DATA STORIES

Creating compelling stories with data

Effectively combining Storytelling, Data Visualisation and business reporting

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Storytelling with Numbers

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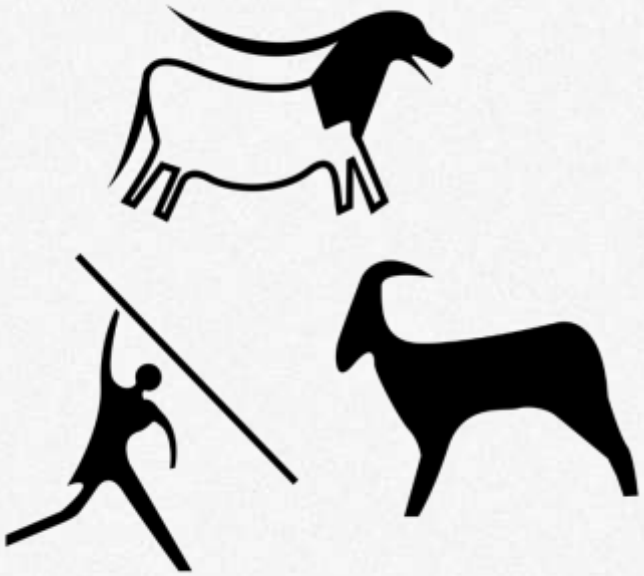
Storytelling in Business

Using stories to convey a message not a new thing. Storytelling is one human trait that transcends time and culture. Examples of stories have been found in all known societies throughout history..

What has storytelling to do with business?

Isn't business about hard facts and figures? Actually, storytelling has become big business.

Corporate storytelling has gone mainstream in the last decade, with leaders use storytelling techniques to inspire staff and all self-respecting marketers use stories when talking about products, services and brands.



The most common focus for storytelling in business is to persuade, influence and motivate an audience.

Think of a CEO standing in front of a crowd of employees. Or a major brand trying to entice customer to buy more of their products. Because of that, you find most business storytellers within marketing, branding and sales functions and among leadership groups. However, with the rise of ever more data being accessible and digestible by organisation, a new kind of business story teller is emerging among data scientist, analysts and other technical professionals. News media businesses are already on the case: Data Journalist has become a recognised job description.

"Data Storyteller" also seems set to become a common job description, alongside data scientist . And if you google "Master Data Storyteller" you will find more than one company advertising vacancies!

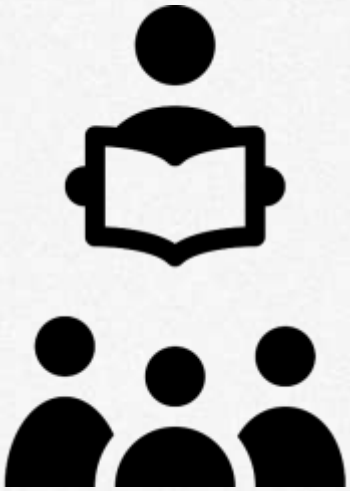
How to we define “stories” in business?

The Oxford Dictionary defines “story” as:

1: An **account** of imaginary or real people and events told for entertainment; 2: A **report** of an item of news in a newspaper, magazine, or broadcast; 3: An account of past events in someone’s life or in the development of something; 4: The commercial prospects or circumstances of a particular company.

There is no single, ultimate definition for what constitutes a story, just many, many opinions

Most traditional definitions of “story” demand that a story includes a protagonist, some kind of struggle or conflict, dialogue and sensory language. That would mean that many forms of narrative do not qualify, including for example, silent movies and video games, even though there is a large industry devoted to developing storylines for games. Based on that definition, the place for stories in business would be limited, and many areas of organisations might shy away from exploring the benefits of stories. To define Data Stories, we therefore adopt a more inclusive approach:



Stories are accounts of real or imaginary events that engage the listener in interactive[1] communication

How Storytelling works

Research in neuroscience and psychology investigates what happens when we are exposed to stories. It's shown that stories have a physical, mental and emotional impact on us, and that evolution has indeed hardwired *our brains to respond to stories differently compared with all other forms of communication[1].*

Stories can make the complex simple

Living in an increasingly complex world, we place a lot of reliance on facts and data. However, the numbers rarely speak for themselves, they need expert interpretation. Stories can provide that interpretation by taking analysis results, trends and scenarios off the spreadsheets and bringing them into the world of people. They can convey complex relationships, provide context and allow us to compare what we hear to our experience – thus enabling us to assimilate information quicker and question more insightful those things that don't fit our expectations.

Stories make information memorable

Research shows most people forget facts and data quickly. However, people can vividly recall stories they heard in childhood. Studies into how our brain reacts to stories show that stories give people an emotional frame of reference. This makes stories "sticky" and they provide the language to be recalled quickly.

Stories can foster collaboration and embed values

In modern organisations, we are often part of multi-function teams and collaboration is vital to achieve the business' goals. Using stories can help create common ground by enabling us to share experiences and make abstract concepts tangible.

What is different about Data Storytelling

General issues with business communication

Many traditional business reports and presentations err on the side of detail, resulting in lengthy documents with dense text, tables and over-busy graphs. Of course, executives and meeting attendees then regularly initiate an exercise to reduce the paper mountain, asking for executive summaries, highlights or exception reports, one page briefing memos and dashboards.

The trick here is to ensure that all the relevant information is still present in the shortened version and your message comes across clearly. Too often, the shortened version (and sometime the long version as well) does not answer the crucial question:

So what? What is the story?

Data stories – how they can help

Data stories take advantage of the power of storytelling to quickly provide context and establish relevance and expectations. This enables the audience to grasp a large quantity of facts quickly This is combined with the power of effective visual communication to let the audience grasp large amounts of information in "chunks" that help the working memory retain information. There is a large body of evidence showing that the working memory is correlated with problem solving, learning, reasoning, and reading comprehension – all good ingredients for your audience to experience.

Data stories combine narrative storytelling with data in a format that makes the data easily accessible, generally using visualisation:

Data Storytelling: Definition

A method of delivering messages derived from complex data analysis in a way that allows the audience to quickly and easily assimilate the material, understand its meaning and draw conclusions from it.

Key ingredients for Data Storytelling - 1

Going beyond the data means presenting a message – key to effective (data) storytelling

A message

Without a message, you have no story. And you owe it your audience to give them a story. A data scientists or data analysts job is partly to assemble the data (mine, discover, unearth, aggregate) and help the rest of the world to draw meaning from it without the audience having to understand the hundreds of caveats, sources, transformations, etc. necessary to get usable insights.

A poor data scientist is a number monkey, able to use new tools to blindly pull whatever information is asked of him. He will be replaced by automated tools in the next 10 years. A good data scientist does the job of the poor one and more. She is a critical reviewer of the data. She develops a hypothesis based on the data, verifies her hypotheses by investigating similar data that would disprove her hypotheses, making sure she catches any obvious mistakes.

She makes sure her audience understands what the data suggests and what it does NOT suggest. She helps the audience - whether that is the CEO, CMO, BOD, or conference attendees - to understand that because something is correlated, one effect is not necessarily caused by another, and keeps the insights sane. At the end of the day her analysis is successful when actions can be taken from her insights and she has been asked about angles she had not yet explored.

Key ingredients for Data Storytelling - 2

Narrative

A narrative is any account of connected events, presented to a reader or listener in a sequence of written or spoken words, or in a sequence of (moving) pictures or acted display. It's the tool you use to convey your message. When it comes to data stories, you select from a combination of words, graphics and potential videos (mime and dance are less likely in a business setting).

Structure and flow

Structure is the internal framework that holds the data story together. Flow is the "movement" through the story; the order in which you arrange the information and style to present the information to your audience.

Visual communication

A good data visualization has the ability to show you something that you wouldn't have seen by only looking at the data, it presents the data in a way that the viewer can explore and understand it. Most commonly, charts and graphs are used for this purpose.

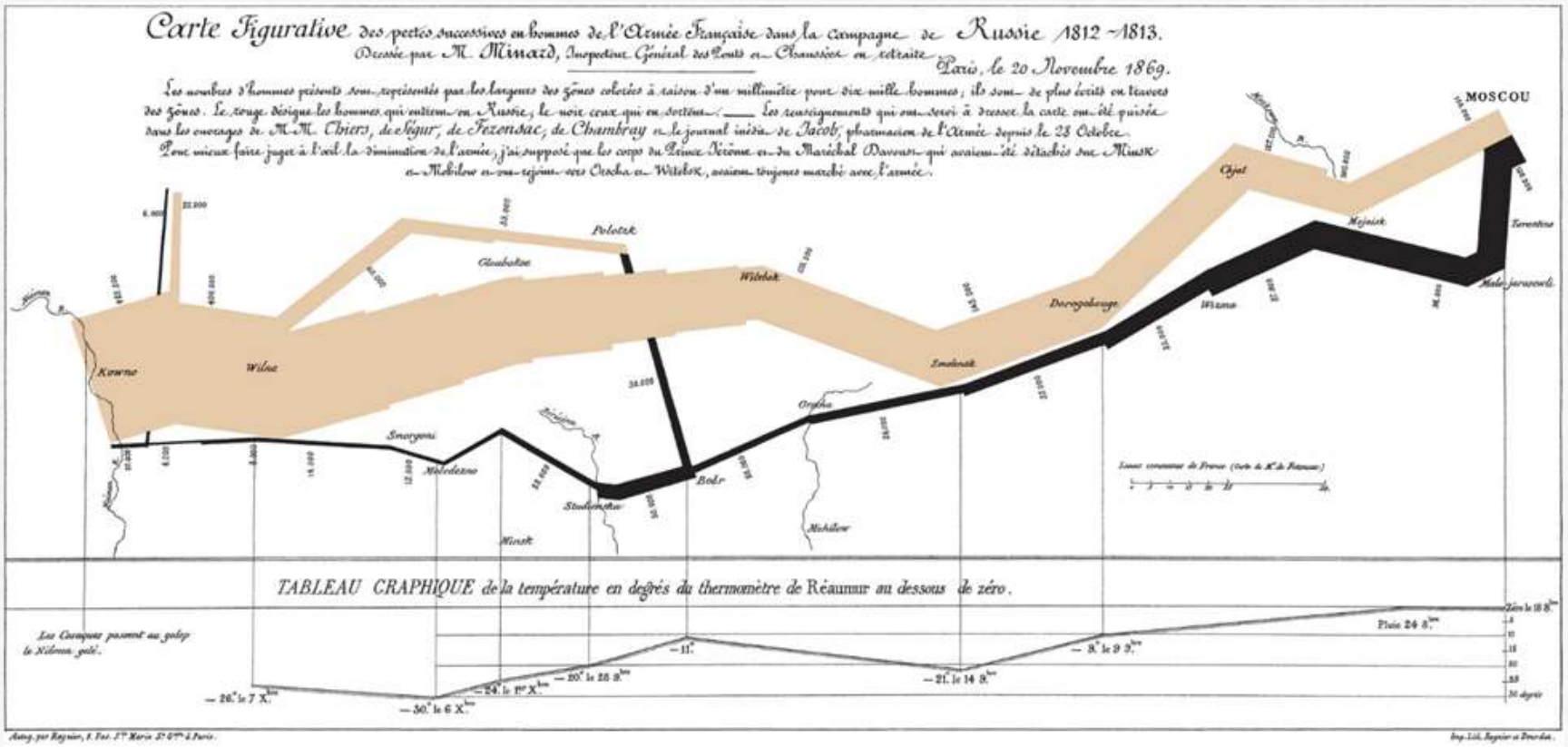
- *Data Visualisation*
- *Expressiveness, precision and accuracy*
- *The right tools*
- *Drawing attention*
- *Guidelines*

Visual communication

Data visualization and communication

Visualisations have the power to "show" the story behind the data – and they are nothing new. In fact, one of the best known early data stories is the visualisation of Napoleon's disastrous invasion of Russia in 1812 by Charles Joseph Minard, a French engineer with a flair for "infographics":

The flow map shows the size of Napoleon's army at different stages of the campaign combining geography, time, temperature, the course and direction of the army's movement, and the number of troops remaining to tell the story of this dreadful campaign: In 1812, the Grand Army set out from Poland with a force of 422,000; only 100,000 reached Moscow; and only 10,000 returned[2].

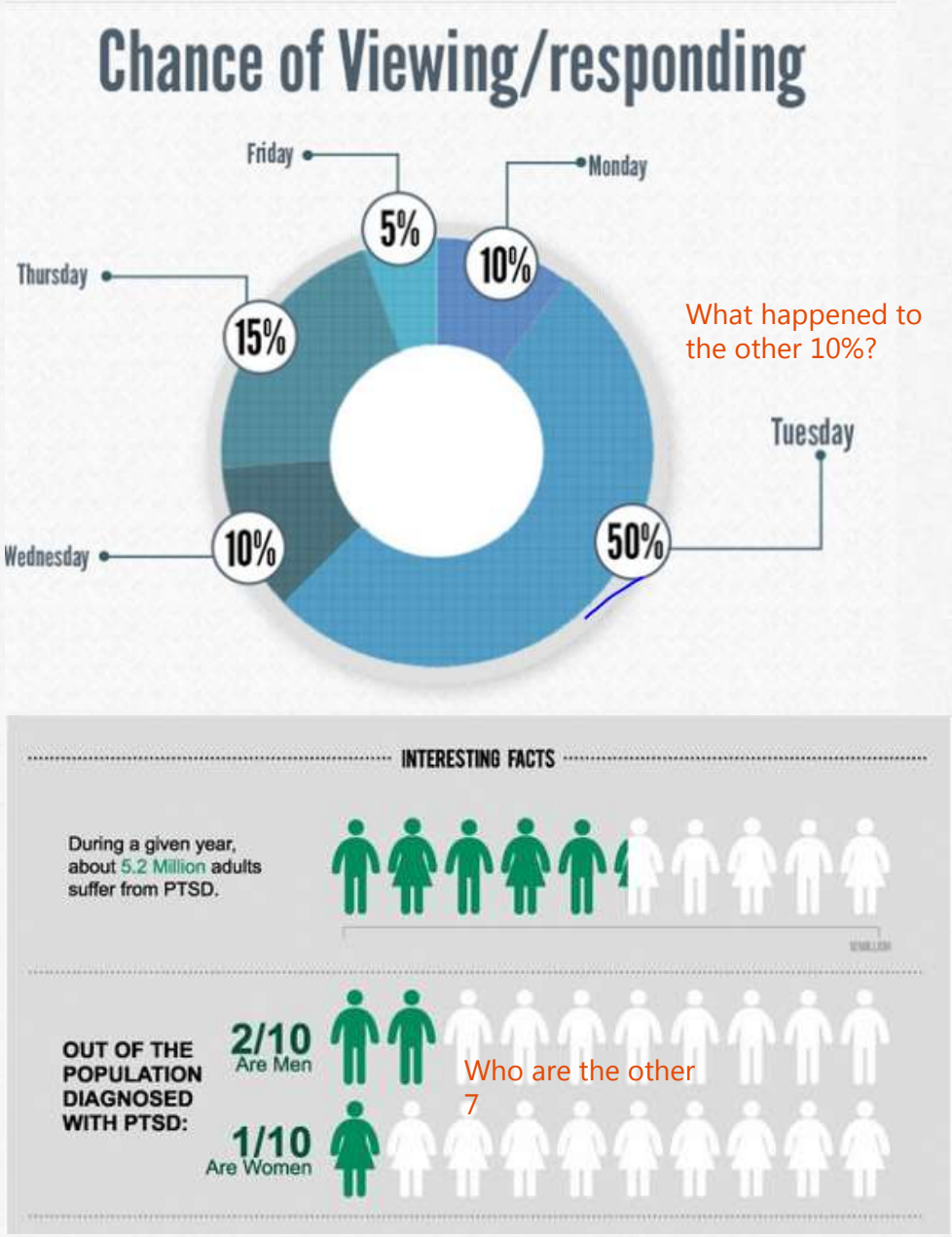


Data visualization and communication

Much of the focus in data visualization has historically been on exploring and analysing data.

But the analysts who use visualization often are not the decision makers, so they need to communicate their findings to the decision makers.

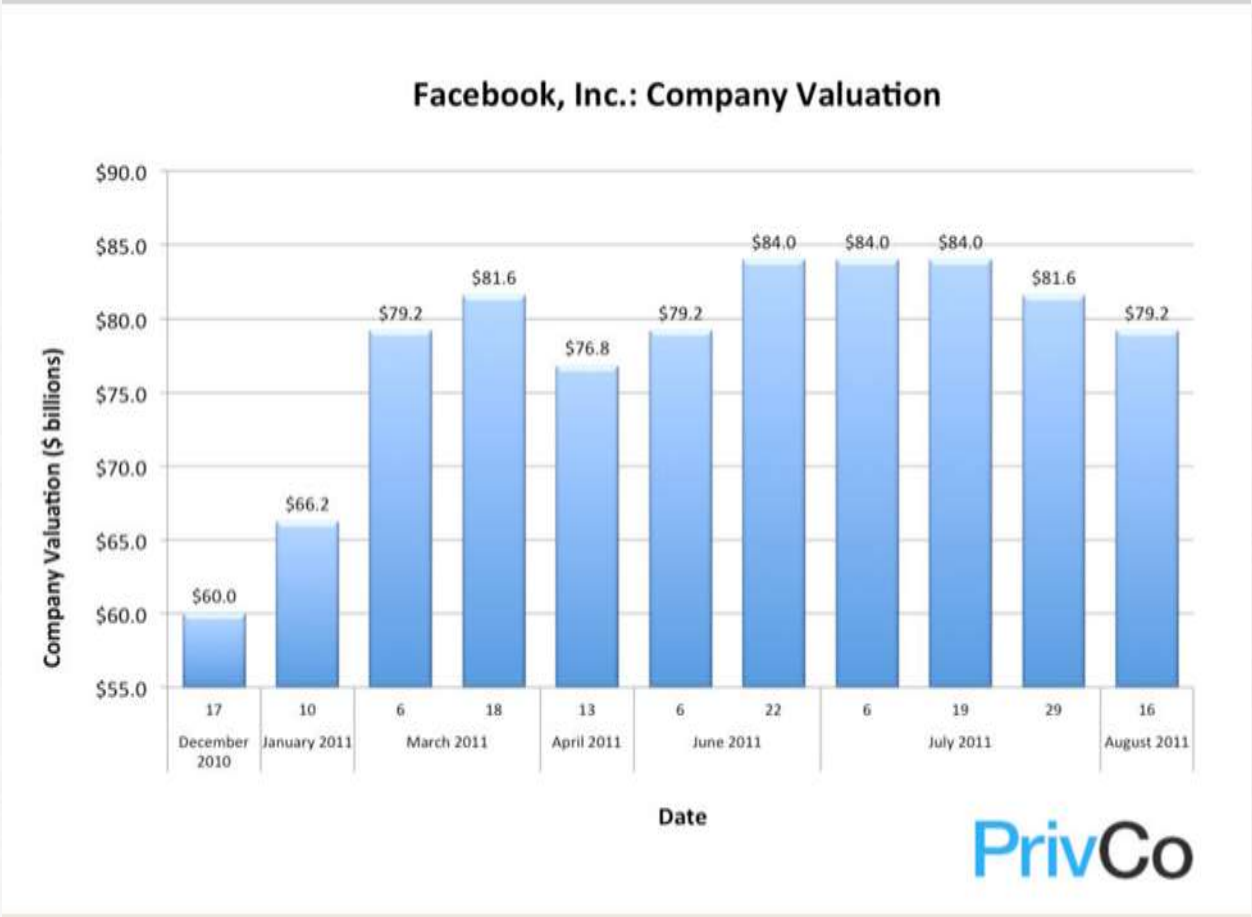
The problem is that many data visualisations used for communication purposes are bad – as simple as that. This ranges from many infographics used for marketing purposes to certain default graphs in excel or the outputs by data visualisation tools where it is assumed that the tools used for analysis are usable for presentation just as well as for their original purpose.



What is wrong with this chart?

*Spot at least 6 flaws in this bar chart**

*Solution in the appendix



- *Data Visualisation*
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Visual communication

Expressiveness
Precision
Accuracy

Expressiveness tells the story

Precision is about level of detail

Accuracy describes correctness

Translating data into visual forms is called visual encoding. For visual communication to be effective in data stories, the visualisation needs to

express the encoded data in a meaningful way. This means not trying to show every piece of data under the sun but all the facts that are relevant. Editorialising should be done explicitly and transparently, for example by using colour or other focus-driving tools or with words. Editorialising must never be done underhand using tools such as artificial scaling of axis, misleading selection of source data or implying relationships where there are none.

Precision is different from expressiveness and it is concerned with the level details you want to give. A simple example of precision is the number of decimal point displayed in a table. Depending on the needs of the audience, you might opt for more or less decimal points.

Accuracy is again different from both expressiveness and precision. The relationship between accuracy and precision is particularly important, as sometimes greater precision is associated with accuracy, even when this relationship does not exist. An example of the difference is this:

Imagine you are running a charity tombola where participants have to guess the value of copper coins in a jar. One participant guesses the coins total "£3,234.67" and another guesses "about £2,000". If the coins come to £2,054, then the first guess is the more precise one but the second the more accurate one.

It goes without saying that you should feel comfortable about the accuracy of the data encoded, whereas expressiveness of the level of precision and method of encoding depend on the circumstances.

- *Data Visualisation*
- *Expressiveness, precision and accuracy*
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Visual communication

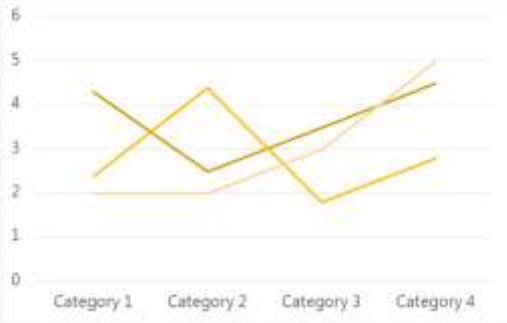
Choosing the right tool for the job

The two most common forms to visually encode data is with graphs and tables. Both are excellent tools, when chosen for the right task.

Tables are the right choice if the audience wants to look up individual values of a data set. They allow to pick up individual points with great precision. They can also be useful if you want to display a very small data set of up to 10 data points or less.

Graphs, on the other hand reveal meaningful relationships between the data. Using graphs enables you to see trends, patterns and exceptions in the underlying data that might remain hidden if displayed as a table.

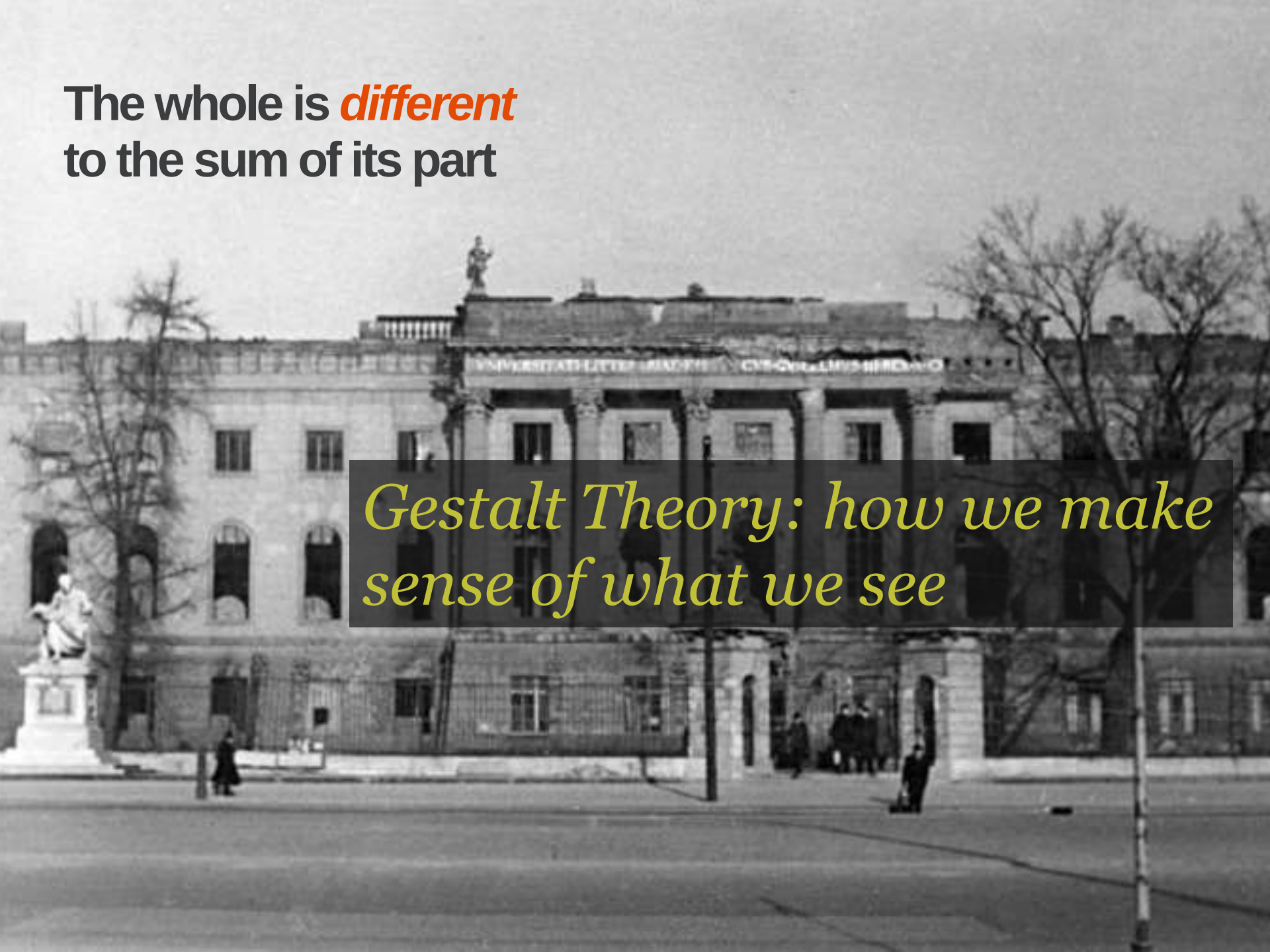
When deciding that a graph is the best tool to visually display your story, you need to decide what data relationships you want to display. Different graphs work for different relationship types, so consider:



Do you want to show a comparison? A distribution? A Composition or a relationship?

- *Data Visualisation*
- *Expressiveness, precision and accuracy*
- *The right tools*
- *Drawing attention*
- *Guidelines*

Visual communication


The whole is *different*
to the sum of its part
Gestalt Theory: how we make sense of what we see

Gestalt theory: how do we make sense of what we see

*Once you have decided on your message, effective visual communication is about **showing** it to the audience and this means enabling people to see it effectively .*

The presentation needs to play to the strength of visual perception and minimising its weaknesses. In order to do this, it is necessary to understand a bit about how visual perception works, i.e. how people see, how their eyes work.

The eye and visual cortex have been likened to a massive parallel processor, feeding into the human cognitive centres. The strength of the human visual system is that is an unparalleled pattern detector but it works to its own rules. If the patterns are presented in one way, we can easily see them but in another way, we cannot[3].

There is extensive research into what the rules of perception and cognition are, going all the way back to the work by the

Berliner Schule der Gestaltpsychologie (Berlin School of Gestalt psychology), established in the early 20th Century.

Gestalt means "form", "patterns" or "shape". The Gestalt theory stipulates that *the whole is different to the sum of its parts* (*NOT more*), and that perception is not built up from stimuli sensation (i.e. light from an object entering the eye) but is a result of perceptual organisation.

How does this relate to Data Storytelling?

Data stories, by their very definition, include data and visuals. Using the principles of Gestalt theory helps choosing the most appropriate design for these visuals, and avoid confusing mistakes. For example, not visually grouping unrelated items or visually connecting items where there is no real connection

All of this allows us to identify what we really need when we communicate data - and remove the clutter!

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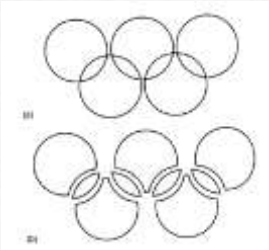
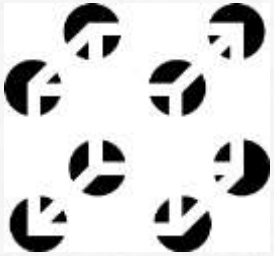
Making sense of what we see …

. To explain the phenomenon of perceptual organisation, Gestalt theory established a number of "principles of perception". Key ones are:



Pragnanz

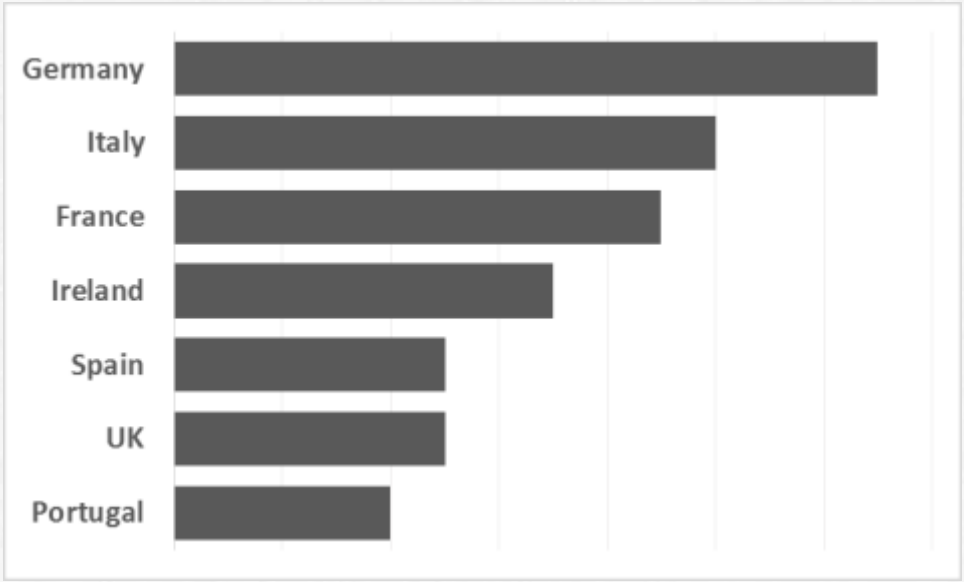
Simple patterns are noticed before other, more complex ones. Visual perception reduces patterns to the simplest possible structure, searching for *pithiness*



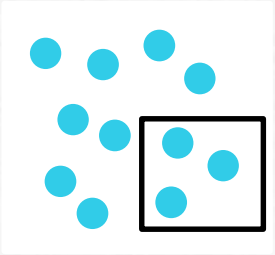
Continuation and closure

Points, when connected, result in contours. These contours follow the smoothest path and even trick the eye into perceiving things that are not there. This includes "completing" a figure, even if parts are missing.

Applying these principles in business report might look like this:

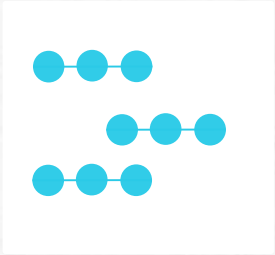


Making sense of what we see … *(cont).*



Common region

Elements grouped together in a region are perceived to belong together



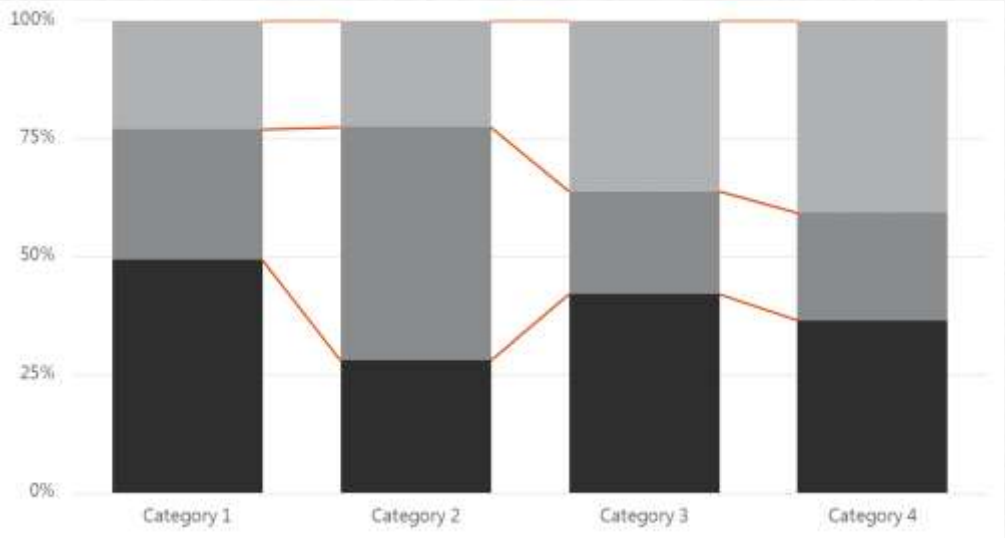
Connectedness

A connected region of visual properties is perceived as a single unit

Common fate & Synchronicity

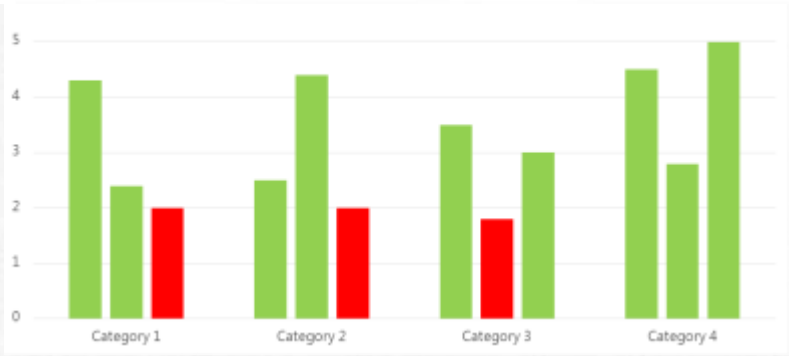
Elements that move together or change together (e.g. blinking lights) are perceived to belong together.

Applying these principles in business report might look like this:



Making sense of what we see … *(cont).*

Bev Doolittle (1985)

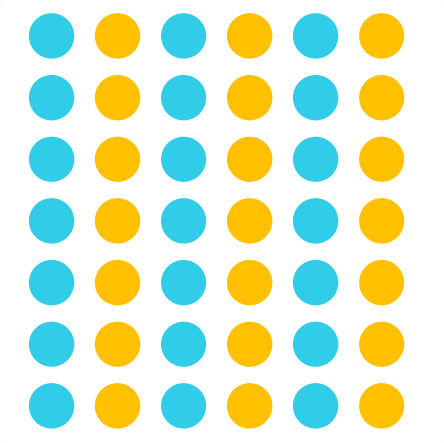


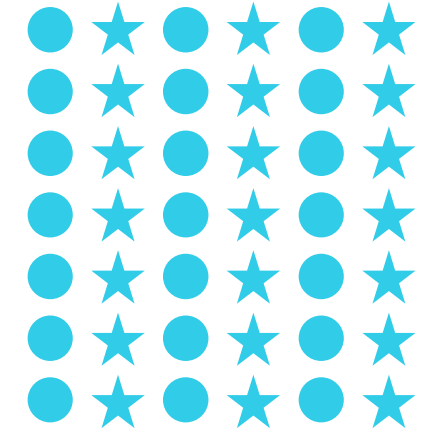
Meaningfulness and familiarity

Visual elements are more likely to be perceived as groups if the groups appear meaningful or familiar.

The bottom data chart plays on the concept of familiarity. As the colour RED is associated with something bad (in many cultures), it draws attention to the months with poor performance.

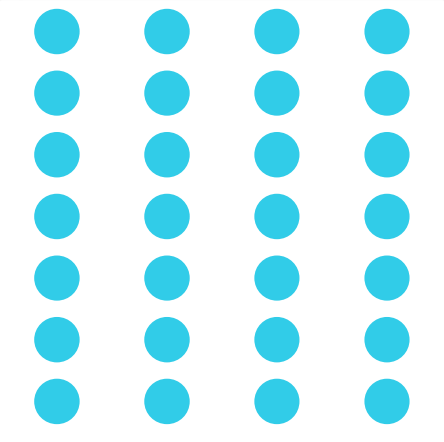
Making sense of what we see … *(cont).*





Similarity

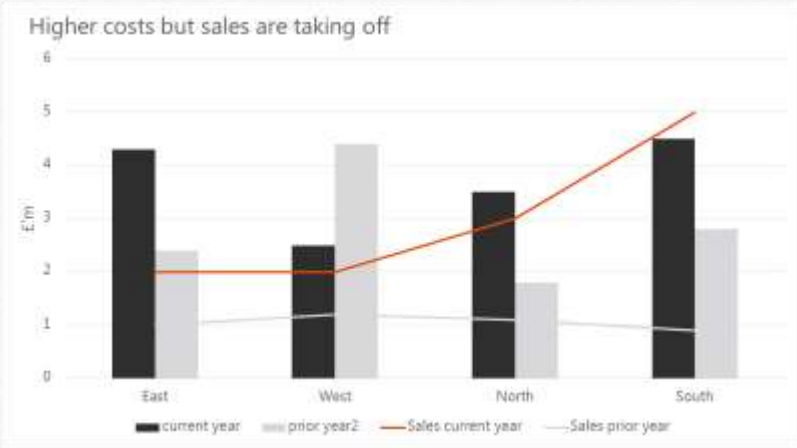
Elements that are visually similar, appear grouped together.



Proximity

Elements that are visually grouped together are perceived as belonging together

Combining the principles of proximity and similarity



Pre-attentive Attributes

Some elements command more attention than others:

Pre-attentive attributes

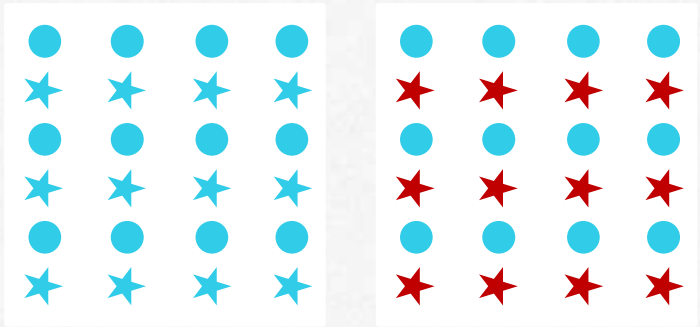
Research into how the human visual system analyses images discovered a limited set of visual properties that are detected very rapidly and accurately by low-level visual system. These are properties are deemed to have ***pre-attentive attributes.***

This is important for design of visualizations as it lets us understand:

- what can be perceived immediately
- what properties are good discriminators
- what can mislead viewers

Knowing this, we can guide attention to the key points in our story.

Proximity vs. Similarity:
Which one wins?



How many fives can you spot quickly?

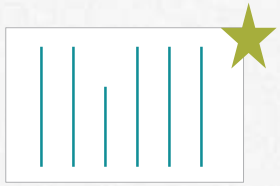
12345678978945645623467897456723456

12345678978945645623467897456723456

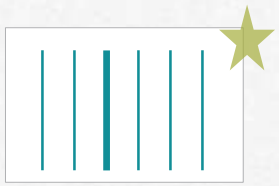
Grabbing attention

There are a total of 12 types of pre-attentive attributes. We can use a combination of our understanding of Gestalt principles and strategically placed pre-attentive attributes to direct our readers attention without taking away any essential information.

Only some pre-attentive attributes are perceived quantitative. 2D position and Line length are the strongest, though Line width, Size and Intensity have limited pre-attentive quantitative qualities

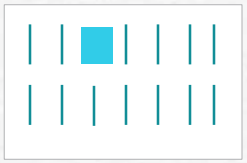


Line length



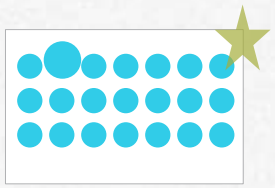
Line width

Orientation

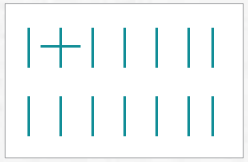


Shape

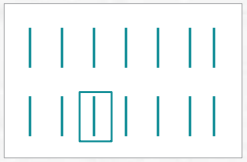
2D position



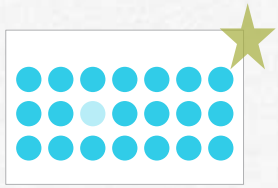
Size



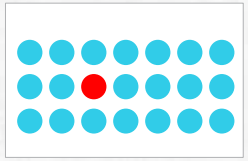
Additions



Enclosure



Intensity



Hue

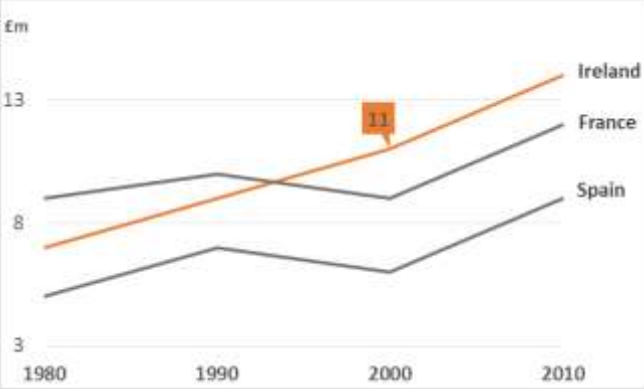
Curvature / form

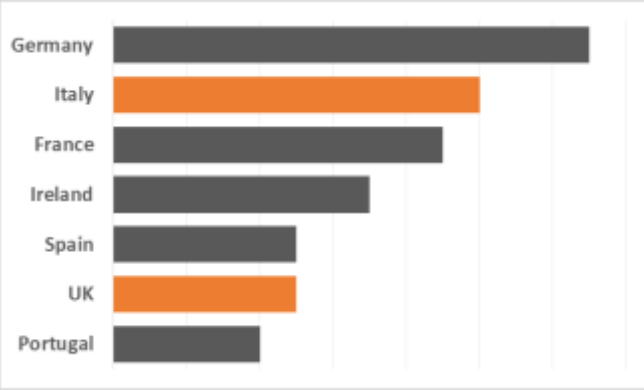
Blinking
Flicker
Direction

Motion

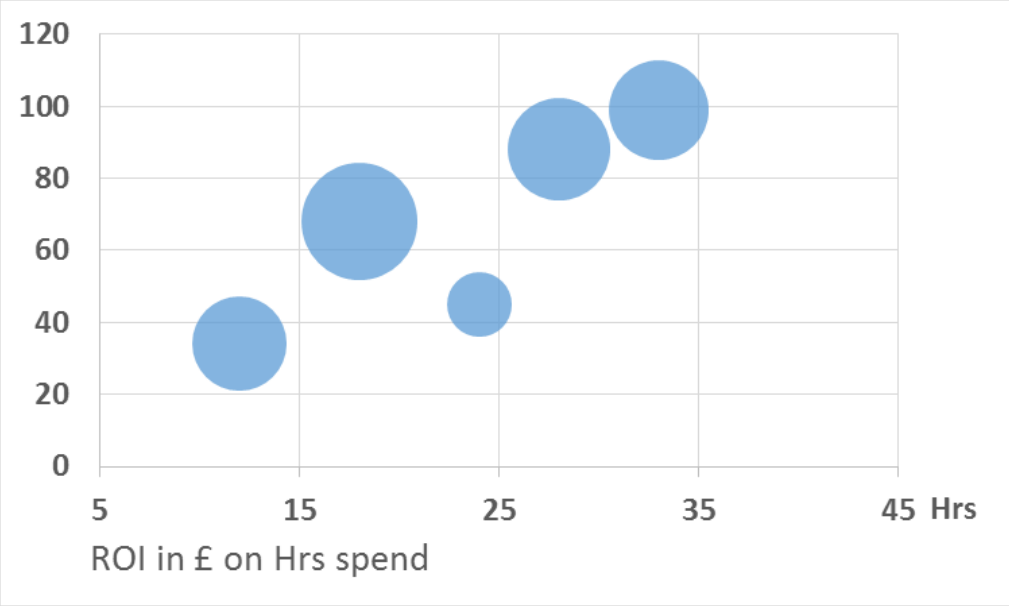
Pre-attentive attributes applied

Fairly accurate perception: We can perceive relatively small differences in position or line length and get a "feel" for the difference.





Limited accuracy in perception: small differences are much harder to perceive when it comes to angles, slopes and areas.



Intensity and hue can draw attention but on their own they need a definition to become meaningful, e.g. traffic light designation of red as "bad" (which itself needs clear definition).

Pre-attentive attributes are not limited to graphs

Good Data storytelling contain text as well as graphs and tables, so we can use pre-attentive features to highlight specific sections, make larger chunks of text more digest-able and direct attention

Bigger elements like letters, numbers and objects stand out more than smaller ones.

Slanted words, letters and number stand out from those with regular orientation.

Making the lines of elements like letters and numbers **thicker lets them stand out** more.

Choosing a *different font* changes the shape and lets elements like letters and numbers stand out from others.

Adding or enclosing letters, numbers and objects lets them stand out from those that are not.

Changing the hue (colour) or intensity of letters and numbers makes them stand out.

But avoid **the** Ransom *Note effect*

- *Data Visualisation*
- *Expressiveness, precision and accuracy*
- *The right tools*
- *Drawing attention*
- *Guidelines*

Visual communication

Guidelines for effective visual communication

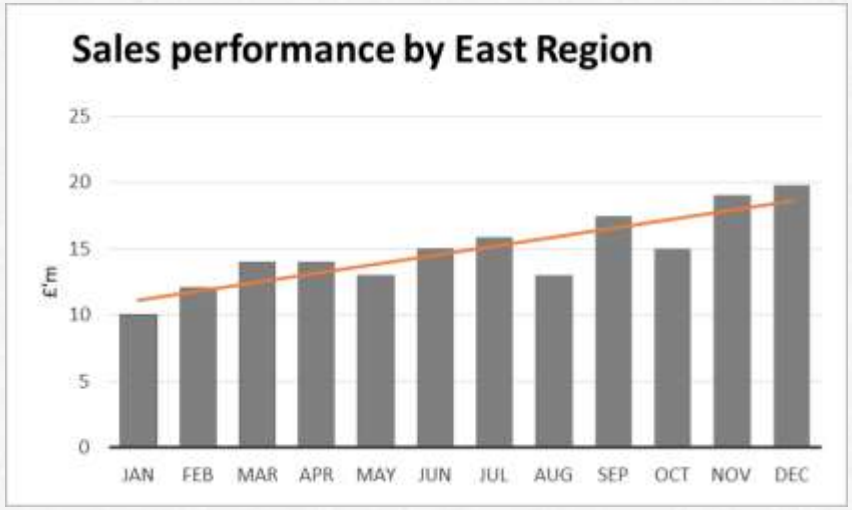
Combine the principles of Gestalt theory, pre-attentive attributes and generally accepted graphic design principles

#1

Only display information that is relevant to your message.

Of course, you must include all information that is relevant to the case in point – *never (!) exclude information simply because it doesn't fit your message* . If there is such information, you might have to rethink your argument. However, many charts (aided by the excesses of Excel) include superfluous information – background pictures, numerous colours, 3D effects, excessive gridlines or labels.

Edward Tufte calls this *chart junk* and the aim is to increase the *data:ink ratio* (the proportion of Ink (or pixels) that is used to present actual data compared to the total amount of ink used in the entire display).



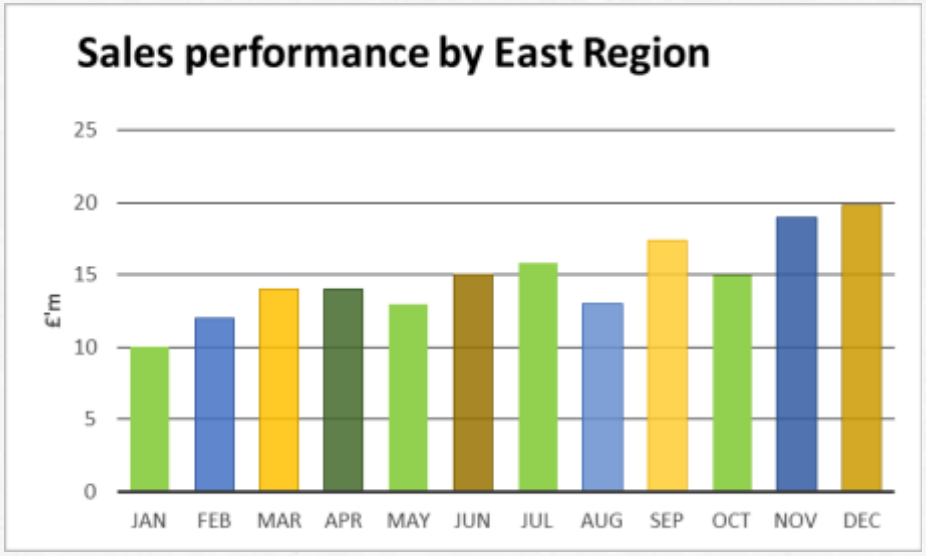
Guidelines for effective visual communication

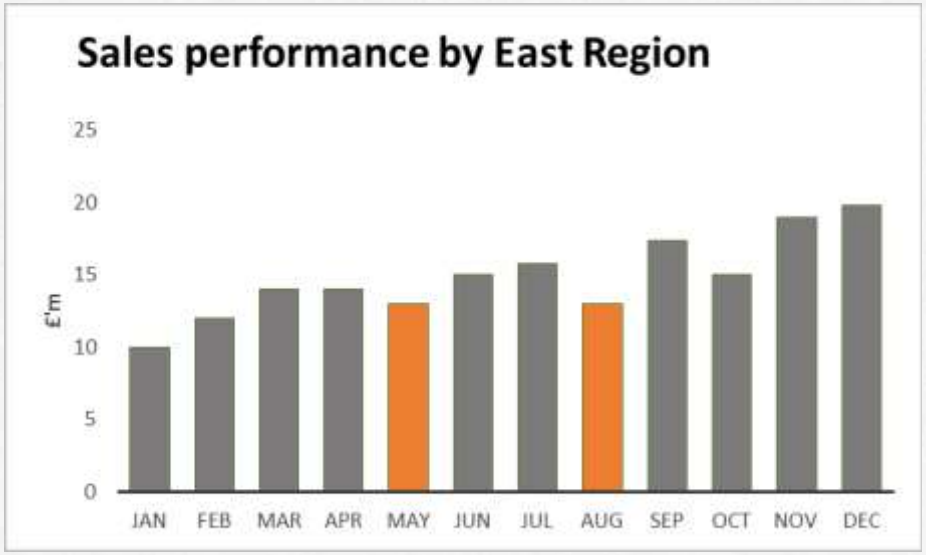
#2

Visual differences are perceived as actual differences in the data or underlying message

That means differences in colour for example should have some meaning to be effective communication tools – rainbow coloured charts like this one could imply a link between e.g. the yellow tinted months, even though no such link exists.

Therefore limit the use of visual differences to those points that you want to highlights are part of your story.





Guidelines for effective visual communication

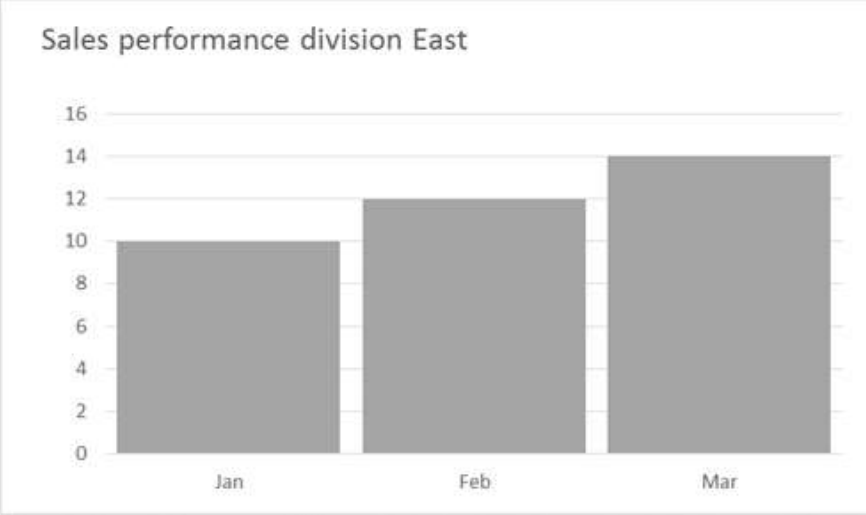
Bar charts must start at zero to represent data faithfully

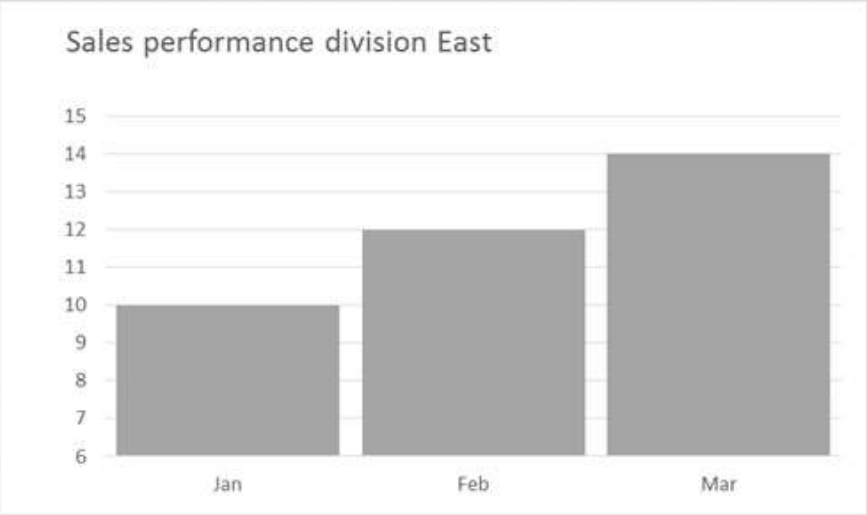
#3

Display visual differences in proportion to the actual differences in the underlying data

People perceive differences in the lengths or 2-D locations of objects fairly accurately and interpret them as differences in the actual values that they represent. The most common area where this is an issue is when bar charts don't cross at zero.

Compare the monthly differences in these two graphs:





The data is the same but the graph on the right *seems* to say sales in Mar are almost double that of Jan, which is untrue. The reason is that we cannot help noticing the length of a bar, hence bar charts must always start at zero.

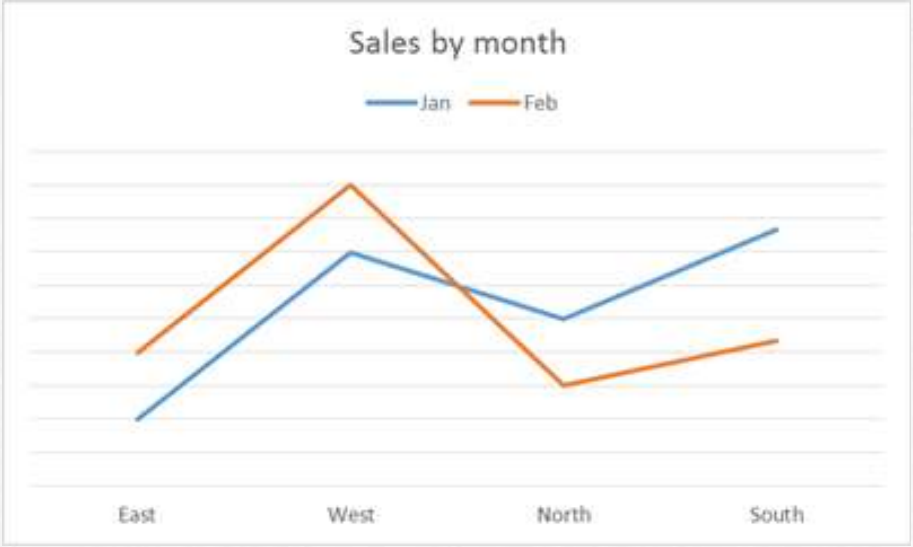
Guidelines for effective visual communication

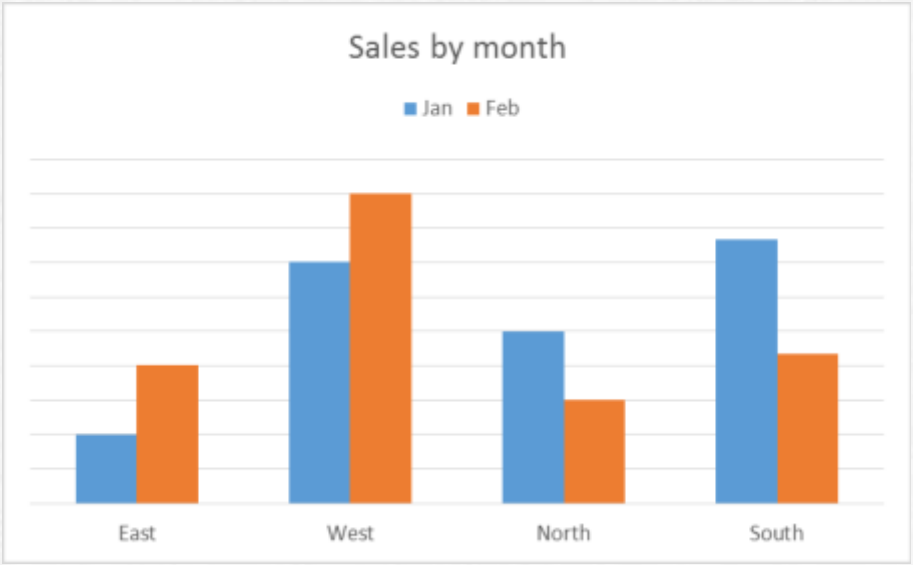
#4

Visually connecting values are perceived to imply a direct relationship in the underlying value

When we connect data point, e.g. in a line chart, the viewer interprets the data to have some form of intrinsic relationship, even if the data really only is only nominally related.

In those cases, chose a bar charts instead of connecting lines.



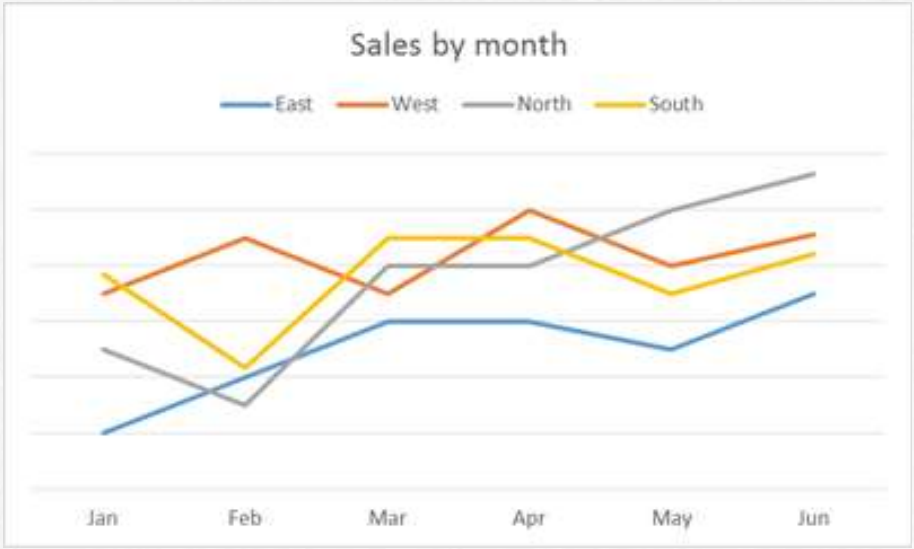


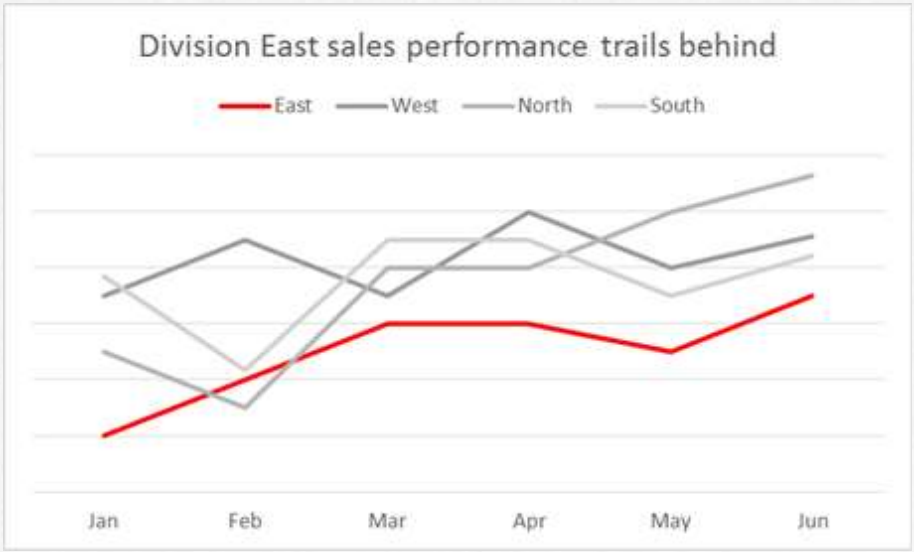
Guidelines for effective visual communication

#5 guide people's attention by making some visual elements more salient

Letting some visual elements "stand out" drives the viewer's attention and they will see those elements as more important than others.

As we have seen in the section on pre-attentive attributes, there are number of ways we can achieve this effect, colour just being one simple method.



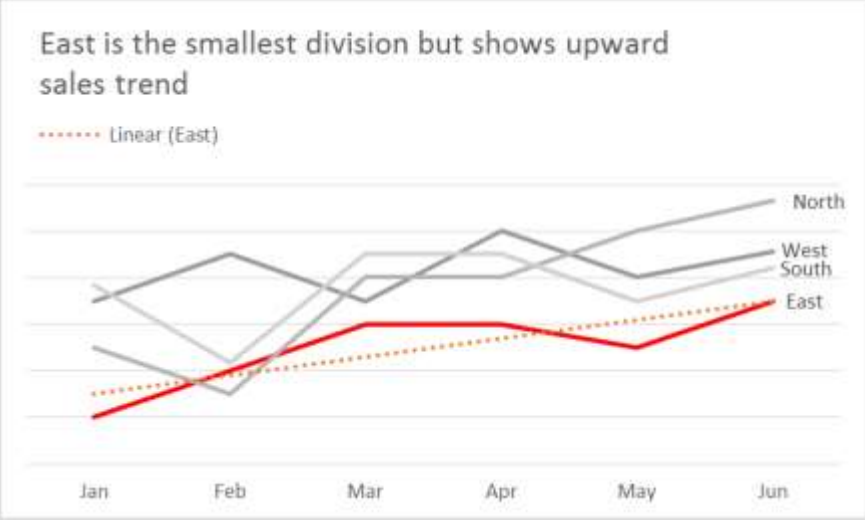


Guidelines for effective visual communication

#6

Help your brain to process information by combining multiple facts into a single visual pattern

Holding information in the working memory is essential to processing the information. Research has shown that the brain can only hold about 4 chunks of information at any given time in the working memory.



Combining (also called chunking in psychology) several data points in a visual pattern assist the brain to retain more information in one go and process it accordingly. The graph is a good example of chunking.

Making sure that all the relevant information is available within easy eye-span is another aspect of chunking. Remember how annoying it is if a report has related information on separate pages and you have to keep flipping backwards and forwards?

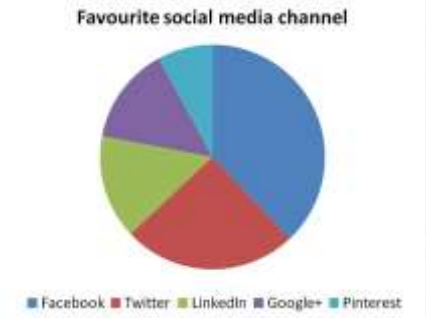
Guidelines for effective visual communication

#7

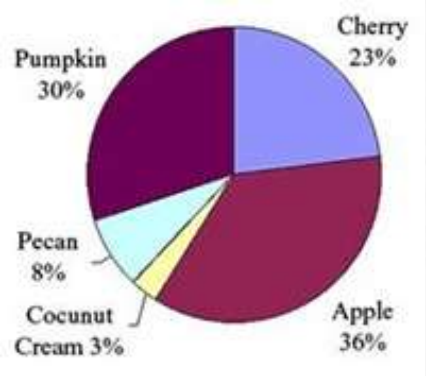
Just because some tools are popular that does not make them useful

There are at least five reasons why the ever popular pie chart (and their cousins, doughnut and gauges) are often not a good choice when it comes to visually displaying data, regardless what the media tells you.

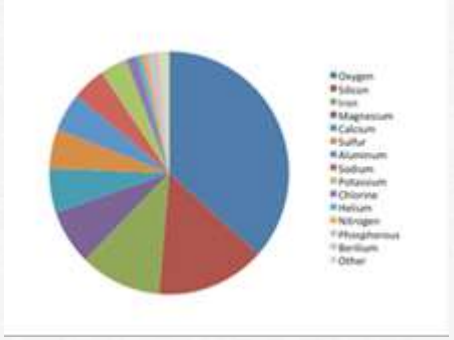
Pie charts imply that the components they show sum up to the whole. They say that if you add all the slices, you get 100% of whatever you are trying to measure. This might not be correct as shown in this pie because it misses out on quite a number of other social media channels.



Just like the slices of a pie chart must represent a whole, they also have to be mutually exclusive. As soon as values can fall into more than one category, for example when it comes to expressing preferences, a pie chart is not the right tool.



A common problem with pie charts is that they cannot show more than a few categories and remain effective. While they can work for up to 4 categories, anything more than you are ending up with a pretty pattern, but no real discernable information.

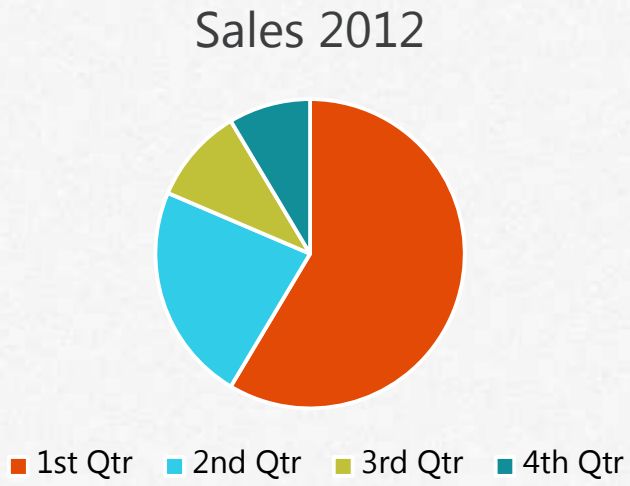


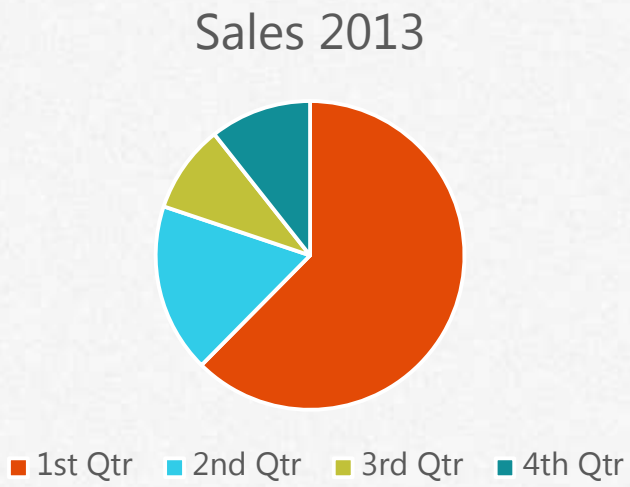
Guidelines for effective visual communication

#7 (cont)…
if in doubt, stay off the pies

Under most circumstances, pies are hard to read. It's because we are not very good at judging angles other than 90°, 180° and 270°. It makes it difficult to compare the relative size of slices– and when comparing different pie charts it is almost impossible to draw sensible conclusions. Things get even worse when visual distortions are applied to pretty-fy the charts to make them more "interesting".
Particular culprits are the infamous 3D effect and the exploding pie. When faced with these kind of charts, you will find that most people will simply focus on the numbers, trying their best to ignore the actual chart – make the whole visualization pretty pointless

How helpful are these two charts?





Guidelines for effective visual communication

#8 Crowding too many visual elements into one space reduces the visual impact of all elements

White space is the space that exists, most frequently behind and around forms, in a work of art, graphic design or other form of visual communication.

The term white space derives from the newspaper and magazine print industry. Historically, resources like paper were scarce and printing was expensive, and publishers tried to pack as much information on every page. It was only in the early 1900's that white space was "officially" recognised and important design element.

The biggest mistake most people make is seeing white space as something that must be filled in—as something that is wasted unless it is occupied with more elements. But white space makes the positive elements of a visual communication design stand out and avoids clutter The intentional use of space does not just lead to better aesthetic qualities; it's a powerful tool for directing the eye. White space, then, is absolutely crucial for obtaining clarity in your message.

- *Narrative*
- *Story structure*
- *Storyboarding content and layout*
- *Telling your story*

Storytelling

Create a narrative around your message

When it comes to preparing to communicate with others, most of us look at the content and say to ourselves: this is important stuff, I must tell others⋯. It's called being content led but to really engage with your audience, turn it into an audience led one. We do that by focusing clearly on the what you want from your audience as a result of your communication. It's called the *Most Important Point.*

So right before you start, before putting pen to paper, ask yourself these 4 questions:

- **What do you want the audience to do as a result of your presentation?** (Use action verbs.)
- **What does your audience need to know in order to do that?**
- **What does your audience need to feel in order to do that?**
- **Why would your audience want to do what you want them to do?** (What is in it for them?)

Presenting data – even as visualisation – is not enough.

Consider how to build a story around your core message. Building a narrative includes answering the "how?", the "why?" and the often missed "so what?" (some traditional storytelling would also ask "who", though this might not be the case for business reports.

This does not only convey a lot of information in a short space and make complex insights accessible, but a solid narrative can create order and make sense of a lot of information – and set the direction for further investigation

The most powerful stories are about people

In business settings, the best stories are those that focus on real people. Yes, even a presentation or report with lots of facts and data is still about real people.

Of course, the content of your presentation is determined by the information you want to communicate, and your Most Important Point. But to make sure that your message does indeed get heard about the noise, you need to tell it in a compelling manner. Using stories, you can either wrap your whole communication into a story format (maybe tell the story of how your project has overcome great adversity or how your business is about to embark on a brand new direction) or sprinkle some stories into your presentations. Analogies and comparisons work well here, too.

Finding inspiration for your story:

Specifically for numbers and data, try comparing or contrasting the numbers with something familiar. For Example: scaling down works by breaking the grandness of a number down into something that everyone understands, e.g. the price of a coffee. (e.g. *the total is less than the price of just one cup a day*).

Comparing can work in a number of ways. Take Steve Job, in his famous launch of the Macbook Air didn't go on about the slimness of the laptop in millimetres. Instead, all he said that it was so thin, it fits into one of those brown envelops you see floating around the office. Then, he took out a brown envelop and showed how the laptop fits inside..

Putting numbers into context: is another useful tool, e.g. if dealing with the financial impact of a project change request, set it into context of the overall cost, or the total numbers of change requests, depending on the point you want to make.

Language matters

LOTS

A quick word on language:

A powerful way of engaging your audience is to use **L**anguage **O**f **T**he **S**enses. That means telling the audience what you or the character in your story hears, sees, smells, feels, senses and thinks. When you trigger a sense, you bring you audience with you.

The most powerful stories appeal to at least 2 senses. Try this example:

The extraordinary project board meeting was well attended, even though the torrential rain drumming against the window had caused a few delays. Bob, the senior programme manager checked his papers, the papers rustling as he shuffled his notes. The room was unusually quiet – none of the normal small talk and banter over last night's football results. Bob could sense the tension in his fellow board members and he was glad he had spent the extra time preparing for this presentation…

LANGUAGE
OF
THE
SENSES

- *Narrative*
- *Story structure*
- *Storyboarding content and layout*
- *Telling your story*

Storytelling

Giving your message some structure makes it memorable

Don't bury your message:
Make sure you highlight your key point at the front of your story,
e.g. in the headline or graph title

Translating this to business reports means we need to provide context (aka the **beginning** of the story), enable discovery (the **middle**) and provide some conclusion (the **end**).

Although structures in business reports contain different elements compared to story structures in creative industries, they are important none the less. Establishing structure and flow in data stories makes sure:

- You actually get your message across,
- The sequence of information makes sense and supports your message
- You present the right level of complexity and detail at the right time
- Ensures you present all of the relevant information and no more

A beginning, A middle, and An end

The most basic story structure is familiar to us all. It consists of a beginning, a middle and an end.

The beginning (context)

To allow readers of a report to grasp its full meaning and insights, they need to have a point of reference. That reference is the context in which reported events took place or the assumptions on which forecasts are based. The context could be actual performance vs plan, this period's performance vs prior ones, explaining what events led to the current situation or any other relevant background information.

The middle (discovery)

To make your message compelling, make the middle about discovery. Explain a conflict, the hurdles that had to be overcome and potentially the wrong turns that were taken in arriving at the real proposed solution and call to action.

Mixing graphical representation with narrative enables you to convey your message while still allowing your audience their own journey of discovery. This is particularly powerful in interactive settings but as our example shows, can be done with conventional reports, too.

The end (conclusion)

Many business reports leave the reader with the question "so what?". To achieve their full purpose, effective Data Storytelling must go beyond simple display of data but answer the so-what-question. This means including a conclusion, recommendation, forecast or next step suggestions. Yes, it means you have to have an opinion and a message – *and as we have seen earlier, those aspects differentiate you from a trained monkey*.

- *Narrative*
- *Story structure*
- *Storyboarding content and layout*
- *Telling your story*

Storytelling

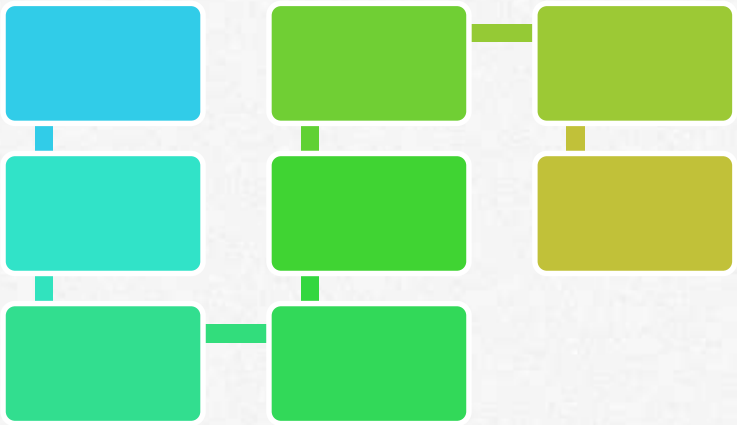
Visual outlines via Storyboarding

A Storyboard is simply the visual layout of how you are going to tell your story..

Storyboards are valuable for four reasons:

- Storyboards force you to assimilate your information, thus causing you to clarify the logic of your hypothesis and supporting assertions
- Storyboards help you to focus the analysis
- A storyboard can identify gaps in your analysis
- Storyboards prevent work that is unnecessary or redundant (story creep)

Storyboarding for Data Stories in business reports relates two aspects: the structure and flow of each story content in the report and the layout of the pages of the report:.



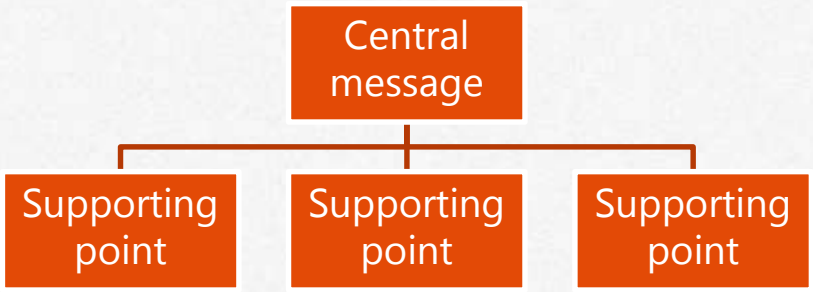
Five simple steps to content storyboards:

The quickest and most useful way to storyboard is to go back to pen and paper.

Post-its are invaluable here, though some people prefer to write on a whiteboard.

1. For each individual story, write the core message that you wish to convey on one post-it.
2. Then write down all the supporting points and other relevant information you wish to include in your story on further post-its.
3. Start physically arranging your post-its to give your story structure, checking back that it makes logical sense to an uninitiated reader. There is no one right way – use one that makes sense to you and your material
4. Remove any superfluous information – does the story still make sense?
5. Check back: is your message clear and concise?

Two examples of content Storyboards



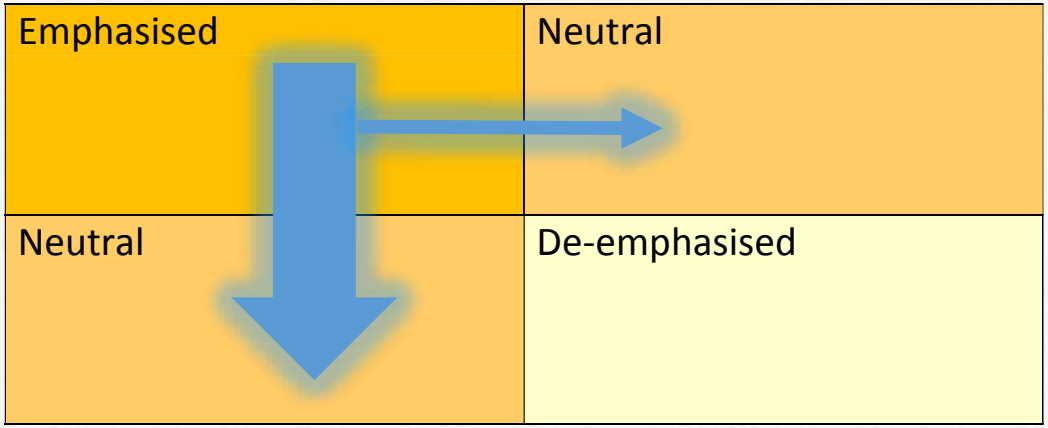
Creating effective layouts

Storyboarding layout and format of the page helps avoiding common mistakes:

Mistake #1

Placing information in places that don't fit its importance or does not support its use

Research shows that not all parts of a page, whether printed or on-screen are equal when it comes to drawing attention and being perceived as important. With this in mind, it is important to maximise on your page real-estate.



This means you don't want to put less important information in the top left hand quadrant, like a company logo or a legend. Keep them for the bottom right.

The arrows indicate the emphasis with which most people first scan down a page, then across if the page contains written as well as other visual elements. It's a legacy of webpage design that has permeated other media.

Creating effective layouts

Mistake #2

Including items that serve no useful purpose

As per visual communication guideline #1, only include elements that are relevant. Storyboarding your page layout will help you identifying those that are not.

Mistake #3

Separating content excessively

How often have you found yourself reading a report where important information was spread over several pages (or separated visually on one page), making comparisons difficult? Storyboarding your layout lets you plan how to keep related information together.

Mistake #4

Failing to visually link contents and other items that are related

Even the best plans fail and sometimes you cannot keep all the relevant information in one place. In that case, you can help the reader by providing other clues, such as using common colours or shapes. Storyboarding lets you identify where this is necessary

Mistake #5

Visually suggesting links between contents that are not related

This is the flip side of the point above: make sure you don't visually link those items which are discrete from another.

- *Narrative*
- *Story structure*
- *Storyboarding content and layout*
- *Telling your story*

Storytelling

Telling a story with just one graph

Background: use text to explain the context and the problem you are exploring

Details: Data source and parameters
Method
Assumptions

Insights: give more detail on your headlines, summarise your findings, explain your interpretations and predidictions, help the reader to interprete your visualisation and understand the message.

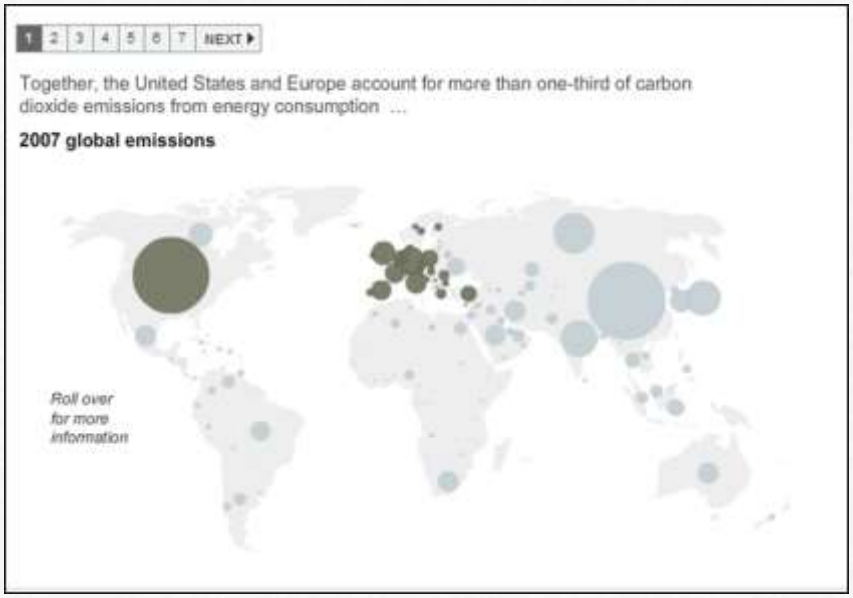
Recommendations:

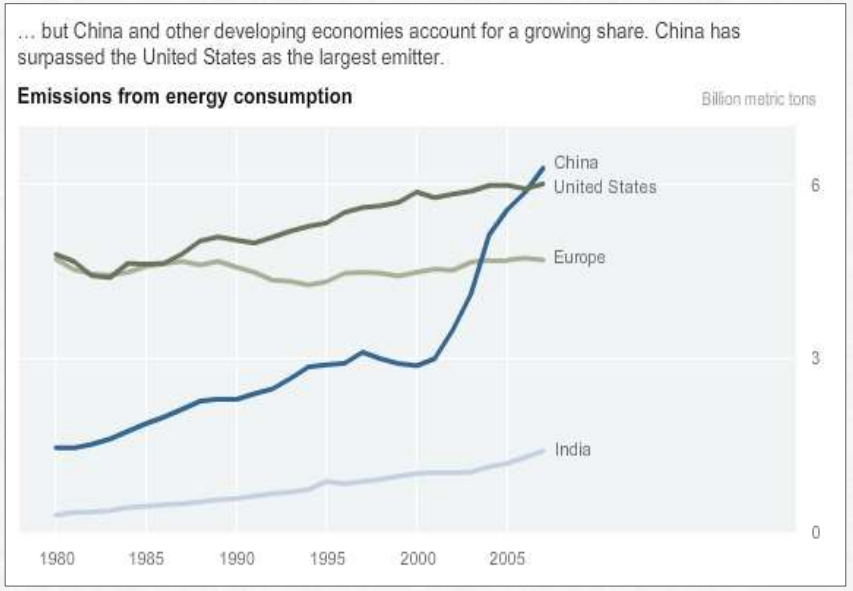
use text with pre-attentive attributes to highlight your message

Telling a story with multiple graphs

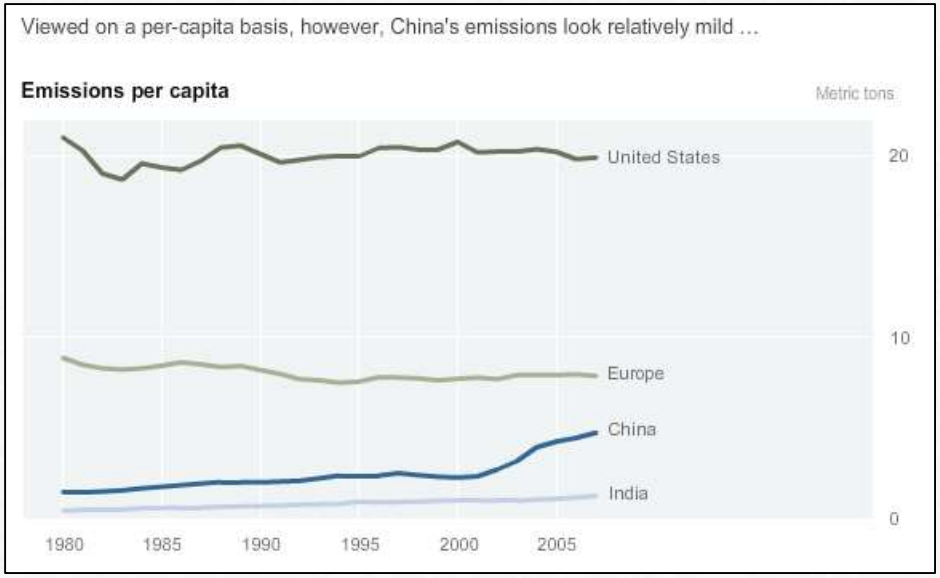
This visualisation appeared in the NY Times, 5 Dec 2009. It covered issues around emissions and other factors of climate change in preparation for the Copenhagen climate conference (7/12 – 18/12/2009). Although the original is an interactive web-based visualisation, these slides show how simple graphs can tell an intriguing story even in static form.

Copenhagen: Emissions, Treaties and Impacts



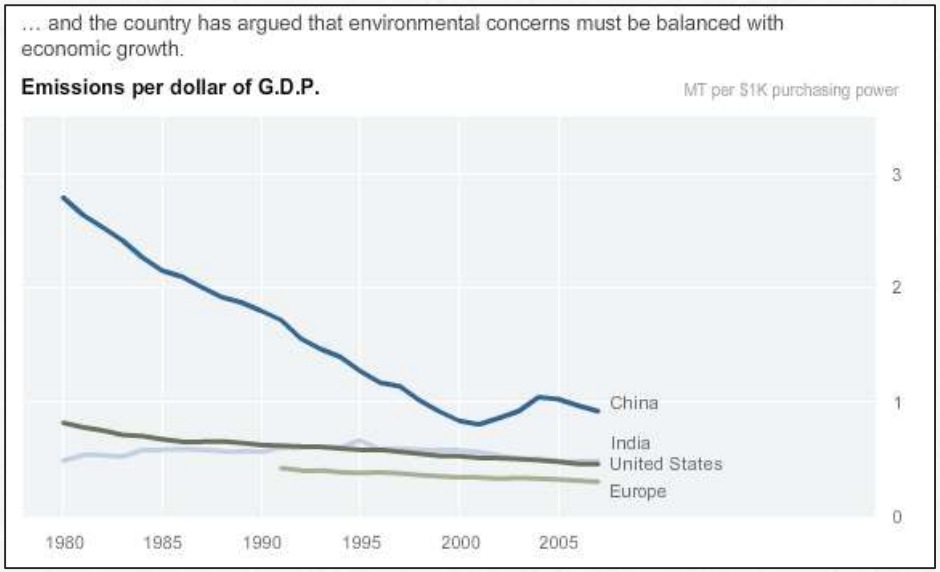


Telling a story with multiple graphs



Please note, the original visualisation contains a wealth of additional data, information and messages which have not been reproduced here for brevity's sake. You can find the original at:

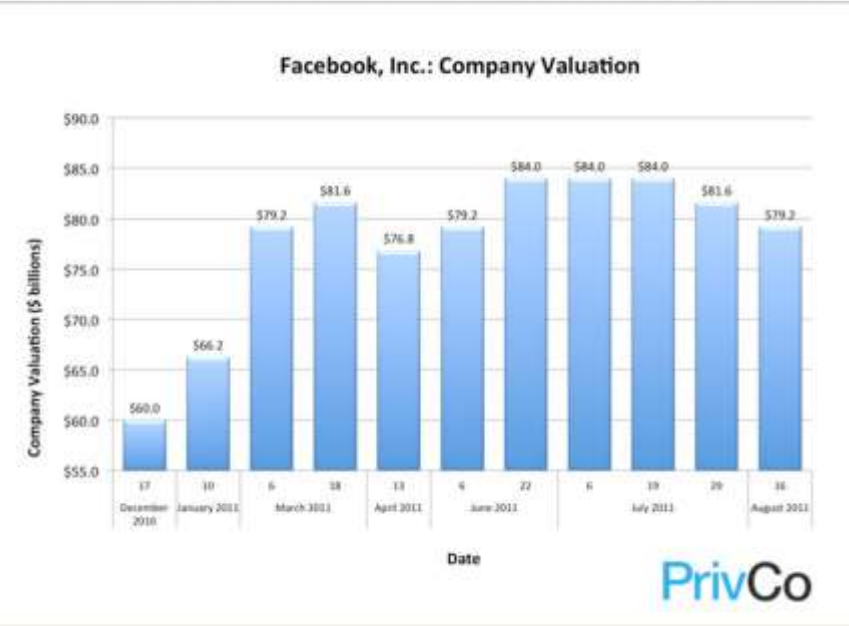
Copenhagen: Emissions, Treaties and Impacts



Appendix

Six flaws in the graph:

1. The value axis does not start at zero
2. Using uneven time periods
3. 3D effect
4. Excessive use of $-sign
5. X-axis description is not helpful
6. No core message / key point



End Notes:

1 Karen Dietz, Lori Silverman: Business Storytelling for Dummies, 2013, p.17
2 Michael Sandberg, Data Viz blog, datavizblog.com, 2013/05/26/
3 Colin Ware: Information Visualization: Perception for Design (Interactive Technologie**s)**, 2004, p36

Resources and credits

Acknowledgement:
The work in this booklet is influenced by many sources, with especial acknowledgement for the learnings from the following:

Edward Tufte: The Visual Display of Quantitative Information, 2001
Stephen Few: Information Dashboard Design, 2013
Stephen Few: Now you see it, 2009
Colin Ware: Information Visualization: Perception for Design (Interactive Technologie**s)**, 2004
Karen Dietz, Lori Silverman: Business Storytelling for Dummies, 2013
Geni Whitehouse: How to make a boring subject interesting, 2009
Garr Reynolds: Presentation Zen Design, 2010
Randall Bolten: Painting with Numbers, 2012
Nancy Duarte: Resonate, Present visual stories that transform audiences, 2013

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Bev Doolittle, The forest has eyes, 1985

Copenhagen, Emissions, Treaties and Impacts: NY Times, 5 Dec 2009

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Storytelling with Numbers