

Measuring Relevance Theory's Effects in an image-driven explorative information system

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ABSTRACT

In information system, there are many techniques for extracting data, such as semantic elements from author, title, or subject tracings from MARC or other records, to express relationships within the data. The addition of visualization techniques stimulate the viewer because the graphic design of the data forms a purposive communicative act. Applying Sperber & Wilson's theory of relevance helps explicate a model of feature integration applicable to image-driven, user-guided exploration of digital collections. The model, implemented as an alternative search engine in a college library, is being tested in late 2012, and may result in creating a well-founded methodology for exploring repurposing digital objects for greater user engagement.

Categories and Subject Descriptors

H.5.2 [Information Systems]: Graphical user interfaces (GUI), User-centered design. D.2.2 [Software]: Design Tools and Techniques – *Modules and interfaces*. J.5 [Computer Applications] – *Arts and humanities*.

General Terms

Measurement, Design, Human Factors.

Keywords

Meaning construction; relevance theory; contextualization

1. INTRODUCTION

Several factors combine to encourage reusing digital objects for greater user engagement with digital resources, or to facilitate digital library objects for other needs, such as creating personal sub-collections, or enabling innovative explorations of the collection in engaging ways [1], such as thematic collections, image-driven queries, etc. As the result of several focus groups conducted using humanities and social sciences faculty and students, a candidate interface was created and is being tested.

Rather than create only an aesthetically engaging interface, the interface's interactive behaviors and content were mapped to Sperber and Wilson's theory of relevance [2], a consistently popular model of language [3]. In brief this theory, often used as

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a counter to Grice's models [3, 4], is governed largely by two factors: contextual efforts adding, strengthening, weakening, or canceling new info and the effort needed to process data, to recovering facts.

Another main consideration in their theory is the relationship between speaker/hearer, or in information systems activities, we translate to system designer and system user. The designer and users roles are flexible, at times passively receptive, other times more actively searching for salience. This process, called explicature, has subactivities, such as "bridging", where the viewer tries to interpret [semantic and visual] references which establishes a sequence of preattentive and focusing behaviors: e.g., recalling previous discourse and engagements, the influence of the immediate situation, and calling upon stored knowledge; "enrichment" [5] or providing missing components needed for interpretation, higher-order [non-communicative] explicatures, and weighing weak/strong implicatures. The latter consists of implicated premises, the part of context that the viewer must construct to recover the implicated conclusion, which is the main point of the "utterance", and the implicated conclusions [2, p. 194-8], which tie the hearer's/viewer's passive engagement to the speaker's/designer's intentionally created message. In this way the message - visual and interactive in an interface - also binds the message's interpretive possibilities, and hence responsibility, back to the speaker/designer.

2. RESEARCH

This project focuses on three components: integrating records from existing stores to create a test bed collection, expressing user interests via the interface realizing Sperber & Wilson's theories, and measuring the affect these have on users' ability to "recover facts", effect of salience, and implicated conclusions. As user experiences with visual resources and interfaces expand and appreciation for them grow [6], some types of information visualization techniques [e.g., 7] are likely solution to ensuring the usefulness of records and for improving the user experience.

2.1 User interests

Between late 2008-early 2011, a series of seven focus groups were conducted with students and faculty. The motivation for these meetings was the end-users' dissatisfaction with available systems. As a result of the focus groups a great many issues emerged. Of these, we were able to model some responses to their concerns with (1) the "silo approach", or having to drawn from multiple, independent information storage and retrieval systems, (2) too much drilling down in the interface to make decisions about resources, (3) inability to engage "more physically" with visual objects, and (4) exploring rather than just searching/browsing for materials.

Consequently, the users wanted to retain searching for known entities for resource identification and location, but wanted also

the explore ways to contextualize individual visual objects; explore collections without typing, that is, to create a “user-guided experience”.

Theory	Interface Implementation	Interaction implementation
New information	changing theme images	control over amount of record data to show per item
Strengthening old	display similar records	user selects <i>specific event</i> values for interpretation
Weakening old	display dissimilar records	user selects <i>intellectual level</i> and other record properties
Canceling	delete record from retrieval set	user sense of control to reduce explications and implicative opportunities
Recovering facts	situate item in larger subject theme	flip-card, rather than drill down, to read more about the record, subject, <i>value</i>

Table 1. Relationship between the theory and the interface behaviors

Following [2]’s model, new facts that are taken with old information allows many inferences and this, according to the model, are opportunities end-users think are inferences probably worth investigating (or “processing”). By controlling the relevancy set’s membership, contextualizing by theme, as an implicated premise, it is possible to measure the effort necessary to recover facts that are interpretable by the end-users. Providing background knowledge through the interface contextualizes objects in the information system; according to the theory contextualizing and manipulation through the interface affect the “salience” of facts and is dependent upon the end-users’ sense of effort expended to rescue salience.

System designers, as “speakers”, have a range of responsibilities according to Sperber & Wilson - from responsibility for the proper receipt of their “intended message” to providing enough opportunity for the end-user’s personal situation to establish relevancy. [Note this type of “relevancy” is differs from the definition of relevancy in information retrieval studies, which do not include the designers’ parity with the end-user in constructing a meaningful interaction.] Designers’ model of the user becomes the implicated premises of the interactive possibilities. The end-users’ behaviors cast as either open exploration, that is, the user has no parameters to his or her explorations, to more clearly sensed need for using the interface, the traditional browsing & searching model. There is, then, “*implicated premises*” that affect through the visuals and interactive possibilities the “*implicated conclusions*” or relevancy. By providing context in a visual-oriented information retrieval system, does the addition of context make a strong (i.e., fully determinate) implicature? “The strongest possible implicatures are those fully determinate premises or conclusions ... which must actually be supplied if the interpretation is to be consistent with the principle of relevance, and for which the speaker takes full responsibility. Strong implicatures are those premises and conclusions ... which the hearer is strongly encouraged but not actually forced to supply. The weaker the encouragement, and the wider the range of possibilities among which the hearer can choose, the weaker the implicatures. Eventually ... a point is reached at which the hearer receives no encouragement at all to supply any particular premise

and conclusion, and he takes the entire responsibility for supplying them himself” [2, p. 199]. When applied to information retrieval, it seems reasonable to cast system behaviors along a continuum of tightly-controlled searching [strong implicature] to guided [weak implicature] and evaluate a closed set of cognitive and interactive behaviors.

2.2 Methods

A demonstration information system using a candidate interactive interface, Java, MySQL, and Apache was created as the result of the focus groups (<http://gslis.simmons.edu:8080/visir/index.html>). A test bed of 5,000 MARC records have been ingested. The contextualizing texts (for the flip-card, a GUI technique where image reverses to reveal contexts in Table 1) are being created. The system will be available throughout the test campus; click-through, online survey and randomized volunteer interviews will be conducted.

The theory of relevance from linguistics applied to interface design necessitates a few shifts in vocabulary (from “speaker/hearer” to “designer/user”) and provides an interpretive framework to understand better the relationship between inputs and interpretive end-users strategies. On this ground, we ask (1) does contextualizing and manipulation address the “salience” and so affect the sense of effort?; (2) how much processing effort, measured in time and user affective states, will users expend in a user-guided interface?; (3) although “fact enrichment” using brief encyclopedia articles requires more engagement, what is the effect providing context on increasing or diminishing possible useful inferences?; (4) what effect does putting interface design on this kind of language model have on the implicated premises and implicated conclusions of designers/users? Finally, (5) does image-driven end-user guided experience engage the end-users usefully as a communications-based theory of relevance? Is this approach worth pursuing?

3. CONCLUSIONS – FUTURE RESEARCH

Tying widely-recognized theory of human language and meaning construction to interactive interface design and measuring the impact on end-users may establish a sustainable line of research. As the volume of available data grows interface designers turn increasingly to information visualization techniques; as library, archive, and museum records become more integrated and end-user expectations evolve, a computationally-feasible approach at the nexus of images and data volume ought to be explored to determine preserving the usefulness of extant information system records. We anticipate reporting results in early 2012.

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