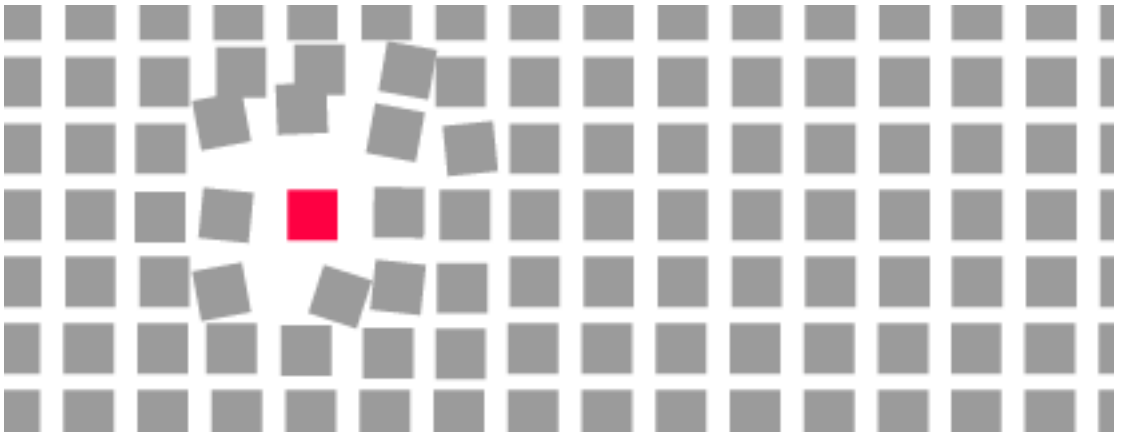
Deconstructing Analysis Techniques



Analysis is that oft-glossed over, but extremely important step in the research process that sits between observation (data gathering) and our design insights or recommendations. In many respects, analysis is crucial to realizing the value of our research since good analysis can salvage something from bad research, but the converse is not so true. This is where the literature tends to fall a little silent, jumping over the analysis techniques straight to a discussion of how best to document and communicate the findings from analysis. This article seeks to begin to redress that imbalance by breaking down the analysis black box into its major sub-techniques.

On a recent project I needed to collect and analyze the content management templates in use across a large enterprise Intranet. We were looking to inventory the diversity of templates in use; whether they existed outside or within the enterprise content management system; what changes might be made to the 'official' template set to reduce the overall number of templates, and to prepare for the migration of all content to a new design a few months down the track. I looked around at the literature for information architecture and Web design generally and found quite a few references to content inventories and content analysis, but nothing on analyzing templates.

I set about designing the analysis task from scratch: looking at what we wanted to get out of the analysis; and looking at what tools and techniques would most effectively allow us to get there. In so doing, it struck me that there is very little information published about the process of analysis that would equip practitioners with a toolkit to construct their own analytical techniques. So User Experience literature and all of its component domains focuses on techniques for user research and testing, it's surprising to realize that the coverage often skips over the process of analysis, since this is where much of the value of our research is realized.

Techniques of Analysis

We can start to pull back the curtain on analysis by looking at the techniques that go into the process:

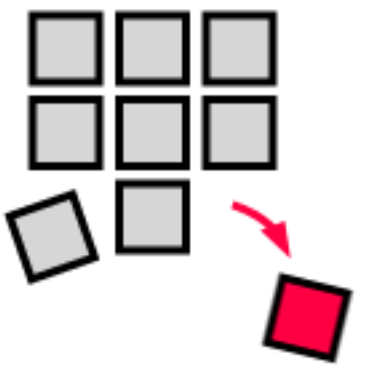
- **Deconstruction**: breaking observations down into component pieces. This is the classical definition of analysis.
- **Manipulation**: re-sorting, rearranging and otherwise moving your research data, without fundamentally changing it. This is used both as a preparatory technique – i.e. as a precursor to some other activity – or as a means of exploring the data as an analytic tool in its own right.
- **Transformation**: Processing the data to arrive at some new representation of the observations. Unlike manipulation, transformation has the effect of changing the data.
- **Summarization**: collating similar observations together and treating them collectively. This is a standard technique in many quantitative analysis methods.
- **Aggregation**: closely related to summarization, this technique draws together data from multiple sources. Such collections typically represent a "higher-level" view made up from the underlying individual data sets. Aggregate data is used frequently in quantitative analysis.
- **Generalization**: taking specific data from our observations and creating general statements or rules.
- **Abstraction**: the process of stripping out the particulars – information that relates to a specific example – so that more general characteristics come to the fore.
- **Synthesis**: The process of drawing together concepts, ideas, objects and other qualitative data in new configurations, or to create something entirely new.

Let's take a look at each of these techniques in detail and discuss some of the ways in which each technique can be applied.

Deconstruction

Breaking observations down into component pieces. This is the classical definition of analysis.

Breaking down research data into its component parts is a standard technique for analysis. One example of deconstruction is turning an interview transcript into a series of separate comments or answers to questions. Deconstruction is often used simply to prepare data for other analytic processes such as manipulation or summarization, or even abstraction.



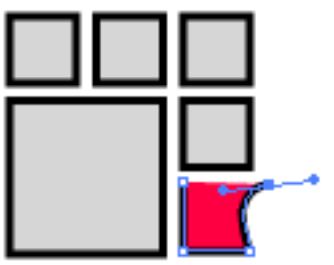
The aim of deconstruction is to decouple each component so as to allow inspection of each in its own right. In other disciplines this process is used as a device for critical thinking, bypassing the potentially misleading image conveyed by the whole. In so doing deconstruction can be a powerful tool for exposing unquestioned assumptions about our

users' mental models or the business priorities of the client organization.

Looking at our template analysis example, one of our first analysis tasks was to deconstruct the templates into their components. Like most of the technique we took a very low-tech approach to the task, blocking out the individual components with a pencil. In our case, the deconstruction made easier a lot of the subsequent analysis work.It was a minor, but significant, step in the overall process.

Manipulation

Re-sorting, rearranging and otherwise moving your research data, without fundamentally changing it. This is used both as a preparatory technique or as a means of exploring the data as an analytic tool in its own right.



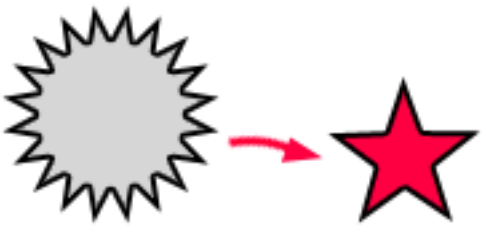
The ability to "play with the data" is a critical capability in analysis. We utilize this technique in many situations: searching for patterns or trends in our observations; or as another preparatory stage for further analysis. For example, sorting data in some way – alphabetic, chronological, complexity or numerical – is an a form of manipulation.

The ability to easily manipulate data is one of the key determinants for the tools we use in our analysis work. Spreadsheets are an excellent tool for manipulating data; but as we see in our template analysis task, the use of a more tangible form – such as our index cards – can be just as effective: if not more so in some cases.

When data recorded in a format that resists fluid manipulation and exploration people can stumble when moving from observation & data collection into analysis. It is important to plan this task into the research design so that it is not overlooked. You could find yourself with a costly and time-consuming data-entry process if it is forgotten in the planning stages.

Transformation

Processing the data to arrive at some new representation of the observations. Unlike manipulation, transformation has the effect of changing the data.



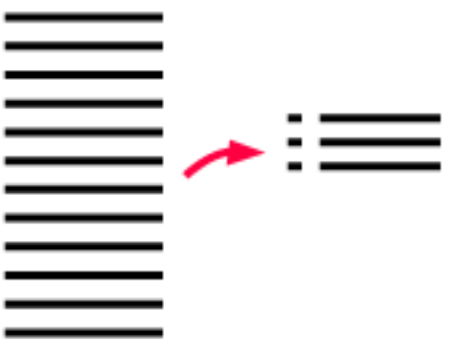
Transforming research data is the process of taking our research data and turning it into something else. For example, you may recall from your schooling days the practice of "scaling" results from an assessment task (exam, essay etc) so they fit a certain distribution, so you end up with (for example) 10% A, 15% B, 25% C, 25% D etc

Another example might be to convert raw data into a logarithmic form to reduce the impact of extreme values – or to demonstrate power laws in the data.

Summarization

Collating similar observations together and treating them collectively. This is a standard technique in many quantitative analysis methods.

The goal of summarizing data is to generate an additional set of data, typically more succinct, that encapsulates the raw data in some way. This may be a short sentence that captures the essential point from several minutes of an interview transcript: "participant finds site search unwieldy, confusing and difficult to use".



We can also summarize the data quantitatively using summary or descriptive statistics such as frequencies, means, and standard deviations. Unlike the process of abstraction, where specificity is sacrificed for the sake of clarity; or aggregation, where several data sets are "rolled up"; summarization seeks to characterize the underlying data.

Once again, spreadsheets are a very useful tool, especially when dealing with quantitative data. But they can be similarly useful when handling other data types. An equally useful medium for capturing summaries (once you have them) – particularly of qualitative data – is the PostIt or sticky note. This medium is also highly suited to manipulation and exploration of the resulting data. One advantage sticky notes have over a spreadsheet is that you can arrange and re-arrange them in two dimensions, so you can further manipulate and explore the summaries.

Index cards share many of the same advantages as sticky notes. They can be an excellent tool for capturing and working with summaries. They have the added advantage of being relatively robust and can therefore sustain a greater degree of handling.

Aggregation

Closely related to summarization, this technique draws together data from multiple sources. Such collections typically represent a "higher-level" view made up from the underlying individual data sets. Aggregate data is used frequently in quantitative analysis.

As discussed previously, aggregation is similar to, but distinct from summarization. In one respect aggregation is simply the process of bringing together data from a variety of sources and adding it together. In an analytic context it also carries with it the connotation of combining those sources together into something new.

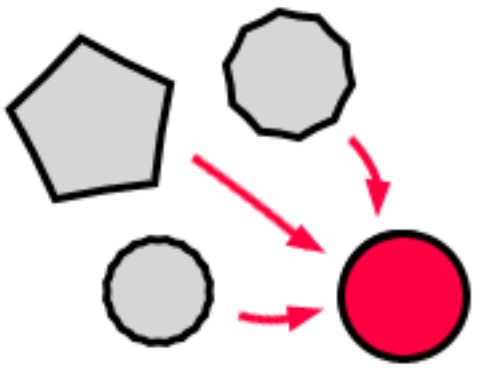
A good example to highlight aggregation in action is the creation of a (fictional) customer satisfaction index (CSI). Our CSI will use data from:

- An annual customer survey;
- The number of product returns received; and
- The ratio of new to repeat customers.

We combine data from each of these sources and arrive at some single figure – based on some form of calculation (we'll save the 'how' of that for another time). That single figure – which we can track year-to-year – is our aggregate. Unlike a summary, which characterizes a single piece of data, you can see that our aggregate is a composite value.

Generalization

Taking specific data from our observations and creating general statements or rules.



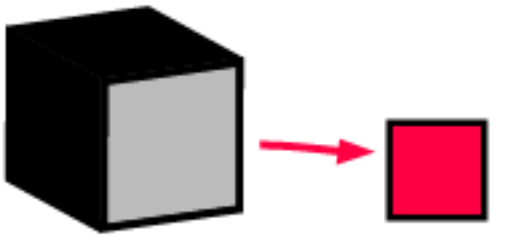
Taking the results of some specific research task and drawing general inferences about the broader population is one of the most common, but perhaps the least understood analytical technique. Generalization draws a great deal of its strength from the discipline of statistics, and the particular techniques of statistical inference.

In many respects generalization is similar to abstraction in that it reflects a move from the specific to the general or essential. It is a way of describing the common characteristics of the objects reflected in the data.

An example of generalization might be: "security is important to our users" based on an analysis of user interviews.

Abstraction

The process of stripping out the particulars — information that relates to a specific example — so that more general characteristics come to the fore.



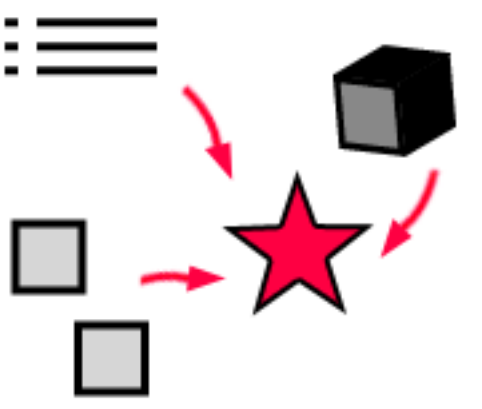
The process of abstraction involves the progressive removal of specific data retaining just the essential information needed to communicate particular characteristics of an object. For example, “professional” is a more abstract form of “Doctor” or “Lawyer”; “graphic” is a more abstract form for “photograph”, “logo”, “illustration” or “chart”.

A wireframe is an abstract representation of a page design; the template thumbnails on our index cards are an abstract representation of the templates.

Abstract representations can be very useful because they remove a lot of visual noise from the analysis process. What we’re left with is a “high-level” depiction devoid of specific detail; highlight focused on just those elements which are relevant to the discussion.

Synthesis

The process of drawing together concepts, ideas, objects and other qualitative data in new configurations, or to create something entirely new.



Combining multiple elements together to create a new, complex ‘thing’ is what the technique of synthesis is all about. Similar in some respects to aggregation, synthesis typically deals with non-numeric data.

Synthesis is often undertaken towards the end of an analytic process as the reverse of deconstruction. So where we might begin by breaking down data into its component parts and examining them; we often end by recombining those components in new ways. Note, however, that synthesis can also form part of an exploration and is one of the fundamental tools of the trade for UX strategy work.

If deconstruction allows us to critically examine assumptions by isolating individual components, synthesis allows us to explore new configurations for the whole.

But what about…

In discussing this article with other people we identified three other techniques that we either weren’t sure belonged as analytic techniques, or we couldn’t decide if they were

already covered by the techniques discussed above. We believe they're all very important to the analysis process. They are:

- **Reflection**: thinking, pondering, contemplating. To the outside observer it looks a lot like staring into space, but your mind is going over and over and over all the detail of your observations, data, diagrams, and other research materials. It's the part you can't put a time limit on, and can make or break your subsequent work. You might call it "soaking it all in", or "immersing myself in the data". This technique is incredibly valuable to me in my own work and I'm not sure I'd be as effective if I didn't include it.
- **Visualization**: this technique is about giving the data a visual dimension. Instead of lists of items, or rows of numbers in a spreadsheet, a chart or graph or some form of illustration. A good visualization can help expose patterns or gaps much more clearly than the raw data.
- '**Number-crunching**': this feels like it needs to be drawn out as a separate activity from data manipulation, transformation, or summarization, but I also recognise that this level of distinction may just be peculiar to me. This refers to all of the heavy-duty quantitative analysis work like clustering analysis, or regression, calculating correlation co-efficients and the like.

Conclusion

Working with research data and observations is often treated as a black box in design literature. Designers find themselves faced with the daunting task of analysing research data, but lack clear approaches to that task. Understanding the major techniques used in analysis work can remove some of the uncertainty and provide a clear way in to the work.

There still exists a very large gap in the literature on analysis and analytic techniques, but I hope that this discussion of the major components of analysis will go some way towards filling that void. The next time you're undertaking some analysis work, try and identify these major techniques, and see if there are any others we can add to the list.

I'd like to say a very big thank you to the people who helped clarify and refine both my thinking on this topic, and the expression of that thinking in this article: Will Evans, Livia Labate, Donna Spencer and Daniel Szuc; Christian Crumlish, Michael Leis and Kaleem Khan.

Graphics by Jeroen van Geel (and he's pretty proud of them 😀 .