Making a Book Cover with Data.

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ABSTRACT

In this pictorial, we describe the process of creating the cover of the book *Making with Data: Physical Design and Craft in a Data Driven World.* The book cover is a physical data-driven papercraft sculpture that visualizes the undulating word counts of each section of each chapter. We present our process of using data as material for designing the book cover in nine phases. Our goal was to allow viewers and readers to 'judge the book by its cover', and experience the book's theme aesthetically and evocatively, even before opening it.

Author Keywords

Data physicalization, book, cover, paper art, paper sculpture.

CSS Concepts

• Human-centered computing~Visualization

WITH DATA

Physical Design and Craft in a Data-Driven World

Samuel Huron, Till Nagel, Lora Oehlberg, Wesley Willett Foreword by Barbara Tversky and Hiroshi Ishii

INTRODUCTION

Making with Data is a physical data-driven papercraft sculpture that serves as the cover of a just released book, Making with Data: Physical Design and Craft in a Data Driven World [3]. The paper waves of the piece reflect the undulating word counts of each of the book's 24 chapters. Each of these chapters tells the story behind the creation of a physical object, space, or experience that represents data — with the artists and designers who crafted the piece explaining the unique and creative process through which they gave that data physical form.

Our *Making with Data* cover sculpture is a data physicalization [1,4] that encodes data through material properties to represent a data set about the book's contents. In a similar way, Richards book *Questions in Dataviz* [5] visualizes data on the book's content and cover on the spine and page edges.

The sculpture captures the lengths of each chapter's Motivation, Practices & Processes, Materials & Tools, and Reflection subsections and reveals them via a physical ridgeline plot. To create the piece, the book's editors (Samuel Huron, Till Nagel, Lora Oehlberg, and Wesley Willett) compiled the data and created vector graphics files for each paper layer. We then commissioned a paper artist, Betty Soliman, to select paper colours, cut each layer, and assemble them together. Graphic designer Elodie Maigné then composited photos of the piece to create the final cover.

In this pictorial, we describe the design process of constructing [2] a data-driven papercraft sculpture from collecting and visualizing the data to creating the sculpture and the final book cover.

PRACTICES AND PROCESSES

1. Gathering the Data

To build a piece that reflected the chapter and section lengths of the book, we first needed to collect data from the underlying manuscript. To collect this data, we wrote a series of scripts to automatically gather the contents of the chapters and count their lengths, then augmented these counts with manual data collection and data cleaning for atypical chapters.

2. Mapping Data to Curves

Next, we generated the ridgeline curves based on word counts from each chapter. We tried multiple variations of the ridgeline plot, ultimately using RAWGraphs to produce the underlying curves and then hand-tuning them in Adobe Illustrator.

3. Creating a Stencil

Using these curves we created PDFs, one of which allowed us to experiment with color combinations and layouts for the cover, and one of which served as a stencil that the paper artist could use to cut and assemble the final sculpture.











4. Choosing the Composition

We transferred these PDFs to paper artist Betty Soliman, who helped us explore different color, composition, and paper possibilities. For the composition, we first had to decide whether to include only the lower chart (the "tartine", the French name for an open-faced sandwich), or if we wanted to use both the positive and negative halves of the sculpture to enclose the title (the "sandwich"). For the final composition we relied on expert feedback from our 2- and 5-year-old design consultants (as well as our students and collaborators), and ultimately went with the "sandwich" composition.

5. Choosing Colors and Paper

Betty also proposed a set of possible color palettes that reflect the color palette from the images and graphic design of the book. As we deliberated on the color palette, Betty selected the specific paper weight, finish, and quality.

6. Cutting and Gluing

Using the curves we produced, Betty then cut, assembled, glued, and photographed the physical sculpture. She carefully glued foam boards between the paper sheets to give depth to the piece, so that more pronounced shadows emerge. For the photograph, we worked with Betty to adjust the lighting and ensure that the image conveyed the true colors and physical depth of the original piece.



7. Adding Legends

For the cover, we wanted to produce a beautiful piece that wasn't cluttered with legends or explanatory text. However, we also wanted to ensure that the result was a legible visualization, rather than an abstract piece of data art. After exploring multiple different labelling options, we created a wireframe version of the chart that sits on a page just after the cover — allowing readers to flip back the cover to reveal the labels and titles (and creating a physical experience with the data).



8. Graphic Design

Our book's designer then assembled everything together in a final cover design that combines photos of the sculpture with the title and other text. She also designed a back cover which includes a description of the book, endorsements, and a selection of project images.

9. Final Design

Making with Data is organized into five thematic sections, each of which includes four or five chapters. These chapters each consist of seven subsections that tell the story of one project, including its Motivation, Practices & Processes, and Materials & Tools, plus a Reflection on the piece. The paper waves of the final piece reflect the undulating word counts from each of these sections.



DATA AS MATERIAL FOR DESIGN

Creating the book cover involved using data as material for creating the resulting visualization which embodies the vision of the book — representing its contents as an evocative data object and bringing the idea of *making with data* full circle.

Making the data sculpture was a collaborative effort of people with different skills and backgrounds. This may have contributed to a miscommunication between the visualization designers and the paper artist. We provided the paper artist with a PDF document containing stencils for each layer of the data sculpture. The document itself included clues for how to assemble the sculpture - numberings for which section and chapter each layer represented. However, when creating the sculpture due to a communication issue Betty assembled the layers based on page numbers instead of the numbering on the stencils - and only after a complete version of the piece was assembled did we realize that it was in the wrong order. To resolve the issue, we provided the PDF document again, so that page order and the numbering on the pages re-iterated the assembly order of the layers.

We found that this miscommunication was ultimately rooted in alternate understandings of data rendering and fabrication processes. The design-fabrication hand-off ended up being a good example of how a holistic understanding of the data feeds into accurate fabrication and assembly. While we can think of "data as a material for design", data literacy and familiarity actually informs the whole pipeline, from data collection to final display.

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