution was through San Francisco Bay Area Craigslist classified ads posted to the "Free" and "For Sale, Photo+Video" sections. (A one-time posting of each ad received 20 and 2 responses, respectively; several "Free" respondents offered to purchase cameras.) Ads included images of the Obscura 1C package and contents. An excerpt of the 270-word ad text reads:

> We are offering a limited number of unique digital cameras as part of an experimental design program. Our aim is to create and distribute unconventional, alternative consumer products. … If you'd like to acquire an Obscura 1C, send us a message with a few words telling us why you'd like to have one of these devices.

6 Obscura 1C packages were distributed to people that each indicated an envisioned use that we anticipated or else found surprising. Some Obscura 1C were delivered in-person (3 were sold for $20 each). Others were anonymously mailed or left at home addresses. Below are inquiries from some individuals we then offered cameras to:

> Hi, I'm super interested in buying one of these cameras. I love film photography so the idea of something digital giving a film like experience (delayed gratification etc.) is really interesting…

> I would love to have a camera. I think I'd want to use it as a sort of time capsule, but I would probably not last very long without smashing it. This whole idea looks like a whole lot of fun.

> … sounds like an awesome project. … we'll be working on a startup from home. I think it would be awesome to have an Obscura Camera in our main work room periodically documenting our work.

> Perfect! Reminds me of being a kid in Montana, saving money to buy one roll of film. Then carefully planning out 12 shots and waiting 2 weeks for the film to be processed and mailed back. You have a great idea here..

Other experimental distribution outlets
Other distribution outlets we have experimented with include local retail partnerships, community bulletin boards, and guerilla tactics such as "droplifting" (leaving a product in a retail store). See Figure 3.

MAKING USES OF THE OBSCURA 1C
The concluding discussion reflects on how use is intended to be made, has been made, and is actively being made of the Obscura 1C—in the hands and minds of researchers, designers and a more diverse set of everyday users.

Making everyday, firsthand uses of the Obscura 1C
The Obscura 1C was designed to be used in everyday contexts by non-experts in the areas of HCI or Design (or Art or Philosophy). A goal was to get these devices into the hands and everyday lives of people that would hopefully enjoy them and the experience they offered. We carefully designed packages with instructional material to allow the
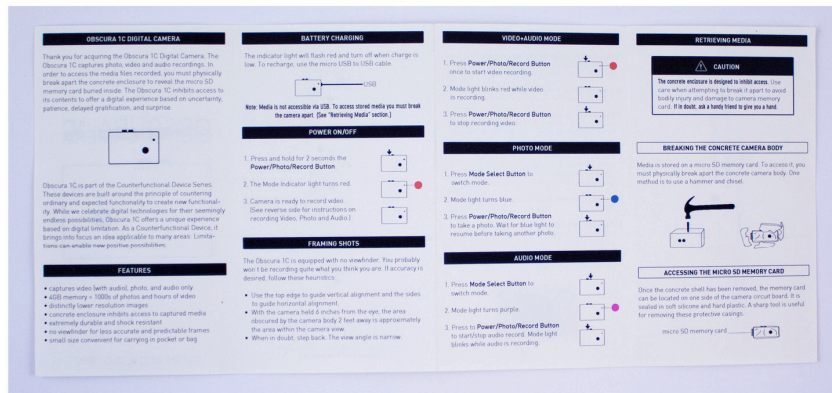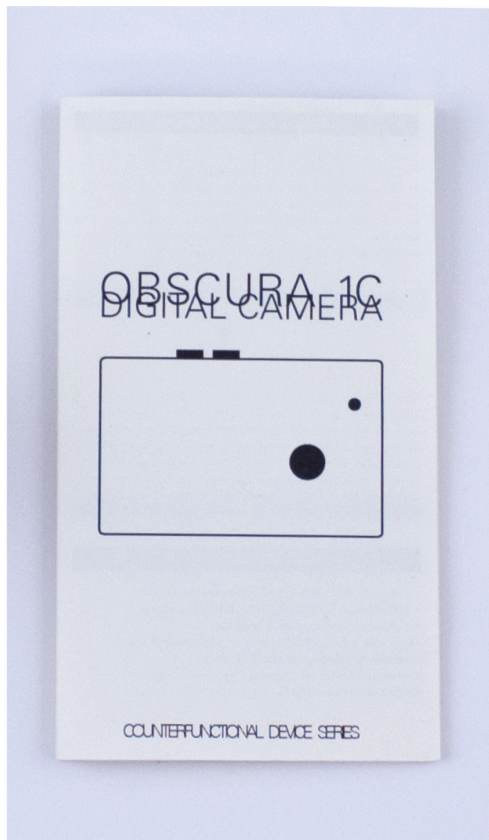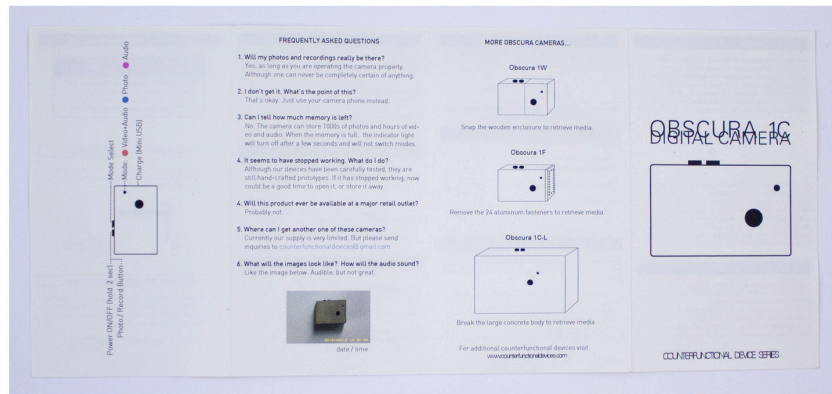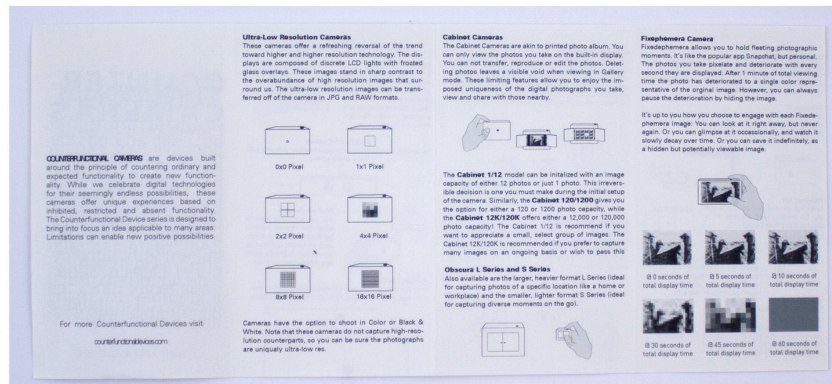
[1a]　　　　[2a]　　　　[3a]　　　　[4a]
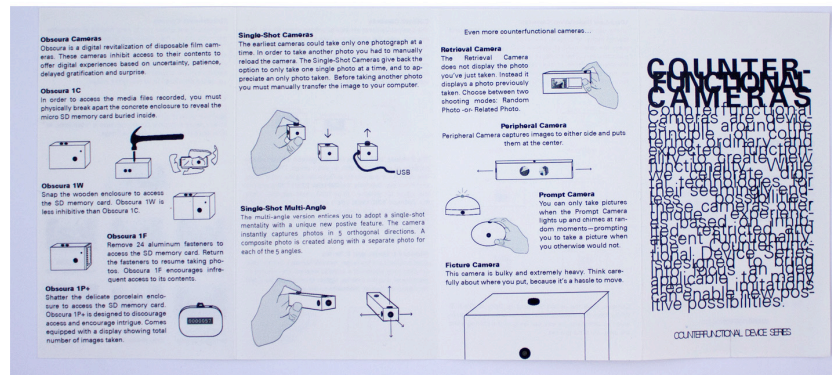
[5a / back]　　　　[6a]　　　　[7a]　　　　[8a / cover]

[1b]　　　　[2b]　　　　[3b]　　　　[4b]

[5b / back]　　　　[6b]　　　　[7b]　　　　[8b / cover]

Figure 5. Obscura 1C Operating Manual (top) and Counterfunctional Cameras brochure (bottom).

devices to "speak for themselves" and be encountered in a manner more akin to retail product offerings than formal research studies. The packaging also functioned to advertise and promote the Obscura 1C.

Yet the types of everyday use we designed for were not limited to the firsthand use of the cameras to take pictures and eventually be smashed to bits. We also designed the Obscura 1C packages so users could imagine firsthand uses of other counterfunctional cameras, such as the Retrieval Camera, Fixedephemera Camera, Cabinet Cameras, and the Obscura 1W, 1F, and 1P+ (Figure 5; or, see supplemental PDF). In turn we hoped this might encourage other imagined and imaginative uses of the Obscura 1C.

We further designed the Obscura 1C to be a "conceptually usable" device. Specifically we wanted to encourage a form of everyday intellectual engagement with the idea that limitations can be enabling, and that the seemingly endless possibilities of digital devices can be limiting (c.f. [2,4,17,15,18,25]). For example, the phrase "limitations can enable new positive possibilities" is featured in both the instruction manual and Counterfunctional Cameras brochure. Verbally stated, this idea can be quite obscure even to the academically inclined. The Obscura 1C was designed with precisely the intention of articulating this abstract concept in a usable, embodied, concrete form. While the following observation is anecdotal, it has been interesting for us as designers to observe that some people react to Obscura 1C with puzzlement, while the remainder react with enthusiasm (Similar findings are discussed in [22]; See also [27] on the appropriate level of "strangeness" for reflective design).

It is also important to note that this type of intellectual engagement was designed as an optional rather than required feature of Obscura 1C. We imagine that many will use the Obscura cameras *without* the sort of intellectual considerations we've outlined here for this audience. However we *do* expect that most will use the device firsthand in a manner similar to a "time capsule" or a "disposable camera" (as the people we've given and sold the devices to have indicated.) And one way of understanding this type of sustained and thoughtful use of Obscura 1C camera is that it *is* a form of intellectual engagement with "counterfunctionality" and "enabling limitations"—regardless of whether these concepts are rigorously engaged with in a precise, verbal manner.

Of course, it's not only possible but in fact likely that many aspects of our Obscura 1C package did not work as well as we envisioned and hoped. But our goal of distributing the cameras here was never to offer compelling empirical evidence of this sort (not in the present work at least). Instead what we offer is a "proof of concept" of these uses that rests primarily on the imagined and conceptual use we have created within the context of this paper. The empirical support we have offered concerning others' firsthand use is limited, anecdotal, and inadvertently gleaned rather than carefully collected. Yet independent of empirical evidence of firsthand use, our detailed design case presented here serves as a model for how a product can function in the ways outlined above. (Even if it doesn't quite work firsthand in the ways that we, and you, may imagine it to.)

Why didn't you empirically study others' firsthand use?
At this point the reader may be asking this question. Wouldn't a user study only help to substantiate our claims? To begin with, space limitations of the 10-page CHI format would have prohibited us from having these discussions alongside reporting the details of a user study.

But the primary logic behind this decision was actually to leverage the absence of a user study. While we've prevented the reader and ourselves the authors from engaging firsthand with findings from a rigorous user study, we've also created *real* imagined and conceptual use here in this paper. This lends support to a multi-part argument about the value of design artifacts independent of scientifically established empirical validations. Succinctly: (1) imagined and conceptual use are very real and important uses of design artifacts; (2) imagined and conceptual uses can most certainly benefit from but do not strictly require empirical support from user studies (c.f. [19]); (3) everyday firsthand use is not always the most important or interesting type of use to *directly* design for, reflect upon, or write about (c.f. [1,28]); (4) empirical studies of firsthand use inevitably make heavy use of imagined and conceptual forms of use (and it isn't the artifact firsthand that readers of a CHI paper experience, but rather it is reproductions and references in the forms of images, descriptions and concepts, c.f. [23]); and (5) the process alone of making a product for everyday firsthand use leads to insights and concepts that are valuable to the research community, again, independent of a user study (c.f. [16,21]).

To be clear, *this is not an argument against user studies.* Rigorous empirical investigation and evaluation of artifacts is a unique strength of CHI and should continue to be championed, as recent longitudinal and large-scale studies have done [8,9,19]. What we are instead arguing is that we need to better acknowledge the representational and conceptual work that field-deployed and empirically studied design artifacts are also and always doing. Further, we need to recognize that *certain* representational and conceptual functions of design artifacts can be detached from or need only be minimally supported by user studies and field deployments.

Making Conceptual Uses of the Obscura 1C for HCI
We now focus on conceptual uses of the Obscura 1C specifically for this audience composed of researchers, designers and other practitioners interested in HCI and interaction design. These conceptual uses are based not on you the reader's firsthand use of the Obscura 1C, or on rigorous empirical data of outside participants' firsthand use. Rather these conceptual uses have a basis in the imaginary uses we have helped to create within the context

of this paper through representations and reproductions of the Obscura 1C (supported by the author's firsthand experiences). Here we outline five conceptual uses.

(a) **Obscura 1C as inhibitive interface.** The Obscura 1C helps make the following abstract concept concrete: An interface can inhibit desirable interactions in ultimately desirable ways (see also: Appendix).

(b) **Obscura 1C as counterfunctional design**. If an inhibitive interface is a design tactic, the design strategy is counterfunctionality. Our detailed discussion of the Obscura 1C illustrates a design process that involves identifying common positive features of a technology and then designing around the absence or inhibition of these features. As a material design outcome, the Obscura 1C shows how useful, desirable functionality can emerge counterintuitively through this process.

(c) **Obscura 1C as enabling limitation.** As discussed earlier, the Obscura 1C concretely illustrates the concept that inhibited or absent functionality (negative functionality) can in fact enable positive functionality. This concept builds directly on technological mediation theory, which describes how technologies both invite and inhibit human action [29]. In the case of the Obscura 1C, inhibited access to digital images enables positive experiences of delayed gratification, surprise and intrigue. Technologies as diverse as Twitter, Snapchat, vinyl records, printed newspapers and various HCI exemplars such as Photobox [21] and Drift Table [11] offer further insights when analyzed through the concept of enabling limitations.

(d) **Obscura 1C as designing digital limitations.** Generalizing further, yet back toward design, the Obscura 1C serves as a focal point among a wider array of counterfunctional cameras that give shape to a design space of *designing digital limitations*. While this space is highly motivated in theory (e.g., [2,4,13,14,15,17,18,25]), it remains practically underexplored through design.

(e) **Obscura 1C as critique/philosophy translated.** One way to understand conceptual use of the Obscura 1C is that it serves as an example of "higher-level" concepts. While this is a useful way to see things, we prefer to also engage with the Obscura 1C as a translation from verbal concepts to material things. Such material translations—as "ideas lodged in things" [6, p. 124]—are not necessarily reductions or "dumbing down" but rather should be seen as "equals to, or even improvements over, the original— precisely to the extent that they depart from it" [6, p. 118]. Even as we make conceptual use of the Obscura 1C here, we should not lose touch (even if it is an imagined touch) with the device's embodied and embedded firsthand uses. For it is precisely these departures from abstract concepts that make material things so concretely compelling.

Making Extended Use of Packaging for Everyday Use
The Obscura 1C demonstrates a level of concern with packaging and instructional material that is unique within

HCI. This in turn suggests ways that the HCI community could benefit from closer attention to the design of packaging for prototypes and user studies. The Obscura 1C also generally speaks to the particular forms through which research through design knowledge is produced, presented and disseminated.

Packaging for user studies
Producing packaged devices that "speak for themselves" can be useful in a number of ways. First, packaging and instructional material can help to clearly and consistently explain aspects of a prototype such as its operation, possible uses, and underlying intentions. Conversely, packaging and instructional material can help the research team maintain an ambiguous or mysterious stance regarding aspects of use, operation, and intention (e.g., mailing the devices allowed us to avoid having to further explain in-person their intended uses). Packaging can also open up new functional possibilities. Here we made use of additional "representational products" using the format of a product brochure (Figure 5). Finally, packaging can be used to promote the product to users in a manner akin to retail products. This can help the research team to find a target market of users with a strong desire or curiosity about using the product, or that demonstrate some specific type of understanding of it. Conversely, the research team can also seek out users that describe envisioned uses that may be at odds with those that were envisioned or intended by the designers (a tactic we have also made use).

Users studies as packaging
At a broader conceptual level, the Obscura 1C helps us to see that *all* user studies are forms of packaging, distribution and exchange with parallels but key differences to things the circulate within the machinery of retail markets. If we agree that even the most seemingly minor details of a product's design matter, then surely similar is the case for the details of its packaging, distribution and exchange. Although this is an empirical question, it is not difficult to imagine how some very different findings could result when a prototype no longer requires the direct human scaffolding of research teams to deliver the product, fix it when it breaks, ask questions about how it is experienced, promise financial compensation, and create various concomitant forms of social expectation for engagement.

Packaging discursive design objects
The Obscura 1C also helps us to appreciate design artifacts as ways of packaging up intellectual ideas or research through design knowledge (c.f. [23,30]). The audience of these packages could be the special discursive audience of CHI (cf. [10]) or the packaging could be for the public more broadly constructed (cf. [5]).

CONCLUSION & FUTURE DIRECTIONS
This paper has described and explained details of the design, production, packaging and distribution of the Obscura 1C Digital Camera. Here we have prioritized

conceptual and imaginary use over of empirically evaluated firsthand use. A number of new concepts have been articulated: counterfunctionality, inhibitive interfaces, enabling limitations, and designing digital limitations. We've also articulated methodologically oriented concepts of conceptual use, material/conceptual translation, criticism as design opportunity, user studies as packaging, and packaging discursive design objects.

In future work we intend to present refinements of these concepts—verbally, materially, and empirically. Here, our main goal and hope is that these formal concepts and general ideas can inspire and provoke new ways of thinking about and doing design-oriented work in HCI. To the extent that these concepts here may appear fragmentary and under-articulated in words, we hope this can be appreciated as reflective of forms of knowledge production we would like to better acknowledge and develop for design-oriented HCI research: knowledge as design thinking residing "within" artifacts [30, p. 51]; as "ideas lodged in things" [6, p. 124]; and as devices that can partially "speak for themselves".

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APPENDIX (CODA)

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