PLACE IN MIND: TOWARDS A DYNAMIC MEMORY PALACE

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This paper will discuss interdisciplinary work on memory between psychologists, biologists, roboticists, neurologists, linguists and discuss archetypical models gleaned from those disciplines. This will include historical memory palaces, neural networks, linguistic structures, and biological systems.

Mnemonic devices: Mental Maps and Memory Lanes
Using the Internet to focus on pinpointing particular nuggets of knowledge, while submerged in an illusion of an infinite amount of data accessible through random access, puts forward the idea of infinite combinations of data and access paths. This combinatory power, along with how a user's choices are informed and filtered, erodes the edges of pre-existing consensus models, laws and identities. Borders between disciplines and paradigms are experienced on the web as increasingly tenuous, arbitrary and dynamic. What kind of model, if any, can serve to supply some constraints of structure on a networked art work.

The Ad Herennium (circa 86-82 B.C.), a textbook on rhetoric, contained a memory section divided into "rules for places, rules for images, memory for things, memory for words." Instructions were to first fix places based on the construction of mental architectural models. The larger and more complex the better because more memories could be housed. Knowledge was broken down into discrete particles and topography constructed as a memory strategy. Bits of information were assigned to objects; objects were placed in specific rooms, in a specific path, which would lead the recaller to data in the correct order. It was imperative that knowledge was fixed - adhered to an object -- so that it could be accessed at any time by virtually beating a path to its door.

Both storage and memory both particularly played a large part in the concerns of medieval scholars, theologians, scientists and artists. In medieval Western Europe the artificial memory structure paradigm shifted from architectural models to theological constructs. The territories of heaven and hell became host to specific memories. Memories were assigned to objects, creatures and topographical landmarks in those territories. Theologically based memory palaces had a large influence on creative forces of their times. It is possible to view Dante's Inferno as a journey through what would have been a pervasive and popular memory palace paradigm. In The Art of Memory, Francis A. Yates describes the Inferno as "based on orders of places Hell, Purgatory and Paradise…. The Divine Comedy would thus become a summa of similitudes and examples, with memory as the converting power, the bridge between the abstraction and the image."

In the 16th century, the memory palace emerged from its virtual state into a physical one existing outside of the mind in the form of an installation. The Memory Theatre of Giulio Camillo Interpolated the Greek memory palace by constructing a wooden structure that became the inspiration for the architecture of Shakespeare's Globe theater. Camillo's theater was a representation of the universe expanding its inception through the stages of creation. Every person who entered this magical portal would come away capable of speaking on any subject with the skill of Cicero. The wooden structure, large enough for two people, was commissioned by the King of France and displayed in Venice and Paris.

A reconstruction of The Memory Theater by Frances Yates

"The work is of wood, marked with many images, and full of little boxes; there are various orders and grades in it. . . . He calls this theatre of his by many names, saying now that it is a built or constructed mind and soul, and now that it is a windowed one. He pretends that all things that the human mind can conceive and which we cannot see with the corporeal eye, after being collected together by diligent meditation may be expressed by certain corporeal signs in such a way that the beholder may at once perceive with his eyes everything that is otherwise hidden in the depths of the human mind."

A-Maze

A 20th century labyrinthine line drawing by Umberto Eco (http://www.intelligentagent.com/archive/ RoadEco.gif) traces the development of a pun created by James Joyce for Finnegan's Wake. The drawing illustrates a decoding of the pun, tracing possible nodes of association which link the words "Nean-derthal," "Meander," and "Tale" from which Joyce formed the transformative word "Meandertale." The newly constructed word "Meandertale" appears to signify the very name of the process that forms it, a meandering quest for associations between words--a quest where these associations simultaneously tell the story of the words' evolution and transform them. In such a well-ventilated world, perhaps one nec-essary constraint might be to assume that no word suffers more than six degrees of separation from any other.

Clues Without Context

How far astray can the routers of imagination take us from what we can consider true? Can we be sure that such a quest on a well-trodden path is revealing good metaphorical expression? Clues without con-text i.e., the nodes without synapses--make the subject of the diagram cease to resonate its potential; it simply becomes a representation of itself where everything is equal or in a simplistic hierarchy (some are upper case, some are lower). The labyrinthine journey defined by the convoluted node line occurring between words is sprinkled with alchemical events: occurrences in language where two words together form another that leads to a whole new expression of association and meaning. Such events stimulate vernacular, slang and new languages.

Mystery Without [E]motion

Then again, selecting the nodes in Eco's drawing without their names or connections offers mystery (go ahead, connect the dots)--but the literary metaphor suffers a loss of its muscular tone, its life-like exu-berance. As the depiction of convoluted connections disappear in the above drawing, the resonance also falls away, dwindling to nothing. If we absent everything but the line, its function as a pointer to possi-bilities suffers. We have uniformly subtracted from this path any of its significant elements.

Order without significance

Networked art presents a process than a product. But the process alone without the narrative, or the significant reason to travel through it, seems barren. Where the relationship of one bit of content to an-other in these works, even at a minimum conjures up additional language in the visitor's mind that makes the leap from one work to another. This invisible text, an emerging hieroglyphic structure in the

reader's mind, is the activity that conjures up a new language of the links and a new mode of presentation. Hypermedia links are pockets, absences, lapses, and synapses, indicating what is inexpressible or interactively assumed by the viewer or reader. The subtext of the work can be embedded, even inconsistently, in the linkages and left to the viewer to decipher.

"Planning is just a way of avoiding figuring out what to do next"

The problems of spatially aware embodied cognition are pervasive. Many disciplines have had to develop strategies to deal with basic questions of 'Where am I?', 'Where is here?' and 'How do I navigate through this place?' in many forms. Some particularly promising techniques have been explored at the intersections between the fields of cognitive science and robotics that may be useful for developing the kinds of advanced spatial navigation of data spaces proposed in this paper. Robots have become advanced enough and cheap enough to be employed in a wide variety of general purposes in relatively uncontrolled environments (for example: using an iRobot Roomba(tm) robot vacuum cleaner to clean the living room floor while you are at work without having to fear for the safety of any household pets that may be roaming about) instead of being restricted to use in controlled industrial environments such as automated factories.

These systems adaptively and efficiently explore their environment using limited contact sensors to determine when they collide with walls or other objects as they follow a semi randomized path through the space. They lack advanced computer vision techniques and have no pre-existing model of what the space is like. They simply know which way they are heading and when they collide with something that would prohibit them moving forward, they go another direction and change the method the pattern they were using to traverse the room (alternating from moving from side to side, spiraling about the room and doing random walks). This may sound simple, because it is.

The robot vacuum doesn't build a high level complex model of the space, it simply reacts to what is immediately happening to it and tries different things when what it was doing did not work. It does not do that because it does not need to. It is able to sense where the boundaries of the area it wishes to explore are and then engages in a controlled and purposeful wandering of that space. The direct feedback that it gets from its environment substitutes for a complex conceptual model. It is a reactive system, with relatively little internal variable state to model the environment. This approach grew out of biological models of how ants and other insects navigate over large areas by following extremely simple rules that rely on responding directly to the environment more than they do on building any complex model of the environment . This subsumption architecture of integrated simple behaviors that respond to a rich environment has been used in a variety of areas of robotics and for tasks such as simulating apparently complex human like behavior in the Sims series of video games. They present a possible method for exploring and designing the sorts of rich data spaces that are proposed in this paper.

References and Notes:

 The Art of Memory, Yates, Frances A., Pimlico Press, London, first published 1992, 2000 ed. Cited.,pp.20-21. Ibid.,pp.104-105.

 Ibid, Chapter 6. Erasmus, "Epistolae, ed. P.S. Allen and others, IX, p. 479, letter from Vigilus to Erasmus, as quoted by Frances Yates in the Art of Memory, pp. 136-137.

Diagram by Umberto Eco from The Limits of Interpretation, A Midland Book, Indiana University Press, Bloomington and Indianapolis, 1994, Illustration 9.2, p. 141.

 R. A. Brooks (1987). "Planning is just a way of avoiding figuring out what to do next", Technical report, MIT Artificial Intelligence Laboratory.

*Rodney Brooks (January 1991), "Intelligence without representation", Artificial Intelligence **47** (1-3): 139–159, doi:10.1016/0004-3702(91)90053-M*

 Steels, Luc & Brooks, Rodney, ed. (1995), The Artificial Life Route to Artificial Intelligence: Building Embodied, Situated Agents, Hillsdale, New Jersey: Lawrence Erlbaum Associates, ISBN 0-8058-1519-8

 Forbus, Ken (2001) "Under the hood of the sims" http://www.cs.northwestern.edu/~forbus/c95-gd/lectures/The_Sims_Under_the_Hood_files/v3_document.htm