Technologies of Wonder: Rhetorical Practice in a Digital World

SECTION	Chapter 4
TITLE	Visual Arrangement as Inquiry
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OVERVIEW	Arrangement is rarely treated as a visual practice or method of discovery in research and writing, despite a rich tradition of associative practices linking visual and verbal knowledge in illuminated manuscripts, secular and religious painting, sculpture, and architecture. The rearrangement of evidence that privileges an associative model of thinking was embodied in sixteenth-century *Wunderkammern,* cabinets of natural, artificial, and scientific wonders that served as embodied spaces and as objects-to-think-with about arranging material artifacts to engender wonder and discovery. But by the eighteenth century, the Cartesian division of mind and body, the development of the scientific method, and the emphasis on "plain style" had shifted the canon of arrangement from a process of rhetorical invention and discovery toward an inflexible rubric for organizing parts of a discourse. In the early 1990s, constructive hypermedia developed multimediated, polyvocal, and nonlinear provocations that began the process of recovering visual arrangement as a valued inventional strategy. To counter more recent "corporate" models for hypermedia that prize speed and clarity over reflective inquiry and generative ambiguity, this chapter proposes a renewed attention to the epistemic potential of the link through the design of interactive digital *Wunderkammern* that reestablish associative thinking, visual analogy, and embodied arrangement as multimediated, multilinear, pedagogical performances.
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Visual Arrangement as Inquiry

Image: Susan Delagrange, Pipe & Snuff Box, 2010.

*L*inking is the "hyper" of hypermedia, the *sine qua non* of texts in hyperspace; it is also the visual and meaningful embodiment of the canon of arrangement online. A link consists of a visual signal (an underlined word, a labeled icon, a "hot spot" that is revealed when the cursor arrow turns into a white, pointing hand) and an implied message ("There is a relationship between where you are now—on the screen, on the Web—and where clicking this link will take you."). How we think of these links when we construct academic projects in digital media—either as invisible membranes through which we pass instantly and effort-lessly to our expected destination, or as substantive cognitive activities through which we make the connections between the linked nodes intelligible—determines whether we are using arrangement as a simple, and sometimes simplistic, organizing strategy or taking advantage of its potential as a rich, multivariate *techné* of invention and representation. ¶The history of the rhetorical canon of arrangement has always contained the capacity, and the need, for both formulaic organizational strategies and more mobile, imaginative uses of arrangement. But I would argue that we have favored the organizational over the inventional and the abstract over the material in recent practice, even as our scholarly performances have shifted from analog to digital forms. Yet the promise of a revitalized canon of arrangement is inherent in the visual, flexible, and multidimensional nature of interactive digital media. A compelling comparison can be made between arrangement as a physical and cognitive invention practice in *Wunderkammern*—the comprehensive collections of natural and man-made artifacts popular in the sixteenth and seventeenth centuries—and arrangement as an invention strategy in twenty-first century interactive digital media. As both a material catalogue of knowledge and a process of inquiry into the workings of the known and imagined world, a *Wunderkammer* uses the arrangement and re-arrangement of objects to create new knowledge. I argue in this chapter that the rhetorical canon of arrangement should be similarly constructed today as a material, embodied *techné* which, through hypermediated linking of visual and verbal evidence, enables a process of wonder and discovery that promotes thoughtful inquiry and insight.

This is not to claim that knowledge gained by the manipulation of objects and evidence is an end in itself; rather, digitally mediated manipulation and linking can become a practice, a habit of mind and eye, that leads to an ethical framing of rhetorical conviction and/or action by both the writer/designer and the reader/viewer.

The canon of arrangement has always been a profoundly visual as well as a verbal rhetorical practice, although the constructive value of its material, visual, tactile side has been set aside over time in favor of a more formulaic or abstracted use. Furthermore, arrangement is not often put to use in a robust way as a method of discovery or inquiry in college writing texts or in scholarly articles. Although the invention process may include a cursory visual exercise in clustering or concept mapping, arrangement is more usually addressed as a function of the conventional organization of the parts of a discourse. In academic argument, writers are encouraged to use a format based loosely (or not so loosely) on the traditional Ciceronian organization of introduction, statement of the question, confirmation, refutation, and conclusion. Although this form can be taught in nuanced ways that pay close attention to the rhetorical nature of proofs (see Corbett and Connors, 1998; Crowley and Hawhee, 2009), in practice arrangement is today most often established by conventional expectations based on genre.

Much has been made of the potential of interactive digital media to revolutionize academic argument through the construction of multivocal, multilinear, multiperspectival texts. But academic discussions of arrangement in hyperlinked media rarely focus on the potential for discovery and insight that these less directive or less "efficient" navigational structures might allow. Instead, many guides for designing hypermedia remain more concerned with how to make sure their structure is clear and straightforward enough that the reader gets to see all of it, in the appropriate order, exactly as the writer wishes it to be read. As with print arguments, the assumption is that the writer's conclusions will be obvious and inevitable following a reading in the "correct" order of a hyperlinked project. Links should be designed, like transition strategies in an academic essay, to be clear and unambiguous; there should be no possibility of "losing one's way."

This model of arrangement has its roots in a Modernist confidence in the efficacy of logic and plain style, and this confidence is also reflected in the standards of speed and efficiency as criteria for effective hypermedia navigation that come to us from commercial and corporate web use (Flanders and Peters, 2002; Nielsen and Loranger, 2006). Instructions for hypermedia page design are geared toward making sure the reader never, ever becomes confused or distracted or lost (Williams and Tollett, 2005; Krug, 2005; Tufte, 1990). Problematic for the purposes of academic inquiry, these criteria construct a very specific kind of audience: an audience that needs to be told what to do, and wants to do it as quickly as possible; an audience that has a severely limited attention span, and is confused and upset by ambiguity and complexity.

But what if designers of interactive digital media imagined a more engaged reader—one interested in the twists and turns that lead toward conviction and action, and not merely in the distilled, Reader's-Digest-condensed version? If we were designing for that reader, then we would want to create a digital *Wunderkammer*, a hypermediated thinking space that would allow us and our reader to explore, to move things about, to seek out curious and unexpected connections, and to defer closure and certainty while we consider the possibilities for rhetorical action that different arrangements of our evidence might suggest. We might, in short, wish to realize the digital, rhetorical promise of a visual canon of arrangement.

Visualizing the Canon

To begin a discussion of arrangement in the postmodern context of remediation and hyper-connection is immediately to call into question what constitutes "a beginning," an opening screen in a web of associations. Perhaps it might point to a conventional chronological beginning for rhetorical arrangement, a far-left position on an historical timeline. Or it might signal a classic academic beginning, a P-to-K4 move in the authorizing chess of citation and precedent. In an online digital context, it might be the first page Google displays in a search for the keywords *rhetoric*, *arrangement*, and *Wunderkammer*. There are other possible and plausible beginnings. Yet one function of genre-defined rules for arrangement has been to limit those possibilities, creating a supposedly neutral, "natural" organization that is easy to teach and easy to understand. And one potential function of hyperlinked digital media is to call those generic forms into question.

Traditionally, the canons of rhetoric— invention, arrangement, style, memory, and delivery—together provide a framework for the generative process by which a rhetor shapes spoken or written discourse. Briefly, invention is the discovery of the content of a discourse, and arrangement is the art of selecting and ordering that content. Style deals with the means of expression of the ideas generated; memory refers to the attachment of developing ideas to appropriate *topoi*; and delivery addresses the physical attributes of the voice and gesture of the orator. But this list seems to suggest that the composing process is linear and sequential; further-more, it implies that content can be separated from form, and that both content and form can be separated from the materiality of the rhetor; yet neither of these holds up under theoretical or pedagogical scrutiny. Rather it is more accurate to imagine the rhetor putting invention, arrangement, style, memory, and delivery into a recursive conversation about the specific choices necessary for a particular audience and purpose. The rhetorical strategies needed to convince an older audience of soon-to-retire, non-union seamstresses to enroll in a government-subsidized prescription plan, for example, would differ significantly from those used to persuade under-graduate students to participate in a university-sponsored health and wellness program.

▲ 4.1 Celtic Knot. Photograph by Leo Reynolds, 2009.
The canon of arrangement deals with the ordering of the parts of a discourse. In hypermedia, these "parts" may be words, images, sounds, animations, or other forms of communication connected to one another by links. This deceptively simple Celtic knot consists of only two "strands," but these strands intersect with one another at sixteen points, each with a unique dimension and direction. So too in hypermedia, the dimension and direction of each link represents an opportunity for new perspectives and cognitive engagement.

Because we are accustomed to thinking of arrangement as a set of verbal conventions in which word follows word, sentence follows sentence, and paragraph follows paragraph in a sequential unfurling of meaning, we forget that classical arrangement was very much a mobile, visual practice. Consider, for example, the copiousness of Aristotle's *konoi topoi,* or commonplaces, available for both invention and arrangement, which Kathleen Welch (1999) characterizes as devices, or *techné,* of "informed performance" (p. 115). And inductive rhetoric, moving from the particular to the general, invites visualization of people, places, and circumstances. Furthermore, the close classical connection between persuasion of the mind (*logos*) and persuasion of the emotions (*pathos*), between rational and embodied perception, encourages us to visualize not just the matter and substance of the argument, but also the materiality of the to-be-persuaded.

Another way to understand classical arrangement as a visual practice is by exploring the relationship of the rhetorical principle of *kairos* to arrangement. The Pythagoreans imagined *kairos* as the harmonious balance of opposites: a concept intimately connected with inquiry through which, notes Kinneavy, rhetors first persuade themselves (1986, p. 306). Although *kairos* is more often invoked to describe the timeliness of a rhetorical opportunity, it also has a significant spatial dimension and an embodied form. If arrangement is the process of manipulating all of the available evidence to determine which connections, which associations, which links will be most effective for the specific material context of and embodied audience for a discourse, then Kairos, the Greek god of the "fleeting moment," is a

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4.2 The god Kairos. Roman marble bas-relief, after Lysippos, ca. 350–330 BCE. Photograph by Sergei Sosnovskiy. Click image to enlarge.
Who and whence was the sculptor? From Sikyon.
And his name? Lysippos.
And who are you? Time who subdues all things.
Why do you stand on tip-toe? I am ever running.
And why do you have a pair of wings on your feet? I fly with the wind.
And why do you hold a razor in your right hand? As a sign to men that I am sharper than any sharp edge.
And why does your hair hang over your face? For him who meets me to take me by the forelock.
And why, in Heaven's name, is the back of your head bald? Because none whom I have once raced by on my winged feet will now, though he wishes it sore, take hold of me from behind.
Why did the artist fashion you? For your sake, stranger, and he set me up in the porch as a lesson. (From the epigram by Posidippos on the now-lost bronze statue of Kairos by Lysippos)

visual representation of that process. Depicted on the previous page in a Roman bas-relief (Figure 4.2), Kairos balances artfully on a tightrope. In his left hand, he holds a razor ("As a sign to men that I am sharper than any sharp edge") on which he balances a scale, while his right hand steadies (or adjusts?) one pan. His winged feet and back suggest both the transitory nature of opportunity and the power of balanced form. This image personifies the weighing and balancing of analogical relations from multiple perspectives in the spirit of inquiry and wonder that constitute rhetorical arrangement. Both the copiousness of classical arrangement and the associative kairotic manipulation of evidence for rhetorical effect also predict the possibilities for rhetorical inquiry in the visual sphere of interactive digital media.

The connections among *techné,* copiousness, and *kairos* are inescapable here. *Techné* is artistic knowledge, formed in a relational oscillation between thinking and doing that becomes more intuitive with experience. To review, *techné* is heuristic, a process of making, and thinking, and re-making, through which meaning and knowledge are made; it is situated, specific to the embodied and material conditions of a particular time and place; it is mobile and strategic, adaptable to changing circumstances and new challenges; and it is ethical, founded in specific beliefs and values (see Chapter 2). Copiousness, the accumulation of a super-abundance of available tropes, figures, and stylistic flourishes to call upon for the perfect solution to a specific rhetorical situation, is also heuristic in its development and situated, mobile, and strategic in its deployment. But copiousness as a characteristic of *techné* applies as well to the profusion of *embodied* strategies and actions that are acquired through study and experience and are available to the rhetor, just as they are in the *techné* deployed by a doctor or a navigator. *Kairos*, too, is an essential component of *techné.* No amount of skill, art, practice, or experience can carry the day if they are not deployed at the opportune moment. Beginning too soon, or waiting too long, particularly in (rhetorical) situations where the opposing force is objectively stronger, will result in failure, no matter the skill of the craftsperson or the virtue of the enterprise.

Arrangement as a rhetorical *techné* retained this sense of flexibility and responsiveness to the rhetorical situation into the late Renaissance, when there was a significant shift in the place of arrangement as a rhetorical strategy. This change was influenced in large part by Peter Ramus, the French scholar and teacher of dialectic and rhetoric who argued that invention, arrangement, and memory (*contra* Cicero and Quintilian) belonged in the realm of philosophy and logic. Ramus thus reduced rhetoric to style and delivery—the arts of eloquence—posterior and ornamental to dialectic. His new program for dialectic called for arrangement to take the form of the syllogism, working deductively from the general to the particular through regressive dichotomizing divisions. He reduced invention to ten topics, arrangement to the application of those topics in order, and style to the tropes of metonymy, irony, metaphor, and synecdoche. If Ramus' system were rigorously followed, there would be no need for mnemonic devices, and the canon of memory effectively disappears. Most damaging to rhetoric, however, was Ramus' assertion that his method constituted a "universally applicable method of inquiry" (Herzberg, 2001, p. 677). This claim to universality made it easy to justify transforming fluid and flexible rhetorical principles into rigid rules and regulations for the new education of individuals from diverse (class) backgrounds, a necessary step toward instilling in them simplified regulatory habits that would mold them into orderly and productive members of society.

Decontextualizing and ramifying dialectic and consigning rhetoric to mere ornament resonated with the Cartesian thinking of the Enlightenment, which separated the mind from the body in the same way that dialectic had been separated from rhetoric. A new "objective" model of language based on clarity and perspicuity prevailed. Words in scientific discourse were meant to be transparent windows to the ideas beneath, and as such were delivered in the unadorned style of the Royal Society and the Puritans. Quantitative scientific investigation, not qualitative rhetorical inquiry, became the principal intellectual method. In this equation, arrangement was no longer tied to extrinsic, visualizable concerns like context and audience, but rather to the intrinsic matter of the discourse; objective, logical "truth" required plain, impersonal, straightforward language.

A fixed pattern of arrangement "can be formulated for all matters," insisted Ramus, ". . . for there is a fixed theory of syllogism and artistic method, common to everything which can be treated with order and reason" (1549/2001, p. 695). Over time, this syllogistic construction of arrangement became naturalized. Whereas Plato had recognized the contingent, embodied nature of arrangement, arguing that "every discourse must be organized, like a living being, with a body of its own, as it were, so as not to be headless or footless, but to have a middle and members, composed in fitting relation to each other and to the whole" (*Phaedrus*, ca. 360 BCE/1913, p. 529) and Quintilian imagined an "organic form" for rhetoric, Ramus situated arrangement in the dematerialized dialectical space of abstract thought.

The Cartesian division of dialectic and rhetoric also had the effect of stripping the overtly visual from the canon of arrangement, and with it arrangement's epistemic reach. The dispersed and visual nature of arrangement-as-inquiry exemplified in *kairos* and the *Wunderkammer*

was replaced by the relentless textualization of scientific experimentation and knowledge during and following the Enlightenment. Arrangement's contemporary iteration in composition instruction (under the rubric of organization) has often been formalized for specific genres (scientific reports, business letters, academic essays) and modes (narration, description, exposition, argumentation) through formulaic patterns of development (classification, division, comparison, definition, analysis, etc.). There is little room in this *schema* for the ambiguity of the image; instead of the provocative materiality of the natural history display case, we have logocentric cluster diagrams as invention, and fixed, hierarchical outlines as arrangement. (There are exceptions, of course. For example, *Writing Analytically* [Rosenwasser and Stephen, 2012] specifically discusses the heuristic value of organization.)

As noted earlier, one function of genre-defined rules for arrangement is to limit options by devising a supposedly neutral, "correct" form that is easy to teach and easy to understand. With the exception of occasional forays into alternate structures of discourse (Zawicki, 1992; Spooner and Yancey, 1999; Schroeder, Fox, and Bizzell, 2002), experiments with print alternatives to the academic essay or scholarly article often focused on "voice," challenging the nature of *ethos* by introducing alternative non-academic discourses in concert with or in place of "traditional" authoritative forms (Yancey, 1994; Elbow, 1994). With the introduction of computers and digital media to university classrooms and offices in the early 1990s, however, teachers and researchers anticipated that this "new new thing" might finally provide the conceptual space for scholarly work to incorporate the multimediated, multivocal, multilinear challenges to authorial control that were already informing postmodern literary and rhetorical theory.

A Feminist Re-Arrangement

4.3 Shadi Ghadirian, From the series *Like Everyday*, 2000. Photographs by Herry Lawford (2009).
In this series of photographs, Iranian-born Ghadirian juxtaposes the restrictive emblem of the traditional burkha with equally constricting icons of modern domestic life, including strainers, irons, teacups, and cleavers.
Click on thumbnails to enlarge.

But in the consciousness of our failures, we risk lapsing into boundless difference and giving up on the confusing task of making partial, real connections. Some differences are playful; some are poles of world systems of domination. "Epistemology" is about knowing the difference.
Haraway, 1991, pp. 160-61

Many characteristics of postmodernism can be demonstrated and reinforced within the structural and conceptual frameworks of interactive digital media. Our participation in multiple discourses, the social construction of knowledge, the indeterminacy of context and meaning, the nature of multiple yet partial perspectives: these are all valuable tools for understanding the discursive relations of power in which we are immersed.

But some elements of postmodernism can be troubling. Postmodernism, in pointing out the contingent nature of perspective, sometimes seems to argue that all perspectives are equal, or worse, that there is no place to stand from which to act. It deconstructs without providing a way to rebuild, if only provisionally. It gets so caught up in textual play that it forgets the materiality of language users and the material effects of language use. Postmodernism does not seem up to the task of giving us a way to establish agency and affinity in a fragmented world, to acknowledge complexity and indeterminacy without being incapacitated by it. As Johndan Johnson-Eilola (1997) asks, "If there is no ground zero . . . on which to draw a unified (true) map, how can people orient themselves, how can they move with confidence from one place to another on a map? . . . How can we assume that some maps are good and some maps bad when we lack a ground against which to measure each?" (p. 15). One way to discover how interactive digital media might extract us from these difficulties so that we may rebind ourselves to others and recover ground(s) for rhetorical inquiry and ethical academic performances is to turn to feminist discourse, which has long studied the formation of ethical grounds for action for those who have no authorized place from which to speak.

Postmodern feminism is an embodied practice that grounds its perspectives in the material, social world. Postmodern feminist scholars study relations of power and knowledge and attempt to uncover and resist relationships that disadvantage under-represented groups, all the while conscious that their perspectives are always partial, and that they may themselves be implicated in those relationships. Most importantly, postmodern feminists strive to create a more just, egalitarian world that recognizes the material consequences of social policy and action. Feminist postmodernism is practical, material, and embodied, and tries to avoid becoming mired in an endless regression of signifiers.

Research in the social world of the writing classroom has shown that electronic communication technologies like discussion boards and e-mail can (sometimes) have the salutary effect of flattening hierarchies, creating more egalitarian spaces, and giving voice to students unwilling to speak out face-to-face (Faigley, 1992). Interactive digital media, because of their multimodal and hypermediated capabilities, have an even greater potential for decentering authority, acknowledging the partial perspective of socially constructed knowledge, and embracing multiplicity. As a means of feminist invention and intervention in writing classrooms, participatory new media are powerful because they are structurally equipped to resist the expression of or claim to a single, authentic perspective or experience. In an early example of feminist scholarship on hypertextuality, Donna LeCourt and Luann Barnes (1999) used hypertext to rearrange the elements of classroom discourse in order to resist linearity and unity, while at the same time also denying a postmodern no-place-to-stand by emphasizing the benefits of speaking from multiple positions. Working from the position that identity is both a text and a context, they explored the ways in which "writing

contexts create gendered positions" (p. 56). Designing hypermedia that weave together multiple voices relies on a politics of location to reveal the means through which textual authority is constructed. It also reinforces the contradictory and fragmentary nature of all positions, and undercuts the claim that some should automatically be qualified to speak for others. For LeCourt and Barnes, working with students to create multivocal texts enacts a feminist pedagogy that calls into question the ideology of academic textuality and, by resisting "the discursive authority they are invited to claim," opens up "new possibilities for communicating and forming alliances with their cultural Others" (p. 59). This feminist intervention affirms connection and collaboration in a material world, and encourages writers "to construct other positions from which to write" (p. 60).

LeCourt and Barnes' feminist pedagogy focuses on denying an implicitly patriarchal academic textuality and uses the hypertextual rearrangement of multiple voices to demonstrate the impossibility of a single unified perspective. But their students' hypertexts are patchworks of words; although the hypertexts interrupt the putative invisibility of words through self-conscious visual placement, LeCourt and Barnes make no mention of this visuality, and they do not include graphic images or other media. When Donna Haraway (1991) seeks to deconstruct the myth of scientific objectivity and replace it with admittedly partial "situated knowledges," her approach is relentlessly visual. For Haraway, all vision is embodied, even that which claims scientific omniscience. Recognizing the partial perspective of subjugated positions makes visible this previously unmarked category of omniscience. The alternative to the "all-seeing eye" is not a disempowering relativism, but "partial, locatable, critical knowledges sustaining the possibility

of webs of connections called solidarity in politics and shared conversations in epistemology" (p. 191). By definition, situated knowledge begins and makes meaning in community.

Haraway's conclusion that "only partial perspective promises objective vision" (p. 190) provides support for creating knowledge and understanding through constructive hypermedia. Given that it is impossible to legitimately produce an all-inclusive, coherent account, perhaps a space in which multiple views and relationships can be arranged and rearranged in an ongoing conversation is the best we can do. Any single account of complex and fluid experience is constructed by excluding other possible accounts. This is not to say that all accounts are equivalent, or that accounts from subjugated positions are necessarily more innocent than others, but it recognizes that perspective is mobile and embodied, and that knowledge is deeply relational.

Using digital technologies to enact a feminist pedagogy is also a strategic appropriation of electronic tools culturally associated with patriarchal authority and power in order to resist that authority and power. But adopting, and adapting to, new technologies is not easy. There are personal and professional drawbacks of 24/7 immersion in digital algorithms and networks, including, given the speed of technological change, the intensity and anxiety of working to stay ahead of one's own obsolescence. It is not surprising, then, that a part of many people's reluctance to engage with technology, whether setting up a home entertainment system or designing a course wiki, comes from a figurative cost/benefit analysis of the time and effort involved to do/learn something that may be out of date next week.

But a good part of *women's* reluctance or refusal to "do technology" can be traced to the cultural inscription of technology as male (American Association of University Women, 2000; Cooper and Weaver, 2003; Kirtley, 2009). Arguments about why this is so usually go back to the historical association of men with weapons and tools of production, although I would argue that the (male)

▲ 4.3 Shadi Ghadirian, *Qajar #24*, 1998. Photograph by Herry Lawford (2009).
In this series of large-format images, Ghadirian photographs Iranian women in traditional dress who are wielding contemporary implements—telephones, bicycles, radios, sweepers—against a photographer's backdrop designed for formal portraits and weddings.

gendering of technology is as much an effect as a cause of cultural norming. The history of the design and development of computers contains few women's names; however when personal computers became widely available in the late 1970s, they were well suited to the kind of sedentary, rote tasks that women were already doing with typewriters in the workplace. One might expect that this early exposure would have provided the incentive for women to appropriate desktop computers for other, more personal, autonomous, and liberatory purposes (Brandt, 1998). But the highly structured and linear "hard mastery" needed to work with early desktop computers was far different from today's more friendly "natural language" interfaces, and from an early age, boys are better at "hard mastery" while girls are "soft masters," favoring interaction and bricolage (Turkle, 1995). And since "hard mastery" remains the paradigm for technology, boys are rewarded more often and more highly, even though girls' methods are also successful. This early "technological socialization" is probably more responsible for women's reluctance to engage with technology than their different methods of engagement might be. (Turkle attributed the two forms of mastery to hard-wired cognitive differences between the sexes. Culturally constructed norms of how "good little boys" and "good little girls" are supposed to behave is almost certainly an equally important factor.)

But despite cultural conditioning, there are also comforts that accompany the reluctance or downright refusal to engage with technology that are specific to the academy. The academic body, particularly in the humanities, does not get its hands dirty. Working with technology is not only gendered male, but it is still often considered a "support" service. The work of the academic is done with the mind, not the body. Although this prevailing attitude is changing, in many places it is still as culturally acceptable, even expected, for an academic, male or female, to say, "I'm not good with computers," as it is for an employee of Technology Services to say, "I'm no good at English."

In her keynote speech at the Conference on College Composition and Communication, Cynthia Selfe (1999) pointed out that the problem with using either technophobia or "It's not my job" as excuses for refusing to engage with technology is that, if we refuse, someone else will be in charge of how technology is used, how the design and structure of hardware and software are developed, and how women are represented on-line. Designing interactive digital media enacts a feminist pedagogy by appropriating and affirming the importance of practice as an integral part of conceptual and theoretical traditions in "productive arts" such as medicine, architecture . . . and rhetoric. Digital technologies, therefore, should take their productive place among the rhetorical tools that enable a multimediated *techné* of invention and intervention.

Wendy Morgan demonstrates just such a twinned invention/intervention in "Monstrous Angels" (1999). Her hypermediated project, created explicitly to critique the "norms of mainstream epistemology" (p. 207) in the social sciences, exemplifies hypermediated arrangement as feminist rhetorical action. Based on a print text (*Troubling Angels: Women Living with HIV/AIDS* [Lather and Smithies, 1997]) that itself critiqued the disembodied eye/I of ethnography through split text, journal entries, comments on their research and writing processes, and reflective "intertexts," "Monstrous Angels" not only resituates and layers the original texts in a re-orderable hypermediated space, but also incorporates Morgan's own commentaries, research, and links to other materials, additions that eventually comprised about 25% of the whole. Furthermore, her project was truly constructive in that readers could also make their own additions and comments.

Like LeCourt and Barnes' project, Morgan's is visually dense (with words), but does not include graphic images. Perhaps none were collected by the researchers, or perhaps the technology was not robust enough, but it might also reflect a gap between what feminist postmodern theories of hypertext promise, and what we have been willing to risk. Morgan demonstrates well how interactive digital media can acknowledge the "unstable, contextual, relational and provisional conditions" (p. 209) of research in the social sciences, and provides one model for constructive hypermedia and feminist practice in writing classrooms. Nevertheless, this example relies on the (re)arrangement and juxtaposition of *words* to locate a material multiplicity. Our model for the design of more constructive, multimodal, interactive digital media that fully realize the epistemological potential of visual arrangement remains the promiscuously visible and material technology of multiplicity: the *Wunderkammer.*

Wunderkammer as Thought Engine

In the museum of Mr. John Tradescant are the following things: first in the courtyard there lie two ribs of a whale, also a very ingenious little boat of bark; then in the garden all kinds of foreign plants, which are to be found in a special little book which Mr. Tradescant has had printed about them. In the museum itself we saw a salamander, a chameleon, a pelican, a remora, a lanhado from Africa, a white partridge, a goose which has grown in Scotland on a tree, a flying squirrel, another squirrel like a fish, all kinds of bright coloured birds from India, a number of things changed into stone, amongst others a piece of human flesh on a bone, gourds, olives, a piece of wood, an ape's head, a cheese etc.; all kinds of shells, the hand of a mermaid, the hand of a mummy, a very natural wax hand under glass, all kinds of precious stones, coins, a picture wrought in feathers, a small piece of wood from the cross of Christ, pictures in perspective of Henry IV and Louis XIII of France, who are shown, as in nature, on a polished steel mirror when this is held against the middle of the picture, a little box in which a landscape is seen in perspective, pictures from the church of S. Sophia in Constantinople copied by a Jew into a book, two cups of 'rinocerode', a cup of an E. Indian alcedo which is a kind of unicorn, many Turkish and other foreign shoes and boots, a sea parrot, a toad-fish, an elk's hoof with three claws, a bat as large as a pigeon, a human bone weighing 42 lbs, Indian arrows such as are used by the executioners in the West Indies - when a man is condemned to death, they lay open his back with them and he dies of it - an instrument used by the Jews in circumcision, some very light wood from Africa, the robe of the King of Virginia, a few goblets of agate, a girdle such as the Turks wear in Jerusalem, the passion of Christ carved very daintily on a plumstone, a large magnet stone, a S. Francis in wax under glass, as also a S. Jerome, the Pater Noster of Pope Gregory XV, pipes from the East and West Indies, a stone found in the West Indies in the water, whereon are graven Jesus, Mary and Joseph, a beautiful present from the Duke of Buckingham, which was of gold and diamonds affixed to a feather by which the four elements were signified, Isidor's MS of de natura hominis, a scourge with which Charles V is said to have scourged himself, a hat band of snake bones.
(Georg Christoph Stirn, quoted in MacGregor, 1983, p. 21)

4.4 The Augsburg Kunstschränke, designed and built under the direction of Philipp Hainhofer, presented to Gustav Adolfus of Sweden in 1632.
Hainhofer not only oversaw the construction of the cabinet; he was also responsible for collecting and arranging the more than 1,000 artifacts it contained. In this example, the cabinet itself is as much a wonder as the objects it contained. Click on image for web tour of the cabinet, housed at the University of Uppsala.

With these words, Georg Christoph Stirn described his 1638 visit to The Ark, John Tradescant the Elder's collection of *naturalia* and *artifacta* in South Lambeth, near London. Tradescant's "closett of rarities" became the foundation of the Ashmolean Museum in Oxford, still open to the public today, and still free for visitors.

Tradescant's collection, and the space he created for it, was an example of a *Wunderkammer*, or chamber of marvels. Also called *Wunderschränke*, *Kunsträume*, *cabinets des curiosités*, or simply curiosity cabinets, these cupboards, closets, and rooms were the precursors to modern museums of art and natural history. Their encyclopaedic nature and overwhelming abundance of exotic and unusual specimens represented both a practice and an aesthetic of collecting and scholarly investigation in the sixteenth and seventeenth centuries.

The Ark of Tradescant, embodied in the items catalogued by Stirn and invoked by this illustration from Imperato's 1599 *Dell'Historia Naturale* (Figure 4.5), is in many ways prototypical of *Wunderkammern*

in the radical abundance and diversity of its collections. The contents and categories of *Wunderkammern* included specimens that were natural and man-made, gigantic and minute, religious and magical, local and exotic. Some included the clothing and tools of primitive peoples, or the jewels and armor of powerful people, or the crosses and daggers of famous (and infamous) people. Some artifacts required optical devices (themselves objects of fascination) in order to be made sense of.

Stirn's description also alludes to the categories by which the items in The Ark were classified, displayed and catalogued. In effect, *Wunderkammern* exemplify the

4.5 *Wunderkammer*, double plate ➤ from Ferrante Imperato, *Dell'Historia Naturale . . .* , 1599.

confident pre-Enlightenment belief in mankind's ability to acquire universal knowledge, and his concomitant belief in his ability to exert power and control within that universe.

It is important to acknowledge here that the natural and human artifacts sought by explorers and their collector patrons during the Renaissance and the Enlightenment cannot be separated from the cultural imperialism of European thought and the political and mercantile imperialism of European nation states. Many expeditions were sponsored by powerful institutions and governments, and were often merely adjuncts to the spread of Western colonialism through much of the "undeveloped" (but not uninhabited) world. For example, among the patrons of John Tradescant the Elder's collections were George Villiers, Duke of Buckingham, and Robert Cecil, Earl of Salisbury, who provided Tradescant with access to botanical and cultural specimens shipped to Great Britain by the East India Company, the Levant Company, the Virginia Company, and other colonial sources (London, 1983, p. 24).

The cultural history of the *Wunderkammer*, inevitably influenced by this dubious descent, followed two trajectories, distinguished first by the objects collected and then by the methods of arranging and displaying the collection. While most *Wunderkammern* contained a mix of natural and artificial objects, with an emphasis on the strange and unusual, those accumulated by wealthy and powerful men also included paintings, armor, coins, and objects made from precious metals and rare jewels, as well as the most expensive and hard-to-obtain natural specimens they could purchase by commission. These collections of precious artifacts, sometimes called *Schatzkammern* (treasure chambers) to distinguish them from the more encyclopaedic form of the *Wunderkammer*, were the direct descendants of the royal and church treasuries of the Middle Ages (Hein, 2002, pp. 177-178). Regents and nobles spent significant amounts on expeditions and commissions to fill these treasuries; they were arranged with an eye to enhancing the prestige of their patrons, and access was gained selectively by private permission only. The primary purpose of *Schatzkammern* was to augment the status of their owners, and their contents were ordered and displayed to reify that privileged position.

◄ 4.6 Pre-Colombian gold artifacts (top), Northwest Coast Indian clothing (middle), American beetles (bottom), all in the collections of the Field Museum in Chicago. The museum was incorporated as the Columbian Museum of Chicago in 1893; its mission was the "accumulation and dissemination of knowledge, and the preservation and exhibition of objects illustrating art, archaeology, science and history" (Field, n.p.). It was renamed the Field Museum of Natural History in honor of Marshall Field, who financed numerous archeological expeditions on its behalf. Photographs by Perosha (2010). Click images to enlarge.

The purpose of the second type of *Wunderkammern* was less self-aggrandizement than wonder-induced inquiry and discovery, and this is the model that informs the spirit of a visual canon of arrangement. These cabinets and rooms housed the idiosyncratic collections of scholars and autodidacts—gardeners, physicians, teachers— obsessively accumulated, repeatedly studied, endlessly catalogued, and proudly displayed. They contained animal, vegetable, and mineral specimens from all over the world, the more unusual, exotic, or marvelous the better (*naturalia*); man-made artifacts that included ethnographic specimens of clothing, combs, jewelry, tools, and ritual objects, and also artifacts that had been ingeniously crafted from natural materials like seeds, stones, and metals (*artificialia*); and examples of tools and instruments like lathes and microscopes that not only demonstrated man's skill and creativity, but were often necessary to either craft or view other artifacts in the collection (*scientifica*). Although these collections occasionally included tributes to their makers—paintings of John Tradescant the Elder and Elias Ashmole hang prominently in the Ashmolean Museum—self-puffery was secondary to the quest for comprehensive knowledge, and collectors' attempts to come to an understanding of what these things said about the nature of the world were reflected in the many ways in which they catalogued and arranged their collections for display. Many early *Wunderkammern* evidenced an organizational subtext that demonstrated the traditional tripartite hierarchy of God, Man, and Nature foregrounded in *Schatzkammern*: Man held center stage, on the one hand as the special creation of God, and on the other as holding dominion over Nature. But they also exhibited more specialized classification systems. Some were arranged according to currently understood botanical or zoological classifications (Linnaeus' taxonomy was inspired by viewing exhibits of *naturalia*),

some according to the materials—wood, leather, bone, gold—from which they were made. Some were arranged by points of the compass, some by the four elements (air, earth, fire, and water), and some by the four seasons. Some were classified by their magnitude of deviation from the norm—very large specimens ("a human bone weighing 42 lbs"), very small specimens ("the passion of Christ carved very daintily on a plumstone"), specimens with supernumerary limbs, heads, and other parts. Many *Wunderkammern* deliberately juxtaposed specimens from oppositional categories.

The cumulative abundance of these *naturalia*, *artificialia,* and *scientifica* were physically present together. They could be viewed from different perspectives, turned this way and that, arranged and rearranged to create new combinations, new juxtapositions, and new associations. Every arrangement, every classification, every insight, was provisional, subject to review and change. Collectors, scholars, and casual visitors could freely make the connections among the objects on display in ways that were meaningful for them: collectors and scholars by studying, reclassifying, and physically rearranging the groupings, and visitors by attending to those combinations that made the most sense to them, as Stirn did in his visit to Tradescant's Ark.

The concept of the *Wunderkammer* and the accumulative, manipulative approach to learning it exemplifies make it a productive thought engine, an object-to-think-with (Turkle, 1995) about how to make use of both the visual nature and hyperlinked capacity of interactive digital media as technologies with which to frame a new rhetorical practice of inquiry and discovery. Objects-to-think-with are tangible things or places that enable us to reflect concretely on abstract concepts and relationships. Lacan wrote that tying intricate knots in pieces of string led him to his speculations on the nature of the unconscious, a

literal entanglement of theory and practice. Mary Douglas used the manipulation of food according to complex Jewish dietary laws as an object-to-think-with about the relationship between the sacred and profane. In a similar fashion, many people find Freud's references to slips of the tongue, despite the fact that Freud himself considered them relatively unimportant, to be fruitful objects-to-think-with about how the mind works, so fruitful in fact that they have become naturalized in common beliefs about the unconscious despite the waning of the Freudian perspective in clinical circles (pp. 48-49).

Wunderkammern are objects-to-think-with that construct an uncanny bridge—a material link—between the mental and physical; they engender wonder, a productive *aporia* between not-knowing and knowing. Thinking about and constructing hypermedia-as-*Wunderkammmer* produces new objects-to-think-with about our slippery, provisional, fragmentary understanding of the world, a framework for exploration and discovery of how its seemingly disparate

and disconnected pieces can be joined and made sensible, and thereby help us learn how to behave. Constructing new media, like building a *Wunderkammer*, can become an embodied pedagogical performance that exemplifies postmodern understandings of multiple perspectives and subjectivities through multilinear, multimodal arrangement (of hypermedia nodes, or places) and connections (links), multimediated paths to rhetorical action through a technology of wonder.

Ted Nelson, a pioneer of information technology, claimed that "hypertext is the most basic form of text and linear textuality is a subset" (Landow, 1997). If this is the case, we might consider multilinearity to be the general case for arrangement, and hierarchical linearity to be a special instance of the general case; and we might further speculate that associative, analogical thinking demonstrated in the *Wunderkammer* is the general case for human cognition, represented in the combinatorial practices of early Modern thought, however incompletely understood at the time, and in the evolving contemporary models of the workings of the embodied brain. And in the same way that linearity is a special instance of multilinearity, computational models of cognition might also be only a special and limited instance of how the brain works to make meaning and derive rhetorical bases for action and belief. Furthermore, while we may be attuned to thinking of association and analogy in verbal terms, they are also deeply and fundamentally visual.
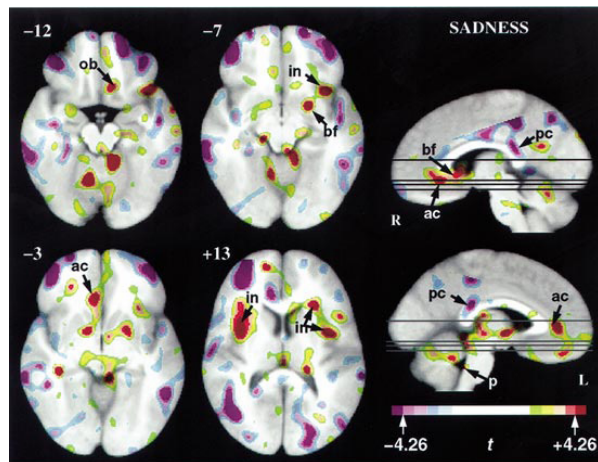
◄ 4.7 Damásio et al., 2000. Sadness. PET scan image of a human brain. Visualization technologies like PET scanning reveal the multiple structures and pathways involved in acquiring and responding to stimulation by various parts of the brain. In this scan, red denotes areas that are significantly activated by self-generated sadness, and purple denotes areas of significant de-activation.

Visual Analogy

Like binary oppositions, in which one term is inevitably devalued in relation to the other, when *associative* and *analogical* are opposed to *analytical* as modes of thinking, analytical has been the privileged term. Analytical thinking, so the story goes, is deep, logical, and objective, while associative thinking is shallow, irrational, and subjective. As with other binaries, this opposition is more strategic that real. The associative practice of "and . . . and . . . and" could as easily be characterized against the analytical "either/or" as broad and inclusive, rather than shallow (and exclusive), a mode based on similarity rather than difference. By the same token, association may be better described as *non*-rational, rather than *ir*rational. *Ir*rational implies absurdity, incoherence, absence of reason, whereas *non*-rational suggests a reason-*ableness* based on induction and inference. Finally, one of our most useful postmodern insights is the under-standing that objectivity is just a privileged form of subjectivity, dressed up in the emperor's new clothes.

As is often the case with binaries, not only are they unable to withstand critique on their own terms, but they also set up a false dichotomy. It is not necessary to choose one over the other. There is space for dialectic *and* rhetoric. As Wendy Morgan (1999) points out, to suggest that association is inferior to analysis, yet useful as a supplement, calls into question the ad-equacy of an analytical reasoning that *requires* supplementing (p. 209). Rather we should admit the necessity of both analysis *and* association as means toward a "strong objectivity" located in multiple but partial situated perspectives.

The (false) opposition of analysis and association brings a problem with postmodernity into high reflief: the infinite regression of difference versus the sympathetic connection of similarity. Stafford (1996) laments the deleterious effect of postmodernism in creating an environment in

◄
4.8 Greg Elms, Palm reader with readings, Chennai, India (top); Alain Evard, Posters announcing Diane Dufresne's album, *Détournement Majeur,* Montreal (middle); Izzet Keribar, Praying at the Western Wall, Jerusalem (bottom). Potential grounds for visual association and analogy include size, shape, scale, color, repetition, the human figure, and the activities of reading (palms, posters, papers, prayer books). Click images to enlarge.

which "differences cannot be honorably reconciled," an atmosphere that is so intent on reifying difference that we are unable to imagine how "alien things [might be] sympathetically joined" (p. 202). In response to postmodernism's "narcissism of minor difference," Stafford proposes visual analogy as a mode of associational construction of knowledge. In an age of otherness, of assertive identity, "we possess no language for talking about resemblance, only an exaggerated awareness of difference" (1999, p. 10). Where postmodernism underscores rupture and discontinuity, visual analogy can construct liaisons in "areas of contemporary life that cry out for fine-grained formulations of resemblance and distinction" (p. 30).

4.9 Human hand effigy, Hopewell culture, Hopewell Mound Group, Ross County, Ohio, ➤ 100 BCE–400 CE. Photograph by Jason Cannon.

Representations of hands occur across history and across cultures, a powerful evocation of what it means to be human. I first encountered this iconic mica example in the Field Museum in Chicago in the 1980s, where it was displayed among other artifacts of the Ohio Moundbuilders. A few visits later, it had been moved to a glass vitrine at the entrance to the North American Indian gallery, where visitors could walk around it and experience the full effect of its translucence. As it changed contexts, it acquired new meanings, from its original context as an artifact of Hopewell culture, to its place in a diorama of disparate native North American objects, to its pride of place as a totem of native American aesthetics. Its meaning also changed in relation to other hands in other places. And closer inspection raised questions about its making, about its survival, about the function of two small holes in its palm.

▲ 4.10 Buddha's hand (photograph by rumple-teaser); Cave of the Hands (Mariano); Entrust (Pescod); X-ray hand (Yamashita); Sign (unknown); Uncle Sam (Flagg); Turkish fist bump (Dombrowski); tattooed hand (Kadri); Hand of Fatima (cbertel); Heart-in-hand staff (Oddfellows); Are we having fun yet? (Kruger). Click image to play.

Stafford draws on the two complementary meanings of analogy, that of proportionality and that of participation. Proportion speaks to the ratios between two things, the identification of difference that can only come from a prior understanding of resemblance; participation describes the inferential understanding that if two things are similar in one way, it is likely that they will be similar in others. From these she derives her definition of analogy as "the vision of ordered relationships articulated as similarity-in-difference" (p. 9).

Although Stafford does not argue that an analogical epistemology is a specifically feminist approach, it clearly shares characteristics with other feminist practices, including its desire to find meaning in kinship and collaboration, and its insistence on making its meaning through material and visual improvisation. As Stafford notes, "It requires perspicuity to see what kinds of adjustments need to be made between uneven cases to achieve a tentative harmony. It also presupposes discernment to discover the relevant likeness in unlike things" (p. 3). These are visual practices, grounded in the particular, the material, the embodied account. By analogy, the *Wunderkammer* in the seventeenth century and the contemporary Internet are organically connected in their promiscuous visibility and associative sprawl, and here again we find a connection between wonder and hypermedia. Both are visual technologies, both require the arrangement and rearrangement of elements to make (provisional) meaning, and both depend on the "mind's positive tendency to discover affinities" (1996, p. 203).

Visual analogy as a method of arrangement requires manipulations and multiple re-stagings, and this is neither an easy nor a comfortable process. Craig Stroupe (2004) notes the dissonances that emerge in the gaps between visual and verbal rhetorical conventions, but describes them as "creative irritants" (p. 244). By revealing "interpretive dilemmas and cultural instabilities that exist socially beneath the veneer of appropriate assumptions . . . at any moment in history" (p. 245), they force us to construct dialogic, analogical bridges between words and images, and images and images, whose relationships are not merely illustrative. It is difficult to sustain this kind of inquiry, yet postponing judgment and actively plumbing these gaps for multiple meanings and perspectives provides a strong foundation for principled rhetorical action.

Interactivity & the Line

If a *Wunderkammer* is both a place and a practice of intellectual inquiry, what are the essential qualities it possesses that pave the way for a *techné* of visual arrangement in interactive digital media, qualities that facilitate analogical discovery and enable rhetorical invention and principled practice? The first, of course, is visuality itself, and the ability to include images and motion to make manifest the material substance of a critical practice of inquiry and learning. The second, dependent on visuality, is embodiment, the ability to represent in context the material conditions of and consequences for individuals and groups who may be affected by political and social action, but who heretofore may not have had an active voice or presence in determining that action. The third is interactivity, which in digital media includes both the means to manipulate and arrange evidence to discover meaningful associations and analogies, and the ability to navigate freely among the nodes and links of that evidence to build multilinear, multiperspectival understanding and knowledge. In many ways, hypermedia was a postmodern technology waiting to be born. Hypermediated digital texts make literal and visual the dream of "non-sequential writing" imagined by Nelson (1974), texts with no fixed typographic form that authorizes a pre-determined linear reading. Each reading/viewing, either by the person(s) who constructed the hypermedia or by other readers, is a unique result of individual navigational choices available within a multidirectional text. For Nelson, movement through hypermediated space would be associational rather than driven by a linear hierarchy, as in conventional printed texts; it would be "less monolithic truth than polyvalent discourse" (Moulthrop and Kaplan, 1994, p. 220).
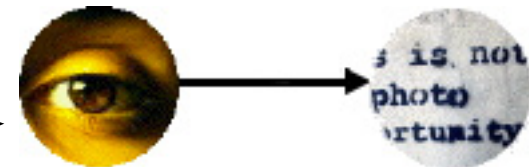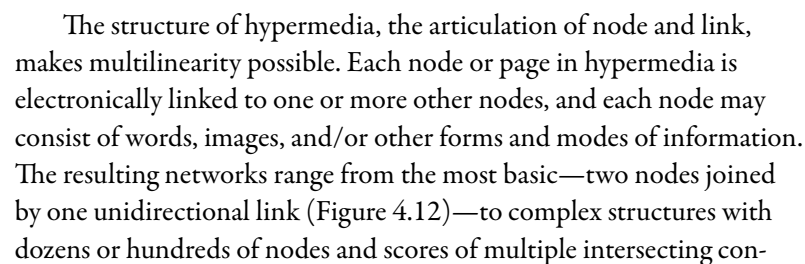

▲ 4.11 Shopping arcade, Leeds, 2007. Photograph by Axel Bruns.
Game theorist Mark Meadows (2003) differentiates between the interactivities of acquiring information and discovering information. Libraries are models for acquiring information in the most direct and efficient way; open-air markets and arcades are models for discovering "something that you don't yet know about" (p. 178). In open-air markets, "a pathway is framed by options," ceding more control to the visitor.

4.12 Two nodes connected ➤ by a unidirectional link

4.13 Colophon from Mark Bernstein's ➤
Chasing Our Tails, 1997.
This map represents the individual *lexia*
and the paths between them in a hyper-
text on the tensions between lovers of
books and advocates of hypertext. Each
node has one or more links, and links
connect nodes within and among the
four parts of the hypertext.
It is fascinating how similar this colo-
phon (created in an early version of
StorySpace) is to the mind-maps pro-
duced in programs such as Nova-Mind,
FreeThink, and MindManager. Advertised
primarily as organizational rather than
inspirational tools, however, mind-map-
ping software is almost invariably used
to produce linear, hierarchical outlines or
documents with little or no cross-linking
of branches.

The structure of hypermedia, the articulation of node and link, makes multilinearity possible. Each node or page in hypermedia is electronically linked to one or more other nodes, and each node may consist of words, images, and/or other forms and modes of information. The resulting networks range from the most basic—two nodes joined by one unidirectional link (Figure 4.12)—to complex structures with dozens or hundreds of nodes and scores of multiple intersecting con-

nections, illustrated here by the colophon of Mark Bernstein's *Chasing Our Tails* (1997) (Figure 4.13).

Travelling in hypermediated space, it is the user who determines the path she will take, and who thereby participates in authoring the text that she experiences. In addition to the dispersal of author-ity between the designer and the reader implicit in the structure, multilinearity enables such postmodern attributes as polyvocality, the flattening of

4.14 Facebook Friend Wheel, 2010.
Visualization of social network in which "friends" are arranged around the perimeter, and also linked to one another through their own "friend" connections.

hierarchies, and the inevitability of partial perspective. Hypermedia thus offer an alternative to the linear, rational, univocal, scholarly article or student essay, an alternative that makes it easier to recognize and incorporate alternative voices and forms of evidence and to create multiple perspectives, and to do so in a way that promotes inquiry and thoughtful judgment rather than a sequential march of traditional logocentric sources in support of a foregone conclusion. Hypermedia becomes "a cardinal technology," a tool for "working at traditional tasks [like the academic essay] that [has] the effect of changing the tasks themselves" (Joyce, 1995a, p. 39). Designing and exploring hypermedia, like arranging and exploring the objects in a *Wunderkammer,* has the potential to transform the linear topologies of reading and writing into meditative, often surprising, performances of discovery and thought.

Early uses of hypermedia in English Studies included hypertext fiction (Joyce, 1990; Moulthrop, 1991); interactive databases of texts and commentaries (*The Victorian Web*, 1987-present); and the work of Michael Joyce, Bernstein and others with Storyspace and Hypercard in writing and literature classes. Joyce, an early designer and theorist of hypermedia, identified two forms of hypertext for the classroom: exploratory and constructive (1995a, pp. 40-49). (I use the term "hypertext" here because in the early 1990s, processor speed and memory limitations effectively restricted Joyce's students' digital media production to text; however, the principles of exploratory and construc-tive hypertext apply equally well to contemporary multimedia.)
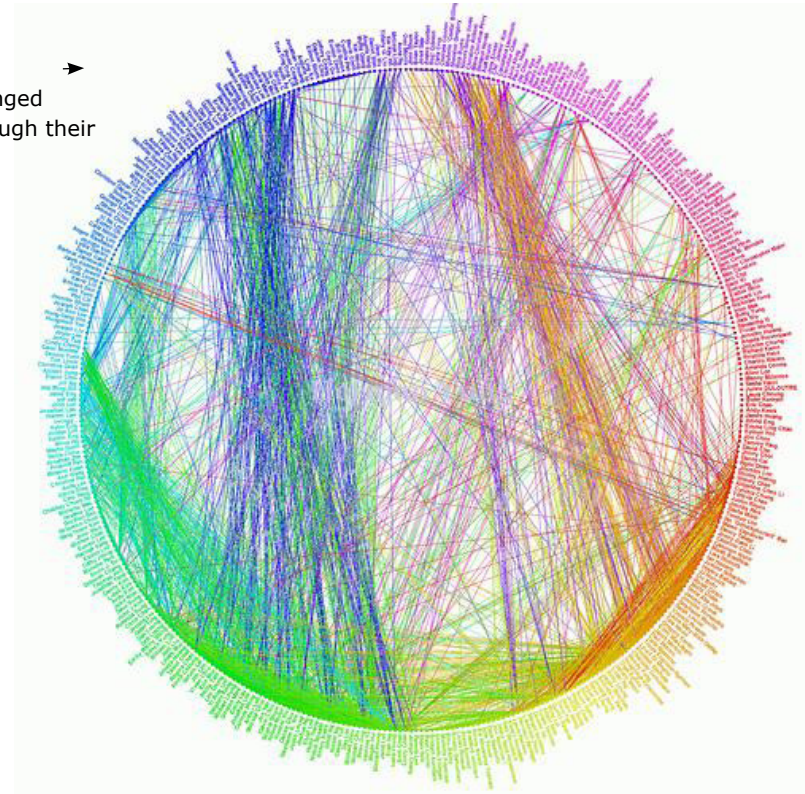
Exploratory hypermedia are presentational, delivering webs of material to student-users which they can navigate to suit their needs and interests. For the most productive engagement with the available visual and verbal resources, students should be able to "create, change, and recover particular encounters with the body of knowledge, maintaining these encounters as versions of the material" (p. 41). Users should also have a sense of the body of knowledge as a whole, and be able

to construct alternate representations of the whole and of their own path(s) through it. Joyce supported this model of interactive learning, but proposed a second, constructive use even more conducive to invention and learning. Constructive hypermedia are primarily for designers rather than users, at least initially. In constructive hypermedia, writer/designers "develop a body of information that they map according to their needs, their interests, and the transformations they discover as they invent, gather, and act upon information" (p. 42). Even more than in exploratory hypermedia, the ability to map constructive hypermedia in different ways, and to create, change, and act on emerging insights as the work evolves, is essential, as is being able to recover alternate pathways. Traces of the designer's encounters with the growing body of knowledge are "versions of what they are becoming, a structure for what does not yet exist" (p. 42). Jay Bolter's term "topographic writing" (2001, p. 36) gets at the intertwingling of content and form implicit in these constructive hypermedia, structures of word and image that can be arranged and re-arranged, and have no comparable equivalent on the page; and it also reinforces both the power of the link as a heuristic and the importance of *seeing* the structure—both nodes and links—as it evolves.

Exploratory and constructive hypermedia may in some cases describe the same text; well-designed constructive hypermedia often make excellent exploratory hypermedia. Yet interactivity is not in and of itself productive of thoughtful inquiry. Interactivity, according to Meadows (2003), is "based on fascination and captivation" (p. 44), like a *Wunderkammer*. It is an iterative process through which the inter-actor is drawn ever more deeply into the system. For Meadows, these systems are the digital narratives of which he writes; yet it also describes the more-or-less dynamic relationship between users and other media. Meadows identifies four steps of interactivity. The first, observation, consists of an assessment of the first level of the media object, determining whether it has "moving parts" (buttons, text, images), and how they might work. In the second step, exploration, the reader "does something" to figure out through serendipitous discovery what is possible. The third step is modification, in which the reader makes a change and connects it to the larger context of the system, increasing the level of interaction. Finally, through reciprocal change, "the system tries to change the reader" (p. 45). Reciprocal change (the user changes the system and the system changes the user) is key to hypermedia designed for inquiry, as the indeterminacy of reciprocal change engages the user more and more intensely.

Composing technologies are tools that suggest and reward particular ways of doing and thinking. Each has its own affordances and constraints. But if the goal of constructive hypermedia in an academic setting is inquiry and reflective understanding—in other words, if its motivating force is wonder—then its interactive design and use enacts a rhetorical *techné*: the process of collecting and arranging will take time, re-arranging and evaluating will take more time, and both will require reflection, cognitive engagement, and a willingness to defer closure as ideas and connections percolate.

Unfortunately there are obstacles to a constructive practice of writing and thinking in hypermedia: the persistence of the traditional linear, logocentric patterns for writing discussed previously, and the insistence on efficiency and speed as primary criteria for navigation of interactive digital media that has leached into university handbooks and textbooks from commercial guides for web design.

Escaping Printland

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schweigen  schweigen  schweigen
schweigen  schweigen  schweigen
schweigen             schweigen
schweigen  schweigen  schweigen
schweigen  schweigen  schweigen
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▲ 4.15 Eugen Gomringer, Schweigen (Silence), 1954; Edvard Munch, The Scream, 1893. "In a literate culture," Richard Lanham (1993) wrote, "our concept of meaning itself . . . depends on this radical act of typographical simplification. No pictures; no color; strict order of left to right then down one line; no type changes; no interaction; no revision" (pp. 33-34). Such typography is for looking *through*, rather than looking *at*. In a visual culture, we can see that these are not mutually exclusive; complex meaning can be made from the oscillation between surface *and* depth for both words and images.

Criteria for linking in interactive digital media should be, as we would expect for written argument and analysis, systematically and intimately connected to the rhetorical situation: What is the purpose of the media project? Who is the audience and what are their needs? What is the larger context of its use? In sum, what sort of navigational strategies will support the most potent use of the digital environment, given the purpose, audience, and context of use? But a look at guidelines for navigational design in the popular press, technical communication publications, and handbooks and guides for university writing students suggests that the rhetorical situation of hypermedia (if considered at all) is imagined very narrowly. One might easily infer from many of these sources that the only purpose of hypermediated linking is to provide information efficiently and transparently, and that the only desire of the viewer is to find and act on that information as quickly and easily as possible. The criterion of efficiency is measured in time: How quickly can the viewer find the information she seeks, and then act on it? How quickly can she locate the price of *The Seven Habits of Highly Effective People* on Amazon and order two copies? How fast can she find the definition of "plagiarism" and paste it into her paper? The criterion of transparency is measured in degree of cognitive engagement: How easily can the viewer, with a minimum of effort and no confusion, accomplish her goal? How clear and unambiguous are the links that will help her buy that book, add *Inception* to her Netflix queue, or make a donation to her party's congressional candidate?

The sense that hypermedia navigation should always be clean and clear and quick is pervasive, and this spills over from the online world of commerce, and also from the conventions of print media. Commercial websites have a vested interest in making our experience there as "painless" as possible; navigating those sites is rarely designed to be a cognitive act. In much the same way, signposts for navigating print texts follow relatively inflexible visual and spatial rules for the micro-level navigational elements of pages, including sentence and paragraph structure, the use of white space and numbering, and the placement of images. Similar standards exist at the macro-level for books, journals, newspapers, etc., including the design and placement of title page information, tables of contents, endnotes, and indices. These design criteria use the

visual organization of pages and books to control strategies for moving through them. Here again, the expectation is that navigation should be easy, fast, and predictable.
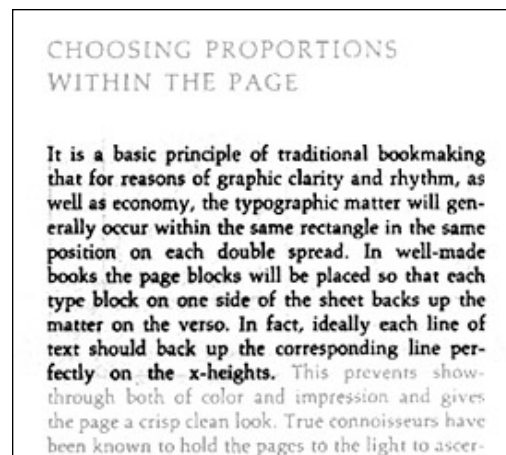
The order of books has become so naturalized that it is no longer present to us. We do not have to think about *how* to navigate a book, how to find our way around it in a productive way. Its form has become transparent. Richard Lanham (1993) refers to this as "looking through" the apparently transparent medium of print to the supposed "reality" beneath the text (pp. 79-84). Book design—the order of pages, and the order of the words on those pages—is intended by authors and publishers to guide the reader invisibly but firmly through the text in a specific sequence. As Anne Wysocki (1998) points out, this invisibility is the product of a belief that we too should "look through" the abstract letters on the page to their true, Platonic meaning. She identifies five

principles of typographic design gleaned from her analysis of classic texts by Robert Bringhurst, Adrian Wilson, Jan Tschichold and others:

> … The words on the page are to approach immateriality;
>
> … Words are to appear on the page so that they visually convey our sense of what knowledge is;
>
> … The printed books that result from the desire to see ideally are to have words that melt into even, repeated lines on evenly presented pages;
>
> … Such repetitions and homogenization of form keep books from calling any attention to themselves;
>
> … There should therefore be no decoration. (n.p.)

As corroborating evidence, Wysocki illustrates how typographers exemplified these principles in their own texts, as shown in the two examples below (Figure 4.16; emphasis added by Wysocki).

4.16 From Adrian Wilson, *The Design of Books,* 1993 (left); from Robert Bringhurst, *The Elements of Typographic Style,* 1992 (right) (Wysocki, 1998).

4.17 Boustrophedon writing, Greece, fifth century BCE. Photograph by PRA.
In boustrophedon, the letters are written left to right, then right to left, on alternate lines.
The name derives from the Greek words for "ox" and "turning," as it mimics the path of an ox
ploughing a field. In this example, letters on the right-to-left lines are also written backward.
Another form of boustrophedon turns the entire alternate line upside down, requiring the
reader to turn the tablet. Click image to enlarge.

Our encounters with new media create a heightened awareness of the constructedness of cultural artifacts, including the alphabet and the book, that calls into question the putative "naturalness" and transparency claimed for print. After all, Western printed forms are not natural for people who write using pictographs, nor are they natural for people who read their texts right to left, or in vertical rather than horizontal lines. And this leads us to wonder whose interests are being served by claiming that the established rules we follow for print and page design are universally "correct." Wysocki addresses this question by proposing that "the visual order of books makes those of us who read desire to be rational, internalized, homogeneous individuals who see the world in a standardized, numerical, scientific, manner" (n.p.). But, of course, this insight motivates us to look for and discover other social

and cultural conventions that are designed to monitor our behavior. The burkha, the nun's habit, and the plain dress of the Amish create and are created by a particular way of being in the world. The ceremonies of our lives—baptisms, graduations, weddings, and funerals—all come with a set of cultural expectations for how to participate. The order of printed books is no less a social technology than are more overt social and cultural practices. But arguing against the desirability of transparency for the design of/on the page resists critique. Questioning it with words that follow the conventional principles of typographic order would seem to negate the question. Questioning it with words (or images) that flout those principles risks one's argument being dismissed as frivolous, immature, or ignorant.

Fortunately, the comparative newness and strangeness of hypermedia force us to oscillate between "looking at" and "looking through" the medium, and make us notice that shape and structure work in concert with content to make meaning. While a linear, sequential order of words predominates in expository and analytical print forms like the conventional academic article or essay, digital hypermedia have the capacity to be visually dynamic and spatially diverse. Instead of line and propositional sequence, we have at hand webs, nets, trees, patchworks, labyrinths, rhizomes, mosaics, collage, montage, bricolage, and other

patterns and strategies of visual arrangement that are more common to the visual and applied arts. Arrangement aggressively re-asserts itself in hypermedia, even when the content is primarily alphabetic text, and makes it impossible to ignore the design and dismiss the electronic spaces of interactive digital media as merely containers for meaning. If the practice of seeking visual analogies in hypermedia is a process of discovering similarities and affinities that make meaning, then arrangement, and a corresponding practice of associative linking, should also reveal multiple possibilities for meaningful discovery.

Of course, linear propositional logic is itself a pattern, an arrangement, with an important intellectual history that has served us well and will continue to do so. But given the current high visibility of digital media as rhetoric and composition scholars rethink their communicative practices, one might expect a strong challenge to conventionalized print and commercial standards for the visual and structural design of hypermedia. Certainly the theoretical claims for hypermedia as symbolic of postmodern culture suggest that intertextuality, indeterminacy, and multiplicity might be foregrounded since, as Jay Bolter and Richard Grusin argue, a new medium "promises to reform its predecessors by offering a more immediate or authentic experience" (2000, p. 19).

But media are invented, designed, and used in a cultural complex of economic, social, political, and aesthetic factors which apply a strong conservative brake. Try as they might to escape the gravitational pull of their predecessors, new media often fall back into a nearby orbit. Revolutionary claims have been made for other new technologies that have eventually re-inscribed culturally constructed norms. The typewriter, the telephone, the microwave oven, the birth-control pill—all were heralded as technological breakthroughs that would make work more efficient and more pleasant, and would give their users

more leisure time and autonomy. Instead, they have become devices through which commercial and institutional interests exert ever more control over countless lives and bodies (Wajcman, 1991). Discourses of and about other technologies have progressed in similar fashion, from emancipatory promise to constricted reality.

Design criteria for hypermedia intended for simple information retrieval should differ from design criteria for hypermedia fiction, and both should differ from criteria for hypermedia constructed to assist academic inquiry and invention and make scholarly contributions to the field. But conservative practices have often uncritically mapped old standards for academic essays onto hypermediated spaces—a continuation of our long history of using print conventions to monitor order—and the rapid colonization of the web by commercial and corporate interests has resulted in ubiquitous standards for the design of hypermedia that deny the particularity of its uses and users and insist on decontextualized, disembodied standards of corporate efficiency and uniformity.
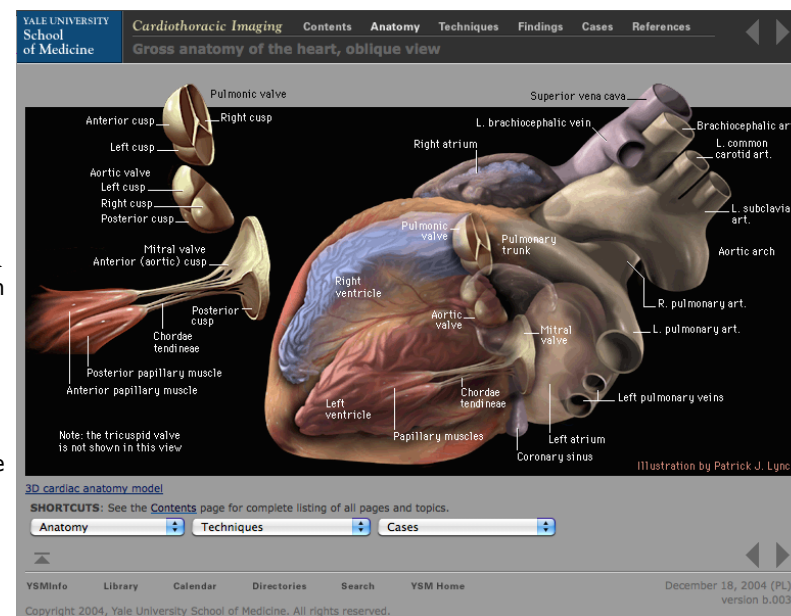
Despite the enthusiasm in rhetoric and composition studies for incorporating hypermediated web pages, social media, and other digital projects into the writing curriculum, popular handbooks tend to insist that navigation and design in hypermedia, like print, should be as simple and inconspicuous as possible. Diana Hacker's *A Writers' Reference* added a section on web design in 2003 that recommended design which does not call attention to itself: "Repeat design elements so visitors will feel at home: Place navigational aids consistently, and use constant background colors, fonts, visual motifs, and formatting" (p. 77). Another popular text, Lester Faigley's *Little Penguin Handbook* (2009), contains an extensive section on web design, and he too suggests that design should be unobtrusive, unified, consistent. Like print. "Clutter

creeps into less extensive websites through decorative images that do not contribute to the content, distracting backgrounds, sprawling text that runs across the screen, and annoying animations" (p. 157). While it is true that "sprawling text" (lines of print running the full width of the screen) is difficult to read on today's screens, without any guidelines or encouragement to use rhetorically effective visual content and arrangement, Faigley's warnings imply that noticeable visual design is bad visual design.

Guides such as these encourage a design model that imitates traditional academic criteria for page layout, particularly its logocentric insistence that visual content gets in the way of the "true" meaning contained in the words on the screen. Of course, handbooks provide guidelines primarily for novice writers, and a more comprehensive text could explore the nuances of rhetorical web design and arrangement more thoroughly. Nevertheless, these novices are being enculturated into an academic mistrust of visual design that will need to be unlearned later.

The online *Yale C/AIM Web Style Guide* (Lynch and Horton, 2009) posits a different kind of user, not an academic novice but one identical to the consumer-user invoked by Nielsen and other popular web design gurus. The *C/AIM Guide* clearly follows the principles of efficiency and transparency from the commercial information model: "Clear, consistent icons, graphic identity schemes, and graphic or text-based overview and summary screens can give the user confidence that they can find what they are looking for without wasting time" (n.p.), and later, "Users want to get information in the fewest possible steps." In the section on bandwidth we find, "Users will not tolerate long delays," and "Your interface metaphors should be simple, familiar,

4.18 Screenshot from *Introduction to Cardiothoracic Imaging* (detail), written and designed by C. Carl Jaffee and Patrick Lynch, and winner of the 2005 Pirelli Prize for multimedia communication of science and technology. Lynch, co-author of the *Yale C/AIM Web Style Guide,* is a medical illustrator and award-winning designer of informative and aesthetically pleasing webtexts. They are brilliantly designed for their purpose (teaching surgical anatomy and procedures) and their audience (medical professionals). But the principles of navigation necessary for communicating empirical information are often incompatible with strategies appropriate for intellectual inquiry and invention.

and logical," and "The best information designs are never noticed." And the giveaway: "To convince your users that what you have to offer is accurate and reliable, you will need to design your Web site as carefully as you would any other type of *corporate* [emphasis mine] communication." In these examples, and many more, it is clear that the interface is meant to disappear, revealing the sought-after information beneath.

The problem with using either the linear print logic of the scholarly article or the economically-motivated linking of commercial or corporate websites as models for developing our own scholarly performances in new media, or for the work that we ask our students to do, is that they are based on a model of efficient and transparent information transfer that strips away the embodied materiality of the writer/designer and of the "information" with which she interacts. Criteria of efficiency and transparency are antithetical to a process of emerging intelligibility that nurtures thoughtful inquiry. We must look elsewhere for a rhetoric of the link that is conducive to a *techné* of wondering.

Pause . . . <Click> . . . Pause

Hypermediated spaces, created for different purposes and directed toward different audiences, should contain links that are visually and cognitively appropriate for their specific rhetorical situation. Three examples: On an interactive DVD designed for children and titled *The Animal Life of Sub-Saharan Africa*, a link to the section on zebras might reasonably include an image of a zebra for a child to click. In an online database for ecologists containing a broad range of statistical information on habitat change, the blue, underlined word "Zebra" would suffice. And on a website published by People for the Ethical Treatment of Animals about the conditions of zebra enclosures in zoos, the opening screen might consist of a large, graphic photograph of those conditions that functions as an image map for links to further visual or verbal information and directions on how to donate money or write a letter of protest. In each case, the audience (children, ecologists, animal rights advocates) and the purpose (to satisfy curiosity, to provide useful data, to encourage activism) dictate the form of the link. But each of these requires a different level of cognitive engagement. For the ecologist, who expects/desires that the link leads directly to the data she is seeking, engagement (with the link) is minimal. For the child, whose response is based on both recognition and wonder, engagement is more expansive. The animal rights activist will be even more engaged: at a sensory, embodied level by the image; at a semiotic level by the relationship between the image map and the destination of the links; and at a rhetorical level by the persuasive options provided by both image and links. This latter experience is more like the densely meaningful linking in constructive and exploratory hypertexts that Joyce (1995a) proposed as generative learning spaces, and it is more like the meaning-making association and analogy that are at the core of the *Wunderkammer* as both a practice and a place.

This level of cognitive and imaginative engagement also takes more time.

As traditional academic performances in print are remediated onto the flickering screens of our computers, we have an opportunity to take advantage of the affordances of interactive digital media to construct new models for the shape of scholarly work. And just as the *Wunderkammer* provides a model for visual and analogical thinking in digital spaces, it also provides

▲ 4.19 Dandelion, n.d.
Cognitive engagement—becoming immersed in an image, an activity, or an idea—changes our sense of time. Like manipulated video, it slows, it speeds up, it rewinds, it stops; and each experience invites a new association and a new response.

a model for interactive linking as a knowledge-making, wisdom-seeking activity, where the knowledge-making designer-functions (construction, deconstruction, and reconstruction), and the knowledge-making user-functions (reaction, pro-action, interaction), are qualitatively different from the information-consuming functions (click-go, click-get) of commerce—where the flexible, mutable shapes of form and content are integral to the meaning of the text. In a digital *Wunderkammer*, we must think about linking, not as a transparent Albertian window, but as an often recalcitrant lock on a stubbornly opaque door.

The distinction is in the nature of the link. Joyce's concepts of exploratory and constructive hypertext were set aside in developing digital media as scholarly performance. But they survived, even thrived, in "creative" hypermedia, including hypermedia fiction and games, where the "problems" that interfered with speed and efficiency—ambiguity, lack of unity, deferral of meaning, multiple paths, lack of closure—were actually part of the appeal, and users were expected to wander and wonder. These are essential qualities of constructive hypermedia that enable inquiry and invention. And the end results of scholarly inquiry and invention in a digital *Wunderkammer* need not be arguments or conclusions or "if, then next" proofs, but may rather be interactive maps of a process that connect, in multiple ways and from multiple perspectives, the discovery and elaboration of associative thought.

But for those of us who wish to take advantage of the meaning-making potential of constructive hypermedia in our teaching and scholarship, the presumption that the meaning of links must be transparent remains problematic. George Landow (1994), an early advocate of hypertextual scholarship, claimed that rhetorics of departure and arrival "stimulate and encourage habits of relational thinking in the reader." Yet he argued that readers expect links to demonstrate "purposeful, and

above all *useful* relationships," and that "Documents that disappoint these expectations appear particularly incoherent and non-significant" (p. 82-83). If he is correct that linking stimulates critical thought, then he should expect that the user would take some responsibility herself for exploring multiple relations that may give an account of the link. But because information-delivery websites are already so familiar, we often slip into the fallacy that "click-and-go" linking is somehow "natural," the way things are supposed to be. Therefore most guides for hypermedia design continue to insist that the destination of every link must be clear and unambiguous, that the user should always understand completely what she will find "at the other end." (Spatial metaphors abound, and influence our thinking about the work and time involved in making a link. After all, it's not as though we've "wasted" more than a few seconds of time or calories of energy in making a link that turns out to be unproductive. But our perceptions about the efficiency and speed of the Internet color our judgment. The friction of distance impinges on the space of flows.) Such a design might produce information, but rarely knowledge. The structure of data influences meaning: meaning increases as data is turned into information; information is filtered through experience to create knowledge; and knowledge is transformed by understanding into wisdom (Shedroff, 2001, p. 42).

The question, then, is how to encourage that progression from information to wisdom, how to add cognitive weight to the link, how to recover the wandering-wondering of narrative fiction and gaming for a *techné* of inquiry and invention. Here again we turn to the *Wunderkammer* as a model, because it is not only the ability to create multiple paths and perspectives among objects that makes *Wunderkammern* such productive sites for research and discovery; it is also the simultaneous ambiguity and multiplicity of visual analogy that allows—requires—the

time and effort to connect, to discover relationships and resemblances and make sense of their meaning. So, too, constructive hypermedia value ambiguity, lack of unity, deferral of meaning, multiple paths, and lack of closure, because each generates a productive tension, an *aporia* in the space between knowing and not-knowing, that truly develops relational thinking. It is up to the designer to try out different possibilities for links and to articulate the nature of those relationships. In this equation, the link is a weighty thing indeed. It embodies the substance that is the middle term, both connecting and making meaning of the places and people and things it connects. In constructive hypermedia, it is not necessary, or even desirable, to (think you) know where you're going. The semantic meaning of the link may be unclear, or it may be assumed to mean one thing prior to linking and turn out to mean something else after arriving, or it may not "mean" anything, at least not anything that makes immediate sense. The success of constructive hypermedia is measured by the extent to which working with/in it is generative. The experience may also be gauged by the pleasure it gives—the *frisson* of the unexpected; the willingness to be lost; the delight of discovery—which might be favorably compared to the ends of rhetoric, and


▲ 4.20 Design for Prospect Park, Brooklyn, New York. Photographs by Gubantron (2008). Frederick Law Olmstead, who designed Prospect Park with Calvert Vaux, was influenced by public landscape practices in Great Britain and believed that parks should provide a tranquil respite from crowded and unhealthy urban spaces for people from all walks of life (Olmstead, 1922). In *Hypertext Gardens* (1998), Mark Bernstein suggests that the structure of parks and gardens, much like Olmstead's Prospect and Central Parks, are models for hypertextual navigation that, through a "mix of regularity and irregularity," offer "the promise of the unexpected without the threat of the wilderness." Click thumbnail images to enlarge.

which acknowledges the embodied materiality of the design and use of hypermedia. Thus the link participates in the dual sense of wonder: as a question, and as delight in discovery.

The models and metaphors we use to represent hypermedia navigation determine in part what we can and cannot think or do. The desktop metaphor for computer screens, for example, makes us think of our computers as little offices, dense with files and folders and trash containers. Efficiency and order are priorities. But it also constructs the computer as part of a corporate world in a way that a different metaphor, say a town square (where one is expected to amble about, to reflect, to chat), might not. In addition, the desktop metaphor presents a fundamentally hierarchical structure "associated with patriarchal cultures and rationalistic traditions of making meaning" (Selfe and Selfe, 1994, p. 491). Bernstein (1998) uses another metaphor, that of landscape design, to think about hypermedia navigation, and asks how "the craft of hypertext [can] invite readers to stay, to explore, and to reflect?" (n.p.). He makes a case for a mix of regularity and irregularity in the paths through a (hypermedia) garden, punctuated by the occasional statuary or folly. Exploratory hypermedia are like gardens and parks—more oriented and orienting than wilderness, but less rigid and conforming than city streets. The generative quality of the link is measured in these analogies by the pause—loitering in the town square, observing from a garden bench—when reflection, re-cognition, and connection occur. These analogies help us to understand how constructive hypermedia can be designed to get full measure not just of the places we construct, but of the paths we take to get there. At the same time, they demonstrate the materiality of our experience through a physical instantiation of our cognitive states, and the materiality of our objects of knowledge through their visually embodied presence.

In *A Thousand Plateaus,* Gilles Deleuze and Félix Guattari (1987) describe hypermedia as a new kind of writing distinguished by its "lines of flight." These communicative lines, the paths between, and the information embedded at/by their intersections form an organic rhizome. Characterized by connectivity, heterogeneity, multiplicity, and rupture, rhizomatic thought-structures are relational and relentlessly non-hierarchical. This is yet another metaphor, one that foregrounds the postmodern complexity and uncertainty that inform constructive hypermedia. Johnson-Eilola (2004) explores this territory using Stuart Hall's articulation theory. Objects have meaning (and an object can be a thing or a concept) not because of what they are, but because of what they are connected to. New connections can be forged, old connections broken. "Articulation theory provides a way for thinking about how meaning is constructed contingently, from pieces of other meanings and social forces that tend to prioritize one meaning over another" (p. 202). In each of these examples, the link establishes connections and relationships that are difficult or impossible to achieve in print. The fluid and flexible arrangement of "objects," literal and figurative, makes meaning in the complexity and scope of the "lines of flight."
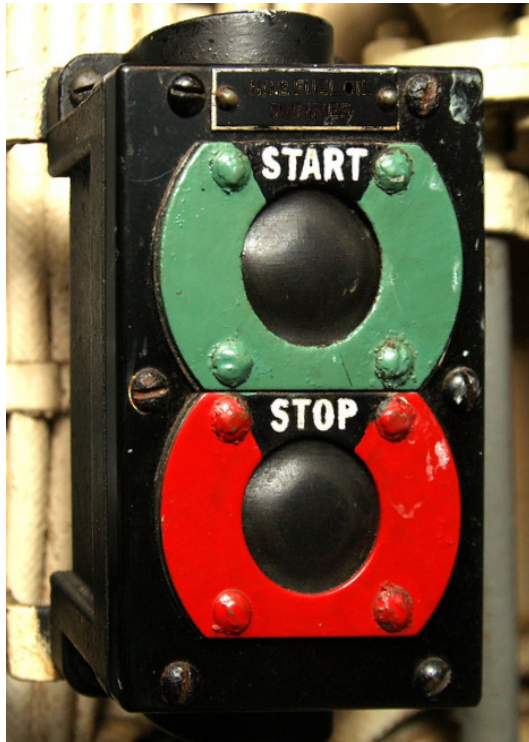
Difficulty, Aporia, & Cognitive Engagement

The hypermedia design criteria of efficiency and transparency are directly related to ease of use, which in turn reflects the relative presence or absence of cognitive engagement with the task of navigation. But despite the direction in which print traditions and commercial web design guides pushes us, scholar-designers must court ambiguity and multiplicity as we construct, and ask our students to construct, interactive digital media that are more than mere conduits for information, and that challenge the limiting linear formats of print. Designing and using such hypermedia to enact a situated, embodied, rhetorical *techné* of ethical belief or action requires significant cognitive engagement. In positing inquiry and engagement as critical tasks of hypermedia in an academic setting, we are choosing to emphasize the value of constructive over functional designs for hypermedia.

Builders of *Wunderkammern* and designers of constructive hypermedia share a commitment to and delight in four recursive and repeatable activities: collecting, arranging (and re-arranging), reflecting, and displaying. Modeling our hypermediated digital sites of pedagogical and scholarly practice on the *Wunderkammer*, we would first populate them copiously with materials of interest, collecting articles, newspaper clippings, letters, drawings, photographs, animations, sounds, and other potential evidence that may relate, however obliquely, to our topic of study. Adalgisa Lugli (1986) notes that encyclopaedic accumulation on the order of the *Wunderkammer* was the product first of wonder or marvel (p. 110); we would hope for material that evokes wonder, but curiosity will do. Wonder, as Philip Fisher (2003) points out, is both an experience and a ready state of mind. It may be that we already have a point of view on the subject at hand, but for the collecting stage, it is important to accumulate material that provides as many perspectives and reflections on our subject as can be found. (In a digital *Wunderkammer*, as each bit of prospective evidence is discovered, it is converted into an electronic form suitable for hypermedia.) This collecting activity should not be a solitary search, but one enhanced by collaboration and connection with colleagues and students. Early *Wunderkammer* intended for scholarly inquiry were often formed largely through gift and exchange (Lugli,

⬆ 4.21 Start Stop, 2008. Photograph by Nectarous.

p. 114), a model of collaboration that both amplifies multivocality in hypermedia and demonstrates an ethical stance toward inquiry. Furthermore, emulating this model and collaborating with our colleagues and students reinforces a practice highly valued in the field of rhetoric and composition.

One objection to this process of "virtual accumulation" might be that collecting and arranging electronic simulations of our evidence is not the same as populating a *Wunderkammer*, not the same as "the real thing." And certainly being able to engage all the senses in a more palpable appreciation of evocative, tangible objects would be ideal. But this disregards the fact that even a facsimile of a person or artifact is more present to us than the evidence presented in previous practices of academic inquiry, which required us to translate and transform that embodied evidence into dematerialized words on the page. People, places, objects were all reduced to their alphabetic signifiers. While an electronic simulation of a photograph or an interview or a handwritten letter is not the same as its physical presence, it is certainly more embodied than its alphabetic translation, and its visible presence makes us less able to claim that we writer/designers can speak for our evidence with a single voice. Interestingly, Lugli points out that there is a precedent for "virtual" presence: *Wunderkammern* intended for scholarly inquiry rather than personal aggrandizement were permitted to include "pictorial images in lieu of objects or specimens that cannot be materially procured but are necessary links in a classificatory chain" (p. 114).

The second stage in building constructive hypermedia entails manipulating the pieces and places in the collection, arranging and re-arranging them to bring to light multiple possibilities for connections, associations, similarities-in-difference. Trying out different classification systems is not the same as taking a simple inventory. An arrangement, a classification, is a provisional attempt at making meaning; new additions will alter the meaning of an arrangement, and re-arranging according to a different set of relationships will produce different meanings. And in addition to experimenting with different spatial arrangements, the objects can also be manipulated visually—magnified, multiplied, reflected, super-imposed upon one another—to reveal further kinships.

Although it is possible that some ways of linking these disparate pieces of evidence will readily suggest themselves, others will not be so apparent; hence the need for reflecting at multiple points in the construction of the project. The purpose of rhetorical inquiry is to promote knowledge and understanding, and it is likely that the easy connections are not the most useful, nor the ones that will help us discover the most ethical position or action for the situation at hand. In constructive hypermedia, the rhetoric of links is not expected to be transparent, as it is in informational sites. Information is just organized data, readily accessible. Knowledge is value(s)-added information, something that has to be constructed by filtering and focusing information through the context of our own experiences and previous understandings (Shedroff, 2001, p. 48).

Identifying the potential connections that exist during the arranging and re-arranging stage, and the potential consequences of making those links, is the primary cognitive task of constructive hypermedia. It is difficult, and failing to immediately understand what a link might mean results in a kind of vertigo, a state of not-knowing that Nicholas Burbules (1997) connects to the experience of *aporia*. Getting lost in cyberspace for Burbules is both arriving at an unknown or unexpected destination ("Where am I?"), and an *aporia*, a gap in signification

("Why am I here?"). While he is referring to the experience of *using* hypermedia, the concept applies equally to questions we must ask in the process of constructing them. Burbules traces his use of *aporia* back to Plato's *Meno*, a dialog in which Socrates leads his student from the student's misunderstanding of a proof in geometry through a series of questions that exposes the student's misconception. He then takes him step-by-step through an alternative proof to the correct answer. The students's state of not-knowing, of suspension between false certainty and true knowledge, is *aporia*, and as Burbules notes, Plato describes it as a physical as well as mental experience, a feeling of "being paralyzed" and "numb." (It is significant that difficulty in navigating hypermedia is so often expressed as a bodily sensation. Johnson-Eilola [1994] speaks of vertigo; Stroupe [2004] of irritation.) This embodied experience bears a striking resemblance to Stafford's (1999) concept of somatic cognition associated with visual analogy.

For Plato, the solution to *aporia* is the application of logic. When we don't know how to proceed, *logos* will lead us to the Truth. Burbules invokes Wittgenstein to argue that while some rules for being in the world may be pre-existing and unchanging, most are contextual, and we often make them up as we go along. Choosing one way to proceed

over another is based on an interpretation of the situation. When navigating the web, then, our choice of links is an interpretive act. Faced with conceptual ambiguity—what is the relationship between where I was and where I am now?—a link is not a transparent portal between two meaningful nodes, but a cognitive place of its own; like Deleuze and Guattari's rhizomatic nomad space (1987, pp. 474-500 *passim*), what *means* is the journey, not the destination. Put another way, it is the journey, the link, the line of flight that determines the meaning of the places it links together; when the meaning of the link is changed, the meanings of the places it links are also transformed.

4.21 Skeleton keys, 2007. Photograph by Jerry Spiller. ➤
When we assume that there is a relationship among a set of objects, as the key ring here leads us to believe, then we work to discover the productive associations available. But these will be specific to the individual, for whom 1984 might be the title of a book, the year Apple released the Macintosh computer, the date of his birth, or the address of his house, which has a blue front door and where he lives with his brother Tom. The very ambiguity of the labels/links and of the categories to which they might belong contributes to the cognitive availability of productive connections.

Burbules describes a "feeling of satisfaction in making a meaningful association," in resolving the *aporia*. He likens it, not to Plato's replacing false certainty with Truth, but to replacing the wrong way of approaching a problem with the right way. I would argue that, rather than trying to locate *the* Truth or *the* right way, a more constructive and ethically supportable approach would be to hold in productive tension a number of possible resolutions, and the underlying warrants and material effects of each, before determining a provisional course of action.

Another value in the *aporia* of conceptual ambiguity is the possibility of serendipity, of expecting to arrive at one destination and finding another, or of taking a path out of curiosity or puzzlement and discovering a new connection that could not have been imagined. Rather than thinking of *aporia* as transitional, as an unsteady state that must be resolved, we should rather think of it as a focus on the journey rather than the destination, the journey at the heart of rhetorical inquiry.

The third stage of a constructive hypermedia, reflecting, is an opportunity to step back, look at the various structures and arrangements as they have been devised, and ask critical questions that will help determine what positions or actions we might best take, all the while allowing the *aporia*, or state of not-knowing, to hold the alternatives in productive tension. Exploring each of the relationships in turn, we might ask whose interests are served by each arrangement? What principled positions are possible in each case? What are the effects on individuals and groups of particular actions?

When I teach courses that include multimedia composing, I encourage my students to find and explore such tensions and gaps during the composing process, and to expose the *aporia* in their final projects, even if they ultimately resolve it. In one example from an upper-level course on digital media and English studies, three students worked

together on a public service announcement, composed in Adobe Flash, about pet adoption. Their initial collecting consisted of dozens of photographs of people with their pets: pets in clothes, pets doing silly tricks, and pets that were somehow out of the ordinary—featuring, as in a *Wunderkammer*, anomalies of size (abnormally large, tiny, fat, furry) and of form (hairless, tailless, three-legged, bi-color-eyed). They also interviewed pet owners, conducted a survey on how people spoiled their pets, and obtained information and statistics on animal adoption from the local animal shelter.

Their initial arrangement grouped their photographs pretty much as I've listed them above. They created quick montage shots and witty transitions, and they recorded a voice-over using some of their survey information (e.g. "77% of our respondents said they spend more than $250 a year on treats for their pets"). After they had organized each section of images to their satisfaction and added a graphic and an exhortation asking viewers to "Adopt a stray," they began to work with their interviews. They tried snipping bits to go with each montage; they tried using extended excerpts between segments. Frustrated, and unable to make the interviews fit the photographic narrative, they decided to throw out the interviews and just use music.

At this point, I asked them to return to their collections, to spend more time thinking about/in the gap between the images and interviews, which they sensed were related, but could not quite connect. Their epiphany—the resolution of their *aporia*—came as they reflected on whose interests were served by their digital project. Initially they had identified the primary beneficiaries of their work as potential adopters: people who would watch their PSA, see how cute and fun pets are, and then adopt one; the secondary beneficiaries they singled out were "pets in general." But as they discussed why the interviews did

not seem to fit their images, they realized that in every interview, pet owners made statements like, "He really hates it when we dress him up for Halloween," and "She's so fat she can't get up the stairs any more." By reflecting on the *aporia* in the link between the images and the interviews, the students realized that it was the interviewees' interests as pet owners, and not the interests of their pets, that were served by the over-indulgence evident in the images. With the pets themselves now in mind as their primary beneficiaries, they revised their project. Their new PSA began in the same way, but snippets of interviews were inserted over images of increasingly unhealthy-looking dogs and cats; the piece ended with new photographs of a pet cemetery, and a final admonition: "Be kind to your pets. Don't spoil them. They'll still love you."

Display is the final stage in the construction of a digital *Wunderkammer*. What to this point has been a constructive space in which multiple paths and potential outcomes are in play must now be transformed into a digital space that will become the public scholarly performance of the collecting, arranging, and reflecting process. Sometimes, as was the case with my students' public service announcement, the final performance is a linear display, retaining the multimodality of a *Wunderkammer*, but displaying only the path through the artifacts that the students determined was the most ethical. But other hypermediated displays might also retain the wondering, wandering, interactive, exploratory nature of early *Wunderkammern*, which ranged from entire palaces to relatively small, many-drawered cabinets. Following this model, our digitized objects and texts may be scattered among several virtual boxes or cupboards or drawers, but the space will be flexible enough, and a sense of the scope of the project visible enough, that connections other than those specifically linked by the designer are available to the viewer. Perhaps each object (an image, a

sound, a block of text) occupies its own small window in a webbed text, or exists as a movable sprite in Flash. At a minimum, the viewer of this new exploratory hypermedia must be able to move about in ways that not only allow engagement with the objects and links as provided by the designer, but also permit new paths and new links to be discovered.

Lugli notes that copious catalogues from several collections show that *Wunderkammer* collectors "perceived the need to sort out and endow their collections with some semblance of order and classification" (p. 112), but this order was not considered immutable; some published a number of catalogues over the years, each with different categorical systems. Displaying the contents of the process of scholarly inquiry, rather than just the results, maintains a fruitful space where new material can be added, new relations imagined, and new rhetorical belief enacted.

Is it fair to compare *Wunderkammern*, collections accumulated and catalogued over a lifetime, to the hypermedia we construct as professional research projects, or to the assignments students complete in a 10- or 15-week term? Not if the comparison is one of magnitude. But it is entirely appropriate if the comparison is of process. Like the cognitive weight of a constructive hypermedia link, the habits of mind of rhetorical inquiry are always under construction, and no time is too short to work on their development.

A final note on design: One concern voiced by scholars about composing with digital media is that they may lack the aesthetic or technical experience to design and build rhetorically effective websites or podcasts or Flash movies. This is not a trivial consideration. Form is an intrinsic part of the "argument" of any digital project, and requires at least as much time and thought and expertise as the rest of the project. That is why some of the most successful digital projects include

collaborations between colleagues who bring different knowledge sets to the table, and who can thus successfully enact both the theory and the practice of digital scholarship. In one example, Madeleine Sorapure collaborated with Patricia Webb Boyd by contributing her expertise in Flash to help Boyd make visible the form she had imagined for her *Kairos* article, "Pulling the Difference" (2008). The editors of the digital documentary site *Picture Projects* also collaborate with their contributors on their multimediated social commentaries. Soon, as our experience with composing digital media increases, and the software becomes available to do so more easily, more of us will become confident designer/scholars.

Collecting, arranging, reflecting, and displaying work together recursively to shape epistemically active hypermedia which manifest feminist principles of embodied arrangement and inquiry, acting as both proving grounds for theoretically informed practice and as constructive knowledge-making spaces for our students and colleagues. Chapter Five will map the shapes of several such spaces—including the boxes of Joseph Cornell, Anne Wysocki's "A Bookling Monument," and student projects by J. P. and Austin Hart—to demonstrate the application of these principles of *Wunderkammer* construction to the design and exploration of constructive hypermedia.