

9. Escaping History: New Historicism, Databases, and Contingency

In 1982, he lined the walls of a room with floor-to-ceiling panels of cardboard and poster board on which he carefully inscribed the events of William Wordsworth's life and times until he was encircled by an intricate, seething web of dates threaded with colored strings pinned from node to node. Sometimes when he stood back, he could almost make out the whole pattern there. Something immanent--not the portrait of an author or his age, perhaps, yet more than just a pulsing circuitry of convergences and divergences--seemed to bulge across the interface into the room. But it always retreated. There was too much imprecision, white space, noise in the panels--too much that could not be known or inscribed except through imprecision, white space, noise.¹

In 1989, he wrote an essay on the fascination of postmodern cultural criticism with "local knowledge," "the massive fact of cultural and historical particularity," "the concrete, the material, and the particular," "the details of disposition and empirical contingency," the "picture of great detail," "etc." "Media-oriented readers," he wrote, "may wish to view this matrix [of detail] as if with remote control in hand--flitting from channel to channel and sentence fragment to fragment in a hallucinatory blur of strangely continuous discontinuity." Perhaps detailism, he thought, could be immersion

in history. But in the end, he found himself again writing about the retreat of the presence. Immanence became detachment. The pictures of great detail dissolved into simulations whose hyper-resolution was somehow the same as background noise, a mere texture or decor of history.²

Then in the 1990s, he thought he had found the medium of capable imagination for these slippery encounters with history: not cardboard or TV channel, but network and database. Some years after collaborating to build the Romantic Chronology on the Web, he rebuilt the site in a database that dynamically generated lists of events, each flanked by a "Details" link that convened related resources automatically.³ As in the case of other database-to-Web projects he experimented with at the time (culminating in the migration of his Voice of the Shuttle into a database), he felt that the Romantic Chronology might thus offer a fuller, livelier picture of great detail.⁴ Yet, the more he learned about the workings of databases, the more he woke to the fact that the great, digitally-sharp massifs of detail they rendered only set off by contrast all the presence not there--whatever could not be cut up and cut down to fit the granular structures of databases, whatever could thus appear only as a ghost within the ceaseless froth of redundant or contradictory entries, overlapping dates, null values, and other database noise attesting to the pressure of the unstructured and unknown. That part of history that was by nature blurred, messy, and contingent (adaptation of contingent-em, Latin for "touching together or on all sides, lying near, contiguous, coming into contact or connexion, befalling, happening, coming to pass"; from con + tangere, con-touch) could

not manifest in databases of fine, digital touch.⁵ Only some grosser, whole-body, ambient touch, he thought, could make contact with the ghost.

This final essay speculates at once retrospectively and prospectively on the function of the New Historicism in the age of the database. In the New Historicism and other postmodern cultural criticisms, history both emerges from the buzzing, blooming swarm of events caught in the great matrix of detail, *and* escapes in the noise of that detail. Similarly, history both manifests and sublimates in databases, both emerges in the tables, records, fields, and joins that are the structure of the modern relational database (implemented in SQL, or Structured Query Language) and escapes all such holding structures. Whether in the form of the New Historicism or of a database, contemporary postmodern historicism is an escape structure. As they say, it is the "end of history."⁶

Yet the New Historicism does not just accompany data on the great escape of random access. Its specific function in the age of the database, I believe, is to bind that escape to the escape structures of the past that might be called the beginning of the end of history.

I start with a note--no more than an anecdote--recounted by Charles Babbage; go on to consider the relational database (epitomized in a recent database project at the Microsoft research labs); and conclude by reflecting, once again, on the New Historicism.

1. The Chains of History

In the 1838 second edition of his *Ninth Bridgewater Treatise: A Fragment* (original edition, 1837), Charles Babbage added a remarkable anecdote to the end of his chapter on

historicity.⁷ To discern how singular this anecdote is, we need to read it within the series of nested frames--almost like nested instructions in a modern computer program--in which it is recursed.

The main frame of Babbage's treatise is natural theology. Offered as an uninvited, unsanctioned sequel to the eight previous Bridgewater Treatises, which had been endowed by the Earl of Bridgewater to demonstrate the "Power, Wisdom and Goodness of God, as manifested in the Creation," Babbage's *Ninth* (as we might call it for short) sought to make deductive mathematics as relevant to the problem of natural theology as the physical, geological, biological, astronomical, and other natural sciences. It did so, in essence, by calculating the existence of God.⁸ Nature is a calculating machine, Babbage analogizes, and God is its programmer (where analogy, of course, was the norm of proof in natural theology, with such mechanically simpler analogies as "watch" or "clock" serving as the precedent).⁹

Specifically, Babbage drew upon the contrast between his partially built Difference Engine (which generated mathematical tables based on polynomial functions through straightforward, if mechanically complicated, algorithms) and his recently conceived Analytical Engine (the predecessor of today's logically general, stored-program computers that can be programmed to change their own programming depending on previous calculations).¹⁰ We can paraphrase--and mathematically simplify--Babbage's God proof as follows. Imagine first, Babbage says in his second chapter, that the world is a Difference Engine running the same, predictable algorithm forever unless a change in the program (that is, a "miracle") is effected ad hoc by the programmer. Such was the world in the age of miracles. But imagine instead, Babbage continues, that the world is an Analytical Engine programmed from the first to change

its own programming from epoch to epoch--that is, the discontinuous epochs of geology and biology then being discovered by the sciences--such that what once seemed a natural law as predictable as the series 1, 2, 3, 4, 5, . . . could be wrenched into a new series (for example, 1, 2, 3, 4, 5, 16) not through the direct intervention of the programmer but merely through the operation of a higher-order, humanly incalculable algorithm governing the succession of lower-order algorithms. Such is the world in the age of natural theology, where God as Programmer sets nature in motion with a single, all-creative code.¹¹ As it were: not "Let there be light" but, on the command line, "execute." "Which of these two engines," Babbage asks, gives "the higher proof of skill in the contriver?" Unequivocally, he answers, the universe-as-Analytical-Engine.¹² The only real questions that remain concern the trustworthiness of the evidence that humans, as reverse-engineers of creation, require to deduce the design of the original Program (an issue Babbage takes up both directly, in applauding the empirical evidence of geology at the end of his second chapter, and indirectly, in regard to testimonial evidence in his later chapters on Hume and miracles) and the possibility of free will in a pre-programmed universe (a topic he addresses in his final chapter, "Reflections on Free Will").

Nested one level down in Babbage's calculation is the chapter on historicity that is our particular concern.¹³ Entitled "On the Permanent Impression of Our Words and Actions on the Globe We Inhabit," this ninth chapter in Babbage's *Ninth* calculates the time arrow of the universe in reverse as a sort of check sum verification of the progress of the God program. Borrowing with attribution from the French mathematician Pierre Simon de Laplace, whose *Philosophical Essay on Probabilities* (1812) had envisioned a universe of atomistically precise causal determination, the chapter projects Babbage's version of what has come to be known as

the Laplace Demon.¹⁴ Babbage imagines a "Being" of enormous calculating powers who can not only foresee the future trajectory of every particle of nature but also review the vectors of quanta back to their sources as if reading in a perfectly lossless, infinitely detailed library of history.

"What a strange chaos is this wide atmosphere we breathe!" he exclaims:

Every atom, impressed with good and with ill, retains at once the motions . . . imparted to it. . . . The air itself is one vast library, on whose pages are forever written all that man has ever said or woman whispered. . . .

No motion impressed by natural causes, or by human agency, is ever obliterated. The ripple on the ocean's surface caused by a gentle breeze, or the still water which marks the more immediate track of a ponderous vessel gliding with scarcely expanded sails over its bosom, are equally indelible. The momentary waves raised by the passing breeze, apparently born but to die on the spot which saw their birth, leave behind them an endless progeny, which, reviving with diminished energy in other seas, visiting a thousand shores, reflected from each and perhaps again partially concentrated, will pursue their ceaseless course till ocean be itself annihilated.

The track of every canoe, of every vessel which has yet disturbed the surface of the ocean, whether impelled by manual force or elemental power, remains for ever registered in the future movement of all succeeding particles which may occupy its place. (pp. 36-37)

Three paragraphs later, this line of thought brings Babbage to the following moral:

If the Almighty stamped on the brow of the earliest murderer--the indelible and visible mark of his guilt--He has also established laws by which every succeeding criminal is not less irrevocably chained to the testimony of his crime; for every atom of his mortal frame, through whatever changes its severed particles may migrate, will still retain, adhering to it through every combination, some movement derived from that very muscular effort, by which the crime itself was perpetrated (p. 38).¹⁵

Here the chapter had closed in the 1837 first edition. But, as if prompted by the drift in his media substrate from "wide atmosphere" to the "ocean's surface" inscribed by "the track of every canoe, of every vessel," Babbage at this point adds in the 1838 second edition one further paragraph that drives the moral home through the then topical example of slave ships. The new paragraph reads:

The soul of the negro, whose fettered body surviving the living charnel-house of his infected prison, was thrown into the sea to lighten the ship . . . will need, at the last great day of human account, no living witness of his earthly agony. When man and all his race shall have disappeared from the face of our planet, ask every particle of air still floating over the unpeopled earth, and it will record the cruel mandate of the tyrant. Interrogate every wave which breaks unimpeded on ten thousand desolate shores, and it will give evidence of the last gurgle of the waters which closed over the head of his dying victim: confront the murderer with every corporeal atom of his immolated slave, and in its still quivering movements he will read the prophet's denunciation of the prophet king. (pp. 38-39)¹⁶

Now we come to the singular anecdote I mentioned, which is remarkable because it is nested within this final, moral codicil as a footnote whose further level of recursion--intended to clinch the point--proves in the end not to be recursive at all. The anecdote (cited by Babbage from a section of the Parliamentary Papers quoted in the *Quarterly Review* for December 1835) is "from a report by Captain Hayes to the Admiralty, of a representation made to him respecting one of these vessels in 1832." Babbage quotes Hayes:

"The master having a large cargo of these human beings *chained together*, with more humanity than his fellows, permitted some of them to come on deck, *but still chained together*, for the benefit of the air; when they immediately commenced jumping overboard, hand in hand, and drowning in couples; and, continued the person (relating the circumstance), '**without any cause whatever.**' Now, these people were just brought from a situation between decks, and to which they knew they must return, where the scalding perspiration was running from one to the other, covered also with their own filth, and where *it is no uncommon occurrence for women to be bringing forth children, and men dying at their side*, with full in their view *living and dead bodies chained together*; and the living, in addition to all their other torments, labouring under the most famishing thirst (being in very few instances allowed more than a pint of water a day)--and, let it not be forgotten, that these unfortunate people had just been torn from their country, their families, their all! Men dragged from their wives, women from their husbands and children, girls from their mothers, and boys from their fathers;

and yet in this man's eye (for heart and soul he could have had none) **there was no cause whatever** for jumping overboard and drowning. This, in truth, is a rough picture; but it is not highly coloured. *The men are chained in pairs; and, as a proof they are intended so to remain to the end of the voyage, their fetters are not locked, but rivetted by the blacksmith, and as deaths are frequently occurring living men are often for a length of time confined to dead bodies; the living man cannot be released till the blacksmith has performed the operation of cutting the clench of the rivet with his chisel; and I have now an officer on board the *Dryad*, who, on examining one of these slave vessels, found *not only living men chained to dead bodies, but the latter in a putrid state.* And we have now a case reported here, which, if true, is too horrible and disgusting to be described." (boldface my emphasis; pp. 38-39n.)¹⁷*

The interest of this anecdote--an anamorphic paratext that does not, and cannot, fully fit within the nested structures of Babbage's main argument--may be stated in this way. Let us accept for the sake of argument Babbage's premise that there is a great chain of determination by which history, slaved to natural determination, can be read forward and backward all along the illimitable tracks of the great program until the Alpha and Omega of existence--the outermost open and close parentheses in the God program--at last come into view to guarantee closure, correctness, justice. Edmund Burke's variant of this premise is instructive. We remember that just before the passage in the *Reflections on the Revolution in France* on society as a "great primæval contract of eternal society, linking the lower with the higher natures" and "those who are living, those who are dead, and those who are to be born," Burke speaks of "the whole chain

and continuity of commonwealth."¹⁸ Babbage, as it were, did the code for that, rescuing chain and contract from the messy imprecision of Burke's "custom" or "prejudice" (all so many tangled, unclosed loops of code) to make the primæval program calculable. Processed through Babbage's interpreter, God's high-level source code--whose compiled form is nature--might be rendered as follows: *Do not weep, ye enchained slaves crossing the watery deep of nature's indifference and human cruelty. There is a greater chain not just of being, but of calculability, in which the links that bind you even as they so cruelly sever you from your country, your families, your all ("Men dragged from their wives, women from their husbands and children, girls from their mothers, and boys from their fathers") will be redeemed in the eyes of God. In the calculation of the final account, positive must balance out negative, and there will be no remainder.*

In the ethical calculation that Babbage runs on top of the primary program of natural and historical determination, in short, there is no remainder--except, of course, for what remains after we have processed Captain Hayes's anecdote and found a bug in the program. Everything in the anecdote between the statement by the anonymous witness quoted by Hayes that the slaves jumped "without any cause whatever" and the damning recapitulation of that phrase by Hayes ("and yet in this man's eye . . . there was no cause whatever")--everything, in other words, framed by the open and close statements in the algorithm of moral judgment being run here--is designed to output a determinate cause. But neither the witness nor Hayes can compute the cause--the witness because the action of the slaves undermines the very premise of rational calculation underlying slavery's (and not just slavery's) regime of force (namely, that human beings will suffer utmost pain and degradation rather than die), and Hayes because, when put to it, he cannot quite come out and declare his alternative theory of rational choice: that pain and degradation

cause humans to prefer death. Except for the most heartless necessitarian, perhaps, that conclusion is unspeakable and, truth be told, unknowable. "Who are those that are *born to poverty*?" Dr. Johnson had asked in his critique of Soame Jenyns's theory of social determination.¹⁹ A variant of that question applies here: who is to say *which* humans *must* be driven by *what degree* of suffering to step overboard?

In any case, what emerges at this point instead of rational statement is an incalculable loop of figuration seeming at once to affirm the slaves' determination by slavery *and* their freedom not just from that system but from the entire chain of calculation--rational, economic, moral--in which exploiters and redeemers alike try to link them. Witness, therefore, the weirdly revealing way in which, on the one hand, Hayes's imagery of chains (a metonymic figure of thought for slavery) stands paradoxically for the inhumane *disconcatenation* of "men . . . from their wives, women from their husbands and children, girls from their mothers, and boys from their fathers"; while, on the other hand, his aggregative or anaphora-like "ands" (a figure of speech) stands for a grotesque *reconcatenation* of human society: "it is no uncommon occurrence for women to be bringing forth children, *and* men dying at their side, with full in their view living and dead bodies chained together; *and* the living . . . --*and*, let it not be forgotten . . . [and so on]."²⁰ *And* here (and throughout this passage) marks both a cruel syntax of utterly associative, arbitrary, and thus fractured causality *and* a powerful, redemptive figure of inalienable sociality--of a society whose continuity somehow survives not just despite but *in* externally caused fractures of pain and degradation. *And* projects the vision of a humanity that, chained side by side as if in an exploded diagram of all the stages of generation, forms a society of life-in-death literalizing (and ironizing) Burke's chain of the living and the dead. Such is the

unspeakable allegory of painfully broken-yet-redeemed society hidden within Hayes's discourse-- otherwise too explicit and reticent both, in strange measure, to look past the naked, embodied hurt of inhumanity to the *subject* of humanity that survives precisely because it needs no assigned "cause." It is its own cause. And at the end of the anecdote, therefore, no conclusion is possible except through an inexpressibility topos (the quit statement in the program) introduced by another *and* marking at once a link and a break in the link of determinate logic: "And we have now a case reported here, which, if true, is too horrible and disgusting to be described." Such is the open-ended close of this unthinkable train, or chain, of thought.

In the very process of imagining a cosmic system of determination that would account in the last days for human beings lost in unutterable abjection, in sum, Babbage counter-imagines through the medium of Captain Hayes an undecidable reversal between his thesis and his empirical example that is incalculable within tidily closed, nested programming structures of the sort that makes slavery just a subroutine framed between the *begin* and *end* statements of divine right. Just as free will is a profound problem in the larger argument of the *Ninth Bridgewater Treatise* about the calculability of the universe, so is the event of the slaves jumping overboard "without any cause whatever." At this point in Babbage's argument, calculability reaches an impasse where one of its functions seems to be precisely incalculability, or the determination to escape determination.

If Babbage's *Ninth* were scored to Beethoven's *Ninth*, we might say, the anecdote of the slaves leaping overboard would be a somber version of the "Ode to Joy"--the climax of the opus of freedom that is actually not part of the symphonic structure of that opus. Or we might allude to Wordsworth's and Coleridge's notion of the One Life. All things touch upon, and are co-

determined by, all things in the round of nature, but somehow there is one thing (not slave, perhaps, but Wordsworthian child or subject) left free to imagine.²¹ Or, again, if the "Ode to Joy" and the One Life seem too pretty a comparison, we might look for a more exact analogy to J. M. W. Turner's *Slavers Throwing Overboard the Dead and Dying--Typhon Coming On (The Slave Ship)*, exhibited at the Royal Academy in 1840 just two years after Babbage published his anecdote (figure 9.1). In the painting, Turner's characteristically orbicular or vortex composition frames the scene of horror between the twin arcs of the sky (especially at the topmost right) and the sea (especially in the swirling patterns at the lower left). But the closure of these transcendental parentheses is violently quartered by the grid imposed by the X-axis of the horizon and the Y-axis of the cleft of light centered on the sun. And in the exploded quadrants of the composition thus formed, we see in the lower left and right foreground a drama of isolated human limbs whose hyperrealistic chains--seeming almost to be inscriptions added with a detail brush--limn their essential disconcatenation from any transcendental, unifying composition (figures 9.2, 9.3). The limbs, the fish, the birds, the chains, the froth: it is as if some great database underneath the sea were throwing forth images ("and . . . and . . . and") organized by random access.²²

2. MyLifeBits

To update Babbage's "one vast library" of history from the age of mechanical calculation to that of digital computing, we might next proceed through a series of well-established relays in the history of computing. One such relay, for example, is the Memex machine imagined by Vannevar Bush in 1945, whose repository of codeable microfilm was to have been interlinked in

random-access "trails" of associations. A second is the Xanadu project that Ted Nelson started in the 1960s and 70s. The random-access "docuverse" that Nelson dubbed "hypertext" was to have included, among other features, "historical backtracking" or time-based "intercomparison" between earlier and later assemblages of linked documents.²³ And a third relay, of course, is the Internet and World Wide Web, which followed up on the hypertext vision.

I will concentrate, however, on a fourth relay in the digitization of the "one vast library" that is less well known in the humanities but equally crucial (and, in computer science, canonical): E. F. Codd's work at IBM on the theory of relational databases--most influentially in his 1970 article, "A Relational Model of Data for Large Shared Data Banks." Codd's formalization of high-level, logically-general, and consistent database structures--together with later work by others at IBM on the SQL language that (partially) implemented Codd's theory--brought into being the modern relational database.²⁴

Before Codd, we know, databases in the 1960s and 1970s followed the so-called hierarchical or network paradigms, according to which information was logically organized in single-root or multi-root "tree" structures such that finding anything required traversing a so-called "pointer" (like running one's index finger down a branching diagram) to the appropriate logical location.²⁵ The disadvantage, of course, was that changing the structure at a later date--for example, adding a new branch or level--scrambled up all the pointers. It was like giving someone elaborate, procedural directions to retrieve a book from the library by taking the elevator to the fifth floor, turning left, going down four aisles (and so on), only to find that someone had added an extra aisle or even a whole floor. Fundamentally, such lack of logical "independence," as it is called, was symptomatic of an underlying lack of physical independence.

A system of traversing pointers was premised at base on needing to know exactly how the bits were organized in hard storage. In the early years, when limited computing power rewarded those who kept an eye out for what the machine was actually doing, database science was more an empirics than a theory.

The first true *theory* of the database appeared in Codd's work in 1970, though it would be a decade before computers came up to the speed needed to implement his notions. But by the 1980s, Codd's relational model had made the hierarchical and network models obsolete, and is now so dominant that it is staving off even the newer object-oriented model that claims to be better aligned with recent programming philosophy. This dominance ensued from the clean break that Codd's relational concept made with both physical and logical data dependency.

An example will be expedient. Consider the following data: "Alan Liu, customer 5643289, of [such and such an address], orders from an online vendor on May 1, 2004, a book by E. F. Codd entitled *The Relational Model for Database Management, Version 2* (Addison-Wesley, 2000, ISBN 0201141922)."²⁶ In a relational database, this proposition would be recorded as a set of data known technically as a "relation" or "relational variable" (more colloquially, a "table" consisting of individual "records" or "rows," each holding data in discrete "columns" or "fields"). A first draft of a Book Order Table in which the above example is the most recent entry might thus appear as in figure 9.4. **[Editor: I suggest laying out figures 9.4 and 9.5 together on their own page, oriented in landscape mode]** Each record in this table consists of a set of entities whose interrelation the database describes through the table structure alone, independent of any awareness of the underlying physical data model and even of the locational order of records (which can be entered in any order). Instead--and this is the heart of

Codd's theory *qua* theory--data are related through a pure mathematics of value comparison and manipulation based on set theory and its database variant, relational algebra. By parsing, transforming, and cross-referencing data tables (individually or in combination) through computable set operations named "restrict" (or "select"), "project," "product," "union," "intersect," "difference," "join," and "divide" (akin to arithmetic addition, subtraction, multiplication, and division), relational algebra does all the origami trick of folding and unfolding data tables into derivative tables showing information exactly as the user wants. Thus a *restrict* (or *select*) operation, for example, might convert our Book Order Table into a derivative table showing just records in which the customer last name field is "Liu" (in SQL: "SELECT * FROM Book_Order_Table WHERE C_Last_Name = 'Liu'"); or, again, a *join* operation might produce a derivative table linking Liu to another table containing credit card information. The basic idea is that data can be broken down into members of a logical set whose permutations can be manipulated free of the restrictions imposed by the "real" concatenations of data in the internal program or physical system.

Nor does the drive toward data independence stop there. Any database programmer today would shudder at the Book Order Table instanced above, which is only a first, untidy approximation of the pristine state of data freedom. Programmers would know that this table is unclean because it exhibits the very anathema of good relational database design: redundancy. Whether in its most dangerous form, duplicate records, or in the lesser form exhibited here of information tediously repeated from record to record (for example, the repetition of the customer name and mailing address), database redundancy is inherently bad because it inevitably leads to inconsistency or ambiguity--for instance, when some, but not all, instances of a customer's credit

card number are updated in a large, complex, and evolving database maintained by multiple operators over many years. At base, redundancy is a symptom of incomplete data "atomization"-a term with multiple meanings in database theory that applies from the level of individual fields (for example, the need to atomize names into separate first and last names) all the way up to that of whole "transactions" (involving multiple records and tables) that must complete as discrete, bounded, and self-consistent events without any possibility of partial or double completion.

The problem with our Book Order Table in figure 9.4, we may say, is that it is molecular rather than atomic: it is really several tables living together in unclean cohabitation and generating data redundancy among them. Specifically, if we think of the ideal table as a proposition "about" one, and only one, subject (the "primary key," unique identifier, or, more loosely, *identity* of a record), then our Book Order Table is abnormal because it is about at least three different subjects: the book order (identified by order number), the customer (identified by customer number), and the book (identified by ISBN number).²⁷ In an actual database, our Book Order Table would thus likely undergo a process that database theory calls "normalization." It would be decomposed into at least three, separate tables: one holding just data about the customer, a second holding just data about the book, and a third holding the actual event of the order itself with the customer number, ISBN number, and date (see figure 9.5). In this revised scheme, Customer and Book tables are independent of each other, yet convene in the Order table through the propinquity of their primary keys. It is like isolating the intercourse between one body of material and another to a single Michelangesque, God-to-Adam point of indexical contact. A new god of random access thus arises--more Maxwell's Demon than Laplace Demon-

-for whom creation is a return to the state of entropy where any one atom can again be free to touch any other.

Or, at least, such is the theory. We have still to account for a crucial remainder not accounted for by database theory. To do so, we must now recognize--as database programmers in fact do all the time--that data independence is in real life not so pristine. First, the normalization process that decomposes data tables almost never proceeds to its conclusion--often stopping at the so-called "third normal form"--because logical and physical efficiency *does* matter beyond a certain point (data independence is purchased at the expense of extra operations that the machine must perform to interpret the pure concept). Secondly, the SQL language that allows users to manipulate and query databases is from the point of view of relational purists a compromised, even bastardized, implementation of the theory--failing, for example, to interdict duplicate records.²⁸ And thirdly, there is the enormous compromise represented by so-called "three-value logic" or, in a word that makes some database theorists almost cross themselves, "nulls." In theory, every value in a database should be evaluated as true or false (for example, either a year is or is not 2000). But in the real world, there is enormous pressure to enter records into a database even if some of the values in a record are either unknown or non-existent (for example, no declared publication date for a book). The result is that major database programs today contravene the purity of database theory by allowing the option of null values, which are neither true nor false but instead a third computational value of "unknown."²⁹ By the mathematical logic of relational algebra, however, *any* comparison operation that involves a null results in a null (akin to multiplying by zero), with the consequence that the null state, unless carefully controlled, propagates outward across ever vaster, more distant reaches of the database,

shadowing knowledge in a cone of night within which all things, again, are indistinguishably concatenated.³⁰

This part of the discussion has been technical, but the important point to retain is not. Babbage sought total data determination, but wrestled with an incalculable remainder of independence called free will. Inversely, relational databases quest for total data independence, but grapple with an incalculable remainder of dependency called, among other bad words, *redundant* and *null*. (Indeed, there is a whole other class of databases called "knowledge bases," "data warehouses," or "decision support databases" that are antithetical to data independence because they present agglomerated historical data for the purpose of managing enduring patterns.)³¹ If Babbage had his "chains" and database theory its "relations," in other words, then the weak link in both systems--indeterminability for Babbage, concatenation in databases--is the common link that joins them in a conterminous, if inverse, meditation on the way human history is ordered.

We can thus at last close all the historical relays mentioned above to watch the signal of random--but not random enough--access surge into the present in "one vast library" projects like MyLifeBits, a software application being developed in the early 2000's by Jim Gemmell, Roger Lueder, and Gordon Bell of the Media Presence Group at the Microsoft Bay Area Research Center. While explicitly inspired by Bush's Memex and Nelson's docuverse, MyLifeBits is grounded in practice on Codd's relational database.³²

MyLifeBits is a personal history system whose true intention (as in the case of such other recent projects as Total Recall, LifeLog, Memories for Life, Time-Machine Computing, and Shoebox) is total history.³³ The premise is that advances in storage media will soon enable users

to have not just gigabytes but terabytes of personal storage--more space, in fact, than can easily or even feasibly be filled.³⁴ In such an abundant-resources environment, therefore, why not save everything? "MylifeBits is a lifetime store of *everything*," the project's home page declares in its first sentence. As defined in the group's paper entitled "MyLifeBits: Fulfilling the Memex Vision," *everything* means that "Users will eventually be able to keep every document they read, every picture they view, all the audio they hear, and a good portion of what they see."³⁵ Or, again, as Bell chants the mantra in an interview: "everything you read, every picture you've ever taken, everything you've said." Indeed, as the project's designated guinea pig, Bell is personally practicing the art of everything. Assisted by such *aides-mémoires* as scanners, recorders, and "cameras mounted on his hat and glasses" that save "the previous 30 seconds of video when a button is pressed," he is embarked on a hyper-Shandyeian enterprise of recording all that crosses his sensorium, past or present:

The system now captures everything that you see that comes to you electronically.

You've got all that. I'm capturing phone conversations, so those are available.

I've got a Sony voice recorder . . . so in principle every conversation you have could be captured there. The TiVo capability could get you all the TV you'd ever watched.³⁶

But, of course, omni-storage is not the same as omniscience. Given "all that," the specific research problem of MyLifeBits becomes *finding* things in life's everything.³⁷ This problem has two aspects, which we can call the Blob and the Tree:

Problem: Text can be searched in relatively well-understood ways, but the ever burgeoning stream of images, video, and audio entering into people's life-stores cannot because

they are technically "blobs." Blobs are Binary Large Objects stored in databases as wholes of raw, binary data without any innate features or internal structure apparent to the storage system.³⁸

To be made tractable, they must be annotated in some way, whether with textual descriptors or through the intelligent juxtaposition of neighboring data related by time, place, or some other criterion important to human experience.³⁹ *Solution:* MyLifeBits is developing various ways to "gang" annotate large batches of multimedia so that they can be poured automatically or semi-automatically *with* descriptions into the relational database that undergirds the system (in this case, Microsoft's SQL Server).⁴⁰ Users will then be able to search both text and blobs through the database's built-in query functions. "Everything," truly, will be random-accessible.

Problem: Besides searching, users also want to assemble, navigate, browse, and mine their life-data in configurable ways--all of which requires organizing information so that its multiplex relationships can be presented through what the project calls flexible "views" or visualizations (including detail, thumbnail, timeline, story, and other views).⁴¹ But the hierarchical tree method of organization that currently rules is hopeless because, above a certain scale, it always degrades into *disorganization* (data isolated in ill-sorted, arbitrary, cryptically named, or forgotten folders). *Solution:* Here, MyLifeBits's profound reliance on the relational database paradigm is clearest, since, of course, it was precisely the "tree" that Codd set out to hew. MyLifeBit's organizational solution is the particular design of its SQL Server database, whose highly modular, pliant table structures are designed to be pre-adapted to human experience--allowing loose organization in some circumstances, imposing tight organization in others, and never constraining information to hierarchical logic. In the vocabulary of the project, users need be aware only of two genres of structure: "resources" and "links." Resources are

documents, email, contacts, events, images, music, and so on; while links relate those resources either polymorphously (when all that is required is to stuff things into such all-purpose structures as "collections" and "annotations") or semantically (through so-called "strong typing" imposing finer relations so that, for instance, a person can be associated with a document through an "author of" link but not an "attendee of" link).⁴² The actual work of organization is then performed in the background by the table schema of the MyLifebits database, which the group diagrams in figure 9.6. As a consequence, users will be able to view their life through the full repertory of database query operations and not just the single-purpose, text-string operation we normally call "search." "Everything" will be an even richer experience of random access.

Only, we note, there is one revealing anomaly, almost a regression, in the way MyLifeBits exploits its database. Consider the MyLifeBits "pivot by time" feature, a last-measures function designed to allow users who have exhausted all other search strategies to cast a very wide net into the sea of data. A user, for example, might remember nothing about a document or Web page (not the author, title, URL, or even precise topic) except that it must have been encountered sometime around the date of a phone call to a particular person who recommended it. In that case, the MyLifeBits team proposes, the user can ask the system for "everything with a timestamp close to that of the object" or, again, "everything in the database with a time falling inside the span of the phone call."⁴³ The return of the repressed here, of course, is "everything." "Everything in the database" is the frightening, final threat of the MyLifeBits system. In the case of the most difficult or desperate queries, we are invited to revert our life to a gigantic blob or, more uncanny still, the database simulation of a blob: thousands of emails, appointments, files, images, and so on exploding into view in their original chronological order around a point in

time. The most advanced, random-access digital technology, in other words, is dedicated to reproducing exactly the concatenated mess that was life in the first place.

And so the blob comes back to life. Where Babbage's *Ninth* focused on programming the concatenation of things, but discovered a disturbing remainder of unprogrammability epitomized in the slaves, MyLifeBits reverses the dilemma. It focuses on freeing things from each other, which is to say, random access, but in the end rediscovers the everything that cannot be disconcatenated. The alter ego of MyLifeBits is MyLifeBlob.

3. \ Escaping History: The New Historicism Reconsidered

The format for parameter expansion is as follows:

`\${expression}`

where expression consists of all characters until the matching `}`. Any `}` escaped by a backslash or within a quoted string . . . shall not be examined in determining the matching `}`.

--from Open Group and IEEE specification for a standard operating system interface and environment⁴⁴

Think of it this way: we want to live in history, where our ancestors and all our brethren live and die in common. Those are the expanded parameters of our community (Burke's contract and chain). But however expansive such parameters may be, we also desire to escape from history. No one, after all, actually wants to live in history if there is no escape from its chains. To adapt Nietzsche's argument of purposiveness in his *Use and Abuse of History*, that is not what history is *for*. We want to be chained in history, but we also want to be unlinked via an escape

character (in programming: a backslash, quote sign, comment tag, and so on) that allows us the freedom to be a link unto ourselves or to whom and what we choose.⁴⁵

Now we are ready to reconsider the New Historicism. Since the 1980s, we know, the New Historicism has blurred somewhat into the larger scene of postmodern cultural criticisms. Insofar as it remains distinctive, it is often because of the keepsake we call the "anecdote"--a silhouette of its best, and worst, features. Yet in the age of the database, I think, the New Historicist anecdote may well be our best clue to the general relation between postmodern historicism in the academy and postindustrial technologism everywhere else. After all, anyone other than a cutting-edge cultural critic (and even the latter when engaged in the act of querying a library database or quickly verifying a date via Google or Wikipedia) knows what the anecdote really is. It is random access. If the New Historicism is a kind of relational database, then the anecdote is its query. As it were: "Here is a key set of motifs linked together to make up an event. It feels like it might be part of a broader pattern. What does the whole dataset of history look like if we filter it through the pattern? What other 'hits' might be returned leading toward pattern recognition--i.e., the recognition of 'episteme,' 'mentality,' 'structure,' 'power,' etc.?"

As a touchstone, we may consult the eulogy for the New Historicism (already referred to in my Introduction) that appeared in 2000, Catherine Gallagher and Stephen Greenblatt's *Practicing New Historicism*, where the anecdote is characterized first of all as what amounts to random access. Indeed, one of Greenblatt's chapters in the book describes anecdotes in faux-technical terms uncannily reminiscent of Codd hewing hierarchical "trees" (or, the equivalent of the tree in Renaissance studies, the Chain of Being in the book the New Historicists loved to hate: E. M. W. Tillyard's *Elizabethan World Picture*). Anecdotes, Greenblatt says, "subvert a

programmatic analytical response, a fully systematized methodology." The "unfamiliar cultural texts" they mark are "marginal, odd, fragmentary, unexpected, and crude."⁴⁶ Or as Gallagher elaborates in one of her chapters: "outlandish and irregular . . . heterogeneous . . . askew . . . accidental, suppressed, defeated, uncanny, abjected, or exotic."⁴⁷ More "subversively," as the New Historicism likes to say, anecdotes do not just atomize history analytically; they are atomization as ontology. "Random" (analogous to the universal, even metaphysical implications of entropy in modern physics) is the ground state of being. In other words, the random anecdote's interior contradiction, irony, or aporia (a whole Foucauldian heterocosm in microcosm) exposes the fault lines in the "reality" of history itself, which is thus revealed to be the primordial disjoint structure--no less than an ironic New Critical or poststructuralist *literature* of ontological being (all paradox, difference, and so on). Phrased somewhat differently, but no less ironically, in romantic New Historicism, the anecdote is what shows history to be "displaced, erased, suppressed, elided, overlooked, overwritten, omitted, obscured, expunged, repudiated, excluded, annihilated, and denied" (see chapter 5). In part, such displacement is a perspective effect imposed by somebody with a particular, angled view of reality--state official, poet, critic, or anyone else. It is akin to "anamorphosis" as discussed in Greenblatt's *Renaissance Self-Fashioning*: a fracturing of history into partial, contradictory, ideologically-blinded views that can be manipulated with imaginative legerdemain to conceal and, more rarely, to reveal.⁴⁸ But more deeply, the displacement effect runs deeper--all the way to the default mode of historical reality. Random-access details (e.g., Wordsworth's image of "wreathes of smoke" at Tintern Abbey) are only apparently random. Like Freud's puns, they are apparitional. They make appear the truth that history *qua* history is the original agent of reality-displacement--of erasure,

exclusion, annihilation, denial, and all the other precious and dreadful mobilities of human desire, all the perpetual fragmentations and remixings we call war, revolution, poverty, diaspora, terror, and so on that break the solid façade of reality open to reveal its radically atomic form, free and cruel at the same time.⁴⁹

This is to say that the seeming levitas of the New Historicism's random anecdotalism (called "why not?" in chapter 1) is counterbalanced by a profound gravitas: no less than the pull of the Real itself. As the vocabulary of "denial" in my own Wordsworth book perhaps too aggressively suggests, the New Historicism is overdetermined (dealing in *denial* rather than just displacement).⁵⁰ Random access in the New Historicism is the very mark--like a brand on flesh--of the forces of historical determination that break up bodies, lives, families, villages, nations, and so on to make both tyranny and recuperative freedom possible. In short, the New Historicism is the intuition simultaneously of random access (an atheist transcendence) *and* determination (a bowing down or conviction). Greenblatt thus witnesses in his chapter in *Practising New Historicism* entitled "The Touch of the Real":

We wanted to recover in our literary criticism a confident conviction of reality, without giving up the power of literature to sidestep or evade the quotidian and without giving up a minimally sophisticated understanding that any text depends upon the absence of the bodies and voices that it represents. We wanted the touch of the real in the way that in an earlier period people wanted the touch of the transcendent.⁵¹

Participating fully in the emancipatory program of random access, the New Historicism nevertheless acknowledges its overlap with older philosophies of determination--including the

nineteenth-century historicisms that originally credited determination by climate, zeitgeist, modes of production, ideology, and, yes, Analytical Engines, too.

In sum, the New Historicism wants a paradox of random determination or determined randomness (Greenblatt: "we wanted to recover . . . a confident conviction of reality, without giving up the power of literature to sidestep or evade"). This want, I wager, is more than just greed, a matter of wanting to have one's cake and eat it, too. It is the want for a very notion of human want or desire unconstrained by our contemporary master-verbs *search* and *query*, with their carefully metered promise of *more* ("next 10 results") indicated by the link at the bottom of any Web search results page. It is the want for the combined substance and freedom of history that, as I intimated earlier, Babbage's and Codd's world views could not individually acknowledge as more than their weak link, their unconscious. The New Historicism wants the determination *and* random access it believes is the entire span (always both enslaved and free) of human life.

The function of the New Historicism in the age of the database, then, is to declare our hope for both a significant history *and* the end of history. Where better to look for such hope, the New Historicism argues, than to history itself, which--in something like the function calls of contemporary object-oriented programming--can be called upon to show that the past is the exact precursor for our own determination to be free of the past. All the New Historicism's anecdotes of subversions, displacements, denials, and so on: what are they but stories of how dearly people have always wanted both determination and freedom, both their history and the end of their history? The function of New Historicism in the age of the database is to define the function of the past as the beginning of the end of history.

4. Postscript: The Poetics of Contingency

Is the New Historicism, therefore, a continuation of the project of the Enlightenment, which named the paradox of determination and freedom Reason (a progressive, irresistible tide of reason that could free humanity from the dark chains of its past)?

A final thought--one that might well serve as an epitaph for the movement--is that the New Historicism is ultimately not a project of the Enlightenment because it is devoted to the romance of irrationality that postmodern cultural criticism calls *contingency*. As Gallagher says in one of her chapters in *Practicing New Historicism*, the attraction of representing history as akin to texts is that "'history' could be imagined as part of [textual] contingency."⁵² The anecdote is the form of contingency.

Widely espoused in contemporary cultural criticism and epitomized in the New Historicism, contingency is a philosophy of compromise between determination and random access. It is both a "touching together or on all sides, lying near, contiguous, coming into contact or connexion, befalling, happening, coming to pass" according to which nothing can act but in lockstep with everything (see *OED* etymology for "contingent") *and* an aleatory slippage within the consistency of everything that allows some things to slip free. As Elena Esposito writes in her "The Arts of Contingency," we are today witnessing a "general reassessment of the relationship of the necessary and the contingent, of the stable and the mutable, of redundancy and variety." We desire "loosely coupled elements" in which "data represent a set of elements whose bonds are loosened in order to be available for new recombinations."⁵³ Or as Esposito once put it more succinctly to me in a personal communication, "constraint is not the same as

determination."⁵⁴ Indeed, constraint may even be the very ground of creativity--as formulated in Jon Elster's rational choice theory definition of creativity as "maximizing aesthetic value under constraints."⁵⁵

We might visualize it as follows: imagine that each particle of existence is constrained within its immediate historical context so that the whole weather cell of history moves together, or not at all. But also imagine that beyond a certain distance, the constraint of any local cell of action ends at its interface with another cell. The result is a world of contingency in which particles may be chained to contexts, but where contexts themselves perpetually slip along their interfaces in sudden, unpredictable shifts evincing unknown meta-constraints beyond the reason of local maximization. And this is not even to reckon the full epistemological as well as ontological force of the unknown in its contemporary guise as the science, philosophy, and literature of contingency. I refer to the epistemology of "emergence" according to which (as in complexity theory) deterministic local systems yield unpredictable results when seen as part of a higher-level, emergent system.⁵⁶ Contingent history is like code "escaped" with a backslash (or other escape character) in programming: the escaped material is embedded in the local routine, but lives a different life.

The function of New Historicism in the age of the database is to declare that the past determines us to be free. The name of that radically determined freedom is contingency, the form of our near escape.

Notes to Chapter 9 (Escaping History)

1. I created the panels here referred to during a leave year spent in Madison, Wisconsin, while I was at work on my *Wordsworth: The Sense of History*. Somewhere in repeated travels back and forth between Madison and New Haven in the succeeding years, the wall charts (carefully folded and packed away for oblivion) were lost.

2. See chap. 3 in this volume, previously published as Liu, "Local Transcendence: Cultural Criticism, Postmodernism, and the Romanticism of Detail," *Representations* 32 (Fall 1990): 75-113. My gratitude to Steven Goldsmith, who in his introduction to my Beckman lecture on "Transcendental Data: Toward a Cultural History and Aesthetics of the New Encoded Discourse" (Univ. of California, Berkeley, Oct. 15, 2003), pointed out the relation between the "matrix of detail" in my "Local Transcendence" essay and my later work in information technology and new media.

3. See the Romantic Chronology, ed. Laura Mandell and Alan Liu, originally created in 1995-96 in the form of static Web pages and then in 1999 migrated to a database-to-Web system. Rita Raley and Carl Stahmer assisted in the original creation of the site.

4. See Voice of the Shuttle: Web Site for Humanities Research, ed. Alan Liu, which was

originally created in 1994 and then migrated in 2001 into a SQL Server to Web database system designed by Robert Adlington and Jeremy Douglass.

5. OED.

6. I use "end of history" here in a manner that emphasizes its postmodern and postindustrial connotation as a release from history. However, Francis Fukuyama's now paradigmatic, neo-Hegelian thesis of the end of history also incorporates the sense of a historical *determination* to be free (motivated by the dual drives of rational economic process and the "struggle for recognition"). See Fukuyama, *The End of History and the Last Man* (whose third part is titled "The Struggle for Recognition"). One of the goals of my present essay is to develop an alternative informational framework for understanding the paradox of "determination to be free"-one that might unchain the understanding of conditional freedom (externally programmed *and* self-programmed freedom) from the neoliberal globalism that today has captured the original Hegelian dialectic and enslaved it to rational economic process.

7. My base text for Babbage's treatise is *The Ninth Bridgewater Treatise: A Fragment* (2d ed. of 1838), vol. 9 of *The Works of Charles Babbage*, ed. Martin Campbell-Kelly (London: William Pickering, 1989). Citations are to this text unless otherwise indicated. However, I have also consulted in microform the first edition: *The Ninth Bridgewater Treatise: A Fragment* (London: J. Murray, 1837).

8. The most noted of the official Bridgewater Treatises--William Whewell's *Astronomy and General Physics Considered with Reference to Natural Theology*, 1833--had dismissed "deductive" mathematics as irrelevant to natural theology. "We have no reason whatever," Whewell said about mathematicians, "to expect from their speculations any help, when we ascend to the first cause and supreme ruler of the universe." Quoting this passage on the title page of his treatise, Babbage sets out explicitly to refute Whewell's judgement of mathematics. Vol. 9 of *The Works of Charles Babbage*, ed. Martin Campbell-Kelly [London: William Pickering, 1989] includes facsimile reproductions of Babbage's title pages of 1837 and 1838, both of which bear the quote from Whewell. For background on the Bridgewater Treatises and Babbage's entry into the lists, see Campbell-Kelly's introduction, pp. 5-7, and Anthony Hyman, *Charles Babbage: Pioneer of the Computer*, pp. 136-42.)

In retrospect, Babbage's effort in this treatise to prevent a further widening of the gap between theoretical mathematics and the empirical sciences may be seen to part of what his modern biographer, Hyman, calls the great, lost "battle for applied science" that he fought throughout his life (p. 1). As a compound problem in the metaphysical *and* physical engineering of the universe, we deduce, natural theology must have been a conundrum as irresistible to Babbage as his calculating machines, which also split the difference between pure mathematics and mechanical design.

9. The best known precedent is William Paley's *Natural Theology; or, Evidences of the Existence and Attributes of the Deity from the Appearances of Nature* (originally published in 1802), which

contains on its first page the famous thought experiment, "suppose I had found a *watch* upon the ground. . . ."

10. In his appended Note B, Babbage writes concerning the Analytical Engine: "About October, 1834, I commenced the design of another, and far more powerful engine. . . . As the remaining illustrations [in this treatise] are all drawn from the powers of this new engine, it may be right to state, that . . . at any period previously fixed upon, or contingent on certain events, it will cease to tabulate [an] algebraic function, and commence the calculation of a different one, and that these changes may be repeated to any extent" (p. 68).

11. This explanation is a simplification in particular of Babbage's second chapter, titled "Argument in Favour of Design from the Changing of Laws in Natural Events" (pp. 4-11). As Hyman puts it in his biography, "Babbage saw God as a being of science and programmer who defined the entire future of the universe at the time of the Creation as a sort of infinite set of programs" (*Charles Babbage: Pioneer of the Computer*, p. 137).

12. Immediately after putting his question, Babbage concludes: we "cannot for a moment hesitate in pronouncing that that for which, after its original adjustment, no superintendance is required, displays far greater ingenuity than that which demands, at every change in its law, the direct intervention of its contriver" (p. 8). He continues: "to have *foreseen*, at the creation of matter and of mind, that a period would arrive when matter, assuming its prearranged combinations, would

become susceptible of the support of vegetable forms; that these should in due time themselves supply the pabulum of animal existence; that successive races of giant forms or of microscopic beings should at appointed periods necessarily rise into existence, and as inevitably yield to decay; and that decay and death--the lot of each individual existence--should also act with equal power on the races which they constitute; that the extinction of every race should be as certain as the death of each individual, and the advent of new genera be as inevitable as the destruction of their predecessors; to have foreseen all these changes, and to have provided, by one comprehensive law, for all that should ever occur, either to the races themselves, to the individuals of which they are composed, or to the globe which they inhabit, manifests a degree of power and of knowledge of a far higher order" (p. 10).

13. Babbage's *Ninth Bridgewater Treatise* was published as a fragmentary work and is in fact too full of digressions and loose ends to be conceived of strictly as a hierarchy (or nesting) of arguments. My notion of "nested" here is just a figure for those modules in Babbage's argument that seem clearly subordinate, even if we cannot always identify the exact relation of subordination between the various chapters and the overall argument (as would be required for an actual computer program).

14. Babbage includes the relevant excerpt from Laplace in a note appended to his ninth chapter; see Note C, pp. 70-71.

15. Ibid., 38. Babbage resumes his meditations on crime and punishment at greater length in chapter 14 of the 1838 edition ("Thoughts On the Nature of Future Punishments").

The break between this paragraph, where the 1837 version of the chapter ended, and subsequent material added in 1838 (discussed below) is indicated by the editor. While I have quoted only the 1838 text, I have also consulted the first edition, where the paragraph differs only in minor points of punctuation (*The Ninth Bridgewater Treatise* [1837], 116-17).

16. The Biblical allusion at the end of this passage to the "prophet's denunciation" is supplied by Babbage in a footnote: "And Nathan said unto David--*Thou art the man.*

17. In transcribing from *The Quarterly Review*, Babbage introduces only minor variations and some punctuation changes. (Compare the original report by Captain Hayes in the Parliamentary Papers as quoted in *The Quarterly Review* 55 [December 1835 and February 1836]: 253-54.) Except for the two emphases I have added, the emphases Babbage includes were in *The Quarterly Review* (with slight variations).

After this extract from the *Quarterly Review*, Babbage's note continues: "When the ink was scarcely dry on the paper on which the remarks in the text, suggested by a former description of the atrocities of the slave trade, was written, the following paragraph caught my attention: 'Slave trade. -- His Majesty's ship *Thalia*, 31, Captain R. Wauchope, has captured on the coast of Africa, two slave vessels--one the *Félicité*, 611 slaves; the other, the *Adalia*, with 409 slaves. It appears the latter vessel had been chased by the boats of one of our cruizers, and to avoid being

come up with she threw overboard upwards of 150 of the poor wretches who were on board, besides almost all her heavy stores.' -- *Western Luminary*, May, 1837."

18. Burke, *Reflections on the Revolution in France*, pp. 194-95, 193.

19. I refer to the point in his "Review of Soame Jenyns, *A Free Enquiry into the Nature and Origin of Evil*" when Johnson, coming to Jenyns's argument that those destined to be poor should not be vexed by an education inappropriate to them, asks piercingly (where the italicized phrases are Jenyns's): "Though it should be granted, that those who are *born to poverty and drudgery*, should not be *deprived by an improper education of the opiate of ignorance*, even this concession will not be of much use to direct our practice, unless it be determined who are those that are *born to poverty*. To entail irreversible poverty upon generation after generation only because the ancestor happened to be poor is in itself, cruel, if not unjust" (Samuel Johnson, *Samuel Johnson*, p. 529).

20. "Anaphora: repetition of same word at beginning of successive clauses or verses"; Richard A. Lanham, *A Handlist of Rhetorical Terms: A Guide for Students of English Literature*, p. 130.

21. From Wordsworth's "Lines Written a Few Miles Above Tintern Abbey":

And I have felt

A presence that disturbs me with the joy
Of elevated thoughts; a sense sublime
Of something far more deeply interfused,
Whose dwelling is the light of setting suns,
And the round ocean, and the living air,
And the blue sky, and in the mind of man,
A motion and a spirit, that impels
All thinking things, all objects of all thought,
And rolls through all things.

The *and's* in this vision of the One Life characteristic of Wordsworth's and Coleridge's work circa 1798 chime hauntingly against those in Babbage's note quoting the witness of the slave ship. We might say that nature was the universal slave ship for the romantics--somehow at once inevitable ("rolled round in earth's diurnal course," Wordsworth says about Lucy in "A Slumber Did My Spirit Seal"; propelled by unseen spirits, Coleridge imagines in "The Rime of the Ancient Mariner") *and* free to be piloted by the romantic subject. "Therefore am I still / A lover of the meadows and the woods, / And mountains; and of all that we behold," Wordsworth continues after the "rolls through all things" above--as if he had a choice (akin to Shelley's expansive ethos of "love") in the matter.

22. See also chap. 8 in this volume, whose conclusion suggests that Turner's *Light and Colour: The Morning after the Deluge* (1843) may be analogized to a transcendental database pouring

forth what seems to be a first record: an image of Moses writing the Pentateuch.

23. Vannevar Bush, "As We May Think," originally published in *Atlantic Monthly*, July 1945.

Theodor Holm Nelson, *Literary Machines: The Report On, and Of, Project Xanadu Concerning Word Processing, Electronic Publishing, Hypertext, Thinkertoys, Tomorrow's Intellectual Revolution, and Certain Other Topics Including Knowledge, Education and Freedom*, rev. ed. (version "90.1"). On Nelson's notion of "historical backtrack," see section 3, pp. 12-13 (each section of the work paginated independently).

24. Raymond Boyce and Donald Chamberlin developed the SQL language at IBM (see Tore Bostrup, "Introduction to Relational Databases - Part 1: Theoretical Foundation").

My following discussion of database theory is informed primarily by the following works: E. F. Codd (Edgar Frank Codd), *The Relational Model for Database Management, Version 2*; C. J. Date, *An Introduction to Database Systems*; Peter Rob and Carlos Coronel, *Database Systems: Design, Implementation, and Management*; and Stefan Stanczyk, et al., *Theory and Practice of Relational Databases*. I am indebted to my friend and colleague, Amr El Abbadi, a database specialist in the Computer Science department at the University of California, Santa Barbara, for excellent discussion over the years relating to database theory and research.

25. For a textbook review of hierarchical and network databases, see Rob and Coronel, *Database Systems*, pp. 24-33. Network databases were similar to hierarchical databases in having

something like a tree structure, but with the variation that each branch in the data tree could have more than a single parent trunk (or "root"), thus allowing for more flexible modelings of data.

26. I take the expedient step here of inventing my own example. The example is of the sort well established in database textbooks, whose illustrative instances of tables often premise a typical business use.

27. As William Kent puts it succinctly in his "A Simple Guide to Five Normal Forms in Relational Database Theory," *CACM* 26, no. 2 (February 1983), an ideal database table--more precisely, a table in "third normal form" and "Boyce Codd Normal Form"--is one in which "each attribute must represent a fact about the key, the whole key, and nothing but the key" (to quote the "slightly paraphrased" version form used in Date, *An Introduction to Database Systems*, 379). (Kent's original sentence reads, "Under second and third normal forms, a non-key field must provide a fact about the key, us[e] the whole key, and nothing but the key.")

28. On why it is often optimal to stop at the third normal form, see Rob and Coronel, *Database Systems*, p. 176. On the limitations of SQL, see Codd's chapter on "Serious Flaws in SQL" (*Relational Model for Database Management*, pp. 371-89); and Date on SQL's "sins of both omission and commission" (*Introduction to Database Systems*, p. 98).

29. Nulls were eventually written into relational database theory by Codd, but with deep misgivings about the fact that database programs typically process nulls unsystematically (see, for example, *Relational Model for Database Management, Version 2*, 197-98). Nulls have remained controversial. On the incommensurability between three-value logic or nulls and relational theory, see especially Date, *Introduction to Database Systems*, chapter 18 ("Missing Information"). As Date colorfully puts it, nulls "undermine the entire foundation of the relational model" and "wreck the relational model" (594, 600). There is even a hint of essentialism in Date's stance. "There is no such thing as a null in the real world," he says (600n). And, of course, from the point of view of the novice or even middling database programmer (as I can personally attest), nulls are the source of fundamental errors. It would be interesting to compare the notion of the null with such philosophical or aesthetic notions now familiar to modern and postmodern humanists as *antithesis* (Hegel), *either/or* (Kierkegaard), *paradox* or *ambiguity* (the New Critics), *mana* and *trickster* (anthropology), *différance* (Derrida), *wasp/orchid* (Deleuze and Guattari), *hybridity* (postcolonial theory), *queer* (gender theory), etc. My own concept of the *ethos of the unknown* (*Laws of Cool*) is apropos. The operational demand that *null* adds to such concepts--one not well accommodated in the humanities--is calculability.

30. Date comments: "any scalar comparison in which one of the comparands is null evaluates to the *unknown* truth value, instead of to *true* or *false*" (*Introduction to Database Systems*, p. 584). Date's chapter on "Missing Information" works out in detail the implication of nulls for various relational operations.

31. See Rob and Coronel's chapter on "The Data Warehouse" (*Database Systems*, pp. 611-64); and Date's chapter on "Decision Support" (*Introduction to Database Systems*, pp. 694-729).

32. The following summary of MyLifeBits derives primarily from the most detailed of the group's papers I was able to find at the time of this writing: Jim Gemmell, et al., "Living with a Lifetime Store" (especially the section on "Data Model) and Jim Gemmell, et al., "MyLifeBits: Fulfilling the Memex Vision." However, I also cite other papers by the MyLifeBits group where useful.

The influence on the MyLifeBits project of Vannevar Bush and Ted Nelson is self-advertised. For example, the title "MyLifeBits: Fulfilling the Memex Vision" alludes to Bush, while "Living with a Lifetime Store" credits both Bush and Nelson. Even the eye-camera used by Gordon Bell (see below) follows up on Bush's idea for head-mounted, "walnut"-sized cameras recording anything and everything. (Cf. other eye-camera recording technology created at Hewlett-Packard and MIT; see Otis Port, "Innovations," and Theo Emory, "Memory Glasses For Total Recall.")

33. On Total Recall, see *PC Magazine*, "IBM's Budding Innovators: Grooming the Next Generation." On LifeLog, see Doug Gage, LifeLog home page. On Memories for Life, see Andrew Fitzgibbon and Ehud Reiter, "'Memories for Life': Managing Information Over a Human Lifetime." On Time-Machine Computing, see Jun Rekimoto, Time-Machine Computing home page. On Shoebox, see Timothy J. Mills, et al., "Shoebox: A Digital Photo Management

System."

34. According to the calculations of the MyLifeBits group, for example, it would "take you five years to fill up your current 80 GB hard drive" with email, cached or stored Web pages, scanned documents, books in digital form, or digital photos and music; and "once you upgrade to a terabyte disk [1,024 gigabytes], it will take more than 60 additional years to fill." The group adds that even video "shot 24 hours a day, seven days a week" fits in a terabyte if the video bit-rate is kept low or moderate (Jim Gemmell, et al., "Living with a Lifetime Store," p. 2).

35. MyLifeBits Project home page; Jim Gemmell, et al., "MyLifeBits: Fulfilling the Memex Vision," p. 1.

36. Paul Festa, "Total Recall." The quotations regarding Gordon Bell's hat-mounted camera are from Jim Gemmell, et al., "The MyLifeBits Lifetime Store," p. 1.

37. The MyLifeBits group identifies its core problem in this way: "Once we see the feasibility of collecting and storing vast amounts of information, the challenge becomes making use of it. There is no point in constructing a 'Write Once Read Never' memory" (Jim Gemmell, et al., "Living with a Lifetime Store," p. 2). In succeeding paragraphs in this same paper, the group invokes sequentially the approaches of Bush's Memex, Nelson's hypertext, and the database (pp.

2-3).

38. The MyLifeBits group uses the term "blob" in Jim Gemmell, et al., "MyLifeBits: Fulfilling the Memex Vision," p. 4. For a definition of "blob," see for example the entry on "binary large object" in the Hyperdictionary.

39. There have also been efforts to allow computers to analyze blobs automatically. See, for example, the discussion by the Shoebox project group of its attempts at image indexing and image content analysis based on various grid-segmentations of an image (Timothy J. Mills, et al., "Shoebox: A Digital Photo Management System," pp. 3-4). However, machine recognition of image files has so far been notably disappointing. The Shoebox group, for example, concludes: "For the management of personal photograph collections, retrieval both by date and annotations out-performed visual-based retrieval. We conclude that visual-based retrieval tools may not be especially valuable" (ibid., p. 7).

40. Jim Gemmell, et al., "MyLifeBits: Fulfilling the Memex Vision," p. 3.

41. Jim Gemmell, et al., "MyLifeBits: Fulfilling the Memex Vision," pp. 3-4.

42. See especially Jim Gemmell, et al., "Living with a Lifetime Store," pp. 4-6. There is overlap

between the notion of semantically aware “strong typing” in the MyLifeBits schema and Tim Berners-Lee’s notion of the Semantic Web based on metadata standards rather than database schemas (see Berners-Lee et. al, “The Semantic Web.”)

43. Jim Gemmell, et al., "Living with a Lifetime Store," p. 7, and "The MyLifeBits Lifetime Store," p. 3.

44. The Open Group Base Specifications Issue 6, IEEE Std 1003.1, 2004 Edition, IEEE and the Open Group,

http://www.opengroup.org/onlinepubs/009695399/utilities/xcu_chap02.html#tag_02_02_01,
retrieved 13 June 2004. See specifically Chapter 2 of “Shell & Utilities” section (“Shell Command Language”). [Editor: I've put this reference in the Works Cited, but it is so anomalous in nature and form (e.g., "Issue" and "Edition" have standards-specification meanings that do not exactly correspond with the ordinary bibliographical usage of those terms) that I recommend duplicating it in full complete with URL here in the note. It's simpler for the reader that way.]

45. Programming here is my allegory for historical experience, just as psychoanalysis served the same purpose in Joel Fineman's well-known essay on the New Historicism, "The History of the Anecdote: Fiction and Fiction." The escape character that I fetishize is the code for what Fine, in a passage I touched upon in my Introduction, calls the hole and rim of the anecdote. See the passage from Fineman’s p. 61 quoted in my Introduction, n. 41.

46. Gallagher and Greenblatt, *Practicising New Historicism*, pp. 22, 28. On the relation between Renaissance New Historicism and Tillyard's book, see note 3 in my chap. 1 above.

47. Gallagher and Greenblatt, *Practicising New Historicism*, pp. 51-52.

48. On anamorphosis, see Greenblatt, *Renaissance Self-Fashioning*, pp. 17-26 (also discussed in my chap. 1 above).

49. In citing the "wreathes of smoke" at Tintern Abbey in Wordsworth's poem as a testament to history-as-displacement, I allude to Marjorie Levinson's strong, subtle reading of the poem (see her *Wordsworth's Great Period Poems*, chapter 1, esp. 42-43), one of the most definitive and influential of the early New Historicist readings of romanticism.

50. Liu, *Wordsworth: The Sense of History*, esp. pp. 31-51.

51. Gallagher and Greenblatt, *Practicing New Historicism*, p. 31.

52. Gallagher and Greenblatt, *Practicing New Historicism*, p. 51.

53. Elena Esposito, "The Arts of Contingency," pp. 9, 24.

54. I am grateful for Elena Esposito's fine conversation at dinner on May 22, 2004, during the University of Chicago Franke Institute's conference on the "Arts of Transmission" (where she presented her "The Arts of Contingency" essay as a paper).

55. See Jon Elster, "Less is More: Creativity and Constraints in the Arts," in his *Ulysses Unbound: Studies in Rationality, Precommitment, and Constraints*. See also Elster's *Explaining Technical Change: A Case Study in the Philosophy of Science*.

56. For my own discussion of contemporary creativity theory caught in the divergence between rational choice theory and emergence (or complexity) theory, see Liu, "'A Forming Hand': Creativity and Destruction from Romanticism to Emergence Theory."