

# Using Composition to Re-Present Personal Collections of Hypersigns

Andruid Kerne, J. Michael Mistrot, Madhur Khandelwal, Vikram Sundaram, Eunyee Koh

Interface Ecology Lab

Center for Study of Digital Libraries, Computer Science Department

Texas A&M University, College Station, TX 77845, USA

+1 979.862.3217

andruid@cs.tamu.edu, mistrot@blueskystudios.com, {madhur, vikrams@tamu.edu}, eunyee@cSDL.tamu.edu

A *langue* (*langue*) is a social institution and a system of values... that resists the modifications coming from a single individual. In contrast, *speech* (*parole*) is essentially an individual act of selection and actualization, the combination thanks to which the speaking subject can use the code of the language with a view to expressing his personal thought.

The sign is a compound of a signifier and a signified. The plane of signifiers constitutes the plane of expression and that of the signified the plane of content... The sign-function ... is the very unit where the relations of the technical and the significant are woven together."

– Roland Barthes, *Elements of Semiology*

## ABSTRACT

The hyperlink is structurally amenable to semiotic analysis. Anchor and destination function as signifier and signified. Especially significant are digital surrogates, such as Amazon catalogue entries, and Google gists. These are systematically produced hypertextual signifier-signified pairings. This paper develops a new semiotic operand, the *hypersign*, emphasizing the role of hyperlinked surrogates in information age communication.

We consider work by art theorist John Berger, installation artist Hanne Darboven, and hip-hop DJ Spooky, while theorizing about transformational forms for personal hypersign collections. We provide an architectural overview of combinFormation, a mixed-initiative tool for using composition to re-present personal collections of hypersigns. combinFormation interjects personal speech, or *syntagm*, into the process of collecting information resources. We illustrate the use of combinFormation by developing a navigable composition of hypersigns based on the source materials of this paper. The result is a form of recombinant information, in which visual bookmarks are transformed through remix/assemblage, creating new meanings. Like the work of Darboven and Spooky, the resulting form interjects a personal sense into the experience of reproductions. In doing so, it recasts Benjamin's aura of the original through a postmodern process of personal collection. By connecting theory and practice through information artifacts, and concurrently remixing methodologies, this paper+composition functions as an interface ecosystem.

## Categories and Subject Descriptors

H.5.4 [Information Interfaces & Presentation]: *Hypertext / Hypermedia*: Architectures, Navigation, Theory, User Issues.

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## General Terms

Design, Human Factors, Languages, Theory.

## Keywords

semiotics, surrogates, information space, composition, remix, browsing, world wide web, digital libraries, electronic commerce

## 1. SIGNIFIER-SIGNIFIED-SIGN

Saussure's semiotics are based on the coupling of the signifier and the signified in the sign [28]. The signifier is a label, name, or icon, used to refer. The signified is the content or concept being referred to. The conjunction is tight. It is systemized in the practices of a language, or semiotic code, by a society. We can apply this construct in the analysis of meaning in information age ecologies [16]. Such analysis straddles media, cultures, methodologies, and epistemologies. For an initial example, in declarative programming languages, the signifier is the name of a variable; the signified is its value.

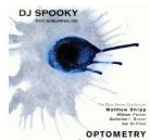
Barthes [1, 2] and Baudrillard [3] extend this formulation to account for  $n^{\text{th}}$  order nested sign amalgams. Barthes describes such phenomena in terms of *metalanguage*. One example is that a calm and dignified looking person of color saluting the French flag conveys a sense of order and dignity in French globalism [2]. Another example is the use of the term "world wide" web as a means of suggesting that everyone has equal access to digital information. However, 41% of those online are in North America, which has only 6% of the world's population [9]. This means that in actuality people in North America are an order of magnitude more likely to have access to the net than those elsewhere.

## 2. SURROGATES

*Surrogate* is a term from library science. A surrogate is "a replacement for an original item, ... which gives some description of the item, and how it can be obtained" [7]. Examples of surrogates include entries in catalogues, bibliographic citations,

search engine result set elements, and bookmarks. As Greene et al have observed, "in browsing, surrogates provide an important alternative to primary objects as they take far less time to examine," while "in digital libraries and archives, surrogates are crucial for browsing large distributed collections that result from filtering programs or analytical queries of the data space. The need for inventing new types of surrogates underlies much of the research in digital libraries" [13]. Semiotics has a role to play in this research, because it addresses the structure of representations of meaning.

**Optometry**  
DJ Spooky



List Price: \$16.98  
Price: **\$16.98** & eligible for FREE Super Saver Shipping on orders over \$25. [See details.](#)  
Availability: Usually ships within 24 hours  
Only 1 left in stock--order soon (more on the way).

24 used & new from \$13.02

▶ See more product details

Figure 1: an Amazon surrogate.

Surrogates are often retrieved as members of result sets, in response to search queries, or category-based browse requests. Typical applications, from Google to eBay, present these collections of surrogates in the form of lists. Particularly since people involved in browsing and searching spend so much time interacting with result sets of surrogates, the form of their representation deserves consideration.

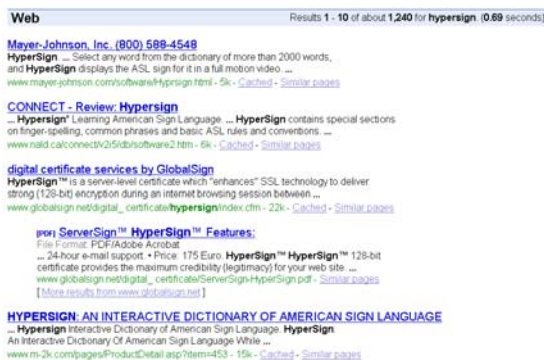


Figure 2: a set of Google surrogates.

### 3. SEMIOTICS OF THE HYPERLINK

We can use semiotics to analyze the function of surrogates in the context of hypermedia, the web, and digital libraries. Most basically, a hyperlink constitutes a sign conjunction. The link source, known as its anchor text or iconographic image, is a signifier. The href destination is its signified. Aesthetics, style, and semiotics function structurally in the construction of meaning across the hyperlink. For example, according to Tosca, the structure of the hyperlink association can be more straightforward (requiring less thinking), or more lyrical (requiring contemplation to understand). Lyricality, in this sense, can be seen as part of a cognitive process of ideation [11], in which new understandings are arrived at through engagement with the signifier-signified

pairing of the hyperlink. The information discovery framework addresses the iterative reformulation of interests and goals, and the emergence of new ideas, during processes in which a person engages with digital information resources [18].

The hyperlink as sign strikes us a relation that is emblematic of the information age. Hypermedia surrogates constitute a special subset of these postmodern phenomena. In their role as descriptive replacements, surrogates are created particularly to function as signifiers; the original object is the signified. The conjunction of surrogate and hyperlink reference object interoperate as a fundamental unit of meaning, that is, as a sign.

Surrogates are created and re-presented according to structural schemas. In this, sets of surrogates from a single source instantiate consistent signifier forms. In addition to Google result sets, commercial electronic catalogs, online catalogues of brick and mortar libraries, and digital libraries are examples. Metadata ontologies play a fundamental role in this bridging between signified and signifier, as do presentation templates. These schemas define the form of a collection, through the plane of signifiers. The uniformity effected by surrogate structures in the presentation of a collection corresponds to the homogenous perspective in terms of which Barthes' identifies typical structuralist activity as the building of a *simulacrum* [1: 95-97], or simulation model, of the objects of investigation. Such phenomena encompass and go beyond branding, and particular experiences of (1) form query, (2) browse choices, and (3) select product. They delimit a metalinguistic form. Thus, the semiotic structure of an Amazon catalogue entry goes beyond selling a particular product, such as a DJ Spooky album (figure 1); it conveys the e-commerce marketplace as a whole. Likewise, the representation of Google result set gists goes beyond the results of a particular query on "hypersign" (figure 2), to stand for the process of effectively searching the web. This role of the hyperlink as sign in the representation of surrogates is so significant in the digital landscape, extending over, across, and through the terrain of browsers, search engines, electronic commerce, and digital libraries, that we call the hypermedia surrogate, *hypersign*. According to the search query of figure 2, this usage appears to be new. It shows that the term hypersign has not previously been used in semiotic or hypertext theory. In this example, the act of *googling*, and the sign of a Google surrogate result set play a standardized role in the validation of innovation.

### 4. THE SEMIOTIC FORM OF HYPERSIGN SETS

When we make a search query -- to Google, Amazon, or the ACM Digital Library -- we typically get back a set of similar hypersigns, such as a list of representations of articles or DVDs. Such sets correspond to what Barthes calls *system*, which corresponds to *langue*. Such a semiotic system is a homogeneous set of signs derived in association to a common term. The association, rather than an a priori common context, is the set's organizing principle. The search query is exactly this type of associational basis. In this way, the result set represents a language system.

Barthes offers another axis of semiotics, perpendicular to systematic language. *Syntagm* is a combination of co-contextualized signs which correspond to speech (*parole*). This is an individualized set, such as the clothes a person is wearing at

one time, or all the furniture in a single house. At first blush, syntagm would seem to correspond to the personal collections of hypersigns that we are interested in: e.g., the shopping cart, the set of references that are associated with the development of an academic paper, or the set of bookmarks to cool stuff on the net that one teenager sends to another.

Yet, we must consider the process through which these personal collections are formed. That is, typically, early in the process of conducting research, a person will form queries to find relevant information resources. The particular results they decide to collect and use can be seen as a residue or crystallization, which emerges from these searches. The search queries formed and hypersign result sets received play an integral role in the process of forming personal collections, and so are, themselves, significant artifacts. Thus, in one type of personal representation of a research collection, surrogates of the most relevant results are foregrounded, over a background formed by the other more or less relevant results. The personal and the systematic are combined. We believe that from a semiotic perspective, the significant hypersign sets people need to collect are both syntagmatic and systematic.

Our research is focused on the semiotic form of the collections that people need and desire to create when they work and play with information. To what extent are the forms of individual and collected hypersign signifiers determined by the automata that produce them? To what extent can humans affect them? What role can expression play in these processes?

We turn to art history and critical theory. John Berger (citing Benjamin [4]) observes that in the age of reproduction, the role of the art museum has changed [5]. Instead of simply presenting paintings as visual artifacts, museums re-present the authority of the original, in relation to reproductions. Berger is unsatisfied with this role. He sketches an alternative paradigm for the museum in the postmodern era:

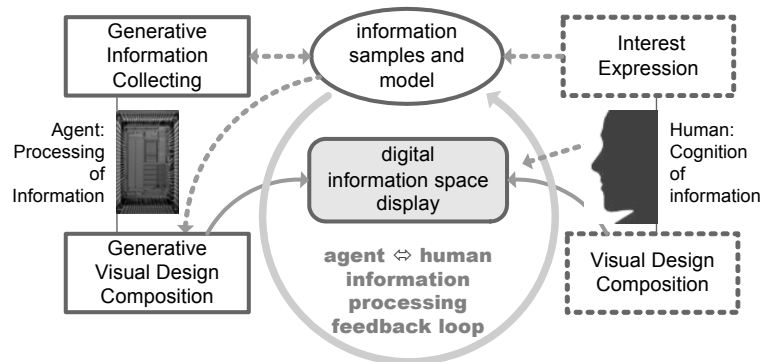
Adults and children sometimes have boards ... on which they pin pieces of newspaper cuttings, original drawings, postcards. On each board all the images belong to the same language and are all more or less equal within it, because they have been chosen in a highly personal way to match and express the experience of the room's inhabitant. [5: 31]

In Berger's model, the museum is a personal collection of reproductions, which is formed by the individual. The notion of "belonging to the same language," in this context, invokes *langue* and *parole*, at the same time. It is certainly personal speech, and thus *parole/syntagm*. Yet the push pin board may be used to collect, for example, a set of impressionist paintings, in which case systematic *langue* is invoked.

In contrast, we observe that the normal forms of hypersigns employed on the web are notable by how fixed they are. This is ironic, since digital media are so amenable to manipulation. Thus, while a user can type a word into a search box, one result set is typically received. There is little generally available in the way of mechanisms that enable one to move forward from the search in a personalized way, that is, in a form that corresponds to speech (*parole*), and syntagm, assembling hypersigns across queries. Exceptions to this tend to be limited in the expressiveness of their form. The browser "favorites menu," and the Amazon shopping cart and wish list allow for the construction of personalized lists. Yet the surrogates are textual. The format is fixed, rather than fluid, like the push-pin board. "My EBay," a more advanced incarnation, likewise consists of a list of lists (e.g., items I'm watching, items I'm bidding on, items I've bought). The user can customize which lists are displayed, and the order of these lists on the page. The list form does little to aid the user creatively, cognitively or semiotically in seeing how the items can function together as an ensemble or mental set, that is, in functioning syntagmatically. Instead, it challenges the capacities of human working memory [18].

The list and the push-pin board are differentiated by their degree of flexibility. Prior spatial hypertext systems [e.g., 24] give users the ability to manipulate elements spatially. However, they do not facilitate the manipulation of surrogates, in particular. That is, they leave the process of forming personal collections, and of maintaining the links of the surrogate hypersign, to the user.

Installation artist Hanne Darboven creates personal collections systematically [6]. She uses reproduced artifacts as elements. For example, "Friedrich II, Harburg 1986" consists of 398 prints of the same photograph, each annotated with a different handwritten text. The photograph is historic. It depicts a street scene, with a street car, pushcarts, and bicycles. A consistent form of annotation is employed. The resulting elements are re-presented in a grid structure. The form of the re-presentation transforms the



**Figure 3: An overview of combinFormation's mixed-initiatives architecture. The agent engages in generative information collecting and visual composition. The user engages in interest expression and composes design. State flows through the model.**

But there is also another sense  
in which seeing comes before  
words.

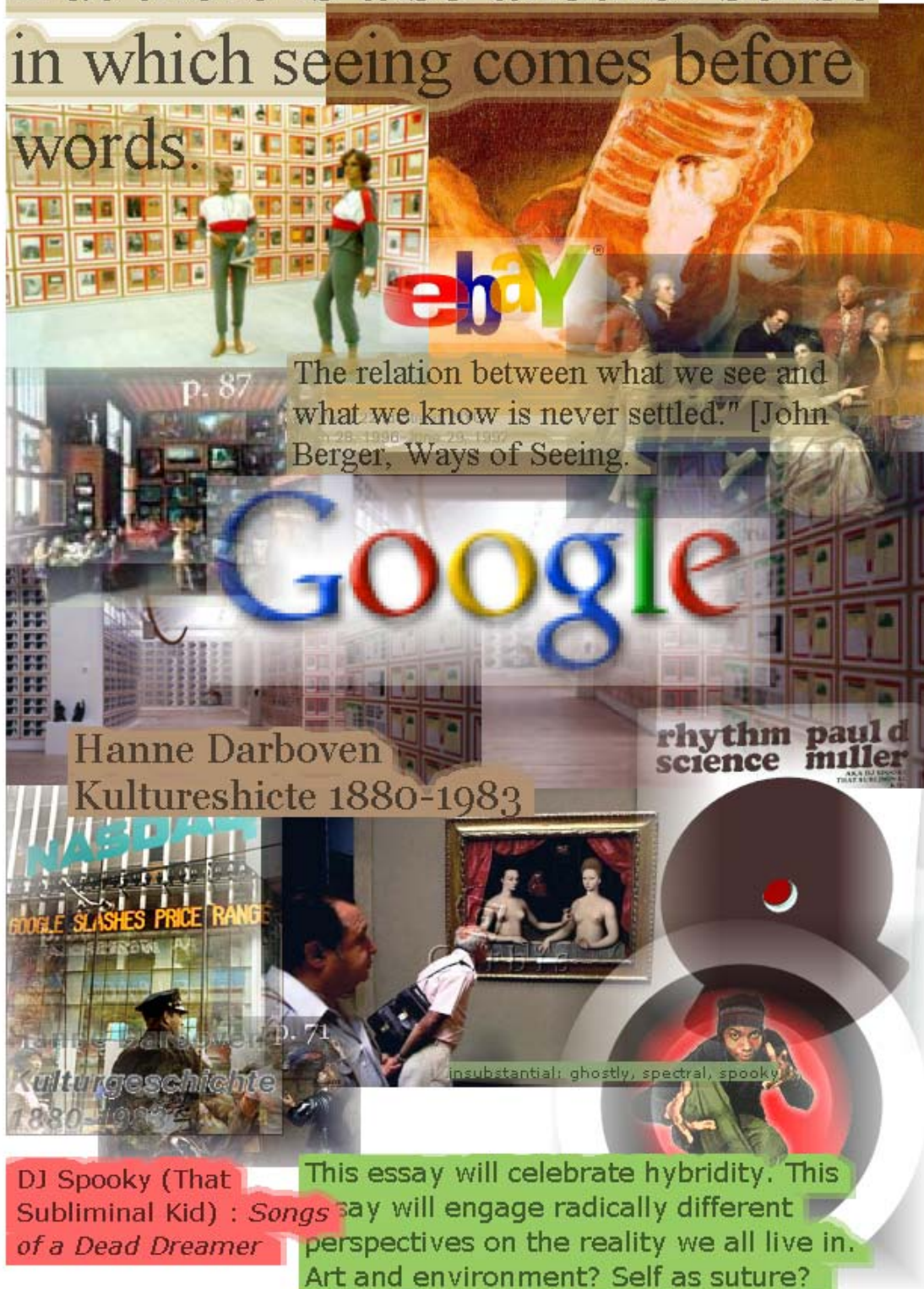


Figure 4: Re-presenting the ideas of this paper as a composition of hypersigns. Samples include works by and about Hanne Darboven, DJ Spooky, John Berger, Google, and EBay.

reproductions into a new original. While the resulting language is personal for her, the audience receives a beautiful edifice of arbitrary structure, that is simultaneously distinctive and imposing.

Hip-hop musician Paul Miller (aka DJ Spooky) connects the formation of conceptual frameworks with rhythm. He identifies the assemblage of elements of identity, which characterizes the information age through immersion in data, as *multiplex consciousness*. Miller defines DJing in terms of *rhythm science*:

Rhythm science uses an endless recontextualizing as a core compositional strategy... DJs are griots, and whether their stories are conscious or unconscious, narratives are implicit in the sampling idea.. The mix breaks free of old associations. The languages evolve and learn to speak in new forms, new thoughts... Sampling allows people to replay their own memories... At the end of the day, it's all about reprocessing the world around you [27: 21-27].

The hypersign is a significant type of sample. Surrogates are produced explicitly as samples, to represent the original object. They arrive in our field of browsing as anchors, dressed in hyperlinks. The Interface Ecology Lab researchers are interested in how hypersigns function in people's processes of creating meaning. People encounter hypersigns while browsing and

searching. We use them as we work to construct new plans, new ideas, new knowledge. We use them as well, as we play with information, in more freeform processes. We form personal collections when we research, when we write, when we buy, and while we are entertained. We need to discover how to enable users to re-present these collections of syntagmatic and systematic hypersign forms. To this end, the Interface Ecology Lab is engaged in building software to support personal and public processes of hypersign remix [15].

## 5. combinFormation: COMPOSING HYPERSIGN COLLECTIONS

Our software gives people tools for re-presenting hypersign collections, whose information elements need to be connected in the mind, across experiences of interaction, cognition, understanding, and use. The focus moves from fixed forms, which are presented for binary one-shot decisions of accept or reject, to malleable forms which can be contemplated and manipulated by the user, forming personal re-presentations. We are developing a transformative digital engine that enables a person to engage in syntagm/parole with digital surrogates, by reappropriating the hypersign forms, and recasting them as personal speech. The basic idea is to gather hypersigns in a compositional space that enables a person to modify and recombine them. This form integrates prevailing language systems of surrogates, with new potentials for personal expression and recontextualization. These compositions can be shared via email and published on the web

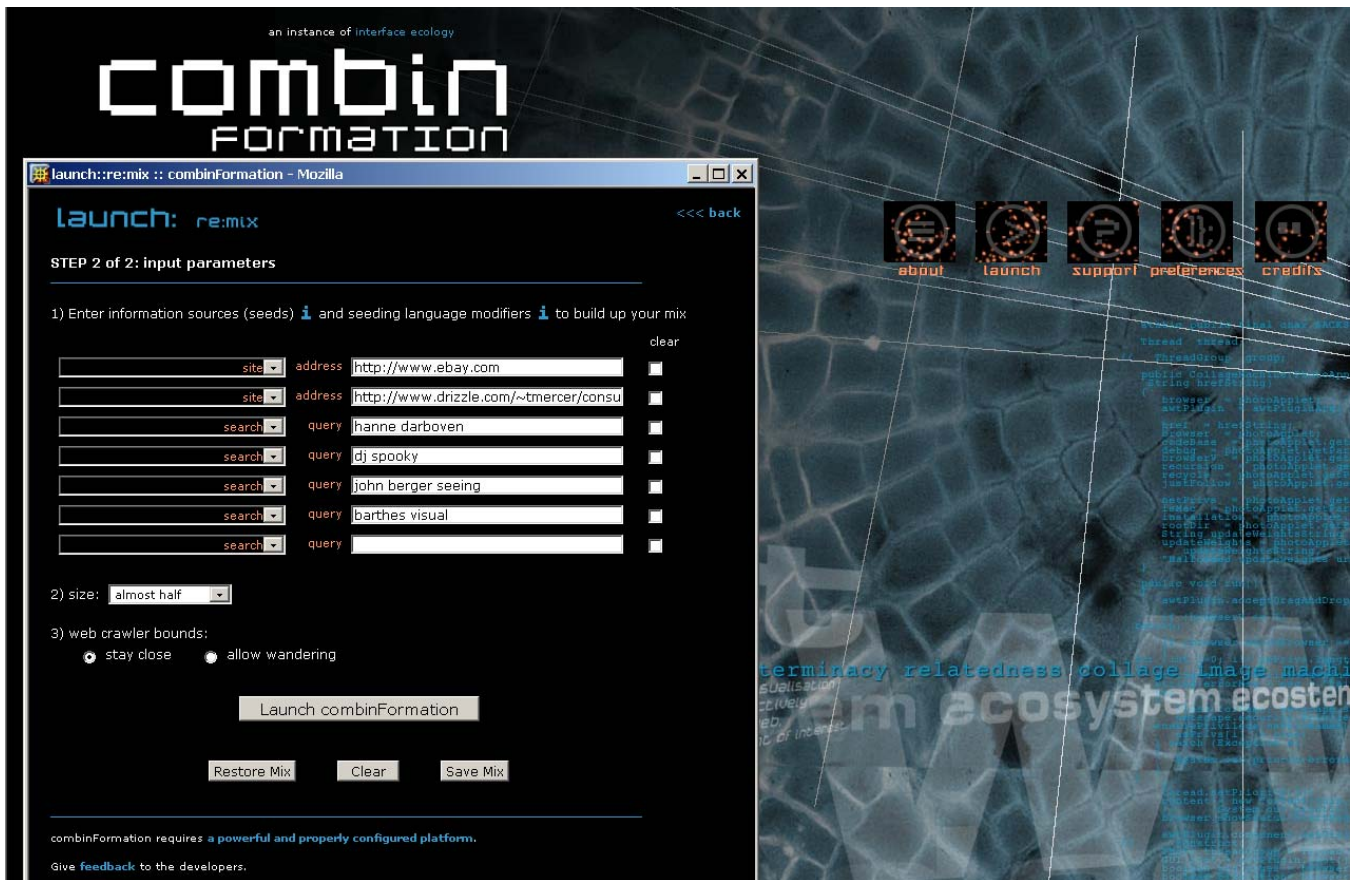


Figure 5: Launching the re:mix to seed an information surrogates composition session in combinFormation.

[17].

In order to facilitate the person's process of gathering relevant hypersigns, the system integrates a composition agent into the process of creating the information space (figure 3). In this way, *combinFormation* is a mixed-initiative system that uses composition for browsing, collecting, and arranging information samples from web pages. In the current implementation, these samples are images and sentences of text. The samples act as visual, semiotic, and navigational surrogates for the documents from which they are extracted. When they are brought into the composition space, the images and texts retain the structure of first class samples; that is, they remain connected to their source and hyperlink documents, as hypersigns.

The initiatives mixed in *combinFormation* are the system's generation of composition, and the user's direct manipulation (figure 3). The system's generative actions -- collecting hypersigns, and composing them visually -- are conducted iteratively, based on a user model. The system presents the ongoing generation of the composition to the user in an interactive information space. In this space, one of the user's initiatives is to directly manipulate the composition through interactive design operations, which enable samples to be displaced, layered, resized, annotated, and removed. Another user initiative is to navigate through the sample as hypersign, connecting to a traditional browser. The user's third form of initiative is to express positive or negative interest in each sample. Expressions of interest affect the model, creating a feedback loop through the information space display (figure 3).

*combinFormation* uses an underlying grid structure for the layout of elements, as it adds them to the composition. The grid works quite differently than Darboven's [6], because the elements are heterogeneous, rather than homogeneous. In addition to containing different colors and shapes, the elements possess different aspect ratios. They are assigned different sizes, by the composition agent, based on their relative importance. As the space fills up, over time, new elements are expected to overlap prior ones. In the current implementation, the agent places each new element over the contiguous set of grid cells of the assigned size, which corresponds to the lowest weight candidate area. The user can override grid-based layout, by using the grab tool to reposition elements in the space.



**Figure 6: Composition + Interest Expression toolbar with selected operations: grab + positive interest.**

The current *combinFormation* interface includes three floating toolbars. Initially, they are distributed vertically, on the right side of the space. Each toolbar can be dragged to anywhere on the user's screen. The top toolbar (figure 7) controls text-image mix. It defaults to 60% images. The center toolbar (figures 6, 7) enables selection of composition/navigation tool on the left side, and interest expression on the right. These options are orthogonal [19]; that is, they can be combined independently. Interest can be neutral, positive, or negative. The conjunction is displayed in the

cursor. At the start of a session, composition/navigation is set to navigate, while interest expression is neutral. The other composition and interest expression actions can be selected by clicking the appropriate icon, or by toggling with arrow keys (composition/navigation via left/right; interest expression via up/down).

Elements are activated for interaction with the expression-interest tool conjunction, by simple mouse over, rather than click. This choice of interaction design style emphasizes fluidity. Activated elements display metadata in the context of the composition. There are no dialog boxes. Mouse over activation also provides local tools, such as one for initiating search, and an edit palette for element-specific (rather than assemblage-scope) composition actions, such as font change or transparency toggle. Clicking an activated element causes the selected composition and interest expression effects to be processed.

The bottom toolbar (figure 7) is the tape recorder transport. In record mode, the usual initial state, the agent engages in generative visual composition. This can be paused. Prior states can also be traversed with reverse and forward play, and with a history jog-shuttle. These controls address the temporal form of the mixed initiative medium [21].

The composition space is split into 2 regions, delimited by a thin grey and white line (figure 7). The outer area is the *cool space*. This is for the human, only. In the center is the mixed-initiative *hot space*. The composition agent adds elements here, and as the space fills, will also remove elements from here. We have appropriated the language of McLuhan [25]: a hot medium, such as film, saturates its audience with information. A cool one, such as the novel, leaves more of the sense of view forming to the audience member's imagination.

## 6. HYPERSIGN RE:MIX SESSION

We will now explain the *combinFormation* experience through a first-person example session narrative. In this session, we will compose research source materials associated with this paper. *combinFormation* is a client-side web application, implemented as a veneer of DHTML, which gathers runtime parameters, and passes them as it invokes a signed Java applet. To use the software, you access the *combinFormation* web address [15] in a traditional browser, and then click "launch."<sup>1</sup> The launch page offers several forms for seeding [20] a session. This is the specification of initial documents, which are downloaded, and sampled. Information element surrogates encountered become candidates for the agent's subsequent generative visual composition initiatives. Hyperlinks become candidates for generative information collecting, via web crawling. (See the architecture overview in figure 3.)

In the example case, I have utilized the re:mix seeding interface (figure 5). This particular front-end enables specification of any number of seeds, and allows mixing of seed types, such as web site addresses, and search queries. I specify a couple of web sites (Mercer's paper, "The Consumption of Links" [26], and EBay), and then several searches in areas that have been cited. Then, I click launch.

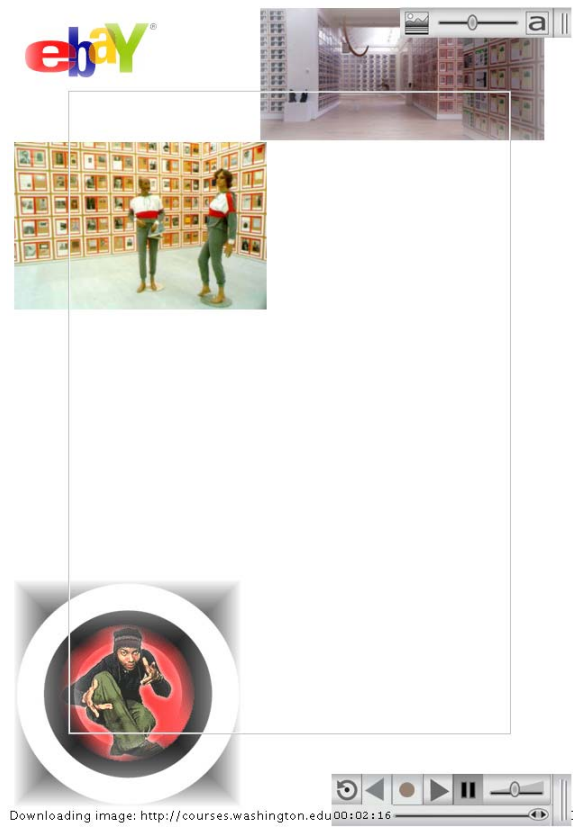
<sup>1</sup> First time users will likely need to click "support" to install Java, and configure the Java plug-in, prior to using the program.



**Figure 7: Move desired elements to the cool space, and pause.**

The program processes search queries in a tailored manner. It uses Google to perform the searches. It does not actually bring samples from the Google results page – the standard surrogates -- into the composition. Instead, it immediately downloads the first fifteen Google result pages, from their web sites. These get sampled. The samples are collected in a set of candidates, which feeds the composition. Those of the collected samples that are selected for visual composition will function as hypersigns. Similarly, the links from the downloaded pages become candidates to feed the web crawler.

The applet initializes the interface. The space begins to fill. Some excellent images of Hanne Darboven’s work enter. I use positive interest expression (up arrow in center toolbar, right side; this is also available with the up-arrow keyboard accelerator), to put some positive interest on one of these elements. I drag it over to the cool space (using the grab tool: center toolbar, left side), in the peripherae. This is a way to make sure that the agent won’t remove it, or cover it up. I shift to neutral, so as not to express too much interest, too fast, and drag another Darboven image over. I repeat this pattern -- express some interest and drag to cool space -- the same with a DJ Spooky image. I also drag the EBay logo over, but with neutral interest expression. A bunch of other EBay elements are showing up. They are not interesting to me; I shift



**Figure 8: After clearing the hot space of extraneous elements.**

the center toolbar left, use the down arrow to express negative interest, and remove several of them.

At this point (figure 7), I pause generation of the space. It seems to me that while I’m getting good stuff, and the session is going well, the center feels crowded with elements that I’m not crazy about, visually. I’m also really wishing for some John Berger material. I cut a bunch of elements, using negative interest. But this feels tiring. So, I press the clear button (lower toolbar, the tape recorder transport, very left). This is the button with the partial circle and arrow pointing counter clockwise. Immediately, all the elements in the center hot space are removed (figure 8). I use File -> Undo to toggle back and forth once, to make sure that I didn’t delete any elements that I wanted. I feel satisfied.

I unpaused composition generation. An element enters from a site about John Berger’s *Ways of Seeing*. I click it a few times with positive interest, to strongly promote collecting related elements. These begin to flow into the space. The system also begins to respond to my expression of interest in DJ Spooky / Paul Miller. I drag the elements I like best out to the cool space. I reach the state shown in figure 9.

In figure 9, an image element with text that reads “Reviews and Features,” is selected via mouse over interaction. I have set the composition-interest tool state to cut + positive interest. This is because the subject – reviews of albums by Spooky – is of interest. But the image itself is not visually strong, so I wish to remove it. Immediately after taking the screen shot, I click,



**Figure 9: With more relevant elements on DJ Spooky and *Ways of Seeing*. An element is selected, displaying descriptive metadata. The cursor is poised for “positive cut.”**

simultaneously cutting the element and asking for more related information.

Next, I realize that I want Google depicted in the composition. But even though combinFormation has used Google to conduct the search, I haven’t included the look and feel of their site directly in the seeding. On this occasion, Google’s presence must be made explicit. I use the traditional browser to find a page in google.com, with the plain Google logo. (This is a bit more work than usual, because the Olympics are on, and most of the Google logos have been altered to celebrate them.) I use drag and drop to bring the Google logo into the center of the composition. I immediately resize this element to be larger, because Google plays such a major role in how people collect information. I simply use mouse over selection, and then drag one of the corner boxes.

I continue to compose with drag and drop. I use the navigate tool to go to a page from the Berger site. This page includes links to larger versions of most of the image examples from the book. I drag several of these into the space, as well. The result is figure 10.

I collect more hypersigns. I recall that there is an image on the New York Times web site this evening, in which a stock ticker



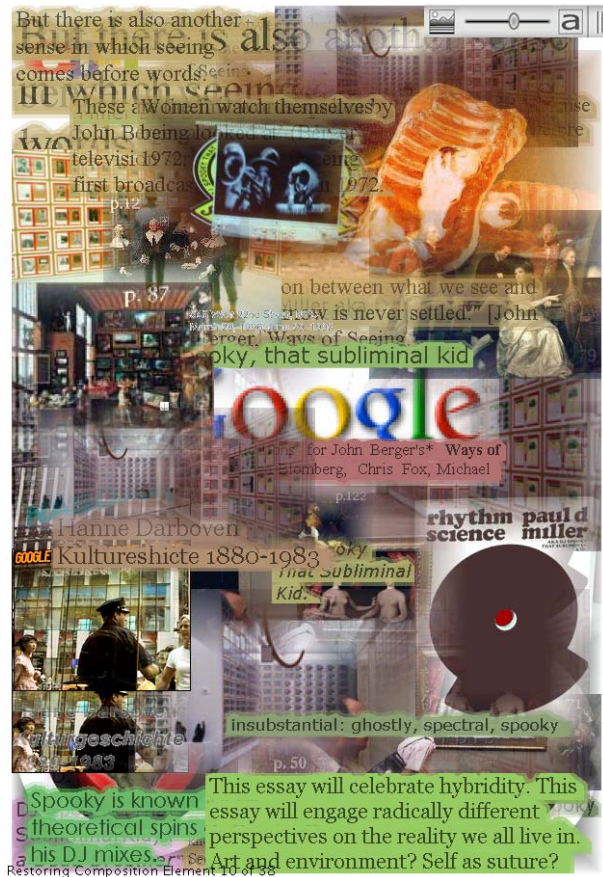
**Figure 10: Hypersigns from Google and *Ways of Seeing* have been composed through human imitative of drag and drop.**

shows a message about Google’s IPO, and a decline in their initial asking price. The image strikes me as a signifier for the role of economy in shaping our experience of information, and the sometimes hard to comprehend manner in which this works. I drag this image in, as well. I want the new elements to feel more connected, visually, so I use the element editing panel to add compositing to several of them. I then turn generate back on. The space grows extremely dense, resulting in figure 11.

I enter a final stage of work: preparing the composition for representation to an audience. I eliminate many elements, reducing density. I compose elements spatially, with more definite intention. I restore the EBay logo, which I somehow lost track of, with drag and drop. I make some text elements larger, and some elements smaller.

I take a break and return. Now, I make fine changes. I move the Darboven image near the top left up some, so one of the mannequins seems to be standing on the p. 57 label in the proximate Berger image. At the same time, I shift the EBay logo to give it more space, let it breathe. I position this logo clearly in relation to the other mannequin’s hand, so it almost seems to emanate from it. The work of Darboven and EBay both involve mechanistic processes of forming and representing collections, which are also personal. Darboven’s work can be interpreted as a





**Figure 11** An extremely dense and rich space, after further generation of composition. The agent is retrieving many interesting elements. The composition clearly exhibits the influences both of myself, and of the agent. Two of the toolbars have been dragged out of the way, to permit clearer viewing of and interaction with the composition.

commentary on the role of automata in our lives. EBay, Google, and Amazon are signs of this, as prominent corporate entities.

I alter the opacity of a number of elements. Specifically, I make two of the Darboven images, and one of the images from *Ways of Seeing* (Goya's Still Life with a Sheep's Head) opaque, so they read more strongly. I do this by unchecking "compositing" on the edit palette that pops up on mouse over. (This palette can be seen with a different image, in figure 9.) I also adjust the stacking order of elements, by lifting some with Shift-Click (grab tool). In the composition as a whole, the opaque elements are still strongly composited. This is because for the elements that overlap them, compositing remains selected. These elements are re-presented with transparent borders. The program uses an *alpha gradient* to cross fade elements with "compositing" checked. The way this works is that the extreme border region of a composited element is processed to be more transparent. The center remains opaque. Transparency, also known as alpha, is interpolated across this region. In video editing, this technique is known as *masking*. In commercials and feature films, masking is executed to create perfectly composited scenes, in which the viewer will see elements as naturally part of the same landscape. In *combinFormation*, since the seams often show; the role of

compositing is made visible. This changes its function from spectacle to detournement [8]. The new usage contrasts with Manovich's prior analysis of the prevailing popular media use of compositing in mainstream film and television [23].

The final composition is shown in figure 4. I save this version. The program produces several forms of the composition, when I hit File -> Save. First, it produces an XML file. This file includes textual elements by value, and image elements and source documents by reference. It is a metadocument, that is, a collection of references to other documents [12, 17]. The XML metadocument can be opened again by the program. People can open the saved XML form of the hypersign composition in one of two ways. To access it from a hard disk, use re:open as the launch option. Then, File -> Open. Or, the space can be uploaded to a web server. A special URL syntax can be constructed for hyperlinking to the saved information space [17]. The XML file is passed as an argument to a special seeding web page, which will in turn pass the saved space to *combinFormation* on launch.

In this mode, publishing the composition of hypersigns is fully enabling for the "reader." That is, the reader receives the composition in the same environment in which it is produced. The hypersigns do much more than enable navigation. Their meanings are connected through the form of the composition. When opened, the composition can be further manipulated. Reading and writing become symmetrical, identical acts, which proceed iteratively. The new reader inherits the interest model of the prior writer, as well as the design. The reader as author can use *combinFormation* to express new senses of interest, and change the design to suit her own ideas. S/he can also use the program's generative agent to continue the process of information riffing. S/he can save a new form of the composition, and publish again.

Additionally, the program outputs a JPEG image of the composition, and an HTML file, with an image map, that references the JPEG. The HTML form of the composition also functions as a visual and navigational metadocument. It has the advantage that it can be opened in any standard web browser, without requiring Java to be installed and configured. The HTML form is not open to further manipulation by the agent or the user. It instantiates a more typical publishing model, in which the author and reader are separated by different environments for production and consumption.

## 7. DISCUSSION

The saved form of the composition connects the work of Darboven, Miller/Spooky, Berger, Google, and EBay through visual semiotics. It re-presents the ideas of this paper, through demonstration. The composition can be considered as a supplementary text; or the paper can be considered as notes on the composition as primary text. The composition is a mix, a form of recombinant information [20]. New meanings are created through the assemblage of found elements. The creative frameworks of generations of visual artists, such as Duchamp [22] and, Ernst [30], filmmakers, such as Eisenstein [10], and hip-hop composers, such as Spooky and Public Enemy [28], are invoked.

*combinFormation* enables authoring by reference with web media. The resulting compositional form is the visual metadocument. These are not just images and texts. They are surrogates, which can be navigated, to retrieve original source materials. They are hypersigns, which refer to and re-present the ideas expressed in

the source and hyperlinked documents. They are recontextualized in the compositional space of remix / detournement. They are new forms of information, transformations of Google's detritus.

Benjamin decries the loss of the *aura* of the original, as creative works are reproduced in the age of reproduction [4]. Yet, as in the example of Darboven's work, a *postmodern aura* emerges. This is the aura of the personal collection, in which mass produced objects are recontextualized and annotated. Formalism is one means in this process. The appropriated objects become personal when we interject our own forms through them. Composition is a means for transforming personal collections of hypersigns, so they grow syntagmatic, even as a residue of systematic language remains. The mixed-initiatives of combinFormation bring to the public at large tools for engaging in this process of composing hypersigns. The agent's initiative, as well as the logics of underlying dynamic content digital providers such as Google, Amazon and eBay, transmit a re-presented form of prevailing systematic *langue* through this engagement. The user's initiatives interject syntagmatic forms of personal meaning. We believe that by supporting personal expression as such, we will promote people's creative processes of information discovery [18], as well as their sense of empowerment. As developers, the Interface Ecology Lab's underlying goal is to elevate the role of personal speech (*parole*) and creative process in everyday interactions with information.

The composition created to demonstrate the ideas of this essay instantiates the interface as border zone between heterogeneous systems of representation [16]. Semiotics, information science, design, human computer interaction, art history, musicology, and computer science are among the remixed methodologies. As the theorist, I am present, developing a first person narrative of my own experience. The composition and the narrative about its creation connect theory and practice self-referentially, in a strange loop [14], by utilizing materials on the subject at hand. The product is part of the environment that it describes. Discourse about theory is instantiated through practice. Through this process and form, the composition+essay functions as an interface ecosystem.

## 8. REFERENCES

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