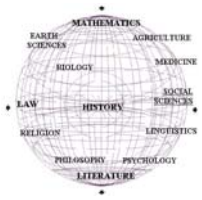
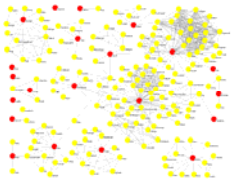
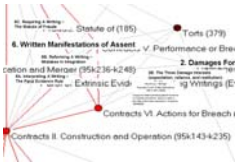
A Proposed Doctoral Research Agenda

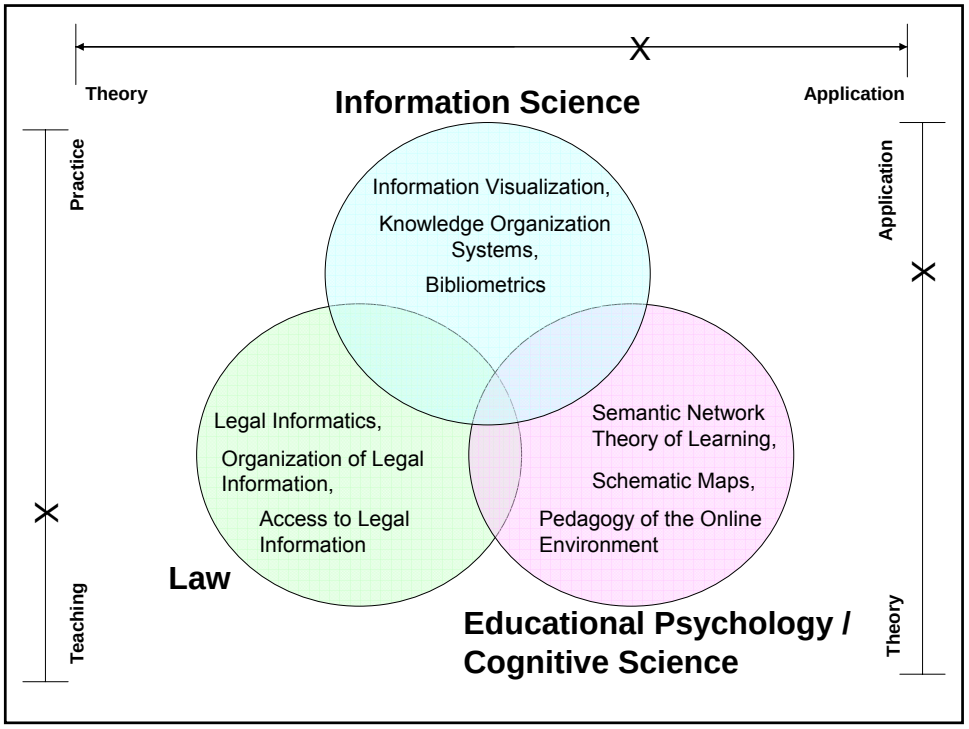






Peter A. Hook
Information Visualization Laboratory
December 16, 2004

Where can I make the most significant contributions commensurate with my interests?



Big Picture Interests

- Domain Maps for Classroom Teaching
- Visual Interfaces to Digital Libraries that Incorporate Domain Maps
  - subtly impart the underlying organizational schema to the user.
  - enhance recall and facilitate navigation back to previously viewed content.
  - Visual OPAC's
- Legal Metrics and Visualizations
- Incorporating GPS metadata into cataloging (and the Semantic Web?)

Qualifying Paper

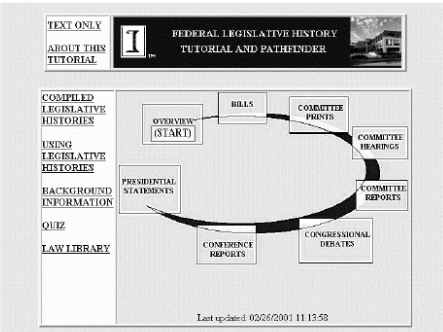
- Survey of the history of KDV's (domain maps), their application, and their use as visual interfaces to digital libraries.
- Combined with a survey of all of the relevant benefits of KDV's from the perspective of educational psychology.

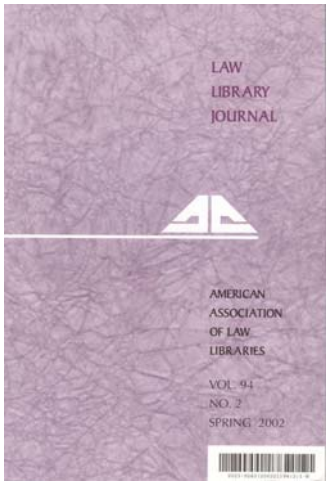
KDV's ∩ Educational Psychology

Expand On Initial Educational Psychology Findings

Hook, Peter A., "Creating An Online Tutorial and Pathfinder," *Law Library Journal* 94:2 (2002) 243-265.

Navigation Frontispiece





Semantic Network Theory of Learning

- Our memory is organized into networks consisting of interlinked nodes.
- Nodes are basic pieces of information or individual words.
- The interlinking of nodes forms knowledge structures or schemas.
- Learning is the process of building new knowledge structures by acquiring new nodes.

Semantic Network Theory Con't

- These new nodes are interrelated with existing nodes and with each other.
- When learners form links between new and existing knowledge, the new knowledge is integrated and comprehended.
  - DAVID H. JONASSEN ET AL., STRUCTURAL KNOWLEDGE: TECHNIQUES FOR REPRESENTING, CONVEYING AND ACQUIRING STRUCTURAL KNOWLEDGE 9 (1993).
  - Domain Maps facilitate this process.

Domain Map Benefits Con't

- Ideas with structure are better recalled than unstructured lists of ideas.
- Understanding the "structural organization of a knowledge domain is a better predictor of being able to problem solve in an area than aptitude (as measured by standardized test scores) or past performance on a similar set of problems."
- What separates expert and novice problem solvers is the well-developed and interconnected knowledge networks of the experts.

Domain Map Benefits Con't

- Structured overviews, spider maps, concept maps, and cognitive maps are ways to ***explicitly*** depict the organization of content through graphics.
- They provide a non-textual means for the user to assimilate a knowledge schema.
- They provide visual scaffolding for the assimilation and comprehension of ideas in a knowledge domain.

Educational Psychology

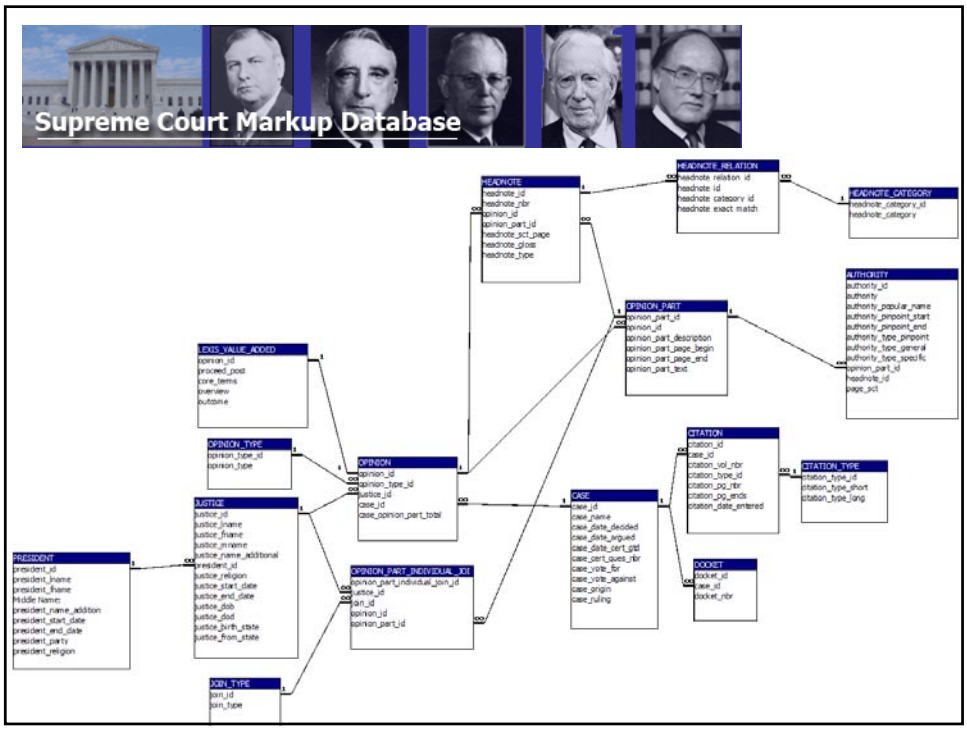
- Experts conveying information instinctively structure the information based on their knowledge schema for that particular domain.
- Readers who are able to discern the author's schema are better able to remember and internalize the information than those who don't recognize the author's organizational framework.
- Learners who are regarded as having good reading comprehension instinctively search out the author's organizational structure and use it to recall content.

Visual Perception and Pedagogy

- Researchers believe that textual and visual information are stored in different areas of the brain.
- Visual information stored in the nonverbal memory region can be highly effective in cuing memory stored in the verbal region.
  - Raymond W. Kulhavey & William A. Stock, Reference Maps as a Framework for Remembering Text, in COMPREHENSION OF GRAPHICS 153, 154 (Wolfgang Schnotz & Raymond W. Kulhavey eds., 1994).

Visual Perception Con't

- Textual or visual information is easier to remember if it can be stored and located spatially.
  - George A. Miller, Psychology and Information, AM. DOCUMENTATION, July 1968, at 287, 286; William Winn, Contributions of Perceptual and Cognitive Processes to the Comprehension of Graphics, in COMPREHENSION OF GRAPHICS at 3, 20.
- The spatial dimension of memory and learning is more important than non-spatial features such as color.
- Animals and humans "learn associations between places and actions more readily than between forms, colors, or sizes and actions."



- Database – tool to store data and analyze the work of the Supreme Court
  - capture the differences between Lexis and West categorizations and facilitate meaningful comparisons
  - spot trends
  - generate relevant metrics
  - provide data to visualize the work of the Court based on semantic space, topic co-occurrence, or citation linkages

Cases in Context:

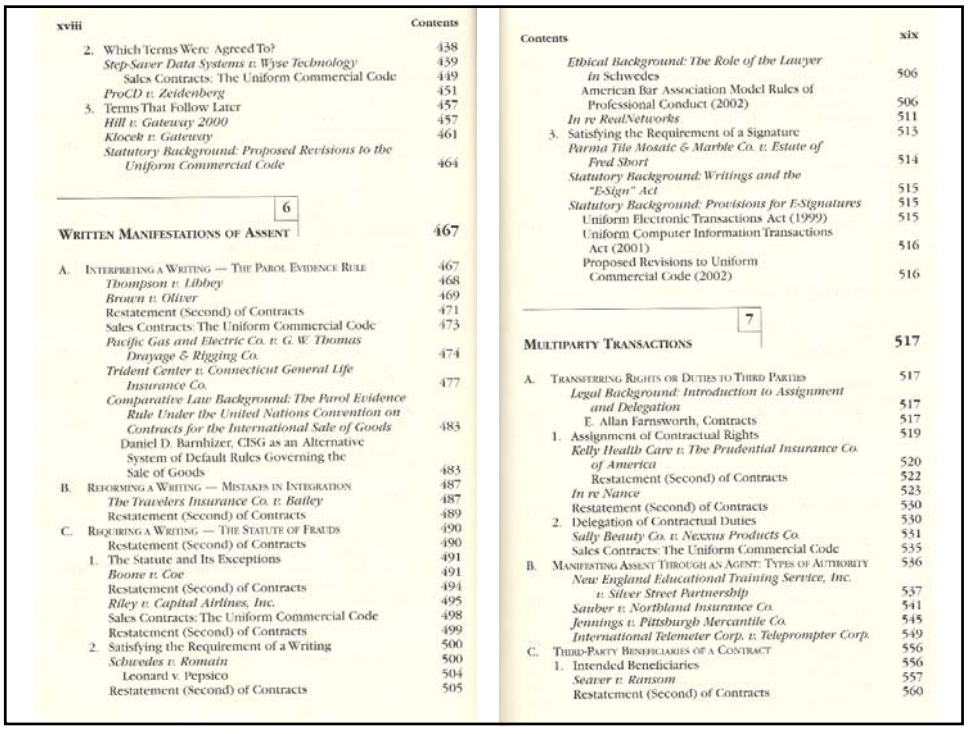
The Content of Barnett's Contracts Casebook Overlain on a Domain Map of Contracts

Peter Hook

L597: Structural Data Mining and Modeling
December 8, 2004

Goal

- Produce a domain map of Contracts law based on the items contained in one casebook.
- Provide an alternative to the lengthy table of contents as a study aid and schematic organization tool.
- Use spatial cues to facilitate memory and the internalization of the conceptual schema of Contracts law.



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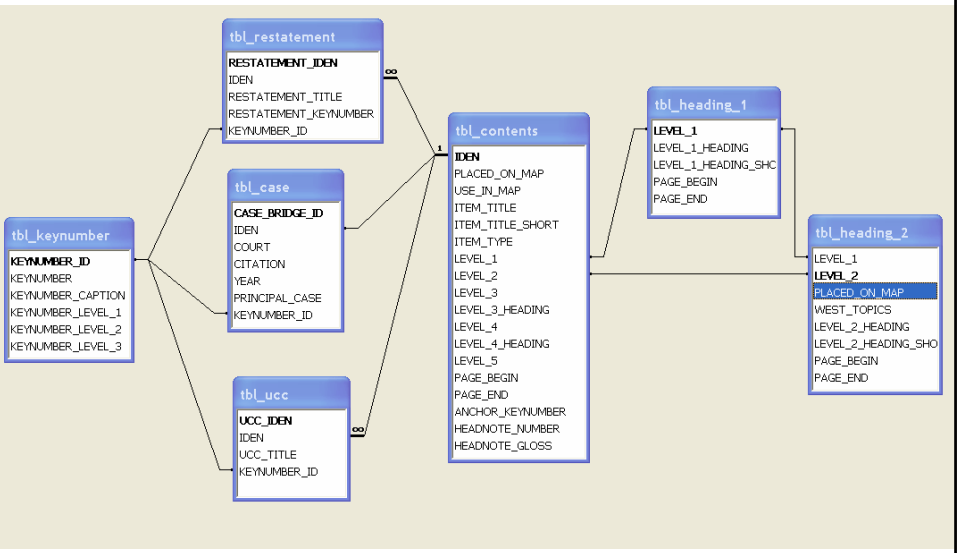
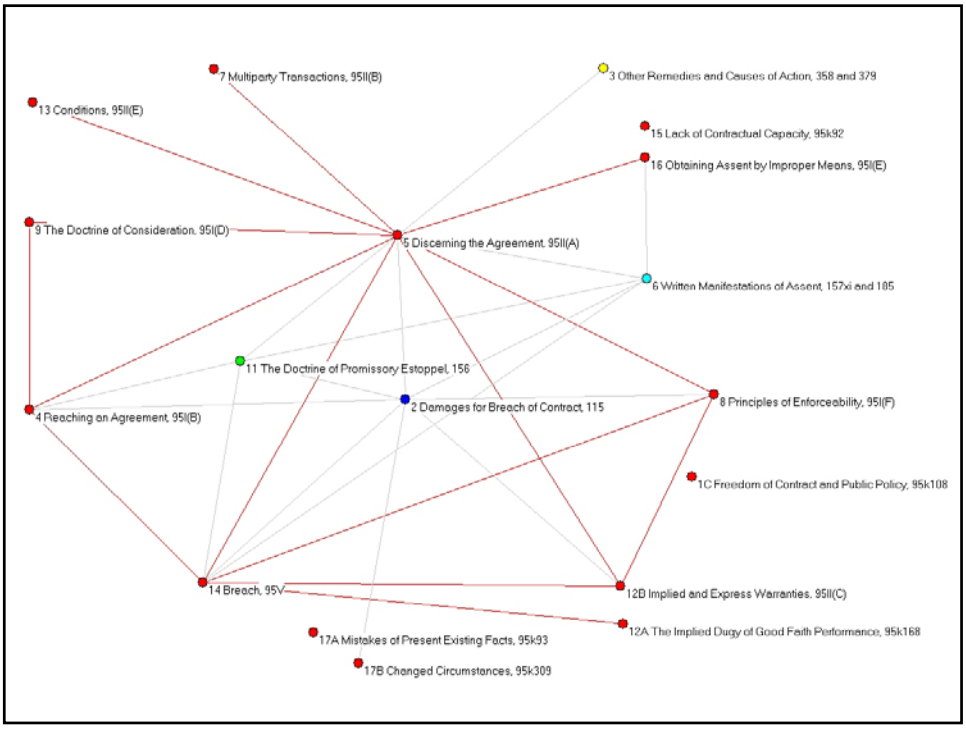
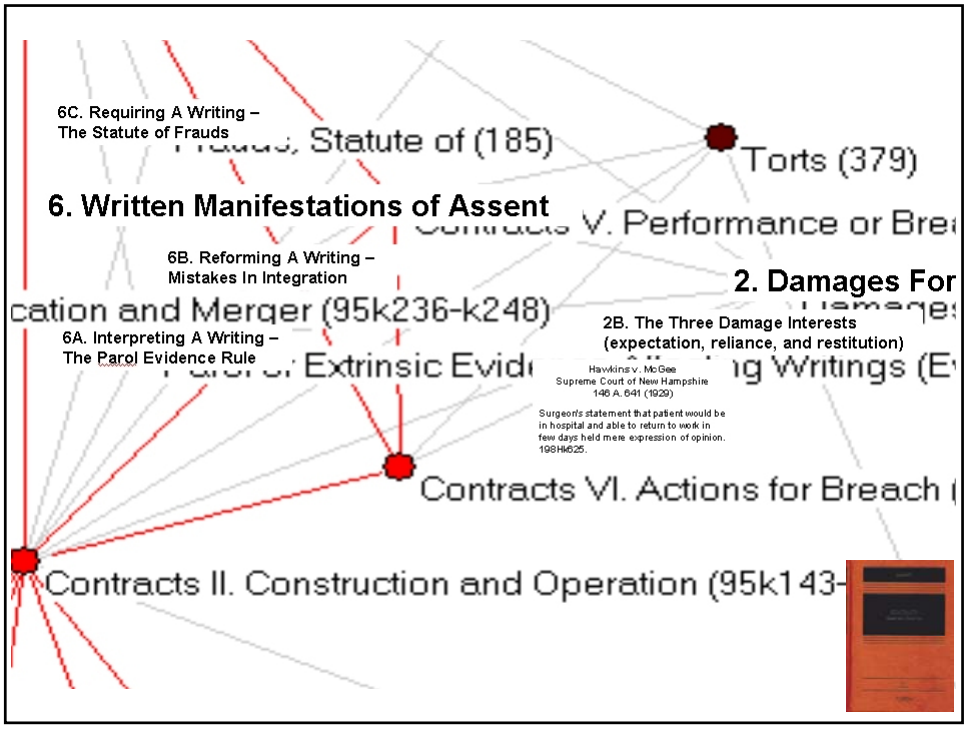
Structure in Database Terms







Domain Map of Contracts Law (Based on Barnett's Casebook)

13. CONDITIONS

7. MULTIPARTY TRANSACTIONS

3. OTHER REMEDIES AND CAUSE OF ACTION

15. LACK OF CONTRACTUAL CAPACITY

10. INTENTION TO BE LEGALLY BOUND

16. OBTAINING ASSENT BY IMPROPER MEANS

9. DOCTRINE OF CONSIDERATION

5. DISCERNING THE AGREEMENT

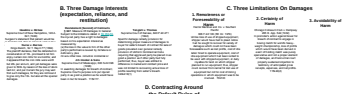
6. WRITTEN MANIFESTATIONS OF ASSENT

11. DOCTRINE OF PROMISSORY ESTOPPEL

8. PRINCIPLES OF ENFORCEABILITY

4. REACHING AN AGREEMENT

2. DAMAGES FOR BREACH OF CONTRACT



1. INTRODUCTION TO CONTRACT LAW

14. BREACH

17. FAILURE OF A BASIC ASSUMPTION

12. PERFORMANCE

A. Mistakes of Present Existing Facts

B. Changed Circumstances

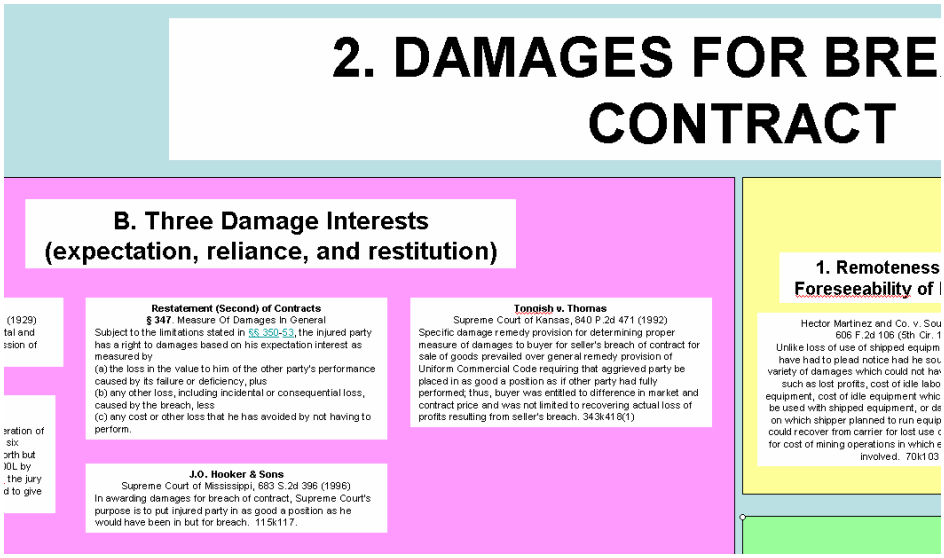
C. Allocation of Risk in Long-Term Contracts

A. Implied Duty of Good Faith Performance

B. Implied and Express Warranties

Crude Mockup of Domain Map

(Detail)

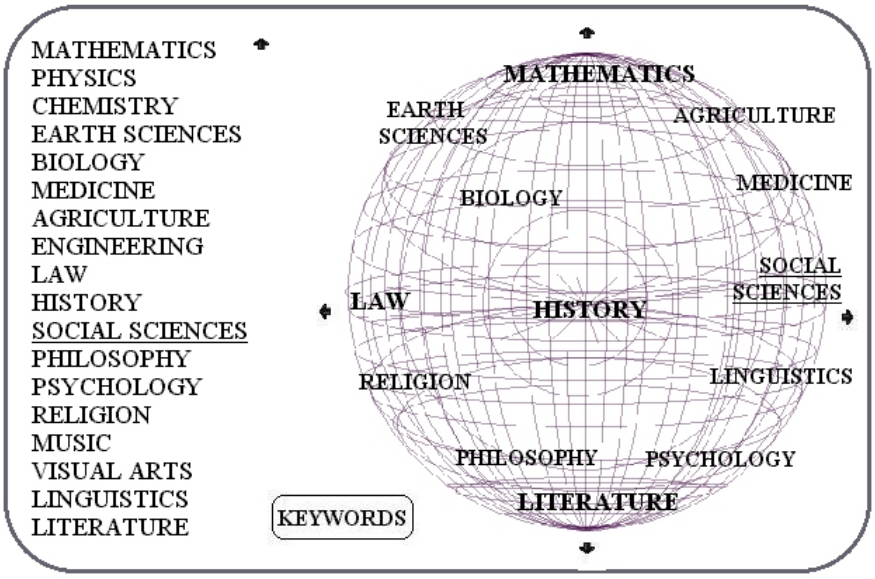


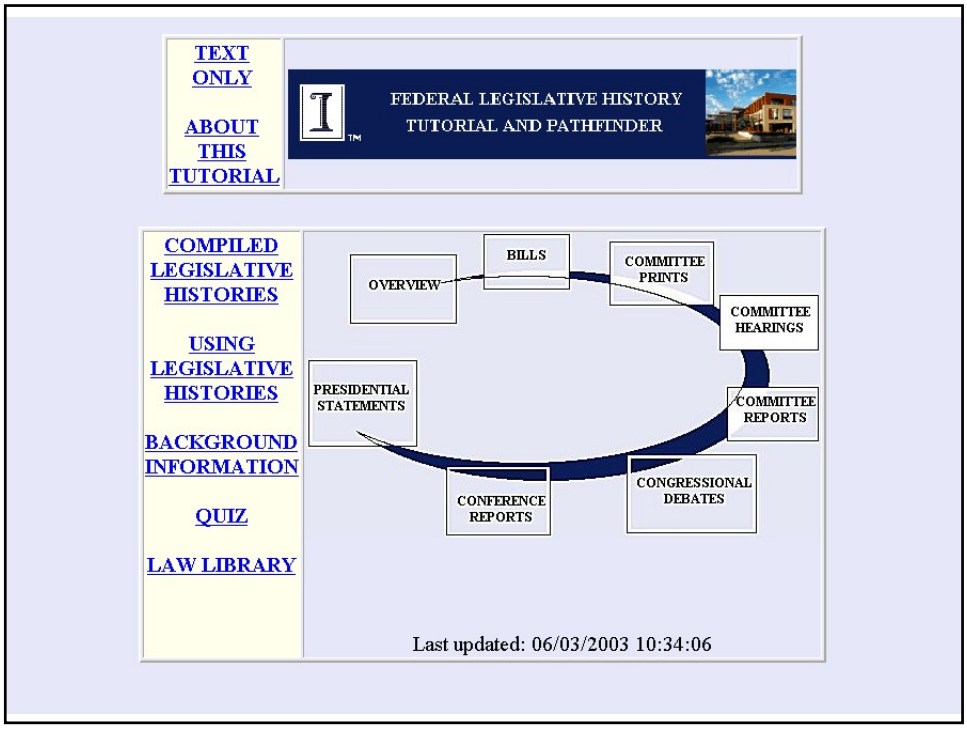
Possible Dissertation Work:

- Ideally, my domain map would be a dynamic and interactive computer program.
- The user could toggle between different layouts of the domain map based on different methods (co-term, semantic analysis, linear typewriter grid population, or random.)
- The professor and students could provide meaningful feedback as to the technique that yields the best layout for doctrinal teaching purposes.
- Students could annotate the maps and manipulate them in whatever way they found to be meaningful.

Possible Dissertation Con't:

- Such an interactive and dynamic system is likely to be the only tool to provide truly definitive and empirical user testing as to the best layout techniques.
- Also, the dynamic map would be able to break the content into two maps representing the two semesters over which contract law is usually taught.
- My next step is to get a more finished draft, with significant details so I can once again get a teaching professional excited about my maps and willing to user test with his/her students.




TEXT ONLY
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COMPILED LEGISLATIVE HISTORIES
USING LEGISLATIVE HISTORIES
BACKGROUND INFORMATION
QUIZ
LAW LIBRARY
OVERVIEW
BILLS
COMMITTEE PRINTS
COMMITTEE HEARINGS
COMMITTEE REPORTS
CONGRESSIONAL DEBATES
CONFERENCE REPORTS
PRESIDENTIAL STATEMENTS
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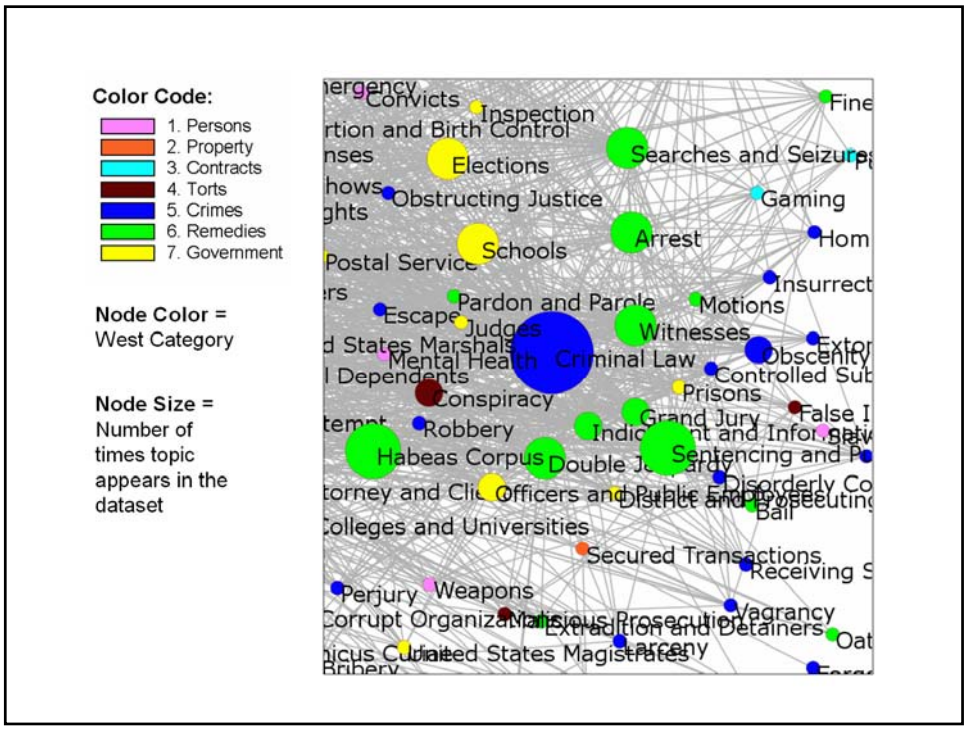
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2. Property
3. Contracts
4. Torts
5. Crimes
6. Remedies
7. Government
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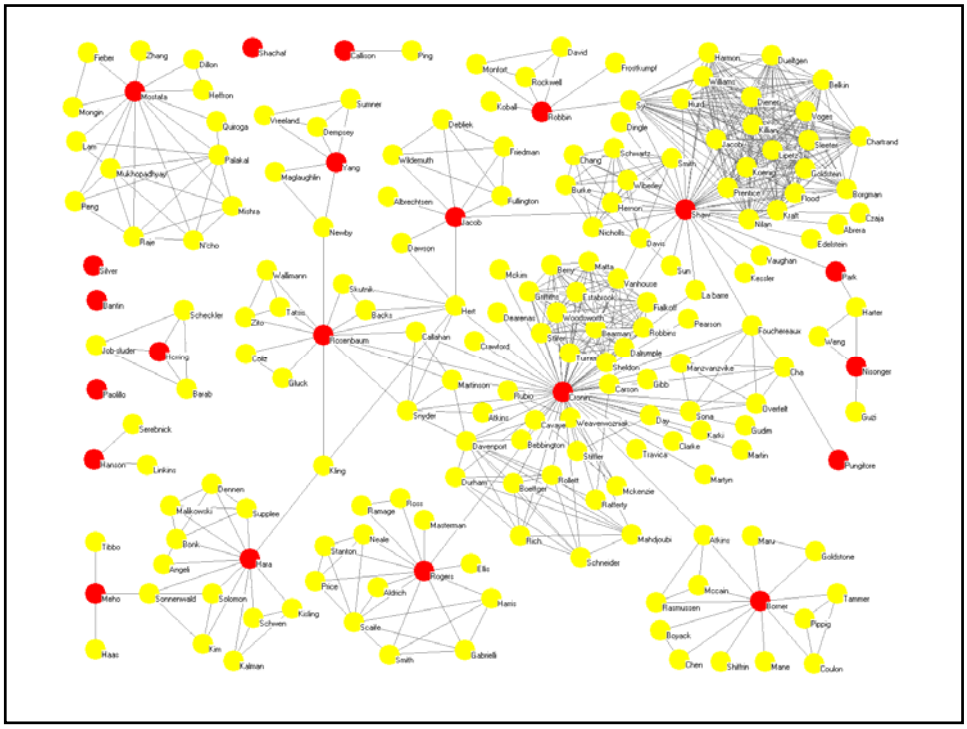
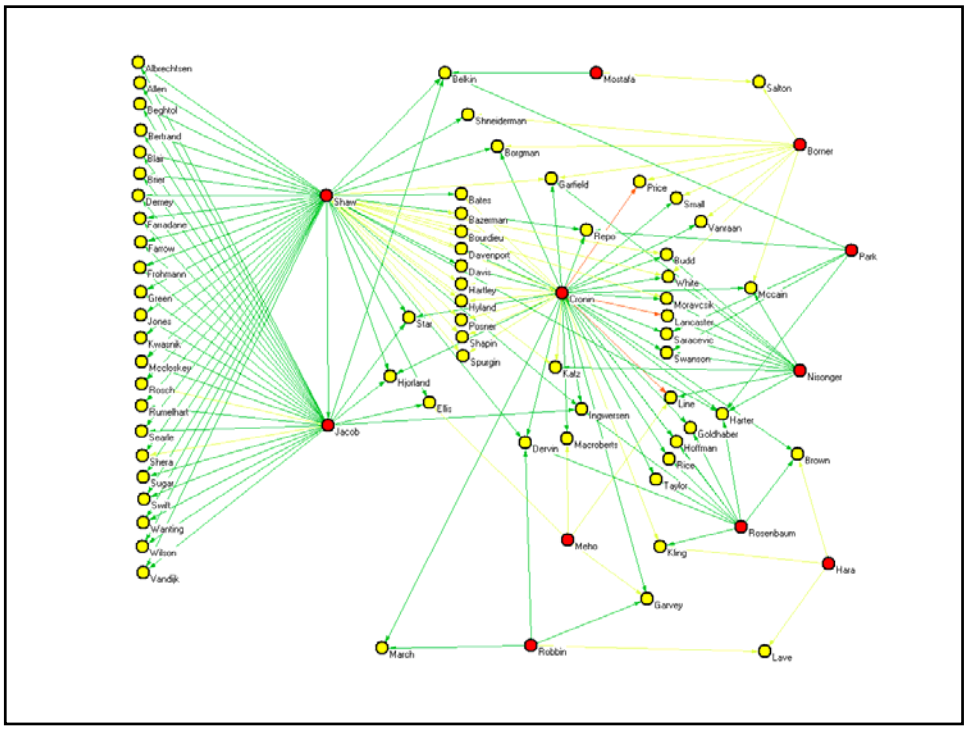
Convicts
Inspection
Elections
Searches and Seizure
Obstructing Justice
Gaming
Arrest
Schools
Postal Service
Pardon and Parole
Motions
Escape
Judges
Witnesses
Criminal Law
Mental Health
Controlled Sub
Conspiracy
Prisons
Grand Jury
Robbery
Habeas Corpus
Sentencing and P
Officers and
Bail
Colleges and Universities
Secured Transactions
Perjury
Weapons
Vagrancy
Extradition and Detainers
Larceny
United States Magistrates





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