Seeking Information-triage

Comparative interface tools to help users manage complexity and mitigate anxiety during online searching

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Abstract

KEYWORDS
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Searching for information online can be overwhelming and confusing...

In many ways, the promise of the Internet—easily sharing information via a network of globally connected hyperlinks—has been overshadowed by a sense of information overload and anxiety for many users. The production and publication of online material has become increasingly accessible and affordable—creating a confusing glut of information that users must sift through to locate exactly what they want or need.

Part of the anxiety Internet users feel has to do with the shifting nature of the human attention span and the limits of working memory. As users engage with data and information online, they are bombarded with multiple levels of layered material and alternate avenues of discovery. When attempting to gather information to aid an important decision—especially when a search yields conflicting opinions—this chaotic atmosphere can prove paralyzing.

The concept of information-triage can help mitigate this anxiety and paralysis. Information-triage is the process of sorting, grouping, categorizing, prioritizing, storing and retrieving information in order to make sense and use of it.

Through this study, I examine the points at which design plays a role in the online search process, reconcile those points with the nature of human attention and the limitations of working memory, and suggest ways to support users with an information-triage system. I have created a set of three speculative and comparative online searching interfaces to explore these issues and the possibilities for information-triage

Table of Contents

SECTION ONE

The complications of complexity

In many ways, the promise of the Internet—easily sharing information via a network of globally connected hyperlinks—has been overshadowed by a sense of information overload and anxiety for many users. The production and publication of online material has become increasingly accessible and affordable—creating a confusing glut of information that users must sift through to locate exactly what they want or need.

"We are BOMBARDED *with material from the media, from colleagues, from cocktail party conversation, all of which is delivered in the form of what we have been taught to think of as information. We are like a* THIRSTY PERSON *who has been* CONDEMNED *to use a* THIMBLE *to drink from a* FIRE HYDRANT*. The sheer volume of available information and the manner in which it is often delivered* RENDER MUCH OF IT USELESS *to us."*
[WURMAN, 15]

Generations of people who have been trained to passively accept information (from sources of vetted authority) are now interacting with a very dynamic system of globally linked information. Is an article in the *Encyclopaedia Britannica* on augmented reality equal to an entry in Wikipedia? Can a blog posting about diabetes be more informative than an appointment with your doctor? These are slippery questions that are no longer easy to answer. In the shifting context of the Internet, credibility and authority should never be assumed.

Information overload is not a new problem—people have been inundated with increasing levels of information since the Industrial Revolution and the explosion of printed material (and later, mass media) that came along with it. What has changed in the last twenty years is the ease of access to an unchecked flood of information. According to Clay Shirky (from his presentation at Web Expo 2.0), what we are experiencing today is not really information overload—it's filter failure. Filters that developed over the last few hundred years to deal with large amounts of information have started to break down as the Internet has moved society from a process of top-down edited publication to one of bottom-up open-source dissemination. Design can (and should) engage with this issue to develop better tools and systems, helping users triage and filter the information they encounter online.

The concept of "information-triage" comes from the medical process of sorting through and prioritizing patients for care. A triage practitioner must quickly recognize, sort, categorize, and prioritize the status of a given patient—usually in a very hierarchically driven and methodical way. Each new case is moved through the system following scripted sets of criteria, allowing less critical cases to be dealt with as time allows, and the most critical cases to be dealt with immediately.

"Information anxiety can have many forms, only the first of which is the frustration with the INABILITY TO 'KEEP UP' *with the amount of data present in our life. What makes this worse is that the data is not just passive, but* ACTIVELY INSERTING *itself into our environment, our attentions. Whether in the form of advertising or gesture,* DATA IS MUCH MORE PREVALENT *and attention-demanding than simply laying in books waiting to be opened. To compound this, as a society, we've made the mistake of* COMMONLY CONFUSING DATA WITH INFORMATION*, indistinguishing the raw commodities that are the building blocks of meaning with* MEANING ITSELF *(the true meaning of the word, information)."*
[WURMAN, 15]

The concept of triage migrated to the computing and business world as tasks and jobs became increasingly complex. In today's milieu of smart phones, laptops and wi-fi, humans are finding themselves "plugged in" 24 hours a day. Tools that were supposed to free up our time (for relaxation and leisure) have instead caused an even greater influx of multi-tasking and fast-paced decision-making. Personal time has increasingly been intertwined with work time, creating an overall environment of distraction.

Part of the anxiety Internet users feel has to do with the shifting nature of the human attention span and the limits of working memory. As users engage with data and information online, they are bombarded with multiple levels of layered material and alternate avenues of discovery. The user encounters countless screens, ads and links, which are all competing for attention. These short bursts of disjointed data are distracting for even the most focused user—and over time users often forget what they were searching for in the first place. When attempting to gather information to aid an important decision—especially when a search yields conflicting opinions—this chaotic atmosphere can prove paralyzing.

Through this study, I propose to address these factors by examining the points at which design plays a role in the online search process, reconciling those points with the nature of human attention and the limitations of working memory, and supporting users with an information-triage system.

SECTION TWO

Problem statement and sub-questions

Definitions

INFORMATION-TRIAGE: the process of sorting, grouping, categorizing, prioritizing, storing and retrieving information to make sense of it.

USERS: average adults who use the Internet to search for information.

NUTRITION: the quantifiable data attached to an item or category of food that signals whether it is considered healthy (or not) by a given organization, community, government or culture.

ATTENTION: the cognitive aspects of attention (the ability to focus on an object, concept or task for an amount of time).

WORKING MEMORY: the human "ability to remember information for a limited period of time" (Klingberg, 33).

DECISIONS: coming to a conclusion, making a judgment, making up one's mind, a resolution.

INFORMATION: data that has been considered, interpreted and made meaningful.

DATA: individual facts, statistics, or items of information given or shown; interpretable.

Problem statement

How can the design of an online information-triage system support users in managing information and making decisions about nutrition?

Sub-questions

1} Where are the critical points where design might intervene within the process of online searching?

2} In what ways can online tools enable users to sort, prioritize and retrieve information according to personal criteria?

3} In what ways can an interface address the shifting nature of attention within the framework of online searching?

4} How can the design of online tools account for and reveal the limitations of working memory during decision making?

(definitions continued)

INTERFACE: the designed space that mediates/facilitates the use of the Internet/information.

INTERACTION: the ways in which users engage with elements of online tools and systems; the actions that are used.

CREDIBILITY: believable, trustworthy, official, capable of being believed, authoritative.

RELEVANCE: pertinent, useful at this time/to the matter at hand, appropriate, has a meaningful connection to.

SEARCH SUCCESS/SUCCESSFUL SEARCH: when a user is able to retrieve the data/information she feels is needed to complete the task at hand; retrieving data that seems to fit the need.

FACETED SEARCH: allows the assignment of multiple classifications to an object, enabling the classifications to be ordered in multiple ways, rather than in a single, pre-determined, taxonomic order.

Assumptions

- Average, adult Internet user.
- User does not have a lot of time.
- User wants to continue using search engines to access information.
- User feels anxious regarding a specific nutrition issue.
- User is supplementing advice received from medical professionals with information found online.

Limitations

- Study will focus on online search engines as a vehicle for gathering information.
- Design will occur within the framework of an online browser (specifically Mozilla Firefox 3.5.8 for Macintosh).

"We're stepping through the looking glass into an information-rich world with NEW POSSIBILITIES AND PROBLEMS*. We will find delight in groovy gadgets and location-based services. Individuals and institutions will achieve greater* FLEXIBILITY AND PRODUCTIVITY*. And yet, we will struggle to balance privacy, freedom, convenience, and safety.*

"And AMIDST ALL THIS NOVELTY*, our vaunted ability to 'learn how to learn' will be put to the test. How will we make* INFORMED DECISIONS*? How will we know enough to ask the right questions? Nine billion web pages. Six billion people. Who do you ask?* WHO DO YOU TRUST*? How do you find the best product, the right person, the* DATA THAT MAKES A DIFFERENCE*?"* [MORVILLE, 3]

SECTION THREE

The actors in interaction: defining my user

Users of the Internet have many different goals and motivations—to seek answers, to be entertained, to conduct business, to communicate. Some users like to wander through pages and paths, following links down dark rabbit holes. Some users point and click in a linear fashion, typing direct queries and expecting direct answers. But, no matter what type of user, it seems we have come to expect (and even taken for granted) the instant gratification of high-speed Internet access and the ubiquity and ease of search engines.

While some Internet users have the luxury of time, the type of user I'm choosing to focus on does not. She has a great many things dividing her attention on any given day—job, family, food, household, finances, friends, pets, healthcare, fitness, hobbies, news—a multi-tasker of the highest order. When she spends time online, it is usually with one eye on the computer screen, and the other on her to-do list.

"Words intended to represent CONCEPTS*: that is the questionable foundation upon which information retrieval is built. Words in the* CONTENT*. Words in the* QUERY*… And words are imprecise,* AMBIGUOUS*, indeterminate,* VAGUE*, opaque…Though* RELEVANCE RANKING *algorithms can factor in the location and frequency of word occurrence, there is no way for software to accurately determine* ABOUTNESS*."*
[MORVILLE, 53]

Using the Internet to find information and conduct research is an obvious choice for our user. It offers quick and easy access to many different kinds of information, and executing a search is generally a low-effort, low-stakes process. If she has a straightforward question, she knows what she's doing—how and where to look, and how to incorporate that information into her general body of knowledge. However, if she is searching for something unfamiliar or overly complicated, it's an entirely different matter. Formulating a query can be tricky, and even a simple search can seem confusing. This is because while computers can quickly locate and retrieve a specific piece of requested information, they have a hard time determining context.

If our user searches for the word gluten, is she interested in making bread? In the chemical makeup of the substance? In creating a homemade kind of glue? In learning more about a food allergy? A computer program has no way to know which of these relationships the user has to the search term—so it returns results related to all of them. The user is faced with an enormous number of websites to sift through, a great number of which have little to do with what she's actually interested in.

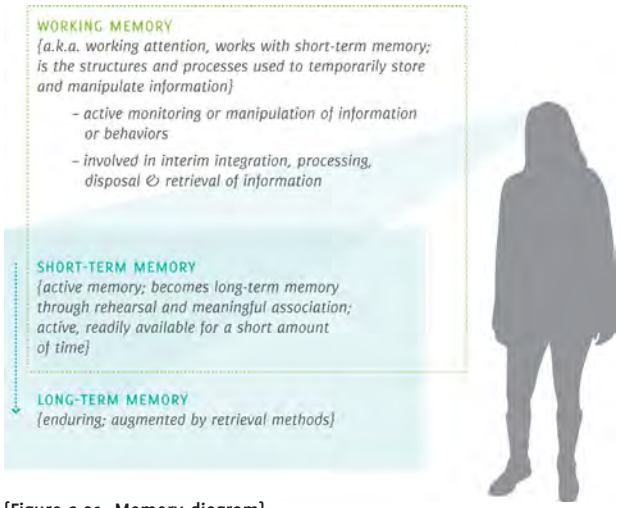
And if the motivation for a search is fraught with emotion or anxiety, our user feels even more overwhelmed. Issues having to do with food—nutrition, in particular—can be especially complicated. Much of the information in the media, on the Internet—even in the aisles of the grocery store—is complex and conflicting.

Working memory: for better and for worse

"Our RELATIONSHIP TO INFORMATION *is ambivalent. We clearly often seek out* MORE, QUICKER, AND MORE COMPLEX *information, as if we're getting a kick from the shot. But when we're sitting on the sofa trying to read the on-screen text while trying to follow the headlines, many of us are struck with a* FEELING OF INADEQUACY*, with a sense that our brain is already full of information.* IT'S OVERFLOWING*."*
[KLINGBERG, 7]

Our brains are overflowing with information—tasks, memories, ideas, conversations, movie dialogue, trivia—which comes at us in a steady stream from technology, media, other people and our environment. We have an undeniably impressive ability to manage immense amounts of this information on a daily basis. But even as we cope, when the steady stream becomes heavier and faster, we're left feeling uneasy, anxious and overloaded.

Our ability to process complex information is related to how well we can focus our attention—which is directly linked to the capacity (and limitations) of our working memory. As our brains overflow, and our tasks become more complex and taxing, we discover that working memory can be very limited indeed.

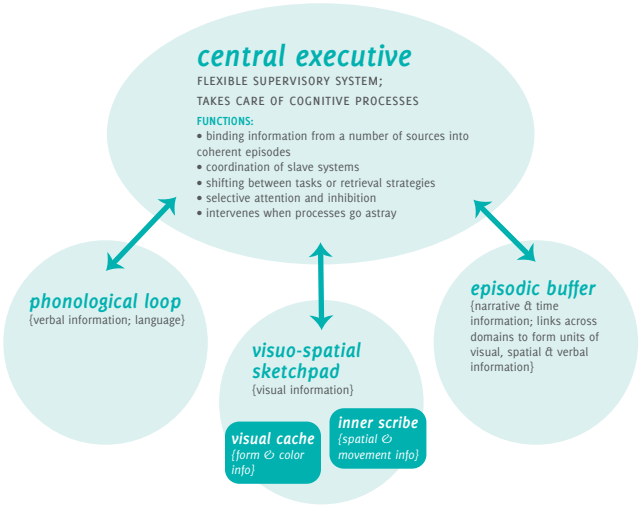


{Figure 3.01: Memory diagram}
source: Wikipedia.com. January 12, 2010.

Working memory is "a limited capacity temporary storage system that underpins complex human thought" (Baddeley, 6–7). It allows the brain to actively hold, and temporarily capture, information, and is part of what makes attentional control (focusing on an object or concept while ignoring others) possible.

Working memory is what allows us to temporarily remember a phone number or verbal directions to a friend's house. It is what allows us to solve a math problem or to think through the steps needed to complete a process. This is the workhorse of our cognition, allowing us to move through information and situations without having to commit everything we encounter to long-term memory.

Working memory operates in conjunction with short-term memory. Short-term memory is a storage system for information on a short-term basis, while working memory is the active manipulation and use of that information. Long-term memories are created through the short-term memory system (see figure 3.01). These generally occur when a sensory stimulus proves particularly powerful or engaging, or through active and conscious rehearsal or memorization techniques. Long-term memories are considered lasting and enduring. They are part of a complex retrieval system, allowing users to call them forward as desired (with mixed results, as anyone who has claimed an answer was "on the tip of my tongue" can attest).



{Figure 3.02: Baddeley's working memory diagram}
source: Conway et al., 21

"The brains with which we are born today are ALMOST IDENTICAL *to those with which Cro-Magnons were born forty thousand years ago. If there is some* INHERENT LIMITATION *to our ability to handle information, it should be present already at this time, when the most technologically advanced artifact was the barbed bone harpoon. The* SAME BRAIN *now has to take on the* TORRENT OF INFORMATION *that the digital society discharges over us. A Cro-Magnon human met in one year as many people as you and I can meet in one day. The* VOLUME AND COMPLEXITY *of the information we're expected to handle continues to increase. If there are any inbuilt limitations that serve as some kind of* SHUTOFF VALVE*, what mental functions are we then talking about? Where will we find the* BOTTLENECK IN THE BRAIN'S CAPACITY *to process information?"*
[KLINGBERG, 10–11]

Alan Baddeley, a professor of psychology at the University of York, defined the term working memory in his ground breaking book, *Working Memory* (1986), and updated those findings in *Working Memory, Thought, and Action* (2007). He has constructed a model to explain working memory (see figure 3.02).

In his book *The Overflowing Brain*, Torkel Klingberg discusses Baddeley's diagram:

> [Baddeley] posited three components to working memory: one responsible for storing visual information, termed the visuospatial sketch pad; one responsible for storing verbal information, termed the phonological loop; and one central component coordinating the other two, termed the central executive. Alan Baddeley has also proposed another kind of working memory store, the episodic buffer, which retains episodic information in working memory. This buffer is, however, less well characterized than the other components. When remembering chess moves, you are using the visuospatial sketch pad; when remembering a telephone number, it is the phonological loop that comes in handy. Both cases need some kind of coordination, and this is where the central executive comes in. (Klingberg, 34)

This diagram was based on clinical findings centered on dual-task experiments. When users were asked to complete tasks involving two of the different "perceptual domains" in the diagram (for instance, verbal and visual), they were able to complete both tasks simultaneously nearly as well as when the tasks were attempted separately. However, when a user was asked to carry out more than one task within the same "perceptual domain" they found it significantly harder to complete. Therefore, Baddeley posited, there must be some kind of interference when a user attempts to process too much information in one perceptual domain at a time. This explains why most people are able to draw while listening to music or someone speaking, but unable to comprehend someone speaking to them while simultaneously watching the news on TV.

Working memory also has an overall limited capacity—at some point it becomes full, and cannot hold any more information. New pieces of information can be taken in, but only through the loss of another piece of information. A great example of this concept at work is the everyday shopping list. Your mother asks you to go to the store to pick up just a few things. She verbally lists off the items for you: a loaf of bread, a carton of eggs, a quart of milk and a stick of butter. This list is fairly short. You repeat back the items, and might rehearse the list once or twice on the way to the store, but have no problems remembering the items without a written list.

"One of the defining characteristics of working memory is this very LIMITATION *… if you are told 'Go straight ahead for two blocks and then left one block,' you will have no difficulty remembering where to go. However, when the* INSTRUCTION IS SO PROLIX *that it exceeds the capacity of your working memory, you could well* FIND YOURSELF LOST*."*
[KLINGBERG, 34]

Now imagine she asks you to remember thirteen items instead of four. Even if you try to rehearse a list of thirteen several times, chances are you will forget something. This is because you've filled your working memory. Typically, people can easily store four to seven items in their working memory. But at some point, the storage is full, and you need to employ another strategy to help you retain and recall the information.

Decision-making in a search engine world

When a search engine user conducts a search for "gluten," she is confronted with an information retrieval system that returns hundreds of thousands (or even millions) of separate results. These results are often confusing or conflicting, and distinctions between sources are often hard to make—how do you know if a website is making legitimate and credible claims? How do you know when a website is trying to con you? How do you know when a website is offering a skewed opinion? How do you make comparisons between different sources? How do you decide what is useful to your current purpose and what can be discarded or set aside to read later?

If our user simply wants a definition of the world "gluten," the act of sifting through all these conflicting results is a relatively simple one. She may open a handful of sites near the top of the list, discard those that don't offer a definition (or information with which to distill one), and make general comparisons among those that do. Her task is basic, and the steps to achieve her goal are minimal.

"What we find…is that working memory PERFORMANCE *and* DISTRACTIONS *are placed on either side of a pair of scales, and the balance determines the* PROBABILITY OF OUR SUCCEEDING *with our demanding working memory task. If we have a lot of* DISTRACTIONS AROUND US*, we need good working memory capacity to manage the task. So if we have a lot of information in our working memory, we are more* DISTRAUGHT *than when we have a little. The greater level of distraction associated with the modern information technology society thus places* HIGHER DEMANDS *on our working memory."*
[KLINGBERG, 76]

However, if our user needs to find more information to help her make a serious decision (for instance, whether to try a gluten-free diet because of a health concern) this confusing online atmosphere becomes a hindrance. This is because the ways by which most people make decisions are not reflected in search-engine interfaces.

Peter Facione is a professor of philosophy at Loyola University in Chicago who studies human reasoning and decision-making. He has described two different cognitive factors that people use when they make decisions: ***argument making*** and ***heuristic thinking*** (heuristic defined as: of, pertaining to, or based on experimentation, evaluation, or trial-and-error methods). "The complexity of human decision making in high stakes contexts of risk and uncertainty can be mapped as the interplay of two cognitive drivers: the human propensity toward self-explanation known as argument making and the influence of cognitive heuristics" (Facione, 5).

cognitive factors

ARGUMENT MAKING	HEURISTIC THINKING
– *effort to be logical*	– *making judgments efficiently*
– *relying on relevance*	– *relying on cognitive short-cuts*
– *relying on facts*	– *efficient mental maneuvers*
– *effort to be rational*	– *of, pertaining to, or based on experimentation, or trial-and-error methods*
– *choices*	
– *judgments*	

{Figure 3.03: Cognitive factors}
source: Facione, 5

decision making systems

REFLECTIVE	REACTIVE
– *deliberative*	– *instinctive*
– *analytical*	– *quick*
– *procedural*	– *holistic*
– *when here is more time*	– *relies heavily on heuristics*
– *for processing abstract concepts*	– *arrive quickly and confidently at judgments*
– *useful in unfamiliar situations*	– *useful in familiar situations*

{Figure 3.04: Decision making systems}
source: Facione, 24

Argument making involves logic, rationality and a reliance on facts. ***Heuristic thinking*** relies on cognitive short-cuts and a more experimental, trial-and-error approach (see figure 3.03). Facione discusses his definition for heuristic thinking:

> Heuristic Thinking is the tendency, at times quite useful, of relying on… highly efficient mental maneuvers, to reach a conclusion. The cognitive maneuvers are as much a part of the human reasoning process as argument making. Cognitive heuristics often enable us to make judgments and decisions more expeditiously and efficiently. Their influences are often positive, but they can introduce errors and biases into decision-making (Facione, 5).

Facione has compiled a list of fourteen heuristic short-cuts, titled "Specific Heuristic Maneuvers" (see appendix A). These maneuvers include:

- ***Satisficing:*** given an option that is good enough, decide in favor of that option.
- ***Generalizing from one to all:*** from a single salient instance, draw a generalization about an entire group; stereotyping, profiling.
- ***Simulation:*** estimate the likelihood of a given outcome based on one's ease in imagining that outcome. (Facione, 114–130).

Facione's two cognitive factors are not binary—many decisions are made in some combination of the two. However, most people believe they make decisions mostly via the argument making method, but when experiencing anxiety or stress, they typically use a more heuristic thinking process.

Facione has also outlined two different decision making systems: ***reflective*** and ***reactive*** (see figure 3.04). ***Reflective*** decision-making is slow, deliberate and analytical, and is generally used when the decision-maker has the luxury of time. On the other hand, ***reactive*** decision-making is more instinctive, quick, trial-and-error (often implementing the fourteen heuristic short-cuts discussed above), and is generally used when the decision-maker must arrive at a decision quickly.

Most people use both of these systems, depending on the situation. However, many types of searches conducted online fall into the reactive system. In fact, most search engines are designed exactly for this type of decision-making: instinctive, quick, shallow, and neat.

However, decisions made about health or nutrition cannot always be made in this quick and easy fashion. Complex decisions require deliberation and reflection—search engines are NOT designed for this kind of methodical effort.

"Unlike computers, human DECISION-MAKING *is not* ALGORITHMIC*. Faced with the need to make an important decision, humans are* OFTEN UNCLEAR *or in conflict about the nature of the problem, attracted by a given, perhaps mistaken, notion of their intended outcome, and* UNAWARE *of all of their* ALTERNATIVES*,* OPPORTUNITIES*, or* RISKS*. We often do not give due consideration even to all of the alternatives which come to mind. We* OVERESTIMATE OUR ABILITY *to control events,* UNDERESTIMATE OUR CHANCES *for failure, and we are effectively drawn toward some options and repelled by others. We mistake superficial resemblances for fundamental structural similarities; we* TRAP OURSELVES *in false us-versus-them dualisms; we* GENERALIZE *from the one to the many; and we readily eliminate options, even good ones, because we perceive a single flaw in them. We* SETTLE *for 'good-enough' when better is available, and we privilege the familiar and the* STATUS QUO*."*
[FACIONE, 6]

Our user, ourselves

So we know that working memory is directly related to how well we can focus our attention. We know that it is limited and when full, a user feels overwhelmed and anxious. We know that this anxiety, and the complexity of the online atmosphere make it difficult for her to make careful, rational decisions.

- Our user is bombarded with information.
- She is often pressed for time.
- Her life is full of distraction and multi-tasking.
- She finds it hard to focus on the task at hand, and her thoughts wander.
- Finding information about nutrition—possibly fraught with emotion and anxiety—can leave her feeling confused and paralyzed.
- The current options for online searching do not adequately address our user's limitations of time, focus, or working memory.

"In the FIRST ORDER OF ORDER*, we organize things themselves—we put silverware into drawers, books on shelves, photos into albums. [When you use a card-catalog] you confront a prototypical example of the* SECOND ORDER OF ORDER *… The catalog separates information about the first-order objects from the objects themselves … the catalog card points to the* PHYSICAL PLACE *where the first-order photo is stored in the back room.*

"The PROBLEMS *with the first two orders of order go back to the fact that* THEY ARRANGE ATOMS*. There are laws about how atoms work. Things made of* ATOMS TEND TO BE UNSTABLE OVER TIME*—paper yellows and disintegrates, negatives turn to soup—so we have to take measures to sway nature from its course.* ATOMS TAKE UP ROOM*, so collections of photos can get so large that we have to build card catalogs to remind us of where each photo is. And things made of atoms can be in* ONLY ONE SPOT AT A TIME*.*

"But NOW WE HAVE BITS*. Content is digitized into bits, and the information about that content consists of bits as well. This is the* THIRD ORDER OF ORDER *and it's hitting us—to use a completely inappropriate metaphor—like a ton of bricks. The third order* REMOVES THE LIMITATIONS *we've* ASSUMED WERE INEVITABLE *in how we organize information."*
[WEINBERGER, 17–19]

tri·age

[tree-ahzh] noun, adjective, verb, -aged, -ag·ing.

–noun

1. *the process of sorting victims, as of a battle or disaster, to determine medical priority in order to increase the number of survivors.*
2. *the determination of priorities for action in an emergency.*

–adjective

3. *of, pertaining to, or performing the task of triage.*

–verb

4. *to act on or in by triage: to triage a crisis.*

Origin:

1925–30; < F: sorting, equiv. to tri(er) to sort.

{Figure 4.01: The definition of triage}
source: dictionary.com

{Figure 4.02: How does triage work?}

SECTION FOUR

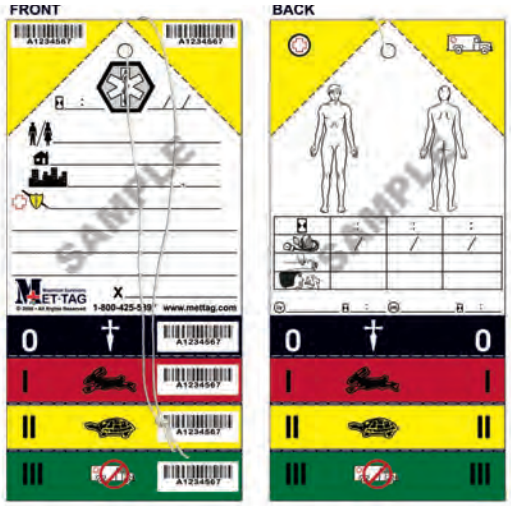
Why triage?: defining the term

Our modern world is filled with countless bits of information and messages, all fighting for our attention. Within this cacophony of content, many people are finding the act of focus harder and harder to maintain. As the role of multi-tasking is being applied to more professions and activities, methods for 'cutting through the clutter' become integral to even basic tasks. Finding ways to sift through all the text, images and promise of the Internet in order to drill down to exactly what you need, exactly when you need it, has become a necessity.

While the ways in which we're interacting with information are quickly changing—and our orders of order are rearranging their order—our need and desire to sort through it all remains the same. This is where the idea of triage is useful.

Triage is generally (and almost exclusively) associated with the medical practice of sorting and prioritizing patients based on the urgency of their need for care. The term is attributed to Barren Dominique Larrey, the Surgeon-in-Chief to Napoleon Bonaparte. The concept of triage became more prominent throughout the major international wars in the 19th and 20th centuries—over the years it has been refined and codified, and is now used by hospitals and trauma professionals all over the world in a fairly consistent way, (O'Meara, 111).

Several triage systems are available for medical practitioners—these typically consist of colorful and meticulously codified tags, and a class to teach triagers how to use the system efficiently and quickly. The process is extremely structured and built around creating a routine. Each time a triager encounters a patient she moves through the same series of steps (see figure 4.02). She carefully records pertinent data, and has been trained to be both methodical and unemotional as she moves through a disaster area, emergency room, or doctor's office. Patients are typically ranked along a four- or five-point scale to determine severity of injury and the urgency of immediate care.



{Figure 4.03: Triage tag}
source: mettag.com. January 30, 2010.

"The NEED FOR TRIAGE *has existed for as long as patients have been treated. Every practicing clinician has occasions when the* DEMANDS *placed upon them* OUTSTRIP *the time or resources available. The ability to* APPROPRIATELY PRIORITIZE TASKS *is fundamental in every discipline and especially so in the care of the trauma patient. Where there are large numbers of casualties, the* UTILITARIAN PHILOSOPHY *of 'the greatest good for the greatest number' supervenes and* UNDERLIES THE PRINCIPLES *behind published triage systems."*
[O'MEARA, 111]

An analysis of several of these triage systems revealed that they use similar techniques and visual conventions, which include the use of: color coding (using primary colors); icons; simple, geometric shapes; roman numerals; fill-ins and check-boxes; strong visual hierarchy; charts; arrows; and bar-coded perforations. Furthermore, all of the tags I analyzed read from top to bottom, used very little text, and were double sided. The tags were designed to move the user through the triage routine step-by-step, alternately asking her to examine the patient and catalog specific injuries, check and document vital signs, and to then use this information to prioritize care.

Triaging information: data as patient?

Information-triage is the process of sorting, grouping, categorizing, prioritizing, storing and retrieving information in order to make sense and use of it. In *The Secret War Between Downloading & Uploading*, Peter Lunenfeld discusses this notion of information-triage. "Info-triage is more art than science, a practice that involves the weighing of options and the measuring of time. We tend to think of time in relation to efficiency, but info-triage is about more than job performance, it is a practice devoted to mindfulness" (Lunenfeld, 29). In this context, information-triage is not merely a sorting technique, but instead, a kind of curation—it "is not so much about efficiency as the culling of the distraction in the search for meaning" (Lunenfeld, 29).

Several methods of information curation currently exist online. Search engines offer a very basic form: they seek out sites based on key words and phrases, and display the results back to the user in a hierarchical fashion. Sites like Google allow users to look through an abbreviated version of the Internet, making it possible to find particular pieces of information quickly and easily. In fact, since their inception over ten years ago, today's users of these engines would likely define them as indispensable—it is difficult to remember what the Internet was like before their implementation.

Google has created another useful interface for curation with iGoogle, an extremely customizable "personalized" homepage. Users can place widgets on their page containing information as diverse as the weather report, today's news headlines, games, and interesting images from other sites like Flickr. iGoogle offers a holding place for information and content that a user would normally have to visit multiple separate websites to view. It acts as a catchall—a single drawer the user can use to keep the content she deems most important to her close at hand. And, when this content exists within one portal, there are fewer chances for the user to become distracted by non-relevant material. iGoogle is both a display of choice and a buffer from distraction.

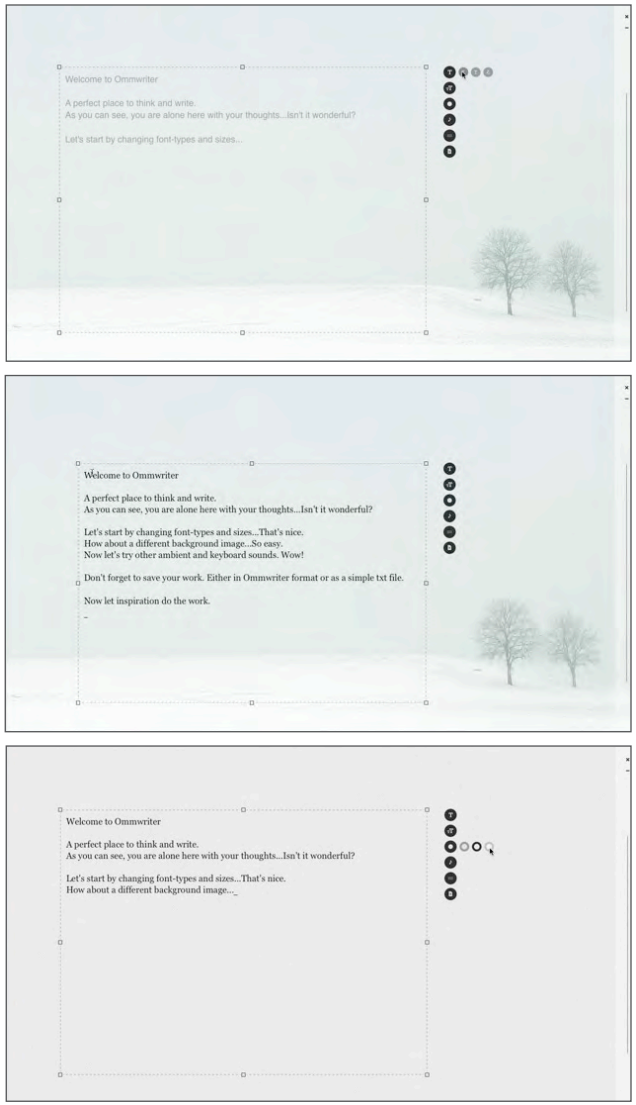
Ultimately, what this notion of info-triage offers is a sense of abbreviation—a sifting out of the chaff—allowing a user to focus on what is actually wanted or needed at any given time. Lunenfeld explains, "Info-triage accepts the psychological insight that those confronted with a vast array of options are often less satisfied than those who select between a smaller set of alternatives. Option paralysis shades into paralysis by analysis, and both are exacerbated by the never-ending dataflow" (Lunenfeld, 29).

The concept and underlying process of information-triage are directly borrowed from the medical context, but the metaphor can only carry so far. If medical triage is about maximizing the number of survivors—treating those most likely to recover or eventually be healthy—then what is info-triage ultimately attempting to do? "Save" only the most useful or pertinent information? What happens to the information deemed unworthy or beyond help? Information given up for "dead" could prove later to be crucial to a user's purpose. Would an information-triage system need to give the option to "resurrect" information when needed?

A significant distinction between medical triage and information-triage is the motivation behind the act. Medical triagers are motivated by a sense of emergency, duty and the greater good. They are confronted with an overwhelming and grave situation, and have been trained to move through survivors or patients quickly, assessing which category each patient falls into. They must act with a sense of urgency because lives are on the line. Medical triagers also have the benefit of a culmination of their efforts—at a certain point the crash site or doctor's office will be cleared of victims or patients, and the triager has the opportunity to feel a sense of completion.

The motivations behind information-triage are quite different. Information-triage functions on a much less visceral level. No one's life is at stake (presumably), and even when information is messy, it is much less so than human bodies. Info-triage allows for mistakes and uncertainty, and is greatly enhanced through the power and efficiency of computers and databases.

Information-triage can also be described in these two ways: triage as noun (a result, or a display of information that has been triaged), and as verb (the system or process of triaging information). This is an important distinction, because the concept of triage can be helpful in both aspects. Providing triage as a result allows a user to understand information more easily—it offers a focus, a filtering, a distillation. Providing triage as a process allows a user to think through a search—it supports her with tools and criteria with which to evaluate the information she encounters. These two aspects are useful for different kinds of situations, users, tasks, and timeframes.



{Figure 4.04: Ommwriter screens}
source: ommwriter.com. March 26, 2010.

What does information-triage look like?

Info-triage can take many different forms, some very subtle, some much more overt. The emotional qualities of these triage experiences can also be quite different. I have analyzed four different cases of info-triage below. Because my overall study focuses on the online searching environment, these examples are all of a digital nature.

OMMWRITER

Attempting to write a text on a personal computer can be deceptively difficult. Because writing software like Word exists as a window, functioning among many other windows (and the Internet), the temptation to procrastinate is great. The functional yet chaotic nature of the desktop makes it difficult for a user to focus. Herraitz Soto & Co. has created a soothing environment for writing, which addresses these difficulties, called Ommwriter. Ommwriter's website defines itself as, "a simple text processor that firmly believes in making writing a pleasure once again, vindicating the close relationship between writer and paper. The more intimate the relation, the smoother the flow of inspiration" (Ommwriter).

The software operates as a bare bones, full-screen text editor, with a decidedly zen look and feel. The designers of the interface have stripped away any superfluous frills or functions, leaving a writing environment that is relaxing and quiet. A text box is automatically generated in the center of the screen, a handful of options float off to one side, and an optional background image keeps the environment from feeling too stark. The overall effect soothes and provides focus—especially because the user has to save her text and close the program before she can use another piece of software or her web browser. This basic limitation forces the user to think twice before trying to multi-task or procrastinate.

Of course, the usefulness of Ommwriter is limited, and much of the appeal is in its novel aesthetic presentation. The tools to manipulate the text are basic, and the software does not include a spellchecker. Most writers require far more robust support and tools. However, just the simple act of simplifying the interface and displaying it full-screen creates a sense of focus.

{Figure 4.05 A: Viewzi home page and Power Grid screens}
source: viewzi.com. March 26, 2010.

VIEWZI

Co-founded in 2006 by Brandon Cotter and Chris Mancini in Dallas, Texas, Viewzi offers Internet searchers a legitimate alternative to Google. The co-founders describe this search engine as, "a new and highly visual way to search that brings all your favorite stuff together in one place." Viewzi operates as a mass search engine aggregator, culling results from Ask, Google, MSN, and Yahoo. However, the real charm (and usefulness) of Viewzi lies in its multiple ways to view results—the website offers nineteen different view modes, some open-ended and some very specific.

Many of the view modes are so specific that their usefulness is very limited, for instance *Celebrity Photos*, *Songs*, or *Recipes*. These modes allow the user to sort through these particular types of media in novel and visual ways, but do not facilitate overall research or making meaningful connections. However, these modes do provide info-triage at a highly specific level. If a user clicks on the *Recipes* view mode, her search results are culled from four popular cooking sites (and not just the Internet at large). The effect of this specificity means that the user may miss out on several hundreds of thousands of recipes from the overall Internet, but the search results she does receive will likely be more useful (and from a more specific kind of source).

However, four of the more general types of searches on Viewzi are particularly interesting examples of info-triage: the ***Power Grid***, the ***Google Timeline***, the ***Web Screenshot***, and the ***4 Sources***. These four view modes reconfigure results—normally seen in a static list—in a dynamic and visual way. The overall effect is a display that has been filtered and prioritized.

The ***Power Grid*** pulls search results from Yahoo and Google, and places them on a six by three grid. This view mode also allows users to move, hide, open (launch) and star (highlight) pages through mouse clicks and key strokes. Users are also given the option to view results as either text or home-page screen shots. This mode creates a visual snapshot of the total search results, allowing the user to view them just eighteen at a time, and also provides a mechanism with which to sort and eliminate results in an intuitive way.

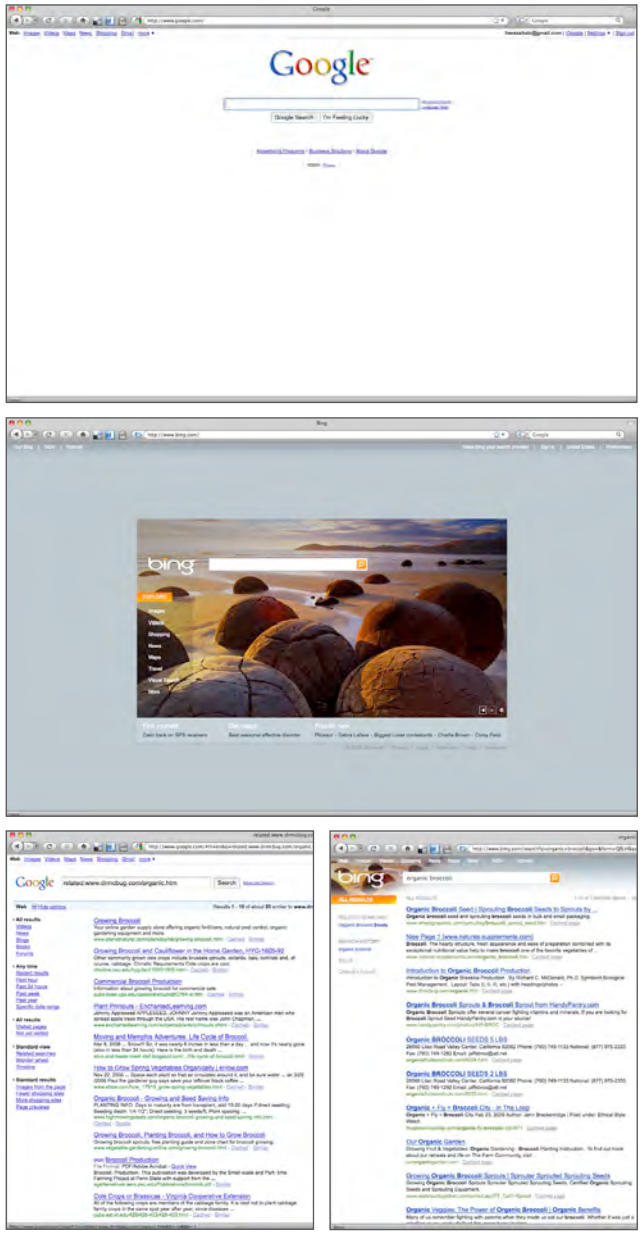
{Figure 4.05 B: Viewzi Google Timeline and 4 Sources screens}
source: viewzi.com. March 26, 2010.

The ***Google Timeline*** creates a dynamic linear strip of chronological results, allowing a user to scroll through time. As the name suggests, these results are aggregated directly from a Google feature (with the same name). The timeline found directly in Google is static, consisting of a time-span bar graph at the top of the page with the corresponding results listed chronologically below, and offers little interactivity or customization. In the Viewzi version, results are plotted horizontally according to date published, and vertically according to page ranking (the results with a high ranking are near the top of the viewing area and are the most opaque). An adjustable time-frame is positioned across the top of the viewing area, allowing the user to easily slide through the search results. This mode is most useful for searches that rely on the most recent articles and data, or are time specific (a particular event or article from the past). Here, Viewzi is offering info-triage by prioritizing time.

The ***Web Screenshot*** is one of the simplest, most focused ways to view search engine results. This mode displays each result one at a time as a home-page screen shot, annotated with synopsis text, the site URL, as well as where the result came from (Yahoo, Google, MSN, etc.), and how many other results came from that same source. The user is able to move through the results fairly quickly using the arrow keys on her keyboard, and the overall effect of viewing the results in isolation allows a user to focus on one thing at a time. However, if a search returns a large number of results, or if the search query wasn't reasonably specific, the interface quickly becomes cumbersome. This mode offers triage through isolation and annotation.

The ***4 Sources*** mode allows a user to compare her search results by search engine source. Results are color coded, and the user is able to select which sources she wants to include in her search. This simple interface allows for quick comparison between search engines, and enables the user to see where results overlap among sources. Furthermore, this kind of comparison and visual overlap allows a user to begin evaluating the credibility of sources.

Viewzi engages users with a dynamic, visual set of displays and interfaces. The end result offers information-triage through prioritizing, visualizing, isolating, annotating and comparing search results. However, these interfaces are only hinting at the usefulness and power of information-triage.



{Figure 4.06: Google and Bing home pages and results filter tool-sets}
sources: Google.com, Bing.com. March 28, 2010.

GOOGLE & BING

These search engine powerhouses (and fierce competitors) are the two most popular ways to search for information on the Internet. Google is the most widely used, offering a bare bones design aesthetic along with a robust database. Bing offers a more sophisticated design and intuitive interface, and is quickly growing in popularity. However, both engines mirror each other in several key features. (See digital appendices 1 and 2 on the attached DVD for a more detailed analysis of both search engines).

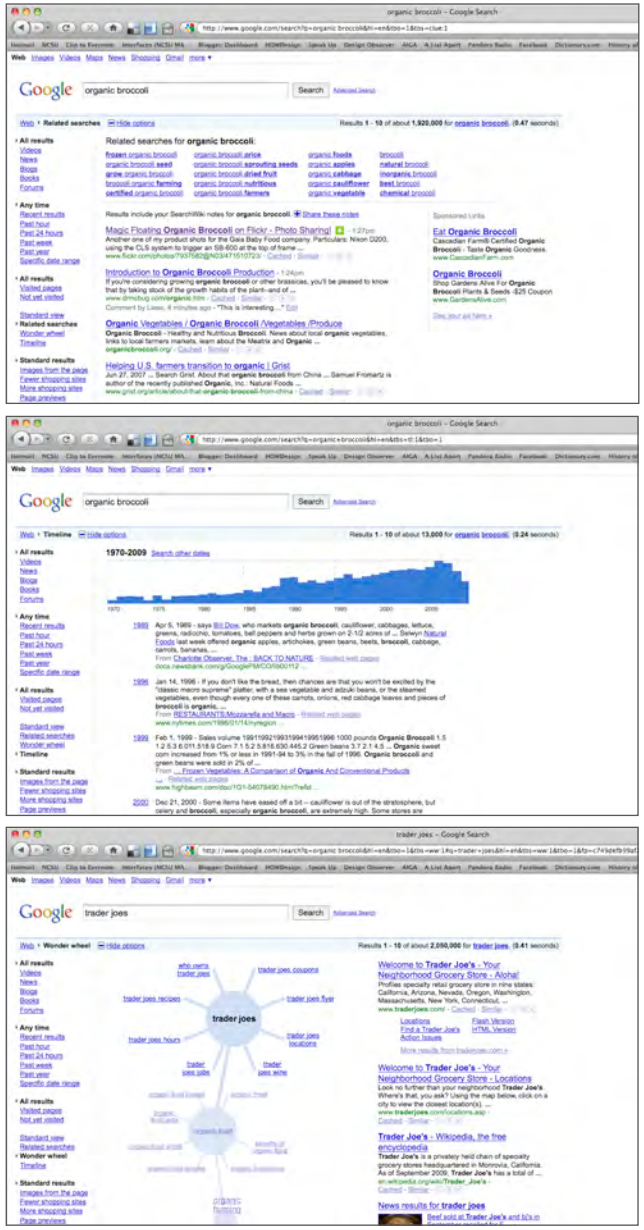
Google and Bing offer short-cut links to separate sub-interfaces focusing on *Images*, *Videos*, *Shopping*, *News* and *Maps*. Both search engines also allow users to move seamlessly among basic information searches and these other specialized searches. This ability has varying degrees of success, depending on the context and specifics of a user's needs and motivations. These specialized interfaces offer a narrowing of results and a specificity of options that start to act as info-triage.

Both search engines also allow users to filter their results using tiered sets of search options in an expandable bar on the left-hand side of the browser window. Both engines use very similar structures for these filters, with slightly different criteria.

Bing focuses its filter-set to: larger categories; related searches (according to other users' frequently-used search queries); and for users who have signed up for an account, a search history. When a user selects one of these filters, a separate filter-set at the top of the bar is created, showing which filters she has selected. The user can then turn these filters on and off as desired. This feature allows the user to quickly sort through the results, and to change her mind as she processes her search. However, the filter-set is still very limited, and mostly based on other users' behavior and habits.

Google organized its filter-set in a different (and more robust) way. The user can sort her results by: large category type (images, videos, news, blogs, updates, books and discussions); chronologically (among several set ranges of time, or a user specified range); by whether the page has been visited by the user before; and through three special types of views (***Related Searches***, the ***Wonder Wheel***, and the ***Timeline***). The organization of these filters feels like a random collection of user-requested features, rather than a carefully considered set of functions, making the end result seem like a hodge-podge of options.

Google's ***Related Searches*** feature simply displays a set of twenty suggestions (similar to the Bing related searches) at the top of the results listing. The ***Wonder Wheel*** creates a dynamic hub-and-spoke results display that branches off as the user interacts with it. The end of each spoke is a link to search results for a specific iteration of the main



{Figure 4.07: Google's Related Searches, Timeline and Wonder Wheel screen shots}
source: Google.com. March 28, 2010.

search, and the user can start to visualize how different search terms and concepts might be connected to each other. The ***Timeline*** creates a bare-bones visual display of search results organized chronologically. (This is the data set that Viewzi's Google Timeline view mode is pulling information from.) Despite the ability to prioritize time, this option still only returns a long list of identical looking results.

Both these search engines have begun to explore how info-triage might help a user: by creating context domains, by offering filter tool-sets, and by starting to visualize information in multiple ways. However, neither engine has attempted to really pursue a robust info-triage system.

So, how might information-triage help our user?

- By creating a methodical system in which to process overwhelming amounts of information.
- By providing sets of criteria to evaluate information and its sources.
- By isolating elements to help the user focus on one thing at a time.
- By asking a user to record pertinent data to help her evaluate information later.
- By giving a user the ability to quickly prioritize information into a few large categories.

Because I am discussing triage in two different ways: as a verb (a structured, step-by-step process), and as a noun (displayed filtered results), we can arrange potential interfaces along a gradient of triage. Medical triage exists mainly as a process (resulting in the patient moving through the system, annotated with a triage tag). However, information-triage may take on one or both of these characteristics. A digital interface can lead a user through a structured process and/or display filtered results at the end.

Information-triage lies along this gradient of system/user control, and the degree to which the system takes over for the user can greatly shift the overall experience—especially when cognitive limitations are taken into consideration. For a user with a need for immediate, filtered information, an interface that acts as a noun would be preferable. For a user needing to fully understand the landscape of her search term, an interface that acts as a verb might be the best option. However, what is key in these two approaches is the vast amount of gray area between them.

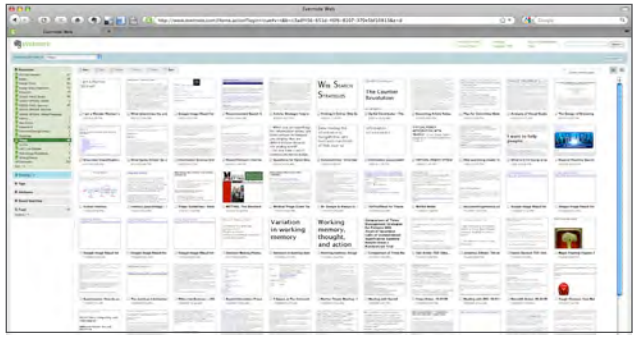
"While the Web's architecture rests on a SOLID FOUNDATION OF CODE*, its usefulness depends on the* SLIPPERY SLOPE OF SEMANTICS*. It's all about words. Words as labels. Words as links. Keywords.*

"And WORDS ARE MESSY LITTLE CRITTERS*. Imprecise and undependable, their meaning shifts with context. One man's paradise is another man's oblivion. Synonyms, antonyms, homonyms, contranyms: the* CHALLENGES *of communication are part of the human condition,* UNSUSCEPTIBLE *to the* EAGER ADVANCES OF TECHNOLOGY*.*

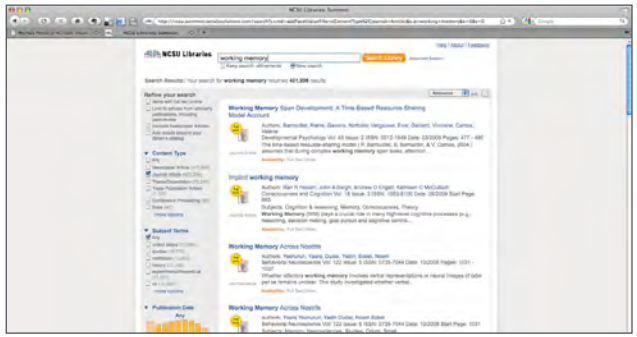
"Some speak of a COMING TECHNO-DYSTOPIA*, a brave new world of more ignorance and less freedom. Librarians worry about students who never step foot in libraries,* A DOT.NET GENERATION *that goes to Google when they need to read. One woman I met at a conference in Paris even accused the Internet of creating '*A BLACK HOLE IN OUR CULTURAL HERITAGE*.'*

"We take LANGUAGE *and the Internet for granted, yet they are* TESTAMENTS *to* HUMAN INGENUITY *and our ability to enlist selfish genes in remarkable acts of cooperation. So, as the Web rolls on, I don't fear the loss of culture. On the contrary, the web* MAKES OUR CULTURAL HERITAGE *more accessible. The dialogues of Plato, the sonnets of Shakespeare, and the poetry of Paradise Lost are all* FINDABLE AND ACCESSIBLE*, even from a beach in Newport."* [MORVILLE, 15]

{Figure 5.01: Books}



{Figure 5.02: Evernote notes}
source: Evernote.com. March 10, 2010.



{Figure 5.03: Articles}
source: ncsu.summon.serialssolutions.com. March 10, 2010.

SECTION FIVE

Looking across the landscape: current conditions of search and search engines

My research journey as a case study: researching as research, and my experiences in unknown territory

In the context of this study, our user is stepping into a completely new world of information—just as I did when I started this process. Realizing this has made me even more cognizant of how searching tools and systems directly affect one's ability to retain and synthesize information—and has led to some insights about how a system might work differently.

My process began with Internet research and a detailed search of the university library—resulting in a long list of books I thought were pertinent to my thesis. I have checked out over 65 of those books since September of 2009, and have read (or skimmed) approximately 26 of them.

The Internet search resulted in over 90 notes collected in my Evernote account. Mostly these notes are jumbled and unlabeled—the result of grabbing items while searching for other things—rendering them rather useless.

I followed my book search with an article search, downloading and printing 91 separate articles. I have read or skimmed approximately 24 of these.

MY POINT IS THIS:

It's incredibly easy to collect information with online interfaces…and that's not necessarily a good thing. In the beginning, while collecting all this material, I felt productive, engaged, and on top of my work. Clicking the box to download an article, or to request yet another book sent to my branch library, required very little effort. I felt I needed to collect as many resources as possible, that if I kept looking I would surely find the magical tome that would be the key to my project.

WHAT I HAVE DISCOVERED:

- The act of searching for information and collecting it to "read later" feels productive, but, unless you actually "read later," all the items you've collected are useless.
- Knowing where to begin and what words to search for is difficult.
- More data and information ≠ more knowledge.
- Being alerted to the existence of hundreds of thousands of other websites about your search term is overwhelming.
- Finding a way to isolate one source at a time to analyze and evaluate can help with focus and comprehension.

"The fundamental problem with Dewey's system…is that any MAP *of knowledge assumes that knowledge has a* GEOGRAPHY*, that it has a* TOP-DOWN VIEW*, that it has a* SHAPE*…This unnecessarily* INHIBITS *the useful* MISCELLANEOUSNESS *of the third order of order."* [WEINBERGER, 63]

But once this initial feverish hoarding was finished, I was left with a teetering pile of 50 books, 91 articles, 90 notes culled from the internet, and no possible way to comprehend, contextualize, consume or connect with it all. And I had spent more hours searching and collecting (just feeling productive), than figuring out what I already had and thoroughly exploring it.

What's worse—I began to feel weighed down by all this stuff.

Discouraged by my slow progress to assimilate all this content, I would turn back to the quick and effortless flow of the search engine and gather more. And the more I gathered, the more overwhelmed I felt. With every online search, I found more and new and bigger and better—authors, books, sources, articles, websites, examples, examples pointing to other examples, authors pointing to other authors. Even while I was reading and connecting and trying to synthesize, a feeling of dread kept creeping in, whispering softly, "You will never be able to read all of this, let alone make sense of it."

AND THEN, AN EPIPHANY…

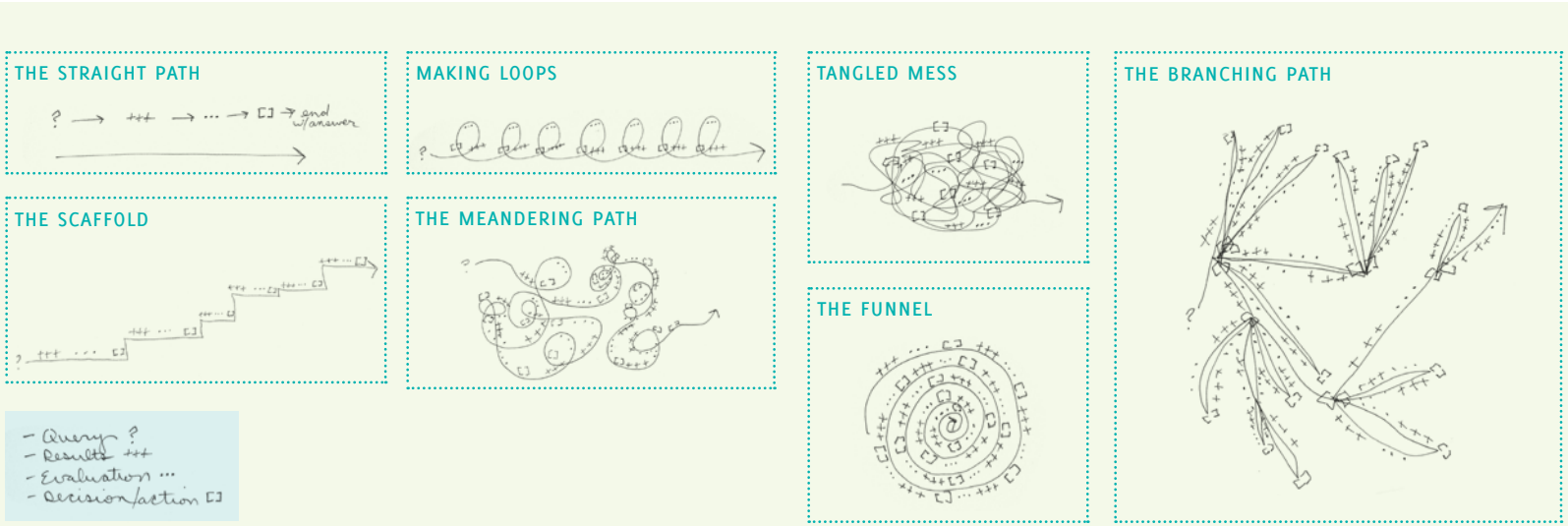
I am in the throes of the experience I want to help change.

Exploring the search landscape: A look at online search tools, user behaviors and critical points for design intervention

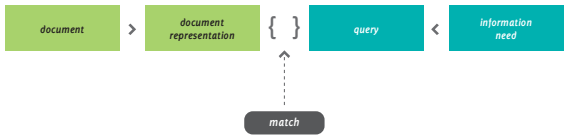
THE SHAPE OF SEARCH

In the quote to the left, Weinberger is suggesting that knowledge doesn't have a shape—moreover that it SHOULD NOT have a shape—when you consider it in his terms of miscellaneousness. Digital information is at its most useful when it can be reconfigured endlessly into different types of structures and meaning. However, humans still need shapes and maps for information (no matter how useful the miscellany), because that's how we cognitively make sense of the world. We constantly sort, sift, categorize, re-categorize and cluster the information around us to create meaningful connections.

I began to wonder, does online searching have a shape?



{Figure 5.04: Shapes of my own}



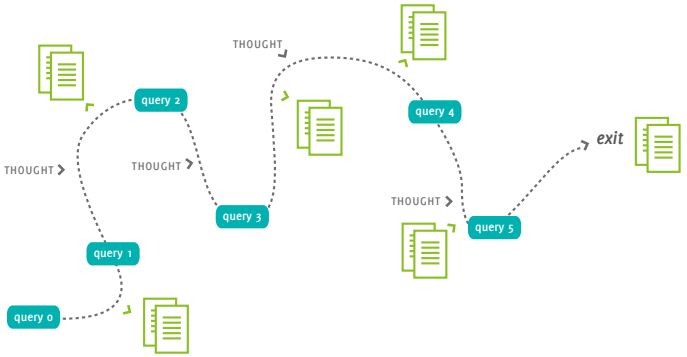
{Figure 5.05: Classic information retrieval model}
source: Bates, 1989

"The CLASSIC MODEL *of information retrieval (IR) used in information science research for over* TWENTY-FIVE YEARS*...represents some searches, but not all, perhaps not even the majority, and that with respect to those it does represent, it frequently does so* INADEQUATELY*. As a formal model for testing it has many limitations. As a consequence, as long as this model dominates information science thinking, it will* LIMIT *our* CREATIVITY *in developing IR systems that really meet user needs and preferences."*
[BATES, 1989]

I started out by creating shapes of my own—sketching out some of the ways typical online searches might be visually described (see figure 5.04). Each path is created from the same four elements: query, results, evaluation, and decision/action. The paths have a clear starting and ending point, and follow the four elements in sequence. The differences lie in how those paths are visualized, and the emotional qualities the differences start to suggest. These seven sketches begin to illustrate the messiness of searching for information, as well as the possibilities for design intervention.

But how do information scientists describe the shape of search? For many years, experts in the field of information and library science have modeled search in a very basic way (see figure 5.05).

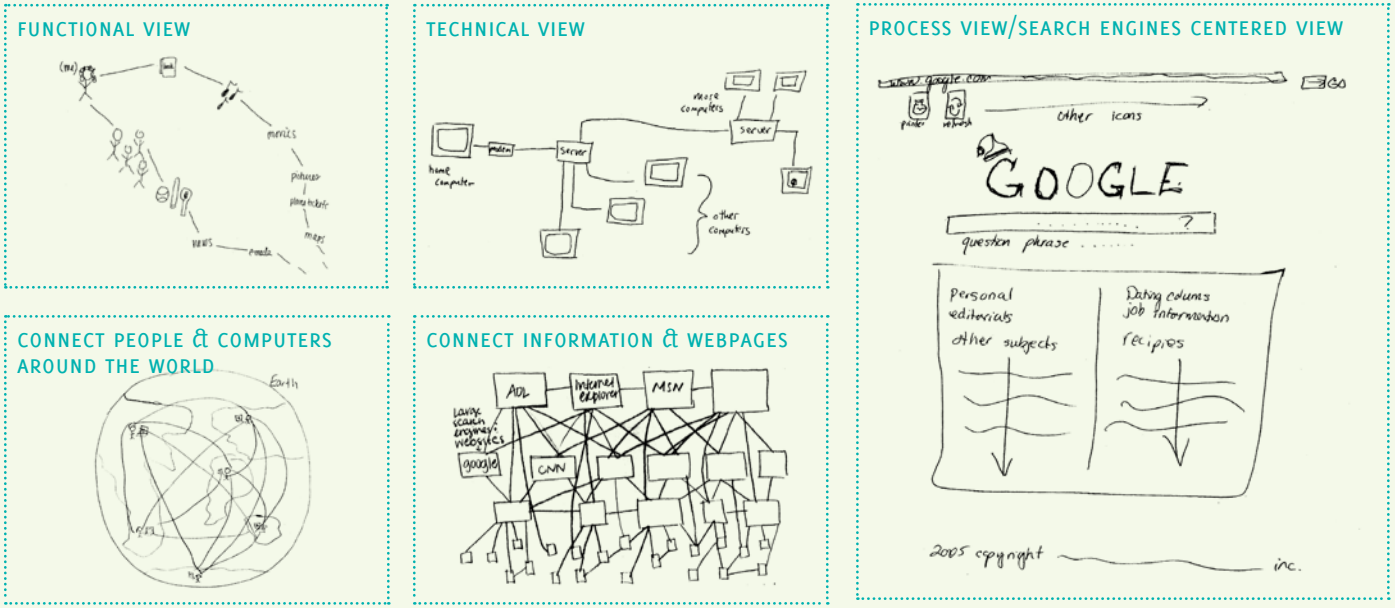
The user enters a search term and the retrieval system matches the term to items in the database, and a successful match is made. This model relies on the assumption that the user knows exactly what she is searching for, that she can easily make sense of the search results, and that there is a perfect match between the user's needs, the user's words and the resources of the system. This is, of course, problematic.



{Figure 5.06: Berrypicking model}
source: Bates, 1989, 2–4

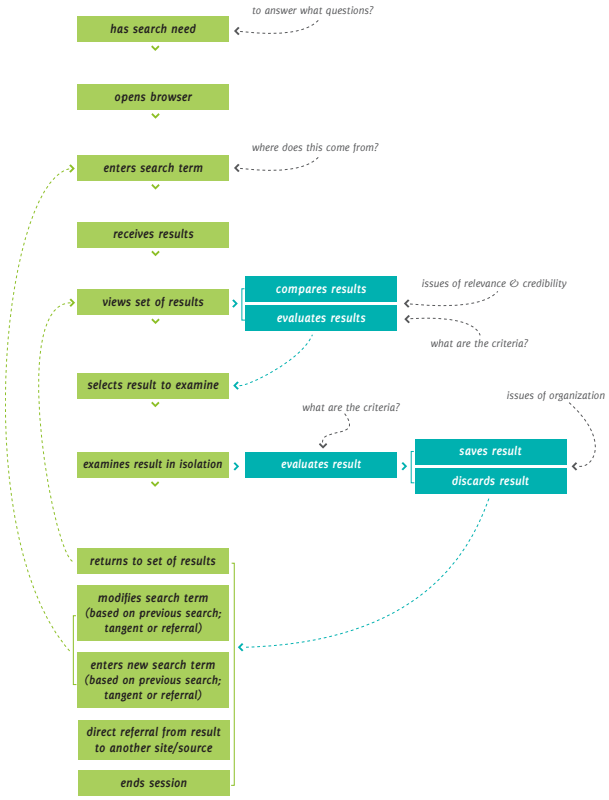
In the 1980s, librarian and information scientist Marcia Bates proposed a different kind of search shape: the berrypicking model (see figure 5.06). This concept is based on the practice of picking blueberries or blackberries, the picker moving from cluster to cluster of berries, from bush to bush, in a meandering fashion. This new model was very influential and helped a generation of information scientists consider their user in an entirely different way. Instead of assuming that a user knows exactly what she wants, creating an information retrieval (IR) system that will fetch those results quickly and efficiently, information scientists started creating interfaces that allowed users to access information in multiple ways, helping to facilitate browsing and wandering behaviors.

Yan Zhang, a researcher at the University of North Carolina, Chapel Hill, asked undergraduate students to imagine and draw a mental model of the Internet, and then asked them to conduct two kinds of searches (see figure 5.07). The first requested they find the lowest price for a book, and the second asked them to find the current census estimate for the population of the U.S. Zhang then analyzed both the mental models and the success rate of the individual students to see if he could draw any conclusions.



{Figure 5.07: Mental models}
source: Zhang, 1335–1337

"The results of the study showed that although subjects with DIFFERENT MENTAL MODEL STYLES *showed different online searching behaviors, few of the differences were statistically significant… Consistent with findings in the current literature,* TASK HAS A MAJOR EFFECT ON PEOPLE'S ONLINE SEARCHING BEHAVIOR*. In this study, search tasks affected an array of measurements, including the way that subjects* STARTED *search,* QUERY *constructions, and search* PATTERNS*."*
[ZHANG, 2007]



{Figure 5.08: Search behavior map}

While Zhang's findings were not statistically significant, he was able to ascertain that there are large differences among individual searchers, and often these are connected to the ways they conceive of themselves in relation to the world (and systems) around them. How might an interface take advantage of these differences and help place a user within the context of the larger system? How could shifting a user's mental model help her search process?

THE BEHAVIORS OF SEARCH…

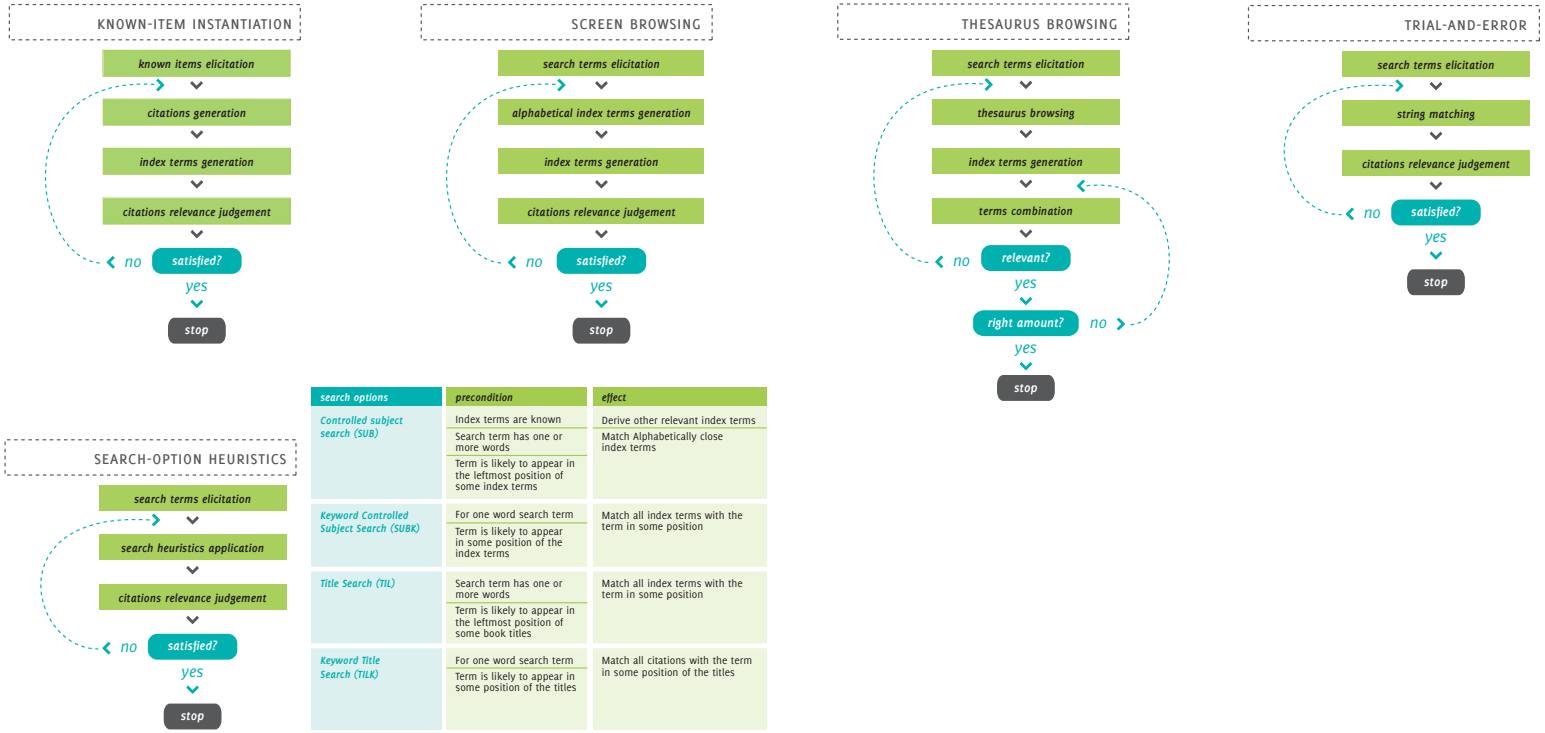
I began my survey of search behavior by diagramming my conception of an average user's online search process (seen in figure 5.08). This behavior map illustrates a typical linear mode of search, which contains several points of divergence and choice. Through the generation of this map, I was able to visualize an online search, identifying where design might intervene and where moments of confusion might occur. For instance, by diagramming the point where the user must enter a search term, I was able to highlight issues involving search queries: Where does the user's query come from? How does she decide what to type? What tools might help her craft a successful query? What criteria are used to determine a successful query?

Using the map, I have identified several key areas of potential intervention: query formulation, criteria for the evaluation of results, issues of relevance and credibility, and issues of the organization of results. Next I turned to the research being done in information science regarding cognition and the structure of information retrieval systems.

Hsinchun Chen and Vasant Dhar, (working collaboratively from the Information Science (IS) departments at the University of Arizona in Tucson, and New York University, respectively) have created a taxonomy of "five computational models of online document retrieval" (Chen and Dhar, 405). This taxonomy has been culled from the results of two studies.

> We conducted two empirical studies investigating the cognitive processes involved during online document-based retrieval. We identified the searchers' and the informational specialists' process models during information retrieval and then used these process models to construct an 'intelligent' document based system.

These studies focused on the users of academic research-based IR systems, usually conducted with the help of professional librarians. The resulting taxonomy highlights the sophistication and mechanics of the thought process of these experts. However, parallels can be drawn between this process and that of a more casual online search engine user.



{Figure 5.09: Taxonomy of five computational models of online document retrieval}
source: Chen & Dhar, 411–415

Most professionals and research experts use the first four methods (known-item instantiation, screen browsing, thesaurus browsing, and search-option heuristics), methodically searching with an understanding of an overall system. Much of this behavior is based on specific training, experience over time, and a broad knowledge base (of both the IR system and the data within that system).

Casual searchers generally use the trial-and-error method—with very mixed results. Instead of systematically moving through a structure, the trial-and-error method is much like grasping for an object in the dark: a user may get lucky after one or two attempts, or she may never find what she's looking for. This lack of methodology and varying levels of conceptual understanding of an overall system, are important differences between experts and more casual searchers.

"Searchers [conducting trial-and-error searches] use whatever TERMS *they have in their* MINDS *... The search process is essentially one of* TRIAL AND ERROR. *It was often used by searchers who had* LITTLE KNOWLEDGE *about the system's* FUNCTIONALITY *and the* CLASSIFICATION SCHEME."
[CHEN & DHAR, 415]

level	definition
0	***No system involvement.*** All search activities human generated and executed.
1	***Displays possible activities.*** System lists search activities when asked. Said activities may or may not also be executable by system (higher levels).
2	***Executes activities on command.*** System executes specific actions at human command.
3	***Monitors search and recommends.*** System monitors search process and recommends search activities: a Only when searcher asks for suggestions. b Always when it identifies a need.
4	***Executes automatically.*** System executes actions automatically and then: a Informs the searcher. b Does not inform the searcher.

{Figure 5.10: Levels of system involvement}
source: see below

level	name	definition
1	Move	An identifiable thought or action that is a part of information searching.
2	Tactic	One or a handful of moves made to further a search.
3	Stratagem	A larger, more complex set of thoughts and/or actions than the tactic; a stratagem consists of multiple tactics and/or moves, all designed to exploit the file structure of a particular search domain thought to contain desired information.
4	Strategy	A plan, which may contain moves, tactics, and/or stratagems, for an entire information search.

{Figure 5.11: Levels of search activities}
source: Bates, 1990, 577–578

Understanding the search system—how it is structured, how it operates, and how to maneuver through it—has a huge impact on the chances of success for a user. And these chances for success are further improved if the IR system is thoughtfully constructed; the developers of these systems play an important role, as well.

In a 1990 research article, Marcia Bates examines how the labor involved in a search might be divided between a user and an IR system. She identifies four levels of system involvement, and four levels of user search activities (see figures 5.10 and 5.11). Bates explains that these search activities are distinct and "conceptually different" from each other, and are combined in different ways to create something new.

By identifying (and codifying) these "chunks" of search behavior, Bates illuminates the ways users move through IR systems. The "move," the smallest unit of behavior, can describe any activity related to searching—including those that have a deliberate purpose, and those that seem random and aimless. The "tactic" relates to any initial attempts to make a search more efficient or quicker. The "stratagem" is more complex, involving a number of moves and/or tactics, and represents a methodical "tackling" of the search task. Stratagems generally involve specific domains of information, and common practices of manipulating those different types of data. For instance, one frequently used stratagem is the "Journal Run," which involves identifying an academic journal of interest and then reading and/or browsing through multiple issues. In this case the user is exploiting the likelihood of finding information pertinent to her needs based on the overall domain of knowledge found within the series of journals.

The "strategy," is an overall "plan for an entire search," which will likely involve all three of the other kinds of search activity. This type of activity is much more difficult to describe, because is an evolving search behavior.

> Most real-life searchers are influenced by the information gathered along the way in the search. Searchers alter the search formulation and the next steps to be taken in light of information discovered in the search process (Bates, 1990, 580).

Searchers implementing a strategy move through the IR system in a methodical way, but are able to adapt their queries and techniques in response to the received results. By calling out this behavior, Bates enables a better understanding of this kind of searching, and how it might be supported and influenced by the interface and structure of the IR system itself.

"These FOUR TYPES OF ACTIVITY *are not just different sizes of the* SAME THING*. It is not the case that one can necessarily put some* MOVES *together to make a tactic, some* TACTICS *together to make a stratagem, and some* STRATAGEMS *together to make a* STRATEGY*… Each of these is an* 'EMERGENT' PHENOMENON*; each higher level of search activity is conceptually different…has different properties, from the lower levels…just as* WATER *is something different from and* MORE *than merely the addition together of* HYDROGEN *and* OXYGEN*"* [BATES, 1990, 580]

name	definition
Starting	Activities characteristic of the initial search for information.
Chaining	Following chains of citations or other forms of referential connection between material.
Browsing	Semi-directed searching in an area of potential interest.
Differentiating	Using differences between sources as a filter on the nature and quality of the material examined.
Monitoring	Maintaining awareness of developments in a field through the monitoring of particular sources.
Extracting	Systematically working through a particular source to identify material of interest.

{Figure 5.12: Levels of search activities}
source: Ellis, 238

Bates' research points to the development of a search interface that accounts for these different types of search activities, and allows for users to easily adapt their searches according to the results returned. She is also asking information scientists and interface developers to consider creating systems that don't simply hold a user's hand, but engage the user equally, as a partner, in the task of searching. She explains, "after a modest amount of experience, users frequently want the capability of controlling the processing more directly themselves." Bates also compares this experience to that of operating a car: while learning, most users prefer a machine that is fully automatic, but expert users may find they prefer a system they can finesse and manipulate to their liking. "In seeking to provide the convenience of a wholly automatic…information search… we may unwittingly be robbing people of the power and freedom of choice that they want to keep" (Bates, 1990, 589).

David Ellis, a researcher in the Department of Information Studies at the University of Sheffield in the UK, posits his own six types of searching behavior, described as "information-seeking patterns" (see figure 5.12). These were distilled from a series of interviews with expert researchers, and then cross-referenced with a body of findings from other social scientists (Ellis, 238).

While these six patterns were crafted using information from research experts, some fundamental behaviors can be grafted on to the more casual online search engine environment. For instance, "starting," is characterized by a user conducting an introductory search rather than an exhaustive one. This serves to orient the searcher to the knowledge domain—it familiarizes her with sources and references for later use in a more pointed or comprehensive search. While experts interviewed for Ellis's study likely conducted their research on library-centered databases, it is easy to imagine users of Google behaving in a similar way.

"Chaining" can also be easily transferred to online search engine use. In Ellis's study, the experts used citations to chain together articles and references. On Google, a user utilizes hyperlinks to chain together pages and sources. Despite some technical (or semantic) differences, the behavior is very similar: a source is identified, and a user follows out the connecting strands to other sources and references. While this behavior can cause backtracking and often takes a considerable amount of time, the technique can prove beneficial in establishing meaningful connections between materials.

What most casual online searchers are missing is an overall search strategy. Many information scientists I examined agree that the development of a strategy can greatly increase a user's chances for a successful search. F.W. Lancaster, information scientist from the University of Illinois, describes a search strategy as, a "sequence of search statements that identify, restrict, or limit a set of retrieved documents" (Lancaster, 1979).

"If we USE, rather than IGNORE, the special traits of humans in the design of HUMAN-COMPUTER INTERFACES for information systems, we may find our abilities ENHANCED in UNPREDICTABLE and CREATIVE ways…A really good information retrieval system that allows us to EXERCISE STRATEGIC search choices quickly and easily may…lead us to explore knowledge and RESEARCH OUR INFORMATION NEEDS in far more powerful and CREATIVELY STIMULATING ways than we ever IMAGINED in the days of the manual library or the simple online bibliographic database."
[BATES, 1990, 590]

"Besides TERMINOLOGICAL KNOWLEDGE and knowledge about basic query manipulation, a SUCCESSFUL SUPPORT to end users has to be given also at a strategic level. Such a strategic help has to be provided AUTONOMOUSLY by the system (i.e., without the user's request), with the aims of (1) making users AWARE OF THE STRATEGIC ASPECTS of their searches, and (2) ENLARGING THE TOOL BOX OF ACTIONS that the users might want to try, providing them with tools and concepts that will ENABLE them to GENERATE better strategies."
[BRAJNIK, 345]

In many ways, this description of a strategy is similar to the idea of information-triage: using criteria to limit a set of results.

Most importantly, the construction of the search query (often at the very beginning of the process) can be crucial to the success or failure of a search. Zhang explains, "Queries are people's mental representations of the problem space that they want to tackle by searching IR systems" (Zhang, 1338). An interface that could help a user construct the most useful query statement would greatly increase the chances of the user finding what she wants/needs.

THE STRATEGY OF SEARCH, AND THE CONCEPT OF A COLLABORATIVE COACH

Giorgio Brajnik and his colleagues in the Department of Mathematics and Computer Science at the University of Udine in Italy discuss how the possibility of an interface that acts as a "collaborative coach" might help bridge the gap between expert and casual IR searchers.

> Although no unified definition of the concept of search strategy in Information Retrieval (IR) exists so far, its importance is manifest: nonexpert users, directly interacting with an IR system, apply a limited portfolio of simple actions; they do not know how to react in critical situations; and they often do not even realize that their difficulties are due to strategic problems. A user interface to an IR system should therefore provide some strategic help, focusing users' attention on strategic issues and providing tools to generate better strategies. (Brajnik, 343)

An IR system (as well as online search engines such as Google) needs to respond to the use of both experts and novices, and allow both groups of users to implement strategies to find the information they need. This concept of a collaborative coach could assist the wandering searcher, making suggestions and providing strategic help before she even realizes she needs it.

A collaborative coaching system in the context of an online search engine would recognize poorly structured search queries and suggest alternatives. Google and other popular search engines have started providing this type of help: when a user enters a search query in Google, the system generates a list of other possible related queries in a box below, allowing the searcher to fix spelling or refine her query statement. By providing this kind of strategic help and criteria-driven suggestions, a coaching system could be one way to extend the concept of information-triage into the online search engine environment.


gathering information about food

1] How often do you use the internet?
SEVERAL TIMES A DAY
ONCE A DAY
ONCE A WEEK
ONCE A MONTH
OTHER (please specify)

2] How important is accessing the internet to you?
VERY IMPORTANT
SOMEWHAT IMPORTANT
NOT VERY IMPORTANT
I NEVER USE IT

3] Do you use it for pleasure, for finding information, or both?

4] What are your other sources of information? (I.E., NEWSPAPERS, BOOKS, TV, RADIO)

5] Do you watch cooking shows on TV? How often? Which ones?

6] Do you read Cooking Magazines? How often? Which ones?

7] Do you collect recipes? How often? Do you keep them digitally (on your computer) or in an analog form (recipe box or binder, etc.)?

8] Do you use cook books? How often? How do you use them? (TO LEARN ABOUT NEW TECHNIQUES AND FOODS, TO DIRECTLY REFER TO AS YOU'RE COOKING, BOTH, OTHER)

{Figure 6.01: Questionnaire}

SECTION SIX

Methodology and process

Personas & Scenarios

In order to structure the development of my visual studies and interfaces, I developed a series of personas and scenarios in which to ground my design. First, I constructed a matrix (see appendix B) that includes the following categories of information: things people are looking for, attributes of users, kinds of decisions, unintended consequences, motivations, problems of attention, and problems of working memory.

Next, I developed a questionnaire (see figure 6.01, and appendix C) and distributed it to a dozen people. This was an interesting exercise (as I had never formulated a questionnaire before) but the results were not as useful as I had expected, partly because my questions centered too much around food and nutrition (the content for my thesis studies), and not enough around online searching and search behaviors (the overall point of my thesis studies). However, the results (see appendix C) were still considered in the formulation of my personas.

Finally, I crafted three personas based on the matrix, the questionnaire results, and amalgamations of real people: resulting in ***Heather***, ***Edward*** and ***Diane***.

1} HEATHER

Morgan's Mysterious Rash: Going Gluten-Free

Heather is a busy working mom. She has two small children: four-year-old Morgan and two-year-old Grant. Her husband's job as an electrician means he's often away from home, leaving Heather to provide most of the care for the children. Her days are full of driving the kids to day care, driving to work for a 6-hour day, running errands, picking the kids up, and then going home to cook dinner and do housework until bedtime.

Heather is only able to surf the Internet while at work (her employers allow for this during slow times), and has to do complex searches in fits and starts. However, she enjoys using the Internet as a source of information, and spends time every workday researching something about health, cooking, shopping or world events.

{Figure 6.02: Heather}

{Figure 6.03: Edward}
source: Flickr.com, dumbledad's photostream, photo taken 27 Oct., 2008, photo downloaded 22 Apr. 2010.

Her daughter Morgan has had a mysterious rash for nearly a year, and the doctors have run a battery of tests without coming to any conclusions. Heather is very concerned about this rash, and has started researching possible causes on the Internet. She recently came across an article that mentioned skin rashes being caused by sensitivity to gluten. She has noticed gluten-free products at the grocery store, but isn't sure how gluten affects the body, or how to test to see if this might be Morgan's problem.

Heather needs more information to decide whether a gluten-free diet is something she can safely (and affordably) test on her daughter, and if so, how to go about it.

2} EDWARD

Over-Active Edward: Comprehending Cholesterol

Edward is a bachelor in his early 40s. He works as an accountant, and despite his sedentary job, manages to keep fit and active through his hobby of Tae Kwon Do. He has been a member of his local Tae Kwon Do club for seven years, and has started teaching classes to the younger members twice a week. He also has three nephews and tries to spend time with them frequently.

Edward's busy lifestyle means he doesn't always have time to prepare himself healthy meals (and he never really figured out how to cook). He usually orders takeout or dines in restaurants, and will treat his nephews to pizza, burgers or sushi once a week.

Edward makes a decent living as an accountant, but is very careful with his money. He owns a home and is saving for a trip to Europe next year.

Edward recently had blood work done and found out that his cholesterol is high. He was very surprised—he feels that he has worked hard to stay fit and active. His doctor wanted to prescribe a popular pill to help him lower his cholesterol numbers, but Edward would rather try to fix the problem with diet first.

However, he doesn't really understand how cholesterol affects the body, or how he should change his diet to help lower his numbers. He needs to find out how cholesterol works, and what foods he should (and should not) eat to avoid having to take medication.

{Figure 6.04: Diane}
source: Flickr.com, Hamed Saber's photostream, photo taken 14 Mar., 2007, photo downloaded 22 Apr. 2010.

3} DIANE

Diane's Dilemma: Differences Among Sweeteners

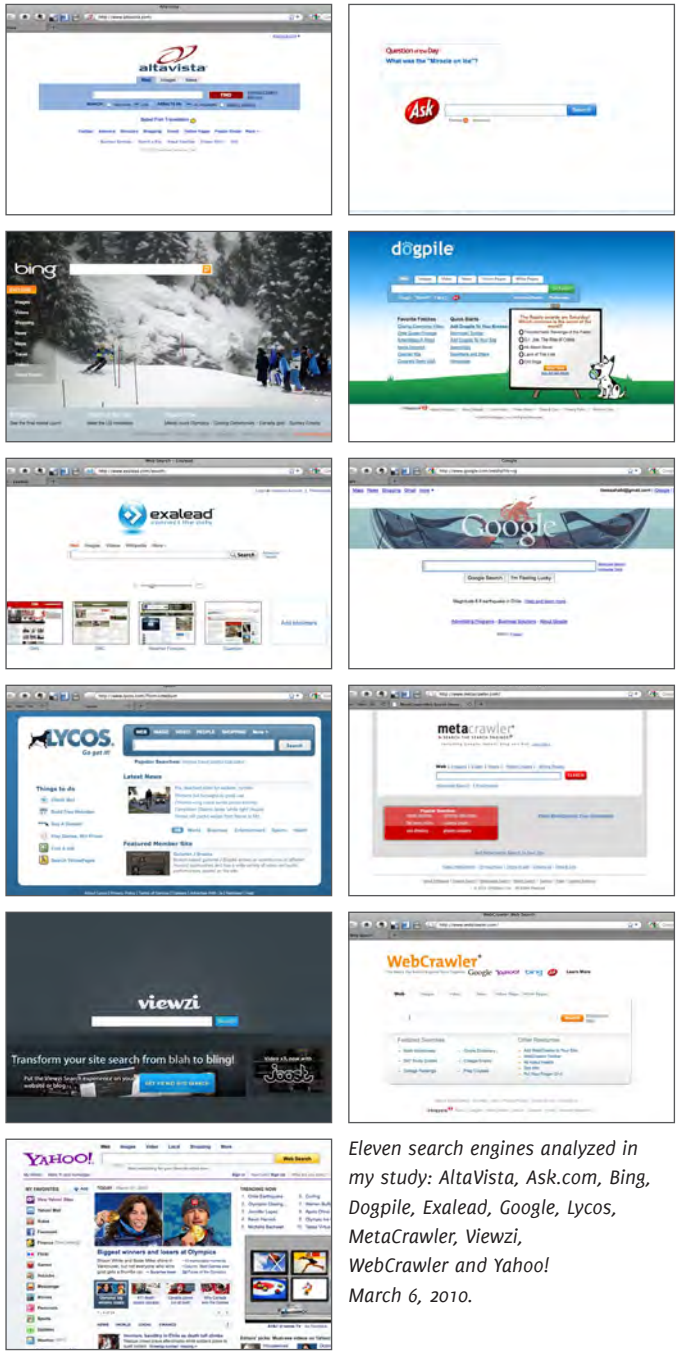
Diane is a young college student, finishing her junior year. She is studying speech therapy, taking a very heavy course load, and spends many hours in the library and at the local coffee shop trying to complete her work. Her busy schedule keeps her on campus from 8 am until almost midnight most days of the week. However her laptop and smart phone allow her to be connected to the Internet all the time.

Diane is trying to watch her money very carefully. During the school year she doesn't have time for a job, and doesn't want to rack up large credit card bills on top of her student loans. She only treats herself to beverages at the coffee shop.

Diane has recently noticed that she's gained some weight, despite trying hard to watch what she eats. She knows that people generally consume a lot of extra calories through what they drink. Diane drinks several sugar or syrup sweetened coffee and tea beverages each day. While she doesn't want to give up the caffeine, she does think she could reconsider the kind of sweetener she uses. However, she finds the choice of no-calorie sweeteners at the coffee shop very confusing. She is not sure how each different kind might affect her body—including the usual choices like table sugar and honey.

Diane needs to find out the differences among the sweeteners at the coffee shop so she can decide which one will be the best for her to use.

Eventually, I plan to populate my studies with all three of these personas. For the purposes of this document and investigation, I have focused solely on the first persona, Heather, and her research about gluten. This has allowed me to empathize with her particular personality and user needs. Heather reflects the overall user type I am choosing to focus on: a multi-tasker who is bombarded with information, pressed for time, and finding it hard to focus, but needs to make an important decision about nutrition and her health.



Eleven search engines analyzed in my study: AltaVista, Ask.com, Bing, Dogpile, Exalead, Google, Lycos, MetaCrawler, Viewzi, WebCrawler and Yahoo! March 6, 2010.

Content and visual analyses…

Another important part of my process was to conduct a methodical survey of online search engines and their capabilities. (I discuss some of my findings in section four, pages 17–20). I conducted this survey in two phases. First, I did an exhaustive analysis of Bing and Google, walking through all the features and elements of each search engine (see digital appendices 1 and 2 on the attached DVD for a more detailed analysis of both search engines).

Next, I analyzed eleven of the most commonly used search engines by examining the same six elements of their interface design and functionality, including:

1. Initial search stage page
2. System search term assistance
3. Search results interface
4. System settings/preferences
5. Advanced search options
6. Basic image search

My analysis (see digital appendix 3 on the attached DVD for the complete analysis) found that ten of these eleven search engines are very similar in setup, function and overall experience. They all begin with a reasonably simple search box page, show results in pages of lists, and have some personal setting options. None of the engines allows a user to search-within-a-search to narrow her results.

Most of the search engines (especially the most popular two, Bing and Google) emphasize "sponsored results," which are not clearly differentiated from the non-sponsored results. This calls into question the credibility (and motivations) of all the sources and the search engine as a whole.

I found that advanced searches are overall shallow and limited—although some of the search engines do offer reasonable "help" pages to assist the user with search basics. Only Bing and Google allow for a faceted search (see definition)—but since the system won't allow for a search-within-a-search, the facets and distinctions aren't robust enough to help a user narrow her search beyond a date range or large system category.

Visually, most of the search engines were eerily similar. Bing offers some interesting design elements and something they call a visual search, but for the most part these are novel (and not useful) distractions. Only Viewzi allows the user to reconfigure search data in different visual displays (see page 17 in chapter 4).

Yahoo.com offers a "search pad" tool attached to their interface, which allows users to save snippets from found websites, and add their own thoughts and other notes. While this is an exciting and potentially useful concept, the execution is confusing and lacks depth. It feels more tacked on than thoughtfully integrated.

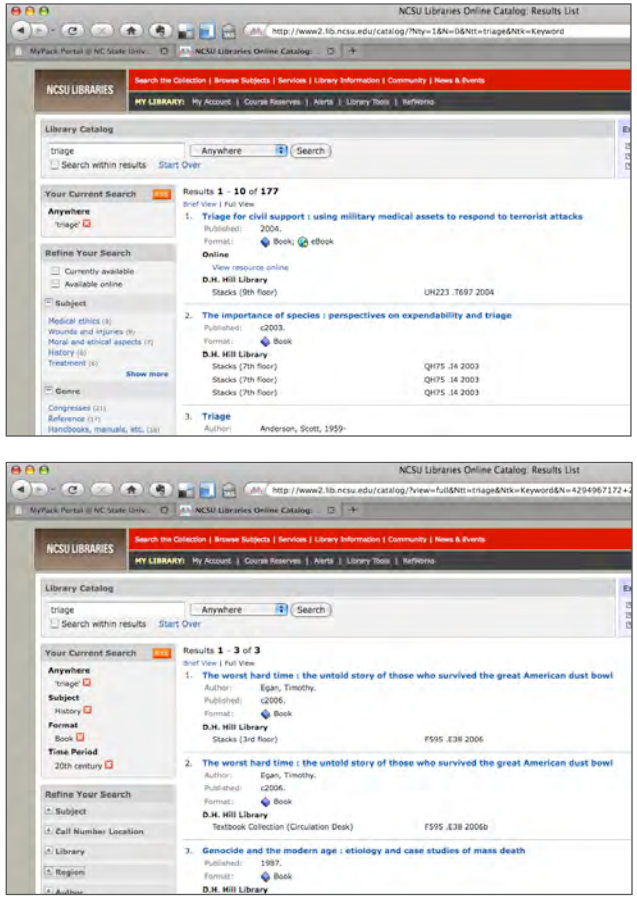
Overall, these search engines, especially Google, excel at cataloging the web and returning increasingly accurate results. But the functionality and visualization of both the interface and results is poorly developed, and in many cases, a hindrance to a user's cognitive abilities and needs.

An interview with a librarian and information scientist

I interviewed the director of NC State University's Design Library, Karen Dewitt, to get an expert researcher's take on my project. The following is not a transcript of the interview, but rather a synopsis of our discussion.

Questions asked:

- When you are searching for information online, are there certain techniques you employ that are different from those in the analog world?
- Do you have a set of criteria you use to judge the credibility of source material?
- Do you have a set routine system you use when searching for information? Or do you ever take a more wandering path?
- When you search for information online, what software/browsers do you typically use?
- Are there any functions you wish were incorporated in the searching software you use? Anything you think is lacking? Anything you think could be done better?



{Figure 6.05: NC State University's library site: faceted search}
source: www2.lib.ncsu.edu/catalog. April 8, 2010.

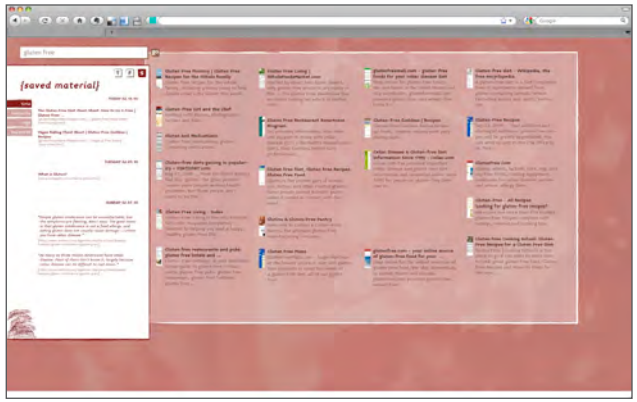
FACETED SEARCH: allows the assignment of multiple classifications to an object, enabling the classifications to be ordered in multiple ways, rather than in a single, pre-determined, taxonomic order.

Synopsis of Karen's answers:

> Databases are much easier to use now (as compared to in the past), but having the knowledge to use more complicated databases helps me even in a simpler search. Today's search engines have a much different back end (underlying database) than more traditional information retrieval systems, but I'm still always trying to formulate a distinctive term or strings of terms in my search queries.
>
> The different levels within Google are nice. The shopping filter helps to get the sense of an overall landscape; it gives a useful overview.
>
> As far as credibility goes, you can tell visually if a website seems credible. If it has a lot of ads, if the layout seems strange or amateurish, or if none of the names involved are recognizable, it's likely a less credible source.
>
> The idea of overlap within searches can be very helpful. I'm always looking for those places where multiple sources agree on an idea or piece of information.
>
> When I search it is usually a combination of wandering through information (and redirecting my search as needed based on what I find) and more direct searches (where I seek and find a specific answer quickly). I usually save material from my searches using digital folders and bookmarks within my web browser. I also use Delicious (the web-based, social bookmarking site).

Karen and I also discussed the idea of "faceted search." The NC State library website utilizes this kind of search. All the information found within the online library database is assigned pertinent tags according to size, author, date, location, and various levels of content. These different facets can then be turned on and off, acting as filters, to narrow down the results from a search (see figure 6.05). Karen was also able to point me to NC State's database of information science articles, which proved to be extremely useful in my research of search behaviors and interface design.

This interview was an important step in my research process. It allowed me to bounce some ideas off an expert in a relevant field, and gain some new knowledge about how search works and where to go for pertinent resources to continue my research. I would like to reach out to other information science experts in the future, to further my research agenda.



{Figure 7.01: Sketch #1, saved material mode}

{Figure 7.01: Detail}

SECTION SEVEN

Initial interface sketches

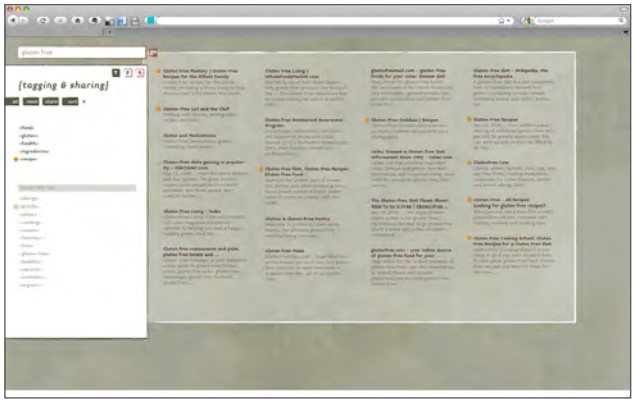
During the course of my investigations, I have proposed and developed several interface designs. The first several did not develop past the initial sketch phase; however, an analysis of these preliminary ideas is still relevant and useful. The following represents the beginning stages of three interface ideas.

Sketch #1

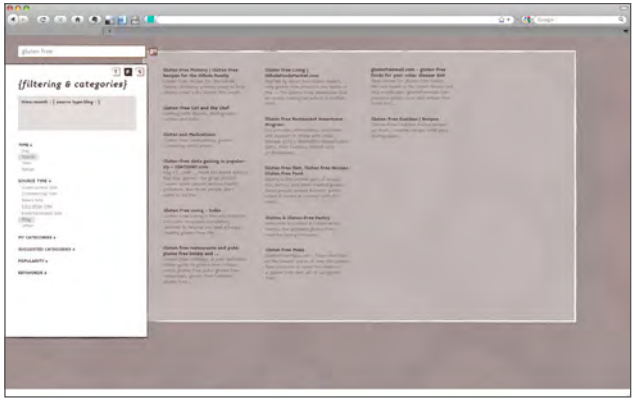
This interface would be housed within a browser as a stand alone program (like Viewzi). The system would allow the user to drag and drop items within the interface, enabling the sorting and clumping of information. The interface has three different special modes: ***saved material***, ***tagging and sharing***, and ***filtering***.

SAVED MATERIAL MODE (SEE FIGURE 7.01):

- Users can drag pages they want to save to this space, where the information and websites can be sorted by different criteria: time, hierarchy, tag relevance, etc.
- Users can also drag results off the edge of the frame to throw away pages they don't want.
- The system recognizes which pages are already saved and thrown away, so these don't show up in future searches.
- This space serves to hold material and allow users to sort through it as needed.
- The drawer can be pulled out further, giving the user a larger space to sort within.
- Information still "being considered" is pooled together in the bottom corner in a small blob, which can be fanned out as needed by clicking on it.



{Figure 7.02: Sketch #1, tagging and sharing mode}



{Figure 7.03: Sketch #1, filtering mode}

TAGGING AND SHARING MODE (SEE FIGURE 7.02):

- This functions as a way to apply tags on the fly (and to organize them).
- The user can also view how other people have tagged information.
- The results window displays which tags have been applied to the current search information.

FILTERING MODE (SEE FIGURE 7.03):

- This interface is meant to be highly robust and flexible, because the way in which people create associations for materials and categorize them can be quite unique.
- Users can filter by: source type, category, time, popularity, etc. (This is just the beginning of the kinds of categories and filters that could be created/ generated by both the system, other users, and the current user).

SKETCH #1, ANALYSIS

This was my first attempt at a system to help triage search, and it remains very conventional and generic. This interface contains some ideas about different tools the user might need, but these tools are functioning as mere add-ons to basic search engine tropes. Search results are sorted into a gridded list, are clickable, and identical in appearance. Users can implement tags in a very predictable way, and filter results using a conventional left-hand column list. The system utilizes many functions and features, but doesn't really establish an atmosphere of triage.

Triage is about getting at the essence of a problem—introducing a user into a whole new world she doesn't fully understand. It is also related to the notion of a system taking over (instead of allowing a user to make all her own decisions). This idea of a system in complete control initially made me uncomfortable, but has proven helpful in future interface designs.

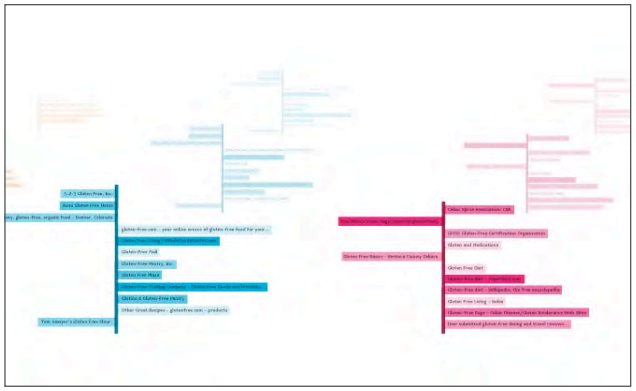
I was caught up in trying to create something to do a lot of the "work" for the user, while allowing complete flexibility. However, many of the systems out there already highlight this idea of complete flexibility. Google works so well because it is simple and flexible.

Ultimately, I wanted to highlight other ways that people might search, using different kinds of tools, functioning in extremely different ways. Looking at Viewzi was very helpful in this regard. This is a system built to aggregate information from Google and other

sites, which then extrapolates that data in numerous and novel ways. The ability to view these data sets in unique shapes and forms is what makes this search engine so arresting—the user experience of Viewzi is memorable and innovative. The user experience of Sketch #1 is staid and conventional.

Sketch #2

{Figure 7.04: Sketch #2}



{Figure 7.04: Detail}

In this interface, the information is organized along spines, which represent overarching organizational categories. Websites to the left of the spine represent sites built/maintained by individuals, while those to the right of the spine represent sites built/maintained by groups, organizations, or companies.

The categories represented here were created from actual search results:

- Green = Recipes
- Gold = Suspect or un-vetted websites
- Blue = Shopping/commerce
- Pink = Reference resources
- Brown = News

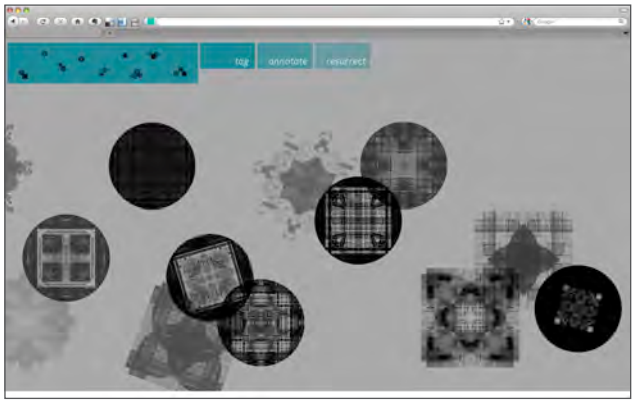
Each line branching off the spine represents a website. These are listed alphabetically from top to bottom. The tints represent popularity of the site (the darker shades are the more popular sites).

The design of this interface is playing with the idea of information receding in space, away from the viewer, existing in layers. The user navigates through material by maneuvering up, down, forward and back. This zooms the user through the information. Clicking previews a website, double clicking takes the user to the selected site.

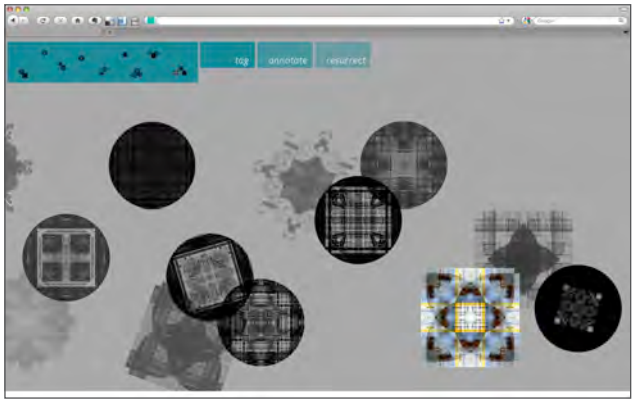
SKETCH #2, ANALYSIS

In this interface, the system is taking over more directly, while allowing the user to manipulate and move through information as desired. But I wondered how I could manage the system so that it might intuitively function on one plane—there are so many possible variables. What I struggled with was balancing practical needs with triage.

This interface starts to work as triage, but every aspect of the coded visuals would need to be carefully thought out before it would be successful. Right now, it isn't functioning as a compelling tool—however, some of the ideas were useful in the creation of later ideas.



{Figure 7.05: Sketch #3}



{Figure 7.06: Sketch #3, highlight}

Sketch #3

The design of this interface investigates the idea of thought and memory as a visual residue. Each website result generates a pattern—the three distinct shapes represent different categories of source material. As the user engages with the search results they become darker against the background, while the material ignored or passed over slowly fades away (see figures 7.05 and 7.06). At the top left is a map of the user's movement through the results, charting her progress through space and over time.

SKETCH #3, ANALYSIS

While this interface was enjoyable to build (generating the patterns for the sites was especially fun), it is far too ambiguous to function as triage. If a user already feels overwhelmed and anxious about her search, the last thing she needs is an ambiguous, vague and fuzzy interface to wander through.

These three initial sketches were important steps in my research. They allowed me to experiment—to visualize and "try-out" some unusual ideas—and to work through how an information-triage system might function. These sketches also inspired new ideas and directions through discussions with my committee members, and my own written analysis.

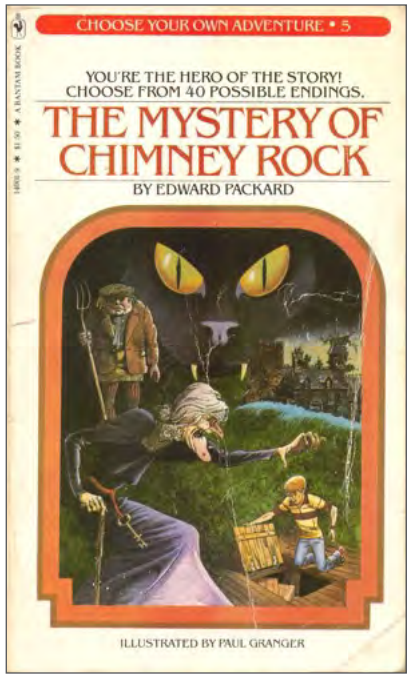
SECTION EIGHT

Information-triage at work: three comparative studies

I have created a framework of comparative studies for my thesis project. Organizing my studies this way (instead of designing one large, comprehensive system) has allowed me to explore several different avenues of information-triage, to speculate multiple types of interactions and interface elements, and to freely compare how the different systems are working (or not). I believe the experimental and undefined nature of information-triage is well suited to this type of open investigation.

Originally, I wanted to organize these visual studies around my four sub-questions; one visualization for each. But, the further I waded into my research and sketches, the more I realized that this structure didn't make sense. The original logic did not fit with my findings about information-triage and working memory. The ideas found in my sub-questions—of attention span, working memory and principles of information organization—were too closely linked to separate into three different visualizations.

After completing my research and initial speculations, I concluded that there is an information-triage gradient: different degrees to which a system could and should take over for a user. How much balance should the interface find between controlling the content and decisions for the user, and providing flexibility and agency? When is user choice more important than system efficiency? What are the degrees between ultimate system control and ultimate user control? In response to this finding, I chose to create three studies that illustrate different possible points along this spectrum—one near each end, and one closer to the center.



{Figure 8.01: Choose Your Own Adventure book cover}
source: nostalgiamanila.blogspot.com. April 20, 2010.

Visual Study #1

(greatest amount of system control)

NARRATIVE GUIDE

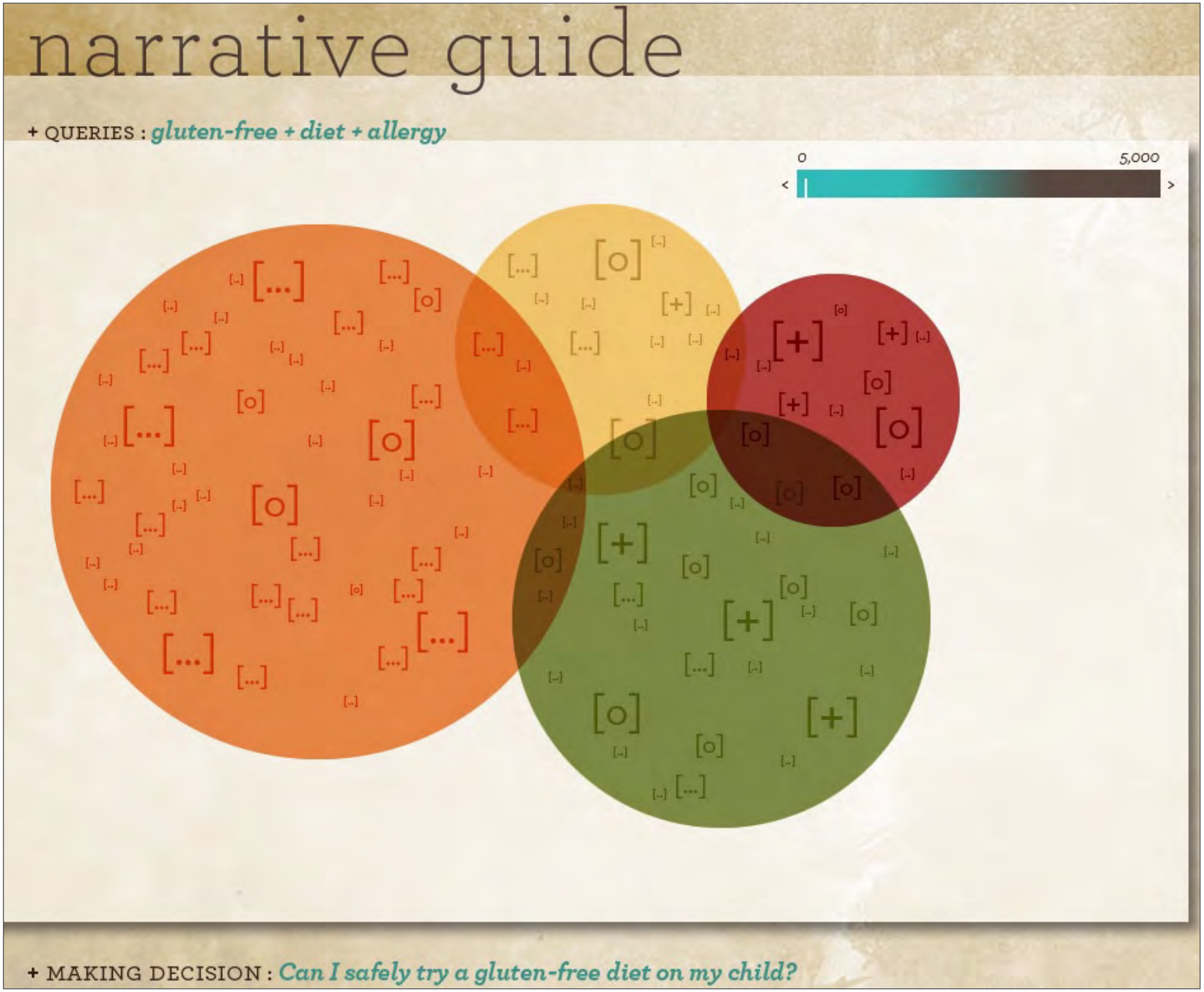
A visual study based on the concept of a narrative guide taking a user on a search journey

This interface takes the form of a narrative guide, which holds the user's hand, taking her step-by-step through her search journey. It is partly based on the idea of *Choose Your Own Adventure* books, in which the user is heavily guided through a process, but prompted with choices along the way.

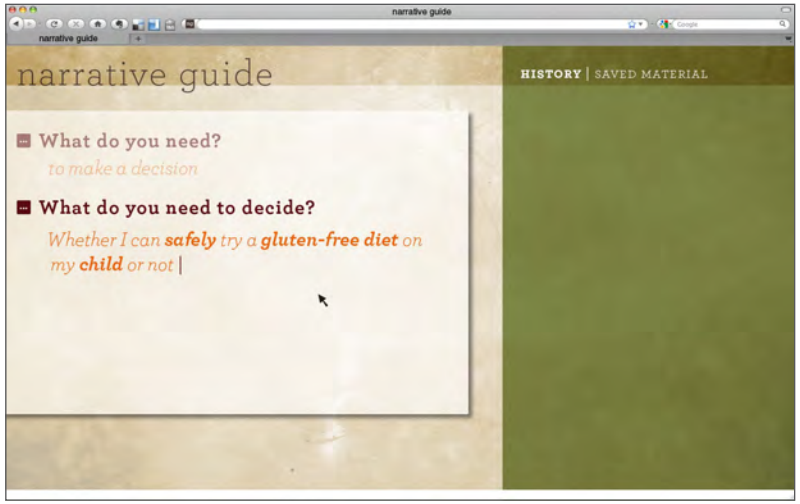
This is an online interface, housed within a web browser that aggregates search results from other search engines. The system keeps track of the user's search every step of the way, and suggests options and alternatives (as a Collaborative Coach). The ***Narrative Guide*** prompts the user, helping her to develop a sound search strategy based on her stated goals and motivations for the search.

The look, feel and function of the system are all meant to inspire comfort and trust. The user should feel like she is in capable hands as she is guided through her search. Even the language of the system has been crafted to offer reassurance and promote focus.

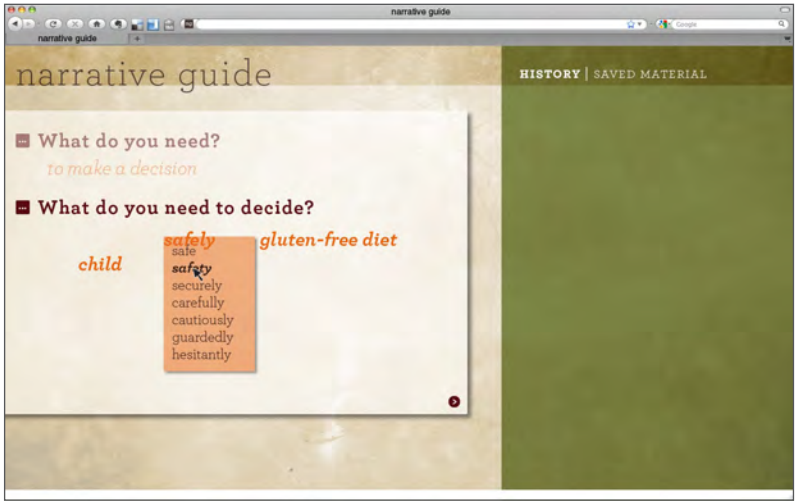
{Figure 8.02: Query help; example of collaborative coaching}
source: Google.com. April 15, 2010.


narrative guide
+ QUERIES : gluten-free + diet + allergy
0
5,000
+ MAKING DECISION : Can I safely try a gluten-free diet on my child?

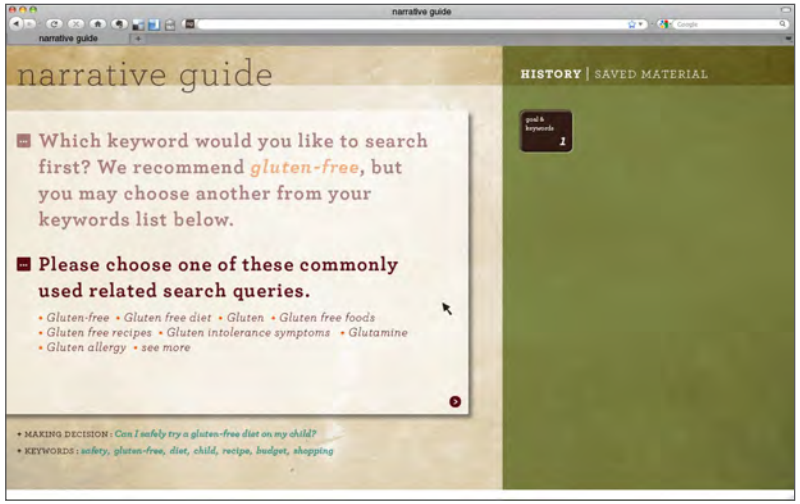
The system leads the user through her search journey, step-by-step through isolated questions. The system also offers suggestions and help through the "help" box to the left of each main question. The user can access pertinent help as needed.



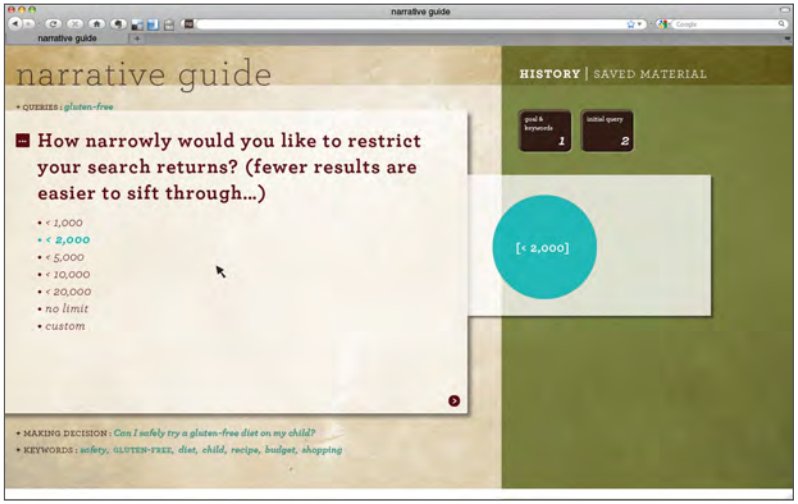
The system automatically pulls keywords from the user's question, helping to break down the language into strategic search queries.



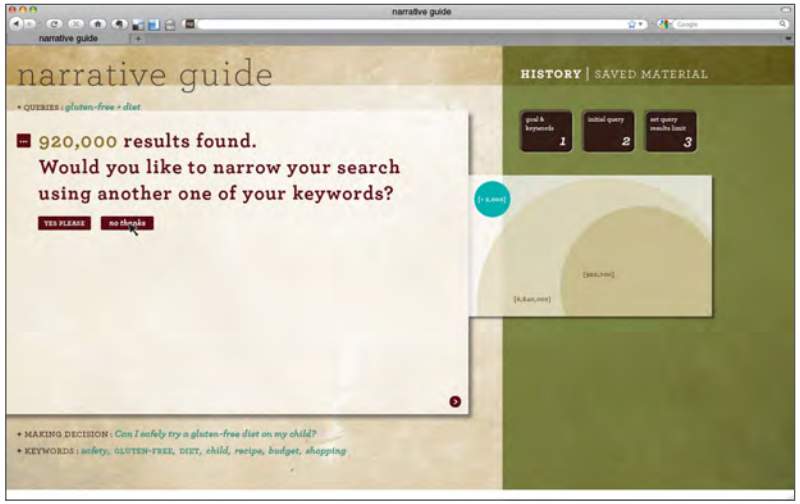
The user also has easy access to a query thesaurus for each of her words. This enables her to look through a list of system-generated related queries, allowing her to discover a more specific term, or a version of the term she hadn't thought of.



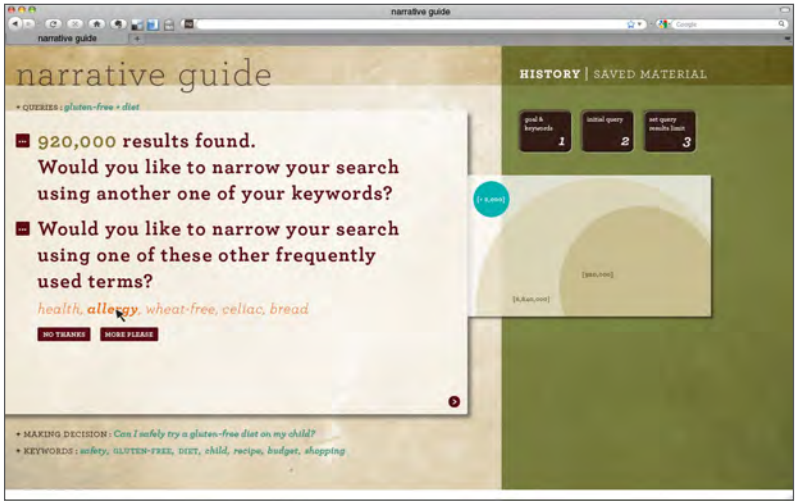
The system displays the user's search purpose and keywords below the question box, allowing her to refer back to them at any time. Additionally, the system keeps track of the user's movement through the system through the history panel to the right, allowing the user to easily return to any previous steps.



The system helps the user choose a limit for her search results, which is reflected in the search limits map to the right of the main question box. This allows a user to understand the ratios of total number of search results to her initial query, and how those results are affected as she narrows down her search.

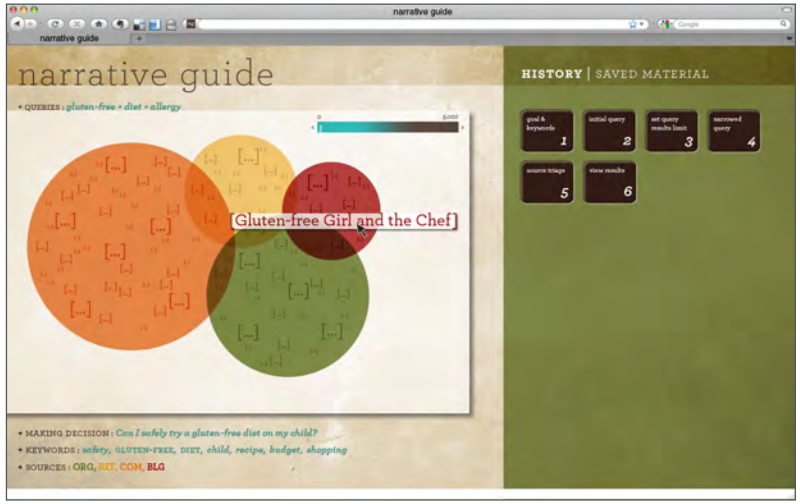


The user is asked to narrow her results using one of her other initial keywords. Then the system displays how adding this keyword to her query narrows down the total results. The search limits map is updated to reflect this change.

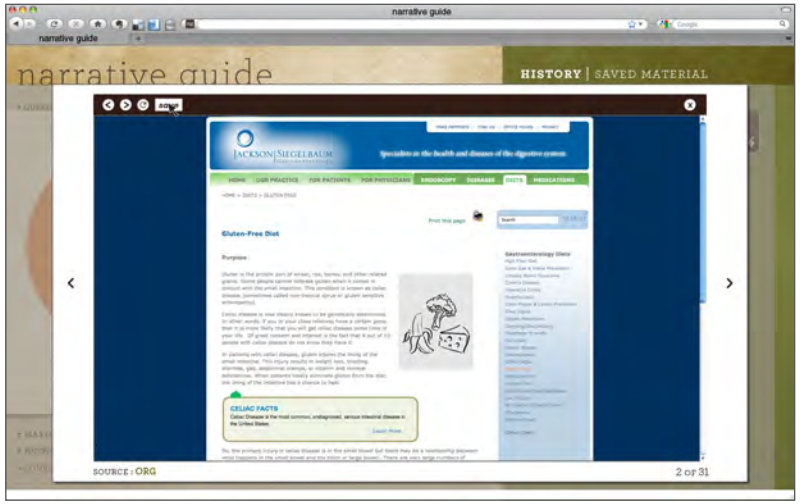


The system asks the user to consider other frequently used search terms to further narrow her search. This represents another way that the system can make strategic suggestions to aid the user in her search.

Next, the system asks the user to select the kinds of sources she'd like to view results from. These six source types help the user filter the results according to credibility and relevance.



The search results are displayed as a series of overlapping circles, sorted by source type. Each website result is represented by an ellipsis in brackets, and the user can view the title of the site by hovering over this symbol. The size of the symbol represents a website's Google ranking. The user can navigate through her returned results using the gradient at the top right of the question box.



The system allows the user to view selected websites (and navigate through them) without leaving the Narrative Guide interface. This allows the user to focus on the information within the website without feeling lost or overwhelmed.

The results display updates as the user interacts with it. Results that have been viewed as a rollover change into "o" symbols. Sites that have been stored in the Saved Material panel change into "+" symbols. This allows the user to methodically move through her results, and easily understand which ones she has viewed and saved.

The user can store websites in her Saved Material panel, organized by source type. She can save these websites from the website browser panel or by dragging the sites to the Saved Material panel from the results display.

One of the main challenges I encountered when designing this interface was controlling the pacing. How might I create a comprehensively reassuring atmosphere—addressing how the user might make choices every single step along the way—without crafting an experience that was plodding and tiresome? When does an interface offering measured and methodical help become too much?

Users of the Internet have become accustomed to fast-acting and highly responsive websites and interfaces. The ***Narrative Guide*** asks our user to slow down, to be thoughtful about her query choices, and to be methodical as she views results. It also displays those results in a visual, information-rich way—creating affordances for different kinds of understanding and connection making.

I believe the Narrative Guide *addresses my sub-questions in the following ways:*

- The system prompts the user to make choices at key points, and provides extra help and layers of prompts when needed. The user can personalize her journey through the system, but the interface acts as a *Collaborative Coach* through every step.
- The system addresses attention span by keeping the interface very simple, calming and comforting. Every choice is isolated, asking the user to focus on only one thing at a time. However, the user can always go back to review previous choices, relieving anxiety.
- The system provides a focused structure, and clearly displays information to keep the user on task.

{Figure 8.03: Mise en place, by Flickr member littlecabbage}
source: Flickr.com, littlecabbage photostream, photo taken 11 Aug. 2009, photo downloaded 22 Apr. 2010.

{Figure 8.04: Images taken on an aircraft carrier at Patriot's Point, Charleston, SC, showing info-graphics from WW II}

Visual Study #2

(equal amounts of system and user control)

MISE EN PLACE

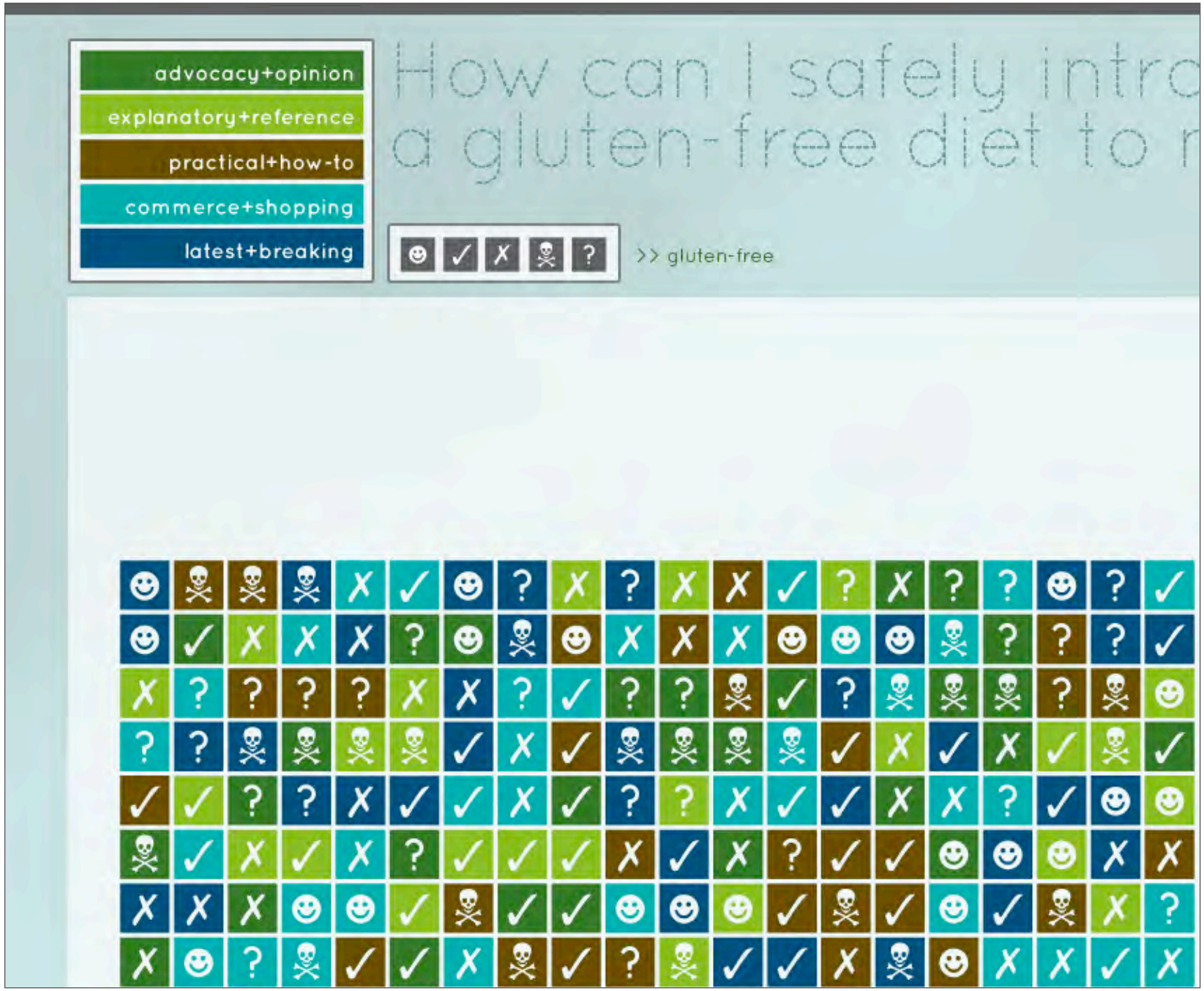
A visual study based on the concept of mise en place and methodical organization

This interface is based on the idea of *mise en place* (French for "everything in its place") that chefs and cooks use to organize—and, in a way, triage—their process, kitchen, ingredients, time and space while cooking. Essentially, *mise en place* is a methodical, focused way to put every element in a row before the main event begins, enhancing competency and providing efficiency through established expectations.

This is an online interface, housed within a web browser that aggregates search results from other search engines. The system allows the user to organize and state the purpose of her search, and then displays coded results of her search query. These results are labeled according to large categories (generated by the system), and a gradient of credibility (generated by other users of the system). The interface is meant to be friendly and comforting—creating an environment that will allow users to make sense of search results and find focus.

I found inspiration for the design of my final interface from a set of information graphics hanging on the tower of the aircraft carrier at Patriot's Point Museum in Charleston, South Carolina (see figure 8.04). This straightforward, yet complex, design influenced my visualizations of color- and icon-coded search results.

The ***Mise en Place*** interface encourages the user to sort through her search results. She can easily conduct mass sorts using the basic category and source menus, and she can discard types of results that aren't relevant to her search. The user can also choose to utilize her *Sort* space, creating categories and affinities that fit personal criteria.


advocacy+opinion
explanatory+reference
practical+how-to
commerce+shopping
latest+breaking
How can I safely intro
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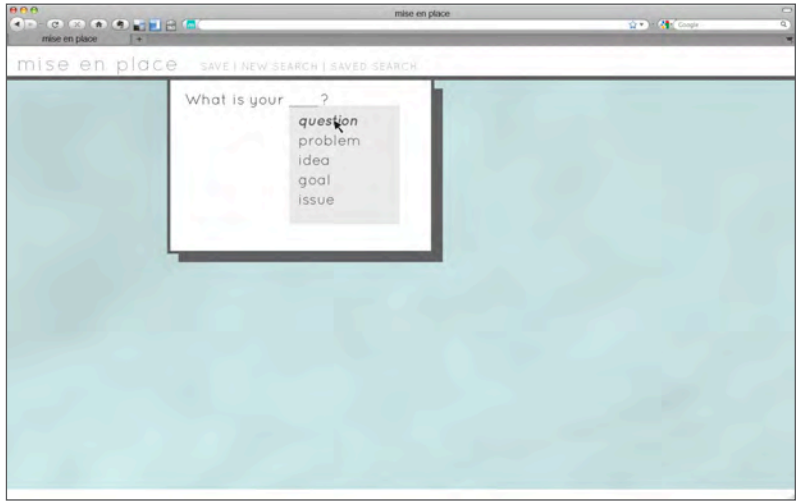
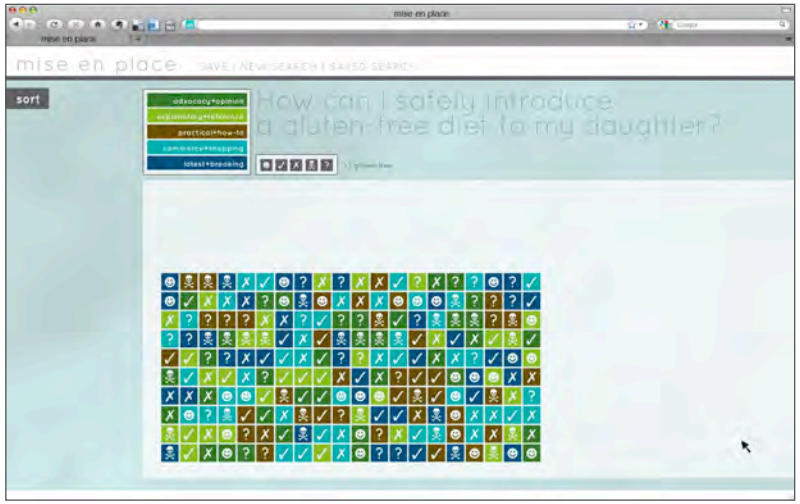
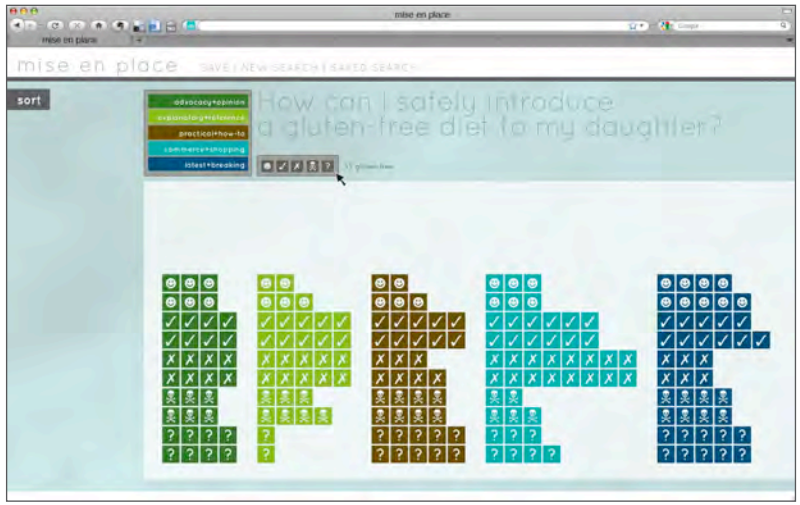


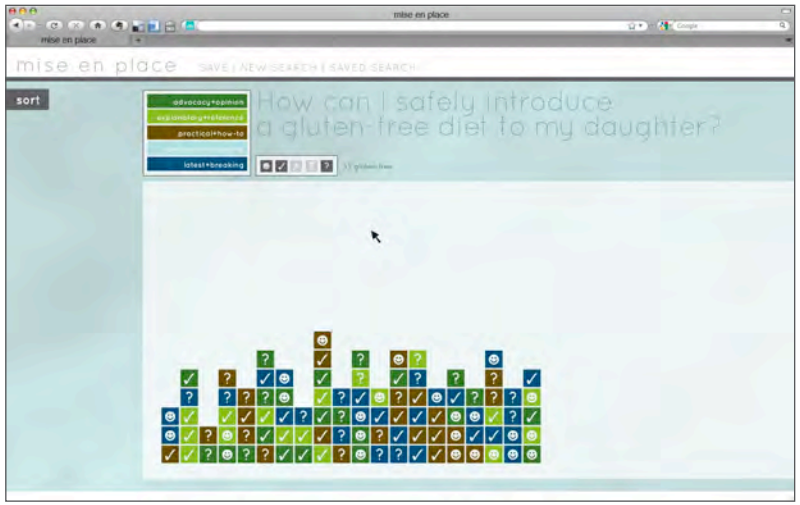
The system prompts the user to organize her search goals, asking her to choose a strategic type of search need. Once the user has generated a statement about her goal, it will permanently appear as part of the interface for her saved search.



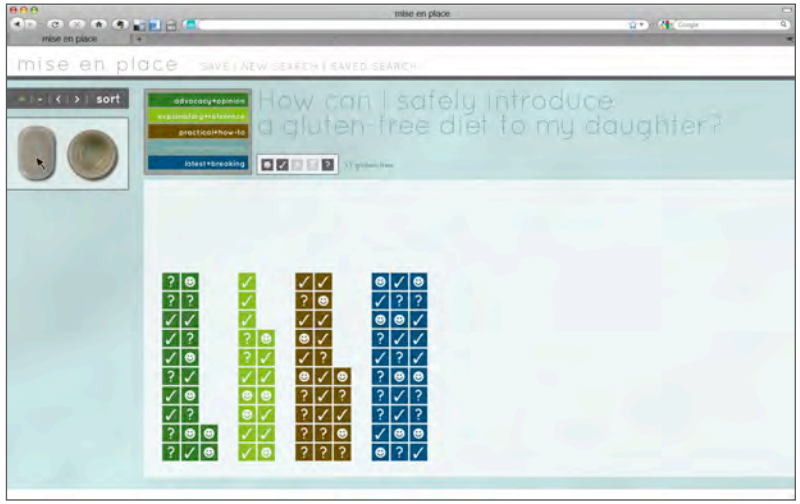
The user's search results are displayed in a grid—each labeled by a specific color (which correlates to a system-generated category) and a symbol (which correlates to a source credibility gradient, generated by other users of the interface). The user can quickly and easily see differences among types of sites.



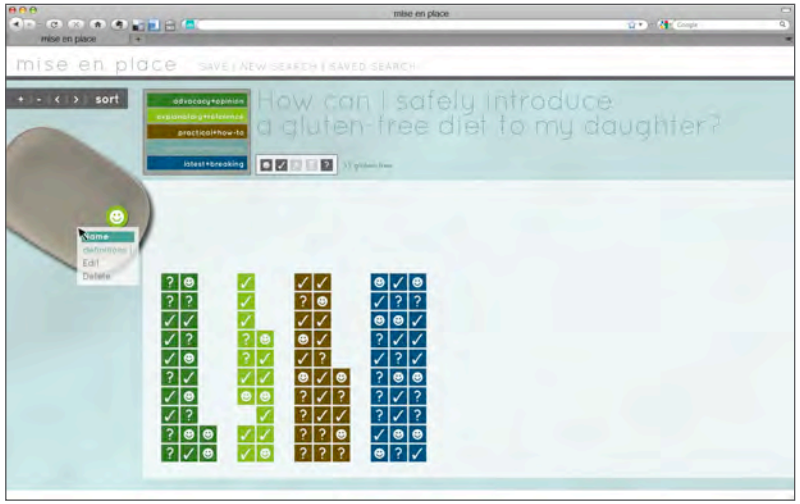
The user can do a meta-sort of the results using the two menu bars: in this way she can sort her results by category and/or source credibility, allowing her to assess the information within the entire group and start making connections.



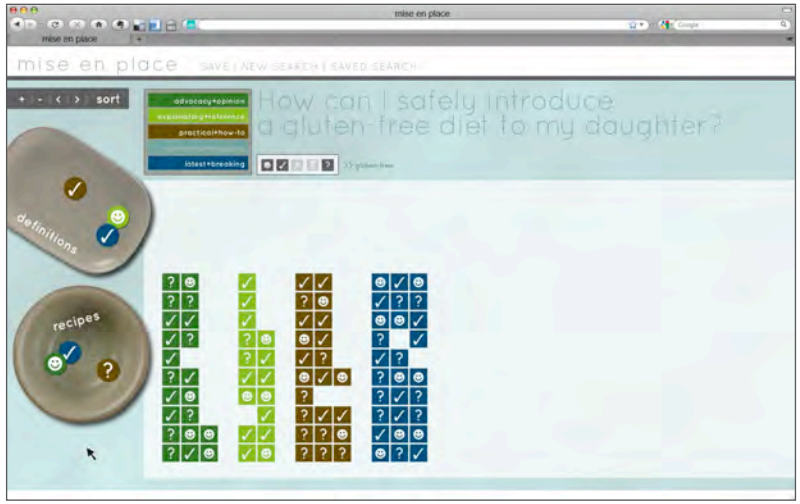
The system also allows the user to discard types of results from the display. If she doesn't want to view results from certain categories or types of sources, then she can easily remove them from the group, or retrieve them if she changes her mind.



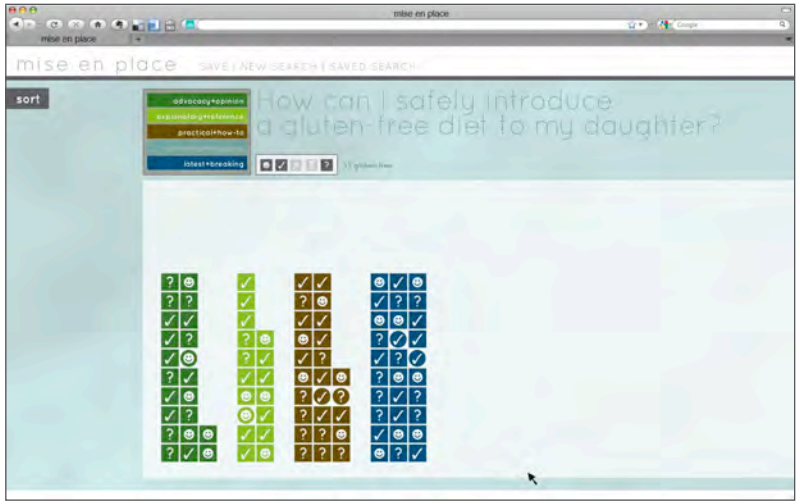
The sort panel allows the user to categorize her saved websites, and organize them into *affinity dishes*. The user can access the sort panel when needed, and then minimize it when finished.



The user can easily name her *affinity dishes*, and can move them around and edit them as her categories and search needs change. As she adds results to her Sort panel, they change from squares to circles, clearly distinguishing them from each other.

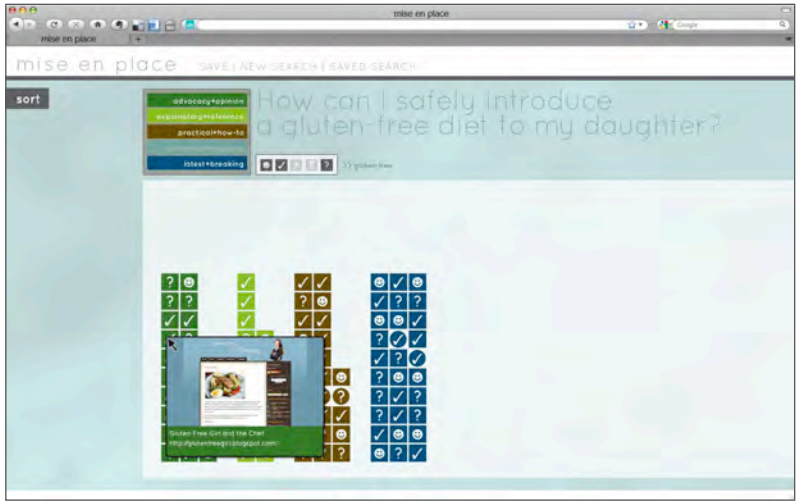


The system keeps track of which sites have been saved to the sort panel, and visualizes this in the main search results display. This alleviates redundancy, and clearly shows patterns in the material the user has saved (or not saved).

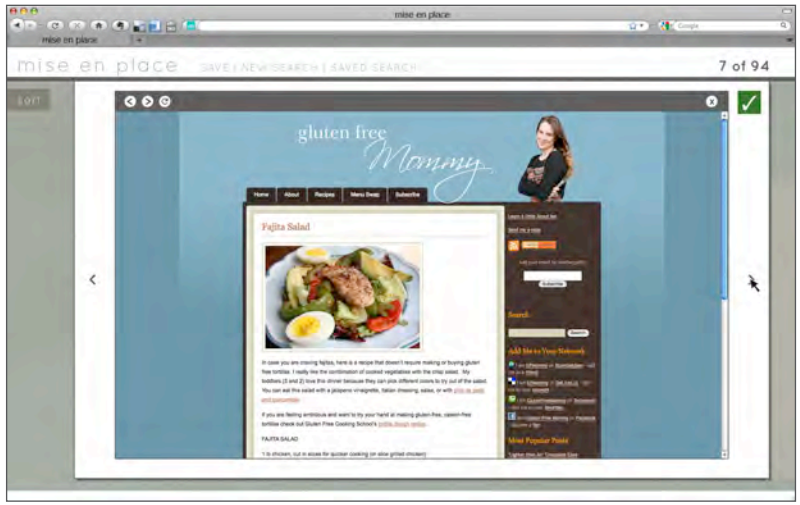


Even when the sort panel is minimized, the system still shows the user which material has been saved. And this material will remain clearly marked, even as the user continues to sort and move through the results.

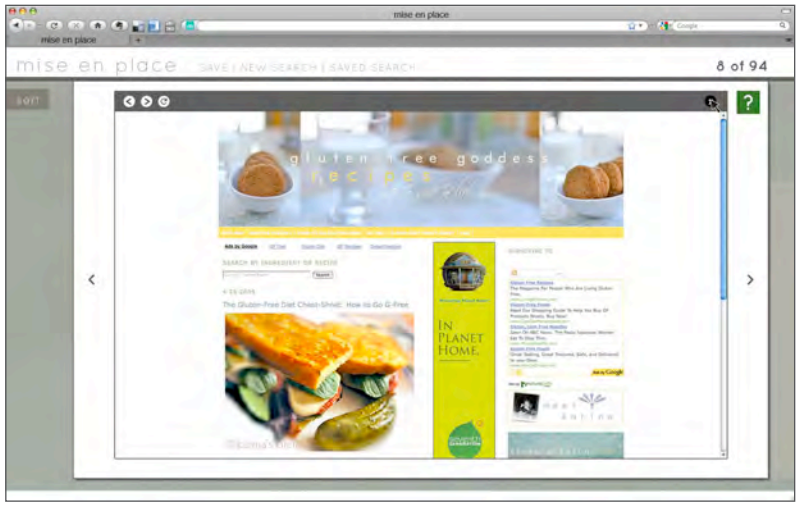
The user can easily view her eliminated results by placing her cursor at the bottom of the results panel. The system will move the space within the panel to reveal these results which have fallen below. The user can view and save these results as desired without adding all of them back to her main sort.



The system allows the user to preview each website result with a hover behavior. The hover produces a screenshot of the webpage, and provides the title and URL below the image. To view the website, the user clicks the rollover.



The websites are displayed in a lightbox window, ensuring that the user remains in the *Mise en Place* interface. This alleviates the feeling of being lost, or later losing track of where the user is within a search. The interface clearly displays the color and source coding for each site.



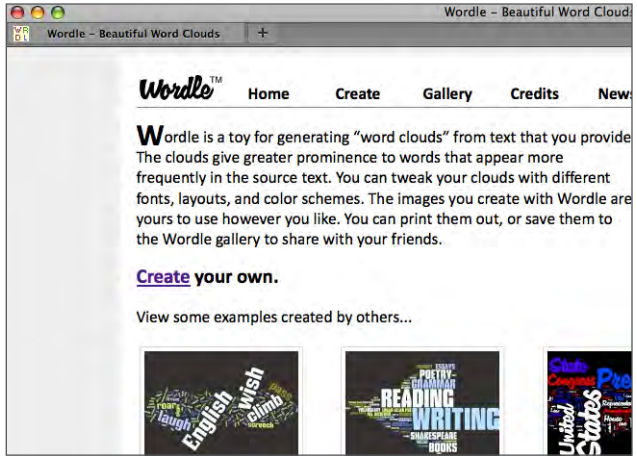
The user is able to navigate within each individual website, and can navigate through all her sorted search results using the arrows in the lightbox frame. Both these options allow the user to isolate the information she wants to view without losing track of the other sites she'd like to explore.

One challenge I encountered in the creation of this interface was deciding how intuitive it should be. Where is the balance between robust and practical functionality, and minimal and intuitive interaction? By providing a simple set of tools and sorting functions, I am attempting to create the possibility for many different kinds of interactions and experiences for users.

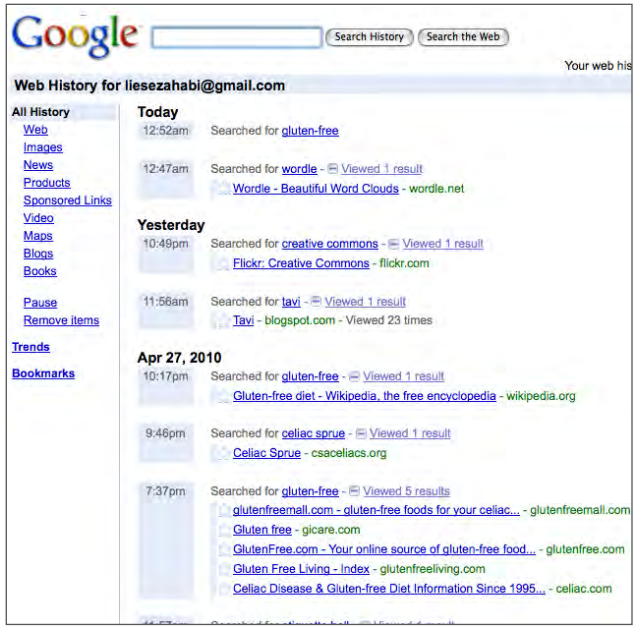
Typically, search engines return results that all look identical—purely language based and neutral. The ***Mise en Place*** interface attempts to color these same search results using sets of meaningful criteria, allowing a user to understand specific aspects of her results before she chooses to read them. This also allows users to see and understand many more results at once—eliminating the tendency of only viewing the first few pages of results found on search engines like Google.

I believe the Mise en Place *interface addresses my sub-questions in the following ways:*

- The system gives the user the agency to make decisions and choices throughout the search process, and offers visual and strategy support along the way.
- The system keeps the user focused on one step at a time, and provides reassurance that ideas and information aren't being lost in the shuffle: everything is saved and stored for the user to find again.
- The system addresses working memory by visually displaying information in digestible bits, and allowing the user to sort through and make sense of her results as needed.



{Figure 8.05: Wordle tag-cloud generator}
source: wordle.net, Jonathan Feinberg, 2009, 22 Apr. 2010.



{Figure 8.06: Google history function, listed chronologically}
source: google.com, 23 Apr. 2010.

Visual Study #3

(greatest amount of user control)...

INTELLIGENT PATH

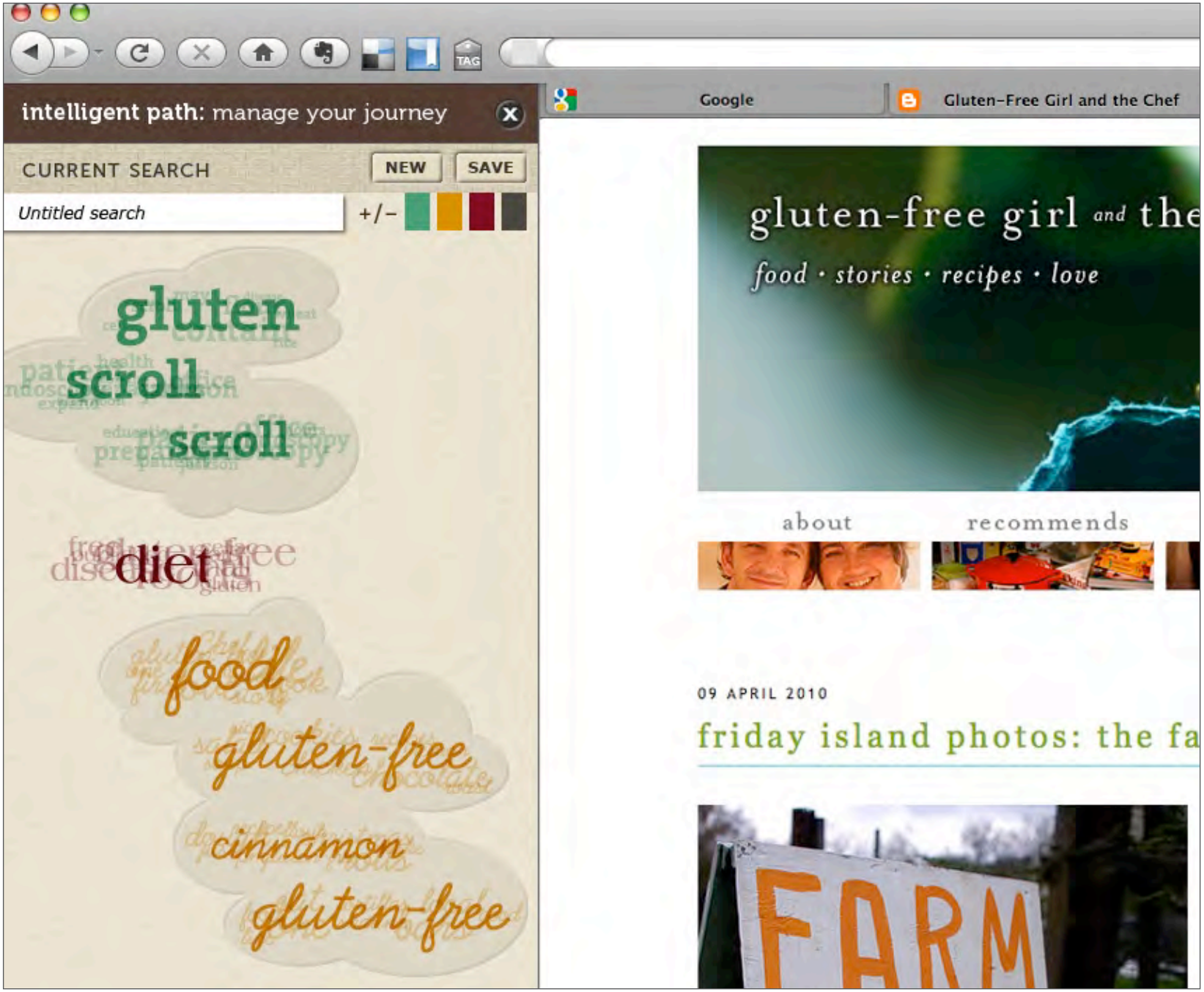
A visual study utilizing a plug-in drawer that contains a visual, keyword-based history of a searcher's path

Both Bing and Google offer search history functions, with some surprisingly robust features including filtering and chronological searching. I wanted to build on this idea for my third interface to create an ***Intelligent Path*** to help a user keep track of her search.

This interface functions as a plug-in to the Mozilla Firefox browser, and operates as a collapsible drawer that houses the user's material. The top portion contains the user's ***Intelligent Path***, along with functions for saving and creating a new search. The bottom portion contains a list of saved searches.

This system is meant to be unobtrusive and ambient as the user conducts a routine search, keeping track of the sites she has visited, and creating a chronological path to re-visit when desired. The user can utilize the interface if and when she needs to, turning it on and leaving it to collect her movements, and then visiting the data at a later time.

The system visualizes each website as a typographical tag-cloud, triaging the content into a set of the ten most-used words. These key words allow a user to quickly ascertain whether the site content is relevant to her search, and provides serendipitous juxtapositions and meaningful connections among words she hadn't initially thought to search for. Each tag-cloud is color and typeface coded to indicate type of source (official organizations, corporate/commercial, and blogs/personal websites).


intelligent path: manage your journey
CURRENT SEARCH
NEW
SAVE
Untitled search
+/−
gluten
scroll
scroll
diet
food
gluten-free
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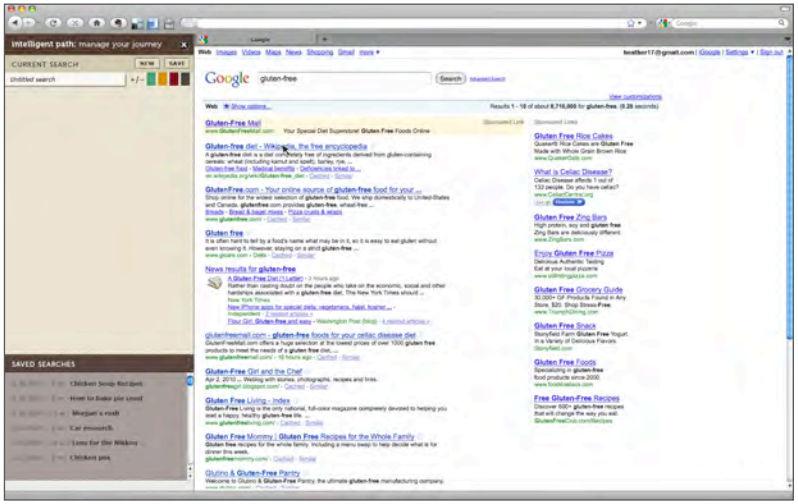
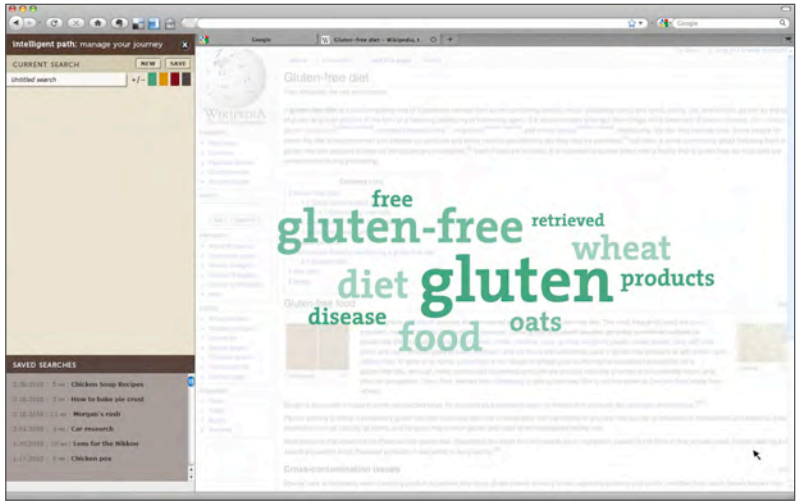
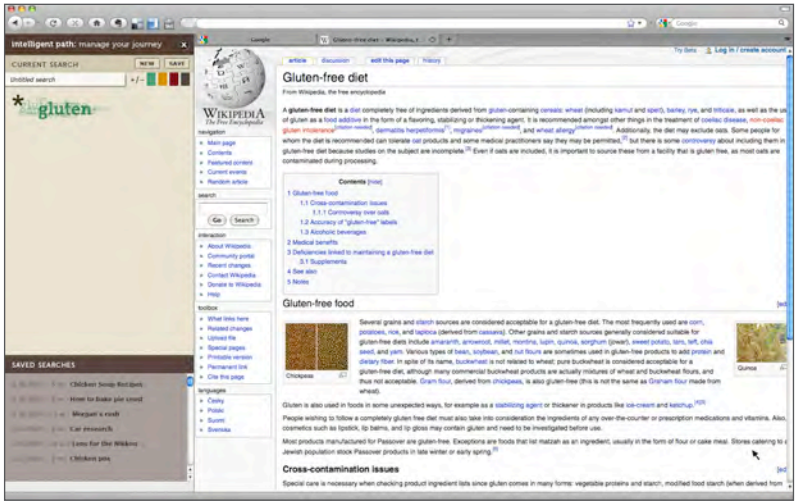


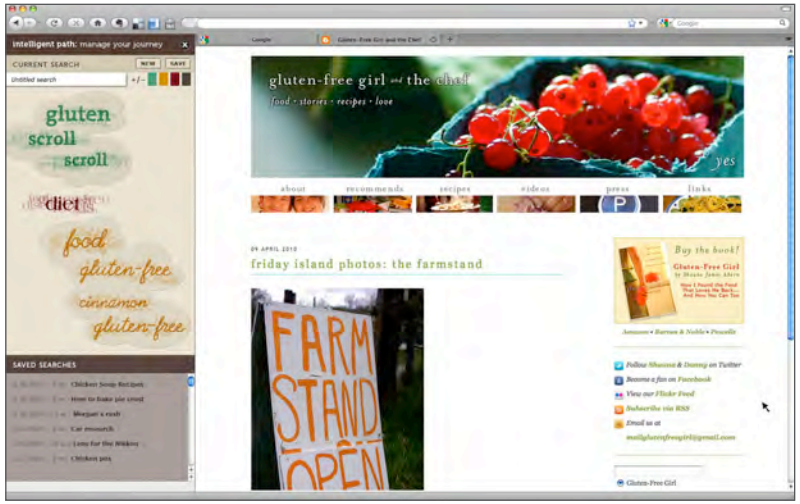
The system includes two distinct spaces: a list of saved searches at the bottom, and an interactive field containing the current search at the top. The user is able to name her current search, save her search, or begin a new search. The drawer is collapsible, so the user can access the interface as needed.



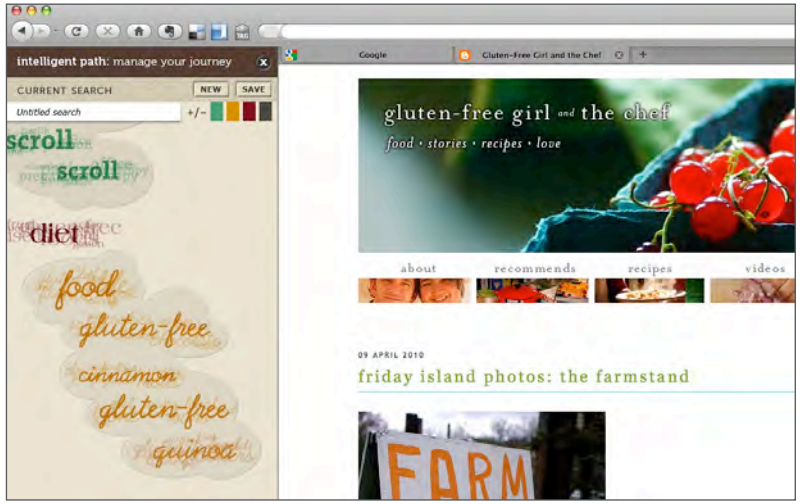
When the user views a result from her search, a tag-cloud is generated (containing the ten most used words on the current page). The tag-cloud stays on the screen for several seconds, and then moves to the interface drawer. There is no user interaction at this point.



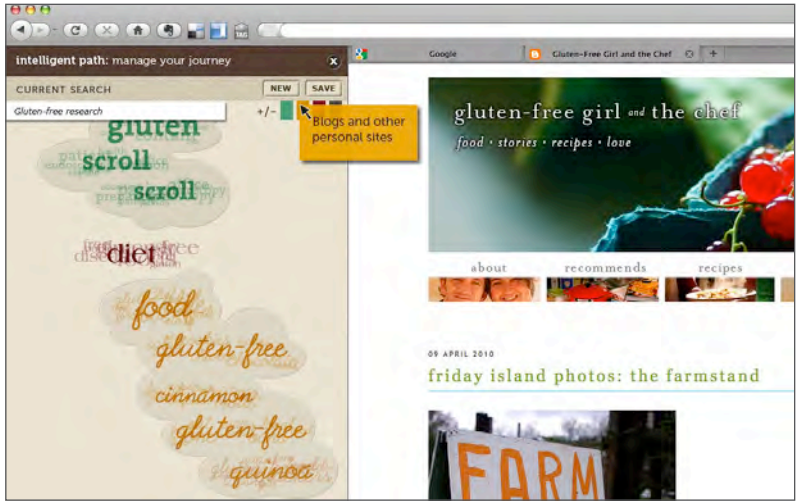
Once the tag cloud has been moved to the drawer, the user can interact with the webpage normally. The interface ambiently collects data from her search, while providing a small level of instant triage through the tag-cloud.



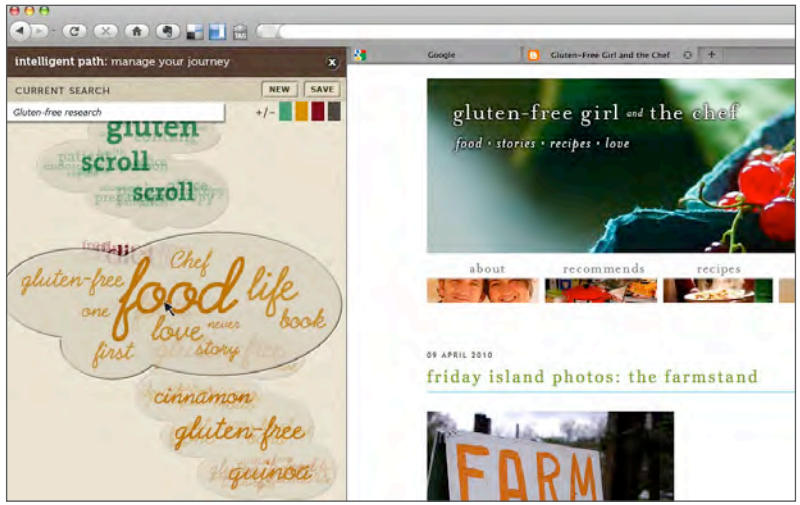
The tag-clouds in the current search space act as a chronological record of the user's search path. Connected clouds represent movement through multiple pages on one website.



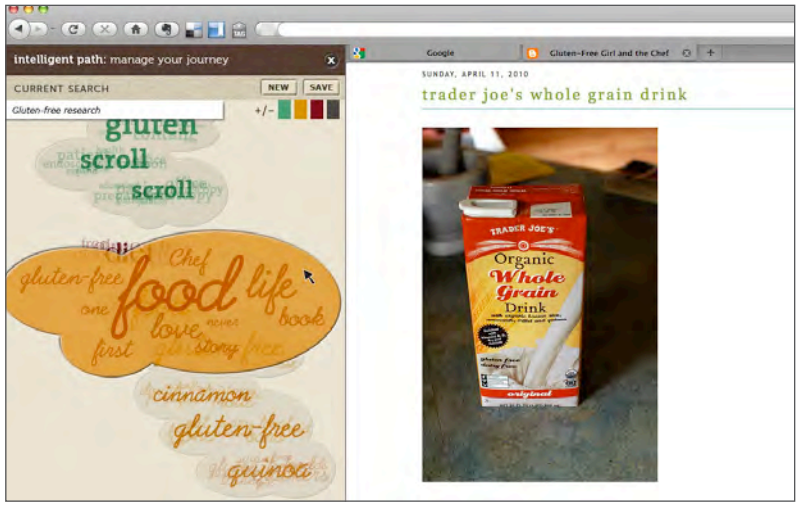
The tag-clouds are coded by color and typeface to indicate system-designated meta-categories. The green slab-serif represents sites sponsored by official organizations, academia, or the government; the red serif typeface represents sites sponsored by corporations or commercial interests; and the orange script typeface represents sites that are blogs or are sponsored by individuals (without a commercial interest).



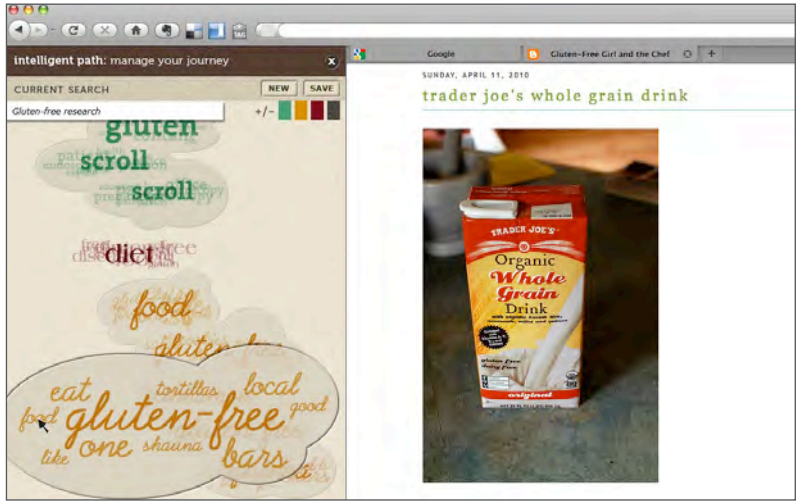
The user can drag the interface drawer farther out to enlarge the viewing space as needed. She can also name and save her searches using the functions at the top of the drawer, and use the color-coded bars to inform her of the system-generated source categories.



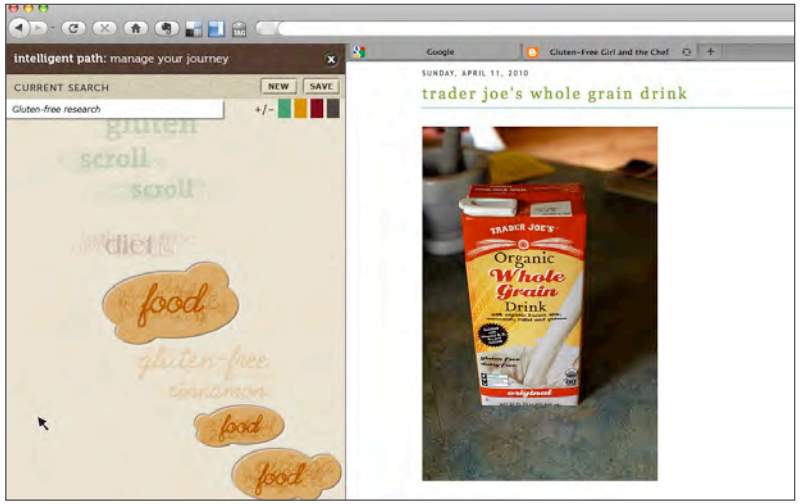
The tag-clouds are interactive—the user can expand each cloud by rolling over it, revealing all ten words in the cloud.



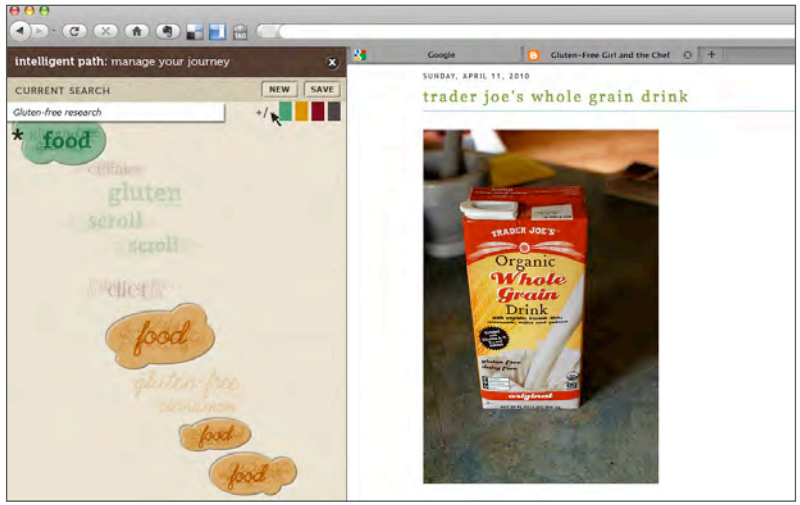
When the user clicks on the edge of the expanded tag-cloud, she is taken back to that particular web page.



The user can organize the information from her saved path by keyword. If she wants to see how many of the sites she visited contain the word "food" she can click on that word in one of the tag-clouds and the rest will rearrange themselves.



This allows the user to make connections among the information on the sites collected during her search journey.



The interface also allows the user to zoom in and out within the path panel. If she wants to view the entire path for this search, she can click on the +/- button.

Ultimately, the greatest challenge in this interface was to find the smallest amount of triage that still functioned as triage. What small amounts of coding and sorting could still allow a user to understand differences among types of websites, and be able to track her journey through a search? What might be added to a simple chronological record of a search to provide another level of information? How useful would that information be to our user?

I believe the Intelligent Path *interface addresses my sub-questions in the following ways:*

- The system ambiently records the user's journey through her search, and provides a way for the user to return to visited sites as needed.
- The system offers some basic forms of visual triage, while focusing the user on whatever task is at hand without shutting her off from any multi-tasking she may need to do. When the user needs to step away, she can easily return to the system and pick up where she left off.
- The system provides a record of a search (no matter how quickly that search is executed) and visualizes the information in a chronological, quantitative and qualitative way.

SECTION NINE

Conclusions and further questions

TWO CONCLUSIONS I HAVE COME TO...

The concept of triage cannot simply be lifted whole from the medical discipline and pasted directly onto the discipline of information science or graphic design. The metaphor simply won't hold. Instead, my concept of information-triage now echoes that of Peter Lunenfeld, "[it] is not so much about efficiency as the culling of the distraction in the search for meaning" (29). Information-triage should enable users to intuitively curate the material they encounter online.

The concept of information-triage has two facets. It can be thought of as a verb (process), and as a noun (display of results). By articulating this difference, I was able to design variations of both facets, and explore what might happen to user experience when the balance of power between system and user shifts.

This investigation began with a series of carefully crafted questions. Those questions have guided me through six months of methodical research and interface experimentation. While I never expected to arrive at a definitive set of conclusions about information-triage, I am surprised by the number of new questions I now have at the end of my thesis explorations.

I am left struggling with three key issues.

BALANCE

- How can we balance the needs of each individual user within the process of searching on a vast and chaotic Internet?
- What kinds of interfaces should we construct to balance a user's needs for efficiency, speed, relevance and ease of comprehension?
- How can we account for the great differences among users—even among one user's different types of searches?

CREDIBILITY

- How can we triage source credibility to allow a user to understand commonalities and differences, yet help eliminate or minimize what is superfluous?
- Who decides which sources are superfluous, and what is the criteria we should use?
- What is the mechanism and structure for tagging these sources?

RELEVANCE

- How much information-triage does the average user require—how much is too much?
- Is this just one more technique for the savvy Internet user's tool-box? Or, is information-triage a technique that needs to be more encompassing than that?
- Could it (does it, should it) be a way of life? A way to comprehend the world around us?
- Do we need uncompromising diligence and vigilance—or can information-triage happen ambiently through the interfaces and computerized tools already at work in our homes, schools and workplaces?

I plan to continue my investigations through the next several years by moving forward with my three proposed interfaces and conducting user-testing. I would also like to collaborate with experts in the disciplines of information science and cognition. Finally, I would really love to tackle all of the questions listed above…one by one.

- WORKING MEMORY & ATTENTION
- DECISION MAKING
- SEARCHING AND INFORMATION SCIENCE
- INTERACTION AND INTERFACE DESIGN

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  These Bates articles were extremely useful in understanding some basic premises of information search and retrieval systems. Bates has become a seminal figure in her field, and her texts are widely cited by others.

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- Facione, Peter A. *Thinking and Reasoning in Human Decision Making*. New York: The California Academic/Insight Assessment, 2007. Print.

  This book provided a framework for decision-making in my studies. It is also a very thorough look (complete with many diagrams) at human decision-making and argument.

- Klingberg, Torkel. *Overflowing Brain: Information Overload and the Limits of Working Memory*. New York: Oxford University Press, 2009. Print.

  Klingberg truly laid the foundation for my understanding of both working memory, cognitive overload, and the ways in which these two elements affect the human attention span. This is also a delightful read—compelling and engaging, with thoughtful examples.

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■ ■ Lunenfeld, Peter. *The Secret War Between Downloading and Uploading*. Unpublished manuscript. January 2009. Electronic file.

This was the text that began my explorations of the concept of information-triage. Lunenfeld posits many interesting ideas regarding info-triage in this text, which I have shared in my own. His writing is tinged with a sense of urgency, which I believe has colored my own explorations. His call for more mindful curation—for users to thoughtfully consume and create (rather than mindlessly and passively download)—has had a powerful impact on me, and this investigation.

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This book gave me an overview of the ways in which ambient technologies are affecting how people interact with online media and interface. It also opened my eyes to some uncomfortable technology capabilities (some of which already exist), and helped me question the ethics and integrity of what I am proposing be created.

■ ■ Norman, Donald A. *Things That Make Us Smart: Defending Human Attributes in the Age of the Machine*. Boston MA: Addison Wesley Company, 1994. Print.

More than fifteen years after he wrote it, this book still provides meaningful insight into human interactions with technology and media. Norman has changed the way I think about those interactions and left an imprint on my interface designs.

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Weinberger's book affected my perceptions of the Internet and the organization of knowledge in some powerful ways. Many of the concepts and ideas found in my writing and visualizations are spun from those found in this book.

■ Wright, Alex. *Glut: Mastering Information Through the Ages*. Washington, DC: Joseph Henry P, 2007.

I devoured this book the summer before my thesis project began, and it rekindled my interests in information science and organization. Wright's methodical journey through the history of man's organization of knowledge influenced my thoughts about info-triage, and the systems I have created.

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I began with Wurman's book to get a (somewhat dated) overview of the concepts of information overload and information anxiety. I quickly moved beyond this text into some that are more recent (and relevant), but as a foundation, Wurman was very useful.

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This study helped me to begin thinking about how actual people might use both online search engines in general, as well as any system I might propose. The use of mental models is compelling, and was an important concept for the formation of my interface ideas, especially the Narrative Guide.

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Appendix A

SPECIFIC HEURISTIC MANEUVERS

See page 10

Maneuver	*Disadvantages*
SATISFICING: given an option that is good enough, decide in favor of that option	Good enough may not be best
AFFECT: taken an initial stance in support of, or in opposition to, a given choice consistent with one's initial affective response to that choice, "gut reaction"	Feelings may mislead
SIMULATION: estimate the likelihood of a given outcome based on one's ease in imagining that outcome	Over-estimation of one's chance of success or likelihood of failure
AVAILABILITY: base the estimate of the likelihood of a future event on the vividness or ease of recalling a similar past event	Mistaken estimations of the chances of events turning out in the future as they are remembered to have turned out in the past
REPRESENTATIVENESS– ANALOGICAL: infer that because X is like Y in some way or other, X is like Y in relevant ways	The analogy may not hold
REPRESENTATIVENESS– ASSOCIATIONAL: connect ideas on the basis of word association and the memories, meanings, or impressions they might trigger	Jumping from one idea to the next absent any genuine logical connection and drawing inaccurate inferences from the combined thought process
GENERALIZING FROM ONE TO ALL: from a single salient instance, draw a generalization about an entire group; stereotyping, profiling	The one may not be representative of the many
THE "US VS. THEM" DYNAMIC: reduce problems to a simple choice between two opposing forces	Conflict which excludes reasonable compromise
"MASTER–SLAVE" POWER DIFFERENTIAL: accept without question a problem as presented by, or a solution as proposed by, a superior authority	Working on the wrong problems, applying a mistaken solution
ANCHORING WITH ADJUSTMENT: having made an evaluation, adjust as little as needed in light of new evidence	Failure to reconsider thoroughly
(ILLUSION OF) CONTROL: estimate the level of control you have over the actual outcome of events upon the amount of desire or energy you put into trying to shape those events	Over-estimation of one's power to control events or under-estimation of one's actual responsibility for what happened
ELIMINATION BY ASPECT: eliminate an option or group of options from consideration upon the discovery of an undesirable feature; simply too many choices	Failure to give holistic consideration to viable options
LOSS AVERSION AND RISK AVERSION: avoid the foreseeable risk of sustaining a loss by not changing the status quo; a bird in the hand is worth two in the bush	Paralysis of decision making stuck in the deteriorating status quo
ZERO-OUT TENDENCY: simplify decision contexts by treating remote probabilities as if they are not even possibilities	Failure to appreciate the possibilities that events could actually turn out differently than expected

source: Facione, 114–130

Appendix B

PERSONA & SCENARIO MATRIX

See page 31

THINGS PEOPLE ARE LOOKING FOR	ATTRIBUTES OF USERS	KINDS OF DECISIONS	UNINTENDED CONSEQUENCES	MOTIVATIONS	PROBLEMS OF ATTENTION	PROBLEMS OF WORKING MEMORY
nutrition labels	special dietary needs	what to eat?	health	to effect health	numerous distractions	making connections between items
nutrition recommendations	individual/family	what to cook?	energy level	lose/gain weight	wavering focus	hard to recall other bits of info (how to get back?)
healthy food	cooking skill level	what to buy?	shopping habits	nurture children	trying to multi-task	thinking of too many things at once
recipes	age	where to buy?	eating habits	doctor said so	hard to reconnect a path	limited amount of time for recall
information about unknown food	free time/busy-ness	who knows best?	cooking habits	have disease	hard to keep track of multiples	limited amount of space for recall (magic #7)
cooking techniques	budget	how to cook?	educated			
peer recommendations	foodie/non-foodie	why eat this?				
images of food	knowledge of food	what is this?				
new ingredients	lifestyle	why bother?				
scientific studies	stress levels	when to compromise?				
	education levels	quality vs. cost				
		health vs. environment				
		individual vs. community				

Appendix C

PERSONA & SCENARIO QUESTIONNAIRE RESULTS

See page 31

briefly about you...

A] **What is your gender?**

FEMALE	66%
MALE	34%

B] **What is your age range?**

UNDER 18	0%
19–30	66%
31–50	23%
50+	11%

C] **What state do you live in?**

NORTH CAROLINA	100%

D] **What is your highest level of education?**

HIGH SCHOOL	0%
COLLEGE	0%
SECONDARY DEGREE	100%
OTHER	0%

E} **Do you own a smart phone (cell phone capable of browsing the internet)?**

NO	33%
YES	67

gathering information about food

1] **How often do you use the internet?**

SEVERAL TIMES A DAY	100%
ONCE A DAY	0%
ONCE A WEEK	0%
ONCE A MONTH	0%
OTHER (please specify)	o%

2] **How important is accessing the internet to you?**

VERY IMPORTANT	100%
SOMEWHAT IMPORTANT	0%
NOT VERY IMPORTANT	0%
I NEVER USE IT	0%

3] **Do you use it for pleasure, for finding information, or both?**

BOTH	100%

4] **What are your other sources of information?** {I.E., NEWSPAPERS, BOOKS, TV, RADIO}

BOOKS	66%
TV	56%
RADIO	66%
PEOPLE	34%
MAGAZINES	56%

5] **Do you watch cooking shows on TV? How often? Which ones?**

NO	56%
RARELY	11%
YES	23%

{*Paula Dean, Giotta, Barefoot Contessa, Man vs. Food, Ace Of Cakes, Good Eats*}

6] **Do you read Cooking Magazines? How often? Which ones?**

NO	77%
YES	23%

{*Bon Appetit, Gourmet*}

7] **Do you collect recipes? How often? Do you keep them digitally (on your computer) or in an analog form (recipe box or binder, etc.)?**

NO	23%
YES	77%

{– *I use epicurious and have a folder with recipes in it*
– *I have a file in my gmail account dedicated to recipes and also have websites/blogs in my bookmarks saved for recipes/websites (about cooking) that i like. I also have (and prefer) my printed cookbooks. When you go to cook, do you really want to bring your computer around the food to look at the recipe? I sure do not!*
– *From newspaper, keep in box/pile*
– *I have been collect some of digital and analog recipes*
– *I keep them digitally and analog (on computer and phone through email*

Appendix C

PERSONA & SCENARIO QUESTIONNAIRE RESULTS, PAGE 2

and evernote, and in a box)
– Recently started keeping them on my computer
– Digitally on epicurious.com}

8] **Do you use cook books? How often? How do you use them?** {TO LEARN ABOUT NEW TECHNIQUES AND FOODS, DIRECTLY REFER TO AS YOU'RE COOKING, BOTH, OTHER}

NO	23%
YES	77%

{*once a month or less; less than once a week; always; maybe once a month; occasionally; very rarely*}

{*– I use them to find recipes or try something new or see how long something (like meat) needs to cook*
– Not for technique, but mainly to tell me what ingredients to add to my concoctions and in what quantity
– New ideas, refer to directly
– While i'm cooking; for new recipes
– More for ideas than to follow directly
– I use them anytime i want to make a fun new meal or to learn new techniques}

planning food

9] **How far in advance do you plan your meals?**

DAILY	56%
WEEKLY	44%
EVERY TWO WEEKS	0%
OTHER (please specify)	11% (about 10 minutes before I start cooking)

10] **When you plan your meals, do you write it down (creating a menu)?**

NO	66%
SORT OF	11%
OTHER	23%

{*mostly a shopping list, for special occasions, I will write down a meal; only for company*}

11] **Do you use a list when you go to the grocery store? How strictly do you use that list?**

{*– Only when i am making a special dinner, i end up buying a lot more than what's on the list, it's actually sort of a problem*
– When i am preparing to cook something, yes, mostly i just grab the same things i eat every week
– Yes, few changes (what's fresh)
– Yes, very strictly
– I use a list before I go there, sadly, I make a list longer at the place
– Yes, loosely
– Usually use a list, stick to it pretty well but may buy a few new things to try
– Yes, i usually buy a few extra things too
– Yes, pretty strictly}

12] **What do you base your list on?** {I.E., INGREDIENTS FOR A SPECIFIC RECIPE, WHAT YOU HAVE RUN OUT OF}

WHAT I'VE RUN OUT OF	44%
INGREDIENTS	33%
STAPLES	23%

{*– My list is based on fresh vegetables, turkey, rib eye, and tofu*
– Ingredients for a specific recipe, otherwise I don't use a list and just hope for the best}

13] **Where do you buy your food?** {I.E., LOCAL CHAIN GROCERY STORE, LOCAL GOURMET STORE, FARMER'S MARKET, WAL-MART, ETC.}

LOCAL CHAIN GROCERY STORE	77%
GOURMET STORE	34%
FARMER'S MARKET	23%
WAL-MART/SUPER TARGET	44%
OTHER	34%

{*Trader Joe's; Costco*}

Appendix C

PERSONA & SCENARIO QUESTIONNAIRE RESULTS, PAGE 3

14] **How do you plan your meals? Do you cook a big batch of food and eat/freeze the leftovers? Or do you cook small meals fresh for every meal?**

BIG BATCH & FREEZE	34%
SMALL FRESH MEALS	11%
BOTH	44%
OTHER	11%

{– *When I cook, ie. use a recipe I freeze 3/4 of it in individual containers that I eat over lots of time*
– *Normally I just make something for dinner out of the freezer, a veggie burger, a sandwich, spaghetti, something easy that I can make a single portion of*}

15] **Do you eat or use in preparation any of the following? (please select all that apply)**

CANNED FOOD	77%
FROZEN FOOD	100%
READY-TO-EAT PACKAGED FOOD	77%
OTHER KINDS OF PROCESSED FOODS	23%

{– *I like chips that are prepackaged, I mean really other than vegetables and fruit (which are also sometimes prepackaged pretty much everything I eat is processed), sick*
– *I prefer uncanned fresh food, in the meantime, I like spam*}

16] **How often do you eat/prepare the foods selected above in a typical week?**

MORE THAN ONCE A DAY	44%
ONCE A DAY	11%
ONCE EVERY FEW DAYS	45%
ONCE A WEEK	0%
ONCE EVERY FEW WEEKS	0%
ONCE A MONTH	0%

17] **Do you eat/prepare meals based on a specific cuisine? Why?** {I.E., FROM FAMILY, TRAVELS, OWN INVESTIGATION}

NO	23%
YES	44%
OTHER	33%

{*mostly just ease and quickness; I eat/prepare meals based on wheat, meat and veggies, and like to add salt and dark, red, peppers*}

{– *I love it all, probably because i've traveled the world, and my parents raised me to eat everything in my sight—and clear my plate*
– *Family, travels, newspaper ideas*
– *I unfortunately have expensive taste in food, and try to eat as natural/organic as possible, but sometimes it's not possible due to being on a budget*
– *The way I was raised*
– *I like to experiment with a lot of cuisines*}

thinking about food

18] Do you read nutrition labels? How much do they factor into your decisions about what to eat?

MOST OF THE TIME	44%
SOMETIMES	56%
SELDOM	0%
NOT AT ALL	0%

19] **If you do read nutrition labels, what are you reading them for?**

CALORIES	77%
FAT	55%
SODIUM	34%
SUGAR	22%
OTHER	44%

{*High Fructose Corn Syrup, Partially Hydrogenated Oils, Dietary Fiber; Artificial Ingredients; Ingredients*}

20] **How often do you think about what you eat (when you're not hungry or actually eating)?**
{– *Mostly just when actually eating*
– *If i'm busy I don't. if I'm stressed, tired or bored I think about food all the time*
– *Driving home at end of day, planning shopping*
– *A couple times a day*
– *5 times a day, sometimes 7 times or less*
– *Often*

Appendix C

PERSONA & SCENARIO QUESTIONNAIRE RESULTS, PAGE 4

– Not a lot, mostly just when i'm hungry
– 80% of the time
– both}

21] **When you think about what you eat, how do you think about it?**
{I.E., IN TERMS OF WHAT YOU ENJOY EATING? IN TERMS OF WHAT YOU'RE MAKING FOR DINNER? IN TERMS OF WHAT YOU FEEL IS HEALTHY? IN TERMS OF WHOM YOU ARE COOKING FOR? SPECIAL OCCASIONS? OTHER?}

{– What I'm making for a meal, I'm a big meal person, not so much a snacker
– I think about the foods I enjoy eating, when I eat healthy, I feel better about myself
– Enjoy/healthy, next dinner, guests
– Mostly planning on what I can make with what's on hand
– I think about my meals in terms of questioning what I did not eat recently, then I ask again with what kind of meal might fulfill my appetite in saving prep-time?
– Ithink about what I am looking forward to eat
– I might think about what's healthy, and try to figure out ways to eat interesting meals more cheaply
– Health, enjoyment, what I won't make at home
– What tastes good and what's a healthy choice, sometimes those are conflicting}

22] **How does thinking about your food choices make you feel?**
{– Hungry, I'm not sure
– Eating a good meal is something I look forward to, so if I'm thinking about eating a delightful dish, I feel excited, I usually look forward to eating my next meal
– Fine, I think I make good choices
– Sometimes guilty
– I feel happy and relaxed as far as I could enjoy my meals, sometimes I am unsatisfied my food choice that is happened by limited options and budget at the moment
– I feel good when I know I'm eating healthy, but bad when I think about how lazy I am about learning to cook!
– Not sure
– In control of my health}

talking about food (social aspects of food)

23] **Do you talk about food with friends and family? How often do you discuss it?**
{OFTEN, SOMETIMES, RARELY, NEVER}

OFTEN	44%
SOMETIMES	11%
RARELY	34%
OTHER	11%

{in between often and sometimes}

24] **If you do talk about food with others, what do you talk about?**
{– What is high fat, how to make things fresh and easy
– Cooking, good restaurants, different types of food
– New recipes, new restaurants
– Taste or maybe price
– Secret own recipe and unique taste from it
– What I am going to eat, how good something tasted
– My sister and I talk about interesting meals—we both worked at a 5-star restaurant and have similar (expensive) taste because of it
– What's for dinner
– Calorie content, what foods I've eaten, how much I've eaten, food preparation and recipes}

25] **Do you eat with other people, or do you eat alone? Please estimate a percentage for each as to how often you eat with other people vs. alone**
{I.E., 20%/80%}

100% WITH OTHERS	11%
20%/80%	34%
25%/75%	22%
33%/66%	11%
50%/50%	11%
60%/40%	11%

26] **Do you enjoy eating out? How often do you dine out?**

NO	0%
YES	100%

{1–3 times a week; try to keep it to a minimum, once a week}

Appendix C

PERSONA & SCENARIO QUESTIONNAIRE RESULTS, PAGE 5

27] **Why do you eat out?** {I.E., CONVENIENCE, ACTIVITY WITH FAMILY OR FRIENDS, SPECIAL TREAT, TRYING A NEW OR DIFFERENT CUISINE, OTHER}

CONVENIENCE	55%
SOCIAL ACTIVITY	66%
CELEBRATION	22%
OTHER	11%

{*Trying new food*}

28] **Do you cook with others? When and why?**

NO	22%
YES	22%
SOMETIMES	22%
RARELY	11%
OTHER	12%

{*I'd love to but don't right now*}

{*– I did while I was in a relationship and while living with people I loved and cared about*
– With family when visiting
– For fellowship
– Usually socially with my mom or a friend; when family is around}

final thoughts...

29] **How important is food in your life?**

VERY IMPORTANT	66%
SOMEWHAT IMPORTANT	34%
NOT VERY IMPORTANT	0%
I DON'T CARE ABOUT IT AT ALL	0%

30] **Comments? Anything you'd like to add about food, cooking, nutrition or information about food?**

{*– Food is 1/3 (or 1/5) of value in my life, I appreciate farmers' diligence, food system, and changes to cook, I enjoy my appetite and its fulfillment*
– I'm trying to learn how to deal with low blood sugar, and my eating habits affect that a lot, I'm not very good about snacking so I tend to run up a calorie deficit and end up eating junk
– I think that the people you hang out with have a great influence on your eating habits, if they eat well, you will tend to do so as well, if your best friend is someone that snacks a lot you will do the same, also, much of our eating habits are rooted in the way we were raised}

Inventory of digital elements

Visual Studies

- Visual Study #1: Narrative Guide
  - Scenario Animation [NarrativeGuide.mov]
  - Scenario PDF [NarrativeGuide.pdf]
- Visual Study #2: Mise en Place
  - Scenario Animation [MiseEnPlace.mov]
  - Scenario PDF [MiseEnPlace.pdf]
- Visual Study #3: Intelligent Path
  - Scenario PDF [IntelligentPath.pdf]

Digital Appendices

- Appendix 1: Analysis of Google [GoogleAnalysis.pdf]
- Appendix 2: Analysis of Bing [BingAnalysis.pdf]
- Appendix 3: Analysis of 11 Search Engines [SearchEngineAnalysis.pdf]

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