

Transforming Qualitative Information: Thematic Analysis and Code Development
Real World Research: A Resource for Social Scientists and Practitioner-Researchers
Redefining Designing: From Form to Experience
Research Design: Qualitative and Quantitative Approaches
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Content Analysis: An Introduction to Its Methodology
Contextual Design: Defining Customer-Centered Systems
The Craft of Research
Design Methods
Case Study Research: Design and Methods
Collecting and Interpreting
Qualitative Materials
Constructing Social Research:
The Unity and Diversity of Method
Against Method
Analyzing Design Activity
Against Method
Basics of Qualitative Research:
Techniques and Procedures for
Developing Grounded Theory
Analyzing Design Activity

P r i n c i p l e s

Building a Foundation for Design Research Methods is one of the three sections of the Annotated Design Research Bibliography. Design is a hybrid activity that encompasses many disciplines beyond itself, which blend depending on the nature of the research project. To support a range of design research activities, thirty books listed in this section embrace research principles and methods from general to specific research content and practice across three levels of design research: basic research, applied research and clinical research. The content in the book lists demonstrate methodologies from many design research perspectives, from those with a social science focus to those with a science orientation, to those that build method from a design perspective. The research method guidance in these books is useful for both design researchers and design practitioners who are interested in building a body of design knowledge.

and

Methods

**Perspectives on Building a Foundation
for Design Research**

Chujit Jeamsinkul and Napawan Sawasdichai

&

**Annotated Principles and Methods
of Design Research List**

Perspectives on Building a Foundation for Design Research

OVERVIEW

Definitions, perspectives and roles of design research

Design is an especially broad field with a mixture of both practical activities and theoretical knowledge overlapping several professions and sciences. Design research is as faceted as design itself, and varies according to what aspects of design are investigated (Sevaldson, 2000). Research is systematic enquiry, the goal of which is knowledge (Archer, 1981). Many perspectives on design research are explored methodologically in this section from those with a social science focus to those with a science orientation to those that build method from a design perspective.

According to Nigel Cross in his article: Design/Science/Research: Developing a Discipline, design research must be the development, articulation and communication of design knowledge. His taxonomy of the field of design research has three categories, those based on people, processes and products. The first one is design epistemology, which is the study of designerly ways of knowing. The second is design praxiology, which is the study of the practices and processes of design. The third is design phenomenology, which is the study of the forms and configurations of artifacts.

One focus of design research is the scientific study of processes and knowledge of design. Another focus is to develop theories, methods and tools to enhance the quality of design practice based on the body of knowledge developed by the scientific study (Sato, 2000). Theory, method, and tool are interrelated; they stand in either weak or strong relationship to each other. For example, methods are implicitly or explicitly based on theory, or in some cases, untheorized observation of practice, while the building of a tool requires a methodological basis. Theory develops abstract principles that explain a set of facts in relation to one another. Method sets a systematic procedure, technique or mode of inquiry, tool is an instrument that assists in the performance of an operation (Poggenpohl, 2000). Theories, methods and tools are all legitimate outcomes of design research.

Classification of design research

From the article *Design Research and the New Learning* (Buchanan, 2001) and also the conversation in PhD-Design listserv led by Ken Friedman with participation by William Gilles, Terrence Love, Chris Rust, and others, (PhD listserv, 2001), three levels of design research can be identified: basic research, applied research and clinical research. They are defined as follows.

Basic research, also called pure research, is a search for fundamental knowledge. This level of research seeks theories or laws explaining why things operate as they do, or even why they are as they are (Friedman, 2001). The focus of developing the research instrument is to gather information in as generalizable a manner as possible, without taking into account specific applications for the findings. Basic research produces general theories that must be reworked for use in applied situations (Love, 2001). Because it seeks to establish significant facts and connections in our experience of design, this level is the most difficult and critical to the future of the design field (Buchanan, 2001).

Applied research focuses on how to do things in general (Friedman, 2001). This level of research undertakes to find results that are useable across many situations. The intention of undertaking applied research is to develop theories that can be used to help practitioners predict the future in particular situations (Love, 2001). With the disposition that this applied research could establish connections among many individual cases, this level is critical to advance understanding of design (Buchanan, 2001).

Clinical research is the examination of specific cases (Friedman, 2001). This level of research examines a particular situation to solve a problem in that situation. Clinical research is applied research in a specific context. The findings of clinical research are specific to the particular 'case' or project in which it is undertaken. The research instruments are created to gather information specific to the problem being addressed. The findings of clinical research cannot usually be directly applied to other situations because of the specificity of the situation from which information is gathered and the limitations of the research instrument(s) (Love, 2001). This research level is most recognized by designers and design researchers and is the most used (Buchanan, 2001).

However those three levels may interact and influence each other. Some research may fulfill both basic and applied functions, or applied and clinical. Clinical problems can suggest basic questions. Basic discoveries can inform applications. Applications feed queries to basic research and to clinical research, as well as provide solutions to problems (Friedman, 2001).

Focus and scope of principles and methods of design research

Even though the design discipline has some design method literature that is largely used to facilitate the creation of a solution or product in practice, there is little literature that establishes methods for design research to use in its construction of design knowledge. Design is a hybrid activity that encompasses many disciplines beyond itself, which blend depending on the nature of the research project. A rich diversity of research methods is available for the field of design, but they are adapted from other fields such as natural science, social science, technology and the humanities; new methods developed expressly for design are under development.

The issue of using research methods developed for and in other fields without examining their transfer to design is a cause for concern among some design researchers. The underlying philosophical perspective, the original research goals of the host discipline and the relation to design research needs are all opportunities to more deeply understand research paradigms in general and design's research orientation in particular.

This section concentrates on selecting books that contain appropriate methods for design research. Methods for use only in design practice do not appear in this section. However, methods for design research and practice can and do overlap as there is often no clear distinction between them. The degree to which practice engages in research is variable; likewise some research quickly seeks practical demonstration of its findings to establish its validity.

RESULT AND DISCUSSION

The initial books were selected from several sources as follow;

- References from articles in Section 2: Principles and Methods of Design Research, *Proceedings of the conference: Doctoral Education in Design: Foundations for the Future* 8-12 July 2000, La Clusaz, France, edited by David Durling, Ph.D. and Ken Friedman, Ph.D.
- *A Bibliography of Design Research Methods and Applied Methodology* by Charles L. Owen, June 1995
- Library search engine at the Illinois Institute of Technology and the University of Illinois at Chicago
- Commercial search engines such as Amazon.com, Barnes & Noble.com and publisher websites

For the initial list of forty-eight books, the following criteria was used for evaluation:

1. Book content has potential relevance for use in design research activities
2. Both general and specific research methods are covered
3. Books are frequently mentioned and referred to by design researchers

Seventy-five participants in the design community ranked the list of forty-eight books selected for the methodology section. The result of the ranking showed that not many designers are interested in the domain of design research methods. They are more concerned with methods for design practice. This is no doubt why the ranking results are higher for books about methods that could also be used in design practice than methods that focus only on design research. Moreover, particular methods for design research are not well established. Most of the methods are borrowed from other disciplines such as science, technology and engineering, and business depending on what aspect of research is in question. These are possible factors for the results in this section being lower than in the other two sections.

Results from ranking

High ranking involved a positive response to the following four categories: read the book, heard about the book, know the author(s) and recommend the book.

The books that participants ranked highest in this section are:

1. *Design Methods* by Jones (1970, 1981, 1992)
2. *Notes on the Synthesis of Form* by Alexander (1964)
3. *Developments in Design Methodology* by Cross (1984)
4. *Contextual Design: Defining Customer-Centered Systems* by Beyer and Holtzblatt (1997)

Design Methods by J. Christopher Jones is both the most read and most highly recommended by the design community. He is known as a founder of the design methods movement. This book has been praised and widely translated into Japanese, Russian and Spanish. According to the field-keyword analysis, the fields that would strongly benefit from this book are technology engineering, architecture and industrial design. Intentionally focused on creative projects, the book is applicable to design research as well.

Notes on the Synthesis of Form by Christopher W. Alexander is highly ranked in all four categories: read, heard, known author and also recommended by design community. He explored a method of dealing with complexity in design by organizing structure through relationship and hierarchy. His theory underpins many computer-aided design programs. The author also had another high-ranking book, *A Pattern Language*, in the Theory and Practice section.

Developments in Design Methodology by Nigel Cross, a well known author, is highly read and recommended by the design community. Engaged in design research since the 1960s, his lectures and publications have received worldwide attention in the design community. Beside having an outstanding reputation, this book might be highly ranked because it can serve as a guide for researchers who are interested in developing design methodology. According to the field-keyword analysis, the fields that relate to this book are architecture and industrial design.

Contextual Design by Hugh Bever and Karen Holtzblatt is highly regarded in the design community. This book provides underlying principles and methods for how to apply a user-centered approach to business and design by showing how data gathered from one's work can drive the definition of a product or process. This important bridge between knowledge from researchers and designers and its transfer to practice might be the reason why this book is considered relevant by the design community. According to the field-keyword analysis, the fields that strongly relate to this book are technology, engineering, business and communication design.

From the ranking result, most books that have high ranking are classic with the exception of *Contextual Design* which is very new, but despite this the authors are remarkably well known and respected in the design community.

Field-keyword analysis

The percentage of the field-keyword distribution in this section is as shown below:

	Natural science	Social science	Technology science	Business	Education	Architecture	Industrial design	Visual design
Original list	18.64	42.37	16.94	8.47	1.69	3.38	1.69	6.77
On-line ranking	14.28	38.09	14.28	9.52	0	9.52	4.76	9.52
Recommended books	0	75	0	0	0	0	25	0
Added-recommended	0	50	0	0	0	0	50	0
Added by experts	10.52	36.84	5.26	5.26	21.05	5.26	0	15.78
Final list	10	32.50	10	2.50	10	12.50	10	12.50

Table 1 Field-keyword Analysis

Based on the field-keyword analysis, the books in the original list are highly related to social science, natural science and technology. Since these disciplines have a well established body of knowledge, most of the research method books found from a literature reference perspective fall into these fields. Other books included in the original list relate to business, visual communication, architecture, industrial design and education respectively.

The web survey included as participants those interested in design at an advanced education or research level, consequently their response was substantial with regard to books related to design disciplines, with less response to books related to science. As a result, books in the design discipline as well as business and education were intentionally selected in the first round of bibliography development in an attempt to even the distribution of books among different disciplines.

The books included in the final list relate strongly to social science. Since most of the research methods used in design research, particularly in user-centered design, are borrowed from social science, these books are recognized by many scholars practicing design research. Other selected books are distributed among architecture, visual communication, technology, education, natural science, industrial design and business respectively. (See table 2, p. 172-173.)

Observation on the methods

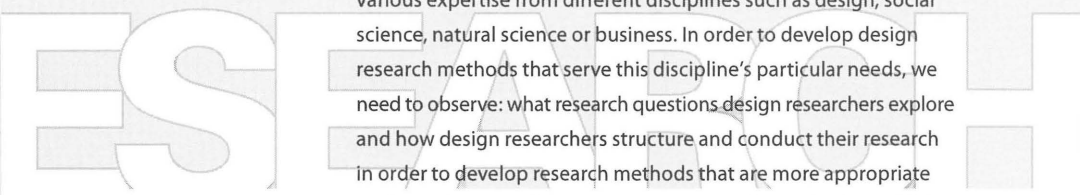
As this section had a relatively low response in the ranking process, additional books were needed to complete the list. These additional books were recommended by those actively engaged in design research such as the Ph.D. community at the Institute of Design, IIT and other scholars who work in design research or education. Most of these books relate to social science and education; some fall into the category of visual communication and natural science.

Final book selection

The final selection includes fifteen highly ranked books among a total of thirty books. Few of them are in the design discipline, most are in social research. Another fifteen books were added that are in the design discipline. The additional books came from book recommendations from participants in the original recommendation process on the web and from the Institute of Design's "Search[re]Search" website (www.ir.iit.edu/id). The final book list was refined by consulting experts in the domain of design research and balancing the entries equally to various design research methods and disciplines. Eleven books in natural science, twenty-five books in social science, ten books in technology and engineering, four books in business, one book in education and seven books in creative and applied art (note: some books are in more than one discipline) are on the final list. Related to Nigel Cross's taxonomy of the field of design research mentioned earlier, some of the books listed in this section can crossover in all three categories: design epistemology, design praxiology and design phenomenology. Some books relate more to specific categories depending upon the research content and the levels of design research in terms of basic research, applied research or clinical research.

CONCLUSION

From our study of the book ranking survey and book recommendation process by the design community, the highest percentage-ranking books in this section are in social science. This could be interpreted in two ways; either we have few methods established to directly support design research or those methods are not explicitly published and widely accessible to design researchers. As a result, to conduct design research, we need to borrow research methods from other disciplines that have more expertise in research activity such as social science and natural science. However, different disciplines have different goals and philosophy regarding research and the research methods needed to approach their goals, let alone differences in subject or content. If design researchers rely only on borrowed methods from other disciplines, the knowledge obtained from the research results might not directly be applicable to designers in practice. Some methods might need to be modified and adapted in order to be more suitable to the content and goals of design research.



Therefore, the research methods used particularly for design research activity should be structurally established and documented, which can be achieved by the collaboration of designer-researchers with various expertise from different disciplines such as design, social science, natural science or business. In order to develop design research methods that serve this discipline's particular needs, we need to observe: what research questions design researchers explore and how design researchers structure and conduct their research in order to develop research methods that are more appropriate to design in terms of its context, process and goal. In the end this would unite research with design practitioners more seamlessly.

Furthermore, since each research contains particular goals and processes that lead to different method use, these methods should be developed with contemplation of their appropriateness in different categories of design research activity: design epistemology, design praxiology and design phenomenology, as well as considering their effectiveness as applied to different design research levels: basic research, applied research and clinical research.

In order to structurally establish the principles and methods of design research, this dilemma calls for contribution from both design practitioners and researchers. Understanding this need in design culture, researchers could position their research interest in a direction valuable to the world of practice as also discussed in the Theory and Practice section.

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	Title: The final list	Author
1	Against Method	Feyerabend, Paul K.
2	Analyzing Design Activity	Cross, Nigel; Christians, Henri, editors
3	Basics of Qualitative Research: Techniques and Procedures for Developing...	Strauss, Anselm; Corbin, Juliet.
4	Case Study Research: Design and Methods	Yin, Robert K.
5	Collecting and Interpreting Qualitative Materials	Denzin, Norman K.; Lincoln, Yvonna S., editors
6	Constructing Social Research: The Unity and Diversity of Method	Ragin, Charles C.
7	Content Analysis: An Introduction to Its Methodology	Krippendorff, Klaus
8	Contextual Design: Defining Customer-Centered Systems	Beyer, Hugh; Holtzblatt, Karen
9	The Craft of Research	Booth, Wayne C., et al
10	Design Methods	Jones, John Christopher
11	Developments in Design Methodology	Cross, Nigel, editor
12	Engineering Design Method: Strategies for Product Design	Cross, Nigel
13	Ethnography: Principles in Practice	Hammersley, Martyn; Atkinson, Paul
14	Grounded Theory Methodology: An Overview	Strauss, Anselm, et al, editors
15	Handbook of Visual Analysis	van Leeuwen, Theo; Jewitt, Carey
16	How Designers Think: The Design Process Demystified	Lawson, Bryan
17	How to Write and Publish a Scientific Paper	Day, Robert A.
18	Inquiry by Design: Tools for Environment-Behavior Research	Zeisel, John, et al, editors
19	Investigating Communication: An Introduction to Research Methods	Frey, Lawrence R., et al
20	Notes on Synthesis of Form	Alexander, Christopher W.
21	A Practical Guide to Behavioral Research	Sommer, Barbara; Sommer, Robert
22	Protocol Analysis: Verbal Reports as Data	Ericsson, K. Anders; Simon, Herbert A.
23	Qualitative Data Analysis: An Expanded Sourcebook	Miles, Matthew B.; Huberman, A. Michael
24	Qualitative Research Methods for Social Science	Bero, Bruce Lawrence
25	Real World Research: A Resource for Social Scientists and Practitioner-Researchers	Robson, Colin
26	Redefining Designing: From Form to Experience	Mitchell, C. Thomas
27	Research Design: Qualitative and Quantitative Approaches	Creswell, John W.
28	Scenario-based Design: Envisioning Work and Technology in Systems Development	Carroll, John M.
29	System Thinking: Managing Chaos and Complexity: A Platform for Designing...	Gharajedaghi, Jamshid
30	Transforming Qualitative Information: Thematic Analysis and Code Development	Boyatzis, Richard E.

Table 2 Foundations for Design Research Book List

Field-keyword Analysis

On-line Survey *

	Nature Science	Social Science	Technology Science	Business	Education	Architecture	Industrial Design	Visual Communication	Heard	Known Author	Read	Recommend
	■						■		○	○	○	○
	■	■							•	•	○	○
		■							○	○	○	○
		■							•	•	•	•
					■			■				
			■		■			■	○	○	○	○
			■			■	■		○	○	●	○
			■			■	■		○	○	○	○
		■					■		○	○	○	○
		■						■				
		■							○	○	○	○
		■			■				○	○	○	○
		■			■			■	•	•	•	•
		■				■	■		○	○	○	○
		■						■				
		■			■				○	○	○	○
		■							○	○	○	○
	■	■				■			○	○	○	○
			■					■				
	■			■								
		■										

* The on-line survey produced limited information regarding the Foundations for Design Research selection

Legend



Response

0
1-3
4-6
7-9
10-13

Methods

Annotated Principles and Methods of Design Research List

1 Against Method Feyerabend, Paul K. London: Verso, 2000

In its seventh printing, *Against Method* continues to be a lightning rod for controversy. The author is a philosopher of science, able to examine the history of science with a critical eye as well as launch a serious argument. He argues that scientific discovery does not proceed by strict rules: "...the history of science will be as complex, chaotic, full of mistakes, and entertaining as the ideas it contains, and these ideas in turn will be as complex, chaotic, full of mistakes, and entertaining as the minds of those who invented them."

His discussion ranges across the relationships between hypothesis and observation, observation and appearance, observation and its representation, fact and experimental result, theory and fact. Social aspects of acceptance or rejection of new ideas is not ignored. Likewise the hidden influence of past ideas that unwittingly color fact or cloud judgment are also acknowledged. His extended example is the development of the Copernican point of view from Galileo to the twentieth century. (Without at least a little knowledge of astronomy and history, the example may be hard to follow.)

Feyerabend enthusiastically cites John Stuart Mill's *On Liberty* several times — so he can't be all bad — but he is a provocateur.

Sharon Poggenpohl

2 Analyzing Design Activity

*Cross, Nigel and Christians, Henri, editors
New York: John Wiley & Sons, 1997*

A collection of Protocol Workshops in the area of research in Design Thinking, this book states that there is no general understanding of protocol studies as a standard procedure. As a result, the book assembles different views of protocol analysis from many leading researchers. They combine different types of methods, techniques, tools and frameworks for protocol analysis and use activity based models, linkography, decision trees, observation, neural networks, design rationales, function-behavior-structure models and others for investigation. This book illustrates that the protocols seem to be a general method that can be used with different concepts and techniques and both qualitative and quantitative data. Written in a research style and using the same case study throughout, a mountain bicycle and backpack, it compares different research approaches. The authors include a discussion of the properties and limitations of protocol analysis as a research technique for analyzing design activity and accumulating design knowledge.

Sakol Teeravarunyou

3 Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory

*Strauss, Anselm; Corbin, Juliet.
Thousand Oaks, CA: Sage Publications, 1998*

Anselm Strauss with Barney Glaser wrote the book that defined and established Grounded Theory as one of the more used methodological strategies in qualitative research. This work represents Anselm Strauss' ideas on what Grounded Theory is and how it should be carried out. (After their initial collaboration, Strauss and Glaser each developed their own version of this theory.)

The intent of Grounded Theory is to create theory through the analysis of qualitative data. The emphasis of the book lies in giving the reader the necessary analytical tools to step through the process of making theory. "...We are referring not to the quantifying of qualitative data but rather to a nonmathematical process of interpretation, carried out for the purpose of discovering concepts and relationships in raw data and then organizing these into a theoretical explanatory scheme..."

The book is divided into three parts: the first covers what is necessary for doing this form of grounded theory; the second part deals with specific analytic techniques and procedures; and the last part contains issues that relate to what comes after completing the analysis.

Roberto Holguin

4 Case Study Research: Design and Methods

Yin, Robert K.

Thousand Oaks, CA: Sage Publications, 1994

Design researchers sometimes find themselves dealing with current phenomenon when the boundaries between context and phenomenon are not clear. Case study is a method appropriate for such situations. It uses multiple sources of evidence in order to answer 'how and why' questions. As the researcher has little or no control over events, case study as a scientific research method has been viewed with suspicion. Yin provides guidelines for case study as a reliable and valid research method that can be used for theory building and testing. All stages of case study research from research problem definition through reporting are thoroughly described and exemplified. The author also points to different strategies for single and multiple case studies. Lacking a clear and common understanding of what should constitute design case study, Yin's framework is highly valuable for design researchers.

Suzan Boztepe

5 **Collecting and Interpreting Qualitative Materials**

*Denzin, Norman K. and Lincoln, Yvonna S., editors
Thousand Oaks, CA: Sage Publications, 1998*

Part of a collection of what was formerly the *Handbook of Qualitative Research*, this version was divided to make it a better fit for the teaching environment. The purpose of this volume is to introduce the basic methods of gathering and analyzing qualitative data. The methods included are the expected fundamental ones for qualitative research; this is not an exhaustive collection or description of all possible methods. In two parts, part one moves from interviewing to observation; covers the use of artifacts, documents and records from the past; visual, personal experience; data management and computerized, narrative content and semiotic methods of analysis. Part two focuses on interpretation, evaluation and presentation.

Part one's emphasis is the most practical. A chapter on interviewing, includes the history of interviewing and a description of the range of structured and unstructured interviews. A chapter on observation describes the different techniques and different observational paradigms (formal sociology, dramaturgical sociology, studies of the public realm, auto observation and ethnomethodology) as well as the problems inherent in these methods. Two chapters of particular interest to beginning researchers deal with issues of data management and analysis methods as well as the use of computers in qualitative methods.

Roberto Holguin

6 **Constructing Social Research: The Unity and Diversity of Method**

*Ragin, Charles C.
Thousand Oaks, CA: Pine Forge Press, 1994*

Social research is a construction of a 'representation of social life.' What distinguishes social researchers from others who represent social life, such as a journalist, is her use of scientific methods. It is the dialogue between theory and evidence that brings unity to the diversity of evidence in social research. Indeed the goal of social researchers may range from identifying patterns and testing theories to giving voice to a group. Pairing the goal and objective to a method is the key in choosing appropriate research strategies. Qualitative research looks for commonality by examining many aspects of a small numbers of cases in depth. The comparative method is useful for understanding diversity in a moderate number of cases in a comprehensive manner. Quantitative research is focused on revealing broad patterns and investigates a small number of variables across many, many cases. By supplying an overview of social research rather than focusing on techniques in detail, the book is best used as a starting point for any researcher.

Suzan Boztepe

7 Content Analysis: An Introduction to Its Methodology

Krippendorff, Klaus

Newbury Park CA.: Sage Publications, 1980

This book introduces the research technique of content analysis — analyzing data as symbolic communications and making valid inferences from the data to their context. Content analysis is most commonly associated with analysis of mass media — for instance, a study in which portrayals of race in television programming are scrutinized for the extent to which they are representative of the racial make-up of a regional population, or a study of sexual images in the press and what they indicate about national consciousness. Citing numerous examples, the author provides an historical overview of the method's development and the domains to which it has been applied. The bulk of the text is devoted to a detailed discussion of the procedures involved in constructing rigorous and reliable studies. The final chapter is an abbreviated guide to planning and executing a content analysis.

Jay Melican

8 Contextual Design: Defining Customer-Centered Systems

Beyer, Hugh and Holtzblatt, Karen

San Francisco, CA: Morgan Kaufmann Publishers, 1997

This is a practical guidebook that supports system development team members to effectively reflect the way customers want to do their work throughout the development process. The method, contextual design, developed by the authors, enables the team members to gather detailed data about how people work and use systems through contextual interviews. It develops a coherent picture of a whole customer population and generates systems designs from knowledge of customer work. Many examples that apply this method are explained to enhance the understanding of the benefits. Diagrams and illustrations presented in this book are well combined to describe work structure, system environment and their relationships. They reveal the way to find the problems in existing systems, which are targets for new system development.

Youn-kyung Lim

9

The Craft of Research

Booth, Wayne C.; Colomb, Gregory G.; Williams, Joseph M.
Chicago: University of Chicago Press, 1995

The research process is an elaborate dialogue between the researcher, the data, the written drafts and questions and issues that emerge as the project moves forward. The writer learns through the process of writing, reading and an iterative approach in preparing various drafts, outlines and visual presentations of data. Carefully crafted arguments and reliable evidence are essential components of every research project. Such arguments provide a challenging experience for both the writer and the reader. A substantive claim is essential to good research and must be contestable, yet plausible. Revisions of the final draft are not limited to superficial editing, but must include a thorough analysis of the structure of the paper from the hypothetical perspective of the reader. The conversational tone, stepwise recommendations for each research stage and layer of information provide a useful tool for both novice and expert researchers in any discipline.

Barbara Martinson

10

Design Methods

Jones, John Christopher
New York: John Wiley & Sons, 1992

The author was part of the design methods movements of the 1960s. At that time, industrial designers, engineers and architects faced the problem of cooperative work among many designers and stakeholders. His work is a collection of many methods or 'recipes' that grew from group design work. The book first evaluates traditional methods such as design-by-drawing and shows how this method does not adequately address the complex demands of the contemporary design context. He sets to work re-designing the design process itself so that intuition and rationality co-exist rather than exclude each other. The book then provides thirty-five methods including logical, data gathering, taxonomic and evaluative procedures. *Design Methods* is a landmark of the design methods movement and it was widely appreciated. This book has had a tremendous impact on many designers.

Sakol Teeravarunyou

Design

12 Engineering Design Method: Strategies for Product Design

Cross, Nigel

London: John Wiley & Sons, 1994

The author concentrates on fundamental approaches to design for a wide variety of engineered products. Emphasis is placed upon problem formulation, concept and embodiment in design through a mix of creative and systematic methods that together can be used to resolve design problems and develop successful solutions. This strategic approach to design means that the book is of value to those studying, teaching and practicing design across a wide range of engineering-related disciplines. The book is organized in three parts. The first part deals with the nature of engineering product design with models and methods of both creative and rational approaches to design. The second part explores seven powerful systematic design methods which are discussed in detail and illustrated with a wide range of examples. The third part examines how to combine methods for a successful strategic approach to engineering product design.

Youn-kyung Lim

11 Developments in Design Methodology

Cross, Nigel, editor

Bath, UK: Pitman Press, 1984

A collection of articles from a twenty-year period, it contains the writings of many distinguished methodologists like J. Christopher Jones, Christopher Alexander, Herbert A. Simon and others. The management of design process involves the borrowed techniques of problem solving, management and operational research. Many authors propose solutions to solve ill-structured problems. Understanding how designers tackle such problems in design activity is another approach. In the philosophy of design method section, reflective methods draw upon the knowledge gained. Some principles are borrowed from the philosophy of science, from Popper's and Kant's views. The book ends with the History of Design Methodology that refers to many generations of design methods and their chronological development. Nevertheless the book still lacks consensus on design methodology and a proof for the ideologies as many authors debate the application of a scientific approach to design problems. This book provides a significant foundation for the formation of design methodology.

Sakol Teeravarunyou

13 **Ethnography: Principles in Practice**

*Hammersley, Martyn and Atkinson, Paul
London: Routledge, 1995 (Second edition)*

Hammersley and Atkinson define ethnography, its origins and discrepancies with positivistic reasoning. A great portion of the book delves into the more practical aspects of carrying out ethnographic research (research design, gaining access, analysis and ethics). The goal as described by the authors is to steer a course between an abstract methodological treatise and a practical cookbook. Methodology and method, like social theory and empirical theory, feed into each other. Neither can be discussed effectively in isolation.

The methods and the principles presented are guided by the concept of reflexivity, which is the central theme of the book. Reflexivity provides the basis for a reconstructed knowledge of inquiry that shares much with positivism and naturalism, but goes beyond them in important aspects: "By including the researcher's role within the research focus, and perhaps even systematically exploiting their participation in the settings under study as researchers." (Naturalistic inquiry was ethnography's answer to positivist tenets, the social world should be studied in its 'natural state.')

Roberto Holguin

Design

14 Grounded Theory Methodology: An Overview

*Strauss, Anselm; Corbin, Juliet; Denzin, Norman K.; Lincoln, Yvonna S., editors
Thousand Oaks, CA: Sage Publications, 1998*

Grounded theory is a general methodology for developing theory founded in data systematically gathered and analyzed. Theory evolves during actual research and it does this through continuous interplay between analysis and data collection. A central feature of this analytic approach is a general method of [constant] comparative analysis (Glaser and Strauss, 1967); the approach is also referred to as the constant comparative method. The term is also used for theoretical elaboration. Conceptual density refers to richness of concept development and relationships — which rest on great familiarity with associated data and are checked out systematically with these data. (This is different from Geertz's thick descriptions where emphasis is on description rather than conceptualization.) Grounded theory methodology is designed to guide researchers in producing theory that is conceptually dense — that is with many concept relationships. Presented in the context of descriptive and conceptual writing, this discursive presentation captures the density and conveys the substantive content of a study better than the natural science form of propositional presentation (typically framed as if-then statements).

Roberto Holguin

15 **Handbook of Visual Analysis**

van Leeuwen, Theo and Jewitt, Carey
Thousand Oaks, CA: Sage Publications, 2001

Images as data; data as images. Images need not be relegated to the role of supporting research, but are in themselves a valuable source of knowledge. Visual information is frequently the subject of qualitative and quantitative research. Cultural and situational contexts influence perception and identification with images. This handbook presents analytic frameworks from varying disciplines such as cultural studies, anthropology, communication studies and psychoanalysis. Research examples range from content analysis, semiotic analysis and ethnomethodology. The integration of theory with how-to information creates a useful resource for both beginning and experienced visual researchers.

Barbara Martinson

16 **How Designers Think: The Design Process Demystified**

Lawson, Bryan
United Kingdom: Butterworth Architecture, 1990

Though written more for a lay public, this book nevertheless presents a complete theory of design thinking and is an interesting book. Attention to the notion of primary generator, an organizing principle or theme that may run through design development and deliberation and a theory of design constraints is presented as ways to define solutions. While 'users' are mentioned categorically, ideas relating to user observation or prototype testing are noticeably missing. Lawson focuses more on the beginnings — problem setting and understanding, and endings, the solution based on criteria and its assessment — than on the middle design development phase. The author has much interest in creativity.

Luis Pereira

Design

17 How to Write and Publish a Scientific Paper

Day, Robert A.

Philadelphia: ISI Press, 1988

This book carries an explanation of all the details that go into making a scientific paper acceptable as well as the larger issues related to research dissemination. The first chapter holds general views on purpose, organization and language of a scientific paper, but then launches into very detailed recommendations for preparing titles, listing authors, writing up results and discussions, designing effective tables and illustrations and developing the materials and methods sections. In addition to those details, this book covers the editorial review process, manuscript submission and the publication process. Although this author writes from a biological science background, his recommendations for scientific paper preparation are among the best. In addition, design students who read this book will know they are receiving credible information when they discover the amount of detail and attention recommended for a publishable scientific paper.

Lorraine Justice

18 Inquiry by Design: Tools for Environment-Behavior Research

Zeisel, John; Stokols, Daniel;

Altman, Irwin, editors

Cambridge: Cambridge University Press, 1984

This collection of essays explores how to apply sociological, psychological and anthropological methodologies to the study of human behavior and the physical environment, where design and planning are crucial. Oriented to a multi-disciplinary audience — social scientists, designers, urban planners and architects — the author discusses many interesting relationships between research and design. He combines the process of research with the process of design.

The book is in two parts. In part one, he explores the empirical study of conducting research through learning and testing. This includes concept development, hypothesis building, research and design in cooperation and the side effects of cooperation. In part two, multiple-method research for solving complex problems such as observing physical traces, observing behavior and others are discussed. The book provides a good foundation for designers who want to know about social science research or researchers who want to know about design.

Sakol Teeravarunyou



19

Investigating Communication:

An Introduction to Research Methods

*Frey, Lawrence R.; Botan, Carl H.; Friedman, Paul G.; Kreps, Gary L.
New York: Prentice Hall, 1991*

Understanding the culture of research is a daunting task for the beginning researcher, and certainly more so for those working in multidisciplinary fields such as Communication. Increased understanding can be facilitated through an examination of the three general research cultures: the physical sciences, the humanities and the social sciences. Frequently an integrated approach, using multiple methods from each of the different cultures, is most effective. Rejecting the notion of researcher-as-scientist for the more active researcher-as-detective, the research process includes conceptualization, planning, method, analysis and interpretation and reconceptualization. The researcher must recognize the interrelationship of theory and practice, and select the appropriate method for the specific research question. To help the researcher accomplish these tasks, the authors present a comprehensive overview of methods applicable to communication inquiry.

Barbara Martinson

Design

TEXT

20

Notes on Synthesis of Form*Alexander, Christopher W.**Cambridge: Harvard University Press, 1964*

Starting from a concept of fitness (problem to solution) that design intends to develop and solve, Alexander explores design complexity in terms of the structural configurations among problem elements, their relationships and hierarchies. He describes his main task as "...to show that there is a deep and important underlying structural correspondence between the pattern of a problem and the process of designing a physical form that answers that problem." He focuses on encapsulating each element of a form into its own investigation and then later combines all elements into the whole form. His method involves algorithms used to organize the structure. These are important underlying elements and principles of product architecture and complexity theory. This is a short and beautifully written book in which he outlines his design theory. The author is the 1960s architect who later developed 'pattern language.'

Sakol Teeravarunyou

PATTERN LANGUAGE

21

A Practical Guide to Behavioral Research

*Sommer, Barbara and Sommer, Robert
New York: Oxford University Press, 1997*

A Practical Guide to Behavioral Research is a very easy and informative read on behavioral research without a lot of dry content and examples. It works very well for undergraduate industrial design students who are first introduced to research as a tool to enhance the design process. The book covers ethics, literature reviews, observation, experiments, survey designs, content analysis, sampling, statistics and report writing. One of the better facets of this book is the promotion of a multi-method approach to behavioral research and its recommendation of qualitative and quantitative methods. The limitation of this book is that it is an overview of the methods. Other research method books are needed by the advanced student if they want in-depth coverage on any particular research method such as hypotheses and experimentation or questionnaire design. This book emerges from the behavioral sciences and is very applicable to the design profession, especially in relation to user representation for product needs and perceptions.

Lorraine Justice

Design

RESEARCH

22

Protocol Analysis: Verbal Reports as Data*Ericsson, K. Anders and Simon, Herbert A.**Cambridge: MIT Press, 1993*

An in-depth discussion of the issues associated with the use of subjects' verbal reports as representative of their cognitive processes, this book should be considered required reading only for researchers who are considering employing this technique (or some variation of it). Together with the preface, the introductory chapter provides a comprehensive overview of the 'think aloud' approach — in which subjects verbalize their thought processes as they perform specific tasks. The following chapters go into depth on issues including: the effects of verbalization on the subjects' performance of the task, the validity of verbal reports and specific techniques for their analysis. Each section of the book is concisely summarized with its conclusion. Protocol analysis is significant to design research as a technique that has been fairly widely adopted in studying the cognitive processes involved in design problem solving.

The first edition of this book was heralded as the bible of cognitive science methodology. It stimulated a strong body of research. But due to its importance and many suggestions, many researchers went beyond its prescriptions. This later edition provides a more complete and current theoretical view of connections between focal task processes and reporting processes, especially in regard to the many situations in which retrospective protocols are necessary. Protocol analysis is put on a firm footing — verbalization is seen as any other kind of behavior.

Jay Melican

23 **Qualitative Data Analysis: An Expanded Sourcebook**

Miles, Matthew B. and Huberman, A. Michael

Thousand Oaks, CA: Sage Publications, 1994

The authors concentrate on addressing what they feel is one of the major problems facing qualitative researchers: how to draw valid meaning from qualitative data. They identify that the most serious and central difficulty in the use of qualitative data is that methods of analysis are not well formulated. Like the title suggests, there are multiple methods of analysis presented throughout the book. Data collection methods are not part of this handbook as there are better sources for this. The authors clearly present their bias to analysis and compare it to other existing forms of interpretation and analysis. Qualitative data analysis contains a nonlinear process of doing: data reduction — selecting, focusing, simplifying, abstracting and transforming the data; data display — compressing and organizing information that permits a conclusion and action; verification — carefully documenting analytical sets and making them useful to others.

Roberto Holguin

24 **Qualitative Research Methods for Social Science**

Berg, Bruce Lawrence

Boston, MA: Allyn & Bacon, 2001

Offering a comprehensive view of qualitative field techniques, this book provides information in a way that novice researchers can easily follow. Berg describes seven different data collection strategies including interviews, focus group interviews, ethnographic field strategies, action research, archival strategies and historiography and oral traditions. A chapter on the ethical dimension of field research is new to this fourth edition; here Berg stresses the importance of ethics in research and in taking the time to properly design and think through any research endeavor. He also discusses the value of combining 'research-before-theory' and 'theory-before-research' approaches in a 'spiraling' pattern, in comparison to the 'linear' research pattern from literature review to data collection. This book is useful for design practitioners and researchers who need to develop qualitative research skills, especially data collection techniques. After reading this book, design practitioners or researchers should be able to design, collect and analyze data and then present their results to the community (scientifically).

Praima Chayutsahakij

25

**Real World Research: A Resource for Social Scientists
and Practitioner-Researchers***Robson, Colin**London: Blackwell, 1993*

Researchers faced with 'real world' challenges like limited time and money and the need to address a pressing problem or issue will find this book valuable. Written for psychology and social science researchers, this book is also useful in design. The chapters cover everything from how to write a research proposal, act on your research findings and get research results published. In between these topics, the reader is offered overviews on different data collection and analysis methods covering both quantitative and qualitative approaches. It is comprehensive enough to suit people who want to learn about a particular methodology, but do not want to commit themselves to one approach. The book is useful for both general research and design research. Some methods can be applied to specific design problems such as case studies.

Sakol Teeravaranyou

26 **Redefining Designing: From Form to Experience**

Mitchell, C. Thomas

New York: Van Nostrand Reinhold, 1993

This book offers a comprehensive user-centered design perspective focusing on design in terms of human experience rather than physical form. Mitchell discusses how design philosophies since industrialization, including modernism, late modernism, post-modernism and deconstruction, have emphasized only style and failed to fulfill users needs and wishes. He also cites many examples of design projects, especially in architecture, that fail to suit intended purposes, including award winning ones. He then points out how design research is important to user-centered design or what he calls 'user-responsive design' or 'design turned inside-out' in this book. In the second half of the book, he explores collaborative, contextual and intangible design along with examples for each. *Redefining Designing* demonstrates user-centered methods that could be applied in any design field. This book is of interest to architects, planners and landscape architects, as well as interior, communication, product and industrial designers.

Praima Chayutsahakij

27 **Research Design: Qualitative and Quantitative Approaches**

Creswell, John W.

Thousand Oaks, CA: Sage Publications, 1994

Research Design is similar to Sommer and Sommer's *Practical Guide to Behavioral Research* because it also is a very easy read about a potentially dry topic. This book seeks to engage and inform the reader and imparts why one would use qualitative or quantitative methods. It brings value because it involves an inquiry into the very nature of research design and all its intricacies. A highlight of this book is the discussion on questions, objectives and hypothesis construction as well as a discussion on the use of a theory. This information is presented in a way that is very applied — something that lends itself very well to the design profession.

Lorraine Justice

28

**Scenario-based Design: Envisioning Work and Technology
in Systems Development***Carroll, John M.**New York: John Wiley & Sons, 1995*

On behalf of enhancement in the development of software systems, applications and user interfaces, the leading figures in the field of human-computer interaction and object-oriented software engineering contribute to provide the cases for discussion in an array of scenario-based design approaches in this book. Here scenario-based design demonstrates practical applications across the system development life cycle, from requirements analysis and software design, to documentation, training and prototype evaluation. It brings the work processes of users to a focused concern in development instead of attention to the product itself. These aspects are supported by the scenarios that describe activities and sequences of actions in the user context. Introducing this perspective as the main concept of the scenario-based approaches, the case studies are presented along with clearly explained illustrations and diagrams.

Youn-kyung Lim

29

System Thinking: Managing Chaos and Complexity: A Platform for Designing Business Architecture

Gharajedaghi, Jamshid

Washington, D.C.: Library of Congress, 1999

The imperative of organizational interdependency requires reducing endless complexity in order to produce manageable simplicities. This requires a change in mode of thinking to a holistic frame of reference that allows one to focus on relevant issues and avoid the endless search for more detail. While organizations as a whole are becoming more and more interdependent, their parts display choice and behave independently. This is the dilemma this book tries to resolve. The author introduces a general system philosophy and theories including systems principles, organizational dimensions and a sociocultural model. A system framework and methodology, understood as an iterative process, is discussed. The book deals with all three dimensions: structure, function and process, and their containing environment, which together define the whole. The book demonstrates how to apply this methodology to system architecture through five case studies. In the conclusion, the author claims that modular design is the most potent and practical means of handling change and implementing complex designs without getting lost in the process.

Sakol Teeravarunyou

30

Transforming Qualitative Information: Thematic Analysis and Code Development

Boyatzis, Richard E.

Thousand Oaks, CA: Sage Publications, 1988

Boyatzis focuses on the search for insight or making sense from data collected in this book. The author presents a process for segmenting and relating data in order to develop themes. A theme is a pattern found in the information that at the minimum describes and organizes possible observations or at the maximum interprets aspects of the phenomenon. Themes might be identified at a manifest level (directly observable in the information) or at a latent level (underlying the phenomenon). Thematic analysis is a process that requires the labeling or coding of qualitative information in order to construct the themes. Thematic analysis occupies an interesting place somewhere between qualitative data and quantitative data; the author even argues that this process is potentially a bridge or transition between the two.

Roberto Holguin