

# A Curriculum for Tools for Thought

Will Crichton, Brown University

**Main theme(s):** teaching TFT to undergraduates, elaborating the design space of TFT

**Target domain(s):** all of tools for thought!

**Cognitive target(s):** all of them!

## What is the motivation for this project?

In order for people to work effectively on Tools for Thought, I think there should be a consolidated body of knowledge that we can agree constitutes the foundations of this subfield. I have yet to see a textbook or a course which meets that requirement, so I set out to make such a course.

The goal of my course, CSCI 1377 (Tools for Thought), is to survey a range of interesting computational tools for thought through the lenses of psychology, history, and engineering. The full lecture schedule is on the right.

This is a bit of an unusual topic for this workshop, but I figured there's no better place to talk about it!

## How is this connected to AI?

The curriculum is intentionally light on AI, being a novel addition to TFT and therefore not part of its present foundations. The last four weeks of the course are reserved for a class seminar on AI+TFT while students complete their final projects.

Some angles on AI+TFT we will explore:

- *AI as Automating the Subjective:* identifying ways that TFT previously resisted automation in relying on subjective judgment, that could now be facilitated with generative AI.
- *AI as Shifting Task Structures:* analyzing how areas of TFT like reading augmentations will change now that the process of reading itself has dramatically shifted in the presence of LLMs.
- *AI as Eroding Productive Friction:* critically evaluating how the automation of knowledge work by AI causes "collateral damage" by eliminating tasks that were load-bearing in the construction of cognitive skills (e.g., debugging, critical thinking / reading, etc.).

Lecture	Subtitle	Principal Sources
Introduction		"As We May Think" [14]; "Mother of All Demos" [19]; "Dynabook: The Complete Story" [27]; "Knowledge Navigator" [6]; "Computational Public Space" [54]
Mnemonics I	Science and Tradition of Memory	<i>Cognitive Psychology</i> Chs 6–7 [4]; <i>Orality and Literacy</i> [40]; <i>Memory in Oral Traditions</i> [44]
Mnemonics II	Spaced Repetition Systems	"Spaced Repetition for Efficient Learning" [13]; "How can we develop transformative tools for thought?" [35]
Reading I	Technology of the Written Word	<i>A History of Writing</i> [20]; <i>Psychology of Reading</i> [42]; <i>Cognitive Psychology</i> Ch 13 [4]
Reading II	Reading Augmentation Systems	<i>The Myth of the Paperless Office</i> [47]; "LiquidText" [48]; "Explorable Explanations" [52]; "The Semantic Reader Project" [33]
Hypertext I	Managing Information Overload	<i>The Printing Revolution in Early Modern Europe</i> [18]; <i>Too Much to Know: Managing Scholarly Information before the Modern Age</i> [10];
Hypertext II	The Internet and Beyond	"Information Management: A Proposal" [9]; "Prolegomena to Any Future Hypertext System" [17]; "Patterns of Hypertext-Augmented Sensemaking" [61]
Visualization I	Principles of Perception	<i>Information Visualization</i> [55]; <i>Visualization Analysis &amp; Design</i> [38]
Visualization II	Data Visualization Systems	<i>The Grammar of Graphics</i> [57]; "Vega-Lite: A Grammar of Interactive Graphics" [46]
Visualization III	Effective & Expressive Visualization	<i>The Visual Display of Quantitative Information</i> [49]; "Automating the design of graphical presentations of relational information" [34]
Multimedia I	Communicating in Space	"Why a Diagram is (Sometimes) Worth Ten Thousand Words" [30]; <i>Understanding Comics</i> [37]
Multimedia II	Communicating in Time	<i>Multimedia Learning</i> [36]; <i>The Cognitive Style of PowerPoint</i> [50]; "Animation: can it facilitate?" [51]
Learning I	Constructing Knowledge	<i>Mindstorms</i> [41]; "Learnable Programming" [53]; <i>The Charisma Machine</i> [3]
Learning II	Software Tutors	"The 2 Sigma Problem" [11]; "Cognitive Tutors: Lessons Learned" [5]
Notation I	Compacting Concepts	<i>The Story of Notation</i> [58]; <i>A History of Mathematical Notations</i> [15]; "A Representational Analysis of Numeration Systems" [60]
Notation II	Programming Systems	"Notation as a Tool of Thought" [26]; "Cognitive Dimensions of Notation" [21]; "Mathematical Notation: Past and Future" [59]
Programming I	Spreadsheets	<i>A Small Matter of Programming</i> [39]; "Creating, Comprehending and Explaining Spreadsheets" [22]; "Untidy Data" [8]; "Ambsheets" [56]
Programming II	Notebooks	"Exploration and Explanation in Computational Notebooks" [45]; "The Design Space of Computational Notebooks" [31]; "What's Wrong with Computational Notebooks?" [16]
Programming III	Devtools	"Designing the Whyline" [29]; "Mylar" [28]; "Code Bubbles" [12]; "Ply" [32]

## What you would like to discuss

I am looking for feedback on the curriculum: what units are missing? How would you organize this differently? Any ideas for assignments?

I would also like to talk more broadly about how to train people to work on tools for thought, and what types of learning resources this community needs.

## What would you like to take away from the workshop?

Besides feedback, I would love to get other people excited about teaching a Tools for Thought course at their university, and I would be happy to share all my materials if useful.

## How to proceed with this work/idea?

I am going to run this course this semester, and then in Fall '26 and every Fall thereafter.