Value-Driven Design
with Algebraic Semiotics

Joseph Goguen and Fox Harrell

This is a draft outline for a book in progress; everything is subject to change, though the introduction is relatively stable now.

1 Introduction

1.1 Evolution of Interface Research and Design Methods

1.2 Value-Driven Design

1.3 Algebraic Semiotics

1.4 Cognitive Science

1.5 Empirical Methods for Social Issues

1.6 Notes

1.6.1 Origin and Use of this Book

1.6.2 Historical Notes

1.6.3 Special Note for Instructors

1.6.4 Acknowledgements

1.7 Other Resources

1.8 Exercises

References

2 Design, Values, and Requirements

Motivation: analysis and synthesis (design) for groups vs. individuals. ....

Models are constructed in the course of some task, such as designing an interface, in order to clarify certain issues concerning that task. Under this view, models are socially situated entities, which only need to be accurate in certain respects, to a certain degree; they may or may not need to support calculations or proofs. This is consistent with the pragmatism of Peirce.

Need a very good but small example right away: clothing store? Fox's math game? UK QALY (quality adjusted life year)?

2.0.1 Clothing Store Tentative Ideas

Initial sketch for [Men] only; later add [Sale Items],[Kids], [Women], all at top level; use values (expected customer numbers) to determine priorities at top level. Other values of store: friendly, inexpensive, informal, country style; a bit like Edie Bauer.

Items for [Men]: pants (dress pants, work pants, shorts), shirts (dress shirts, T shirts, work-shirts), shoes (socks, workboots, walking boots, dress shoes), jackets (leather, buffalo, simulated leather, wool). All of these should also be categorized by size. ... The challenge is to sort all this into a menu system, using values.

2.1 Interfaces

We take a broad view of interfaces: any designed artifact, whether physical or virtual, whether utilitarian or artistic, can be seen as an interface to (some of) the intentions, values, and actions of its intended community of users. This is particularly obvious for the graphical user interface of an operating system or a commercial website, but it is just as true for the personal website of a musician, or of a community service organization, and we will argue in detail that the same holds for artifacts such as coffee cups, chairs, doors, and whole buildings, as well as poems, strories, and paintings. Interfaces are everywhere, and nearly everything can be seen as an interface, to which principles of good design can, and should, be applied.

2.2 Historical Notes

Values hold civilizations together, and have been a topic of interest from ancient times in Western civilization. Plato's civic virtues; Aristotle's virtues; the ten commandments; .....

Modernism, formalism, logical positivism, cognitivism, reductionism are all related; reached zenith perhaps in 1950s, with Detroit production line, serialist music, structuralist theory, modernist high rise apartment towers, etc. Post-structuralist theory, post-serialist music, post-modernist archtiecture, etc., ... Greek *techne* did not separate aesthetics from function: it was assumed that each built object would be designed to fit its environment harmoniously. Classic AI made two major errors: (1) it aimed to create artificial replacements for human capabilities; and (2) it aimed to employ a disembodied, abstract notion of intelligence. This tradition is still alive, e.g., in the predictions of Ray Kurzweil, and it constrasts strongly with the moderate position of the great computing pioneer Doug Englebart, who sought to augment human intelligence, rather than to replace it.

2.3 Exercises

3 Semiotics, Structure and Representation

Motivation: organization of information, e.g., menus.

3.1 Classical Semiotics

Saussure & Peirce: dyadic & triadic; system & sign. Firstness, secondness, thirdness; icon, index, symbol.

3.2 Semiotic Spaces

3.3 Semiotic Morphisms

Preservation of constructors implies consistency of design. ...

3.4 Optimality Principles

3.5 Examples

Menu design; ...

3.6 Notes

3.7 Exercises

4 Value-Driven Design

Practical techniques: participant observation; card sorting, KJ; stories; ... [[Use material from kyoto05 slides.]]

4.1 Results from Computer Supported Cooperative Work

Vygotsky CHAT, mediation, requirements elicitation, ANT, symbolic interactionism, ...

4.2 How to Discover Values

Value discovery: Labov stories, ...

The Western intellectual tradition has long separated the human individual (often seen as an abstract rational mind), the concrete physical world of objects, and the complex social world, including values. On the other hand, the pragmatic needs of real world design, and in particular, of user interface design, demand that these three must be considered together, in order to create designs that work well in practice. Peirce's semiotics already integrates the first two, and it also implicitly includes the social, as a component of the context of signs during interpretation.

4.2.1 Labov Narrative Structure

4.3 Social Information Theory

Classical information theories. Ethnomethodology: member's categories and methods; Sacks' category systems.

4.4 Notes

4.5 Exercises

5 Cognitive Science and the Single User

Chapter 2 emphasized the social aspects of design; although we do consider that primary, cognitive issues that apply to users as individuals are also very important, and are discussed in this chapter.

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5.1 Color

5.2 Visual Layout

5.3 Exercises

6 Interaction and Discourse

Motivation: ...

6.1 Navigation

6.2 Direct Manipulation

6.3 Agents

Ackerman's AG-2 & escalation hierarchy.

6.4 Conversation Analysis

Recipient design. Adjacency pair: first part, second part, noticeable absence.

6.5 Discourse Grammar

6.5.1 More on Labov Narrative Structure

6.6 Mitigation and Speech Acts

6.7 Notes

6.8 Exercises

7 Prototyping and Evaluation

Motivation: done throughout life cycle of a system.

7.1 Design Methodology

Critical comparison of methods (paper with Linde). Tacit knowledge.

7.2 Computer Science

Computer code is part many design projects today, and is certainly part of any website design project. In such cases, principles of software engineering, such as iterative prototyping, extensibility, and modularity will certainly be important; but in fact, such principles are important even in projects that are not computer based.

Agile programming (aka extreme programming), Kent Beck ...

7.3 Usability Studies

Usability; interview guidelines; experiment guidelines; Jenny's SCIA experiment....

7.4 Social Impact Statements

7.5 Notes

7.6 Exercises

8 Information Visualization

Motivation: scientific visualization, program visualization, ...

8.1 Examples

8.2 Notes

8.3 Exercises

9 Social Networks

Motivation: social context; interaction; values; ...

9.1 Actor Network Theory

Classical ANT; examples.

9.2 Value Actor Network Theory

ANT enriched with values and translations on edges; examples.

9.3 Social Network Analysis

Algorithms for graphs derived for social networks.

9.4 Notes

9.5 Exercises

10 Metaphor, Blending, Humor

Motivation: Metaphors in interface design; importance of basic metaphors, BT is important new area of cognitive semantics; MM is future of art; humor is great illustration.

10.1 Lakoff Metaphor Theory

Basic image schemas; applications to design. Metaphor as mapping. Pierce views metaphor as one of three forms of iconicity (in order, the three forms are images, diagrams, and metaphors) [Hiraga05].

10.2   Blending Theory

Motivation. Metaphor as cross-space map. Optimality principles see Chapter 15 of [twwt] for 29 "classics." Interface Examples.

10.3   Humor

The reblending theory of humor; some other theories.

10.4   Notes

10.5   Exercises

11   Further Applications and Examples

11.1   Mathematical Proofs

Narrative; Kumo interface; ...

11.2   Multimedia

Phase spaces, non-linear dynamics, Anderson's Viking museum, Griot; ...

11.3   Schema Matching Tools

SCIA interface design: underlying models for schemas.

11.4   Notes

11.5   Exercises

12   Afterword

A   Algebraic Specification

Motivation: .....

A.1   Universal Algebra

A.2   Abstract Data Types

A.3   OBJ

A.4   Glimpses of Category Theory

A.5   Notes

Nöther, Mac Lane, Göttingen, ...

A.6 Exercises

B HTML, CSS, XSL, Etc.

B.1 Notes

B.2 Exercises