EARLY TOOLS FOR THOUGHT

Mark Bernstein
Eastgate Systems, Inc.

TINDERBOX

Desktop tool for organizing and visualizing notes
Debuted in 2001 (!)

https://www.eastgate.com/Tinderbox/

Visualization and Structural Intuition in Early Hypertext

Mark Bernstein, Eastgate Systems Inc.

Early visions of hypertext emphasize the necessarily-arbitrary arrangement of information stored on shelves or in files cabinets, and promise fast and facile retrieval, but hypertext originated as a reaction against the disasters of the 20th Century. This reaction inspired a great wave of inquiry into the abstract, structural foundations of history, language, machinery, and mathematics itself. Growing disciplinary incomprehension obscured this common origin and caused much tension, while the consequences of the systems in use, foreseen and otherwise, now seem to portend disaster.

Beyond Bush, Nelson, Engelbart and Berners-Lee

Senate House, University of London
December 15-16, 2022

The Origins of Digital Humanities In The Origins Of Hypertext

Cotton: Vitellius A.xv

"If you wanted to find Beowulf in Sir Robert Bruce Cotton's library, you would look for Vitellius A xv — the 15th book on the top shelf of the bookcase surmounted by the a bust of Vitellius (Beard, 2021)."

Beowulf

Mary Beard, Twelve Caesars

Edward Wilson-Lee, The Catalog of Shipwrecked Books

Not Cotton's Vitellius. Also not Vitellius

What would an INTRODUCTION TO COMPUTING look like, if "mainstream computing" was humanistic computing?

DL.ACM.ORG

Proceedings of The ACM Hypertext Conference
1987-present

TOOLS FOR THOUGHT

LINKS

TOOLS FOR THOUGHT

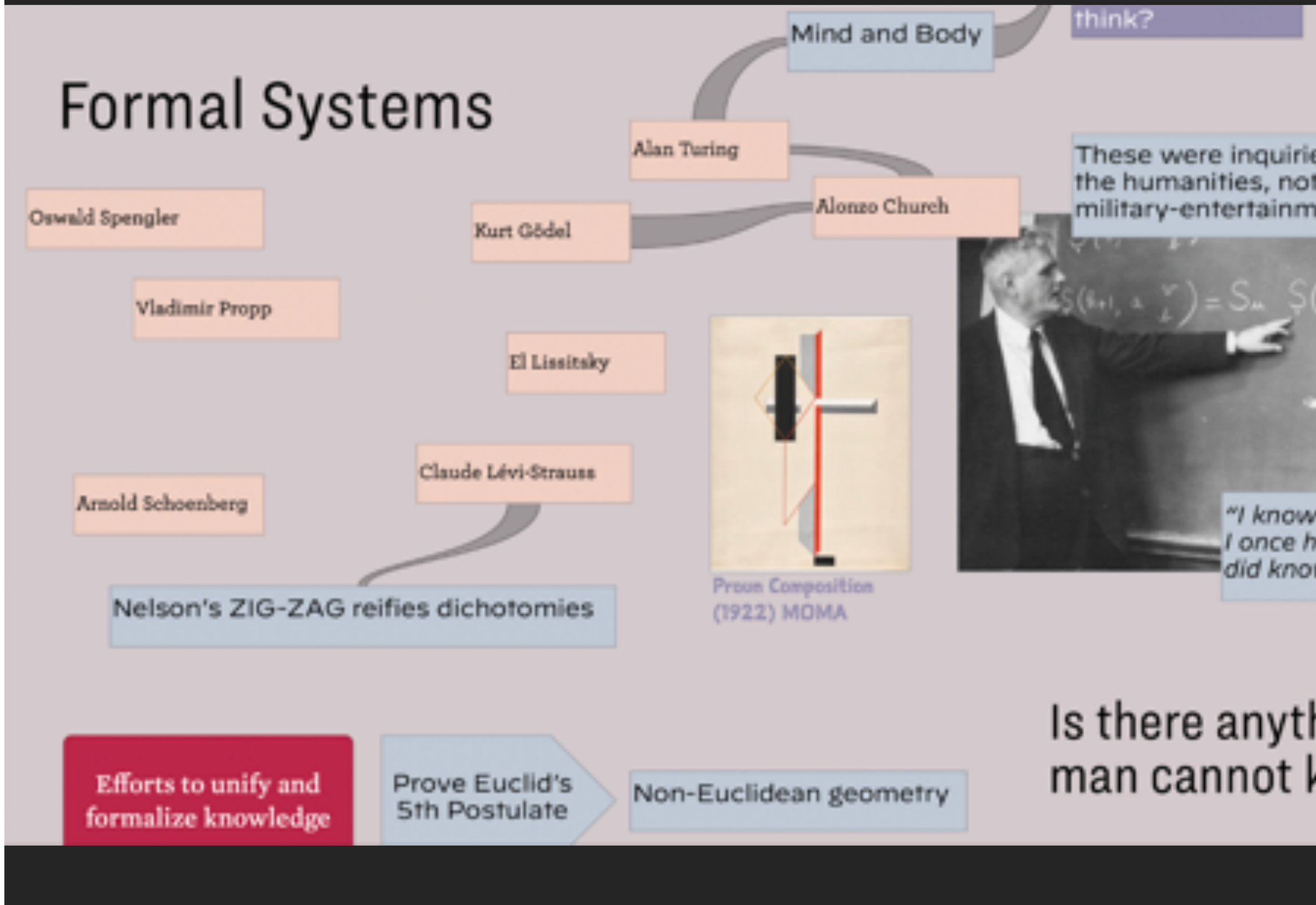
INTELLECTUAL ROOTS OF HYPERTEXT

Bernstein, Mark (2022), ‘On The Origins Of Hypertext In The Disasters Of The Short 20th Century’, The ACM Web Conference.

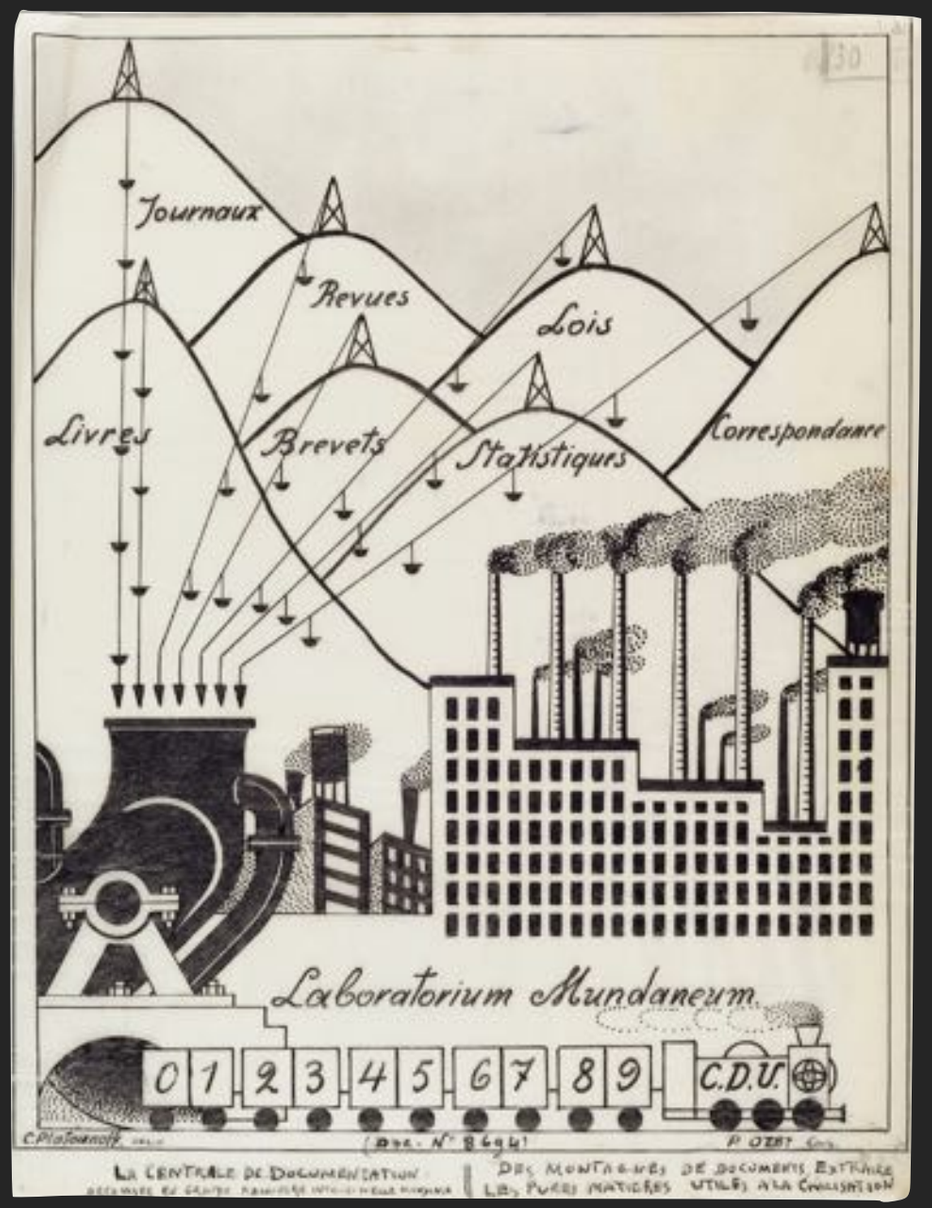
Bernstein, Mark (2023), ‘Knowledge Machines: a Complex Web of History and Technology’, in Wiebke Keim, Leandro Rodriguez Medina, Rigas Arvanitis (ed.), *Handbook of Academic Knowledge Circulation* (Routledge),

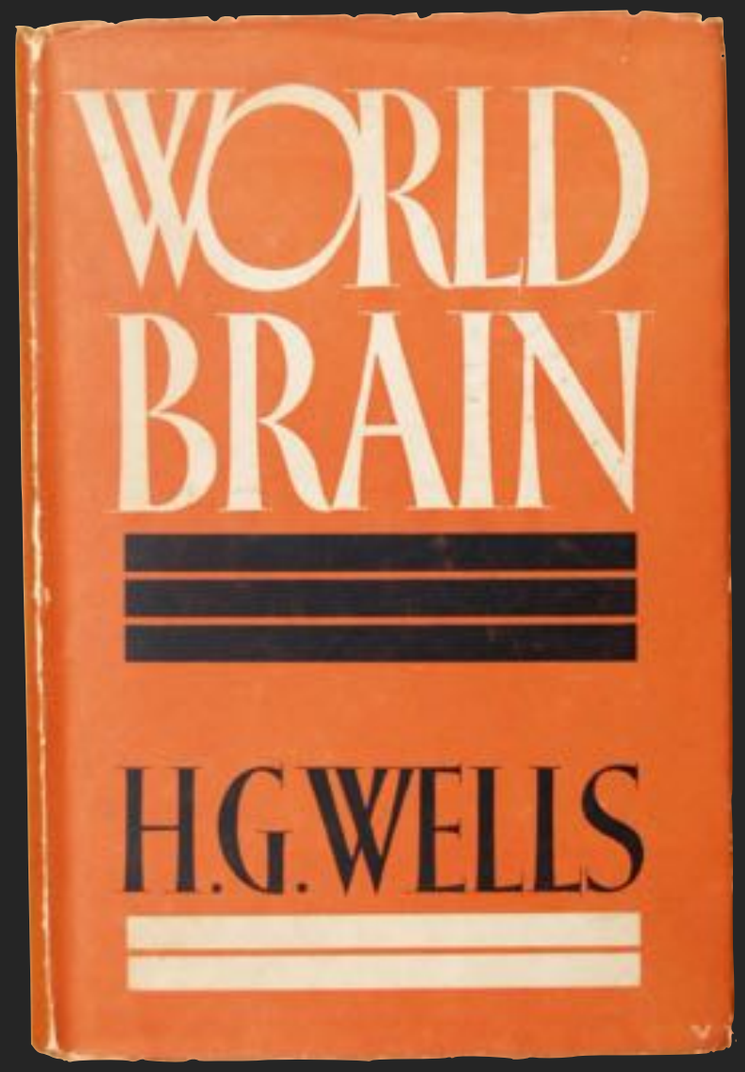
- Structuralism
- Existentialism
- Anti-Communitarianism

STRUCTURALISM



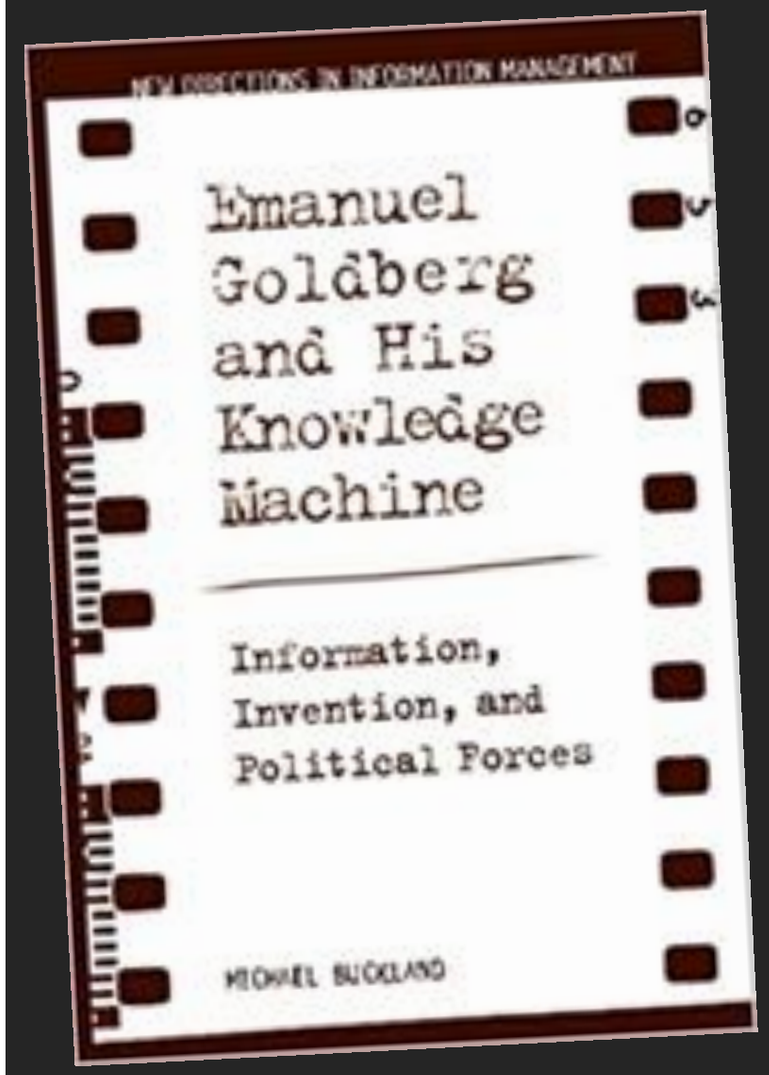
PAUL OTLET
H. G. WELLS

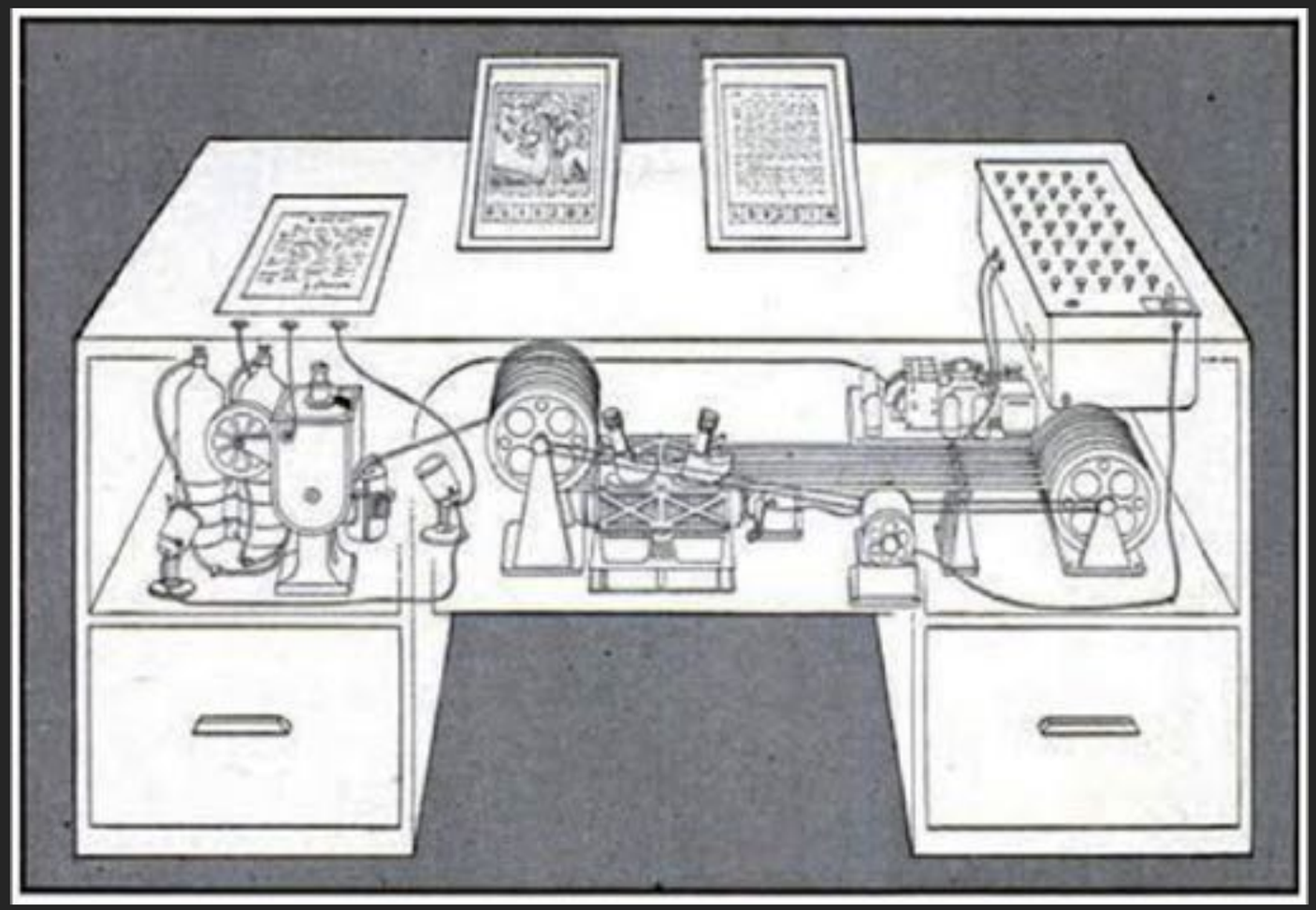




EMANUEL GOLDBERG VANNEVAR BUSH

Bush, V. (1945), '**As we may think**', Atlantic Monthly, July 1945 101-8.





10

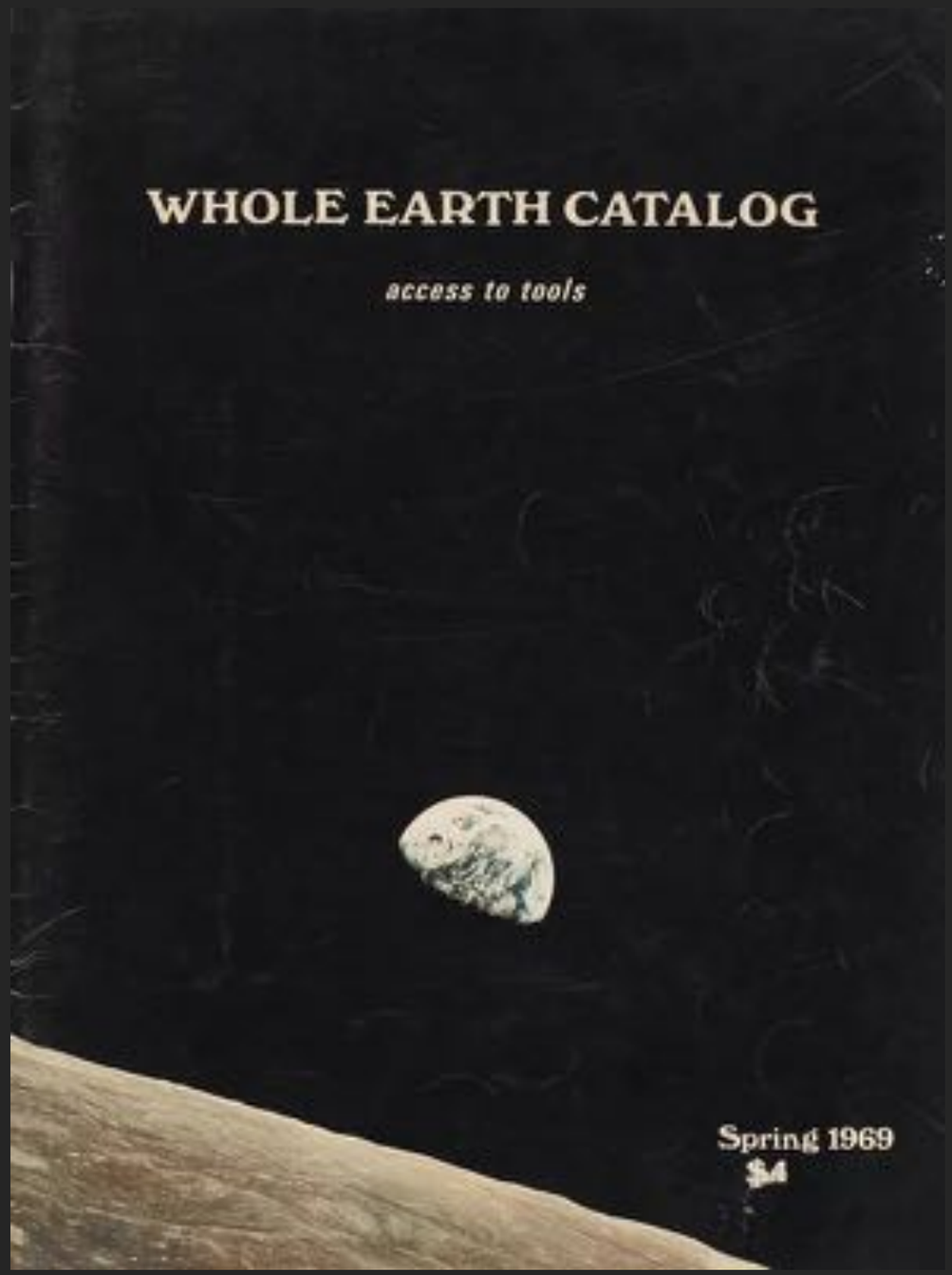
TOOLS FOR THOUGHT

EXISTENTIALISM

Robert Doisneau
Simone Beauvoir and Jean-Paul Sartre, circa 1945

Mark Bernstein
The Origins Of Hypertext

ANTI-COMMUNITARIANISM



COMPUTER LIB / DREAM MACHINES

Nelson, Theodor Holm (1974), ***Computer Lib/Dream Machines,*** (Swarthmore, PA: Ted Nelson).

Nelson, T. (1982), **Literary Machines,** (1987: Mindscape Press).

Barnet, Belinda. (2013), **Memory machines** : the evolution of hypertext, (London: Anthem Press) xxvi, 166 pages.

COMPUTER LIB

That reminds me. Nowhere in the book have I defined the phrase "computer lib." By Computer Lib I mean simply: making people freer through computers. That's all.

Fantically-- or fanatically--
Yours for a better world,
Before we have to settle for Any--

Ted Nelson

TOOLS FOR THOUGHT

TED NELSON

TOOLS FOR THOUGHT

SKETCHPAD

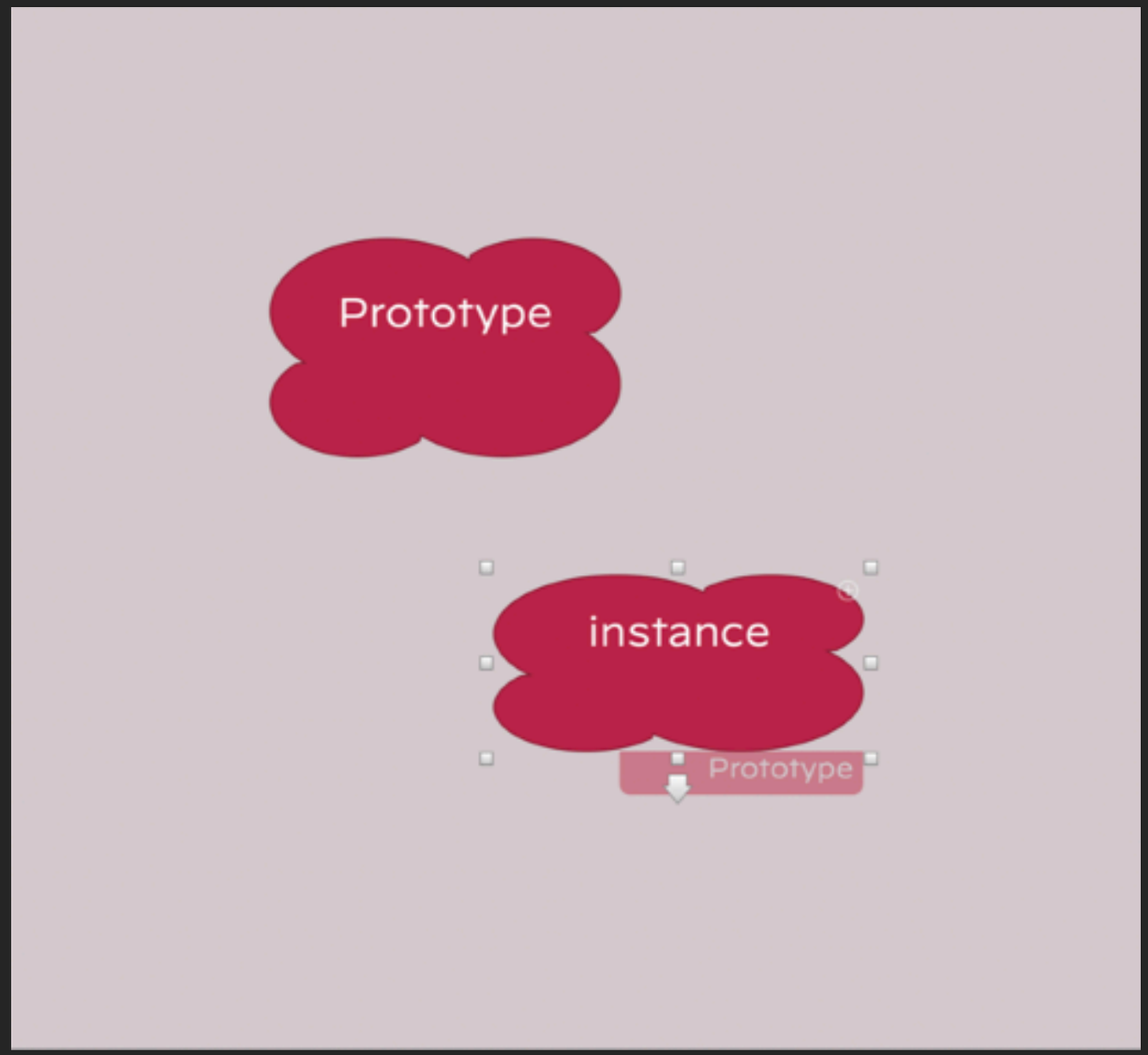
Ivan E. Sutherland. 1963. **Sketchpad: a man-machine graphical communication system.** In Proceedings of the May 21-23, 1963, spring joint computer conference (AFIPS '63 (Spring)). 329–346.

OBJECT-ORIENTED PROGRAMMING IN 1963

EXPANDING SKETCHPAD

Addition of new types of things to the Sketchpad system's vocabulary of picture parts requires only the construction of a new generic block (about 20 registers) and the writing of appropriate subroutines for the new type. The subroutines might be easy to write, as they usually are for new constraints, or difficult to write, as for adding ellipse capability, but at least a finite, well-defined task faces one to add a new ability to the system. Without a generic structure it would be almost impossible to add the instructions required to handle a new type of element.

TINDERBOX: INHERITANCE



TOOLS FOR THOUGHT

NLS/AUGMENT

Engelbart, Douglas C. (1963), '**A Conceptual Framework for the Augmentation of Man's Intellect',** in Howerton, P. (Ed.), Vistas in Information Handling (1; Washington DC: Spartan Books), 1-29.

The first:

* outliner

* URI

* personal workstation

* mouse

* viewspec

* synchronous collaboration system

TOOLS FOR THOUGHT

DOUG ENGELBART

IMMORTAL SYSTEMS

TOOLS FOR THOUGHT

EMACS

Richard M. Stallman. 1981. **EMACS the extensible, customizable self-documenting display editor.** In Proceedings of the *ACM SIGPLAN SIGOA symposium on Text manipulation.* Association for Computing Machinery, New York, NY, USA, 147–156.

EMACS
The Extensible, Customizable Self-Documenting Display Editor

Richard M. Stallman
Artificial Intelligence Lab
Massachusetts Institute of Technology
Cambridge, MA 02139

Abstract

EMACS is a display editor which is implemented in an interpreted high level language. This allows users to extend the editor by replacing parts of it, to experiment with alternative command languages, and to share extensions which are generally useful. The ease of extension has contributed to the growth of a large set of useful features. This paper describes the organization of the EMACS system, emphasizing the way in which extensibility is achieved and used.

This report describes work done at the Artificial Intelligence Laboratory of the Massachusetts Institute of Technology. Support for the laboratory's research is provided in part by the Advanced Research Projects Agency of the Department of Defense under Office of Naval Research contract N00014-80-C-0505.

1. Introduction

EMACS[2] is a real-time display editor which can be extended by the user while it is running.

Extensibility means that the user can add new editing commands or change old ones to fit his editing needs, while he is editing. EMACS is written in a modular fashion, composed of many separate and independent functions. The user extends EMACS by adding or replacing functions, writing their definitions in the same language that was used to write the original EMACS system. We will explain below why this is the only method of extension which is practical to use: others are theoretically equally good but discourage use, or discourage nontrivial use.

Extensibility makes EMACS more flexible than any other editor. Users are not limited by the decisions made by the

add, the user can provide for himself. He can just as easily provide his own alternative to a feature if he does not like the way it works in the standard system.

A coherent set of new and redefined functions can be bound into a *library* so that the user can load them together conveniently. Libraries enable users to publish and share their extensions, which then become effectively part of the basic system. By this route, many people can contribute to the development of the system, for the most part without interfering with each other. This has led the EMACS system to become more powerful than any previous editor.

User customization helps in another, subtler way, by making the whole user community into a breeding and testing ground for new ideas. Users think of small changes, try them, and give them to other users. If an idea becomes popular, it can be incorporated into the core system. When we poll users on suggested changes, they can respond on the basis of actual experience rather than thought experiments.

To help the user make effective use of the copious supply of features, EMACS provides powerful and complete interactive self-documentation facilities with which the user can find out what is available.

A sign of the success of the EMACS design is that EMACS has been requested by over a hundred sites and imitated at least ten times.

1.1. Background: Real-Time Display Editors

By a *display editor*, we mean an editor in which the text being edited is normally visible on the screen and is updated automatically as the user types his commands. No explicit commands to "print" text are needed.

TOOLS FOR THOUGHT

RICHARD STALLMAN

Photo: Sam Williams. CC by SA 3

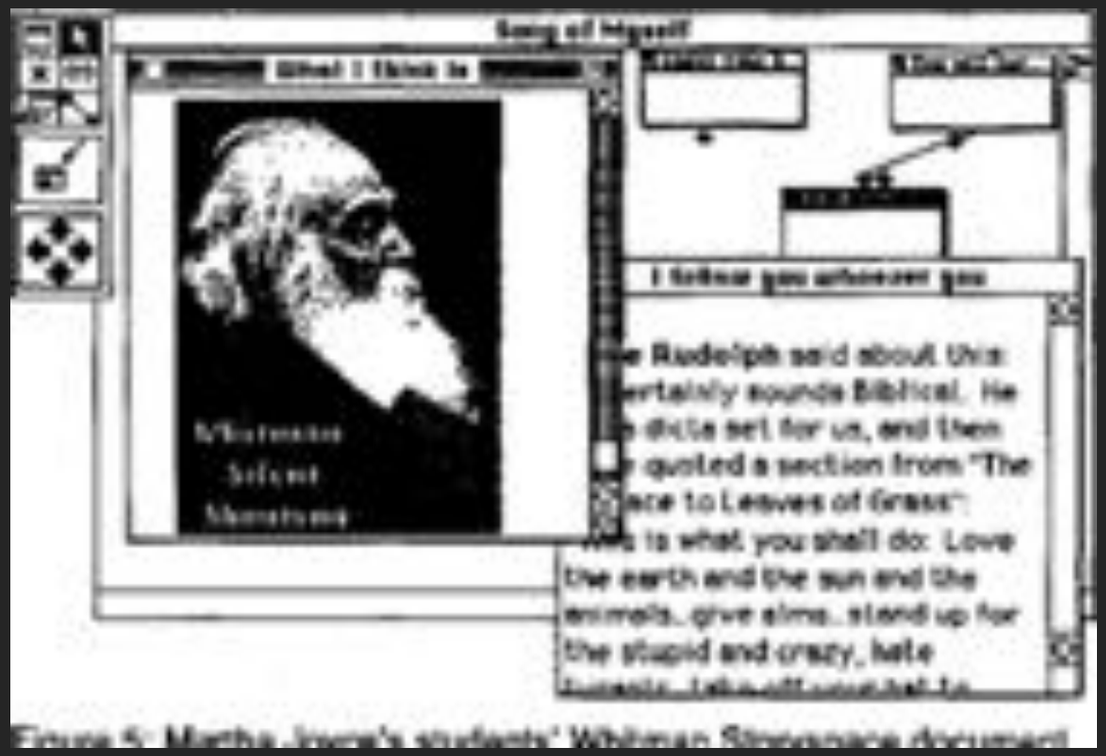
TOOLS FOR THOUGHT

STORYSPACE

Bolter, Jay David and Michael Joyce (1987), '**Hypertext and Creative Writing**', Hypertext '87, 41-50.

Joyce, Michael (1991), '**Storyspace as a hypertext system for writers and readers of varying ability**', Hypertext'91, 381- 387.

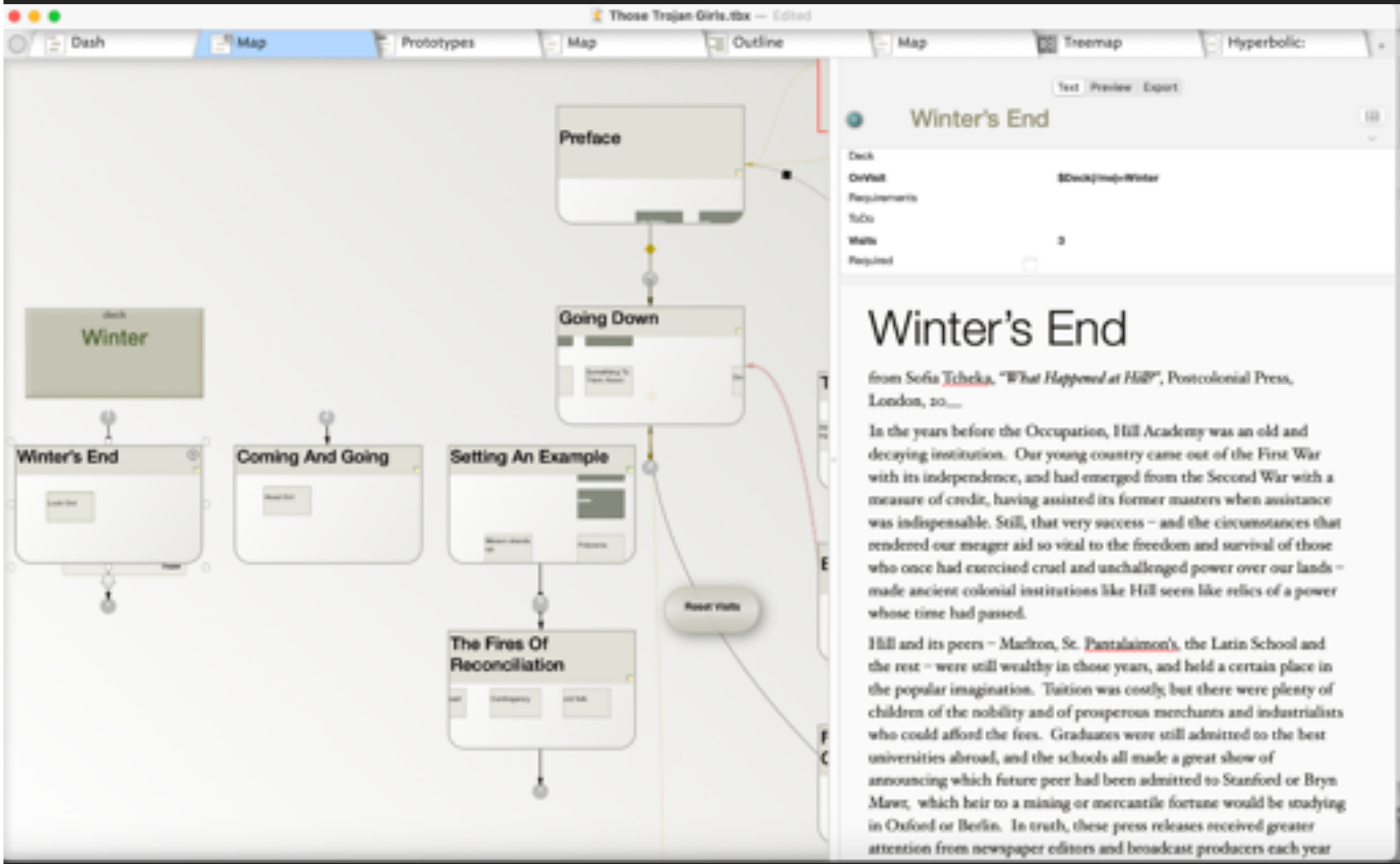
Bernstein, Mark (2016), '**Storyspace 3'**, Proceedings of the 27th ACM Conference on Hypertext and Social Media', HT '16, 201-6.



TOOLS FOR THOUGHT

ARCHITECTONIC WRITING

Bernstein, Mark (2016), **Those Trojan Girls: a hypertext,** (Watertown, MA: Eastgate Systems, Inc.).

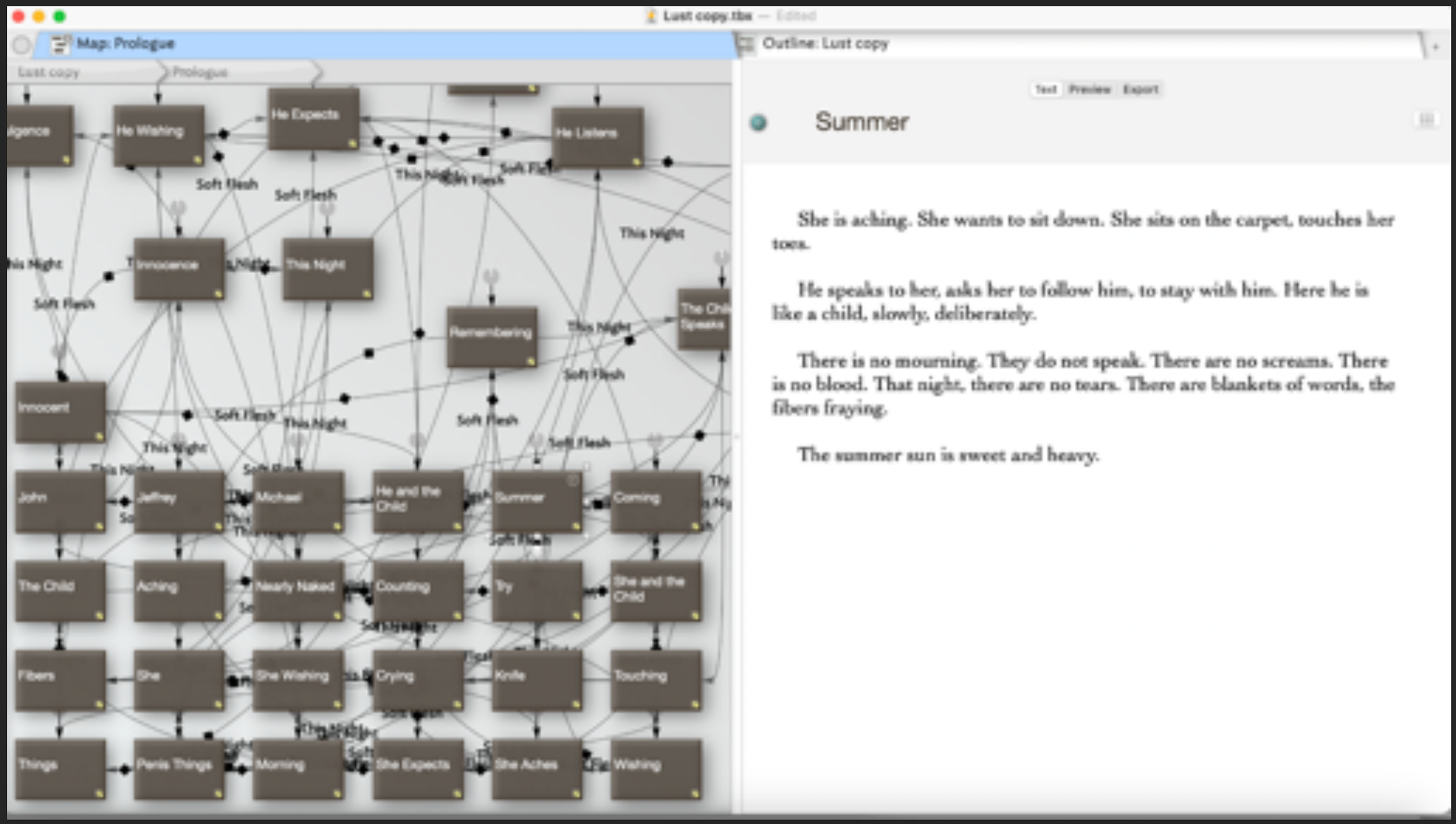


TOOLS FOR THOUGHT

INTERTWINGLED

Arnold, Mary-Kim (1993), ‘Lust’, *Eastgate Quarterly Review of Hypertext, 1 (2)*

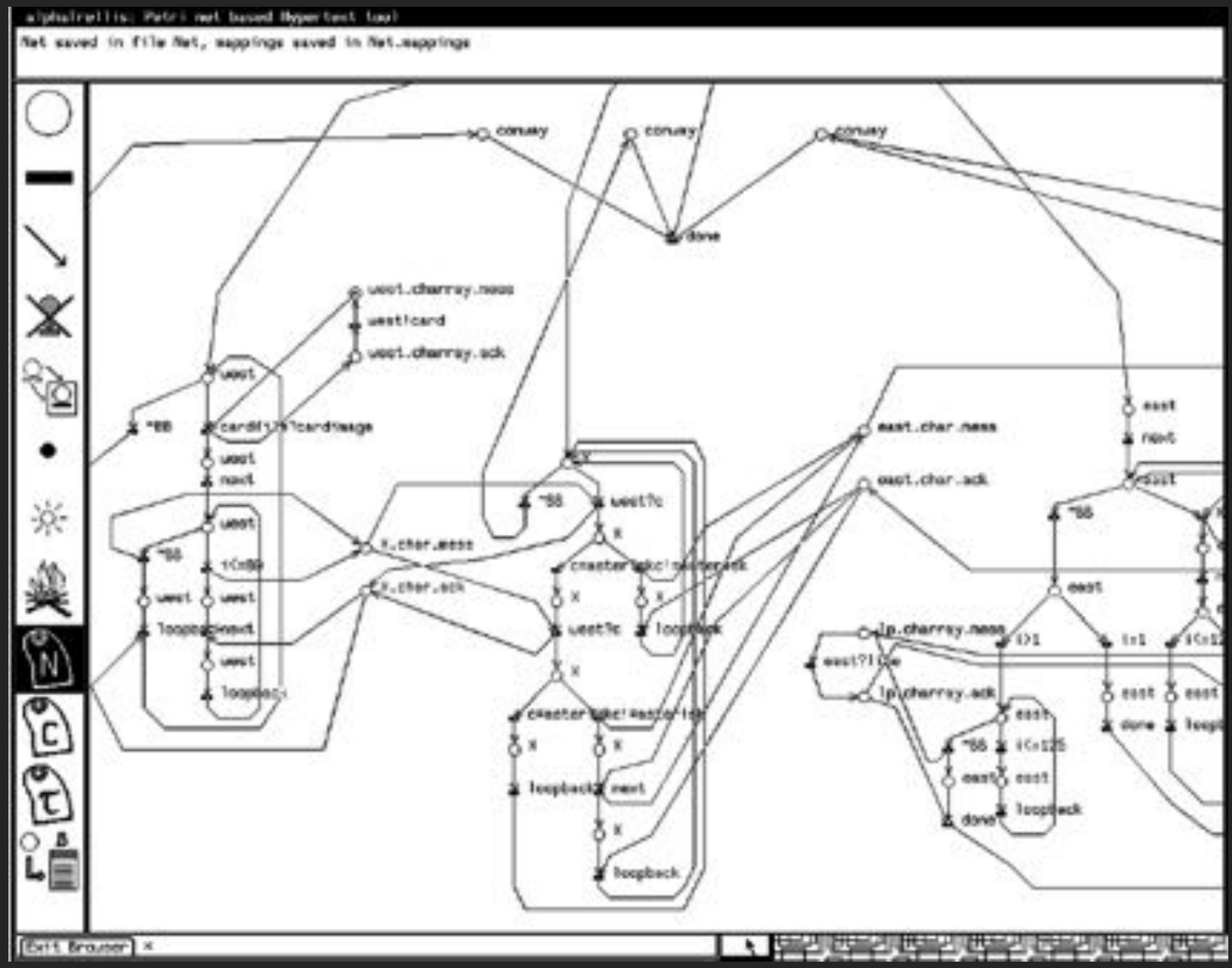
Ensslin, Astrid (2022), *Pre-Web Digital Publishing and the Lore of Electronic Literature,* (Cambridge: Cambridge University Press).



TOOLS FOR THOUGHT

TRELLIS

Stotts, P. David and Richard Furuta (1989), 'Petri-net based hypertext: Document structure with browsing semantics', ***ACM Transactions on Office Information Systems*, 7 (1),** 3-29.



STANDARDS & MODELS

TOOLS FOR THOUGHT

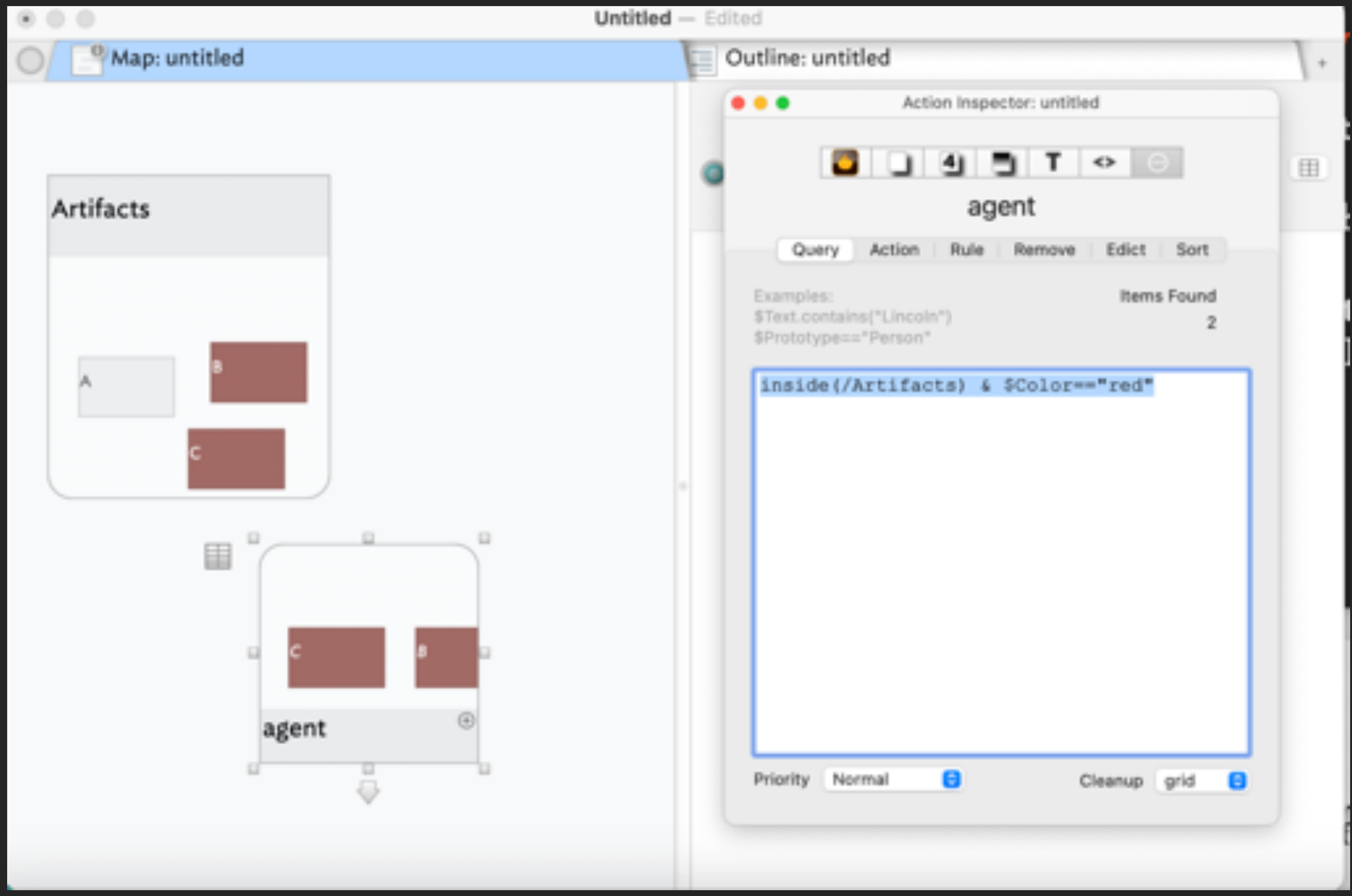
HYPERSET

H. Van dyk Parunak, **“Don't link me in: set based hypermedia for taxonomic reasoning”,** HYPERTEXT '91: Proceedings of the third ACM conference on Hypertext, 233-42

“Users move from one node to another in the same set, and from one set to another by way of nodes in the intersection of those sets. They do not think of nodes as linked directly to one another, but in terms of the sets to which they belong. Implementation of such a model in a conventional graph-based hypermedia shell is at best difficult, since the corresponding graph needs nondirectional links of arity greater than two.”

TOOLS FOR THOUGHT

SETS IN TINDERBOX



A CAMBRIAN EXPLOSION

Lots of wonderful ideas

Stone knives and bearskins

TOOLS FOR THOUGHT

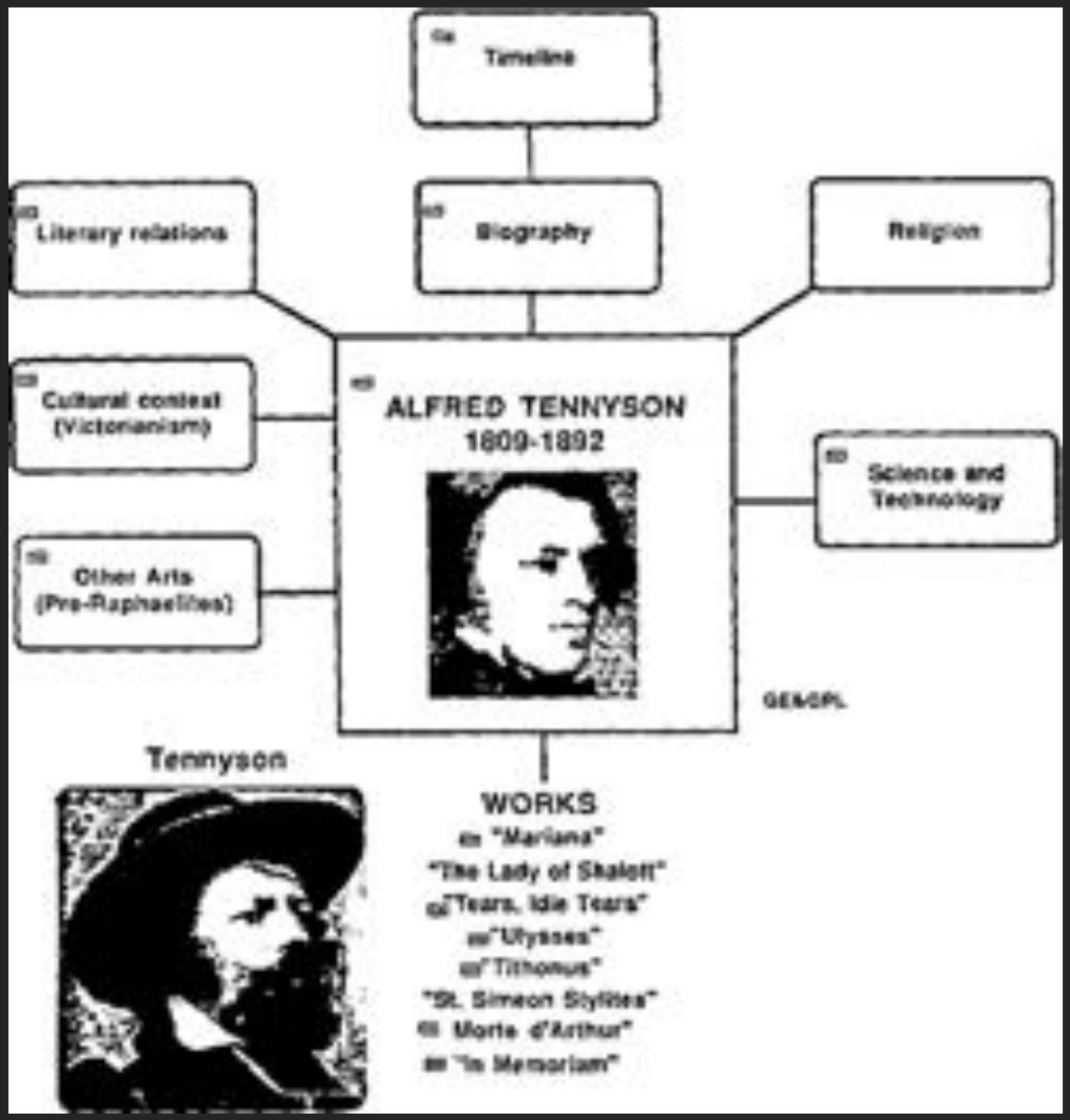
KMS

Akscyn, Robert, Donald McCracken, and Elise Yoder (1987), '**KMS: A Distributed Hypermedia Systems for Managing Knowledge in Organizations**', Hypertext 87

Halasz, Frank. (1987), '**"Seven Issues": Revisited**', Hypertext 91, https://www.eastgate.com/hypertext/Halasz/Halasz7Rev.pdf

CARD SHARKS AND HOLY SCROLLERS

INTERMEDIA

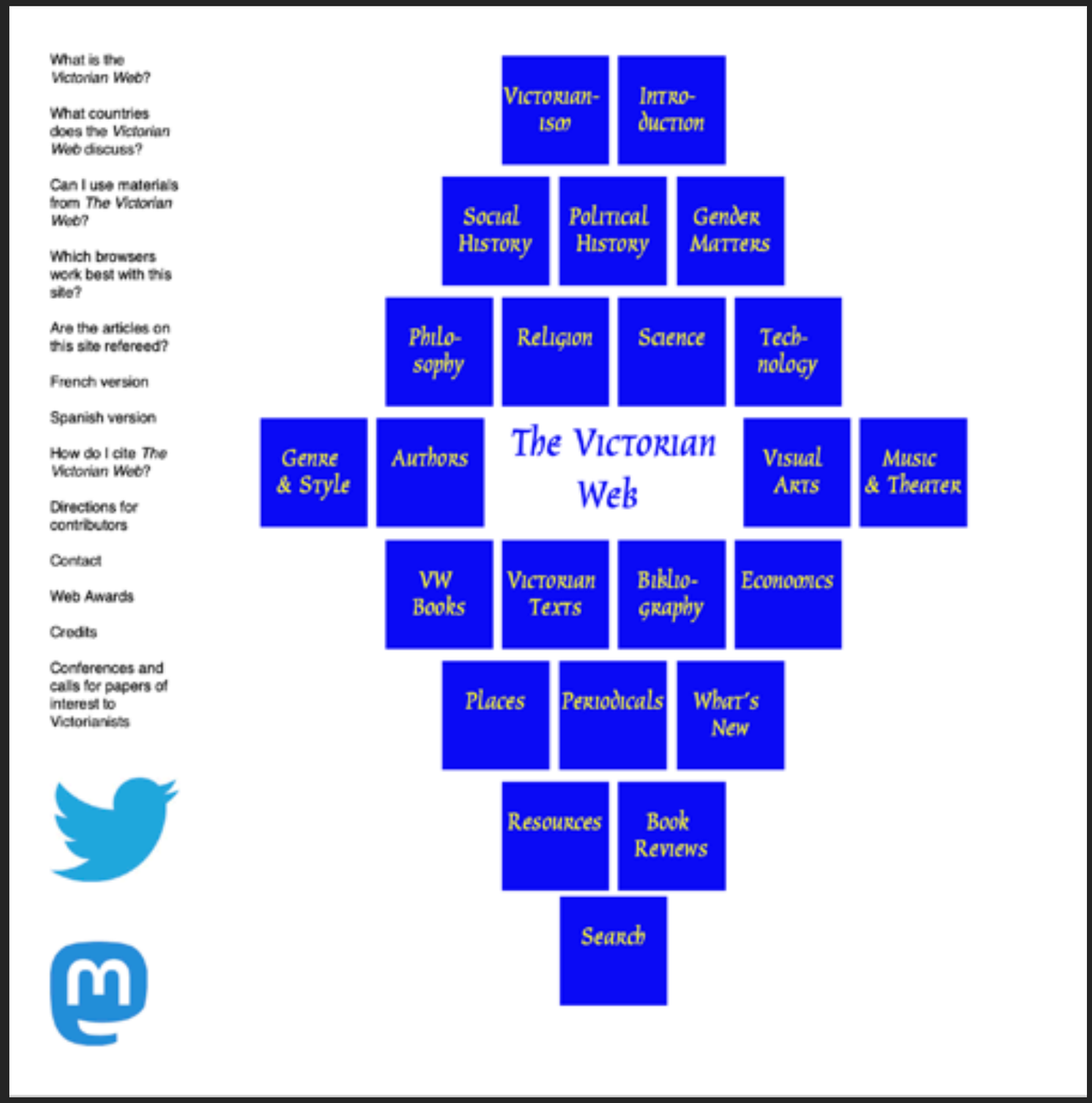


Yankelovich, N., N. Meyrowitz, and A. van Dam (1985), '**Reading and Writing the electronic book**', IEEE Computer, Oct. 1985

Yankelovich, N., et al. (1988), '**Intermedia**: The Concept and the Construction of a Seamless Information Environment', IEEE Computer, 21 (1), 81-96.

TOOLS FOR THOUGHT

VICTORIANWEB.ORG



TOOLS FOR THOUGHT

RHETORIC

"The link is the most significant new punctuation since the medieval invention of the comma."

— me

Landow, George P. (1987), '**Relationally Encoded Links and the Rhetoric of Hypertext**', Hypertext 87, 331-44.

Bernstein, Mark, Michael Joyce, and David B. Levine (1992), '**Contours of Constructive Hypertext**', European Conference on Hypermedia Technology, 161.

Lanham, Richard A. (1993), **The Electronic Word**: Democracy, Technology, and the Arts, (Chicago: University of Chicago Press).

Bernstein, Mark and Stacey Mason (2020), '**Links: Exercises In Style**', Proceedings of the 30th ACM Conference on Hypertext And Social Media,

EYEBROW / CAPLINE HEADER

GUIDE

Stretchtext replaces links

Stretchtext extends and changes links

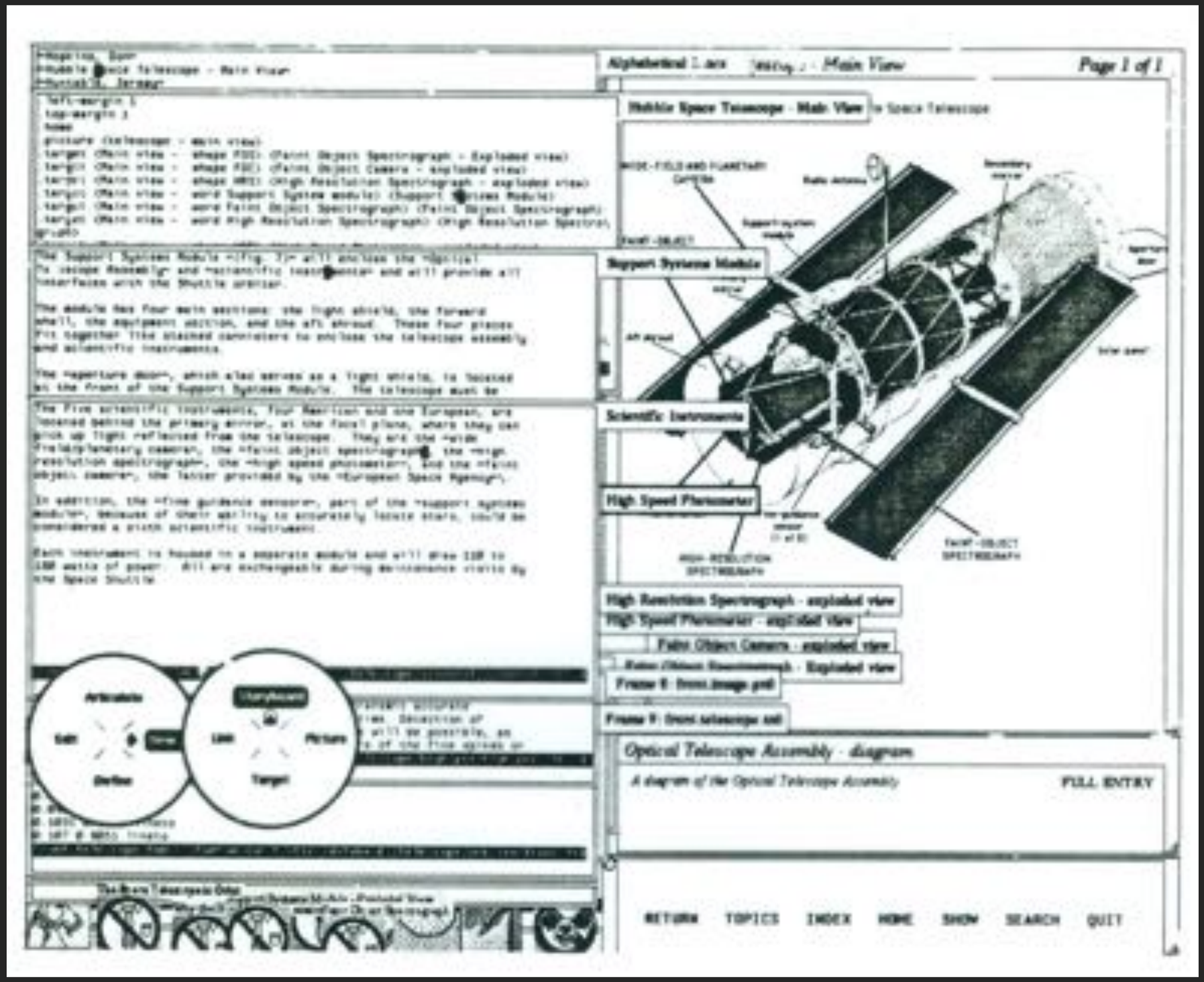
Brown, Peter J. (1987), ‘**Turning Ideas Into Products: The Guide System’,** Proceedings of the ACM Conference on Hypertext, 33-40

Brown, Peter J. (1989), ‘**Do we need maps to navigate round hypertext documents?**’, Electronic Publishing — Organization, Dissemination and Design, 2 (2), 91-100.

P. J. Brown. 1993. U**NIX guide: lessons from ten years' development.** In Proceedings of the ACM conference on Hypertext (ECHT '92). Association for Computing Machinery, New York, NY, USA, 63–70.

Bernstein, Mark (2009), **‘On Hypertext Narrative’**, 20th ACM Conference on Hypertext and Social Media. 5-14

HYPERTIES


Hubble Space Telescope - Main View
Page 1 of 1
Support Systems Module
Scientific Instruments
High Speed Photometer
High Resolution Spectrograph - exploded view
High Speed Photometer - exploded view
Faint Object Camera - exploded view
Optical Telescope Assembly - diagram
A diagram of the Optical Telescope Assembly
FULL ENTRY
RETURN
TOPICS
INDEX
HOME
SHOW
SEARCH
QUIT

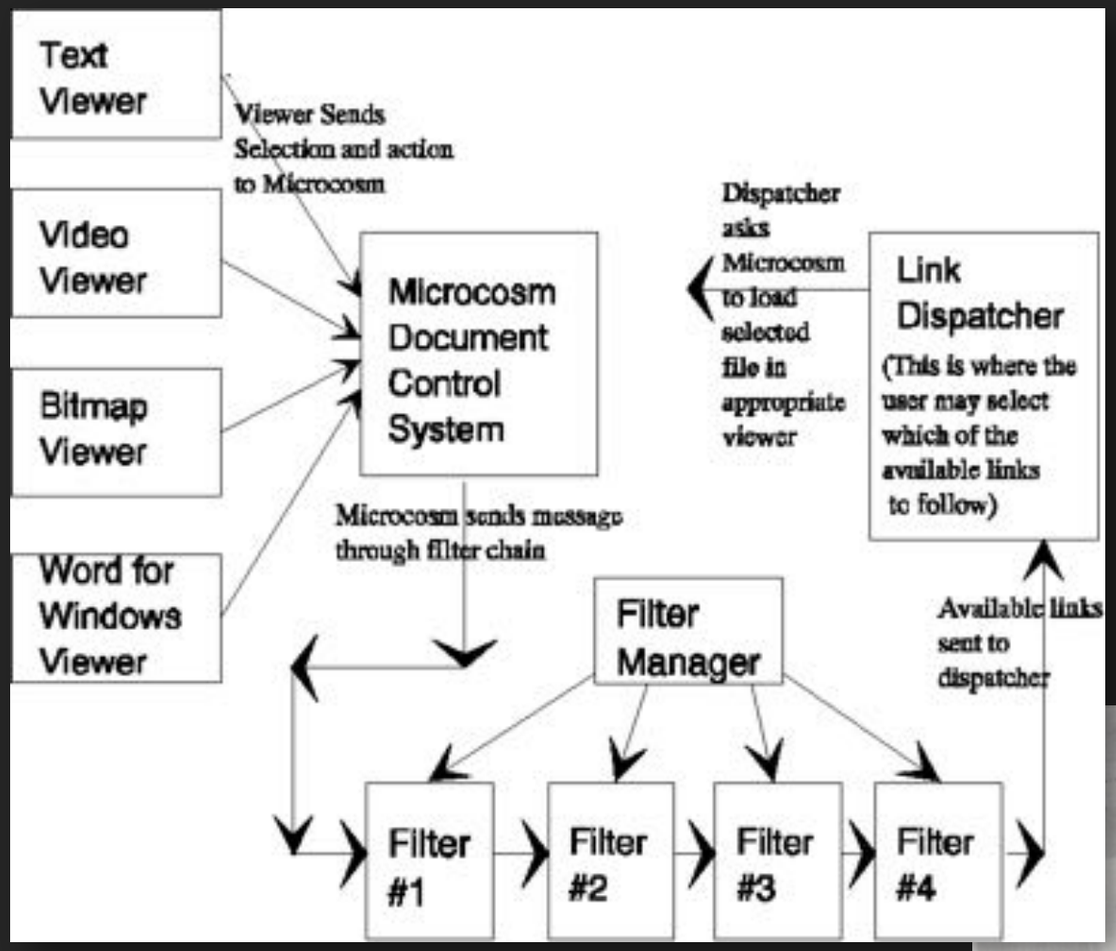
RANDY TRIGG ❧ TYPED LINKS

Trigg, Randall (1983), '**A Network-Based Approach to Text Handling for the Online Scientific Community**', (University of Maryland Technical Report, TR-1346).

Normal link types		
Citation C-source C-pioneer C-credit C-leads C-epon Background Future Refutation Support Methodology Data	Generalization/Specification Abstraction/Example Formalization/Application Argument A-deduction A-induction A-analogy A-intuition Solution	Summarization/Detail Alternate-view Rewrite Simplification/Complication Explanation Correction Update Continuation
Commentary link types		
Comment Critics Supportive *Environment* E-comment E-misrepresent E-vacuum E-ignored E-Isupersede E-Irefute E-Isupport E-Irepeat *Problem Posing* P-comment P-trivial P-unimportant P-impossible P-ill-posed P-solved P-ambitious	*Points* Pt-comment Pt-trivial Pt-unimportant Pt-irrelevant Pt-redherring Pt-contradict Pt-dubious Pt-counter Pt-inelegant Pt-simplistic Pt-arbitrary Pt-unmotivated *Arguments* A-comment A-invalid A-insuff A-immaterial A-mislead A-alternate A-strawman	*Data* D-comment D-inadequate D-dubious D-ignored D-irrelevant D-inapplicable D-misinterpreted *Style* S-comment S-boring S-unimaginative S-incoherent S-arrogant S-rambling S-awkward

Table 4.1: Link types.

MICROCOSM



Fountain, A. M., et al. (1990), '**MICROCOSM: An Open Model for Hypermedia With Dynamic Linking**', in A. Rizk, N. Streitz, and J. André (ed.), *Hypertext: Concepts, Systems and Applications (Proceedings of ECHT'90)* (Cambridge: Cambridge University Press), 298-311.

Davis, Hugh C. (1998), '**Referential Integrity of Links in Open Hypermedia Systems**', The Proceedings of the Ninth ACM Conference on Hypertext and Hypermedia, Hypertext 98, 207-16.

Michaelides, Danius T., et al. (2001), '**Auld Leaky: A Contextual Open Hypermedia Link Server'**, Proceedings of the 7th Workshop on Open Hypermedia Systems,

Dame Wendy Hall
ACM Presidential Award 2022

TOOLS FOR THOUGHT

SCULPTURAL HYPERTEXT

Hargood, Charlie, Mark J. Weal, and David E. Millard (2018), '**The StoryPlaces Platform: Building a Web-Based Locative Hypertext System** Proceedings of the 29th on Hypertext and Social Media', HT '18, 128-35.

Bernstein, Mark and Diane Greco (2002), **'Card Shark and Thespis: exotic tools for hypertext narrative**', in Wardrip-Fruin, Noah and Pat Harrigan (eds.), *First Person* (Cambridge: MIT Press)

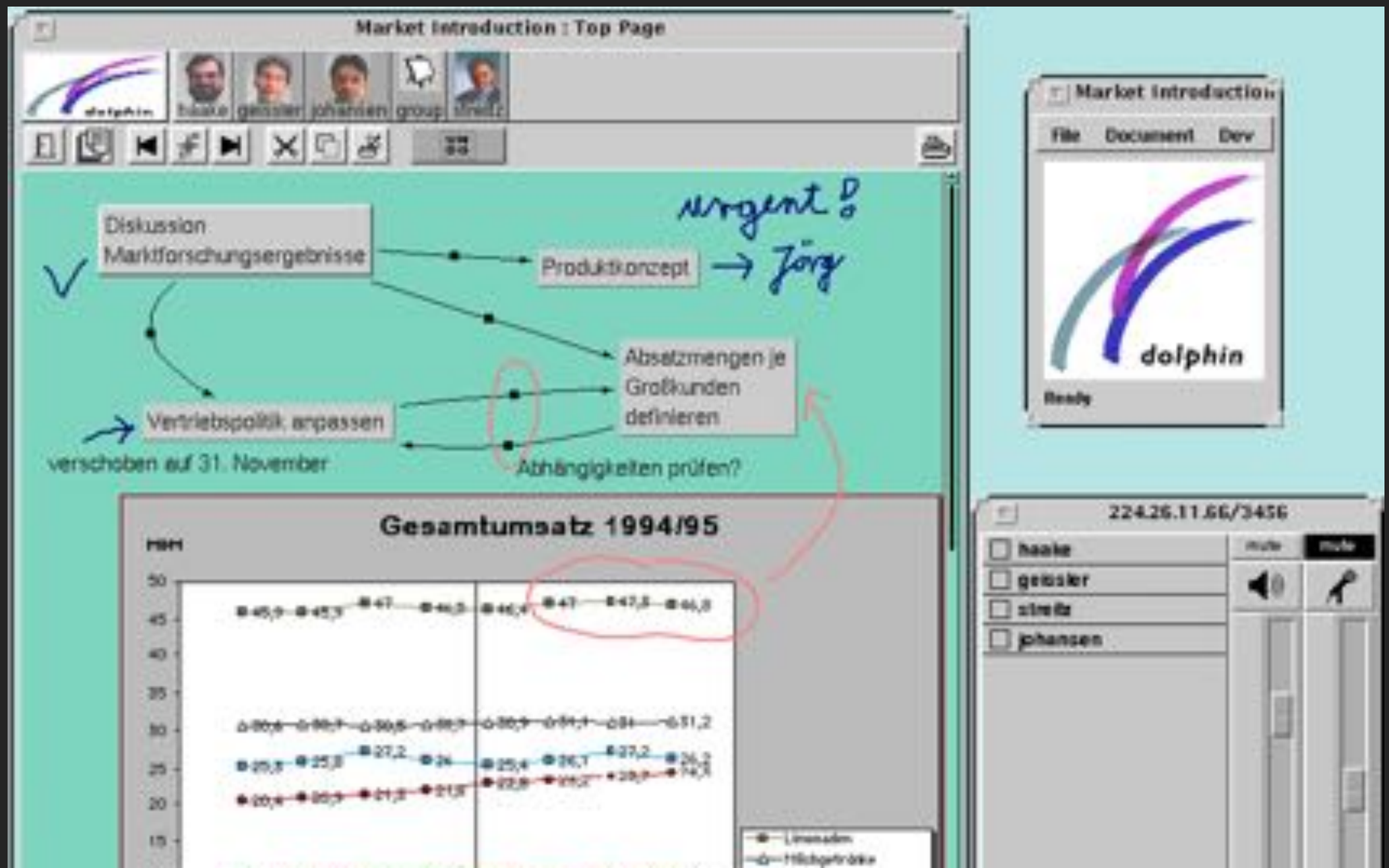
SEE REMNOTE AND NOTION

TOOLS FOR THOUGHT

SEPIA/DOLPHIN

Streitz, Norbert, et al. (1994), ‘DOLPHIN: Integrating meeting support across local and remote desktop environments and liveboards’, CSCW 94, 345-59

Streitz, Norbert, et al. (1992), ‘SEPIA: A cooperative Hypermedia Authoring Environment’, ECHT 92, 11-22.



TOOLS FOR THOUGHT

AQUANET

"A system to hold your ideas in place"

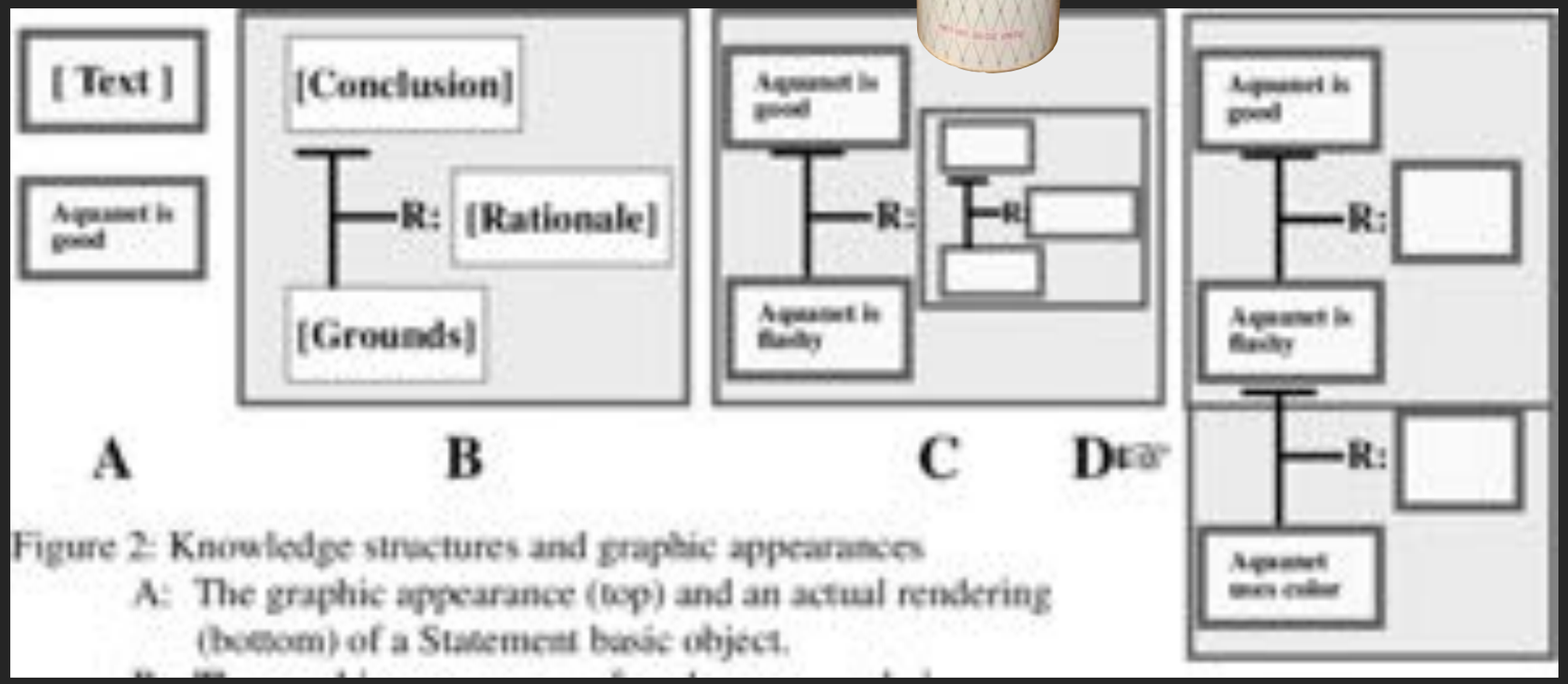
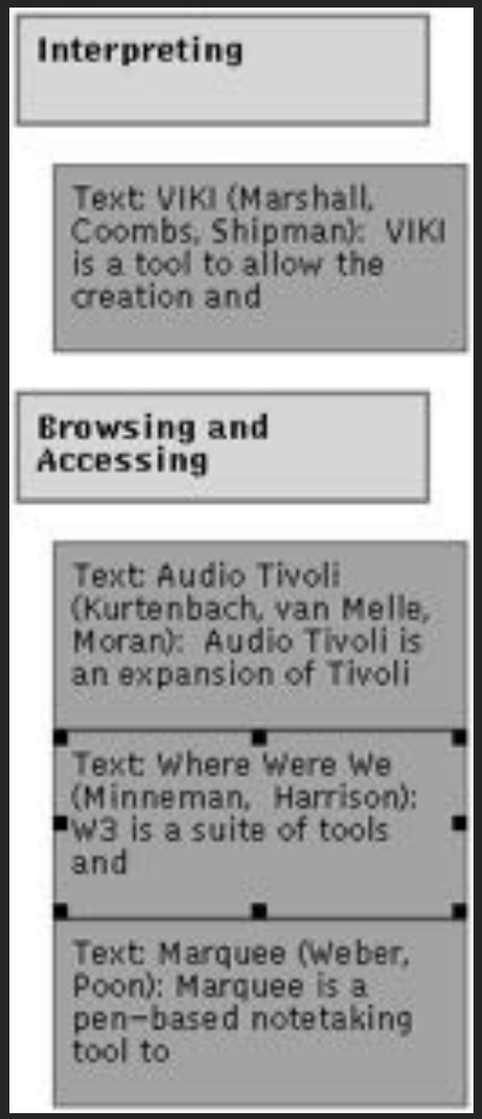


Figure 2: Knowledge structures and graphic appearances
A: The graphic appearance (top) and an actual rendering (bottom) of a Statement basic object.

Marshall, CC., et al. (1991), '**Aquanet: A Hypertext Tool to Hold Your Knowledge in Place**', Hypertext'91, 261-75.

Marshall, C.C. and R.A. Rogers (1992), '**Two Years before the Mist**: Experiences with Aquanet', ECHT'92, 53-62.

VIKI



Shipman, Frank and Catherine C. Marshall (1999), '**Formality Considered Harmful:** Experience, emerging themes, and directions on the use of formal representations in interactive systems', *CSCW*, 333-52.

Marshall, Catherine C., Frank M. Shipman III, and James H. Coombs (1994), '**VIKI: Spatial Hypertext Supporting Emergent Structure**', ECHT'94, 13-23.

Marshall, Catherine C. and III Shipman, Frank M. (1997), '**Spatial hypertext and the practice of information triage**', Proceedings of the eighth ACM conference on Hypertext, 124-33.

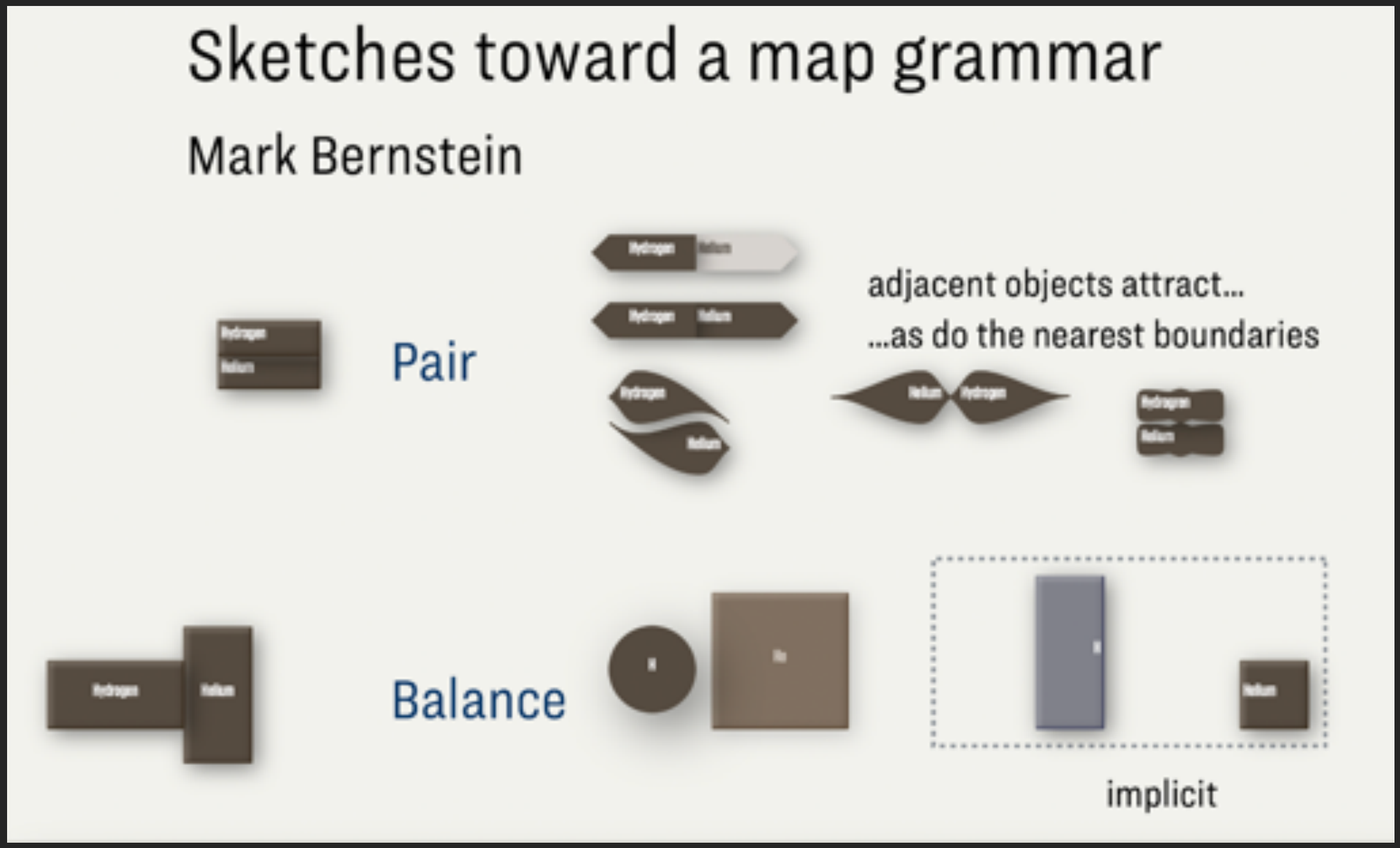
“Tinderbox was meant to by Tiny VIKI. It turned into Tiny Aquanet.”

- Me

TOOLS FOR THOUGHT

SPATIAL HYPERTEXT

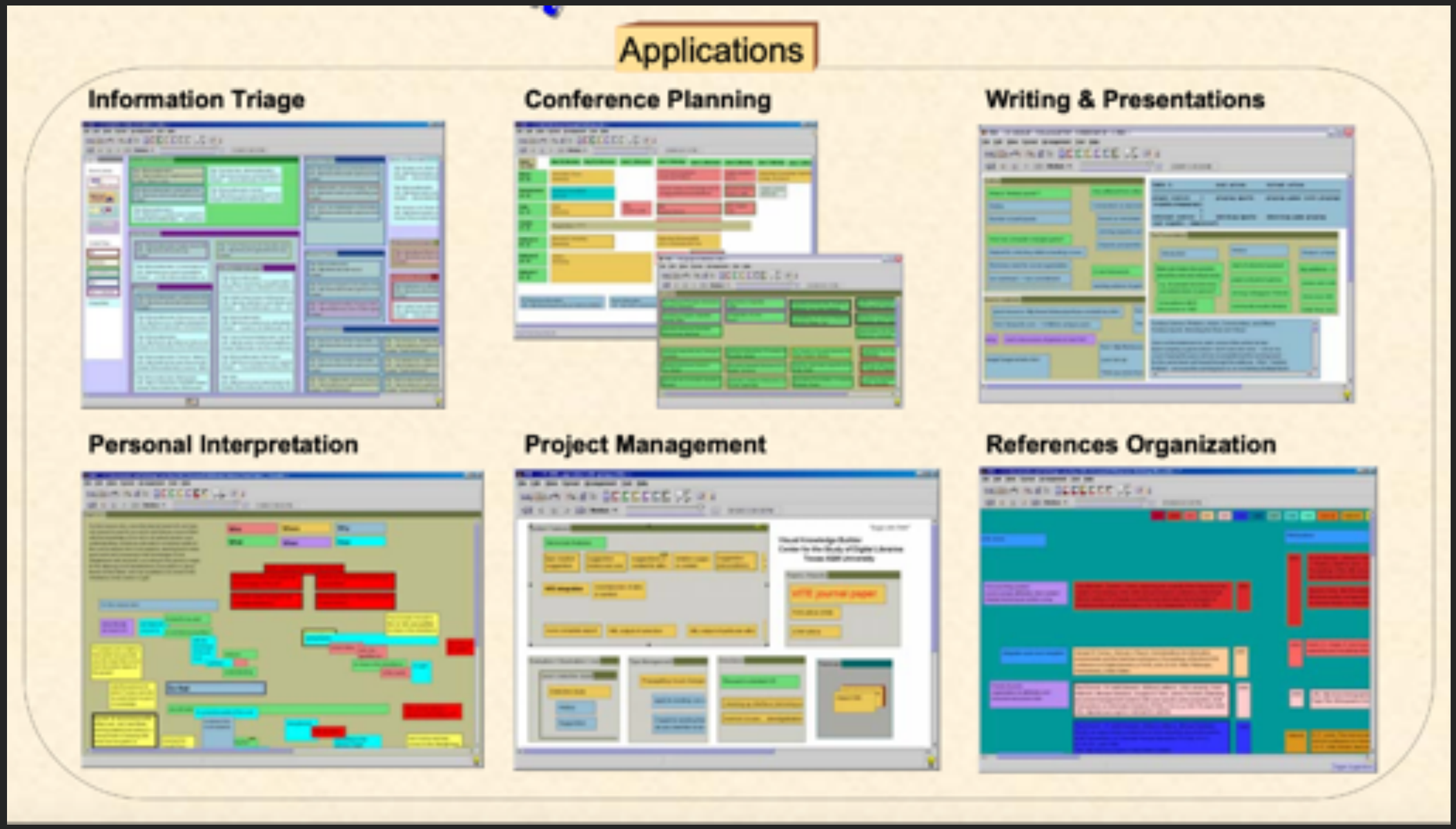
Bernstein, Mark (2011), '**Can We Talk About Spatial Hypertext?**', Proceedings of the 22nd ACM Conference on Hypertext and Hypermedia, 103-12.



TOOLS FOR THOUGHT

VKB AND VITE

Shipman, Frank, et al. (2001), '**The Visual Knowledge Builder**: A Second Generation Spatial Hypertext', Hypertext 2001: Proceedings of the 12th ACM Conference on Hypertext and Hypermedia, 113-22.



THERE'S LOTS MORE!

Agenda
Aha
Auld Leaky
Chandler
Cyc/Eurisko
Dexter Model
Fluid
FRESS
Frontier
Gateway
HES
HyperCard
Hypergate
iMapping
Information Cities
KEE
Literate Programming
MacWeb
Mother/Hell/Mitgard
NoteCards
Ntergaid
Pad++
Perseus
Structure Server
Sun Link Service
SuperBook
Symbolics Document Examiner
TINAC Manifesto
Twine
WikiWiki
Xanadu

TOOLS FOR THOUGHT

IT CONTINUES

THOUGHTFUL TOOLS

BERNSTEIN@EASTGATE.COM