BlinkReporting

Better Reports Better Dashboards Better Decisions

A Step-by-Step Guide to Creating Brilliant Dashboards, Reports and Tables using Excel

Bernie Smith

Contents

Who this book is for 3
About the author 4
Acknowledgements 4

Chapter 1: Introduction 6

Chapter 2: What BlinkReports look like, benefits and why you will want to create one 7

Before and After examples 7
BlinkReporting 10
BlinkReporting features 10
BlinkReporting benefits 11
BlinkReporting will not.. 11
What is the difference between a BlinkChart, BlinkTable, BlinkDashboard and BlinkReport? 12
Who should use BlinkReporting? 13

Chapter 3: The BlinkReporting principles and the science behind them 14

Where do these principles come from? 14
Memory and report design 15
1. Long-term memory 15
Long-term memory, Hannibal Lecter and 16th Century Chinese Civil Servants 16
2. Short-term memory 16
Super-human number memory? No, you just need a system 18
What about those "Report-reading super-humans" I work with? 18
3. Very short-term "Iconic Memory" 19
Visual Encoding 20
Visual Encoding Technique Examples 21
Crying Wolf and visual encoding 21
Chapter Recap 22

Who this book is for

This book is for you if you:

- ✓ Need to produce or revise dashboards and reports
- ✓ Find your current reports and dashboards confusing
- ✓ Are frustrated by the length, complexity and structure of your existing reports
- ✓ Have many different styles of dashboards and reports in use and want to simplify things
- ✓ Need to create a consistent "house style" that can be replicated by different teams
- ✓ Want to look like a star by creating reports and dashboards that your internal customers love

Using this book

You can use this book in the normal way and start at the front. You can also dive into any section you think will help you. To help you pick out the information that you are looking for (and to work out what you can safely ignore) I use a few icons to flag different types of information. Here's what they mean:


Key Idea

This flags one of the core ideas in the book. You should read this bit to understand what I'm on about.


Tip

This advice will help you execute the things being discussed. They are tried and tested shortcuts that should make your life easier.


Trap

There are some traps that others have fallen into and I want you to avoid. Learn from their mistakes and help your career in the process.


True Story

Details have been blurred to protect the innocent, but most of the lurid details will be true. See how and why the BlinkReporting approach was born.


Demo Donuts

To help the instructions make a bit more sense we will be creating the example image that you will see in a few pages. It's called Demo Donuts and it is a simple fictitious dashboard. The idea is that you can see the start-to-finish creation of a dashboard without getting bogged down in the detail.

About the author

Bernie Smith helps businesses improve their measurement systems and present that information in a clear, simple and logical way. For the past fifteen years he has helped clients improve the quality of their reporting and the performance of their operations. He has worked with numerous major companies including Lloyds Banking Group, Scottish Widows, Tesco Bank, Yorkshire Building Society, RSA and Lloyds Register (helping them to win the IQPC Best Improvement programme 2011 award in the process).

Prior to setting up Made to Measure KPIs Bernie, a professional engineer by training, worked extensively for Blue Chip manufacturing organisations around the world, delivering step-change improvements in process efficiency and yield. As a young engineer he was also involved in the design and creation of a giant moving stage for a theatre, building steam turbines and the design of a giant butterfly sunshade for the top of a hotel.

Bernie lives in Sheffield with his wife and two young children. He has a passion for photography, new technology and sculpture.

Acknowledgements

This is my first book and I definitely would not have managed to finish it without a tremendous amount of help and feedback from friends and family. It started as a single chapter in a more general KPI book, but the report design chapter rapidly grew arms and legs. I'd particularly like to thank my wife, Liz, my mum, Jenny Emby, and James Lawther for being honest, critical and supportive pretty much simultaneously.

Many of the ideas here are based on the work of others, especially Edward Tufte, Jon Moon and Stephen Few. My aim has been to bring a number of different strands together in a practical "how to" format. I've been as transparent as possible about where those recycled ideas have come from and have included a reading list for those key influences.

I would also like to thank my clients for their openness and willingness to try a new approach.

I hope you find this book valuable. Let me know what you liked and what could be better.

Bernie Smith

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You can contact Bernie through www.madetomeasureKPIs.com, bernie.smith@madetomeasureKPIs.co.uk or on +44 (0)7973 631102 (it's a UK mobile number)

Part I: About BlinkReporting

Chapter 1: Introduction

Keeping it human

This book is about presenting information in a user-friendly way and making you look like a reporting rock-star for making it happen.

There are many books already available that focus on the technicalities of building dashboards and reports using Excel, databases and business intelligence tools. This book focuses on designing reports and dashboards for **clarity, ease of use** and **decision support**. There is also some practical help on changing default Excel charts and tables into something more in line with the BlinkReporting approach.

Why is it call BlinkReporting?

If you design your reports and dashboards **well** then you should be able to get a good impression of what they are telling you "in the blink of an eye".

If you have to labour through text and struggle to interpret the report then the design is wrong. There is some good science behind how this is done and BlinkReporting is based on this science. You can find out more about the cognitive processes involved in Chapter 3.

Why is it useful?

Have you ever had to set an unfamiliar hotel alarm clock? If you have, then you will have experienced the frustration of the gap between your "intent" and "practice". In your mind you have a very clear picture of what it is you're trying to achieve and you can easily explain it to a human: "I need to be woken at 7am by my favourite radio station". The trouble is that the design and function of the clock's interface makes achieving this simple task slow, stressful and unreliable (You may have set the alarm but will it wake you at the right time and will the radio come on?).

I see just the same issue with management reports and dashboards. Very often managers have a clear picture of what they would like to get from a report but find the reality slow, confusing and difficult to interpret. Report customers are not sure if they can trust the messages that the analysis is delivering.

The challenge has been to come up with a simple, structured and repeatable method for creating clear dashboards and reports. The objective has been to remove barriers between the reader and the insight that they seek. This book will give you the tools to achieve this.

Chapter 2: What BlinkReports look like, benefits and why you will want to create one

In this chapter you will..

See a "before" and "after" example, showing the impact of BlinkReporting.

Understand the benefits that the BlinkReporting approach will (and will not) bring.

Have the difference between a BlinkDashboard, BlinkReport and BlinkTable clearly explained.

Understand the principles that underpin the BlinkReporting approach.

Before and After examples

On the next two pages you will see a "before" and "after" dashboard for a fictitious company called Demo Donuts. The data is exactly the same for both but there are some obvious differences between them (and some more subtle ones). I would ask you to put yourself in the shoes of Big Al, the proprietor of Demo Donuts, and see if each dashboard actually makes it easy to understand what is going on in his business. Each time you struggle to make sense of something in the first example, make a mental note and see if it is easier in the reworked example.

See if you can come up with some of the key differences between the two dashboards. We will be putting together a list of "ideal" dashboard design principles later, so you can see how many of them you have already spotted.

If anyone out there has actually run a coffee shop or donut store, sorry!

Demo Donuts Dashboard

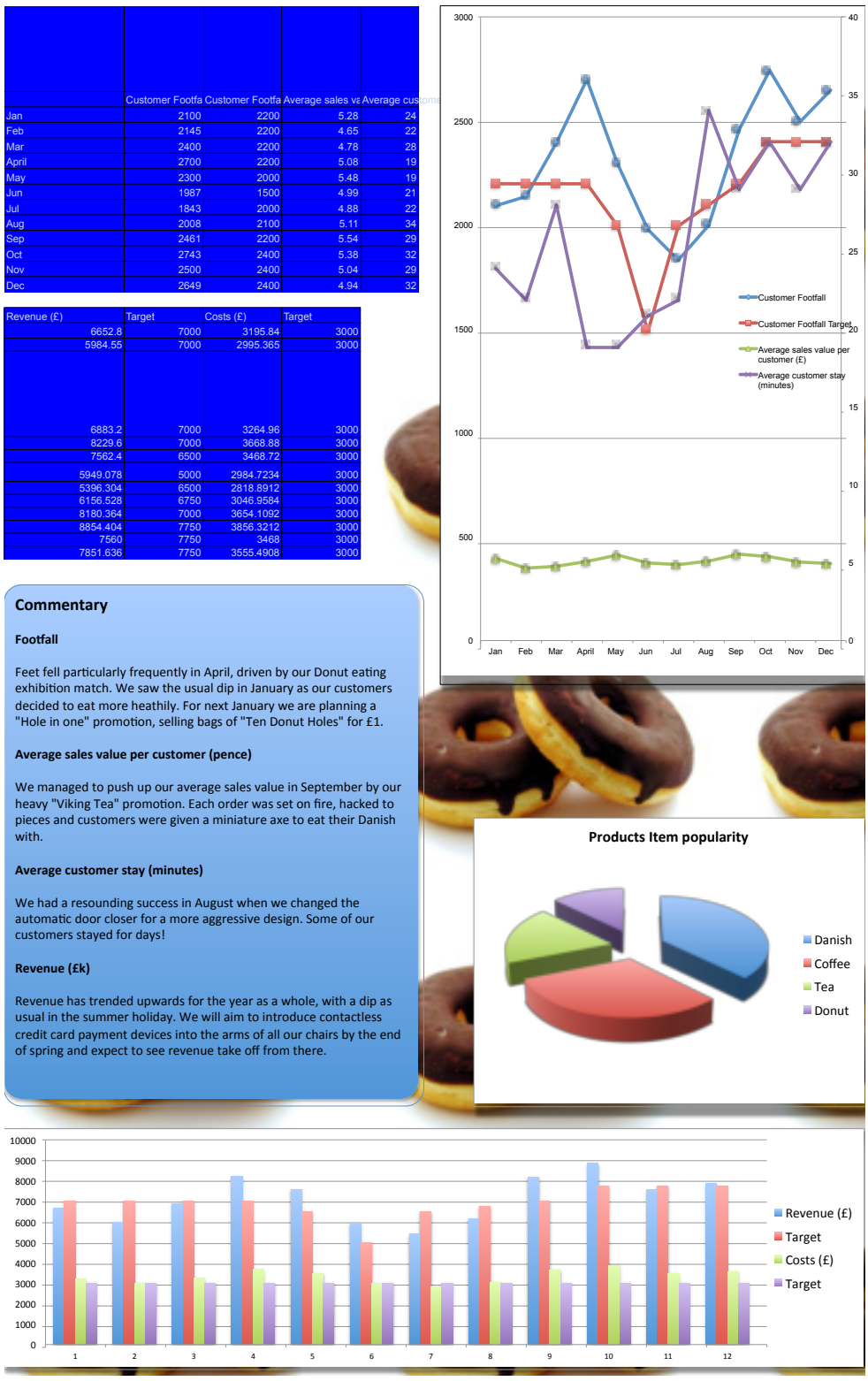

Figure 1: “Before". A dashboard that breaks almost all the design rules you will learn about in this workbook.

Demo Donuts Dashboard

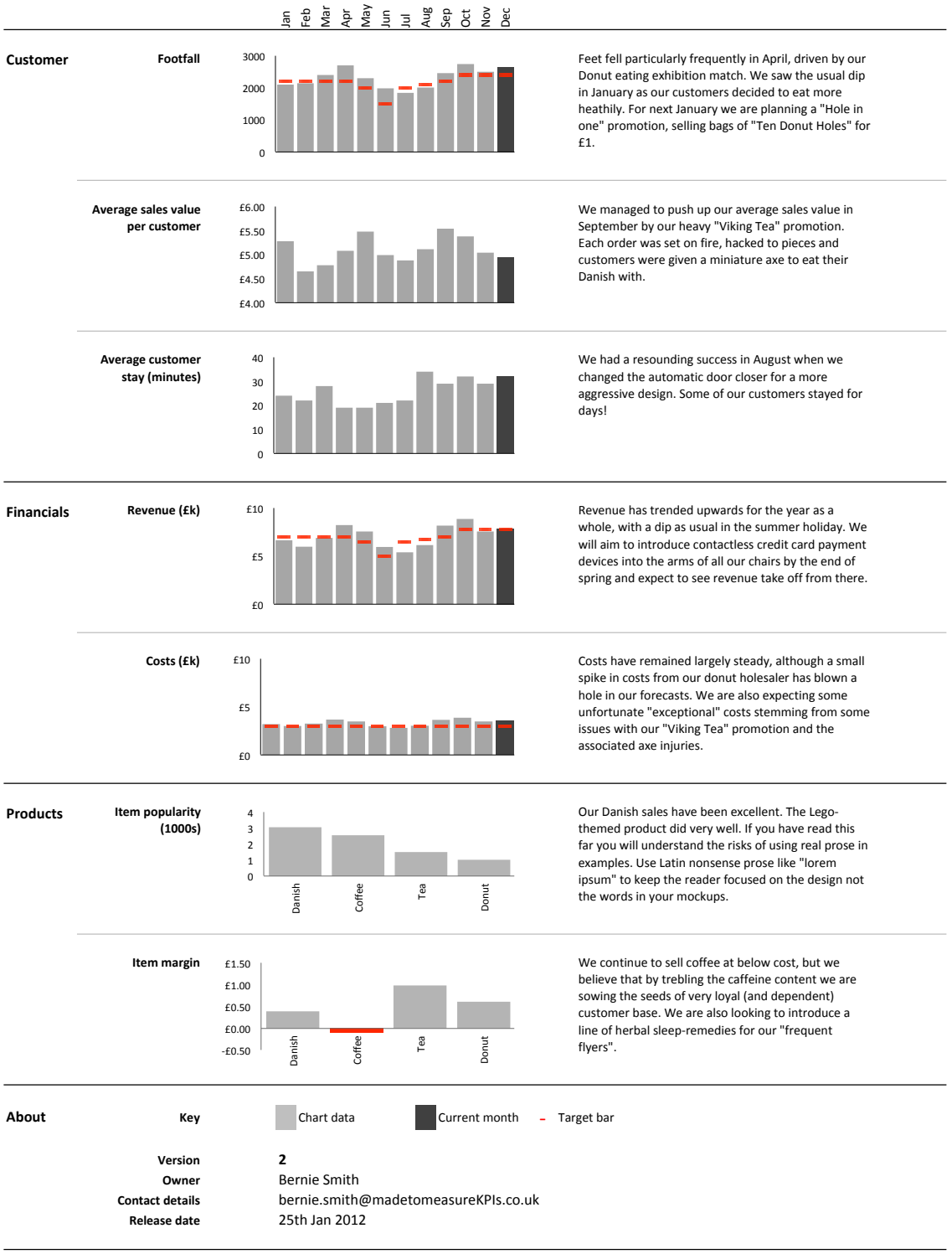

Figure 2: "After". The finished product - like the ones you will produce by following the step-by-step instructions in this book.

BlinkReporting

BlinkReporting is a new method for creating easy-to-read, clear, reports in a consistent and repeatable way. The approach also includes:

- BlinkDashboards - the BlinkReporting dashboard approach
- BlinkTables - a better way to lay out data in an easy-to-understand way
- BlinkReporting - clear, simple reports using a repeatable methodology.

The BlinkReporting approach is **proudly plain** to look at - but tested and loved by many happy clients.

BlinkReporting *features*

Because the BlinkReporting approach is deliberately finicky about the way in which you lay out your documents, the visual details you use and the style of charts you create, it gives a consistent finished product. If you follow the rules and do a good job then you can be pretty confident that you will get reports with the following features:

Structured	Logical layouts promote understanding and lead to reports that are quicker and easier to use. BlinkReporting shows you how to systematically produce well-structured reports.
Consistent	Brains love consistency. When you drive you don't look at the pedals or indicators. Reading a report should be as intuitive and familiar as driving. Unfortunately many reports randomly swap the pedals and move the controls, making "driving" them a slow and frustrating experience. BlinkReporting will enable you to build dashboard reports that remain consistent and, as a result, logical to the user.
Repeatable	Where more than one person is involved in full production (and that's most organisations I've worked with), having a teachable and repeatable process means that you can develop a brilliant "house style", avoiding a mish-mash of different approaches for different reports and areas.

And the whole point of having structure, consistency and repeatability is that they will deliver benefits…

BlinkReporting *benefits*

Highlight hidden problems	Charts are often tweaked and adapted to work around missing information. Layouts can also be compromised to conceal vital data that may be missing. Using the BlinkReporting approach, and some of the layout tools that this includes, will highlight gaps in the data and problems with report design.
Change the way you use data	Better data in meetings and during discussion can transform a business. BlinkReports will help restore trust in the data and support fact-based decision-making and management. It's not a magic wand, but it certainly helps.
Become the "way we do things"	BlinkReports will rapidly become "the way we do reports" once your report customer has seen them done properly and has become familiar and comfortable with them.

It has to be said, this approach isn't for everybody. If you are looking for any of the features listed in the next table, then this is not the book for you..

BlinkReporting will not..

"Knock your socks off"	BlinkReports will not normally "knock the socks off" their users the first time they see one. However, once users have become used to them, they invariably insist on using this approach.
Be flashy	Don't expect lots of flashy graphic tricks with BlinkReports. Shadows, borders, funky shading and big logos all distract from the message and confuse the reader's eye (sometimes imperceptibly). The BlinkReporting approach is based on sound cognitive research[1] that shows that simple and clutter-free is easier to understand.

[1] You can find out more about the science behind this in chapter 3, or skip it if you aren't the cynical or curious sort.

Be colourful	Colour is one of a number of tools that we have to guide the user along with things like font size, lead-lines and emphasis. The BlinkReporting approach is to be very sparing with colour as it is such a powerful draw when it is used. Do the reports look utilitarian? Well yes, if I'm being honest, but this keeps them quick and effective to use. They are not a marketing tool, they are a business tool. You will also discover in chapter 3 that there are very sound cognitive reasons for reducing visual clutter and keeping noise to a minimum.
Be full of "widgets"	They look great at first - the speedometer, the pressure gauge and the thermometer. The trouble is that they are often a poor use of space and slower (and harder) to interpret.

What is the difference between a BlinkChart, BlinkTable, BlinkDashboard and BlinkReport?

Some of the terms I use may be a bit confusing, so here is a description of what the difference is between a BlinkChart, BlinkTable, BlinkDashboard and BlinkingLamp (yep, that one is a just a lame joke).

Terminology

BlinkChart	A simple chart. They look like this..

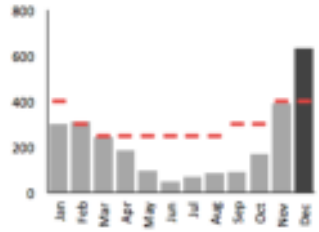

Figure 3: An example BlinkChart

..and are the building blocks of BlinkReports and BlinkDashboards. They are as bare as possible to avoid confusing the reader when a page presents multiple objects, but give more information than techniques such as Sparklines[2].

[2] To find out more about Sparklines take a look at: "The Visual Display of Quantitative Information" by Edward R. Tufte

BlinkTable	This is a streamlined way to present data tables. Although I prefer a purely graphical method of presenting data (particularly in BlinkDashboards) many clients insist on having data tables as well. BlinkTables are designed to combine well with BlinkCharts. BlinkTables are based on Jon Moon's approach called WiT [3] – Words in Tables.
BlinkDashboard	A BlinkDashboard is a dashboard built using the Blink principles. It uses a combination of BlinkCharts and BlinkTables to present information in the least confusing way. A BlinkDashboard is typically one (occasionally two) page long, but may have drill-down pages as well.
BlinkReport	A BlinkReport is similar in look and feel to the BlinkDashboard, but will have many more pages and a different structure. BlinkReports are more in-depth than BlinkDashboards.

Who should use BlinkReporting?

The BlinkReporting approach can be used by anyone who needs to rapidly understand what is going on in his or her organisation and does not want to be slowed down by trying to interpret dense masses of data. Put another way, it is for people who need to understand the "story behind the numbers".

[3] "How to Make an Impact" by Jon Moon

Chapter 3: The BlinkReporting principles and the science behind them

In a few pages I will introduce you to a detailed checklist that will help you build (or put right) your reports and dashboards. There are 54 points on that checklist, but it is really much simpler than it sounds. There are four simple principles listed below that underpin the BlinkReporting approach. The 54 points are either specific examples of these principles or points based on specific results of cognitive research.

1. If the reader does not understand the dashboard, chart or table, it's probably the designer's fault.
2. Do not tax the reader's memory. Make as much of your data as visual as possible, but accept that some people must see some numbers as well.
3. Do not confuse your end-user. Keep the tables and charts as sparse and simple as humanly possible.
4. If your end-user needs to use instructions to understand the document then your document has failed in its purpose.

If you think you need this kind of consistent, clear and simple reporting then the next chapter takes you step-by-step through creating one.

Where do these principles come from?

There has been much research on perception and memory. I have put together a summary of the most relevant material for our purposes here, but if you want to explore this in more depth you can look up some of the papers I've mentioned in the footnotes. I would also recommend reading "Information Dashboard Design", by Stephen Few (further details in Recommended Reading).

This next section isn't essential to the practical business of improving your dashboards and reports, so skip ahead to chapter 4 if you are in a hurry. If you are interested in understanding ***why*** the BlinkReporting approach works, then this is well worth reading.

Memory and report design

The challenge with dashboards is that we are trying to convey an insanely large amount of information in a very small space. A dashboard I built for a client a couple of years ago had nearly 2,000 pieces of information on an A3 sheet. To be able to transmit this amount of information without completely overwhelming the reader we need to use some techniques based on an understanding of the way that humans process information. Don't worry. Most of this will be common sense, although some of it may be new to you.

Too much for our primitive brains

The challenge is that our brains are designed for hunting, gathering and not getting eaten. We are now trying to use those brains to assimilate the kind of information we weren't really designed for. However some of those legacy attributes can really help with dashboard design.

We see with our brain

The key thing to remember is that we see with our brains not just our eyes. Yes, the eye transmits a signal but it's the brain that makes sense of it. For the data to be processed we need to not just see it, our brain needs to focus on it and subject it to conscious thought. It is only when we pay attention to the information that it stands any chance of being processed or stored. It's a bit of a safety mechanism that makes sure our brains are not overwhelmed.

Memory is crucial

Memory plays a really key part in understanding. And I'm not just talking about the type of memory that enables you to know Great Aunt Mabel's phone number without looking on your phone. There are at least 3 types of memory and it's probably worth just recapping what these are and why they are important.

1. Long-term memory
2. Short-term memory
3. Very short-term memory or “Iconic memory”

1. Long-term memory

This is the type of memory that enables you to remember names, what your phone number is or that nasty scrape to your knee when you were six. This is the type of memory that most people think of when you talk about "recall". It can be very useful but your brain jealously guards this capacity. Something normally needs to be either very dramatic or repeated frequently to be filed away in this valuable part of your brain.

True Story

Long-term memory, Hannibal Lecter and 16th Century Chinese Civil Servants

One other interesting aspect of long-term memory is that it seems to be quite closely tied to layout and physical position in space. In fact some of the memory techniques that have been developed over the last thousand rely heavily on physical location as a way of recalling facts.

There is a fascinating book on this called "The Memory Palace of Matteo Ricci"[4]. In this book Jonathan Spence described how in 1577 a Jesuit priest named Matteo Ricci went on a mission to take Christianity to China. In the process he learnt Chinese and as part of his strategy to win over Chinese governing classes he wrote a short book (in Chinese) on the art of memory for the governor of the JiangXi province to help his three sons pass China's demanding civil service examinations. In it he refers to "Memory Palaces" in which you can hold knowledge and recall that with ease, helping these members of the social elite to pass exams easily.

You may also have seen a reference to this technique in Robert Harris's grisly novel "Hannibal", with the less than charming Hannibal Lecter.

Why long-term memory is important for reports

For dashboard and report design purposes this type of memory is really important when it comes to layout. If you frequently visit the same website or read the same newspaper you will just "know" where things are on the page. You do not have to hunt around to find what you're looking for. It's just the same when you get in your car and you know where the indicator stalk is (try getting in a car with the stalk on a different side from the one you're used to and you'll know what I mean!). So for our designs we need to respect and treasure the reader's long-term memory. **Consistency in layout and familiarity of key positional details is absolutely crucial to making reports readable and accessible**. Interestingly, until it becomes familiar and easy for them, this constancy will not be apparent to the user.

Key Idea

2. Short-term memory

Short-term memory is the kind of memory that enables you to remember what drinks you're ordering at a bar, which hotel room you're in or recall what was in

[4] The Memory Palace of Matteo Ricci, Jonathan Spence, ISBN-10: 1847243444 ISBN-13: 978-1847243447

the news. It's a kind of short-term holding area. It is sometimes called "active memory". It can be very useful for comparing a few figures or "chunks of information". Unfortunately research shows that we can only remember between 5 and 9 chunks of information simultaneously.[5] We typically hold things in short-term memory for 20-30 seconds, although we can extend this through reactivation of the memory. This reactivation is called "covert rehearsal". Reactivation prevents neural endocytosis[6], keeping the memory alive for longer than the 20-30 seconds that is typical of short-term memory (clearly essential for remembering which hotel room you are in!).

Most people's short-term memory is terrible!

Now this is really important and relevant to our dashboard and report design process. Even the simplest of business charts will normally have a dozen or so data points (typically monthly data for the last year) so if it's true that we can only remember 5 to 9 points or chunks of data then it means that your average person is incapable of holding enough information in their short-term memory to analyse a simple annual chart!

Why the term "chunk" can help us

The good news is that the term "chunk" is quite elastic. A chunk can be a number but it can also be a shape or line. Now this is good news because obviously a chart line can give a lot more insight than a single number. So one of the key principles (tricks) with dashboard design is to lump as much information into a chunk as we can in a meaningful way. This means "no" to endless data tables and "yes" to simple, streamlined, stripped-down charts.

[5] The Magical Number Seven, Plus or Minus Two: Some Limits on Our Capacity for Processing Information by George A. Miller originally published in The Psychological Review, 1956, vol. 63, pp. 81-97

[6] Tarnow, Eugen (2008): Short-Term Memory May Be the Depletion of the Readily Releasable Pool of Presynaptic Neurotransmitter Vesicles.

Super-human number memory? No, you just need a system

If you run a "digit span test" most people can remember between five and nine digits. Some people can remember as many as 15 or 18.

During the 1970's researchers at Carnegie Mellon University[7] came across a chap, by the name of Steve Faloon, with a freakishly good ability to remember random digits – 82 in their tests.

What is interesting is that Steve had a method. Steve was a very keen track and cross-country runner. He remembered these long stream of random numbers by breaking the number stream down into segments, or "chunks", that were recognisable to him (he would look for distances for which that number would be a typical time, for example a mile or 10km).

The researchers managed to show that this skill could be passed to others. He did this with student Dario Donatelli. Donatelli was eventually able to recall 113 random digits as a result of this training.

What about those "Report-reading super-humans" I work with?

Interestingly quite a few of my clients are very attached to data tables. It is often the people from finance backgrounds who are especially keen on tables. From experience these individuals do not have massively better short-term memories, but what they have done is developed strategies for summarising data (like the one Steve Faloon used in the example above) in their heads so they are able to grasp and distil complex tables of information.

Given that it is quite difficult to know exactly how capable someone is at extracting the key messages from a dashboard, we have a responsibility to make and design them to be usable by the **average individual** and not expect super-human powers of data analysis.

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[7] Acquisition of a Memory Skill, K Anders, William G Chase and Steve Faloon, Science, 6th June 1980, Volume 208, pp. 1181-1182

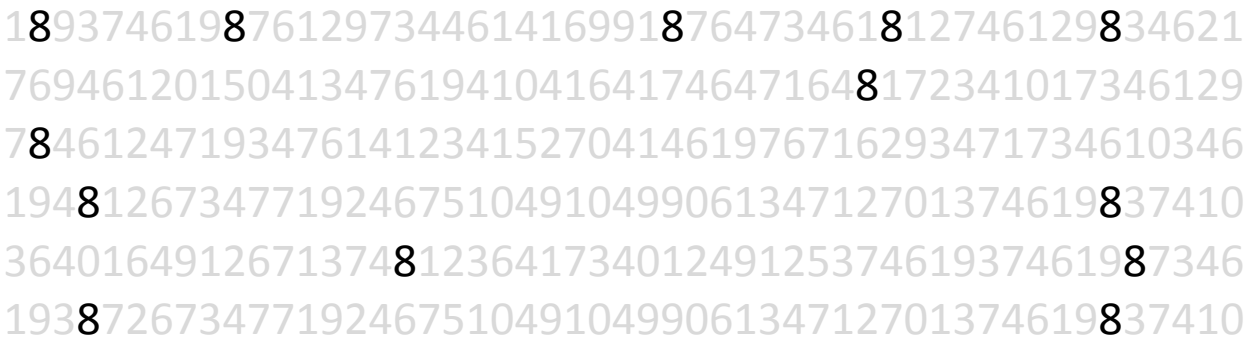
3. Very short-term "Iconic Memory"

Now iconic memory may not even sound like memory to you. It's probably easier to show you an example rather than described with lots of words. Give yourself 60 seconds and see how many 8's you can spot in this example:

189374619876129734461416991876473461812746129834621
769461201504134761941041641746471648172341017346129
784612471934761412341527041461976716293471734610346
194812673477192467510491049906134712701374619837410
364016491267137481236417340124912537461937461987346
193872673477192467510491049906134712701374619837410

How many did you spot? How confident are you in your answer?

Now try the same exercise again …



Much easier, isn't it? And it's not just because you have done the exercise before. The answer "leaps out" at you (it's 13, just so you know). The reason it leaps out is because we have used "visual encoding".

Visual Encoding

The technique you have just seen is the application of "visual encoding". Visual encoding is the tool by which you encode specific information in a visual way. Humans are designed to react to visual information extremely quickly. The good news for our dashboard design is that there are a number of visual encoding methods we can use. If we choose carefully we can use several of them at the same time. Let's have a look at some of the techniques by category. The following categories are based on those devised by Colin Ware[8] in his book "Information Visualization: Perception for Design.

[8] "Information visualization: perception for design", Interactive Technologies, Author: Colin Ware, Publisher: Morgan Kaufmann, 2004, ISBN 1558608192, 978155860819l

Visual Encoding Technique Examples

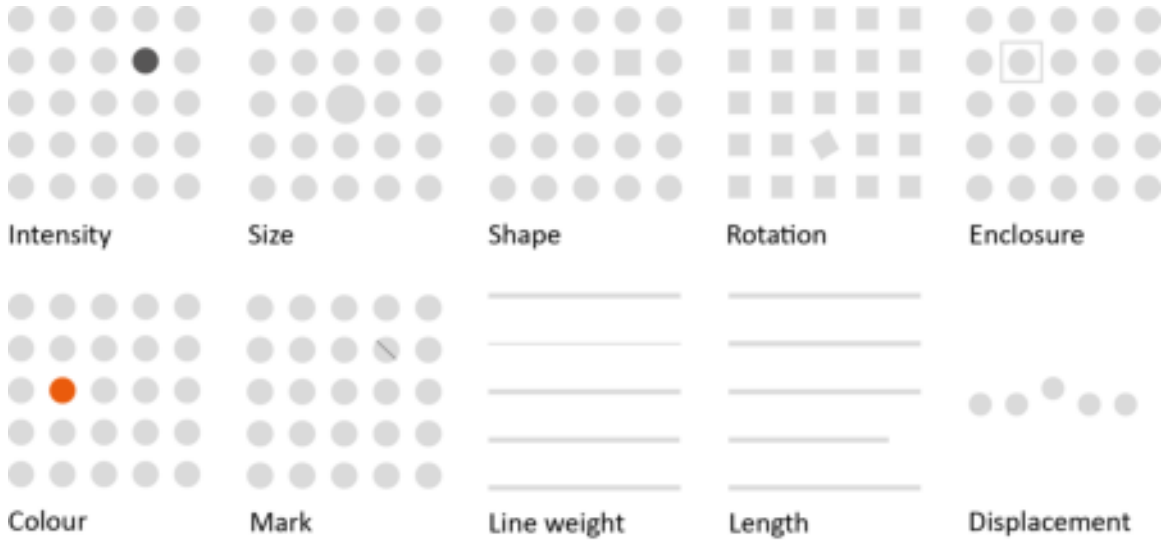


Figure 4: Examples of common visual encoding methods

It's the kind of instantaneous reaction that our prehistoric ancestors absolutely relied on to stop them being eaten and to be successful hunters when they were out and about on the Savannah. It is very, very quick. It is this kind of instantaneous understanding that we seek to use in BlinkReporting. It can enable the reader to instantaneously understand the situation without going through laboured reading and interpretation. The more of this kind of reaction we can use the less fatigued the reader will be, and the faster they will gain understanding from the dashboard report they are looking at.

Every time the reader has to stop and think they are slowed down and fatigued. At some point a reader who is taxed too heavily will give up or end up with a partial understanding of the information in front of them.

There are a number of different ways of conveying information in a way that uses iconic memory. The example above shows just a few of them; if you want the full list see Stephen Few's excellent book "Information Dashboard Design" referred to earlier.

Crying Wolf and visual encoding

Iconic memory is an involuntary response to visual stimulus. If you use too many of these visual cues at the same time, without conveying information, you will overload the reader. A bit like the boy who "cried wolf", the end effect is to dull the reader's response. It reduces the effectiveness of the reader's iconic memory. Put simply "if it

doesn’t need to be there, take it out!". This includes unnecessary borders, colours, logos and gridlines.

Chapter Recap

Long-term memory

Long-term memory takes time to build. You must use consistent design and layout if you want to exploit the long-term **memory** of the reader.

Long-term memory is closely linked to geographical position**.**

Long-term memory can help build familiarity with layout and location of information**.**

It is generally not possible to rely on long-term memory for anything other than information position.

Short-term memory

We can typically only hold 5-9 "chunks" of information in our short-term memory unless specially trained.

A chunk can be a number or a line on a chart. We should pack as much insight into a chunk as possible.

It is very easy to overload a reader’s short-term memory.

Iconic memory

Iconic is the very fast "blink" response to visual cues. We need to use it whenever we can.

Triggering iconic memory is fast and very easy on the reader. It reduces the effort required to read a report.

We should aim to use "Iconic" memory rather than short-term memory.

There are a number of different visual encoding methods we can use to spark iconic memory.

Remove visual and data clutter to avoid blotting out the key encoding methods.

Like what you have read so far?

In the full, paid-for, version, you will …

- Discover the questions that will enable you to identify weaknesses in your current reporting.
- Test your new skills on some sample dashboards.
- Be introduced to the 4 key stages in creating a dashboard and report.
- Understand the high-level questions you will need to ask to make sure your report or dashboard meets its intended purpose.
- Understand the key client interactions you must undertake at the start.
- Be taken through converting default Excel charts to BlinkCharts, step-by-step.
- Learn about the critical elements that determine "readability".
- Discover how to use cues such as lead-lines to guide the reader through the page.
- Learn when and how to use colour.
- See how Excel creates charts that unfortunately break many of the good design "rules".
- Go step-by-step through the process of changing the charts into something cleaner and easier to read and understand.
- Learn how to determine what "must" be present in your layout.
- How to cope with dashboard/report "overload".
- Which chart type to use, and when.
- See how to mix text and charts.
- Create a logical hierarchy and "design language".
- Be introduced to the rules for adding text to reports, tables and dashboards.

Go to http://www.madetomeasurekpis.com/downloads/blinkreporting-step-by-step-guide-to-creating-brilliant-reports/ to buy the full book