former group of procedural tropes *interface logics*, and the latter *input/output (IO) logics*. Just as game engines accumulate multiple, common graphical logics, so software frameworks like Microsoft Foundation Classes (MFC) and Java Foundation Classes (JFC) accumulate multiple, common interface logics, IO logics, and myriad other logics required to drive the modern computer operating system.

Taken together, we can think of game engines, frameworks, and other common groupings of procedural tropes as commensurate with forms of literary or artistic expression, such as the sonnet, the short story, or the feature film. These collections of procedural tropes form the basis for a variety of subsequent expressive artifacts. On its own, the sonnet is no more useful than the physics engine, but both can be deployed in a range of expressive practices. A classical Newtonian mechanics simulation can easily facilitate both war (projectile fire) and naturalism (ballooning), just as a sonnet can facilitate both religious (John Donne) and amorous (Shakespeare) expression.

Procedural genres emerge from assemblages of procedural forms. These are akin to literary, filmic, or artistic genres like the film noir, the lyric poem, or the science fiction novel. In videogames, genres include the platformer, the first-person shooter, the turn-based strategy game, and so forth. When we recognize gameplay, we typically recognize the similarities between the constitutive procedural representations that produce the on-screen effects and controllable dynamics we experience as players.

Procedural representation is significantly different from textual, visual, and plastic representation. Even though other inscription techniques may be partly or wholly driven by a desire to represent human or material processes, only procedural systems like computer software actually represent process with process. This is where the particular power of procedural authorship lies, in its native ability to depict processes.

The inscription of procedural representations on the computer takes place in code. Just like *procedure*, the term *code* can take multiple meanings. Lawrence Lessig has taken advantage of the term's ambiguity to address the similarity between code in the legal sense and code in the programmatic sense: "In real space we recognize how laws regulate—through constitutions, statutes, and other legal codes. In cyberspace we must understand how code regulates—how the software and hardware that make cyberspace what it is *regulate* cyberspace as it is."[25] But in legal systems, code is regulated through complex social and political structures subject to many additional procedural influences, just

like the soldiers in Abu Ghraib and the clerk at the retail return counter. In computational systems, code is regulated through software and hardware systems. These systems impose constraints, but they are not subject to the caprice of direct human action.

Rhetoric

Like procedurality, rhetoric is not an esteemed term. Despite its two and a half millennia-long history, *rhetoric* invokes largely negative connotations. We often speak of "empty rhetoric," elaborate and well-crafted speech that is nevertheless devoid of actual meaning. *Rhetoric* might conjure the impression of *hot air*, as in the case of a fast-talking con who crafts pretentious language to hide barren or deceitful intentions. Academics and politicians are particularly susceptible to this sort of criticism, perhaps because we (and they) tend to use flourish and lexis when coherence runs thin, as in this very sentence. Rhetoric is often equated with a type of smokescreen; it is language used to occlude, confuse, or manipulate the listener.

However, turgidity and extravagance are relatively recent inflections to this term, which originally referred only to persuasive speech, or oratory. The term *rhetoric* (ῥήτωρικη) first appears in Plato's *Gorgias*, written some 2,500 years ago, in reference to the art of persuasion. The term itself derives from the rhetor (ῥήτωρ), or orator, and his practice, oratory (ῥήτωρεύω).[26] Rhetoric in ancient Greece—and by extension classical rhetoric in general—meant public speaking for civic purposes. Golden age Athenian democracy strongly influenced the early development of rhetoric, which dealt specifically with social and political practices. Rhetoric was oral and it was public. The rhetor used his art on specific occasions and in particular social contexts—the law court and the public forum. A well-known example of this type of rhetoric is Plato's *Apology*, in which Socrates defends himself against accusations that he has corrupted the youth of Athens—*apology* here refers to the Greek term ἀπολογία, a defense speech. In the context of public speech and especially legal and civic speech, rhetoric's direct relation to persuasion is much clearer. Spoken words attempt to convert listeners to a particular opinion, usually one that will influence direct and immediate action, such as the fateful vote of Socrates' jury.

In golden age Athens, there was good reason to become versed in rhetorical technique. Unlike our contemporary representative democracies, the Athenian system was much more direct. Citizens were required to participate

in the courts, and anyone (i.e., any male) could speak in the assembly. Unlike our legal system, with its guarantees of professional representation, Athenians accused of a crime were expected to defend themselves (or to find a relative or friend to speak on their behalf). Furthermore, Athenian juries were huge—usually 201 members but often many hundreds more depending on the importance of the case. The average citizen untrained in oratory not only might find himself at a loss for words but also might experience significant intimidation speaking before such a large group.

Rhetorical training responded to this need, partly motivated by lucrative business opportunities. The title character in Plato's *Phaedrus* speaks of books on the subject of rhetoric (ἐν τοῖς περὶ λόγων τέχνης), and Socrates subsequently recounts the technical advice these books proffer:[27]

Socrates: Thank you for reminding me. You mean that there must be an introduction [προοίμιον, *prooemion*] first, at the beginning of the discourse; these are the things you mean, are they not?—the niceties of the art.

Phaedrus: Yes.

Socrates: And the narrative [διήγησίν, *diegesis*] must come second with the testimony [τεχμήρια] after it, and third the proofs [πίστωσιν, *pistis*], and fourth the probabilities [ἐπιπίστωσιν, *epipistis*]; and confirmation and further confirmation are mentioned, I believe, by the man from Byzantium, that most excellent artist in words.

Phaedrus: You mean the worthy Theodorus?

Socrates: Of course. And he tells how refutation [ἔλεγχόν, *elenkhos*] and further refutation [ἐπεξέλεγχον, *epexelenkhos*] must be accomplished, both in accusation and in defense. Shall we not bring the illustrious Parian, Evenus, into our discussion, who invented covert allusion and indirect praises? And some say that he also wrote indirect censures, composing them in verse as an aid to memory; for he is a clever man.

. . .

But all seem to be in agreement concerning the conclusion of discourses, which some call recapitulation [ἐπάνοδον, *epanodos*], while others give it some other name.

Phaedrus: You mean making a summary of the points of the speech at the end of it, so as to remind the hearers of what has been said?

Socrates: These are the things I mean, these and anything else you can mention concerned with the art of rhetoric.[28]

Socrates' negative opinion of textbook rhetoric notwithstanding (see below), the *Phaedrus* offers evidence of the method by which fifth-century Greeks thought oratory could be best composed. Speakers should begin with an introduction (*prooemion*), then continue with a description or narration of events (*diegesis*), followed by proof and evidence (*pistis*) and the probabilities that such evidence is sound (*epipistis*). The speaker should then refute the opposing claim (*elenkhos*), and then refute it once more (*epexelenkhos*). Finally, the speech should end with a conclusion, including a recapitulation (*epanodos*) of the argument.

These techniques form the basis for rhetorical speech; they describe how it works and they instruct the speaker on how best to use rhetoric in any situation. Technical rhetoric, as this type is sometimes called, is useful for the layperson but perhaps too simplistic for the professional orator. Numerous other techniques developed around imitating skilled orators. These experts usually charged for their services, and they were called *sophists*. Sophistic rhetoric was taught by demonstration and practice, not by principle like technical rhetoric. In some cases, a demonstration of sophistic rhetoric resembled the performance of epic poetry, where narrative fragments were memorized and reassembled during recitation.[29] Other techniques included parallelism in structure, syllabic meter, and tone.[30]

The popularity of books and sophistry bred critique. Such approaches motivated the work of Socrates, Plato, and Aristotle, who rejected the social and political contingency of the court and the assembly in favor of more lasting philosophical truths. Socrates and Plato privilege *dialectic*, or methods of reasoning about questions toward unknown conclusions, over rhetoric, which crafts discourse around known or desired conclusions. In Plato's *Gorgias*, Socrates exposes rhetoric as a form of flattery, intended to produce pleasure, not knowledge or justice.[31]

Aristotle resuscitated rhetoric, joining it with his notion of causality. In the *Physics*, Aristotle articulates four causes: the material, formal, efficient, and final. The material cause is the material out of which a thing is made; the formal cause is the structure that makes it what it is; the efficient cause is that which produces the thing; and the final cause is the purpose for which it is produced.[32] A table, for example, is made of wood (material cause), crafted to have four legs and a flat surface (formal cause) by a carpenter (efficient cause) for the purpose of eating upon (final cause). For Aristotle, rhetoric has three possible ends, or final causes, and therefore he distinguishes three varieties of rhetoric: *forensic*, *deliberative*, and *epideictic*. Forensic (or judicial) rhetoric aims for justice, as in the purview of the law courts. Deliberative (or political) rhetoric strives for public benefit, as in the case of the assembly. Epideictic (or

ceremonial) rhetoric aims for honor or shame, as in the case of a private communication.[33] Aristotle avoids Plato's dismissal of rhetoric, arguing that rhetorical practice as a whole has the final cause of persuasion to correct judgment.

In the *Rhetoric*, Aristotle accomplishes this corrective through an approach to rhetorical practice that aligns it with knowledge instead of sophistry. Responding to Plato, Aristotle attempts a systematic, philosophical approach to the art of persuasive oratory. This approach borrows much from the idea of oratory process from technical rhetoric, and a great deal of Aristotle's rhetorical theory addresses the style, arrangement, and organization of persuasive speech. For Aristotle, rhetoric is defined as "the faculty of observing in any given case the available means of persuasion."[34] The adept rhetorician does not merely follow a list of instructions for composing an oratory (technical rhetoric), nor does he merely parrot the style or words of an expert (sophistic rhetoric), but rather he musters reason to discover the available means of persuasion in any particular case (philosophical rhetoric). This variety of rhetoric implies an understanding of both the reasons to persuade (the final cause) and the tools available to achieve that end (the efficient cause), including propositions, evidence, styles, and devices. Most importantly, Aristotle offers a philosophical justification for rhetoric that moves it closer to dialectic, the philosophical practice of reason that Socrates and Plato deliberately opposed to rhetoric.

In particular, Aristotle draws a correlation between two modes of human reason, induction (ἐπαγωγή) and deduction (συλλογισμός, *syllogism*). In rhetoric, the equivalent to induction is the example (παράδειγμα, *paradigm*), and the equivalent to deduction is the enthymeme (ἐνθύμημα). Examples advance the claim that a certain proposition is a part of a set of such (allegedly true) cases, and therefore equally true. Enthymemes advance the claim that a certain proposition is true in light of another's truth value. Unlike syllogisms, in which both propositions and conclusions are given explicitly, in enthymeme the orator omits one of the propositions in a syllogism.[35] For example, in the enthymeme "We cannot trust this man, as he is a politician," the major premise of a proper syllogism is omitted:

Politicians are not trustworthy. (Omitted)
This man is a politician.
Therefore, we cannot trust this man.

The enthymeme and the example offer instances of a broad variety of rhetorical figures developed by and since Aristotle. Like procedural figures, rhetorical figures define the possibility space for rhetorical practice. These figures are many, and a complete discussion of them would be impossible in the present context. However, many rhetorical figures will be familiar by virtue of our common experience with them: antithesis (the juxtaposition of contrasting ideas); paradox (a seemingly self-contradictory statement that produces insight or truth); oxymoron (a highly compressed paradox); aporia (feigning flummox about the best way to approach a proposition); irony (evoking contrary meaning to yield scorn). These and other rhetorical figures found the basis of rhetorical tactics. Combining these with the structural framework of introduction, statement, proof, and epilogue, Aristotle offers a complete process for constructing oratory.[36]

Rhetoric Beyond Oratory

Unlike his Roman counterparts Cicero and Quintilian, Aristotle does not explicitly define rhetoric as the art of *verbal* persuasion, although it is unlikely that any other rhetorical mode occurred to him. Classical rhetoric passed into the Middle Ages and modern times with considerable alteration. The use of rhetoric in civil contexts like the court never disappeared entirely, and indeed it remains a common form of rhetoric today; our modern politicians soapbox just as Plato's contemporaries did. But the concept of rhetoric was expanded beyond oratory and beyond direct persuasion. Effectively, rhetoric was extended to account for new modes of inscription—especially literary and artistic modes. Rhetoric in writing, painting, sculpture, and other media do not necessarily make the same direct appeals to persuasion as oratory. Rhetoric thus also came to refer to *effective expression*, that is, writing, speech, or art that both accomplishes the goals of the author and absorbs the reader or viewer.

Persuasion as a rhetorical goal persists, but it has changed in nature. In classical rhetoric, oral persuasion primarily served political purposes. It was enacted when needed and with particular ends in mind. The effectiveness of oratory related directly to its success or failure at accomplishing a particular, known goal. And because citizens often got only one shot at oratory—as is the case in Socrates' defense speech—one can point to the clear success or failure of rhetorical techniques. In discursive rhetoric, persuasion is not necessarily so teleological. Writers and artists have expressive goals, and they

deploy techniques to accomplish those goals. The poststructuralist tendency to decouple authorship from readership, celebrating the free play of textual meanings, further undermines the status of persuasion. Here, persuasion shifts from the simple achievement of desired ends to the effective arrangement of a work so as to create a desirable possibility space for interpretation. In contemporary rhetoric, the goal of persuasion is largely underplayed or even omitted as a defining feature of the field, replaced by the more general notion of elegance, clarity, and creativity in communication. When understood in this sense, rhetoric "provides ways of emphasizing ideas or making them vivid."[37] Success means effective expression, not necessarily effective influence.

Despite the apparent dichotomy between classical and contemporary rhetorics, the two share one core property: that of technique. Rhetorics of all types assume a particular approach to effective expression, whether it be oral, written, artistic, or otherwise inscribed. Today, spoken and written expression remain deeply relevant to culture. The spoken and written word enjoys a long rhetorical tradition—Aristotle's techniques remain equally useful, and indeed equally put to use, by contemporary orators. Sonja Foss, Karen Foss, and Robert Trapp have attempted to reposition rhetoric outside of any particular mode of inscription. The three define rhetoric "broadly as the uniquely human ability to use symbols to communicate with one another."[38] However, as Kevin DeLuca points out, on the "very next page"[39] Foss, Foss, and Trapp also argue that "the paradigm case of rhetoric is the use of the spoken word to persuade an audience."[40] While rhetoric might include nonverbal transmission, these modes still maintain a tenuous relationship, and are at risk of appearing inferior to verbal discourse.

The influential twentieth-century rhetorician Kenneth Burke marks an important change in the understanding of rhetoric. Because people are inherently separate from one another, we seek ways to join our interests. Burke identifies this need as the ancestor of the practice of rhetoric. He extends rhetoric beyond persuasion, instead suggesting "identification" as a key term for the practice.[41] We use symbolic systems, such as language, as a way to achieve this identification. Burke defines rhetoric as a part of the practice of identification, as "the use of words by human agents to form attitudes or induce actions in other human agents."[42] While rhetoric still entails persuasion for Burke, he greatly expands its purview, arguing that it facilitates human action in general. Persuasion is subordinated to identification (or the more obscure term *consubstantiality*, which Burke uses to characterize identification), and

using rhetoric to achieve an end is only one possible use of the craft for Burke.[43] Rhetoric becomes a means to facilitate identification and to "bridge the conditions of estrangement that are natural and inevitable."[44]

In addition to expanding the conception of rhetoric, Burke also expands its domain. Following the tradition of oral and written rhetoric, he maintains language as central, but Burke's understanding of humans as creators and consumers of symbolic systems expands rhetoric to include nonverbal domains. He does not explicitly delineate all the domains to which rhetoric could apply; instead, he embraces the broadness of human symbolic production in the abstract. "Wherever there is persuasion," writes Burke, "there is rhetoric. And wherever there is 'meaning,' there is 'persuasion.'"[45]

Visual Rhetoric

The wide latitude Burke affords rhetoric won him both champions and critics, but his approach advances the rhetorical value of multiple forms of cultural expression, not just speech and writing.[46] Thanks to the influence of Burke, and amplified by the increasingly inescapable presence of non-oral, nonverbal media, increasing interest has mounted around efforts to understand the rhetorical figures and forms of these other, newer modes of inscription that also appear to serve rhetorical ends. In particular, the emergence of photographic and cinematic expression in the nineteenth and twentieth centuries suggests a need to understand how these new, nonverbal media mount arguments. This subfield is called *visual rhetoric*. Marguerite Helmers and Charles A. Hill explain:

> Rhetoricians working from a variety of disciplinary perspectives are beginning to pay a substantial amount of attention to issues of visual rhetoric. Through analysis of photographs and drawings, graphs and tables, and motion pictures, scholars are exploring the many ways in which visual elements are used to influence people's attitudes, opinions, and beliefs.[47]

Visual communication cannot simply adopt the figures and forms of oral and written expression, so a new form of rhetoric must be created to accommodate these media forms. Helmers and Hill argue that visual rhetoric is particularly essential in the face of globalization and mass media. Visual images on television, clothing, retail storefronts, and public spaces are nearly

ubiquitous, offering a strong incentive to understand the rhetoric of such media. Moreover, the profusion of photographic, illustrative, and cinematic images increases with the rise in cheap, accessible digital photography and video techniques coupled with instant, worldwide distribution on the Internet. Politicians and advertisers use visual images as much as, if not more than, they use spoken and written words. In reference to these and related uses of images, visual rhetoricians ask, "how, exactly, do images persuade?"[48]

Aristotle took great pains to reconnect rhetoric with philosophical discourse. A common thread in visual rhetoric addresses the relative merit of visual communication as emotional versus philosophical. As Hill explains,

> It is likely that verbal text, because of its analytic nature (being made up of discrete meaningful units) and because it is apprehended relatively slowly over time, is more likely to prompt systematic processing, while images, which are comprehend wholistically and almost instantaneously, tend to prompt heuristic processing.[49]

Images may lack the kind of deep analysis afforded by textual interpretation, a sentiment that resonates with concerns over the use of images in propaganda. According to Hill, images are more "vivid" than text or speech, and therefore they are more easily manipulated toward visceral responses.[50] This use of images has been especially popular in advertising, a subject to which I will return in chapter 5. Advertisers, notes Hill, "don't want to *persuade* people to buy their products, because persuasion implies that the audience has given the issue some thought and come to a conscious decision. Instead, advertisers want to . . . compel people to buy a product without even knowing why they're buying it—as a visceral response to a stimulus, not as a conscious decision. And this is best done through images."[51] Hill offers no final conclusions about the potential for images to serve more reflective rhetorical purposes, but he does point out that visual rhetoric should not strive "to banish emotional and aesthetic concerns."[52]

J. Anthony Blair argues that visual rhetoric needs a theory of visual argument to escape this trap. Blair argues that, like Hill's psychological vividness, "symbolic inducement" alone is inadequate for a theory of rhetoric.[53] Rather, visual rhetoric requires visual "arguments" which "supply us with *reasons* for accepting a point of view."[54] Blair advances the rather ambiguous view that visual images cannot make propositional claims—the very notion of a "visual argument" stands at the edge of paradox.[55] The acid test for a visual argument, according to Blair, is "whether it would be possible to construct from what is communicated visually a verbal argument that is consistent with the visual presentation."[56] Blair admits that such an argument could never be equivalent to the visual argument, but that the test is necessary to determine whether an image has propositional content. Verbal rhetoric remains privileged, with images mainly useful for "evocative power."[57]

The preferential treatment afforded to verbal rhetoric underscores the continued privilege of speech over writing, and writing over images. Philosopher Jacques Derrida argued against the hierarchy of forms of language, giving the name *logocentrism* to the view that speech is central to language because it is closer to thought.[58] In the Western tradition, speech is thought to derive from thought, and writing from speech. Detractors of visual rhetoric like Blair could be seen as logocentric in arguing that images derive from writing and are thus more distant from thought, less conducive to persuasive expression.

David S. Birdsell and Leo Groarke oppose this position. Visual argument does exist, but it takes a necessarily different form from that of verbal argument; images are, after all, a different mode of inscription from writing. Birdsell and Groarke call the "prevalent prejudice that visual images are in some way arbitrary vague and ambiguous" a "dogma that has outlived its usefulness."[59] Objections claiming that images are sometimes vague are unconvincing, for spoken and written language is also vague at times. Visual argument, argue Birdsell and Groarke, is simply constructed differently than verbal argument. The two also observe that the rapid changes in visual culture make visual cultural contexts crucial in considerations of visual argument.

Randall A. Lake and Barbara A. Pickering offer several tropes for visual argument and refutation, including substitution, in which an image is replaced in part of a frame with connotatively different ones, and transformation, in which an image is "recontextualized in a new visual frame, such that its polarity is modified or reversed through association with different images."[60] Examples of transformation include the "reframing" and "mobile framing" techniques used by filmmakers. Keith Kenney points out that documentarian Ken Burns liberally uses these gestures to reveal portions of an image in order to draw selective attention to its constituent parts, which then complete the visual argument.[61] Editorial cartoons, a favorite example of visual rhetoricians, use similar techniques, encouraging the viewer to break down the image into constituent parts, each of which advances a portion of the argument.

Kevin Michael DeLuca attempts to address visual argument through the concept of "image event," a kind of visual documentation of a rhetorical strategy.[62] He draws examples from large-scale environmental demonstrations, such as the (failed) 1975 Greenpeace attempt to disrupt the Soviet whaling vessel *Vlastny* by positioning activists in inflatable boats between the harpoon and the whale. DeLuca argues that despite the failed actions of Greenpeace's Save the Whales campaign, they succeed in their rhetorical purpose, namely drawing massive worldwide attention to the problem in question. DeLuca makes convincing claims that these situationist-style interventions actually influence future policy, but I would argue that they do not deploy visual rhetoric in the true sense of the word. To be sure, images of the Greenpeace actions appear to be partly, even largely responsible for subsequent protests and rejoinders toward environmental policy changes, but the actions themselves are designed to generate provocation, not to make arguments for policy changes.

The profusion of visual images recommends a subfield of rhetoric, but visual rhetoric remains an emerging discipline. The very notion of a visual rhetoric reinforces the idea that rhetoric is a general field of inquiry, applicable to multiple media and modes of inscription. To address the possibilities of a new medium as a type of rhetoric, we must identify how inscription works in that medium, and then how arguments can be constructed through those modes of inscription.

Digital Rhetoric

Visual rhetoric offers a useful lesson in the creation of new forms of rhetoric in the general sense. One would be hard pressed to deny that advertisements, photographs, illustrations, and other optical phenomena have some effect on their viewers. To be sure, visual rhetoric is often at work in videogames, a medium that deploys both still and moving images. A study of visual rhetoric in games would need to address the disputes of the former field, especially the rift between psychological and cultural discourses about manipulation and phenomenal impact on the one hand and logical deliberation on the other. But despite its possible value to digital media, visual rhetoric cannot help us address the rhetorical function of procedural representation. To convincingly propose a new domain for rhetoric, one is obliged to address the properties of the persuasive medium in particular, and the general practice of persuasion

on the other. Visual rhetoric simply does not account for procedural representation. This is not a flaw in the subfield of visual rhetoric; there is much value to be gained from the study of images in all media. But in procedural media like videogames, images are frequently constructed, selected, or sequenced in code, making the stock tools of visual rhetoric inadequate. Image is subordinate to process.

Unfortunately, many efforts to unite computers and rhetoric do not ever make appeals to visual rhetoric, instead remaining firmly planted in the traditional frame of verbal and written rhetoric in support of vague notions of "the digital." *Digital rhetoric* typically abstracts the computer as a consideration, focusing on the text and image content a machine might host and the communities of practice in which that content is created and used. Email, websites, message boards, blogs, and wikis are examples of these targets. To be sure, all of these digital forms can function rhetorically, and they are worthy of study; like visual rhetoricians, digital rhetoricians hope to revise and reinvent rhetorical theory for a new medium. James P. Zappen begins his integrated theory of digital rhetoric on this very note: "Studies of digital rhetoric," he writes, "help to explain how traditional rhetorical strategies of persuasion function and are being reconfigured in digital spaces."[63] But for scholars of digital rhetoric, to "function in digital spaces" often means mistaking subordinate properties of the computer for primary ones. For example, Laura J. Gurak identifies several "basic characteristics"[64] of digital rhetoric, including speed, reach, anonymity, and interactivity.[65] Of these, the first three simply characterize the aggregate effects of networked microcomputers. On first blush the last characteristic, interactivity, appears to address the properties of the computer more directly. But Gurak does not intend *interactivity* to refer to the machine's ability to facilitate the manipulation of processes. Instead, she is thinking of the more vague notion of computer-mediated discussion and feedback, essentially a repetition and consolidation of the other three characteristics.[66]

Other digital rhetoricians likewise focus on the use of digital computers to carry out culturally modified versions of existing oral and written discourse; letters become emails, conversations become instant message sessions. Barbara Warnick has argued that the more populist, nonhierarchical structure of the web facilitated opposition to the standards of traditional media. For example, Warnick explores zines and personal websites as welcome alternatives to top-down commercial media like print magazines.[67] Others want educators,

especially secondary and postsecondary instructors, to provide stylistic training in increasingly indispensable digital forms like email and the web. Richard Lanham has made a case for digital rhetoric's place in the broader "digital arts," encouraging higher education to address the changing composition practices brought on by so-called new media.[68] Both Warnick and Lanham's proposals are reasonable and valuable. But they focus on revisions of existing cultural and expressive practices; the computer is secondary. What is missing is a digital rhetoric that addresses the unique properties of computation, like procedurality, to found a new rhetorical practice.

This challenge is aggravated by the fact that rhetoric itself does not currently enjoy favor among critics of digital media. In one highly visible example, new media artist and theorist Lev Manovich has argued that digital media may sound a death knell for rhetoric. Writing about web interfaces, Manovich doubts that hypertext could serve a rhetorical function:

> While it is probably possible to invent a new rhetoric of hypermedia that will use hyperlinking not to distract the reader from the argument (as is often the case today), but rather to further convince her of an argument's validity, the sheer existence and popularity of hyperlinking exemplifies the continuing decline of the field of rhetoric in the modern era. . . . World Wide Web hyperlinking has privileged the single figure of metonymy at the expense of all others. The hypertext of the World Wide Web leads the reader from one text to another, ad infinitum. . . . Rather than seducing the user through a careful arrangement of arguments and examples, points and counterpoints, changing rhythms of presentation, . . . [hypertext] interfaces . . . bombard the user with all the data at once.[69]

One can raise numerous objections to Manovich's claims. For one, he has a rather curious view of hypertext that seems to equate hypermedia with media gluttony. Manovich seems to think that web pages present links in an attempt to substitute their linkage for their content, causing endless, haptic clicking on the part of the user. Meaning is tragically, "infinitely" deferred. This claim is especially curious given the prehistory of hypertext in Vannevar Bush's conceptual Memex and Ted Nelson's Xanadu.[70] These systems were conceived largely as tools to *increase* the correlation between documents, as material manifestations of manual cross-reference. Today, hypertext on "ordinary" websites is frequently used in this fashion; they provide additional information or resources to the user who wishes to confer them. Frequently, these resources

take the form of supporting arguments, evidence, or citation, very old and very traditional tools in written rhetoric.

While Manovich considers the nature of the hyperlink, he ignores the computational system that facilitates hypermedia in the first place. Chris Crawford has used the term *process intensity* to refer to the "degree to which a program emphasizes processes instead of data."[71] Higher process intensity—or in Crawford's words a higher "crunch per bit ratio"—suggests that a program has greater potential for meaningful expression. While hypertexts themselves exhibit low process intensity, the systems that allow authorship and readership of web pages exhibit high process intensity. A web browser must construct a request for a page using the proper format for the Hypertext Transfer Protocol (HTTP) that carries requests between the computer and a server. The computer must then create a connection to the server via Transmission Control Protocol (TCP), which in turn communicates the request via Internet Protocol (IP), the communication convention that transports data across the packet-switched network that comprises the Internet. The server hosting the requested web page must then interpret the request, retrieve the requested document, and prepare it for transmission back to the user's computer via the same protocols, HTTP atop TCP/IP. IP guarantees delivery of all packets in a request, so the receiving computer's network layer must determine—all in code—whether all the packets have been received, which ones are out of order, and which need to be resent owing to corruption or loss. Once received, reordered, and reconstructed, the web browser must then take the textual data that the server has returned and render it in the browser. This too takes place in code. The web page is made up of Hypertext Markup Language (HTML), which the browser must parse, making decisions about which elements to place where and in what format on the user's screen. Then the web browser repeats the process for other resources referenced in the HTML document, such as other embedded HTML pages, images, script files, or stylesheets.

These technical details may appear to have little to do with Manovich's claims about the endless progression of hyperlinks on a web page. But the aggregate software systems that facilitate web-based hypertext are what make it possible to link and click in the first place. The principal innovation of the web is the merger of a computer-managed cross-referencing system with a networking system that supports heterogenous clients. More plainly put, Manovich ignores the software systems that make it possible for hyperlinks

to work in the first place, instead making loose and technically inaccurate appeals to computer hardware as exotic metaphors rather than as material systems. Continuing the argument above, he compares hypertext to computer chipsets: "individual texts are placed in no particular order, like the Web page designed by [artist collective] antirom for HotWired. Expanding this comparison further, we can note that Random Access Memory, the concept behind the group's name, also implies a lack of hierarchy: Any RAM location can be accessed as quickly as any other."[72] Manovich compares the HotWired website to RAM not because computer memory facilitates the authorship of websites, but because the website was designed by a group that uses a pun on a computer chip term in their name—a different chip from RAM, as it happens, Read Only Memory, or ROM.

Manovich admits that a new rhetoric of hypermedia is "probably possible," but clearly he has no intention of pursuing one. Gurak and Warnick are not cynical about rhetoric and communication, but they focus on digital communities of practice, treating the computer primarily as a black-box network appliance, not as an executor of processes. In short, digital rhetoric tends to focus on the presentation of traditional materials—especially text and images—without accounting for the computational underpinnings of that presentation.

Rhetorician Elizabeth Losh neatly summarizes this inconsistency among digital rhetoricians. "In the standard model of digital rhetoric," she argues, "literary theory is applied to technological phenomena without considering how technological theories could conversely elucidate new media texts."[73] While I admit that there are useful interrogations of digital media that focus on reception over the technological structure (Losh's own work on the way digital artifacts take part in the public sphere is such a one), my contention here is that approaches to digital rhetoric must address the role of procedurality, the unique representational property of the computer.

Procedural Rhetoric

With these lessons in mind, I would now like to put the concepts of *procedurality* and *rhetoric* back together. As I proposed at the start of this chapter, *procedural rhetoric* is the practice of using processes persuasively, just as verbal rhetoric is the practice of using oratory persuasively and visual rhetoric is the practice of using images persuasively. Procedural rhetoric is a general name for the practice of authoring arguments through processes. Following the classical model, procedural rhetoric entails persuasion—to change opinion or action. Following the contemporary model, procedural rhetoric entails expression—to convey ideas effectively. Procedural rhetoric is a subdomain of procedural authorship; its arguments are made not through the construction of words or images, but through the authorship of rules of behavior, the construction of dynamic models. In computation, those rules are authored in code, through the practice of programming.

My rationale for suggesting a new rhetorical domain is the same one that motivates visual rhetoricians. Just as photography, motion graphics, moving images, and illustrations have become pervasive in contemporary society, so have computer hardware, software, and videogames. Just as visual rhetoricians argue that verbal and written rhetorics inadequately account for the unique properties of visual expression, so I argue that verbal, written, and visual rhetorics inadequately account for the unique properties of procedural expression. A theory of procedural rhetoric is needed to make commensurate judgments about the software systems we encounter every day and to allow a more sophisticated procedural authorship with both persuasion and expression as its goal.

Procedural rhetorics afford a new and promising way to make claims about *how things work*. Consider a particularly sophisticated example of a procedural rhetoric at work in a game. *The McDonald's Videogame* is a critique of McDonald's business practices by Italian social critic collective Molleindustria. The game is an example of a genre I call the anti-advergame, a game created to censure or disparage a company rather than support it.[74] The player controls four separate aspects of the McDonald's production environment, each of which he has to manage simultaneously: the third-world pasture where cattle are raised as cheaply as possible; the slaughterhouse where cattle are fattened for slaughter; the restaurant where burgers are sold; and the corporate offices where lobbying, public relations, and marketing are managed. In each sector, the player must make difficult business choices, but more importantly he must make difficult moral choices. In the pasture, the player must create enough cattle-grazing land and soy crops to produce the meat required to run the business. But only a limited number of fields are available; to acquire more land, the player must bribe the local governor for rights to convert his people's crops into corporate ones. More extreme tactics are also available: the player can bulldoze rainforest or dismantle indigenous settlements to clear space for