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Farradane’s Relational Indexing and its Relationship to Hyperlinking in Alzheimer’s Information

Abstract

In an ongoing investigation of the relationship between Jason Farradane’s relational indexing principles and concept combination in Web-based information on Alzheimer’s Disease, the hyperlinks of three consumer health information websites are examined to see how well the linking relationships map to Farradane’s relational operators, as well as to the linking attributes in HTML 5. The links were found to be largely bibliographic in nature, and as such mapped well onto HTML 5. Farradane’s operators were less effective at capturing the individual links; nonetheless, the two dimensions of his relational matrix—association and discrimination—reveal a crucial underlying strategy of the emotionally-charged mediation between complex information and users who are consulting it under severe stress.

Introduction

This paper reports on an ongoing research project which examines the relationship between the principles of relational indexing developed by Jason Farradane and the combinations of concepts that appear in Web-based information on Alzheimer’s disease. An examination of the hyperlinks in consumer information websites shows that while Farradane’s specific relational matrix may prove unsatisfying as a means of codifying hyperlinks, it does provide insight into the relationship between contingent and permanent associations in Alzheimer’s information in particular, and consumer health information in general.

Background and Literature Review

Jason Farradane’s concept of relational indexing emerged formally in 1979, with the first of two articles on the subject in Journal of Information Science. In it, he outlined a matrix of nine operators, plotted along the axes of two principles of concept combination: association and discrimination. Assigning symbols for each, Farradane argued that one could index anything by separating the concepts, and then locating the relationships between them on this matrix of nine operators, ranging from concurrence (a combination of low discrimination and mere awareness of co-existence) to functional dependence (two concepts distinct from each other but associated firmly in a cause-and-effect relationship).

Farradane has fallen so completely off the radar of classification research in recent decades that we can easily overlook his innovative foresight. His contributions to the Classification Research Group have been widely acknowledged, and his scheme for relational indexing continues to command respect for its daring and foresightedness. He anticipated the modern interest in contextualized and socially-situated classification. Like Derek Austin with PRECIS, Farradane anticipated the need for machine-readable systems that could separate the intellectual work of indexing from the mechanical work of assembling the terms and entries. And his attempt to disambiguate complex and ambiguous language constructs for machine processing and interpretation anticipated by at least fifteen years the Semantic Web initiative with its emphasis on machine-understandable information based on unique identifiers that permit inferential logic on defined pieces of data.

Despite these innovations, Farradane has suffered an eclipse in recent years, an eclipse brought about by the failure of his relational indexing system to achieve widespread
adoption. The limitations of Farradane’s matrix of relational operators as an indexing system have overshadowed his contribution to the theory of concept combination.

It may be time to revisit Farradane, simply because his fascination with the codifying of relationships between concepts proved prescient. Tim Berners-Lee, the inventor of the World Wide Web, argued similarly for a view of information based not on data per se but on relationships between data elements (Berners-Lee & Fischetti, 2000, p.12). And as the Semantic Web seeks to develop a new standard of Web design which makes these relationships overt and machine-readable, interest is rising in enhancing our ability to encode relationships. The emerging HTML 5 boasts clarified and enhanced linking capabilities (Pilgrim, 2009).

Even as information systems are developing new functionalities for rendering complex relationships in Web design, consumer health information on the Web is growing in size and complexity. Enabling end users to navigate sites which contain massive amounts of information of many different types is as urgent a challenge as ever, and particularly so with information related to Alzheimer’s disease. Alzheimer’s disease is on the rise (Brookmeyer, et al., 1998, 1337), and its potential for overwhelming our health systems in the next few decades is troubling. Information about Alzheimer’s disease is of interest to varied users, ranging from medical and health care professionals to caregivers and those directly afflicted with the disease. It covers a wide range of topics, including medicine, social work, psychology, law, finance and religion. Above all, the causes of Alzheimer’s disease, together with its interactions with other physical conditions, continue to trouble researchers: everyone intimately involved with Alzheimer’s disease is frustrated by how little we know.

In the first stage of this project, which was reported at the ISKO-UK conference in 2011, the author analyzed concept combination embedded in the prose of two Web resources on Alzheimer’s disease: one a professional information guide, the other a collection of diary entries by Alzheimer’s patients. When these combinations were plotted on Farradane’s relational matrix, the professional literature revealed a concentration on functional dependence, reflective of its concern with isolating a cause; it also revealed a tension between association and functional dependence, reflective of the medical establishment’s uncertainty about the relationship of Alzheimer’s with other disorders such as thyroid disease, vitamin deficiency, stroke, anemia and depression (Campbell, 2011, 35). The prose of the Alzheimer’s patients, on the other hand, revealed a focus on the dimensional and action cells. They were comparatively unconcerned about causation; rather, they were very much concerned with centering their lives dimensionally, by relating the stories of their lives in sequence. They were also understandably concerned with action: what influence would this disease have on themselves and their families? Above all, the self-activity operator appeared in the prose of the Alzheimer’s patients: they expressed intransitive verbs, in which they walked, slept, and thought (Campbell, 2011, 38).

These were interesting findings, but they tell only part of the story. As Rebecca Green reminds us, there are three different levels at which one can examine the combination of concepts: at the syntactic level, the level of relationships within the document, and the relationships between documents (2001). Web-based information resources on Alzheimer’s disease are filled with hyperlinks. What is more, proponents of the Semantic Web will argue for the use of new linking functionalities to describe those hyperlinks in a way that is useful for anyone—human or semantic agent—navigating the site for a particular purpose.

This study investigates the concept combinations manifested in the hyperlinks of three websites devoted to Alzheimer’s disease. By comparing these links to both the linking
attributes offered by HTML 5 and the relational operators offered by Farradane, the study poses the following two research questions:

1. Do Farradane’s operators improve on HTML 5 as a means of encoding relationships into hyperlinks?
2. Does Farradane’s distinction between association and discrimination provide a successful means of analyzing the design and linking structures of Alzheimer’s disease websites?

Method
Three websites were selected: the National Institute of Health’s site on Alzheimer’s disease (http://www.nia.nih.gov/alzheimers), the Fisher Institute (http://www.alzinfo.org), and the Alzheimer’s Association (http://www.alz.org). These are the three most frequently cited sources in Medline Plus’s guide to Alzheimer’s disease. All three resources have a detailed and well-documented menu structure, as well as ample links within the textual information, linking the user to other parts of the site. For each site, the menu structure was noted, identifying the formal organization of the site. Then the hyperlinks within the informational text were collected and analyzed, to assess:

a. the relationship of the anchor text and the target;

b. a classification of the relationship according to the HTML 5 attributes for the link and href tags;

c. a classification of the relationship according to Farradane’s matrix.

Site Design and Menu Structure
All three web resources share certain characteristics in their overall design. The very top of the page established the website’s organizational provenance: the Alzheimer’s Association, the Fisher Center for Alzheimer’s Research, and the Alzheimer’s Disease Education and Referral Center (ADEAR). The ADEAR site is placed within a banner establishing it as part of the National Institute on Aging, which in turn is situated within the U.S. department of Health and Human Services.

All three sites have a menu across the top which offers access to the bulk of the site’s information, in a canonical order which most closely resembles a formal classification system. Most of these top menu items link to subtopics, which consist of short prose pieces, many of them containing hyperlinks to other documents.

Beneath this upper menu bar, all three sites have a central section which contains a variety of images, advertisements for publications or upcoming conferences, and portals for donating or signing petitions. In addition, all three sites contain additional menus, most of which link directly to information accessible through the top menu bar, but which are designed to suggest immediate connections between information and a particular need or predicament. The Alzheimer’s Society site, for instance, has a menu with the title “We can help” with the following elements:

- I have Alzheimer’s.
- I am younger than 65.
- I am a caregiver.
- I am a care professional.
- I am a physician.
- I am a researcher.

The Fisher Center contains a series of callouts in its middle section, with phrases including “I have been diagnosed with Alzheimer’s” and “I’m caring for someone with Alzheimer’s.”
Below this center section we find a lower section devoted in all three instances to newsfeeds, as well as a variety of other resources such as FAQ sites, donation buttons or signup services for receiving email news updates.

All three sites, then, offer three ways into the Alzheimer’s information: through a formal menu structure that suggests relationships appropriate to the information; through a less formal structure that suggests a direct line from a question to an answer; and through news and updates that emphasize recent accretions to existing knowledge.

**The Links Themselves**

The preponderance of the hyperlinks within the textual documents accessed from the upper menu bars on the sites are bibliographic in nature, implying a relative equivalence in terms of subject, but generally a whole-part relationship between the target and the anchor. The ADEAR section called “Alzheimer’s Basics,” for instance, links its first use of the term “mild cognitive impairment” to a later essay that deals more expansively with the term, while another link with the anchor text “read more about what happens to the brain during Alzheimer’s” connects to a separate document in the ADEAR collection entitled *Alzheimer’s Disease: Unraveling the Mystery*. In general, these links expand on terms and concepts discussed within the anchor document, by linking to three different types of document:

- Topic sheets and online resources, offered within the organization’s website or a parent website;
- Descriptions of relevant print resources available for purchase through the organization; and
- Resource guides containing catalogues and bibliographies of resources for further reading and study.

The links in the center sections tend to provide similar links, and indeed usually link to the same documents available through the top menu bar. However, there is a question/answer quality to many of these links. The link “I have Alzheimer’s” on the Alzheimer’s Association website leads to a page which anticipates a host of responses to that stark statement: a reassurance that the user is not alone, followed by links to resources which imply an answer to the question, “What now?”: advice on self-care, coping with change, getting involved in support groups, and confronting driving and home safety issues.

The newsfeed links typically provide late-breaking news on research findings, either in the area of causation or treatment.

**HTML 5**

The relationships that prevail on the top menu bars on these websites map reasonably effectively onto the attributes for the `<link>` and `<a>` elements in HTML 5. Although the HTML 5 specification defines a fairly small number of link types, many extensions to the predefined set have been registered, some of them retained from HTML 4, and others developed by numerous Web stakeholders (Microformats 2012). Many of these are bibliographic in nature—appendix, copyright, contents, glossary, help, and bibliography—and could be mapped effectively onto many of the hyperlinks on these three sites.

In addition, HTML 5 specifies explicitly that the `<link>` element can be used for two purposes: for linking to external resources, and for hyperlinking (WHATWG, 2012). A link to an external resource is a link to a resource that is used to augment the current resource; most commonly, the `<link>` element is used to load a stylesheet for viewing the resource.

It is possible that the `<link>` element could be used to specify a particular type of user, along the lines suggested by the list on the front of the Alzheimer’s Society website, to create separate instantiations of the site for someone with Alzheimer’s, for a caregiver, or for a care professional, physician or researcher.
By contrast, Farradane’s matrix fits the link relationships only to a limited degree. Designed as they were to represent concept combinations within documents, they are less effective in representing links between documents. Many of the links fall into the “appurtenance” category, in the sense of whole-part relationships, and some could be defined as Action relationships, due to their movement from a recognition of Alzheimer’s to a set of concrete steps that can be taken in response to this knowledge. But the operators show the same ambiguity that plagued many who originally tried to use Farradane’s system, and they map uneasily to the relationships implied by most of the hyperlinks on these three sites.

If, however, we move back from the specific operators to the two axes of the matrix—association and differentiation—we find that Farradane’s paradigm shows us other things equally valuable.

The Three Strategies

None of these three sites would win awards for superlative information architecture: dead links appear frequently; the ordering principles across the various menus often show an unwieldy and inconsistent organizational principle; linking practices are inconsistent within the sites. Nonetheless, throughout the linking patterns on these sites, three distinct patterns of linking can be perceived, each allowing for a different strategy of selection.

The first might be called a strategy of “saturation”. In most of the materials on all three sites, the authors anticipate that the reader can take only so much information at a time, and therefore embed more detailed and comprehensive treatments of each topic in a sub-layer of resources, publications and resource guides that the reader can choose to follow or ignore. This practice resembles that of recorded guides at museums and historic sites, in which the surface layer of quick information is seeded with opportunities to go to a deeper, more involved layer when desired.

The second involves selection through the provision of “direct answers”. These links anticipate that the user is seeking a select piece of information to a specific question: Can I still drive? What medications are available? When should I ask my doctor about my memory problems? These links, generally contained in the centre sections of the websites, anticipate a user need, and direct the user directly to the relevant part of the information archive that has been formally classified in the top menu bar.

The third involves a “newsfeed” approach, in which only the latest resources are provided, presumably to top up the awareness of someone who has achieved a comfortable state of knowledge, and wants only the latest additions.

Each of the three strategies enabled by the linking practices on these websites involves giving the user some control over time and sequence. Links can be used to save time (internal links that jump to the relevant part of a large document), to preserve narrative sequence (allowing the user to bypass a link and continue reading a structured explanation), or to extend the time devoted to a subject (allowing the reader to link to a more expansive treatment of the topic).

Even more important, these linking patterns give the user some power to decide how much or how little to learn. And with Alzheimer’s disease, as with other momentous events, this is a significant edge. The combination of these three strategies enables the user to draw a line that separates the “enough” from “too much.”

Farradane makes a distinction between three stages of the associative mechanism: awareness, temporary association and fixed association. This is by no means an abstract principle for those who suffer from Alzheimer’s disease or their families. The movement
from a casual awareness of the disease to a recognition and acceptance of its existence in one’s life is a painful one, and one which individuals negotiate in their different ways.

The line the user draws through selecting which links to follow and which to ignore charts an uneasy progress through the painful middle column of Farradane’s matrix. The association of one’s life with Alzheimer’s is initially a temporary one, one which involves extensive use in the early stages of the dimensional and action relations. It involves establishing the dimensions of the disease: gathering evidence, confirming the suspicion, attaining the diagnosis, establishing a timeline for the progress of the disease. It involves action: arranging finances and legal matters; arranging care; securing the home; embarking on medication; changing the lifestyle.

Conclusions

Farradane’s matrix of relational indexing, then, is an unlikely candidate for the encoding of relational attributes in hyperlinks, and therefore unlikely to make any great difference to web design as envisioned by groups like the World Wide Web Consortium. As a means of analysis of Web practice, however, it has a surprising relevance. When used to analyze patterns of Web linking, it can highlight vexed junctures of information use. In particular, it shows how Web designers anticipate and allow for the user’s uneasy self-association with an unwelcome undesired affliction.

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References


