TAMPERE UNIVERSITY
OF APPLIED SCIENCES

Infographics and Data Visualization: Design Practices

Kristina Gushcheva

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Media and Arts
Interactive Media

ABSTRACT

Tampereen ammattikorkeakoulu
Tampere University of Applied Sciences
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KRISTINA GUSHCHEVA:
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Infographics creation as a design medium is diverse, and it is used as a tool to showcase the depths and details of quantitative information. Infographics require a clear-cut visual system, application of fundamental design rules, creativity and the ability to tell your viewers a story through the numbers.

The objective of this thesis was to study the design principles, most used data visualization practices, and creatively deliver data visualization-related design projects for the case study company, Nosto Solutions.

In order to create the final project assets, extensive research has been conducted. Study of varied literature sources and A/B testing were among the used research methods.

The findings reveal that the essential design rules were a crucial factor for creating clear and appealing data visualization, and the overall understanding of the data visualization medium was equally important in the infographic creation process. Moreover, taking the meaning and context behind data into consideration was proven to be essential.

This study suggests that the design process behind working with numbers is not as simple as it might seem at a first glance – it requires precise work and acquired knowledge of the design principles.

Key words: infographics, data visualization, graphic design

CONTENTS

GLOSSARY

TAMK	Tampere University of Applied Sciences
cr	credit
Data visualization	Data visualization refers to techniques used to communicate data or information by encoding it as visual objects (e.g. points, lines or bars) contained in graphics.
Infographic	Infographics are graphic visual representations of information, data or knowledge intended to present information quickly and clearly.
Big data	large data sets that may be analysed computationally to reveal patterns, trends, and associations, especially relating to human behaviour and interactions.
Marketing	Marketing is the business process of creating relationships with and satisfying customers.
UI	User Interface.
CR	Conversion Rate. Number of conversions (sales) divided by the total number of visitors.
A/B testing	A process of comparing two properties (A and B).

1 INTRODUCTION

With the overall technological progress, the importance and the demand of visually decrypting big data sets has never been greater. Data-processing software is capable to adequately analyse the received information, however on the consumer end this data is useless if it can't be understood, and that is where the data visualization techniques step in. The potential design diversity is equally great as the quantitative information that is behind the visuals.

Data visualization is an extremely precise medium that requires deep understanding of common design principles, high expertise in modern design software, and, most importantly, insight on how to visualize the data in the most efficient way, while taking into the consideration the common visualization rules. With that in mind, how does the data visualization process compare to the infographic creation steps?

In order to answer the above question, two project cases were studied: a data report which is aimed at enterprise-level fashion retailers and a playful infographic project. To do that, a thorough analysis of basic design principles and data visualization rules is required. Moreover, the comparison of the two mentioned project cases define some of the main differences and similarities of the design processes. Although there are two projects discussed in this thesis, a more extensive report is conducted on the infographic case study.

This thesis aims to explore the possibilities behind working with data as a graphic designer. Analysing a seemingly complicated medium is a great educational tool, and, in context of being a part of the design field, can improve one's knowledge of creative tools and software drastically.

2 DESIGN PRINCIPLES

2.1 Fundamental Rules

As John Lovett (2011) stated: “The elements and principles of design are the building blocks used to create a work of art.” Truly, if we’re thinking of a design piece as a complete building, it is impossible to assemble one without the knowledge of working with the materials you’re given. As elusive as visual design, photography or drawing might seem, for years artists and designers have been following a certain set of guidelines to help them improve their work, both visually and in terms of working techniques.

Alex White (2011) characterized the essential elements of visual design as following: space, unity, balance, hierarchy, scale and proportion, dominance and emphasis, similarity and contrast. White’s definition is extremely structured, but I think it is overly detailed. For instance, dominance and emphasis are equally comparable to balance and hierarchy, being the elements that are almost identical by definition. A different interpretation is offered by John Lovett (2011). He states balance, gradation, repetition, contrast, harmony, dominance and unity as fundamental principles of design. Indeed, this approach is less detailed, yet it captures the essentials precisely. Both White and Lovett referred to such principles as unity, balance and repetition. Coincidentally, similar laws are represented by the visual theories of Gestalt psychology. To remain in line with the topic of infographics and data visualization, and as Gestalt laws and components vary from source to source, this thesis will take a closer look at the following principles:

- Similarity;
- Continuity;
- Proximity;
- Closure;
- Prägnanz;
- Balance;
- Alignment;
- Contrast;
- Space.

In my opinion, the listed above laws perfectly represent the best design principles in terms of graphic design and are most related to data visualization and infographics. This thesis will also touch on the topic of colour theory, as colour and contrast are among the most prominent design features. Considering that colour theory is an extremely broad subject which is out of scope of this project, I will only refer to it briefly.

2.2 Gestalt Principles

While traveling in 1910, Max Wertheimer, Austro-Hungarian-born psychologist, observed a series of lights flashing on and off at a railroad crossing that resembled lights encircling a theatre marquee (Behrens 2004). In later years, Wertheimer further studied the perception and movement alongside fellow psychologists - Kurt Kofka and Wolfgang Köhler - whom he recruited as test subjects (Behrens 2004).

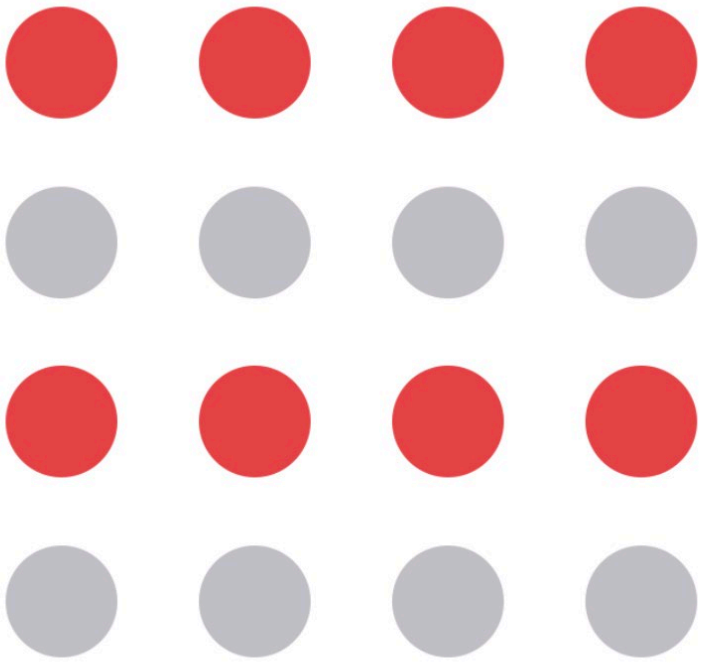
Gestalt is a word which comes from German “gestalt” and means “form” or “shape”. In psychology the Gestalt school of thought suggests that a human mind doesn’t focus on every small component of the surrounding world but perceives it as a whole (Cherry 2018).

> We hear a melody and then, upon hearing it again, memory enables us to recognize it. But what is it that enables us to recognize the melody when it is played in a new key? The sum of the elements is different, yet the melody is the same; indeed, one is often not even aware that a transposition has been made... Is it really true that when I hear a melody I have a sum of individual tones (pieces) which constitute the primary foundation of my experience? Is not perhaps the reverse of this true? What I really have, what I hear of each individual note, what I experience at each place in the melody is apart which is itself determined by the character of the whole.
>
> **Max Wertheimer, an address before the Kant Society,**
> **Berlin, 7 December 1924**

Indeed, Wertheimer's description perfectly captures the idea behind Gestalt – how all the pieces come together and how humans perceive those as a whole, not only with vision, but with other senses as well. In design, Gestalt principles are used up to their advance: implementation of those means benefiting the design's visual balance and structure. In other words, many fundamental design rules are directly connected to the Gestalt philosophy.

2.2.1 Principle of Similarity

The Principle of Similarity, also known as Invariance, suggests that the human eye tends to build a relationship between similar elements within a design. (Soegaard 2019). Similarity can be achieved using various basic elements such as shapes, colours, and adjustment of the size of the elements. (Soegaard 2019). Picture 1 presents a set of shapes formed in rows. Visually, red and grey shapes form separate groups from each other that are distinguishable to the human eye.



PICTURE 1. Similarity (Gushcheva 2019).

2.2.2 The Principle of Continuity

The Principle of Continuity partially refers back to the Principle of Similarity: The Gestalt Continuity Law explains how the human brain experiences visual line of elements that are grouped together, as there is a suggested tendency to perceive a line continuing its established direction (Bulat 2012). According to this principle, the human brain tends to follow the direction of an established pattern rather than deviate from it, and the shape of the letter "X" is a great example of it – we perceive it as two lines crossing each other rather than four lines meeting in the centre (Bulat 2012).

2.2.3 Principle of Proximity

Proximity is the process of ensuring that related design elements are placed together (Smith 2014). Elements that are placed close to each other indicate that they are related to each other, for example like one's first name and last name on a side of the business card. That also means that the correct usage of white space must be taken into consideration, for example to divide groups of elements between each other.

In other words, Proximity is about applying logic to create a sensible visual hierarchy within a standalone artwork. Picture 2, which features a wireframe version of a movie poster, perfectly represents the information structure - the poster could easily be divided into "blocks", for example the title is block 1, date and description is block 2, and movie production information is block 3.

PICTURE 2. Proximity demonstrated with both typography and shape (Siim 2011).

2.2.4 The Principle of Closure

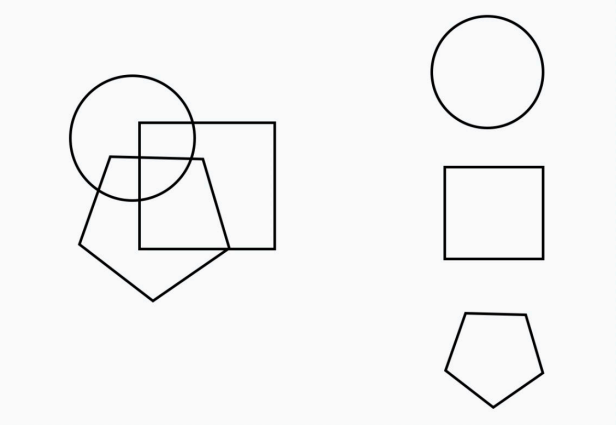
The Principle of Closure states that whenever possible, people tend to perceive a set of individual elements as a single, recognizable pattern, rather than multiple, individual elements (Lidwell, Holden and Butler 2010).

PICTURE 3. The Principle of Closure (Lidwell, Holden and Butler 2010).

Picture 3 represents the Principle of Closure in action. The figures are first perceived as circles, and then as individual elements (Lidwell, Holden and Butler 2010). The Principle of Closure allows designers to reduce complexity by using a smaller number of elements needed to organize and communicate the design (Lidwell, Holden and Butler 2010).

2.2.5 Prägnanz

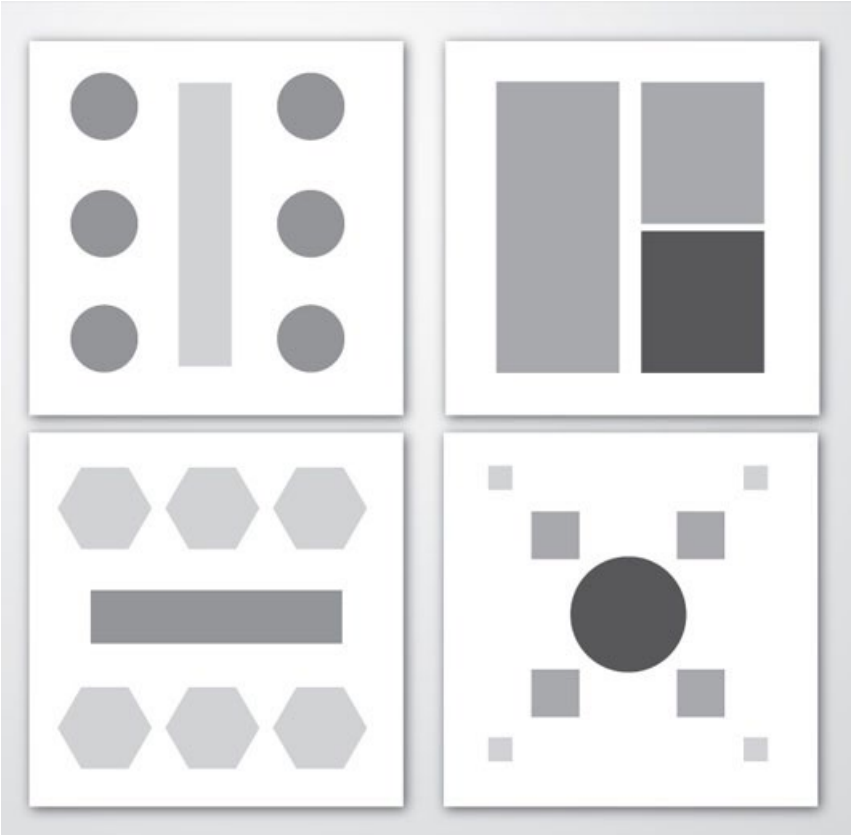
One of the most essential gestalt laws when it comes to e.g. UI design and web design and development is the law of Prägnanz (or Pragnanz). The law suggest that people perceive complex things as simplistic forms in order to recognize the environment easily (Kerti 2018) (Picture 4).



PICTURE 4. Prägnanz (Gushcheva 2019).

2.3 Balance

Balance is a lot like balance in physics: it's about the distribution of visual elements across the canvas of work (Picture 5). Balancing a composition involves arranging both positive elements and negative space in such a way that not one area of the design overpowers other areas (Bradley 2015). The ways of arranging elements may vary, but, for instance, applying symmetrical approach is one of the easiest methods of balancing out the artwork or the layout.

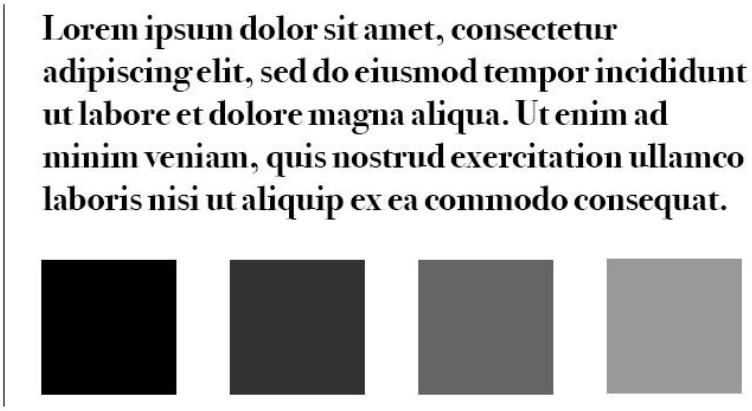


PICTURE 5. Example of balance in 4 different canvases (Desamba 2010).

A design that is well balanced works altogether as a composition and is satisfying to the eye of the viewer. An unbalanced canvas can be a source of tension, the structure can lack visual hierarchy and the whole composition is viewed as elements rather than a complete work (Bradley 2015). With that in mind, balance is especially important when thinking in terms of creating infographic content.

2.4 Alignment

Alignment of elements, even those that aren't in close proximity of each other, creates a connection between them (Picture 6). Alignment, just like proximity, provides order and hierarchy for the canvas.



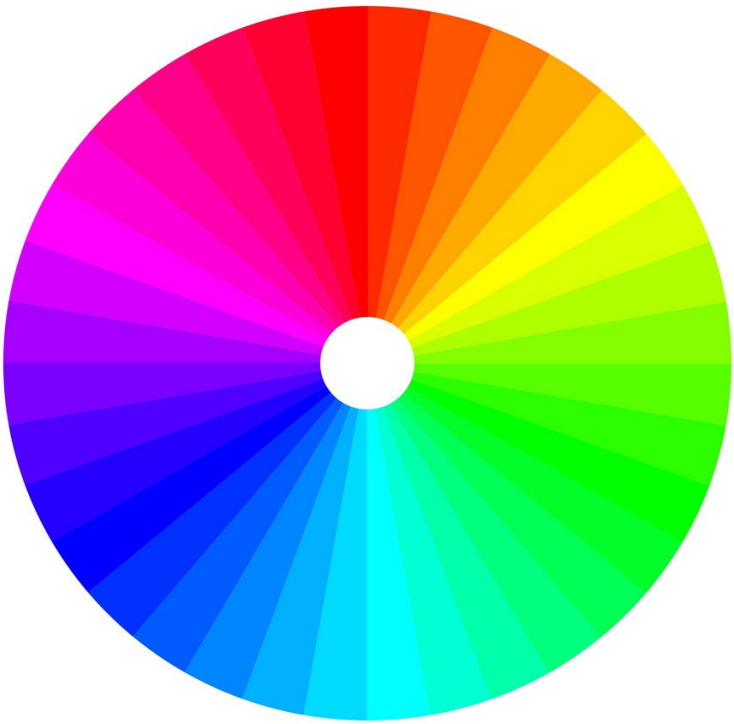
PICTURE 6. Alignment of elements (Gushcheva 2018).

2.5 Contrast

Contrast can refer to contrast in both colour and shape, it is achieved by arrangement of opposite elements; this may interest the viewer visually and create excitement and drama in a design (Selleck 1979).

Contrast is one of the most powerful tools a designer can use, since it covers just about every element that could be included in the artwork. When referring to colour, contrast means using, for instance, opposite tones: when looking at the colour wheel (Picture 7), the closest colours to e.g. true red are way too familiar in tone. To avoid confusion and viewing issues, true red should be paired with a colour that is significantly different to its tone. Contrast can also refer to brightness and saturation.

Contrast is also an important part when thinking about accessibility. Colour blindness, also known as colour vision deficiency, is the decreased ability to see colour or differences in colour (The National Eye Institute, 2015), which can affect the viewing experience if the artwork or design is lacking contrast in colour, tones and brightness.



PICTURE 7. Colour wheel (Gushcheva 2018).

Of course, contrast can also refer to contrast in shape, size and placement. It is important to consider balance when and layout capabilities when working with highly-contrasting elements.

2.6 Space

Think of space as a short pause – in a design piece, space is meant to allow the elements to have their own room on the canvas. White space, or it is also referred to as negative space, gives the eye the freedom to explore the artwork.

Implementing negative space is a great tool to create contrast in the piece and shift the focus on the elements which are of importance. Picture 8 represents white space in a somewhat straight-forward way – the post-processing of the photo lets the viewers focus on the necessary details, like the characters and the building, setting up a solitary atmosphere. In a similar way, white space is also used in art, print design, UI design, illustration and so on.

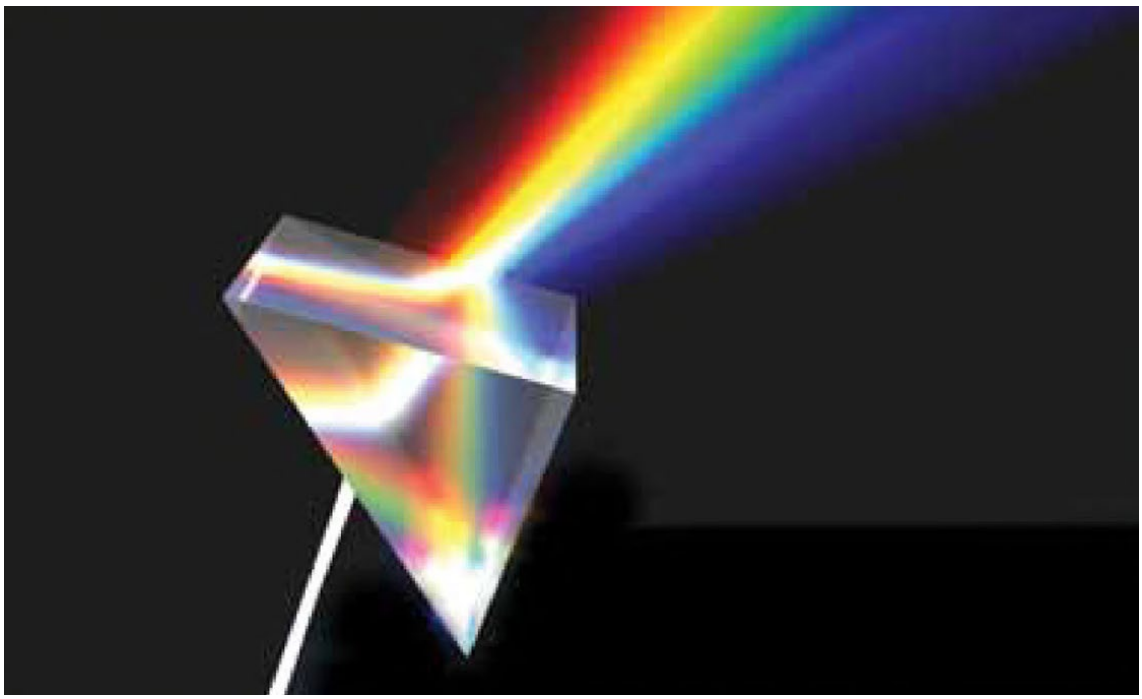
PICTURE 8. White space implemented in photography (Yin 2018).

2.7 Colour Theory

Colour is one of the most powerful tools in the hands of a creator. Visionaries across the globe have explored the emotional and aesthetical impacts of colour through centuries, which has led to the foundation of colour theory.

The power of colour is undeniable. Colour can stimulate the eye and brain of the viewer and create an immediate unconscious response from them; it is able to physically affect the viewer by raising their body temperature or change their blood pressure; colour can be perceived as a quality, as a reflection of social position and as a statement (Bleicher 2012).

2.7.1 Origins of Colour



PICTURE 9. White light passing through a glass prism (Mollica 2013).

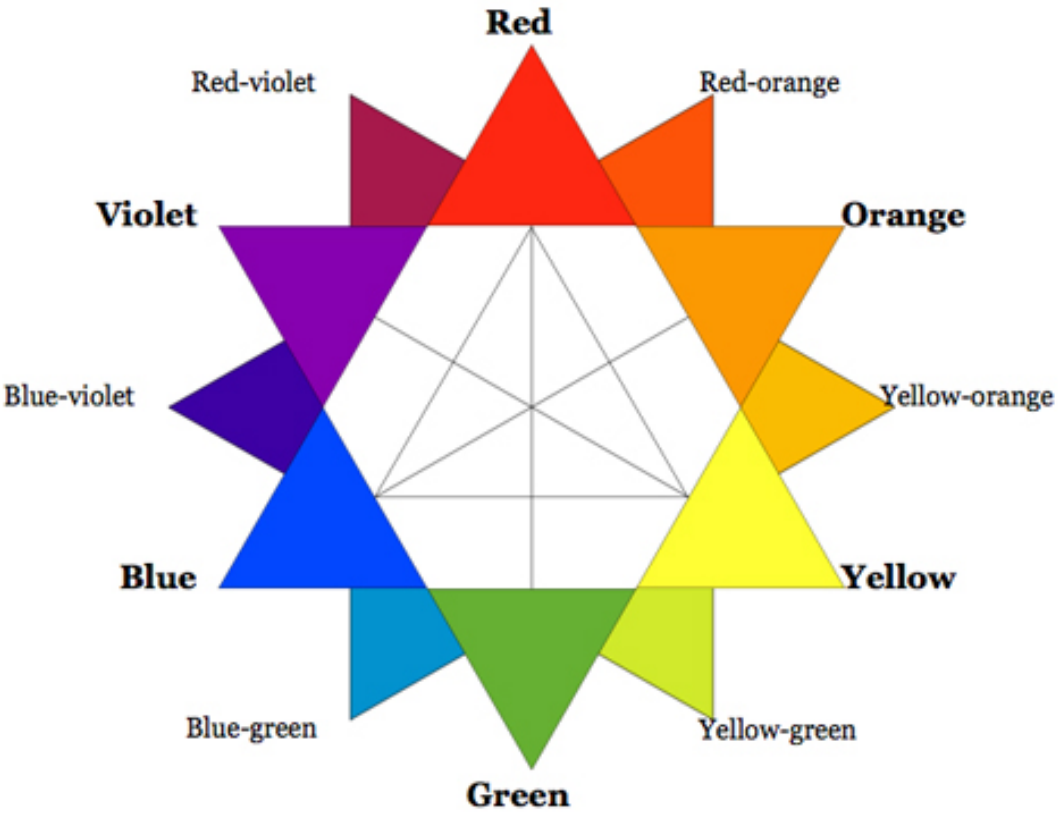
The origins of colour theory lead back to the 17th century, when Isaac Newton conducted multiple experiments with sunlight passing through a triangular prism. The results of the experiment revealed that light could be broken down onto separate colours, and by reversing the process he proved that light is the source of all colour (Mollica 2013). Picture 9 represents the process of the experiment which Newton conducted.

2.7.2 Psychology of Colour

There have been various attempts to translate colours onto definitive human emotions, especially among large companies and corporations in pursuit of selling their brand to larger audiences. However, some specialists mark those attempts as less than promising, since most people react to colour based on their past experiences and knowledge (Ciotti 2014).

Throughout the human history, different cultures have put different meanings onto colours that represent certain parts of their heritage or current reality (Chapman 2010). The perception may vary among different social groups, so trying to appeal to one

hundred percent of your potential target group through colour is a puzzle that as of yet has not been solved.



PICTURE 10. Colour groups (Chapman 2010).

3 INFOGRAPHICS AND DATA VISUALIZATION

3.1 Infographics

> When a graph is made, quantitative and categorical information is encoded by a display method. Then the information is visually decoded. This visual perception is a vital link. No matter how clever the choice of the information, and no matter how technologically impressive the encoding, a visualization fails if the decoding fails. Some display methods lead to efficient, accurate decoding, and others lead to inefficient, inaccurate decoding. It is only through scientific study of visual perception that informed judgments can be made about display methods.
>
> **William S. Cleveland, The Elements of Graphing Data, Hobart Press, 1994, p.1**

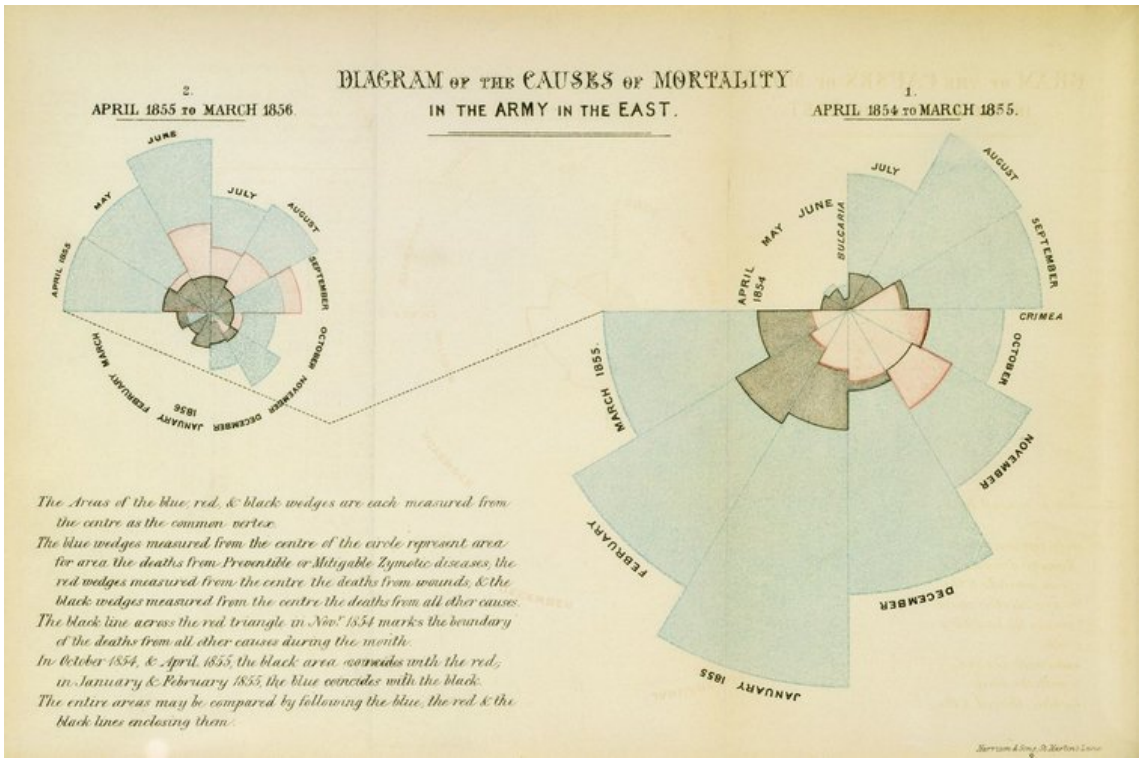
Infographic, or "information graphic", is a design piece that uses visual cues to communicate information (Lankow, Ritchie and Crooks 2012). In his book, The Visual Display of Quantitative Information (1983), Edward Tufte, a pioneering statistician and professor lists a series of factors that an infographic, or "graphical display" as referenced in the book, must contain:

Graphical display should:

- show the data
- induce the viewer to think about the substance rather than about methodology, graphic design, the technology of graphic production, or something else
- avoid distorting what the data has to say
- present many numbers in a small space
- make large data sets coherent
- encourage the eye to compare different pieces of data
- reveal the data at several levels of detail, from a broad overview to the fine structure
- serve a reasonably clear purpose: description, exploration, tabulation, or decoration
- be closely integrated with the statistical and verbal descriptions of a data set.

Although in a grander scheme, the following rules listed by Tufte are indeed applicable to a modern standard of an infographic, I consider design an important part of the piece. Of course, the data is the main point of the display, yet a viewer and the data itself can both benefit from a thoughtful and up-to-date design. However, from all the perspectives, whether you are a designer or a scientist, a clear design should always outweigh the aesthetics. Clarity is the pivotal aspect of great design.

Infographics aren't a new way of visualizing information: as Jason Lankow, Josh Ritchie and Ross Crooks pointed out in their book "Infographics: The Power of Visual Storytelling" (2012), there are numerous examples of efficient usage of infographics in the past. Picture 11, for instance, showcases an infographic created by Florence Nightingale (1857) which illustrates the comparison of causes of mortality for British soldiers in the Crimean War.



PICTURE 11. Florence Nightingale's infographic (1857).

As Tufte (The Visual Display of Quantitative Information, 1983) himself proclaimed: "Graphics reveal data. Indeed, graphics can be more precise and revealing than conventional statistical computations.". To find a great example of an infographic

implemented in the everyday life, one doesn't need to look far. A prime example is as "simple" as the metro map.

PICTURE 12. Moscow metro map (Lebedev 2013).

As represented in Picture 12, the image shows the metro lines of Moscow, Russia. Metro routes are colour-coded and are represented by different lines of corresponding colours. Special signs define such destinations as stations, cross-platform transfers, special locations and etc. The infographic serves its purpose - it helps the viewer understand how to commute through the city via metro by transforming and breaking down a huge set of information into a visual display.

3.1.1 Infographics vs. Data Visualization

When talking about infographics and data, it is important to discuss analytical design. In his book "Beautiful Evidence" (2006), Edward Tufte wrote: "The fundamental principles of analytical design apply broadly, and are indifferent to language or culture or century or the technology of information display. Nearly everyone everywhere, one way or another, reasons about causality, makes comparisons, navigates through 3-space and time". In itself, analytical design is about applying certain design techniques which would initiate viewer's analysis through visual cues, information structure or copy.

Tufte (2006) describes the six principles of analytical design and data visualization as follows:

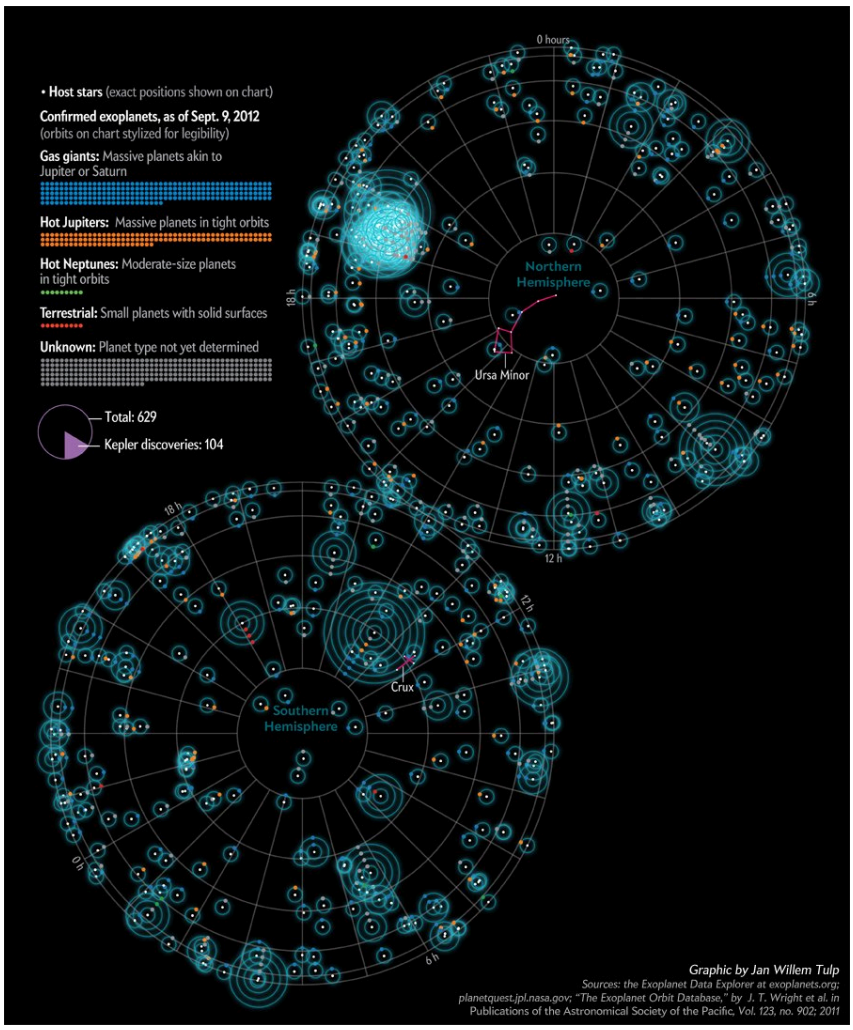
- **Comparisons** - Show comparisons, contrasts, differences.
- **Causality, Mechanism, Structure, Explanation** - Show causality, mechanism, explanation, systematic structure.
- **Multivariate Analysis** - Show multivariate data; show more than 1 or 2 variables.
- **Integration of Evidence** - Completely integrate words, numbers, images, diagrams (i.e. "proof" for the presented data).
- **Documentation** - Thoroughly describe the evidence. Provide a detailed title, indicate the authors and sponsors, document the data sources, show complete measurement scales, point out relevant issues.
- **Content Counts Most of All** - Analytical presentations ultimately stand or fall depending on the quality, relevance and integrity of their content.

Clearly, Tufte is proclaiming the importance of data sources and evidence when it comes to representing the data. Of course, no matter the complexity of the data set, those are the basic guidelines that anyone working with data should follow. But, when it comes to infographics, I believe that this medium is much more scalable and flexible than just plain documentation and integration of additional numbers and words.

That's when the difference between data visualization and infographics shows – infographics are merely a short representation of vast information, events and numbers. Due to their directness, infographics are capable to capture the viewer's attention through easy-to-read visuals, thus conveying more information at once. This way, even pages of data visualization itself can be translated onto just one page – infographics are designed to condense information.

Moreover, in scientific fields, infographics can provide complex information not only in a condensed way, but in a more simplified manner for the non-specialist audience (Picture 13), and as Jen Christiansen, art director of information graphics at Scientific American, states: "Graphics can often communicate scientific concepts more efficiently than words, for any audience. Visuals that are developed for a science savvy but non-specialist audience, like this [one below], can help make scientific findings accessible to broader audiences. By removing barriers (such as technical jargon), and providing context (in this case, the two constellations), the information is presented in an immediately intuitive and engaging manner" (Jackson 2014).

Overall, infographics serve as a condensed version of the vast data sets (which mainly features highlights, interesting or accessible facts or the main point of data) versus full representation of all data points through data visualization.



PICTURE 13. Exoplanet infographic featured in Scientific American (Tulp 2012)

3.2 Storytelling in Data

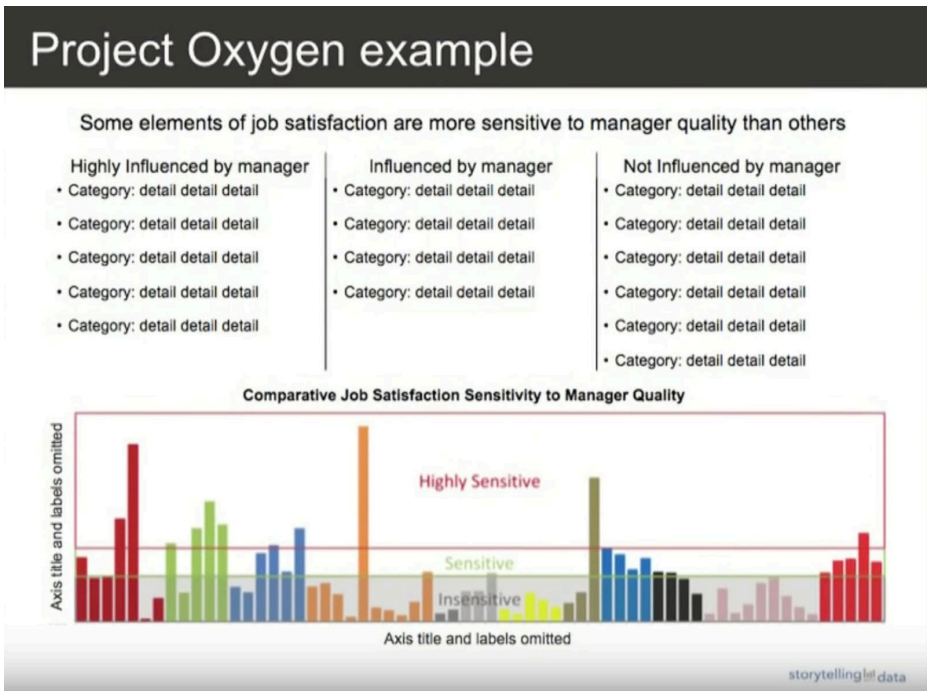
To an amateur, it might seem unnecessary and redundant to attempt to transform the data into something that is beyond just numerical properties and images. However, just like with every visual media, the context in data visualization is as important as the quality of the graphic representation. Storytelling in data refers to providing background for the data sets and painting a narrative, which can add significant value to the data, and, essentially, become a crucial part in resonating the message with the audience (Nussbaumer Knaflic 2015).

No matter what level of the complexity is, storytelling can help navigate the audience through the data piece, serving as guide on one's journey across the information field. Moreover, storytelling is a powerful tool to communicate the contents of the data to a mixed audience, for instance meaning that the data would be interpreted in a familiar

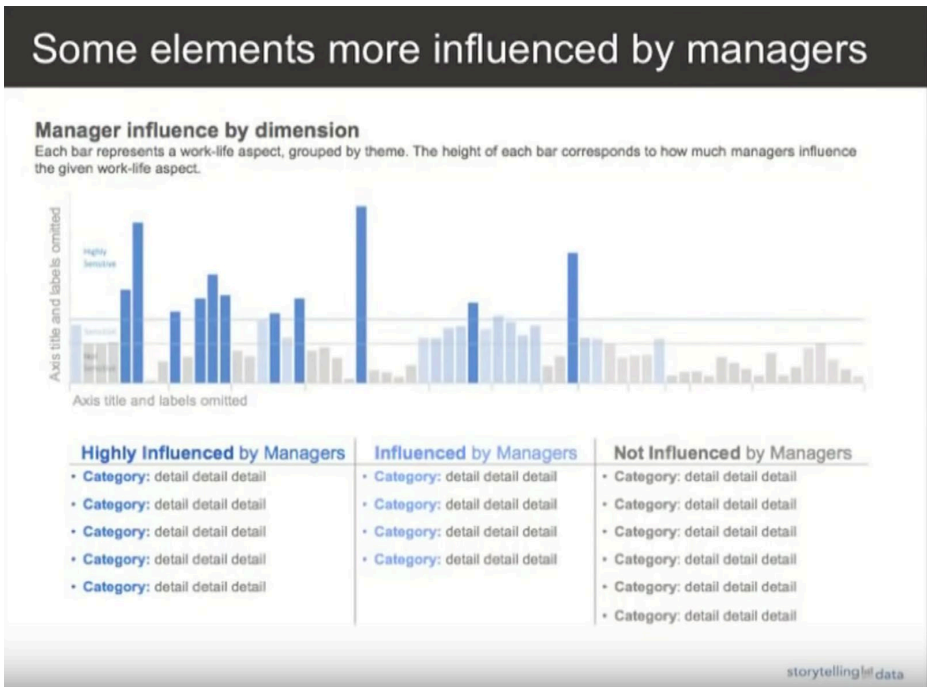
manner across groups of people with different economic and cultural backgrounds (Nussbaumer Knaflic 2015).

From a design perspective, storytelling is crucial. In every design work, context plays a central part in creating the foundation of the piece: why is this data important? Why should this aspect be a focus? What is the purpose of this design choice? In most cases when dealing with infographics, a designer is the one responsible to solve this challenge, alongside the data analysts.

When it comes to storytelling, some of the design principles are tightly connected with "plot" cues: for example, colour can be used strategically depending on the given context and point of view (Nussbaumer Knaflic 2015). In the example presented by Nussbaumer Knaflic at Talks at Google, the graph represents the genericized job satisfaction survey results for metrics related to manager quality. As she explained, the initial graph (Picture 14) had to be redesigned (Picture 15) to ensure that the audience's attention is drawn to the properties that prove a stated point ("Some elements of job satisfaction are more sensitive to manager quality that others") and, at the same time, describe the original story.



PICTURE 14. Original graph (Nussbaumer Knaflic 2015).



PICTURE 15. Redesigned graph (Nussbaumer Knaflic 2015).

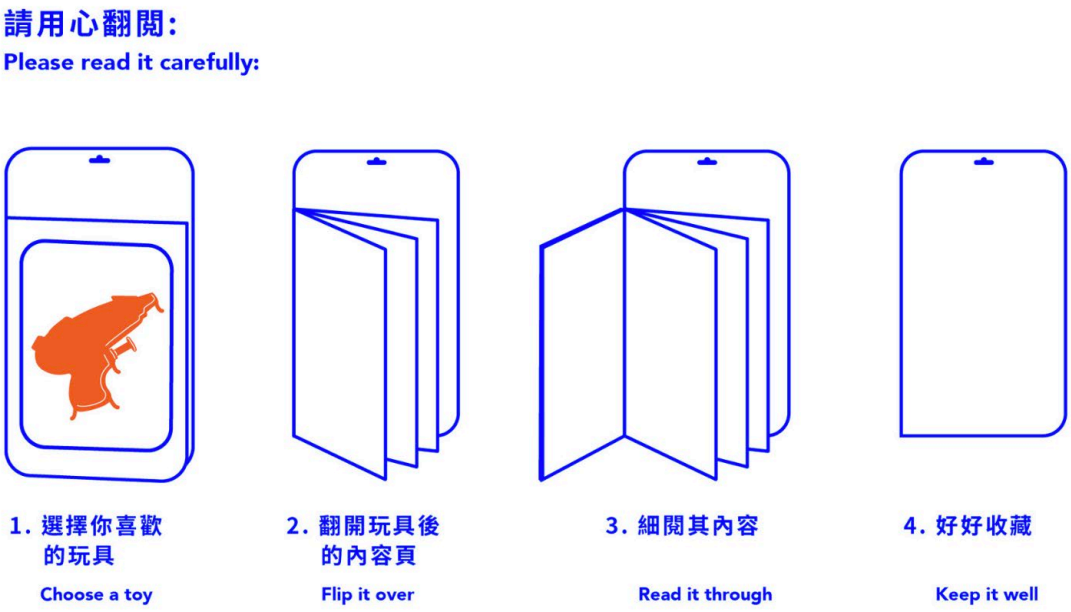
As pictured in Pictures 14 and 15, the content of graphs is essentially the same, however the strategic use of colour makes a huge difference – instead of applying colour categories that are not relevant to the context, 3 colours have been implemented to reflect the levels of influence, and, simultaneously, bring attention to the job satisfaction factors that were in question.

3.3 Illustration as a design feature

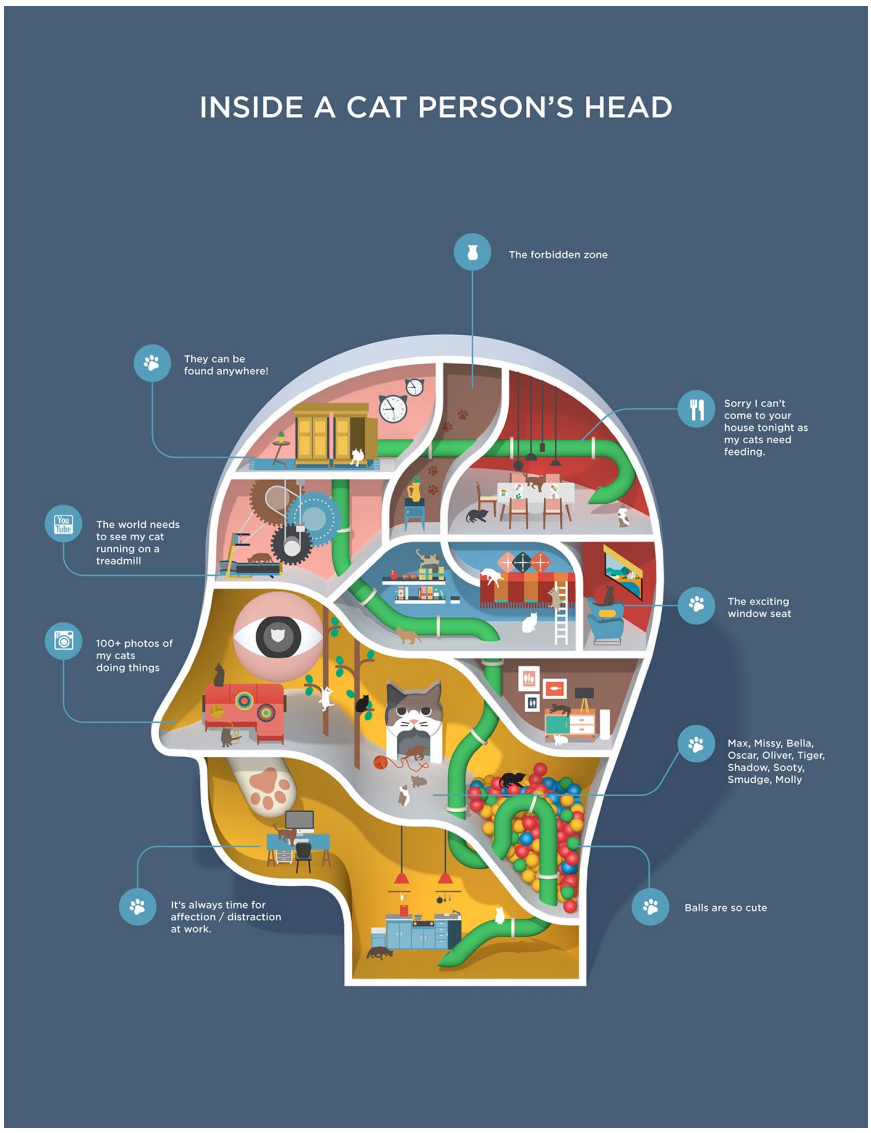
It seems that one of the recent trends in the design field is the heavy implementation of illustration in marketing materials, print and overall company branding. Massive brands like Google and Facebook are actively using illustrations in their blogs and in the case of Facebook, illustrations are now also a part of the UI design, appearing as banners and icons in different parts of the interface (Picture 16). With such global companies being on board with the design trend, it is obvious that recently illustration has become one of the most prominent brand features for many brands.

PICTURE 16. Facebook's thematical illustration (Giovani Flores 2018)

When it comes to infographics illustrations play an important role as another way to translate the information to the viewer. Illustrations are entertaining and accessible, they can be implemented in various ways just as design elements (Picture 17) or the foundation for the canvas (Picture 18).



PICTURE 17. Instructional infographic (Hiu 2018).



PICTURE 18. Illustrative infographic (Zhang 2016).

3.4 Data and Marketing

Although "data and marketing" can be interpreted as big data in relationship to building up the company's marketing strategy, my aim is to briefly mention that data as a piece of content can become a selling point. In marketing, a unique selling point (also referred to as unique selling proposition, or USP) is essentially a quality that differentiates one's business or strategy from the competitors.

While, of course, organizations use data to their competitive advantage and the ability to compare one company's performance to the other's in the long run, access to the data that one's service or software collects can leverage a numerous amount of benefits. Take for example the case study company of this thesis, Nosto: their product is designed

for omnichannel commerce, which allows retailers to personalize the customer's on-site and off-site experience by collecting the behavioural data and analysing it via the AI-powered technology (Nosto 2018). One of Nosto's patents is related to the way the product data from the retailer's store (e.g. product price, description, availability, etc.) is gathered. This way, Nosto is also able to represent the collected data and tell a story of how users behave and engage with the shopping-related activities (Nosto 2018).

So, what exactly is unique about showcasing data? Firstly, one is able to tell a story which is accompanied by concrete proof in the form of available data. Transforming the values into a narrative is a great technique to involve readers and make the content more accessible, as mentioned previously in Section 3.2, while remaining valid.

Secondly, providing insights is an amazing marketing tool which allows the marketer to attract possible leads to the sales funnel, especially if those insights are presented in the form of visualization or infographics. Data is important, of course, but visuals are more memorable.

4 DATA VISUALIZATION DESIGN PROCESS

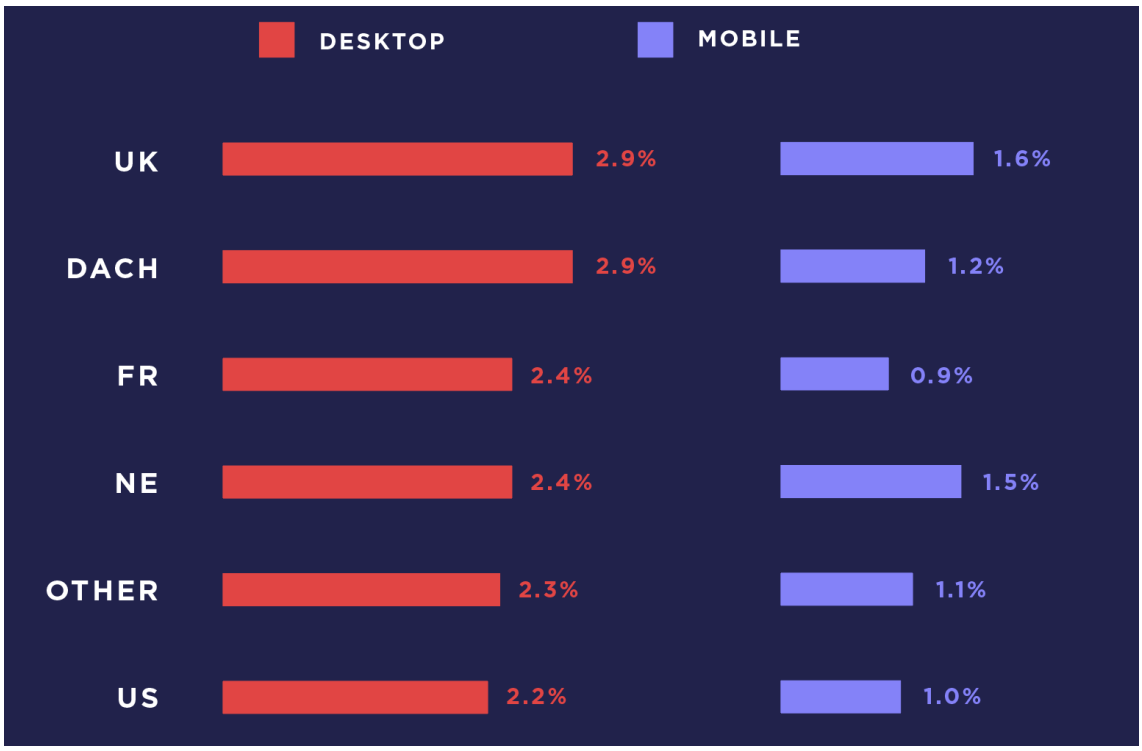
To further identify the differences between the process of infographic creation and data visualization and prove the importance of differentiation between the two, I've gathered some examples from the project that I've done for Nosto during the writing of this thesis (the company introduction is presented in Chapter 5). Differentiation is important, but, however, there are certain elements of the process that are common in both cases.

One of the bigger data reports that I've worked on for Nosto revolves around the fashion vertical in e-commerce and various statistics that are related to the topic. The report is heavily reliant on sharp data and accompanying charts, which are the selling point of the whole marketing campaign. Given the topic of the report, the style of it is very modern, minimalistic and edgy, meaning that the "lightness" of infographics and playful illustrations wouldn't really fit the overall look. For the sake of consistency, I will only touch on the design process of the graphs, and not on the design process of the overall look and feel of the report.

Table 1 showcases the data representing the conversion rate of online shoppers. This is a simple example of a data sample, which is easily visualized through the creation of bar charts (Picture 19).

MEDIAN of Conversion	*device*	
Region	desktop	mobile_phone
UK	2.9%	1.6%
DACH	2.9%	1.2%
FR	2.4%	0.9%
NE	2.4%	1.5%

TABLE 1. Sample data

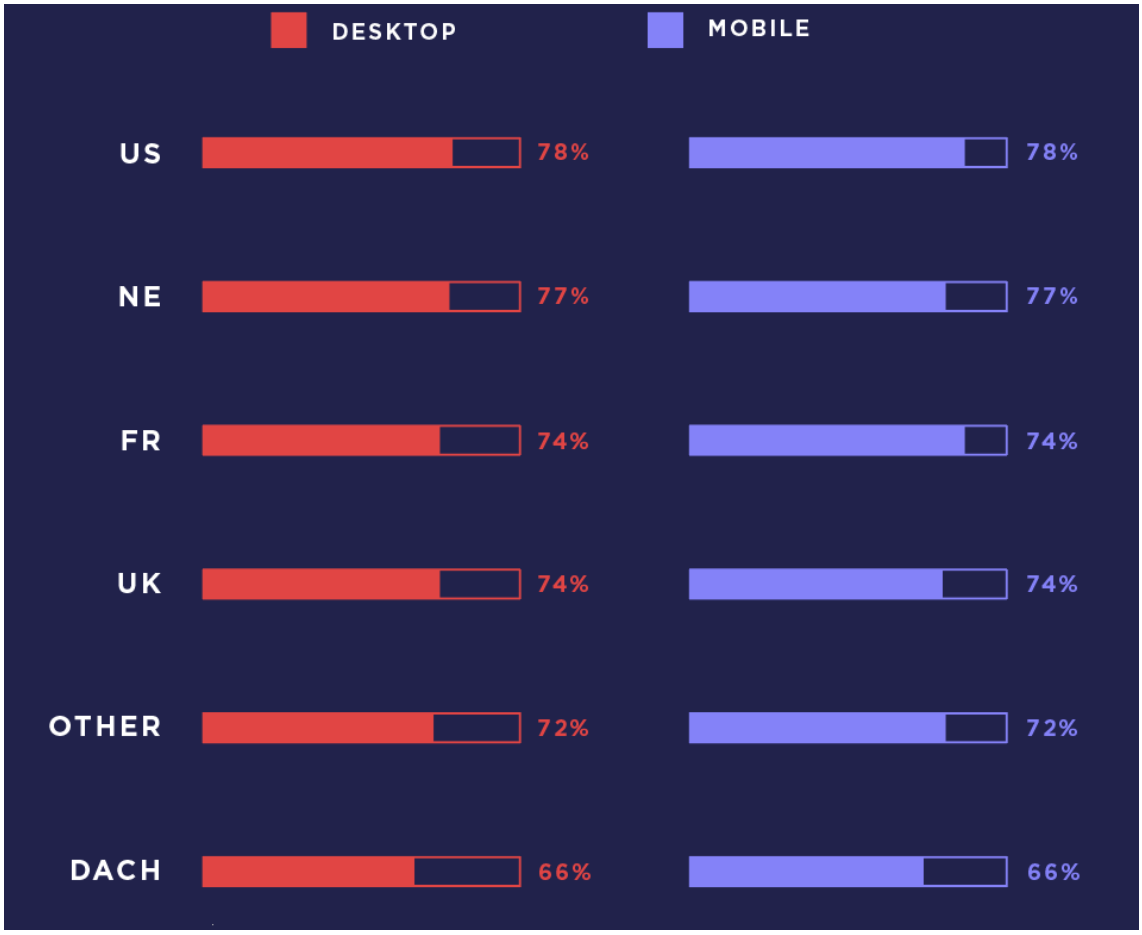


PICTURE 19. Conversion rate data visualized (Gushcheva 2019).

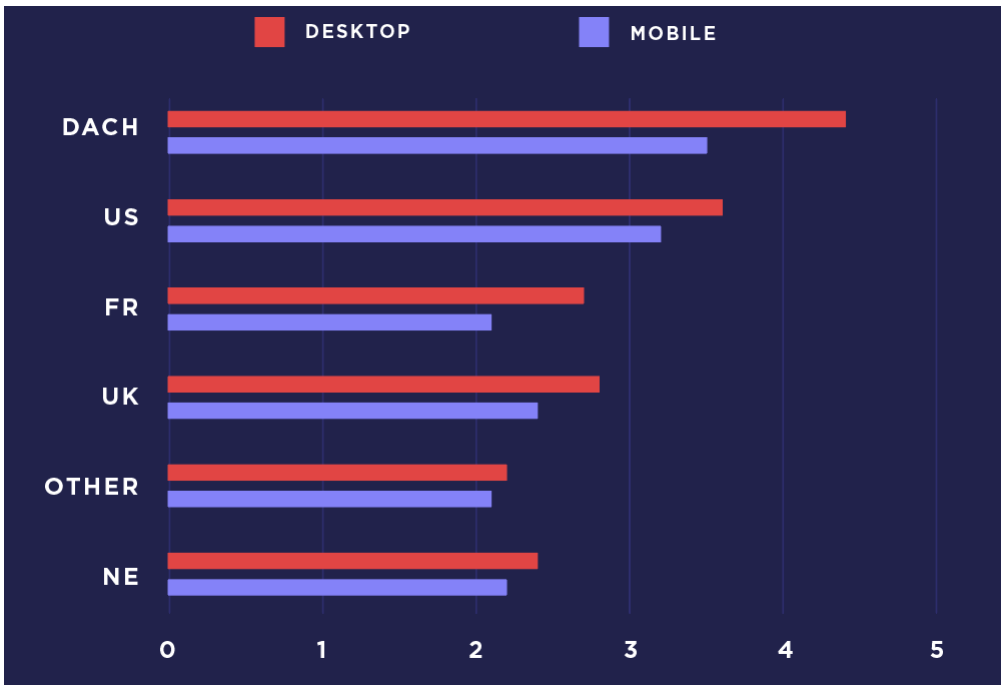
Conversion rate is one of the many metrics that were analysed in that project, others that were included are traffic share, average basket size, average order value, cart abandonment rate, time spent per visit, and revenue per visit. With so many statistics, it is important to stay consistent throughout the report so that the person interacting with it can read the charts much easier. One of the easiest ways to do so is use the same colours for same properties, for example in this case desktop devices are coded as red, and mobile devices are coded as vibrant purple. This way, throughout the many pages of the report, the reader won't have to pay attention to the legends of the charts, because they already know which colour stands for which property (Picture18, Picture 19, Picture 20).

Common elements of a bar chart are the legend of the chart (i.e. a section in the graph area that identifies the properties of the chart), labels, Y and X axis lines, plot lines and data points. However, bar charts are extremely flexible when it comes to axis and plot lines, for instance. In Picture 19 and Picture 20, no lines are used due to the layout of the chart and the fact that labels already represent the percentage numbers in question, and no additional elements are required for interpretation of not so complex data. Picture 21, on the other hand, features the X axis line and plot lines: the data points are

placed in a single column view, and plot lines help the viewer spot the differences with ease.



PICTURE 20. Percentage bar chart (Gushcheva 2019).

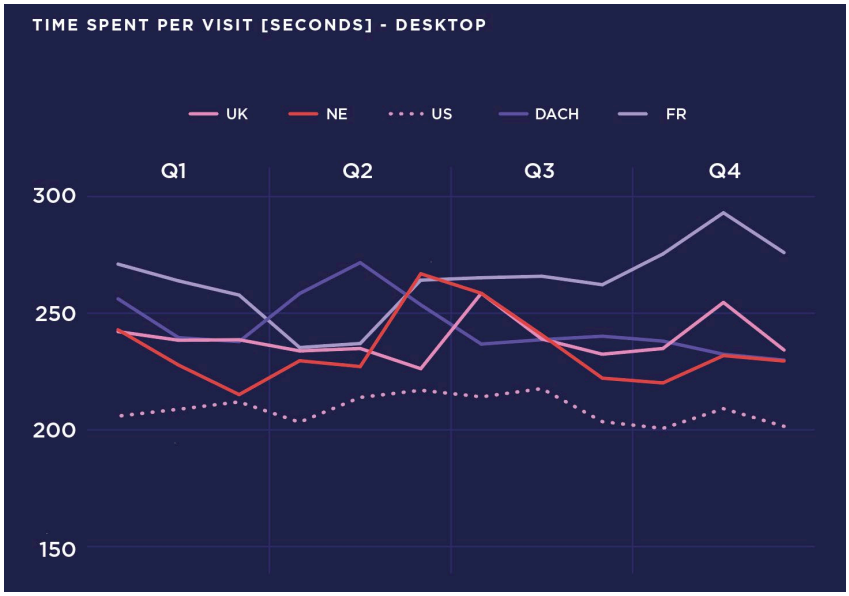


PICTURE 21. Bar chart (Gushcheva 2019).

Although bar charts can be tweaked and transformed quite easily, there are certain types of charts that require significantly more work and attention. Picture 22 represents a line chart, which features a greatly increased amount of properties compared to the bar charts that were presented earlier. Line graphs are used to represent a progression thus this makes it the best option to showcase vast amounts of information and change through time (Table 2).

	Visit time (sec)	Visit time (sec)	Visit time (sec)	Visit time (sec)	Visit time (sec)
Month	**NE**	**US**	**UK**	**DACH**	**FR**
1	242.91	205.90	242.12	256.17	271.05
2	227.78	208.86	238.42	239.53	263.87
3	215.13	211.98	238.64	237.85	257.79
4	229.63	203.29	233.84	258.45	235.30
5	227.14	213.93	234.89	271.69	237.03
6	266.91	216.99	226.22	253.62	264.19
7	258.56	214.17	258.56	236.78	265.21
8	240.71	217.68	238.94	238.67	265.86
9	222.17	203.52	232.43	240.15	262.23
10	220.13	200.65	234.88	238.06	275.41
11	231.84	209.08	254.63	232.42	293.06
12	229.52	201.52	234.24	229.92	276.00

TABLE 2. Line chart data



PICTURE 22. Line chart (Gushcheva 2019).

So why are line charts a better option in this case? Firstly, the data is presented in a form of a 12-month progression (defined by quarters – marked as “Q1, “Q2”, “Q3” and “Q4”) of 5 different properties. The closest analogy to the visualization is a *timeline* of events. Secondly, in terms of design this is the most optimal visual representation for the data – each of the 5 properties have 12 different value points, which would mean that a bar chart, for instance, would either consist of 100 different value bars, or it would have to be split into 5 separate graphs, which is not the most optimal way to understand the overall context of the data.

Due to the complexity of the data (which mostly comes from the amount of data value points), it is necessary that the chart includes such elements as plotlines and labels. If these were missing, the line graphs in particular would be extremely hard to read, as the lines would have no clear direction or relative value. Moreover, as line charts feature the same properties throughout the entire report, it’s important to correctly label each one.

5 INFOGRAPHIC DESIGN PROJECT

5.1 Introduction and planning

In August 2018 I started my work as a Junior Designer at an IT-company called Nosto Solutions. Nosto provides a personalization solution tool to the e-commerce clientele, and as of September 2018 over 2500 merchants were implementing Nosto's services onto their online stores. Just before getting hired, I found out that the marketing department would love to create more data-related pieces into their marketing materials, and since I have the experience of previously working with strict data visualization projects, I knew that I would be able to contribute.

After a couple of months at the new workplace, an exciting project had been handed over to me: the team started preparations for a new content piece which would revolve around Black Friday and Cyber Monday, a 4-day period of heavy sales following Thanksgiving that started in the United States but is nowadays widely practiced around the globe. The project scope would be an infographic based on the data collected during the stated period.

The project itself seemed challenging from the beginning: the timeline was strict due to the fact that the release of the data piece would have to be immediate, so everyone involved in the project would have to manage their time perfectly in order to deliver on their tasks efficiently. Luckily from a designer's perspective it is possible to plan certain aspects ahead - for instance, knowing the topic of the infographic allowed me to understand which assets would be needed before the initial release.

To prepare for the project, there were several steps that had to be taken: first of all, the company branding had to be thoroughly studied. Secondly, the data pull for year 2017 with similar properties had to be reviewed in order to understand the context and chart forms which were to be produced. And, finally, continuous collaboration with the marketing team and analytics team took place throughout the duration of the project, and especially during the preparation weeks.

The key points of the project are as follows:

- **Campaign description and objectives**

  Producing a content piece for Black Friday/Cyber Monday that will include an infographic. The fashion infographic is based on Nosto's own customer data. Focusing on Fashion online retailers' sales during Black Friday and Cyber Monday, the results will be analysed from both 2017 and 2018 and compared in terms of Desktop values and Mobile values.

- **The goal of this campaign**

  Generate PR globally.

- **Content Focus**

  Nosto customers, Ecommerce, Fashion.

- **Target**

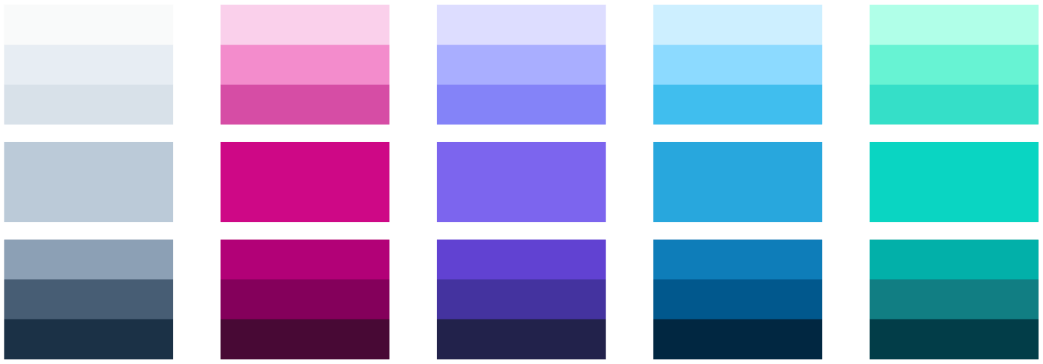
  Top tier publications companies.

5.2 Company Branding

As stated previously, in order to create one of the most important content pieces of the year from a marketing and PR point of view, the visual contents had to be up to par with the company's standards and branding guidelines. I got to research and work on a multitude of projects for the Nosto marketing team prior to creating content for this case, and for the project's context matter it is important to address some of the essential branding guidelines.

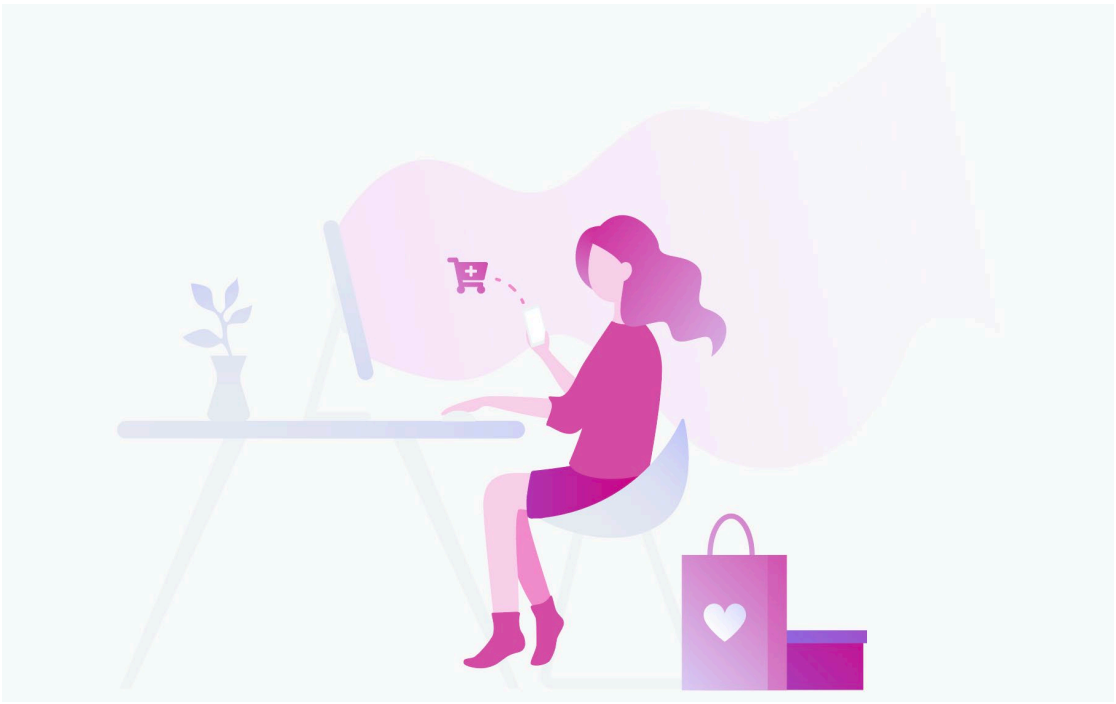
The Nosto company has a defined colour palette which was created for the usage in marketing-specific materials and assets. As seen in Picture 23, the middle row indicates primary colours, the rows above and below indicate additional tones. For this project, as well as the rest of the marketing projects which were released before, it is essential to

resonate with the brand stylistically and conceptually, so the colours represented would be the foundation for the infographic design.



PICTURE 23. Nosto company colours (Gushcheva 2018).

Nosto's branding was previously relying heavily on the usage of stock images and photography, but it was decided to initiate the shift from photos to custom-created illustrations. As mentioned previously, custom illustrations allow great creative freedom and their implementation can significantly boost brand recognition and credibility when it comes to external channels (Gosling 2018).



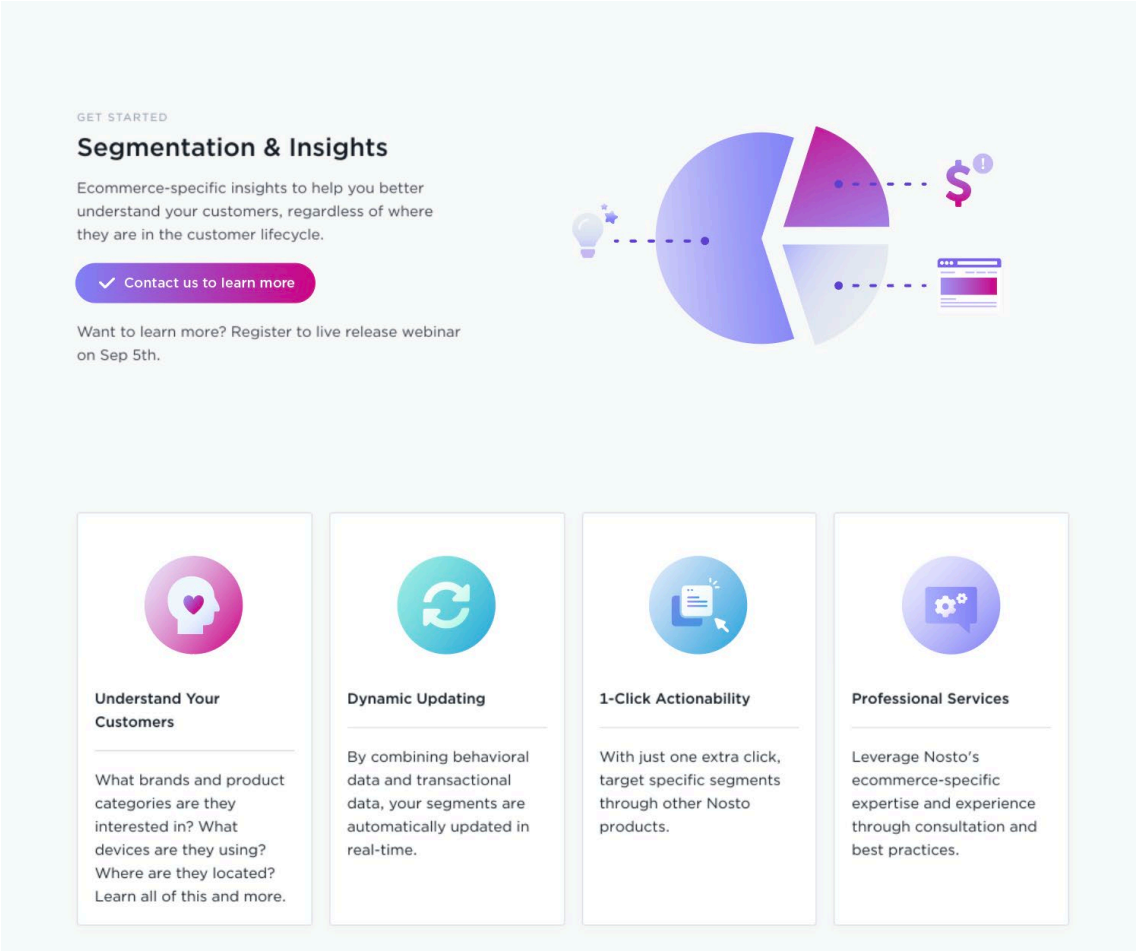
PICTURE 24. Example of character illustration done for Nosto (Gushcheva 2018).

Picture 24 represents a custom illustration featuring a character created for Nosto's product as an interface element. As seen in the image, the primary colours are used to a great extent, and, moreover, gradients are implemented in order to add depth and resonate with a common graphic design trend. Several product illustrations were created, which initially kicked-off a stylistic transition of the company branding to more vector-based graphics.

An important part of any company's branding is the font system. Nosto primarily uses two fonts across all channels – Archer in italic for titles, highlights, headings and buttons; and Gotham for body text and UI text. However, it has been noted by the design team that Archer is an extremely hard font to implement – its performance in terms of readability is considerably worse than that of Gotham. Personally, I think that this type of serif font isn't good for highlighting desired text, and compared to other serif fonts that are available, it isn't as visually prominent either (Picture 25).

PICTURE 25. Nosto font system (Gushcheva 2018).

Picture 26 demonstrates a UI mockup for the company's product. The illustrations which were created for the specified page are in line with the target vector style, the font system is used correctly with one exception: for the purpose of improving readability, I changed the serif font Archer to a sans serif Gotham, as seen in the gradient button.



PICTURE 26. UI mockup (Gushcheva 2018).

Even though current branding guidelines are extremely scalable due to their relative simplicity, all of the aforementioned rules have been followed during the infographic creation process.

5.3 Design Process

5.3.1 First Draft

Multiple meetings were held, and it was decided to kick off the project with benchmarking and designing the first draft of the infographic which would serve as a foundation for when the data, which is supposed to be used for the visualization, is available. For that, it essential to understand the scope of data, design possibilities, time frame and use cases. In terms of defining the scope of data, the key metrics of interest were outlined by field marketers at one of the project meetings (Table 3).

Nosto Fashion customer data (US, UK, DACH, FR, NE)	

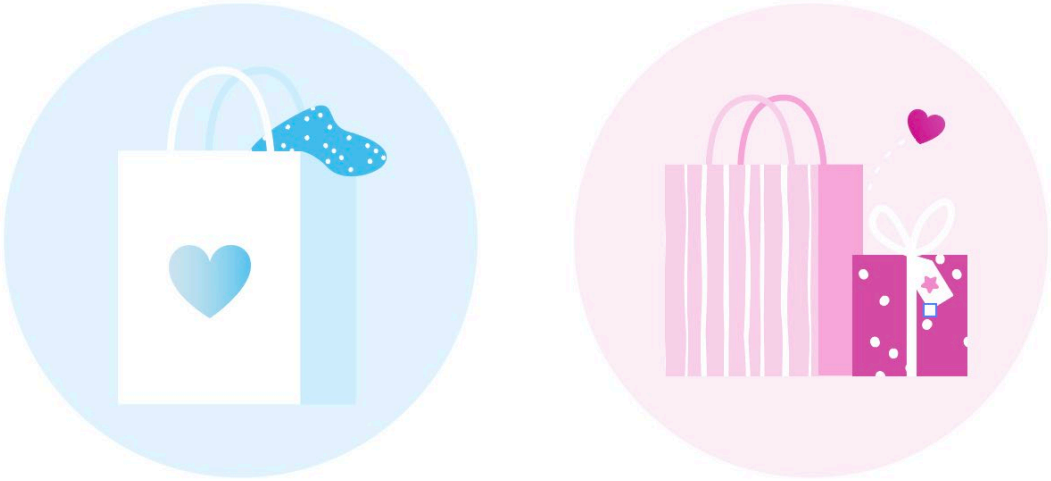
2018 only:
• Who's the bigger player: Black Friday or Cyber Monday?
• Some fun facts around personalization:
  ○ The most clicked product recommended by Nosto was X clicked Y times over the weekend;
  ○ The most clicked product recommended by Nosto in top 10 range were each clicked over x million times.
	2018 - 2017 year over year:
	• We have more customers than last year so it's difficult to compare 2017 and 2018 with absolute numbers. We can compare average/median numbers and give an absolute number for 2018;
	• Sales;
	• Traffic;
	• Sales, traffic and CR by device (desktop versus mobile).

TABLE 3. First data scope plan

The plan allowed me to realize the approximate amount of data points (charts or graphics) that were planned to be included. I then decided to create a sectioned layout – each block would represent its own context and idea, yet all of the sections would thematically be tied together. The colours that were chosen are high in saturation and contrast, being in line with Nosto's official branding guidelines (Picture 27).

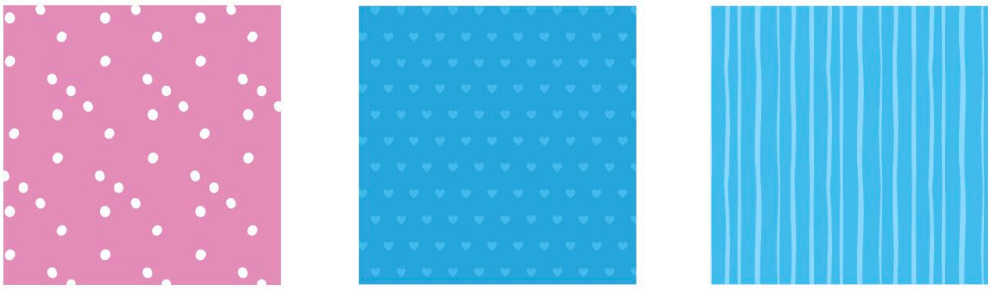
PICTURE 27. Primary colour scheme (Gushcheva 2018).

As a next step, I created multiple graphic assets and icons that could be incorporated into the infographic. Some of those elements were pre-designed charts that were used in previous marketing materials, but stylistically they were not in-line with the newly created assets.



PICTURE 28. Graphic assets (Gushcheva 2018).

As seen in Picture 28, the created elements are of illustrative nature. The overall visual direction had started to form – playful icons and illustrations, vibrant colours and patterns - all of which would be especially appropriate during the holiday season. The Black Friday week is well-known for its intense gift shopping prior to the Christmas season, so the gift-themed elements play an important part in the infographic's visual delivery. Of course, just like with any design project, I think it is important for the designer to incorporate some personal touch into the work. In my case, I created multiple patterns which would be used across different assets (Picture 29). Custom elements like patterns, shapes and gradients can make the design appear special and unique.



Picture 29. Custom patterns (Gushcheva 2018).

Placeholders are a great tool to estimate the design and spacing possibilities, and prior to the design work, it was known that the main channel where the infographic would be featured is the company website. With that in mind, it was decided to go with the vertical format rather than horizontal for good responsiveness and mobile-friendly view.

5.3.2 Working with Data

The data which is gathered throughout the given period is first iterated by the data analyst, and later on is passed on to the marketing team. Project work is an iterative process, so some of the initial ideas were scrapped and new ones were introduced. First of all, the scope of the project had been adjusted for me to have more time to work on the infographic, which allowed me to invest my time into visualizing information properly. Secondly, I had the opportunity to A/B test the versions of the charts and visuals to understand which visualization methods work best.

A common theme in this project is comparison rather than sole fact-stating. For example, some of the featured data is numbers on sales and traffic throughout the same time frame from years 2017 and 2018. What would the viewer be interested in seeing? The answer to that is: how is one *different* from the other? What has changed or remained the same? The exact given data is:

- Retailers saw 28.8% more sales on Black Friday than on Cyber Monday.
- Retailers saw 13% more traffic on Black Friday than on Cyber Monday.
- There was a 35.8% increase in sales between 2017 and 2018.
- There was a 15.2% increase in site visitors between 2017 and 2018.

While working on my first draft, I worked on some simple bar charts which I could later repurpose when creating new ones. However, while working on the mentioned metrics, the charts were clearly lacking the highlight, or the main point of why this data is shown. In Picture 30, the two versions of the same chart are presented. Both charts feature the statistic number (28.8%), a bar-type structure and the property indication. However, to understand the value difference, in the case of the example on the left a person would have to read through the stat, then look at the property and then pay

attention to the chart. This action path is shortened by immediately highlighting the key idea with a pattern (example on the right) which indicates *the more and the different,* and the dotted line also brings the attention to the right spot.

PICTURE 30. Chart comparison (Gushcheva 2018).

Even if some of the information is simple enough to be put down as text, it is still essential to keep up with the overall theme of the infographic. For instance, to mark up the dates of the Black Friday week, I decided to create small calendar icons to stylistically compliment the charts and other illustrations that are featured in the infographic, and to also make that small amount of information more engaging and interesting (Picture 31).

PICTURE 31. Calendar icons (Gushcheva 2018).

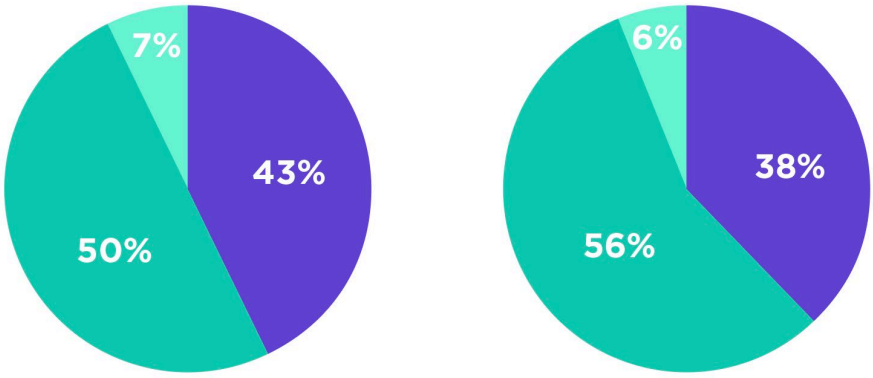
The most challenging section of the infographic is the one that showcases the device breakdown among such metrics as sales, traffic and orders between years 2017 and 2018. Clearly, once again the main point is to demonstrate the differences in numbers of stated metrics, and the challenging task is to do it in the most effective way. To study this case, let's take a look at the given data presented in Table 4:

Sales 2017 (global)	***Sales 2018 (global)***
Desktop: 43% Mobile: 50% Tablet: 7%	Desktop: 38% Mobile: 56% Tablet: 6%
Orders 2017 (global)	***Orders 2018 (global)***
Desktop: 38% Mobile: 56% Tablet: 6%	Desktop: 34% Mobile: 61% Tablet: 5%
Traffic 2017 (global)	***Traffic 2018 (global)***
Desktop: 30% Mobile: 64% Tablet: 6%	Desktop: 24% Mobile: 71% Tablet: 5%

Table 4. Infographic data sample

As shown in Table 4, for each metric there are 3 properties which are being compared. As a first thought, the marketing department was pushing the usage of pie charts in this case, however, there are multiple reasons why pie charts aren't as effective at showcasing the overtime change or progression as bar charts.

First of all, it is important to understand, what is the normal use case for pie charts. As a rule of thumb, that type of graph has been predominantly used to show the parts of a whole – of course, in the case of this project, it fits the description. However, when it comes to comparison, a viewer would have to visually focus on the angles of the chart and evaluate the differences of the angled areas (Picture 32), which requires much more concentration than simply comparing two-dimensional bar lengths. This is especially apparent when the values of the chart are not too different from each other (e.g. 6% vs. 7%).



PICTURE 32. Angles of the pie chart are harder to compare (Gushcheva 2018).

Secondly, in terms of the layout of the infographic, the solid pie charts are visually cluttered and may seem tiring for the viewer. Although there are just three properties included in one chart, the smallest section of the chart barely fits the percentage number, thus making the creation process iteration-heavy and the overall look cluttered and unprofessional. Of course, the values could be moved outside of the chart so that they don't clash with the area, but then it means that additional elements would be needed to indicate which value belongs to which area.

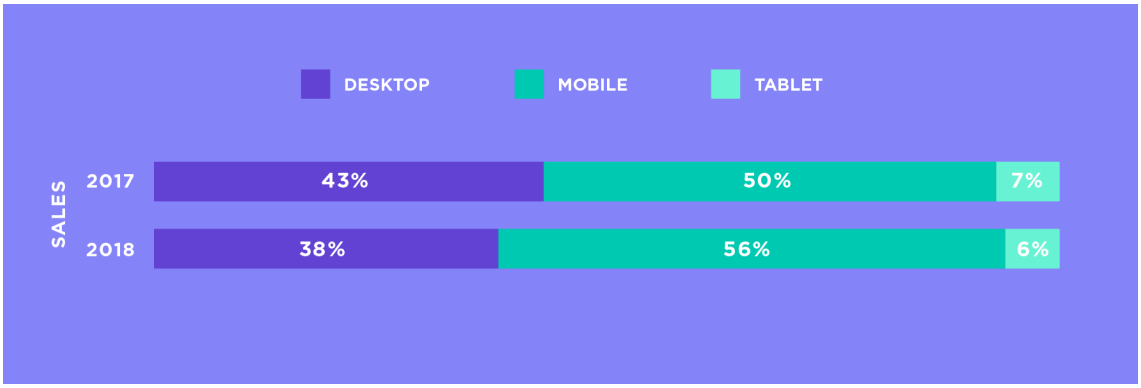
As a solution to these issues, I created stacked horizontal bar charts. Those graphs are easy to manipulate and create, they successfully demonstrate the given data and, with the right placement, they are a great tool for showcasing the differences between the property stats. Moreover, this sectioned view required higher contrast due to the bigger

property number, thus I had to move away from the monochromatic illustration style that I've implemented before.

Of course, it should be mentioned that pie charts aren't as evil as they may be brought out to be. Although I believe that pie charts are highly overused in a lot of materials, blogs and articles that I see online, a pie chart can translate information just as well as a bar chart. For instance, a customized bar chart can be represented as a progression graph – an incredibly familiar element which can be seen in web and different software applications (Picture 33).

PICTURE 33. Progression graph (Gushcheva 2018).

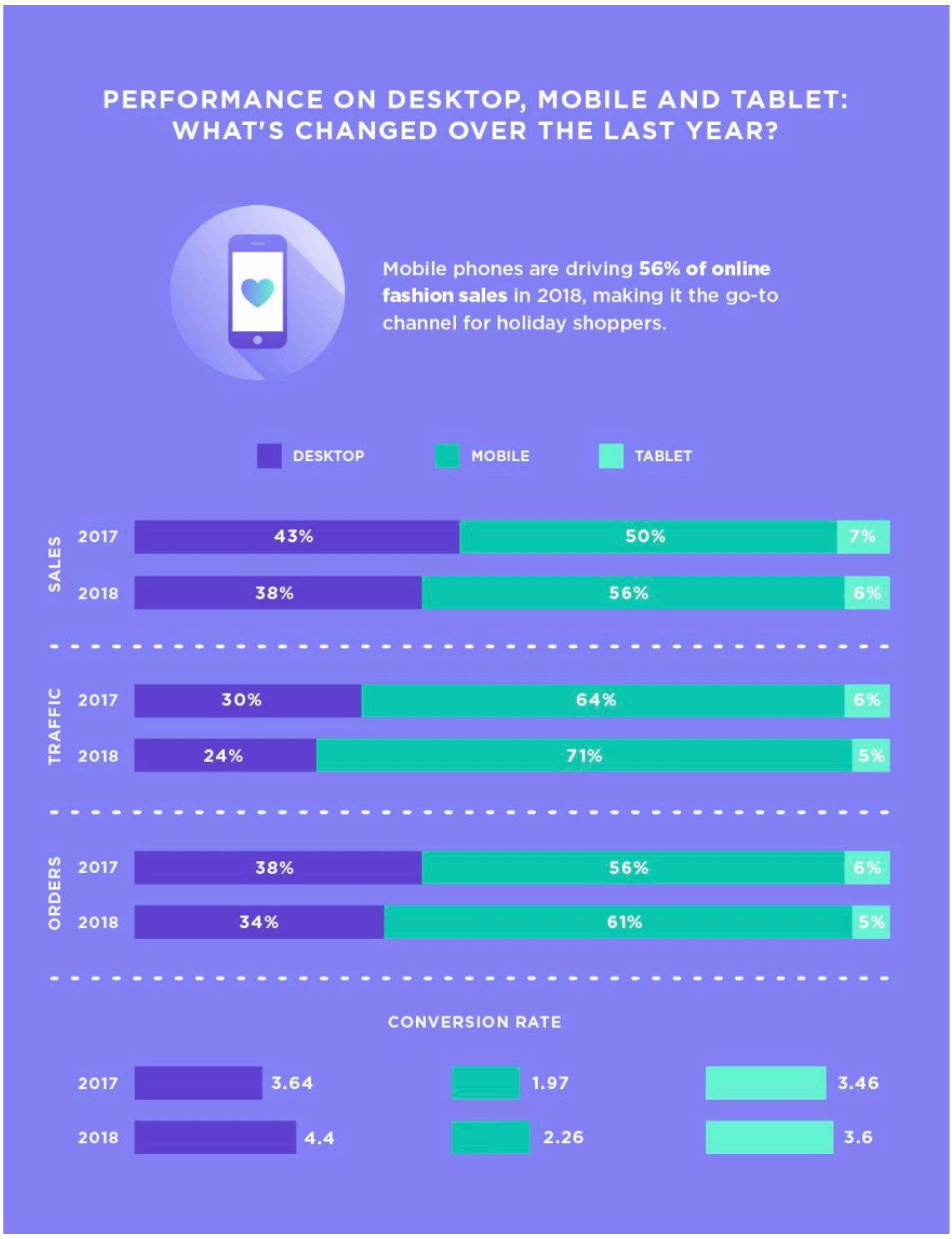
Let's get back to the bar charts. As seen in the image (Picture 34), the values that are present are only a secondary thought, because it is so easy to understand which device has been used more and when, even though the numerical differences aren't that grand (7% vs. 6% or 43% vs. 38%).



PICTURE 34. The newly created stacked bar charts (Gushcheva 2018).

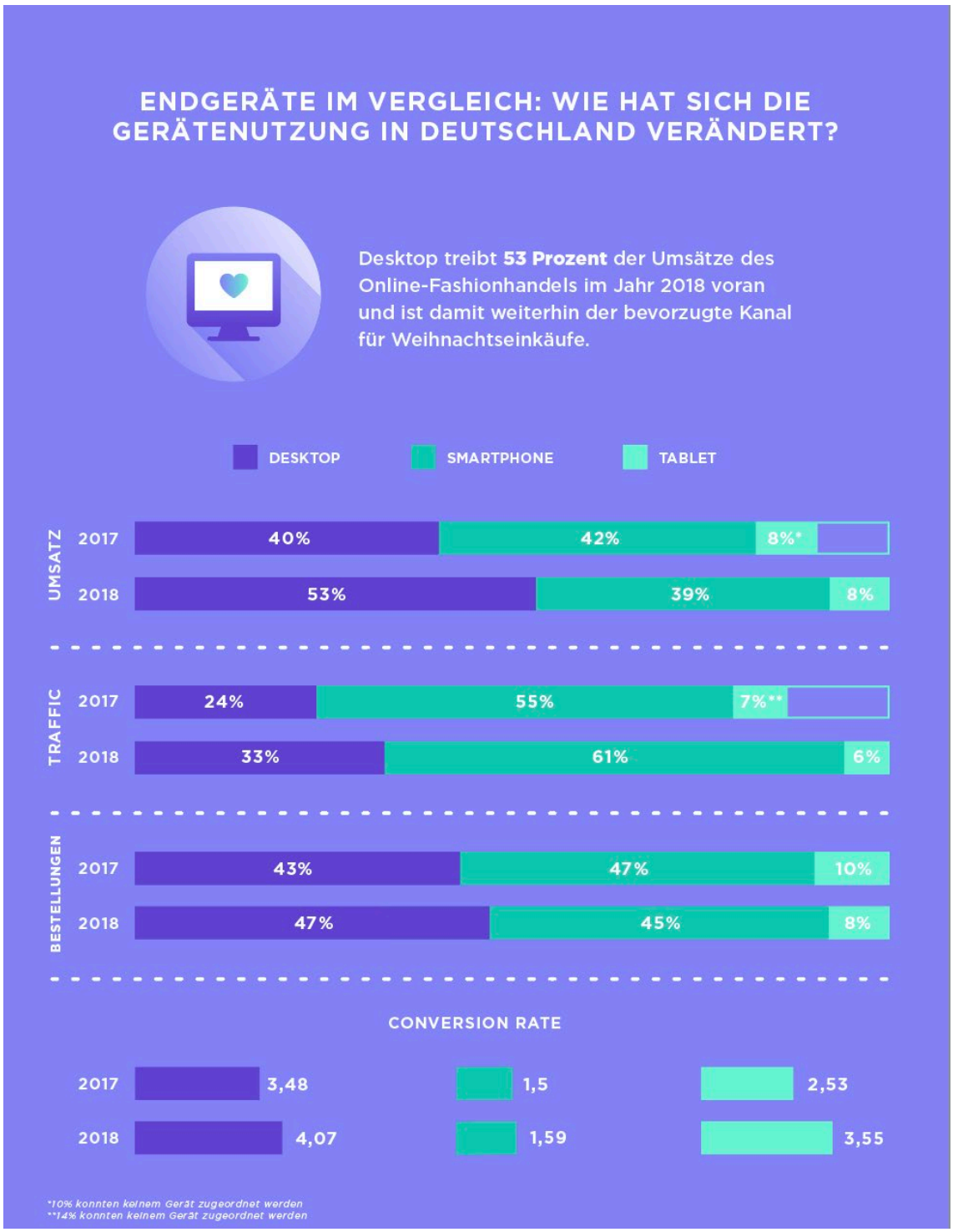
In addition to selecting stacked bar charts over pie charts, highly-contrasting colours were implemented as opposed to overall monochromatic theme for the infographic sections, as there are more that 3 properties presented. In this case, there's no need to differentiate the 2017 and 2018 metrics between each other by colour, as categorization by property (desktop, mobile, tablet) is a bigger priority, and it could appear to be way too distracting and confusing.

As a result, this comparison is represented in a clear form, which makes it easy to evaluate the numbers and comprehend what the data represents (Picture 35). Conversion rate, which is represented at the very bottom of image, follows a similar structure as the graphs above it. However, since it is a different metric, it is necessary to separate it from the sales, traffic and orders comparison charts. Here it is done by adding a new headline and using normal bar charts instead of stacked ones, since the conversion rate isn't represented as percentages of a whole.



PICTURE 35. Final comparison chart (Gushcheva 2018).

The charts are accompanied by introductory text and a small illustration which reflects the context of the introduction. As this infographic has been translated to French and German and the data was pulled for those local markets as well, the icon illustration would be different according to that copy (Picture 36). For instance, the highlight of the German market is the intense usage of desktop computers for online shopping.



PICTURE 36. Excerpt from the German infographic (Gushcheva 2018).

In Picture 36, it is also worth noting that for some metrics the property is unknown. As a solution, I created “filler” sections of the stacked bar charts seen at the end of 2017 bars, which would represent that, even though the source of that data is unknown, those missing pieces are still parts of the whole picture.

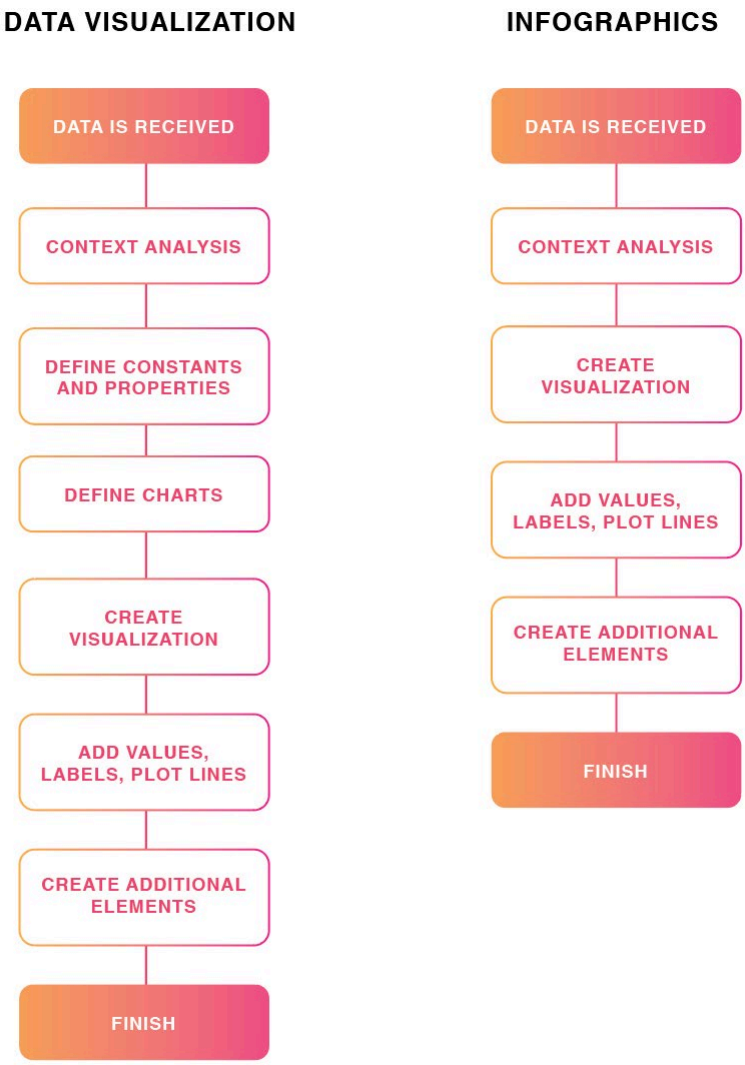
6 RESULTS AND CONCLUSION

The aim of this thesis was to define the design process when working with data, as well as to analyze the different approaches to data visualization and its different forms. As per the holiday infographic project, the knowledge of basic data visualization techniques proved to be essential. It takes practical knowledge to translate the information into a very simple visual form, such as infographic content.

As per the data report, the design process for the visualization was rather straight-forward, yet there were a lot of elements that required thorough consideration, such as the context of the graphs, basic chart structure and the design itself. This type of work demands a lot of attention from the designer: the proofreading of the data was one of the responsibilities of the project. The deliverables went through several revisions – it takes time to figure out what is the best way to showcase certain metrics. The expectations for the project were high as the marketing team expected to see a polished, well-designed report with equally well-created graphs, and, hopefully, I could deliver. The visualization spreads are presented in Appendix 1.

When work on the infographic began - after benchmarking and researching the generic examples of infographics - it was clear to me that it requires a different approach compared to graph creation. Infographics indeed serve a different purpose: from a visual perspective they're more illustrative, portray a shorter scope of data, and, to an extent, they're more entertaining and accessible. However, the other important difference between infographics and data visualization is the presence of discipline in the latter: there are essential elements that, if removed, can disrupt the information (e.g. plot lines, axis lines, legend and labels). Infographics are flexible, and speaking solely from the accessibility point of view, that's what makes them special. The infographic is showcased in Appendix 2.

To illustrate the design processes, I've created flowcharts (Picture 37) which demonstrate the steps that were taken during the project work from a designer's perspective.



PICTURE 37. Process flowcharts (Gushcheva 2019).

In my opinion, in terms of data visualization, defining constants and properties prior to the beginning of the design process (especially if the project is quite extensive) is necessary for consistency's sake. To further enhance the differences between data visualization and infographic creation process, I also think it's crucial to mention that infographics don't necessarily have to include *charts or graphs*, as information or a data point can be visualized through icons, highlighted text or, most commonly, illustrations. Moreover, data visualization requires a multitude of elements to be comprehensive: labels, values, legend and plot lines, which can be optional.

Data visualization is an extremely extensive topic, not just in terms of design but in terms of so many fields it is related to. Although studying these two case projects is not enough to draw definitive results, I think that given the subject differences and scopes

of them it allowed me to define some key elements of the design processes. Moreover, the fundamental design rules appeared to be of significant importance when working with data visualization – the similarity, consistency, balance, and even colour coding mattered immensely, especially in such an extensive project as the data report.

As per personal growth, I believe that these projects are extremely educational for graphic designers. Data visualization requires discipline and strong vision, and infographics are a great exercise in creativity and creation of accessible content. Of course, this thesis doesn't dive into the data analytics and the perspective on visualization of that medium, but, hopefully, I've managed to uncover some of the better practices of data visualization and delivered the projects adequately.

REFERENCES

Lovett, J. 2011. Elements and principles of design. Released on 11.03.2011. Read on 15.03.2018. http://wa-acte.org/Pdf/__www.johnlovett.com_test.pdf

White, A. 2011. The Elements of Graphic Design. 2nd edition. New York: Allworth Press.

Behrens, R. R. 2004. Art, Design and Gestalt Theory. Released on 17.11.2014. Read on 02.01.2019.
https://www.leonardo.info/isast/articles/behrens.html#1

Cherry, K. 2018. What Is Gestalt Psychology? Released 05.10.2018. Read on 02.01.2019.
https://www.verywellmind.com/what-is-gestalt-psychology-2795808

Wertheimer, M. 1924. In the translation by Willis D. Ellis published in Source Book of Gestalt Psychology, New York: Harcourt, Brace and Co, 1938.

Soegaard, M. 2019. The Law of Similarity - Gestalt Principles (1). Read on 02.01.2019.
https://www.interaction-design.org/literature/article/the-law-of-similarity-gestalt-principles-1

Bulat, A. 2012. Understanding Web Design – What is Gestalt Continuity? Released in 2012. Read on 02.01.2019.
https://www.templatemonster.com/blog/gestalt-continuity-law-templatemonster-templates/

Siim, D. 2011. Galleri Tema. Released on 27.08.2011. Read on 15.03.2018.
https://www.behance.net/gallery/1084157/Galleri-Tema

Kerti, A. 2018. The Designer's Guide to the Law of Prägnanz. Fundamental principle of the Gestalt Theory. Released on 10.04.2018. Read on 02.01.2019.
https://blog.prototypr.io/law-of-pr%C3%A4gnanz-bdb2fcf349b8

Lidwell, W., Holden, K. and Butler, J. 2010. Universal Principles of Design. USA: Rockport Publishers.

Bradley, S. 2015. Design Principles: Compositional, Symmetrical And Asymmetrical Balance. Released on 29.06.2015. Read on 15.03.2018. https://www.smashingmagazine.com/2015/06/design-principles-compositional-balance-symmetry-asymmetry/

Smith, M. 2014. The Principles of Graphic Design: How to Use Proximity Effectively. Released on 15.09.2014. Read on 15.03.2018. http://www.edgee.net/the-principles-of-graphic-design-how-to-use-proximity-effectively/

Selleck, J. 1979. Principles of Design: Contrast (Design Concepts). 1st edition. New York: Sterling Publishing.

Yin Y. 2018. Wind of Okhotsk III. Released on 13.03.2018. Read on 15.03.2018. https://www.behance.net/gallery/63145373/Wind-of-Okhotsk-III-III

Bleicher, S. 2012. Contemporary Colour: Theory and Use. 2nd edition. New York: Delmar.

Mollica, P. 2013. Colour Theory: An Essential Guide to Colour-from Basic Principles to Practical Applications. USA: Walter Foster Publishing, Inc.

Ciotti, G. 2014. Colour Psychology: How Colours Influence the Mind. Released on 20.08.2014. Read on 16.03.2018. https://www.psychologytoday.com/us/blog/habits-not-hacks/201408/colour-psychology-how-colours-influence-the-mind

Chapman, C. 2010. Colour Theory for Designers, Part 1: The Meaning of Colour. Released on 28.01.2010. Read on 16.08.2018.

Cleveland, W.S. 1994. The Elements of Graphing Data. Revised Edition. New Jersey: Hobart Press.

Lankow J., Ritchie J. and Crooks R. 2012. Infographics: The Power of Visual Storytelling. New Jersey: John Wiley and Sons, Inc.

Tufte, E.R. 1983. The Visual Display of Quantitative Information. 2nd edition. Connecticut: Graphics Press.

Nightingale, F. 1858. Notes on Matters Affecting the Health, Efficiency and Hospital Administration of the British Army. Sent to Queen Victoria by Florence Nightingale, 11.10.1858. Published on https://www.rct.uk/collection/1075240/notes-on-matters-affecting-the-health-efficiency-and-hospital-administration-of . Read on 15.03.2018.

Lebedev, A. 2013. Official Moscow Metro map. Released on 05.06.2013. Read on 07.08.2018.

Tufte, E.R. 2006. Beautiful Evidence. 2nd edition. Connecticut: Graphics Press.

Jackson, A. 2014. The Power of using Infographics to Communicate Science. Released on 20.01.2014. Read on 02.10.2018. http://blogs.nature.com/ofschemesandmemes/2014/01/20/the-power-of-using-infographics-to-communicate-science

Tulp, J.W. 2012. Posted by Matson, J. in Exoplanet Discoveries to Date Are Just a Drop in the Bucket. Released on 01.12.2012. Read on 02.10.2018. https://www.scientificamerican.com/article/exoplanets-discoveries-to-date-just-drop-in-bucket/

Knaflic, C.N. 2015. Cole Nussbaumer Knaflic: "Storytelling with Data" | Talks at Google. Released on 11.11.2015. Read on 15.09.2018. https://www.youtube.com/watch?v=8EMW7io4rSI

Flores, G. 2018. Facebook Carnival. Released on 22.03.2018. Read on 02.10.2018. https://www.behance.net/gallery/62048815/Facebook-Carnival

Nosto Solutions, 2018. Read on 20.08.2018. https://www.nosto.com/

Chan, H. Y. 2018. Made in Hong Kong vol.1 — The Knock-off Rebuild. Released on 29.08.2018. Read on 15.01.2019. https://www.behance.net/gallery/69169291/vol1

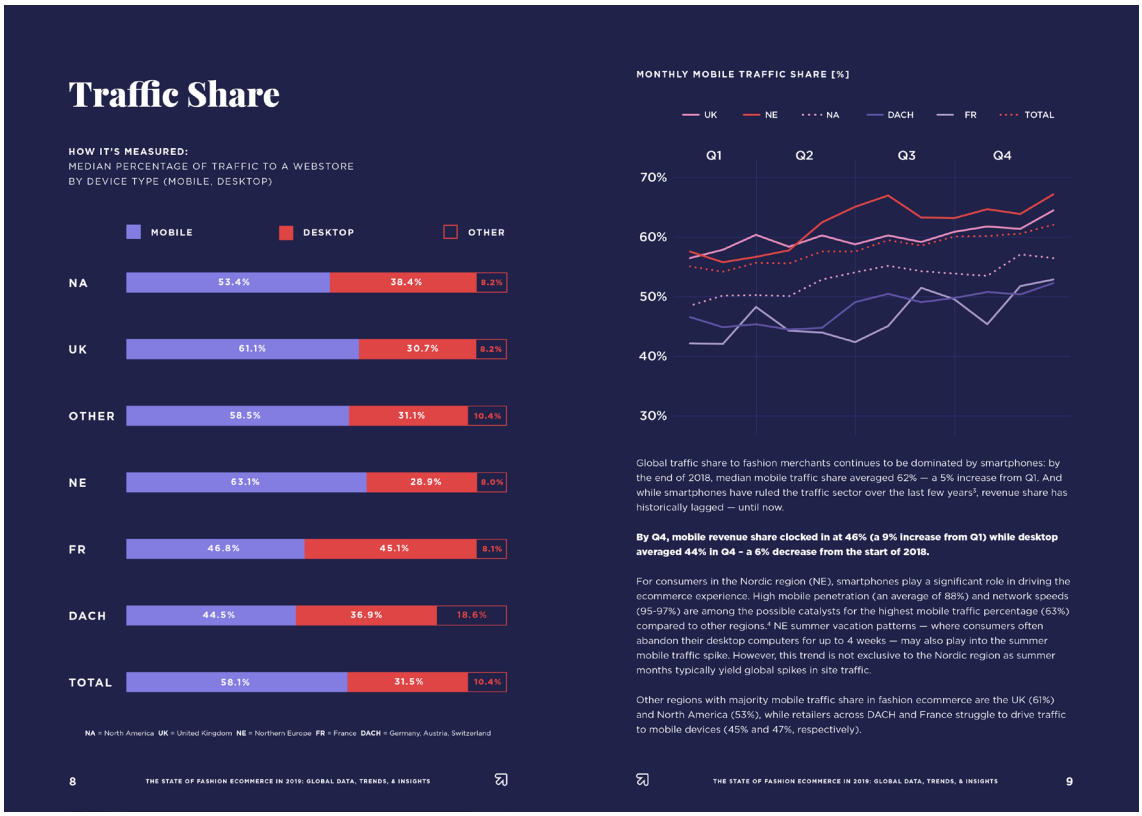
Zhang, J. 2016. Infogra-fake. Released on 03.06.2016. Read on 15.01.2019. https://www.behance.net/gallery/37957325/Infogra-fake

Gosling, E. 2018. Bring a brand to life with illustration. Released on 30.07.2018. Read on 20.02.2019. https://www.creativebloq.com/features/bring-a-brand-to-life-with-illustration

APPENDICES

Appendix 1. Finalised report spreads (Gushcheva 2019)

Full report is available via this link:
http://pages.nosto.com/fashion-ecommerce-data-trends-insights.html



Revenue Per Visit

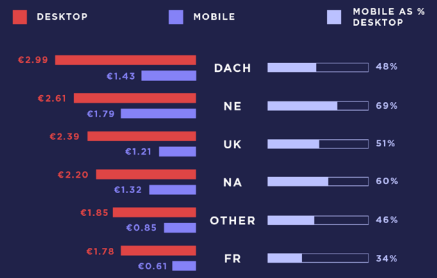
HOW IT'S MEASURED:
AVERAGE ORDER VALUE X CONVERSION RATE

Globally, desktop is still generating the highest RPV €2.39, whereas mobile lags behind at €1.25.

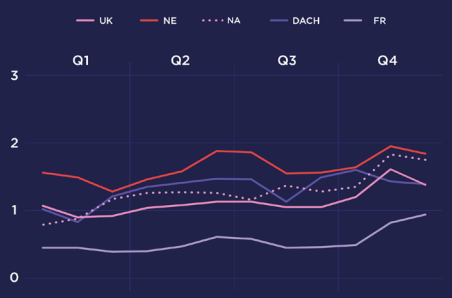
Between Q1 and Q4 of 2018, fashion ecommerce merchants globally saw a 33% increase in average revenue per visit (RPV) on desktop and a 38% increase on mobile devices. One potential catalyst for this increase (though certainly not the sole reason) was November's Black Friday/Cyber Monday weekend — one of retail's most anticipated shopping periods of the year — which yielded the biggest seasonal spike of 2018.

French retailers generated the lowest RPV on mobile (€0.61), falling behind the Nordic region (€1.79) DACH (€1.43) and North America (€1.32) - the result of France falling behind other regions in both conversion rate and average order value on mobile.

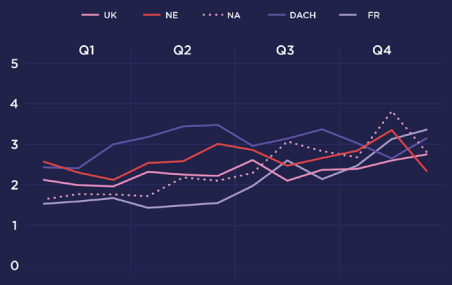
While RPV is generally higher on desktop than on mobile in all regions, DACH saw an exceptionally high RPV on desktop (€2.99) — indicating that DACH consumers are more committed to shopping online via desktop. Although mobile commerce is present in this region (1/3 of purchases are made on mobile devices[5]), there are still a few factors that deter consumers from turning to their smartphones: such as reluctance to share their personal data and a suggested lack of focus on optimizing the mobile shopping experience in this region.



MONTHLY REVENUE PER VISIT [€] - MOBILE



MONTHLY REVENUE PER VISIT [€] - DESKTOP

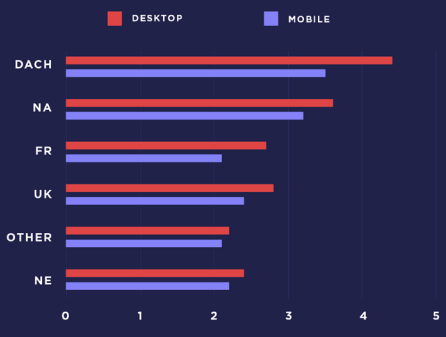


Average Basket Size

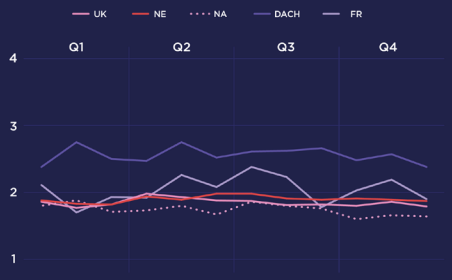
HOW IT'S MEASURED:
TOTAL UNITS SOLD ÷ NUMBER OF INVOICES

Unsurprisingly, the global average basket size was higher on desktop (2.45) versus mobile (2.13). On a regional level, global average basket size across DACH was highest on desktop (4.4) AND on mobile (3.5) relative to the world. Overall, DACH countries averaged the highest basket size (3.8), with Germany averaging the highest share of population (53%) that returns online purchases[6]. The correlation: German regulations protecting consumer rights and behavior allow shoppers to buy multiple colors and sizes and easily return unwanted items[7]. Shipping costs also come into play, with Germany averaging €20 - the third highest in the EU). This suggests that these consumers may also be willing to shop more products per session to cut down on this cost.

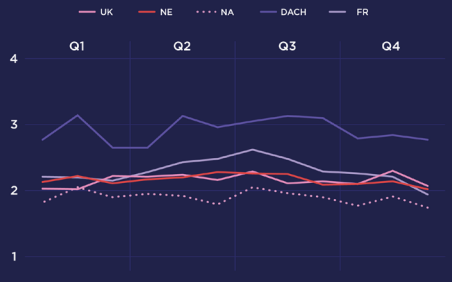
Meanwhile, in the Nordic region a contrast is revealed: while this region yielded the lowest basket size compared to other regions, RPV on mobile was highest of all analyzed regions and mobile share of traffic is strong. This suggests that shoppers in this region are prone to buying fewer, more expensive items on multiple occasions rather than purchasing more items per session.



AVERAGE BASKET SIZE [#] - MOBILE



AVERAGE BASKET SIZE [#] - DESKTOP

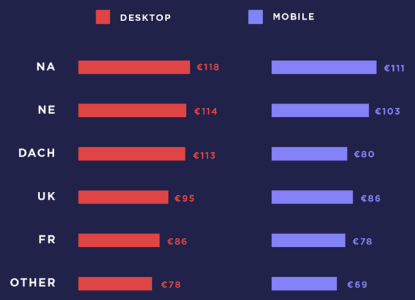


Average Order Value

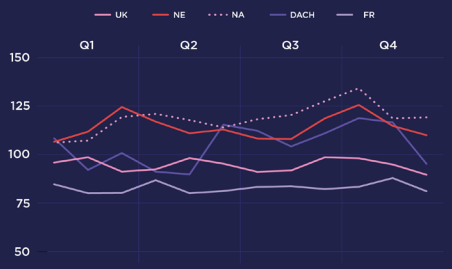
Globally, average order value (AOV) was dominant on desktop at €104 with mobile AOV averaging €90. North America led all other regions on both mobile (€118) and desktop (€111). An interesting phenomenon is the shrinking gap between desktop and mobile AOV in the North American market: mobile AOV is at 94% of desktop AOV, and is smallest percentage-wise relative to all other regions.

We saw previously that the gap between desktop and mobile revenue per visit is still noticeable, which implies that this is predominantly a function of the lower conversion rates between device types in this region. If fashion merchants in North America can improve mobile conversion rates, it will have a significant effect on revenue per visit with such high mobile average order values.

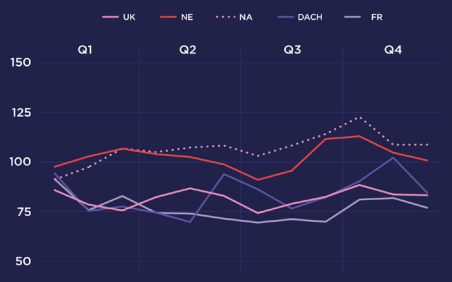
Notably, DACH has high desktop AOVs but low mobile AOVs, and as expected DACH RPV was highest on desktop as well. When looking broadly at the regions on a monthly basis, it's apparent that AOV is relatively flat on desktop, slightly increasing over time on mobile, and both device types see a seasonal spike around Black Friday / Cyber Monday.



AVERAGE ORDER VALUE [€] - DESKTOP



AVERAGE ORDER VALUE [€] - MOBILE



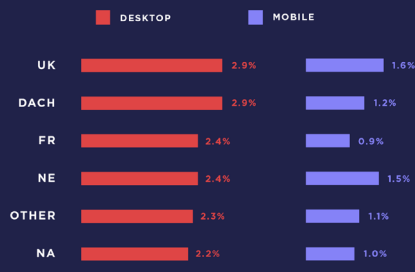
Conversion Rate

HOW IT'S MEASURED:
(CONVERSIONS / TOTAL VISITORS) X 100%

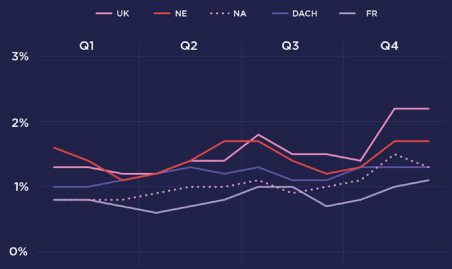
Globally, conversion rate on desktop was the highest at 2.44% vs. 1.32% on mobile. Fashion retailers continue to steadily improve customer conversion rate, with a 21% increase over 2018. This can be driven by factors such as:

- **Improvements in the usage of personalization solutions across the shopping experience**
- **Improvements in customer segmentation and targeting of offers to inspire a purchase**

Fashion retailers in the UK yielded an average range RPV and a relatively low basket size compared to other regions, but they do lead the fashion ecommerce scene in terms of customer conversion: conversion rates were highest on both desktop (2.9%) and mobile (1.6%) when compared the rest of Europe and North America. In turn, North America yielded the lowest conversion rates on desktop (2.2%) while consumers in France yielded the lowest conversion rates on mobile (0.9%). Retailers across the UK are leading the way in terms of mobile conversion — specifically around the holiday season. UK mobile conversion rates jumped to 2.2% between November and December (a 57% increase from a January-October's average of 1.4%).



CONVERSION RATE [%] - MOBILE



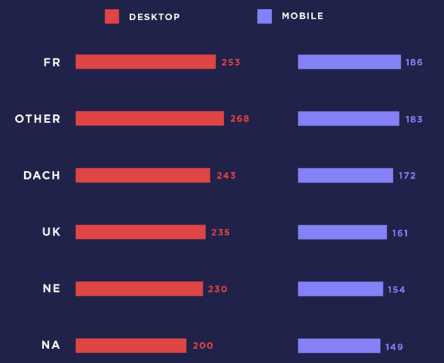
Time Spent Per Visit

Globally on average fashion shoppers browse for 164 seconds when they visit a site on mobile - and 239 seconds on desktop.

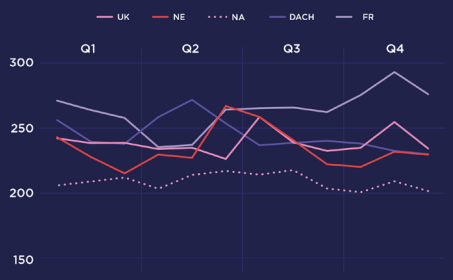
2018 yielded no massive or unexpected changes in average visit times. However, one interesting note is that North American fashion consumers generated the lowest visit time across all devices — yet they had the highest AOV. So while they may have the shortest online shopping attention span, they're actually the most efficient online shoppers.

Consumer behavior on mobile in France is also worth noting: it produced the lowest conversion rates (0.9%), the lowest revenue per visitor (€0.61), and the lowest average order value (€78).

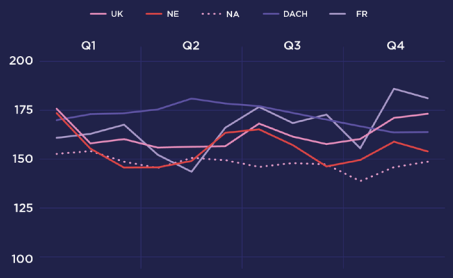
The catch: these consumers had the longest visit times (186 seconds), which is 25% higher than their North American peers. These signs indicate that French consumers prefer "digital window shopping" more than consumers in other regions.



TIME SPENT PER VISIT [SECONDS] - DESKTOP



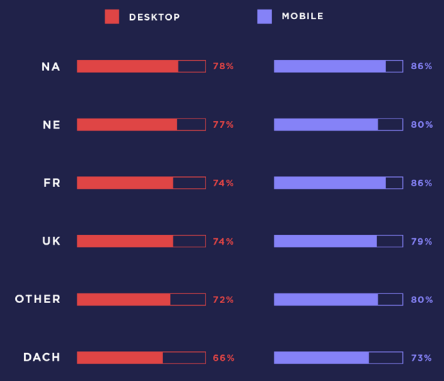
TIME SPENT PER VISIT [SECONDS] - MOBILE



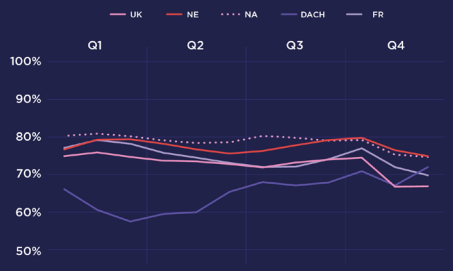
Cart Abandonment Rate

Overall, cart abandonment rates (CAR) were relatively stable throughout 2018, and most regions are relatively clustered together. Globally, we saw a 80% cart abandonment rate on mobile and 74% on desktop.

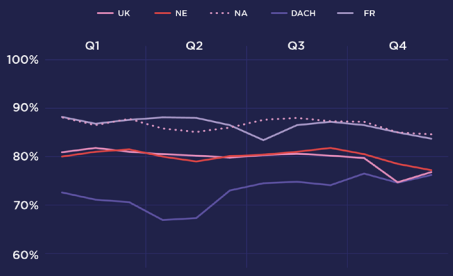
However, DACH is the one outlier — it yielded the lowest CAR on both desktop and mobile. These consumers appear to be "committed shoppers" — if they add something to cart, they are most likely to end up making a purchase. As mentioned in section 3 (Average Basket Size), German consumers are prone to returning products — and with the highest basket size of all regions, evidence of a prevalent "buy many sizes, return the ones that don't fit" phenomenon becomes noticeable. These same consumers are also known to be very brand focused and loyal to the brands they love and trust: two-thirds of them are prone to sticking with a brand they favor above all others.[8]



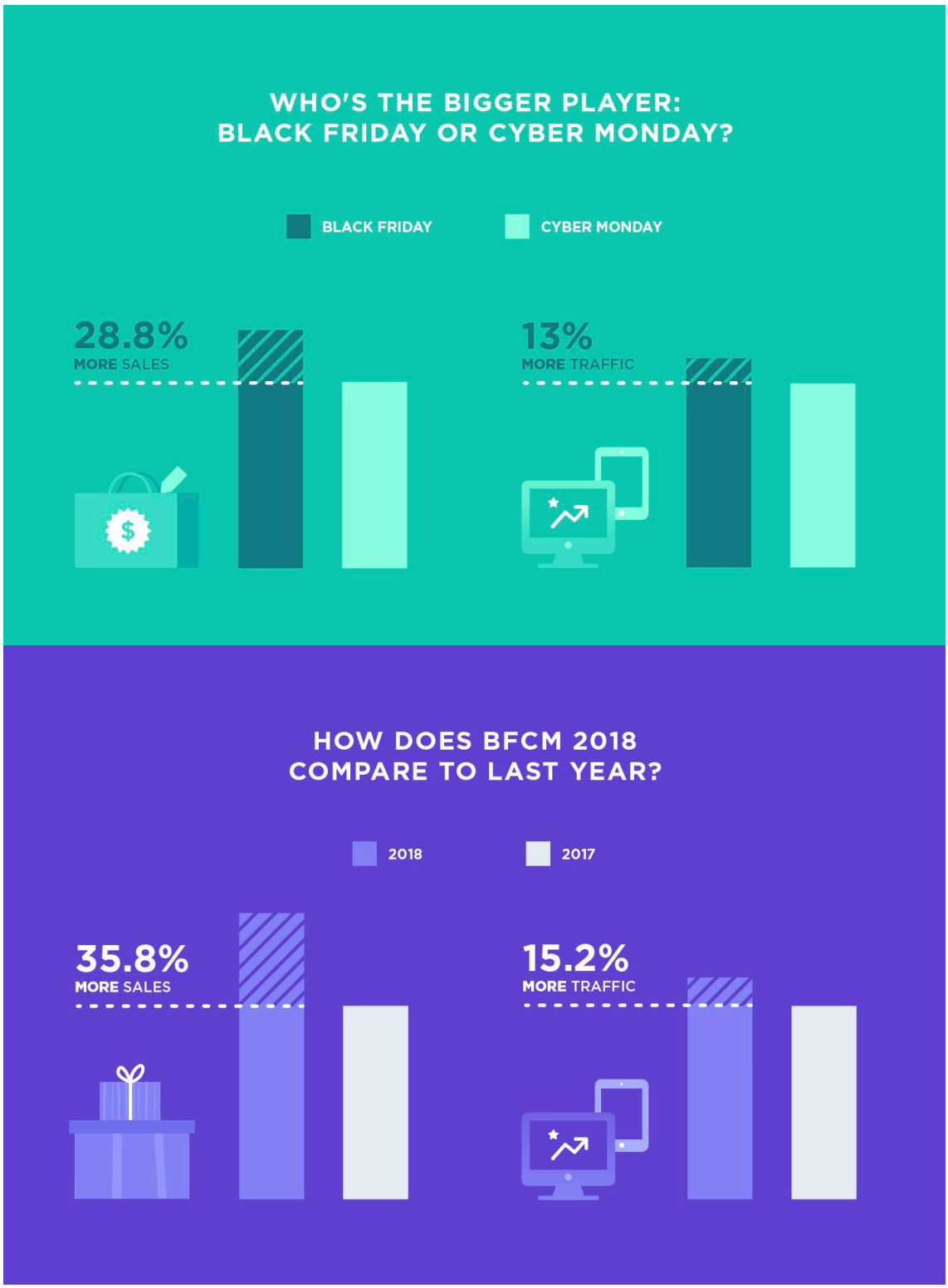
CART ABANDONMENT RATE [%] - DESKTOP

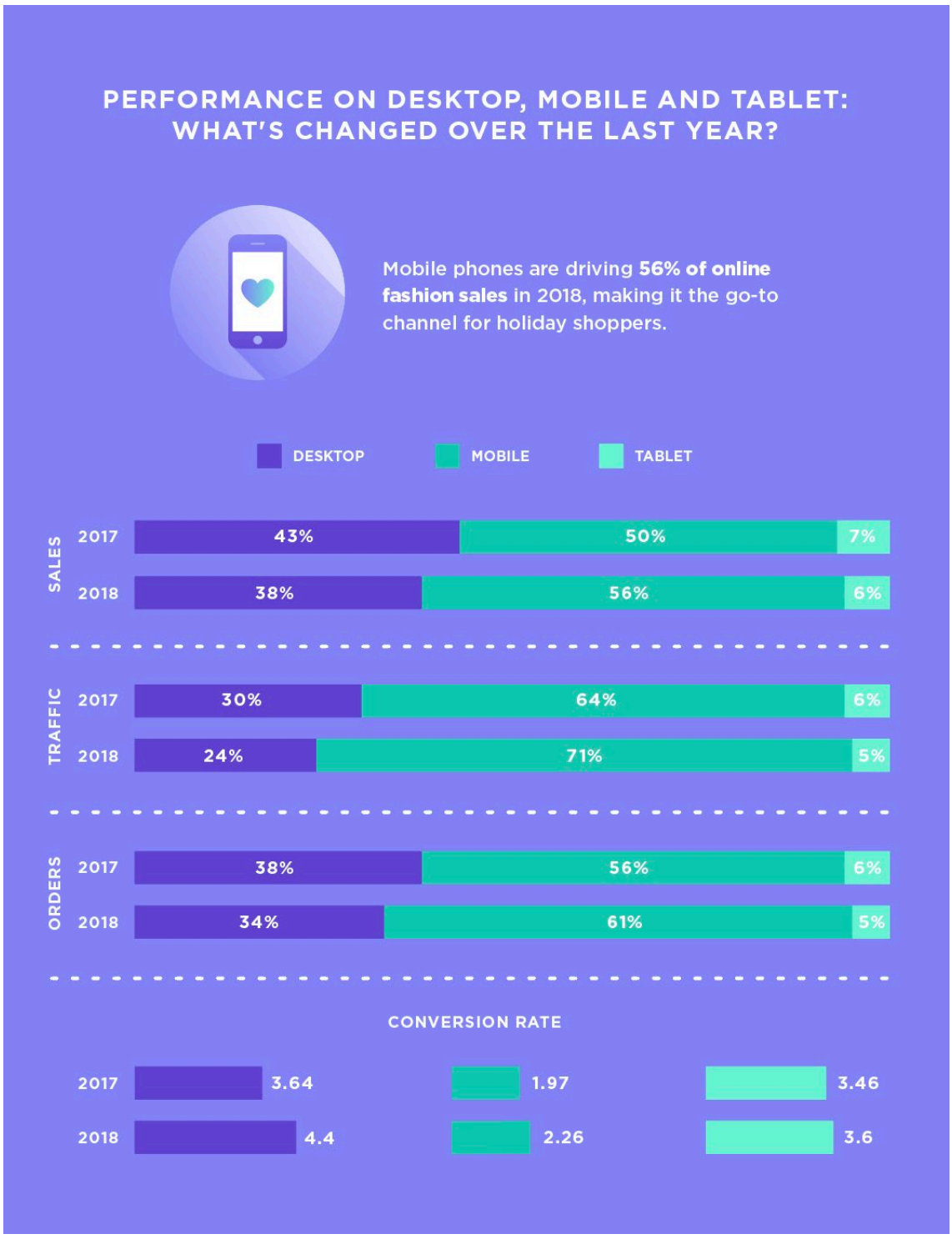


CART ABANDONMENT RATE [%] - MOBILE



Appendix 2. Final English version of infographic (Gushcheva 2018)


WHO'S THE BIGGER PLAYER:
BLACK FRIDAY OR CYBER MONDAY?
BLACK FRIDAY
CYBER MONDAY
28.8%
MORE SALES
13%
MORE TRAFFIC
HOW DOES BFCM 2018
COMPARE TO LAST YEAR?
2018
2017
35.8%
MORE SALES
15.2%
MORE TRAFFIC


PERFORMANCE ON DESKTOP, MOBILE AND TABLET:
WHAT'S CHANGED OVER THE LAST YEAR?
Mobile phones are driving 56% of online fashion sales in 2018, making it the go-to channel for holiday shoppers.
DESKTOP
MOBILE
TABLET
SALES
2017
43%
50%
7%
2018
38%
56%
6%
TRAFFIC
2017
30%
64%
6%
2018
24%
71%
5%
ORDERS
2017
38%
56%
6%
2018
34%
61%
5%
CONVERSION RATE
2017
3.64
1.97
3.46
2018
4.4
2.26
3.6