Always Somewhere, Never There: Using Critical Design to Understand Database Interactions

Melanie Feinberg, Daniel Carter, Julia Bullard
School of Information, The University of Texas at Austin
1616 Guadalupe St., Suite 5.202, Austin, TX 78701 USA
feinberg@ischool.utexas.edu; carter.daniel.w@gmail.com; julia.a.bullard@gmail.com

ABSTRACT
Structured databases achieve effective searching and sorting by enacting sharply delineated category boundaries around their contents. While this enables precise retrieval, it also distorts identities that exist between category lines. A choice between Single and Married, for example, blurs distinctions within the Single group: single, perhaps, merely because same-sex marriage is not legal in one's locality. Sociologists Susan Leigh Star and Geoffrey Bowker describe such *residual* states as inevitable byproducts of information systems. To minimize residuality, traditional practice for descriptive metadata seeks to demarcate clear and objective classes. In this study, we use critical design to question this position by creating information collections that foreground the residual, instead of diminishing it. We then interrogate our design experiments with solicited critical responses from invited experts and student designers. Inspired by the anthropologist Tim Ingold, we argue that our experiments illuminate a form of interacting with databases characterized by notions of wayfaring, or inhabiting a space, as opposed to notions of transport, or reaching a known destination. We suggest that the form of coherence that shapes a wayfaring database is enacted through its *flow,* or fluid integration between structure and content.

Author Keywords
Design; criticism; classification; metadata; collections

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

INTRODUCTION
Categories are indispensable elements of language and thought. Without categories, we couldn't refer to dogs as one group of similar animals, and cats as another group. To reduce ambiguity in communication, categories with clear boundaries are best. It's not difficult to separate cats and dogs. It's harder to separate tall and short; when does short end and tall begin? To enable effective searching of structured databases, systems of attributes and values are designed to avoid these areas of relative indeterminacy. In the case of tall and short, we might avoid potential miscommunication by using exact measurement ranges instead of verbal descriptions.

But clear and usable classification systems also flatten and distort complex realities. It might seem straightforward to distinguish relationship status by separating single and married people. But these simple categories mask a wide variety of experience. Within the Single category, we might find people with committed same-sex partners who cannot legally marry in their locality, people who have been divorced multiple times, and so on. The Married category, as well, might include couples in open relationships, or who live separately, or who enact marriage in various non-prototypical ways. Such examples illustrate the notion of residuality, a phenomenon of classification articulated by Star and Bowker [15]. The residual encompasses everything that doesn't quite fit into a category system. A residual state might be absent, inadequately expressed, or split between existing categories. Star, for example, writes about her own chronic pain, a state that can be described as neither "sick," in terms of a diagnosed illness, nor "well" in terms of lived experience. In a category system where "sick" is associated with conditions of clear etiology, chronic pain is residual. More generally, the residual represents the persistent vagueness, ambiguity, and invisibility that databases, and the classificatory systems that structure them, attempt to eliminate by establishing neatly differentiated relationships.

In this project, we use critical design experiments to highlight the residual instead of minimizing it, contradicting typical design practice for descriptive metadata. We created three "transformations" of a small digital video library to enact three separate approaches to highlighting residuality. We extended this design work by collecting critical responses to our transformations from both invited experts and from students in a course on collection design.

We target two research questions:

- How can a digital information collection foreground the residual?

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page.

Copyrights for components of this work owned by others than ACM must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from Permissions@acm.org.

CHI 2014, April 26 - May 01 2014, Toronto, ON, Canada
Copyright 2014 ACM 978-1-4503-2473-1/14/04…$15.00.
http://dx.doi.org/10.1145/2556288.2557055

- What is the interaction, or reading, experience of such a collection?

Our work makes several contributions to HCI. First, reflection upon our design experiments and the associated critical responses enables us to illuminate an alternate form of interacting with databases, one characterized by notions of wayfaring, or inhabiting a space, as opposed to notions of transport, or reaching a known destination [10]. We argue that residuality emerges through this wayfaring mode of interaction, and we contend that wayfaring databases are characterized by *flow,* or fluid integration between structure and content. In our experiments, flow is a property of a database's descriptive infrastructure (that is, metadata), and not its interface. In emphasizing the category systems that support database interactions as the focus of design, we surface an element of HCI that is less commonly addressed as such. Moreover, we suggest that the wayfaring mode of interaction illuminated through our experiments also constitutes a form of "design-after-design," or creative appropriation of the designed artifact as design material. Our concept of flow can be understood as a type of "infrastructuring," to use a term introduced by Binder and colleagues, to encourage design-after-design [2].

Our study also demonstrates a productive synthesis of critical design and interaction criticism. We suggest this combination is especially appropriate when the character of the artifact class (here, a database) is itself under scrutiny. The active reading demanded by criticism is also, we propose, a form of infrastructuring for subsequent design.

In the following sections, we first present conceptual and methodological foundations in more detail. We then introduce our study design and transformation experiments. After summarizing key findings, we put forth a refined account of our transformations, as enabled through analysis of the critical responses we received, in conjunction with anthropologist Tim Ingold's ideas of wayfaring.

CONCEPTUAL UNDERPINNINGS

We see residuality described by Star and Bowker as related to Gloria Anzaldua's idea of mestiza consciousness, a life experience that fuses divergent aspects of identity through the crossing and recrossing of border states. In her classic work of feminist theory, *Borderlands/La Frontera: The New Mestiza,* Anzaldua uses personal history to depict a mode of existence that is enacted both outside and between traditional categories of culture, class, and ethnicity. Anzaldua describes, for example, her status as a Chicana (American of Mexican descent) from the Rio Grande valley in Texas (on the border with Mexico), raised in an agricultural, socially traditional community, who is also a poet, scholar, feminist, and lesbian. The knot of categories that Anzaldua herself embodies incorporates ambiguity, conflict, and indeterminacy, a condition that Anzaldua terms *mestiza consciousness.* For Anzaldua, the term *mestiza* extends beyond ethnic heritage to involve the mixing of culture, class, language, and other extended elements of identity. In mestiza consciousness, Anzaldua reorients the residual, making it central.

Anzaldua evocatively describes mestiza consciousness in terms of the Aztec goddess Coatlicue, who includes both creator and destroyer aspects. The "Coatlicue state" involves operating in what Anzaldua calls pluralistic mode; the new mestiza embodies a path between oppositions, a path that incorporates a specific history of travel but has no endpoint. In the domain of classificatory infrastructure, mestiza consciousness implies a continual process of understanding what a category like Single or Married can mean: what it is to be Married, to not be Married, to sort of be Married, or to once have been Married, all as a specific, ephemeral event. Our goal to understand and exploit this complex state as a design resource complements and extends work to incorporate ambiguity, open-endedness, contradiction, and plurality into HCI, and to more generally understand HCI in terms of experience [8, 14].

Mestiza consciousness can also be seen as a rhetorical strategy. In *Borderlands,* the reader's path echoes the mestiza's path: Anzaldua includes historical background and scholarly exegesis mixed with poetry and personal anecdotes, even dreams. Anzaldua also uses multiple languages, juxtaposing English with a variety of Spanish dialects. The reader must work through material that can be frustrating, even irritating, in its violations of traditional rhetorical coherence. Eventually, the reader must release conventional expectations in order to perceive the structure of Anzaldua's thought and progress in understanding.

Borderlands suggested that our goal to foreground residuality in an information collection also needed to incorporate experimental forms, potentially in a disquieting way. Accordingly, in pursuing our theoretical investigation through design, we were not focused on what people typically want, need, or like when interacting with information systems. Instead, our transformations bent conventional structures in order to, following Anzaldua, reorient the residual, making it central. In transforming categories like Single and Married, for example, we might use Stable and Unstable. The latter are more ambiguous and tenuous; we can see how a relationship might include elements of both, and might shift over time. (Although mestiza consciousness and residuality are not equal, their overlap is extensive enough, given our research goals, that we use the term *residuality* to incorporate both notions for the remainder of this paper.)

METHODOLOGICAL UNDERPINNINGS

The creation of provocative artifacts to interrogate received ideas is a hallmark of critical design. Critical design produces experimental artifacts that transgress cultural norms and provoke reevaluation of those norms. Dunne, for example, describes design proposals to make apparent the invisible electro-magnetic fields that are emitted by

household objects, such as televisions and computers [7]. Dunne calls these proposals "value-fictions," whose goal is not to satisfy user needs but to explore the enactment of alternate value states, to "stimulate discussion in a way that a film or a novel might."

Shaowen Bardzell and colleagues describe critical design as a form of research inquiry [5]. They summarize the design and deployment of two artifacts created to spur questioning of gender roles. With their "significant screwdriver," using the artifact generates a visual representation of the work performed with it, which can then be shared as a greeting card. This action recasts "handyman" tasks as an expression of caring. Similar to [7], the outcome of [5] centers on the interaction experience as a means of questioning received values. The significant screwdriver reveals attitudes associated with household work, and it suggests implications for feminist and critical design. Its goals are less focused upon hand tools as a class of objects.

Although not labeled as critical design, a number of conceptually aligned studies consider the artifact more directly, as well as the values underlying the artifact [13]. In reviewing the deployment of critical design in HCI, Bardzell and Bardzell claim that such studies, using the example of Dalsgaard and Dindler's interactive peephole projects, also constitute a form of critical design [4, 6]. [4] contends that Dalsgaard and Dindler evolve both an understanding of the peephole as an interactive form and an understanding of user engagement in general. Critical making, another complementary approach, uses the process of designing, building, and using an artifact to explore theoretical questions [12]. The outcome of critical making is reflection upon these processes; the design product provides the catalyst for this reflection.

Some critical design projects, such as [6, 7] rely on designer reflection to interpret and build knowledge from the designs. Other efforts, including [5, 13] conduct user studies to assess their design experiments. These studies include both user and designer reflections as research data. Although it has not been extensively coupled with critical design, information criticism has been proposed as a rigorous, systematic means of generating new understandings from scholarly "reading" of artifacts in HCI [3, 11]. The sustained accounts produced through criticism complement reflections from designers and users.

STUDY DESIGN

Our research goals combine an interest in residuality itself, in the expression of residuality through the classificatory infrastructure of databases, and in the interaction, or reading experience, of using a database that highlights the residual. Accordingly, our study design melds critical design, critical making, and interaction criticism. We aim to learn from:

- The process of making experimental designs.
- Our own reflections on the designs themselves.
- Responses contributed by informed critics.

We use critical responses rather than a more traditional user deployment because our experiments are based on a particular theoretical orientation, and not aligned with user needs, wants, or preferences. Moreover, our interests include understanding the information database itself, as a class of artifacts. This goal aligns with that of criticism; a literary critic may use detailed readings of particular poems, for example, to develop a more general scholarly argument about poetry. The critic, also, often incorporates the work of previous critics into these arguments. We too propose to learn about information databases through our own readings and those of other critics.

Our research plan therefore includes these elements:

- Develop design experiments that enact residuality through descriptive infrastructure (classification schemes and other metadata).
- Write structured reflections that address the authoring activity and the created product.
- Solicit critical responses to the design experiments from both subject experts and student critics.
- Synthesize and interrogate the responses to produce an integrated account of our work.

The following sections describe these elements more fully.

Design experiments

To ensure productive comparability between design experiments, we created three "transformations" of an existing digital video collection. The initial collection contained 50 short videos, gathered from a variety of sources, in the general domain of "Texas" as a subject area. The original Texas collection was created in 2010 to be used in teaching and research, and its descriptive infrastructure was designed to follow traditional design principles of neutrality and objectivity—that is, to restrict the emergence of residuality. The original Texas collection was created with the Open Video Digital Library Toolkit (OVDLT), an environment that includes a wide array of customizable metadata elements [9]. These include:

- Browsing categories (a group of descriptors, or index terms [such as Politics, Lecture, or Gulf Coast] identified with a broader category label [such as Subject, Genre, or Location]).
- Titles, brief summaries, and abstracts of content.
- Roles associated with the video or its metadata record (such as a director or metadata cataloger).
- Dates associated with the video or its metadata record (such as the video's original broadcast or the date the record was created).
- Freeform tags.

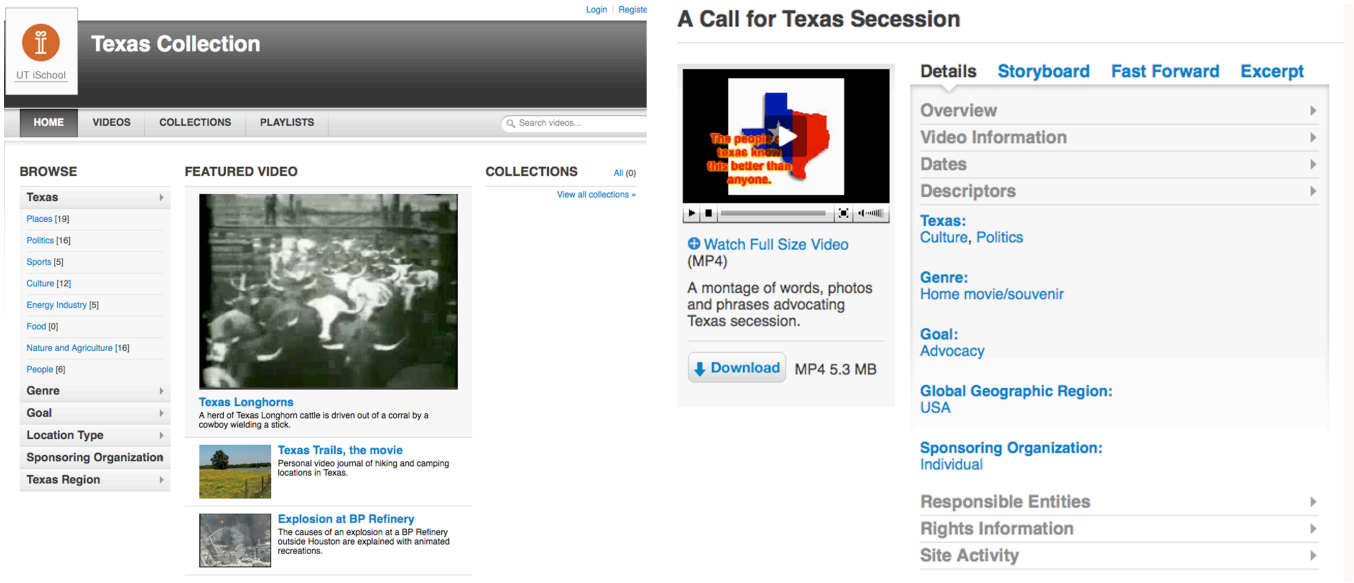

Figure 1: On the left, the home page of the original Texas collection. Each labeled browsing category (Texas, Genre, Goal, and so on) has an associated group of descriptors. On the right, a video metadata record shows assigned descriptors.

- "Collections," or selected subsets of annotated videos to express a theme.

Figure 1 shows some of these elements for the original Texas collection. Our three transformations took copies of this original collection and manipulated them as possible with the OVDLT tools. Accordingly, all three transformations and the original collection include the same 50 videos. Layout and interface features are standardized by the OVDLT. Only the descriptive infrastructure (browsing categories and associated descriptors, titles and abstracts, collections, and other metadata elements) was changed. Each of the three researchers took responsibility for one transformation.

Here in Texas (Figure 2) addresses the relationship between a stereotypical idea of Texas as positioned against its reality, filtered through an authorial persona's perspective as a non-native Texas resident. Some browsing categories reference Texas concepts that are not represented in the collection's current videos. For example, descriptors such as Despair and Armadillos are included in the category Somewhere in Texas, but are not assigned to any resources.

Kaleidoscopic Texas, shown in Figure 3, juxtaposes three descriptive approaches—three facets of a kaleidoscope. These include an "objective" perspective, a contrasting "subjective" perspective, and quoted material from the original collection. Kaleidoscopic Texas subverts traditional classificatory principles, such as a consistent level of abstraction in sibling descriptors, to call attention to the artificiality with which such distinctions are maintained. The Technique category, for example, includes descriptors such as Montage, Nostalgia, and Animation, which refer to very different kinds of technique.

Post-Texas Index, shown in Figure 4, describes video elements as "objectively" as possible but from an atypically high level of abstraction. The context that endows the videos with meaning is stripped away. Both political rallies and the exhortations of football coaches to their players are described, for example, as "men speaking."

Multiple forms of reflection on the design experiments

Each researcher wrote a summative reflective essay that distilled design goals as well as the process of enacting those goals. These reflections encapsulated each designer's sense of significant themes from the making experience.

For the first set of critical responses, we arranged for 11 experts to contribute a brief essay (approximately 750 words) that addressed the two research questions. Seven invited respondents were academics with expertise in aligned fields: classification research, infrastructure studies, digital libraries, and HCI. Four invited respondents were information professionals working in libraries and archives. Invited participants were provided with background about the project goals, including a concise introduction to residuality. They were also given access to the original Texas collection. Invited respondents received $75 gift cards. Respondents were instructed to address one, two, or three transformations in their responses, as they wished. Invited participants did not know which researcher was responsible for any individual transformation. Most invited respondents chose to remain anonymous, but some requested to have their contributions identified by name.

For the second set of responses, 14 master's students in a semester-length course on digital collection design were assigned a 3,000-word essay addressing the two research questions. As part of their course activities, the students learned about traditional classificatory practices, as well as

Figure 2: On the left, the Here in Texas home page. The Nowhere browsing category includes concepts that "do not" exist in Texas, although one descriptor is assigned to 3 videos in the collection. On the right, a metadata record shows assigned descriptors.

residuality. The students were also instructed in critical design and interaction criticism. As with the invited respondents, students could address one, two, or all three transformations in their essays, and they had access to the original Texas collection. This essay assignment was positioned as preparatory to a design project in which students created their own transformations of a different video library. Students were encouraged to engage deeply and critically with the transformations as a means to inform their subsequent design activities. Students did not know who had created the transformations.

FINDINGS

In addition to the three design transformations, this project yielded the following data:

- Structured essays and notes from the researchers.
- Eleven invited responses.
- Fourteen student responses.

These materials were exceedingly diverse in content, structure, and assessments. The invited responses, in particular, were wide-ranging. Some were oriented around immediate impressions, while others were dense scholarly reflections (for instance, one response was grounded in the French theorists Deleuze and Derrida). Some were loose and informal, while others put forth more polished theories. While the student responses incorporated more sustained arguments, they too represented disparate areas of focus.

Because we were soliciting criticism, which is oriented towards unique insight, we anticipated this variety, and we did not code our materials for pervasive themes, as is often useful for interviews and other forms of experience reporting. Instead, we used the responses as provocations to evolve our thinking on the transformations, as begun through the process of making them and continued via our own initial reflections on the completed products.

In the remainder of this section, we summarize selected observations from our three data sources. Then, in the following section, we provide an extended account of our experiments, as enabled by these observations. We have selected the findings included here to demonstrate the progress of our ideas; while they represent only a small fraction of our data, they show how each source contributed to our eventual understanding of the experiments and their significance as critical design interventions. We emphasize that our process was not intended to be replicable, and that our goal is to achieve insight, not to prove a hypothesis.

In our initial reflections around the process of making, we, the designers, were challenged by two concepts: coherence and authenticity. The experiences of the residual as articulated by Star and Bowker and Anzaldua demonstrate that a simple category like Married is ambiguous, fluid, and complicated, that its apparent coherence is a reductive simplification. But Star and Bowker and Anzaldua's goal is not to enact chaos but to propose an alternate form of coherence, a more complex one, as exhibited through the initially strange but ultimately cohesive rhetorical structure of Anzaldua's book. In their accounts of residuality, this alternate coherence derives from an authenticity of character, as expressed via distinct authorial personas.

Certain sections of Star and Bowker's article, for example, are written as signed first-person narratives, replete with both stylistic distinctions and vivid biographical details. Both Star and Anzaldua recount not only particulars of their residual experience but the difficult process of communicating that experience, which for both involved

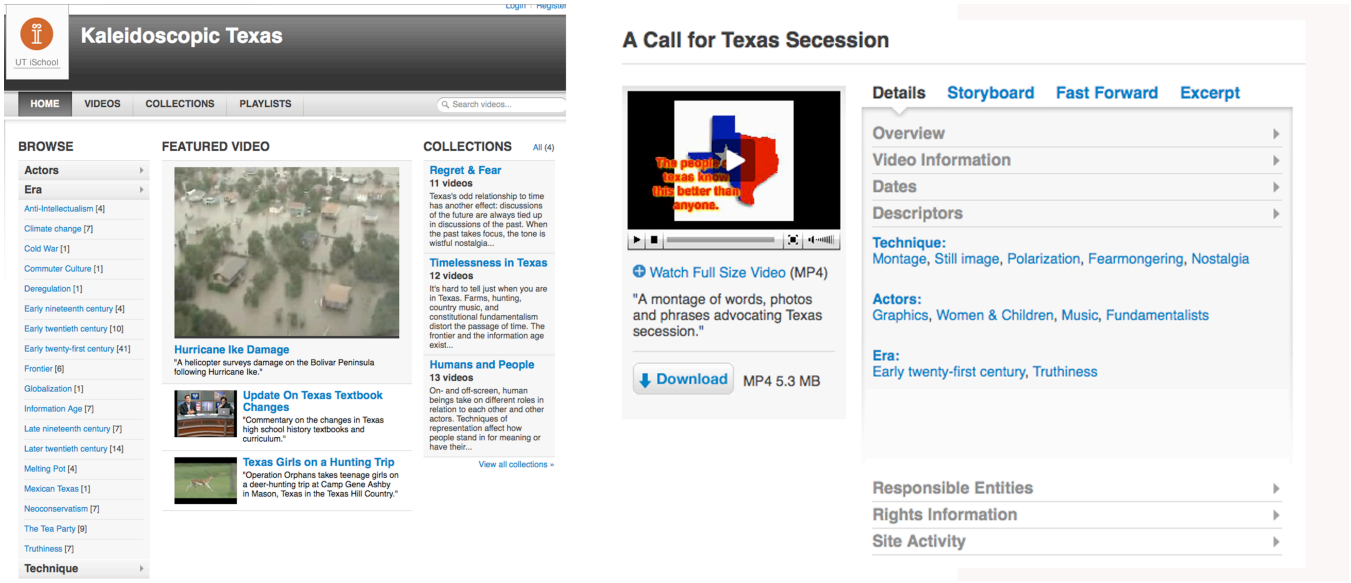

Figure 3: On the left, the Kaleidoscopic Texas home page. The Era category mixes time period types, such as Cold War, Later Twentieth Century, and Globalization. On the right, a video metadata record shows assigned descriptors.

wrenching emotional states. The actual truth of such personal anecdotes is immaterial; the authenticity of authorial voice makes them *feel* true and provides a rationale, or explanation, that lends coherence to the expression of residuality. We, as designers of information collections, struggled with this dense relationship between residuality, coherence, and authenticity. Was an "authentic" voice the only way to find coherence in the residual?

The Here in Texas author did adopt that sort of character-focused approach, and that transformation was entwined with the intersecting specificities of an authorial persona. The Post-Texas Index author, however, relied on consistency of concept to maintain coherence: the transformation maintained a high level of abstraction in description, retaining conventional syntax while avoiding conventional semantics. The coherence for Kaleidoscopic Texas came from the distinctiveness of the three separate kaleidoscope facets: an "objective" perspective, a "subjective" perspective, and quoted material from the original collection itself. In our initial reflections, we felt that all three transformations were equally authentic in their commitment to these different approaches to coherence; that is, they all seemed to provide a focused rationale for their particular expressions of residuality. While these forms of authenticity were different, our design reflections led us to conclude that all three transformations were equally coherent and expressive of the residual.

The critical responses caused us to reevaluate our ideas about authenticity and coherence, and we provide just a few of the remarks that provoked this reevaluation. We had not expected our respondents to address the composition of the original Texas collection in any depth; we provided it as a backdrop to read the transformations against, but we didn't imagine that it would inspire comment, as it was typical and nondescript. But many respondents did address the original collection. Several invited respondents dismissed the original collection as "boring," a term that surprised us. A retrieval-oriented database like the original collection is more often seen as something to be used, not bored or intrigued by. It would be weird to call your local library "boring"; it just wouldn't seem like a germane assessment. It would be like calling the supermarket boring. "Boring" struck us. The student respondents described the original collection more like we expected: "accessible," "familiar," and "useful," and not "boring." However, the student respondents who looked at the original collection in depth tended to become frustrated: although it seemed easy to understand at first, individual descriptive decisions could seem arbitrary. While the Here in Texas and Kaleidescopic Texas collections were sometimes described as inscrutable, frustrating, or annoying, they were seldom called "boring." But the Post-Texas Index was occasionally so designated. Post-Texas, too, was most variously described: sometimes it was boring, sometimes it was the most strange, sometimes most successful, and sometimes least successful.

The appraisals of boredom in the responses spurred us to notice references to modes of attention. A non-boring collection might be described positively in terms of being inviting, intriguing, or clever, or negatively in terms of being annoying or frustrating. But a non-boring collection seemed to require a different form of attention than a boring one. If a collection was deemed both inscrutable and boring, respondents didn't try to figure it out. But non-boring collections seemed more likely to be actively read, or interpreted, in addition to being used. Several student essays organized their thoughts in terms of finding tools for this reading in the transformations that they engaged with. A "boring" collection didn't have such tools. Modes of

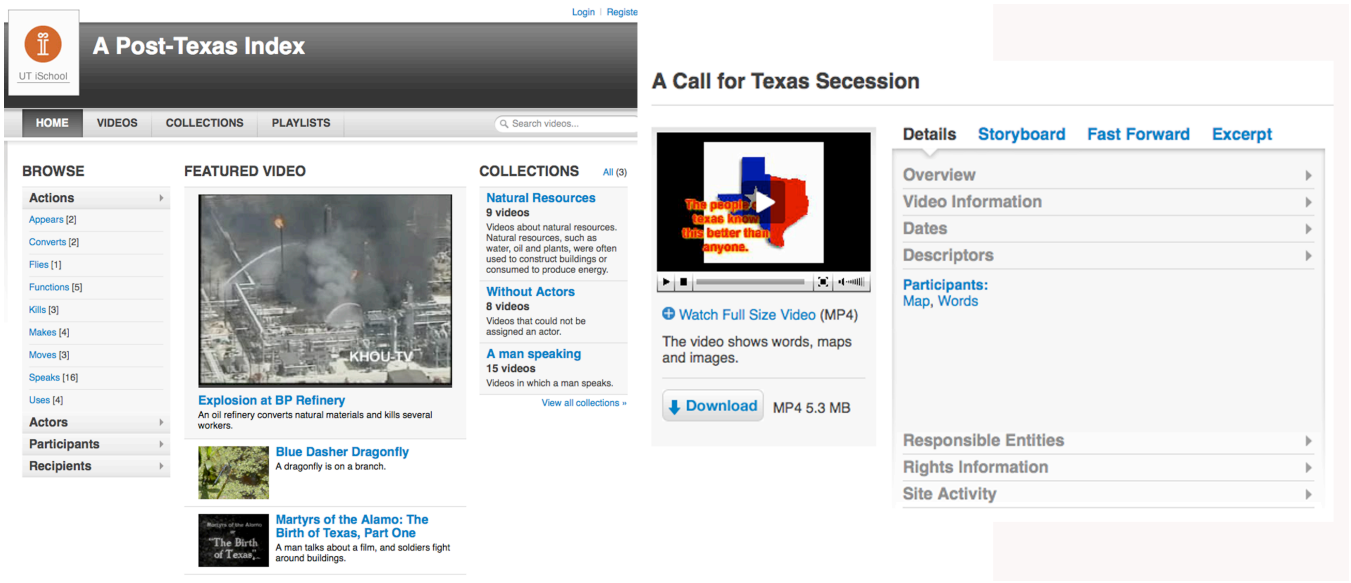

Figure 4: On the left, the Post-Texas Index home page. By emphasizing a high level of abstraction, the collection shows hidden commonalities, such as the prevalence of "speaking" as an action. On the right, a metadata record shows assigned descriptors.

attention also surfaced in the relationship between metadata structure and "content," or the videos themselves. When collections were not boring, attention was more often focused on the integration between structure and content, and not on particular videos or decisions about them.

What did boring mean? Were the different modes of authenticity in our three transformations not equally coherent in their expression of the residual? The next section describes the revised understanding of our experiment that these questions motivated.

DISCUSSION: WAYFARING THE DATABASE

We gradually realized that our transformations were most interesting in enabling us to understand and problematize "normal" database interactions against them. We began to associate residuality less with "unique" characteristics like ambiguity and fluidity and more with a mode of interaction that encouraged the reader's engagement with these characteristics. In other words, the notions of reading and the residual, which had been separate for us at the beginning of our project, started to blur. Our two research questions became commingled: it seemed like a collection might foreground the residual not through *being different* so much as through *being read differently*.

Our ideas gained shape as we examined them in conjunction with the concept of wayfaring put forth by anthropologist Tim Ingold in his 2007 book *Lines* [10]. Ingold's work defies pithy encapsulation, but a pervasive theme involves the contrast between wayfaring and transport as modes of travel. Transport involves getting from one point to another; the goal of transport is arriving at the destination. Wayfaring involves inhabiting a landscape; wayfaring is about where you are, as opposed to where you might, should, or will be. Ingold elaborates:

> *While on the trail, the wayfarer is always somewhere, yet every somewhere is on the way to somewhere else. The inhabited world is a reticulate meshwork of such trails, which is continually being woven and life goes on along them. Transport, by contrast, is tied to specific locations. Every move serves the purpose of relocating persons and their effects, and is oriented to a specific destination. The traveller who departs from one location and arrives at another is, in between, nowhere at all. [10, p. 84]*

Ingold contends that contemporary Western society views reading and writing through the lens of transport; reading is about getting to the end, and writing is about laying out a plan for the reader to arrive there. But older ideas of reading incorporated more of a wayfaring orientation; for medieval monks, Ingold says, words were footsteps or waymarkers, and "every text, story, or trip is a journey made rather than an object found." Accordingly, a text is a place to be inhabited, not "a space to be surveyed" by extracting its pertinent facts [10, p. 13 and p. 16]. When reading is like wayfaring, it is always particular and never finished; there is no transcendent or universal meaning. In fact, reading is no longer about meaning, at least, not in the sense of figuring out an answer to the question posed by the text. Instead, reading is more like taking a walk. When you "go for a walk," you aren't going somewhere, you are just walking. The walking experience is the point, not the destination (which is often right back where you began). Ingold describes the oral storytellers of the Khanty people in Siberia as continuing their performances after everyone in their audience is asleep; the end doesn't matter, the experience does, for as long as one is able to listen.

Ingold doesn't consider databases when he talks about these two modes. But pervading conceptions of databases as mechanisms for efficient information retrieval and access

are clear expositions of reading as transport. A typical database interaction is most often about getting to a predetermined destination as quickly as possible, and a useful database enables efficient extraction of its contents. The attributes and values of database structure exist to promote searching and navigation (a term that Ingold associates with transport); structure works like a vehicle, getting you from one place to another. Indeed, the ideal goal for information systems, according to the philosopher Patrick Wilson, is in locating the "best textual means to an end," the information resources that will enable the accomplishment of one's plans [16]. Wilson was careful to separate this ideal from reality, which is that our databases return what we describe, not necessarily what we need. The gap between need and description is what makes us dissatisfied with databases that do exactly what we ask. If I query the Epicurious recipe database for cakes, and none of the results seem enticing, I am frustrated, even though the results are correct, given my request. In Wilson's characterization, the ideal (and impossible) system would recognize that my need was for an indulgent and yet comforting dessert, and would supply me with the perfect recipe—for pecan pie, not cake at all. Upon receiving this "textual means" to satisfy my real need, I would disengage with the system and continue with my plans.

Ingold, we think, would describe this dissatisfaction differently. Ingold suggests that we build our environments generally "for occupation," a state of being suggested by the transport mode of travel, and not for "habitation," that suggested by wayfaring. We invariably find ourselves trying to inhabit that which we have built to occupy, however, and this disjunction causes frustration. Databases like Epicurious are oriented toward providing us lists of the cakes we think that we want, obeying our commands; they are not oriented toward taking us on a food journey where we start with cake and end somewhere else, with pecan pie, or even with oysters or zucchini, somewhere unrelated to our "needs." We sometimes enjoy "taking a walk" from cake to zucchini in a database, and yet we also tend to feel like doing so is merely wasting time. One of the invited respondents in our study, for example, mused in his narrative that he "should" have been searching the transformations, writing "Why am I bothering to explore the structure of the collection before I dive in and do a search?" Several invited respondents felt like they "should" have had a task to perform with the transformations, instead of "simply poking about," as one respondent remarked; another wondered if "a more effective way to structure this test would be to pose questions to the subjects." The unmarked, habitual mode of database interaction is about transport, about getting from one point to another, finding answers and moving on. We don't as readily interact with a database as wayfarers, following its mesh of trails as they snake over the landscape, intersecting in unpredictable ways. Or when we do, it feels slightly illicit.

Thinking about our transformations in terms of wayfaring enabled several realizations. We could now understand how both the original collection and the Post-Texas Index could be "boring" at the same time as some respondents saw the Post-Texas Index as being most strange and most successful. Although the Post-Texas Index was not oriented towards effective information retrieval as we typically understand it, it was nonetheless, in a certain sense, optimized for a transport mode of interaction. While there were plenty of individual idiosyncrasies in the Post-Texas Index in terms of descriptor instantiation and assignment (an invited respondent wondered, for example, "Why was the Obama mashup tagged as Appearance in the Action category? By what rationale would a video of a family interacting with animals receive the tag Woman?") the overall concept was unified and relatively easy to discern. In terms of "getting the point," or seeing an end goal to the transformation, these irregularities could be glided across in a way similar to the original Texas collection. When one looked closely at the original collection, as some of our respondents did, it was equally full of idiosyncrasies. A student participant, for instance, questioned why old footage of cowboys in 1898 was assigned the Report descriptor in the Genre category: what made this a report? Despite the care with which the original Texas collection had been crafted, such debatable decisions occur throughout any such database. But we are less likely to notice them, because the metadata infrastructure associated with retrieval seems familiar and unexceptional. The set of attributes used for the original Texas collection— Texas subjects, locations, genres–were easily recognizable routes to the "end" of document retrieval. The form of coherence enacted through each of these databases, in other words, was oriented towards moving *over* the content landscape to reach a destination: either a set of results, for the original collection, or a recognition of the arbitrariness of description, for the Post-Texas Index. Both of these databases were "boring" because their structure seemed like a map: framing the content by identifying potential destinations, but nonetheless resisting *integration* between route and underlying terrain. Post-Texas was most strange, for some, because its goal was not retrieval. Post-Texas was most successful, for some respondents, because it could nonetheless be associated with an identifiable goal, and the idea of success therefore more easily attached to it.

In contrast, Here in Texas and Kaleidoscopic Texas suggest wayfaring through a traveled landscape, with the descriptive infrastructure functioning as a meshwork of existing trails, or previous journeys, through the content. As such, these collections have no apparent end. The feelings of being lost or frustrated that some of the respondents noted (one student called Kaleidescopic Texas "a perfectly functioning dilemma generator," and an invited respondent said that "even after spending some time...I am still confused") can be traced to this lack of straightforward goal. As another example, participants quite naturally

associated the available interaction tools, such as browsing categories and filters, with a transport orientation of extracting content to specifications, and some respondents were puzzled when these tools didn't work as expected with Here in Texas and Kaleidescopic Texas. For instance, an invited respondent wondered about the Texas Colors browsing category used in Here in Texas, asking "Why would anyone want to search on colors?" In transport mode, descriptors support identified user needs and tasks by delivering the closest textual means to those ends, and associating color with a video doesn't align with that conception, particularly with the approach taken in Here in Texas, where color was sometimes applied literally (assigning Denim when people in the video wore jeans) and sometimes metaphorically (using Red for a conservative political orientation) and sometimes in both ways (assigning Green to indicate associations with money and for green landscapes). A student respondent similarly remarked that difficulty in "decoding" the Texas Colors category would make it challenging to "use the data," that is, to find videos on command.

But other participants saw a different form of coherence in elements like Texas Colors, one in which the structure was integrated with the content, as a path is integrated into a landscape (in contrast to a map, which is only a conceptual overlay upon the landscape). When Ryan Shaw, an invited respondent, examined his reactions to descriptors that had no items associated with them, he realized that the original Texas collection and Here in Texas suggested different responses to the same mechanism. In describing his experience with the original Texas collection, Ryan reflected upon the appearance of a Food descriptor with no assigned videos: "This irritates me. Why list a category with zero matching items? That's bad practice." Subsequently, when exploring the Here in Texas collection, Ryan encountered a whole set of no-item descriptors associated with the broader category Nowhere in Texas. This time, he had a different reaction to the same device, allowing in this case "Why list a category with zero matching items? When you want to make a point about what's missing." Ryan does not retract his statement that categories with zero matching items are bad practice. Instead, he connects Here in Texas with a different mode of interaction and accordingly, different utilization of tools like descriptors and their display. Ryan further observed that the videos embedded within Here in Texas seemed to have transformed from those he had been "deeply bored" with in the original collection, commenting that "I find it hard to believe that the original Texas collection contained the same videos."

We suggest that Ryan was responding to the *flow* enacted by the Here in Texas collection, in which the metadata structure weaves a series of paths around and through the content, creating a merged environment for the reader to wander. The Nowhere in Texas descriptors for Here in Texas constitute one such route. This path provides access to very little of the collection's data, as all but one descriptor is empty. Instead, the Nowhere in Texas descriptors form a sort of promontory, offering a view, not of the collection's meaning in general, but of what the collection *meant to a specific previous reader, the Here in Texas author.* This view participates in the current reader's own evolving perception of the greater terrain of the database, which cannot be separated from the previous reader's—the author's— wandering footsteps. The flow of metadata structure both around and through the database content serves here like the hand, or ductus, of a scribe's writing; it comprises evidentiary traces of the author's activity through the database. While the videos themselves are not physically altered in the flow, just as a word does not change when it is written in a manuscript, they are nonetheless suffused by the flow, and they appear different, as Ryan experienced. (So too might the word "love" be unchanged and yet different when written by a child on a handmade Valentine card.)

We propose that databases oriented toward a wayfaring mode of interaction exhibit a different form of coherence than databases oriented toward a transport mode of interaction, and that this wayfaring form of coherence is characterized by flow. If the wayfaring mode of database interaction is more like reading a database than searching, or using, one, then flow is a means of following its story. Flow provides a rationale to contextualize apparent inconsistencies, deviations, and obscure judgments in the integrated environment (structure commingled with content), just as the sense of "an end" did so with a transport mode. Here, flow transmutes potential bewilderments by showing how they contribute to the story of the collection author's travels. The sense of "story," here, though, is not coextensive with a simple plotline but more like a saga in the oral tradition, where many adventures take place, and relationships between events, characters, and places emerge over multiple tellings. Flow builds up through subsequent interactions: it helps the reader understand "where" one currently is, but also how that "where" is related to both other "places" along the trail of the tale, as well as other "times," or other walks along the database paths.

When we conceive of wayfaring coherence in terms of flow, we can also better comprehend the role of authenticity in the expression of residuality. We now see authenticity as emerging through flow, through the entanglement of paths—an experience similar to the "pluralistic mode" of Coatlicue transition that Anzaldua both describes and enacts. As the reader wends through the database, authenticity arises when the story occasioned through the reader's travels seems *motivated,* even when events initially seem disconnected or abrupt. That motivation may coalesce through the realization of a character, as with the Here in Texas authorial persona, or it may coalesce through other forms of explanation, as with the three facets of Kaleidescopic Texas. Authenticity informs the residual in

that it may encompass ambivalence, inconsistency, and change, but it is also not haphazard or mistaken. The authentic expression of residuality demonstrates, through flow, its wayfaring form of coherence.

To summarize, no transformations were "more" residual than any other database, including the original Texas collection, in terms of being more ambiguous, fluid, or indeterminate. However, the original collection and Post-Texas Index, in "having an end" and supporting a transport mode of interaction, disguised the residual to an extent (except when scrutinized, and individual decisions emerged as problematic). Here in Texas and Kaleidescopic Texas, on the other hand, revealed—and explained—residuality through flow, instigating a wayfaring mode of interaction.

CONCLUSION

We suggest that flow, as we describe it, constitutes a form of "infrastructuring" to support design-after-design, or ongoing reappropriation of materials in extended design conversations, as performed by users [2]. In *Design Things,* the A. Telier group relates infrastructuring to participatory design, in which the designer's work shifts from producing artifacts with users to facilitating the sociomaterial conditions that enable ongoing conversation between users and their environments. Flow represents the process that a database author took to develop an interpretation, or reading, of the database content. In travsersing the paths established by the initial author, guided by the infrastructure of flow, database readers come to their own understanding of the underlying terrain, potentially to forge new paths. Our work here extends the idea of infrastructuring into the mundane, everyday context of metadata design and application, and we equally extend the concept of design-after-design to the perhaps even more mundane context of database interactions. We suggest that metadata infrastructures to facilitate wayfaring constitute a productive site for design activities in HCI; the thoughtful and provocative design of category systems like those we engage in this study can serve to enhance user agency and re-imagine forms of user participation in meaning making.

Our work also contributes to HCI in demonstrating a productive synthesis of critical design and interaction criticism. Had we relied only on our own process of making and our initial associated reflections, our ideas would not have progressed to thoughts of transport and wayfaring. Moreover, by asking respondents to criticize our transformations, and not use them, we opened up the object of our participants' attention. Many respondents crafted real arguments inspired by the transformations, instead of just relating likes and dislikes. In both substance and scope, these arguments challenged our own initial interpretations of our work and propelled our thinking.

Indeed, just as we have come to see database flow as providing infrastructure for wayfaring interactions, we are also beginning to formulate critical reading as providing infrastructure for critical design and innovation, and our future work will explore this integration, via the new transformations subsequently created by the student critics in our study.

ACKNOWLEDGMENTS

We thank all our respondents for their perceptive and insightful contributions, and the anonymous reviewers for thoughtful advice. We especially thank Kristen Hogan, who initially suggested an integration of classification design and mestiza consciousness.

REFERENCES

1. Anzaldua, G. (2012). *Borderlands/La Frontera: the new mestiza.* (4th ed.). San Francisco: Aunt Lute Books.
2. A. Telier. (Binder, T., et al.) (2011). *Design Things.* Cambridge, MA: MIT Press.
3. Bardzell. J. (2011). Interaction criticism. *Interacting With Computers, 23,* 604–621.
4. Bardzell, J. and Bardzell, S. (2013). What is critical about critical design? *Proc. ACM CHI 2013,* 3297–3306.
5. Bardzell, S., et al. (2012). Critical design and critical theory: The challenge of designing for provocation. *Proc. ACM DIS 2012,* 288–297.
6. Dalsgaard, P., and Dindler, C. (2009). Peepholes as a means of engagement in interaction design. *Proc. Nordes 2009: Engaging Artifacts.*
7. Dunne, A. (2006). *Hertzian tales.* Cambridge, MA: MIT Press.
8. Gaver, W., Beaver, J., and Benford, S. (2003). Ambiguity as a resource for design. *Proc. ACM CHI 2003,* 233–240.
9. Geisler. G. Open Video Digital Library Toolkit. (Available at http://www.open-video-toolkit.org/)
10. Ingold, T. (2007). *Lines.* London: Routledge.
11. Lowgren, J. and Stolterman, E. (2004). *Thoughtful interaction design.* Cambridge, MA: MIT Press.
12. Ratto, M. (2011). Critical making. *The Information Society,* 27(4), 252–260.
13. Sengers, P. Boehner, K., David, S., and Kaye, J. (2005). Reflective design. *Proc. AARHUS 2005,* 49–58.
14. Sengers, P. and Gaver, W. (2006). Staying open to interpretation. *Proc. ACM DIS 2006,* 99-108.
15. Star, S.L., and Bowker, G. (2007). Enacting silence: residual categories as a challenge for ethics, information systems, and communication. *Ethics and Information Technology,* 9, 273–280.
16. Wilson, P. (1978). *Two kinds of power.* Berkeley, CA: University of California Press.