

UKRAINIAN CATHOLIC UNIVERSITY

BACHELOR THESIS

Analysis of illustration influence on Human-Computer Interaction

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for the degree of Bachelor of Science*

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Declaration of Authorship

I, Oleksandr KOZAK, declare that this thesis titled, "Analysis of illustration influence on Human-Computer Interaction" and the work presented in it are my own. I confirm that:

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- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.
- Where I have consulted the published work of others, this is always clearly attributed.
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Signed:

Date:

“Engineers and designers simultaneously know too much and too little. They know too much about the technology and too little about how other people live their lives and do their activities.”

Donald A. Norman

UKRAINIAN CATHOLIC UNIVERSITY

Faculty of Applied Sciences

Bachelor of Science

Analysis of illustration influence on Human-Computer Interaction

by Oleksandr KOZAK

Abstract

This paper presents a study about how digital illustration used in interface design influences human-computer interaction. An illustration is a visual interpretation of a particular concept, text or process. In this study, the name illustration is used for all its types (icons, spot illustrations, etc.)

People now interact with computers differently than they did in the late 1970s when the prototype for a GUI was developed. With the development of technologies such as the Internet or a smartphone, designers moved their focus on creating products that are just usable. British tech philosopher Tom Chatfield explains (*The Most Intimate Relationship in Your Life: Your Smartphone 2015*) that smartphones become the most intimate relationship in lives that most people have now. People now seek for experiences that are emotional, memorable and pleasurable.

Designers use a variety of tools to achieve those experiences. In particular, they tend to use an illustration. According to the statistics (*Finances Online*), 37% of most frequently used visual assets are original graphics, like an illustration. Apart from that, business owners also evaluated the importance of creative graphics. Companies that encourage creativity achieve 1.5 times more significant market share (*Adobe*). Therefore, focusing only on usability is not enough to provide meaningful and relevant experiences to users.

The findings of this study are dedicated to figuring out what tasks can be covered with illustrations in UI design, how illustration affects HCI and what value it can give to the products that are created by IT specialists, in particular, computer scientists.

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List of Abbreviations

HCI	Human-Computer Interaction
UX	User Experience
UI	User Interface

Dedicated to my family

Chapter 1

Introduction

1.1 Objectives

The first goal of this work is to explore how people perceive an illustration. In order to achieve good HCI, developers and designers need to understand how people perceive information. Based on this, they can build their solutions to transfer information to their users. If to consider an illustration as a part of such a solution, we should treat it the same way and try to understand how the information can be transferred with its use.

The second goal is to figure out how an illustration is used by designers today. What value does an illustration bring to the products? What are the constraints that illustration allow resolving? Opinions of the people from the industry can give the context of the problems that are solved by using illustration today. Having received answers from them, we will be able to understand how an illustration influences HCI in products.

The third goal is to test the illustration in practice. By modelling the experiment, we will be able to test the impact of illustration and obtain data from which we can analyze the influence of the illustration on HCI.

1.2 Structure of the thesis

This work is organized as follows: in Chapter 2, we review related studies on human-computer interaction, user experience, emotional design, types of illustrations and how illustration is used. Moreover, in this chapter, we analyze how people perceive illustration, how it is related to processes in our brains, how it affects our productivity and how designers use these principles in their designs. In Chapter 3, we conduct interviews with the designers who work in the industry. We take five designers with different backgrounds in order to figure out how illustration is applied in their projects. In Chapter 4, we create two mockups for the testing: the first only with text and the second with text and illustrations. Each of these two mockups will be tested on two separate groups of people. We separated participants into two groups and developed two mockups in order to measure and compare the probable difference between the collected metrics. This approach will allow us to practically test the influence of illustration on user interaction with an interface. In Chapter 5, we conclude what was done.

Chapter 2

Related works

Nowadays, illustration became a powerful communication tool for making a pleasing experience for users who interact with interfaces. UI designers use illustrations in their designs in order to elicit emotion, build engagement with users and quickly transfer product or brand messages. An illustration is widely used in interface design as a gamification, storytelling and perception accelerating tool.

This chapter describes all these concepts, their usage and how they improve HCI. Also, this chapter explains illustration in terms of psychology, human perception and UX.

2.1 Human-Computer Interaction

According to Interaction Design Foundation article *Human-Computer Interaction (HCI)*, HCI is a multidisciplinary field of study that focuses on the design of computer technology and, in particular, the interaction between humans (the users) and computers. John M. Carroll, in *The encyclopedia of human-computer interaction 2nd ed.* explains HCI initially as a specialty in computer science, which included cognitive science and human factors engineering.

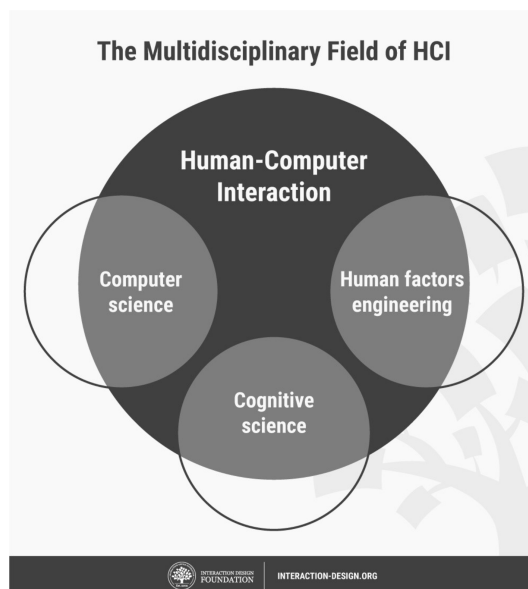


FIGURE 2.1: The Multidisciplinary Field of HCI, *Human-Computer Interaction (HCI)*

HCI surfacing in the 1980s is tightly related to the development of personal computers. Until the late 1970s, the only humans who interacted with computers were information technology professionals. At that time, computers were built upon the metaphor of Unix, in which typing commands accomplished all interactions. The non-professional computer user was often subjected to arcane commands and system dialogues.

The situation started to change with the development of machines with GUI, such as the Apple Macintosh and Xerox alto, just at the point when personal computing presented the practical need for HCI. Furthermore, the thing that made everyone in the world a potential computer user was the so-called desktop metaphor.

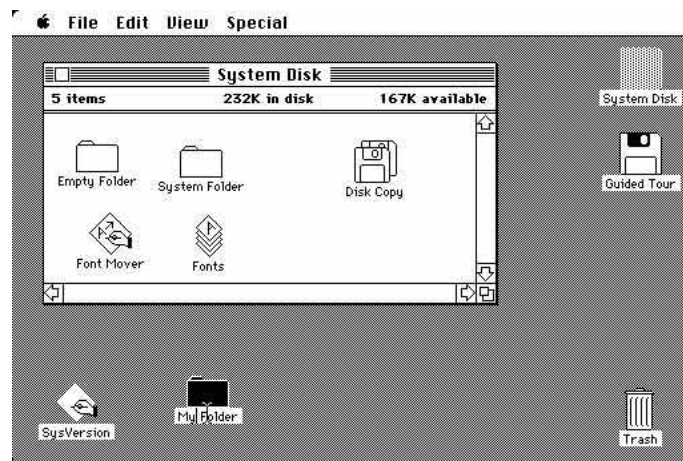


FIGURE 2.2: Apple Macintosh Desktop, *The encyclopedia of human-computer interaction 2nd ed.*

As John M. Carroll in *Human-Computer Interaction (HCI)* explains, this metaphor was built around a real-life desktop that an average person worked at. The reason why it was a great concept is that the whole interface was modelled on a physical desktop with the use of graphical illustrations of real-life objects. In this case, illustration made the interface easier to comprehend because each object was familiar to most of the people. The second Jakob Nielsen's heuristic says:

"Systems should speak the users' language with familiar words, phrases, and concepts rather than system-oriented terms" (The 2nd Usability Heuristic)

Being designed like that even before Jakob Nielsen published his usability principles in 1994, desktop metaphor became a highly contrasting alternative to the previous metaphor, in which typing commands accomplished all interactions.

Eventually, as computers became more portable and affordable, the need to develop efficient HCI for less experienced users became increasingly important.

With the rise of technologies, HCI has continuously diversified and expanded to incorporate multiple disciplines. John M. Carroll says that it no longer makes sense to regard HCI as a specialty of computer science because it has become much more diverse than computer science itself. (*The encyclopedia of human-computer interaction 2nd ed.*). Now HCI is related to psychology, communication studies, cognitive science, information science and design, in particular with UX/UI design.

2.2 UX/UI

HCI expanded and became a broader field that overlaps, in particular, with such areas as user experience (UX) design and user interface (UI) design. HCI is considered as the forerunner to UX design. However, there are some differences between them. HCI practitioners are involved in scientific research and developing empirical understandings of users. In comparison, UX designers are more practical, industry-focused and involved in building products or services. Despite this divide, practical considerations UX designers use for developing the products have a direct link to the findings of HCI researchers about users' mindsets. (*Human-Computer Interaction (HCI)*)

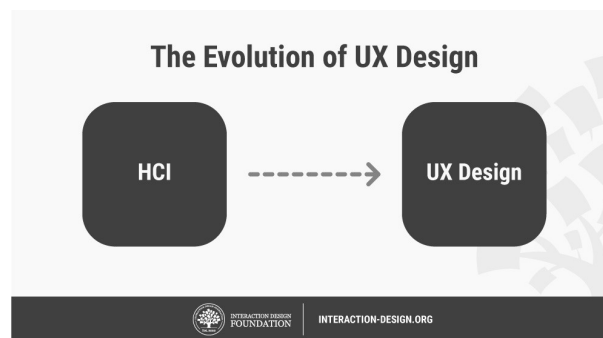


FIGURE 2.3: The Evolution of UX Design, *Human-Computer Interaction (HCI)*

The term UX stands for the quality of experience a person has when interacting with a specific design (*User Experience. The Glossary of Human-Computer Interaction*). It was invented by Dr. Donald Norman, co-founder of the Nielsen Norman group, Professor at Northwestern University, in the mid-1990s. As he explains:

"No product is an island. A product is more than the product. It is a cohesive, integrated set of experiences. Think through all of the stages of a product or service – from initial intentions through final reflections, from the first usage to help, service, and maintenance. Make them all work together seamlessly."

UX is about the entire experience that users have with a product. That experience also includes UI.

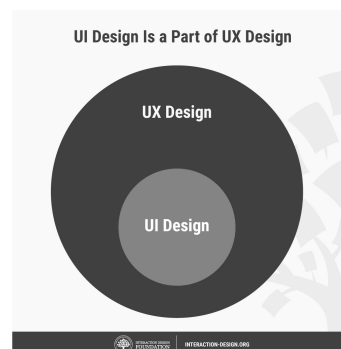


FIGURE 2.4: UI Design Is a Part of UX Design, *User Interface (UI) Design*

UI is what users see and feel when directly using a product. Everett N. McKay, in his book *UI is communication 2013*, says that UI is what connects users to a product's underlying technology. He emphasizes that UI Design is a form of human communication.

Those practitioners who worked in HCI saw it as an essential tool to promote the idea that the interaction between a computer and the user should resemble a human-to-human. Everett N. McKay in *UI is communication 2013* emphasizes that users are emotional, error-prone people, so software they use must comply with the standards of proper social interaction. That is what UX/UI designers are trying to achieve in their products. With the advent of technologies such as the Internet or a smartphone, HCI moved its focus on creating products that are just usable.

Human activities implicitly form needs, preferences and design visions. New designs are created in response to the users' activities and provide new possibilities for action and interaction. Ultimately, these activities form further human needs, preferences, and design visions. (*The encyclopedia of human-computer interaction 2nd ed.*) Now UX/UI designers concentrate on other aspects of the user experience, such as pleasure, efficiency and fun. They try to design products that will communicate with users with the human-to-human concept.

There are many tools that can create such a feeling. In particular, designers tend to use an illustration. An illustration is a great tool that elicits emotions, triggers a memory and accelerates perception. Such an effect of illustration is tightly related to the processes in our brains.

2.3 Psychology of Illustration & Human behaviour

2.3.1 Human needs

In the 1950s, the American psychologist Abraham Maslow formed a hierarchical pyramid of basic needs that all people have no matter their age, gender, race, or station in life. It consists of five needs: physiological, safety, love/belonging, esteem, self-actualization.



FIGURE 2.5: Maslow's Hierarchy of Needs, *Designing for Emotion 2011*

Maslow emphasized that physiological needs, like the need to breathe, at the base of this hierarchy, must be met first. The same works for other needs: in order to

satisfy the next need, we need to satisfy all previous ones. The more satisfied stages, the more happiness overall.

As Aaron Walter, VP of Design Education at InVision, explains in *Designing for Emotion 2011*, Maslow's approach to identifying human needs can help designers understand their goals when designing interfaces. He made a remap of the Maslow's pyramid in order to translate human needs into the needs of users.

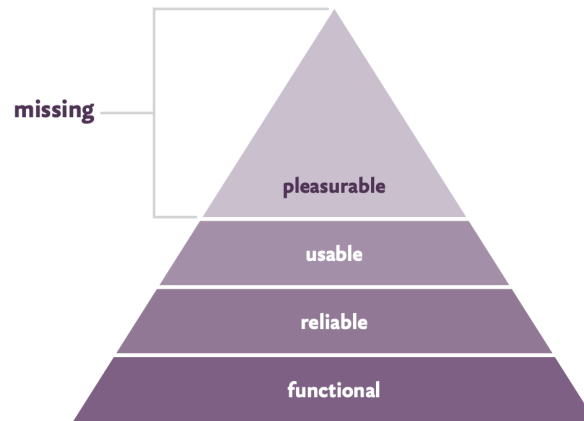


FIGURE 2.6: Remap of Maslow's Hierarchy of Needs, *Designing for Emotion 2011*

Now the pyramid consists of the following stages: functional, reliable, usable and pleasurable. Historically, usability, apparently along with functionality and reliability, has been the highest objective of interface design. Designers made their best so that their users could quickly learn how to interact with a product and complete their tasks. However, as the author highlights, interface design is design for humans. Apart from basic needs, people seek experiences that are delightful, fun and aesthetic.

As an example, Aaron Walter describes his work on MailChimp redesign. One of what they did was creating the illustrated character and writing a set of greeting phrases in order to deliver random, witty greetings each time a user enters the website. When they launched, they discovered that people became highly emotionally connected to the new design. People posted on social media how the illustrated character brightened their workday. Moreover, the design team noticed that random jokes actually helped users complete long and more complicated task flows (*Designing for Emotion 2011*). Donald Norman, in his book *Emotional Design 2004*, shares that pleasurable experiences enhance creative, breadth-first thinking, whereas negative ones focus cognition and enhance depth-first processing.

In comparison, users who had a pleasurable impression before (due to funny illustration, for example), face a problem in an interface, are capable of finding the solution faster than those users who previously had a wrong impression. As the author explains, bad emotions activate breadth-first thinking, which can make a user stuck on one solution to a problem, that may even be incorrect. Because of the inability to solve the problem as quickly as desired, the user may eventually leave, for example, a website. Donald Norman described this effect as Aesthetic-Usability Effect.

"Positive affect makes people more tolerant of minor difficulties and more flexible and creative in finding solutions." (*Emotion & Design: Attractive things work*

better)

User experience designers, as Aaron Walter says, should begin by understanding the needs of the people they are designing for. People do have needs they want to fulfill. Apart from functionality, reliability and usability, people tend to those things that are pleasurable. In Aaron's case, funny and humoristic illustrations improved how users perceived interface usability. Moreover, it was a tool that created an emotional and memorable experience.

2.3.2 Emotion & Memory

Emotional experiences make a deep imprint on our long-term memory. People generate emotion and record memories in the limbic system. A limbic system is a group of interconnected structures located deep within the brain. It is the part of the brain that's responsible for behavioural and emotional responses (*Emotion & Design: Attractive things work better*). Molecular biologist John Medina in his book *Brain Rules*, explains the process:

"Emotionally charged events persist much longer in our memories and are recalled with greater accuracy than neutral memories. How does this work in our brains? It involves the prefrontal cortex, the uniquely human part of the brain that governs "executive functions," such as problem-solving, maintaining attention, and inhibiting emotional impulses. If the prefrontal cortex is the board chairman, the cingulate gyrus is its personal assistant. The assistant provides the chairman with certain filtering functions and assists in teleconferencing with other parts of the brain—especially the amygdala, which helps create and maintain emotions. The amygdala is chock-full of the neurotransmitter dopamine, and it uses dopamine the way an office assistant uses Post-It notes. When the brain detects an emotionally charged event, the amygdala releases dopamine into the system. Because dopamine greatly aids memory and information processing, you could say the Post-It note reads, "Remember this!" Getting the brain to put a chemical Post-It note on a given piece of information means that information is going to be more robustly processed." (Designing for Emotion 2011)

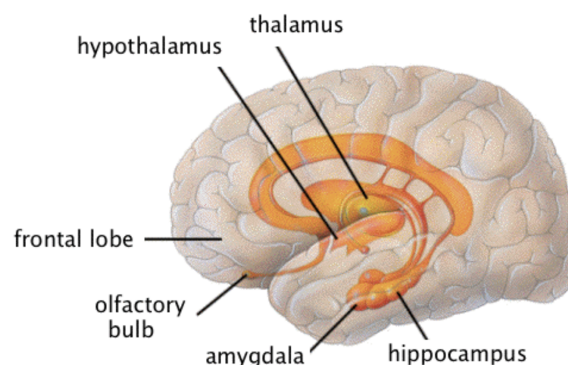


FIGURE 2.7: The Limbic System, *The Emotional Nervous System*

As Aaron Walter explains, the reason why emotion and memory are so closely coupled is related to surviving social skills. In order to not be doomed to repeat

negative experiences and be able to repeat positive experiences, consciously, people need to have a memory of both. Based on this principle, babies, for example, build an emotional bond with their parents when those care about them. Each time when they feed a baby or try to calm, they trigger the limbic system to release calming neurotransmitters. With every response, babies begin to trust their parents and form an emotional bond.

A similar principle works in interface design. Positive emotional stimuli can build engagement with users, which can make the design experience friendly and trustful, like communication with a close person. (*Designing for Emotion 2011*)

Even though emotions influence memory, the way people remember the overall experience may differ over time. In the publication, initially written by Donald Norman, *Memory is more important than actuality* is stated that people remember events differently after they happened. To make choices for the future, people review the past, anticipate and evaluate at a distance in time from the event itself. This determines what we learn from our experiences.

Some things fade from memory faster than others. For example, the negative emotions fade away more quickly than the cognitive evaluation. So although the person remembers the event, the emotions have dissipated, and what really matters is the memory of the events. In the related work, *User Memory Design: How To Design For Experiences That Last*, Curt Arledge, based on the 1996 psychological study, describes the difference between experience and memory and the ways they are related.

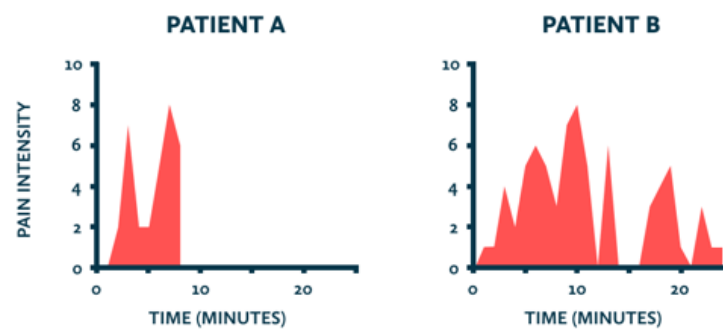


FIGURE 2.8: The pain experienced by two patients during a painful medical procedure, *User Memory Design: How To Design For Experiences That Last*

These charts depict the pain intensity that two patients experienced during a painful medical procedure, according to their minute-by-minute ratings. A rating of zero means no pain, and 10 means “extreme pain.” At first glance, it seems that patient B had an objectively worse time. However, when patient A, patient B and the 150 other participants were asked after the procedure to rate the total amount of pain they had experienced, statistical analysis showed that those ratings had nothing to do with the length of the procedure or the cumulative amount of pain they experienced. (*User Memory Design: How To Design For Experiences That Last*)

As turned out, patients’ ratings of total pain could be described by a rough average of the pain intensity of two single moments: the moment of highest intensity and the final moment of the procedure. Daniel Kahneman, the lead researcher, Nobel Prize-winning psychologist, confirmed that the length of experience has no impact

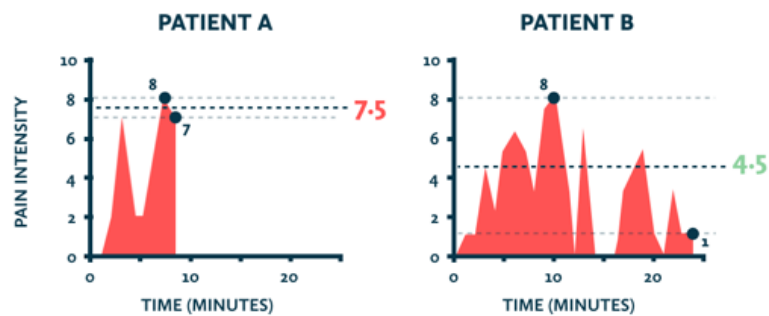


FIGURE 2.9: How patients remembered the pain, *User Memory Design: How To Design For Experiences That Last*

on people's memory of it. People's memories of an experience are based on a rough average of the most intense moment (the peak) and the final moment (the end). This concept is called "duration neglect" or "peak-end" rule. (*User Memory Design: How To Design For Experiences That Last*) Even though there is a difference between the actual experience and memory, the "duration neglect" concept can be used by UX designers. Curt Arledge recommends designers to consider how user experience can be translated into positive memories. As it is stated, people's memories are based on a rough average of the peak and the end. Hence, it is crucial to create something emotional and pleasurable for the peak and the end moments. Curt Arledge shares that one of the many emotional design techniques is to create moments of surprise by letting users make their own discoveries in a UI. It is similar to the MailChimp experience that Aaron Walter shared in *Designing for Emotion 2011*. In that case, the moment of surprise was created by the funny illustration of the MailChimp mascot.

The reason why visuals, like illustration, cause a strong emotional reaction is that the visual memory is encoded in the same place where emotions are processed. The amygdala, which has a primary role in the processing of emotional reactions, fulfils an essential role in visual encoding. (*Memory Encoding*) Moreover, according to the study provided by neuroscientists from Massachusetts Institute of Technology, the brain can identify images seen for 13 milliseconds (*In the blink of an eye*). Fast perception and emotional response: two necessary conditions to create a surprise moment. That is why visuals, and in particular illustration, is used to create those "peaks" and "ends" of an experience.

So what does this mean to a designer? Both authors of the before mentioned publications promote designing for the memory.

"The implication for design is clear. We should not be devoting all of our time to provide a perfect experience. Why not? Well, perfection is seldom possible. More importantly, perfection is seldom worth the effort. So what if people have some problems with an application, a website, a product, or a service? What matters is the total experience. Furthermore, the actual experience is not as important as the way it is remembered." (Memory is more important than actuality)

As it was mentioned before, pleasurable experiences are part of basic human needs. Most people would repeat something they remembered as pleasurable. Moreover, what matters is the memory of these events. With positive memories, people repeatedly use products and recommend them to their friends. One possible way to achieve those memories is to use an illustration. Even though the product has some

little issues, illustration is a tool that can accent the positive, and it will overwhelm the memory for the negative.

2.4 How illustration is used

Due to the influence illustration has on people, it has become a functional element of an interface rather than decoration. Designers began to use it in UI design increasingly. In this section, we will go through some examples of how illustration can be used. Due to the lack of suitable research that describes how illustration is used today, the info in this section will be based on the experience of designers who work in the industry. Most of the information is shared by Tubik Design Studio, a design studio that specializes in branding, worked on 400+ projects and received several design awards, such as Red Dot Award.

2.4.1 Accelerator of perception

Tubik Design Studio shares their knowledge about visual perception of illustration in the article *Visual Perception. Icons vs Copy in UI*. As they put, people have incredibly broad abilities to perceive visual marks, recognize and proceed data transformed in images. One of the most productive and quick ways to obtain and process information is visual perception, and this fact is widely used by designers to improve the usability of their solutions.

It turns out that people perceive illustration even faster than words. As it was before mentioned, people can get a general perception of a visual scene seen for as little as 13 milliseconds. As designers from the Tubik Studio say, that speed is indeed impossible for textual items. Apart from that, important pieces of information are often fixed by the brain as visual images, even if they were obtained via text perception. Furthermore, no less important fact, images have a tendency to stick better in long-term memory than written text.

All these properties of illustration allow a designer to do the following (*Visual Perception. Icons vs Copy in UI*):

- Accelerate perception of a content;
- Enhance the memorability of an element or a part of an interface
- Replace long words and phrases keeping the essence
- Support text by providing its additional visual explanation

Figure 2.10 shows how illustrations of weather conditions provide necessary information even without descriptive text. They are easy to understand and, at the same time, faster to perceive. Another interesting fact is that illustrations can make the interface more universal in cases when people from different countries use it. As an example, illustrations of weather conditions in the above figure would be perceived by most of the people.

Overall, all these properties of illustration make the interaction with interface faster, since people do not need to process and remember extra data. In user interfaces, where in many cases, fundamental interactions should take seconds, this aspect is highly important, and it is the essential reason to use such graphical material, like an illustration. (*Visual Perception. Icons vs Copy in UI*)

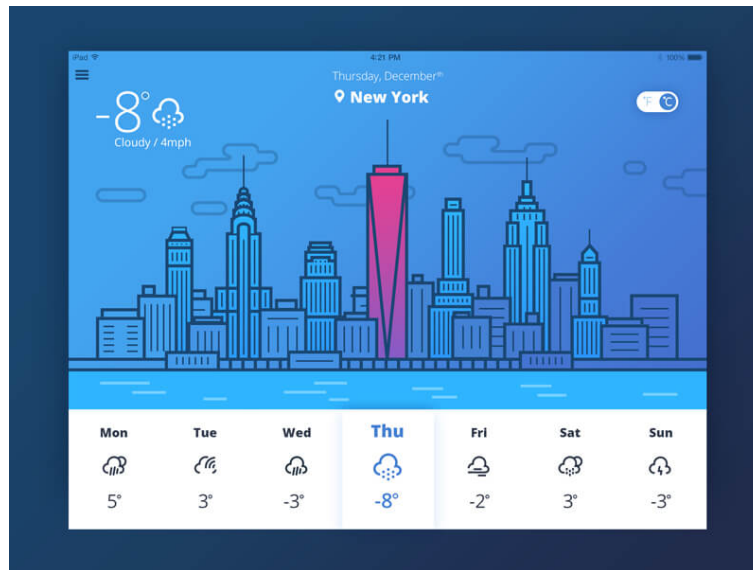


FIGURE 2.10: How illustrations provide a user with the necessary information about weather, *Visual Perception. Icons vs Copy in UI*

2.4.2 Brand perception

It is vital to stand out in the world of tight competition because otherwise, people may not even try your product. In a search for a great experience, customers are willing to switch brands until they find one that meets their needs, which is why creating and maintaining unique brand matters (*Why Brand Perception Matters and How You Can Measure It*).

Business is built on customer relationships, and brand perception is that thing that distinct businesses from each other. In already mentioned *Designing for Emotion 2011*, Aaron Walter explains the importance of having a brand's personality. In order to engage the audience emotionally, businesses must let their brand's personality show. As he says:

“When you present your brand’s personality clearly, your audience can relate to it as if it were just another human. It creates empathy and helps your audience see a better version of themselves. Humans want to connect with real people. We forget that businesses are just collections of people—so why not let that shine through? Emotional design turns casual users into fanatics, ready to tell others about their positive experience. It also offers a trust safety net that encourages your audience to stay when things go awry.”

Today's consumers share their opinions and experiences widely, and their peers trust them when it comes time to buy or pass. In fact, after having a positive experience with a company, 77% of customers would recommend the brand to a friend (*Why Brand Perception Matters and How You Can Measure It*).

The interface of the product is also a part of the brand, and the way it looks tells users a lot about the brand overall. It takes 50 microseconds for a website visitor to register a visual appeal (*Red Website Design*). If we are talking about a website, more than 46% of website visitors relate the website design to the brand/company (*Apium Tech*).

Designers from Tubic Studios share that illustration is a useful tool that works well in growing brand awareness and recognizability (*Functional Art*). Illustrations

are memorable and catchy. If they designed according to the target audience’s expectations, people could relate to the brand’s personality. Moreover, brands that create and maintain a unified illustrations style – the specific technique of using graphic design elements that of an individual designer – in their product benefit from people automatically associating the design with their company (*Why illustrations matter in UX*).

2.4.3 Gamification

Gamification is a design technique that includes using various game mechanics in the non-game environment, such as interfaces of websites or mobile apps (*Gamification in UX*). This does not mean turning a product into a game, and it is not related to game design directly.

First of all, the gamification brings the element of fun to the websites and applications. As it was mentioned before, people appreciate when the interaction with the interface brings pleasure and fun. Gamification brings challenges, achievements, game journeys and competitive spirit similar to video games that people know and love. One of the main points of gamification is that people like having a clear goal and even more to be rewarded after it is achieved (*Gamification in UX*). In *Designing for Emotion 2011* Aaron Walter, explains that when rewards are regularly achieved, with varying degrees of joy, it inspires curiosity in people to see what the next reward will be. This is a psychological phenomenon called variable rewards. As the author says, something similar happens when people play slots.

Designers from Tubik Design Studio share a few types of game mechanics that may improve UX. The first one is the “Challenge.” It is based on giving users challenges and rewards. Rewards, as mentioned before, are given in order to enhance the challenge effect. Another popular technique is “Journey.” This game mechanic aims to make the user feel like the real player starting the personal journey of product usage. For example, on the starting page, users can be offered an introduction to the features. When the journey continues, features are disclosed progressively as the users become more experienced in using the product. Figure 2.11 illustrates such a Journey in the music app.

This is useful because users will not be afraid to make a mistake and will understand how to use the interface more quickly and without guessing (*Gamification in UX*).

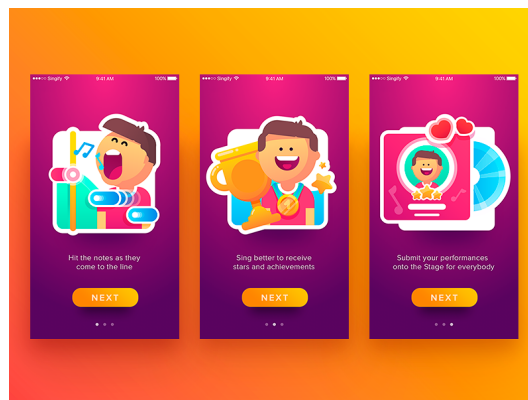


FIGURE 2.11: “Singify” app tutorial, *Gamification in UX*

According to the Tubik Design Studio (*Gamification in UX*), characters and illustrations play a crucial role in interface gamification. Such things as rewards, badges and stickers are designed to give users an emotional feeling of achievement. Characters integrated into UI became the core element of communication and interaction with a user. They deliver different messages making the interactions more user-friendly and human-like. (*Functional Art*)

2.4.4 Storytelling

Storytelling is the method of uniting different blocks of information into one story to set a strong connection between the parts (*Functional Art*). And not only separate blocks, but the whole interface can be designed to tell one story.

According to the publication of Vanessa Boris on Harvard Business Publishing (*What Makes Storytelling So Effective For Learning?*), there are a few reasons why storytelling can benefit businesses. The first one is that stories make people more open to learning. Good stories build familiarity, trust and surprisingly effective in conveying complex ideas. Apart from that, stories are more engaging than a dry statement of data points of abstract ideas. Furthermore, storytelling can help in learning because stories are easier to remember. Organizational psychologist Peg Neuhauser shares that things that people learn from a well-told story are remembered longer and more accurately than learning derived from facts and figures (*What Makes Storytelling So Effective For Learning?*). All this makes storytelling a useful tool for explaining abstract ideas, which is essential for digital products.

In UI design, storytelling often goes along with an illustration. Designers from Tubik Studio call illustration a well-checked tool of creative storytelling (*Functional Art*). The properties of the illustration were mentioned above. Similarly, they work in storytelling. A story explains what the product is about so that as many people as possible could remember and relate to the product. An illustration is used to enhance this effect. It can be used to support a block of text (Figure 2.12) or depict the overall idea of the product (Figure 2.13) in particular parts of an interface. The main point is to set the bonds between the user and the product.



FIGURE 2.12: Illustration supports a block of text, *How To Use Illustrations To Elicit Emotions*

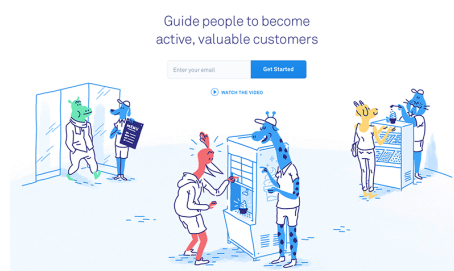


FIGURE 2.13: Illustration depicts the idea of the product, *How To Use Illustrations To Elicit Emotions*

2.5 When does illustration work?

Custom graphics, like an illustration, require a skilled designer and some time resources. That is why it often seems more logical for the product owners to use stock images. It is cheaper and does not require extra human and time resources. However, unfortunately, images from a stock library may not always suit the task.

Nielsen Norman Group presented a study *Photos as Web Content* in how users approach website images. In one example, a school page shows a generic photo of students next to important info about the school's application process. The blue dots indicate the parts of the page that users looked at (Figure 2.14).

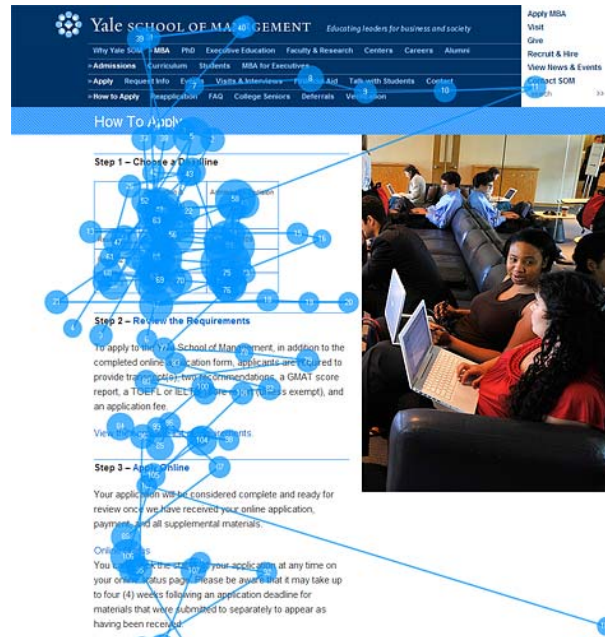


FIGURE 2.14: Eye-tracking result on the Yale School of Management page, *Photos as Web Content*

It turned out that the photo of students was mostly ignored in favour of the more important application information. As the author explains, people did not pay attention to the photo because it was irrelevant to their primary need - school application. In the same study, researchers eye-tracked the user's interaction with the team page of the company. The page consisted of a long list of employees, where each employee had a short biography and a photo (Figure 2.15).

In this case, the user spent 10% more time viewing the portrait photos than reading the biographies. The photos were more relevant to the users because it was a faster way to become familiar with the team members.

This study concludes that users pay close attention to graphics that contain relevant information. In order to have an impact, the image must directly represent critical elements of the content. That is why stock images (both photos and illustrations), in most cases, may not work well. The imagery, like an illustration, works when a designer creates it specifically for the problem that he is trying to solve.



FIGURE 2.15: Eye-tracking result on the Freshbooks page, *Photos as Web Content*

Chapter 3

Interviews with designers

This chapter contains interviews with the designers who work in the industry and has the experience of using illustration in their projects. The goal of these interviews is to figure out how illustration is used by designers today, how it is created and how it affects HCI. In order to discuss the illustration, for each interview, there was picked a specific project of the interviewed designer.

3.1 Interviews

Greg Gunn

Greg Gunn is a professional illustrator and animator from Los Angeles. He graduated from Otis College of Art and Design in 2006 and has been working professionally since then. As Greg says, he spent most of his career as a creative director for tv and advertising, then transitioned into branding and graphic design role as director and now he spends most of his time working with the education company *TheFutur*. He had an opportunity to work with such companies as Disney, Sony and Facebook. In this interview, we will talk about the collaboration with Facebook, where they created a set of animated stickers for the Facebook Messenger interface. (*Stretch, The Dog*)

Interviewer: Oles Kozak

Interviewee: Greg Gunn

– **Greg, could you tell us about that project where you developed a set of stickers for Facebook Messenger?**

– Sure, the project is called “Stretch.” Facebook approached me to create a unique set of 24 animated stickers for their Messenger app. These stickers were intended to show emotions, and with my affinity to dogs, I wanted to do something dog-based. So I came up with this idea of a stretchy dog, and I needed to communicate all these different emotions through this character. Apart from that, stickers should be a short looping animation. So this was another challenge to depict a particular emotion through a small and also short animation. Moreover, they needed to communicate whether you are from the U.S. or Europe, so they needed to be universal regardless of the language.

– **How did you pick the list of the emotions for the stickers?**

– It was our collaborative work. I came up with a list of some emotions, shared it with the Facebook team, and they made a few suggestions.

– **How did you choose the style of illustration for this project? Is it your own style, or you developed it particularly for this project?**

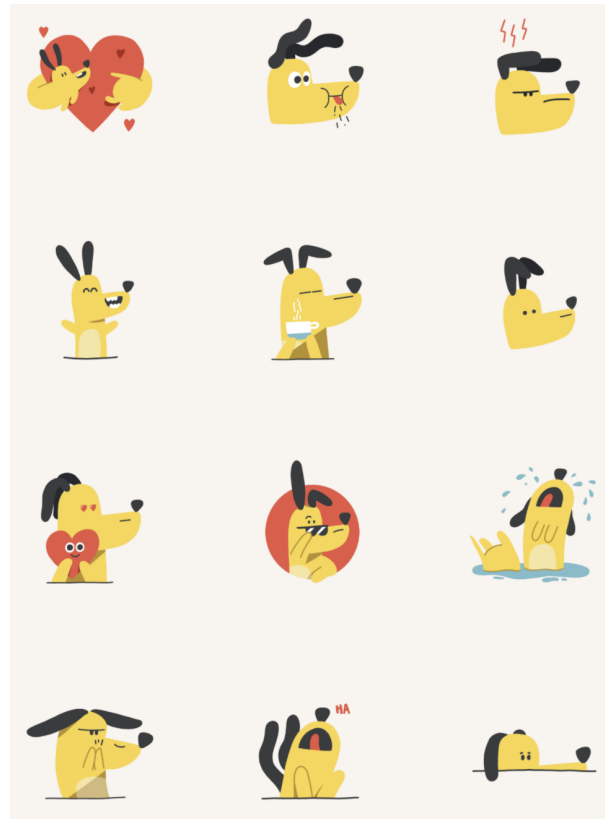


FIGURE 3.1: Sticker pack “Stretch” for the Facebook Messenger, *Stretch, The Dog*

– You know, it is tough to understand what your style is. I can get the essence of my style, but I am not intended to go into a project and say, “Hey, now we will use my style,” that is not how I think. Every creative person has their own way of solving a problem, and in the case of Facebook, I assume they did like something about my work and decided to collaborate. I am not sure if my style had anything to do with it, but I try to approach every project with an open mind and blank canvas and try to understand what is the best way to solve this problem.

– **You previously said that you created 24 stickers. How did you work on the plot of each of the stickers?**

– So I had a list of emotions that we needed to communicate. Keeping this in mind, I decided to explore the character and test if the idea of a stretchy dog could work with the emotions that we needed to communicate. I started sketching a character with each of 24 emotions, then handed sketches to the client and made some adjustments if needed. From sketches, I moved to visual rendering and started creating static illustrations of the stickers. After that, we looked over again and decided that this was a good style and approach.

– **Did you or a Facebook team measure somehow the value that illustration brought?**

– I think that the Facebook team might measure it somehow, but I personally do not have access to that. In general, the value of these emojis is that you can use them, regardless of the language you speak or culture you come from, to communicate something that might be hard to say.

– **In your experience, why is an illustration a useful tool?**

– In my opinion, it is all about communication. I would say communicating in a way that removes any language barriers. If we modern people, of course with sort of exaggeration, look back at some paintings, we can follow the stories and understand what they were trying to communicate with that story. So I think this is the most potent aspect of the illustration.

– **In your opinion, what is the benefit of illustration in digital products - sites, applications, etc.?**

– I think it all goes back to communication. You can use it to explain something that is not real, or that is very abstract, like networking software. Often time, you will see an illustrated diagram that depicts it, and without this illustration, it would be tough to understand how something like that might work. So, in my opinion, illustration is an excellent tool for storytelling, communication and explaining complex ideas.

Oles Kucherenko

Oles Kucherenko is an art-director at “Bambuk Design Studio,” which is based in Lviv. Before the art-director role in the studio, he worked as a head of advertising in one of the largest networks of gas stations in Ukraine, “Concern Galnaftogaz.” In “Bambuk Design Studio,” they usually work in three main directions: web design, branding, and advertisement (video and key visual production). They provide services for medium and large businesses. They had an opportunity to work with “OKKO,” “Perfectial,” “Celentano,” and other Ukrainian businesses. This interview is based on the project “Bambuk Design Studio” did for “Hivecell.” (*Ricker Lyman - website and illustrations*)

Interviewer: Oles Kozak

Interviewee: Oles Kucherenko

– **Could you tell us a little about the project that you did for “Hivecell”?**

– “Hivecell” was opening a new office in Lviv, and they needed to create a website. So they reached us with a request to create a website, and they had a particular desire to include original illustration into it. This was a vision of the product owner, and it was vital for him to depict this vision on the website through the illustration. This request matched our capabilities because we could do both web design and illustration, so we began our partnership. One of our tasks was to figure out how to communicate this vision through the illustrations on the website. An illustration is a potent tool if your task is to communicate something. They already had an idea of a robot in their logo, so the first thing that we did was talking about the story of the company. What is that robot? What does it symbolize? What does it tell about the company? Based on such questions, we could understand more clearly the story of the company and start embodying the vision into illustration.

– **How did you choose the illustration style for this project?**

– The product owner liked the 50’s, and this epoch was the primary visual reference of how he described his idea behind the brand. As he said, people back then saw a happy future that technical progress was about to bring. Nowadays, the technical progress achieves even greater heights. Almost every day we hear about new technologies, but unlike the ’50s, most of the people are not that inspired by it. So he wanted to embody this feeling of inspiration by technology in the illustrations.

Keeping this in mind, we started looking for some references that would be visually correlated with the previously mentioned theme and, based on them, started building a style.

– How did you work on the plot of the illustrations?

– We started brainstorming around the idea of '50s and inspired by technology. We produced around 20 concepts and picked the one which the main idea was to combine modern technologies like wi-fi, blockchain and others with the society of the '50s. Again, we wanted to emphasize the idea of inspiration by technology. Based on this, we started sketching the first variants of illustrations. Eventually, we decided to show one modern technology per illustration. For example, in one illustration, we depicted a call box from the '50s but with the equipment for a video call. Thus, we created four excellent illustrations where technologies were put into the surroundings of that epoch.



FIGURE 3.2: Blockchain farm, *Ricker Lyman - website and illustrations*



FIGURE 3.3: A video phone call, *Ricker Lyman - website and illustrations*



FIGURE 3.4: Big data apiary, *Ricker Lyman - website and illustrations*



FIGURE 3.5: Hivecell foundry, *Ricker Lyman - website and illustrations*

– In your experience, why is an illustration a useful tool?

– An illustration is a very many-sided tool. You can tell with it a story, a specific feeling, depict some object or communicate an abstract idea. In terms of art, you can convey a sense of aesthetics, pleasure, dynamics or statics, and even depict some different reality. It allows us to tell stories and elicit emotions. In the web, for example, illustration is usually used for that kind of task.

– **In your opinion, what is the benefit of illustration in digital products - sites, applications, etc.?**

– Again, there are several directions where illustration can be used. For example, illustrations like infographics can quickly explain a complex or an abstract idea. Also, the illustration can elicit emotions and make an impression. For example, if I would go to a website and there would be only text, I would hardly read it. Even if the author wrote a pretty descriptive text, it would take more time and resources for me to comprehend it, and it probably would not make the impression that the illustration could make. In other words, illustration is a fast means to convey information and make an impression.

Oksana Pleten

Oksana Pleten is a UX/UI designer at “KeenEthics,” which is based in Lviv. She graduated from the Ukrainian Academy of Printing, where she studied graphic design. Before the role of UX/UI designer at “KeenEthics,” she worked as a brand manager and graphic designer. Now at “KeenEthics,” they provide a service in web development, mobile development, chatbot and artificial intelligence. They work with startups and companies which need to cover any product development necessity. This interview is based on the project “Attendance,” which was created for the internal needs of “KeenEthics.” (*Attendance*)

Interviewer: Oles Kozak

Interviewee: Oksana Pleten

– **Could you tell us a little about the “Attendance”?**

– “Attendance” is our internal product, which was created the “KeenEthics” team. It allows our employees to manage their schedules more conveniently. It includes informing about vacation days, sick leaves and day off, checking information about their salary coefficient and other functions. Before this app, employees had to request their manager; the manager had to consider the request and enter all the data manually to a Google spreadsheet table. With such an approach, managers had some issues with completing all requests on time and without mistakes. Moreover, the complexity increased with the growth of the company. So we started developing the app. One of our hypotheses was to keep the interface simple, but it was the opposite and required an increase in functionality. However, despite this fact, I wanted the interface to be visually appealing. As a designer, I love to make tools for improving someone’s workflows, which not only working well but gives users a pleasurable experience. And in this case, our employees would use this tool everyday. That is why I decided to use illustration in this project. We came up with the idea to make our employees the heroes of the illustration. Before the New Year, I took the photos of them without them knowing, and drew on top of the photos, so it became sort of collage. When they saw it for the first time, they were astonished to see themselves with funny Christmas hats in the app. They shared this illustration, and sometime after, some of the team members texted me and said that they were

pleasantly surprised to such an illustration. After this, we decided to create such illustrations for each holiday.

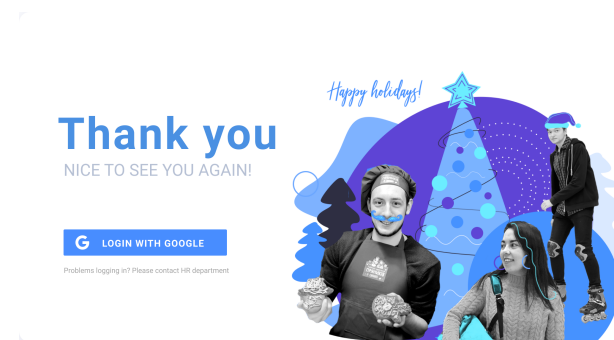


FIGURE 3.6: Illustration on the starting screen of “Attendance”, *Attendance*

– **How did you choose the illustration style for this project?**

– Before making this illustration, we had already created the colour palette and the logo for the app. Based on these colours and the shape of the logo, I developed the minimalist style, which included similar colours and rounded shapes. My main goal was to create a collage illustration of our team members, so I used this style along with the photography.

– **In your experience, why is an illustration a useful tool?**

– I like it when even in serious products there is a moment of some game. Designers also call it gamification. Trello, for example, has its own character Taco, which sends emails to the users. This character is a moment of pleasant surprise in the interface. The communication with such a mascot elicits emotions and makes users more attached to the product. By the way, here at “KeenEthics,” we also had a character called “Keeny.” “Keeny” sent postcards to our clients, which made a good impression on them. So yeah, illustration is useful when an emotional response is needed. Another aspect is that illustration can accelerate the perception of content. In books, for example, illustration helps readers to comprehend and memorize text faster. A similar principle works in UI design as well.

Chapter 4

Influence of illustration on HCI

4.1 Study hypotheses

In Chapter 2, we described how people perceive illustration and how it affects interaction with interfaces. From this, we have derived several key properties of illustration:

- Illustration triggers a memory and makes content more memorable;
- Illustration elicits emotions and makes an experience more pleasurable;
- Illustration accelerated perception of the content;

To derive any conclusions about the influence of illustration on HCI, we need to conduct research and test these properties as hypotheses on real users. For this, we provided usability testing.

4.2 Methodology

Usability testing is a popular observational methodology used by UX researchers to uncover problems and opportunities in designs. According to Nielsen Norman Group, usability testing helps to identify problems in the design of the product, uncover opportunities to improve and learn about the user's behaviour and preferences (*Usability Testing*). In this study, we are interested in exploring user behaviour when interacting with illustrations in an interface. The core elements in usability tests are the facilitator, the tasks, and the participant. A facilitator guides the participant through the test process. She gives instructions and asks a participant, using an interface, to perform tasks. While the participant completes each task, the facilitator observes the participant's behaviour, listens for feedback, and asks follow-up questions.

Usability testing can be either qualitative or quantitative. In this research, we will be testing three above mentioned hypotheses, and for this, we will use both approaches. In order to test the first and the third hypotheses (the ability of illustration to make content more memorable and accelerate perception), we will use a quantitative approach to collect metrics that describe the user experience. To test the second hypothesis (the ability of illustration to elicit emotions and make an experience more pleasurable), we will use a quantitative approach to get insights into the specific case when the participant interacted with illustrations.

4.3 Creating mockups for the testing

Considering all the above-mentioned information, we created two mockups for this testing. The first mockup consists only of text, and the second one consists of the same text and the illustrations. Each of these two mockups will be tested on two separate groups of people. We separated participants into two groups and developed two mockups in order to measure and compare the probable difference between the collected metrics. This will allow us to make conclusions about illustration influence and obtain more reliable data.

4.3.1 Tasks for participants

To conduct this testing, we created two tasks for the participants. Each mockup consists of two pages, one task per page. In the first task, each participant must read all the information on the first page with a limit of 50 seconds. This task is designed to measure how much content a participant will remember over time. We assume that participants who tested the mockup with the illustrations will remember more of the content. After comparing the measurements of all participants, we will be able to evaluate the first hypothesis. Also, after this task, we ask participants to rate from 0 to 10 how much they enjoyed interacting with the first page, and explain their decision. Thus, we want to learn how pleasant the experience was and what they liked the most in it. We assume that participants who tested the mockup with the illustrations will have a more pleasurable experience. In this way, we test the second hypothesis.

The second task is to find the right article on the second page. Here we are intended to test the third hypothesis. Each participant receives the phrase that describes what the article is about. The phrase does not contain any word from the title of the article. It is made so that a participant could not find the right article just by scanning similar words. We assume that participants who tested the mockup with the illustrations will find the right article faster than participants from the text-only group.

4.3.2 Layout of the pages

As it was mentioned before, both of the mockups consist of two pages. For the first task, we took some general info from this thesis and put it into the first page. All info is in Ukrainian since the mockups will be tested on Ukrainians.



FIGURE 4.1: The layout of the first page for the first task, *Mockups for the testing*

For the second task, we generated nine random titles for the articles on the second page.

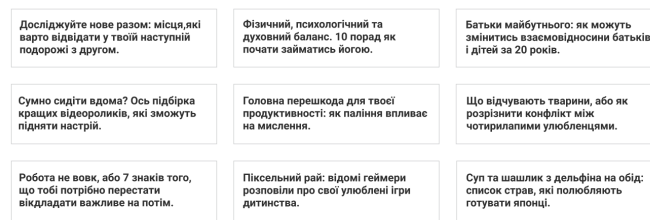


FIGURE 4.2: The layout of the second page for the second task, *Mockups for the testing*

To make a transition between the first and the second page, we added a block that contained an explanation text for the second task and the button that led to the second page.



FIGURE 4.3: The modified layout of the first page, *Mockups for the testing*

These pages composed the first mockup. In order to compose the second mockup, we need to create illustrations that would depict the content of these two initial pages.

4.3.3 Creating illustrations for the second mockup

In the first interview of Chapter 3, Greg Gunn shared his approach in creating illustrations. It included brainstorming ideas, sketching, validating and creating the final variants of illustrations. This approach was used to create the illustrations for

the second mockup. The main goal of the illustrations on these pages is to depict the content it is used with. For the first page, we created seven illustrations.



FIGURE 4.4: A set of illustrations for the first page of the second mockup, *Mockups for the testing*

The top illustration was made for the intro block. In this block, we give a context of what this page is about and who the author is. That is why this illustration depicts the head of a character and a diploma. The next three illustrations were made for the second block. This block is about how research is conducted in this study. The first sub-block of text is about learning-related works (Chapter 2), the second one is about interviewing designers (Chapter 3), and the third is about drawing illustrations and testing hypotheses (Chapter 4). The third block on the first page informs about three facts about an illustration from the thesis. The first one is that illustration elicits emotions, the second one is that emotional experiences tend to stick in long-term memory, and the third is that an illustration is perceived faster than a text. We can see the relevant illustrations in Figure 4.4.

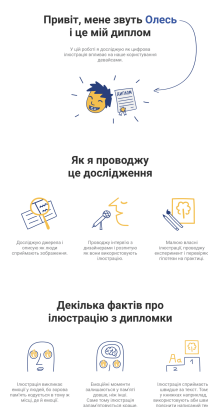


FIGURE 4.5: The layout of the first page with illustrations, *Mockups for the testing*

For the second page, we needed to create nine illustrations for the articles. The main task here is the same as on the first page – depict the core of the text, in this case, the title of the article. For each article, we picked a phrase that describes it

best. Namely, “places checklist,” “calm yoga,” “pets’ conflict,” “future parents,” “top videos,” “harm from smoking,” “big procrastination,” “games of childhood,” “Japanese man.” Based on these phrases, we developed the illustrations for each article.



FIGURE 4.6: The illustrations for articles. Part 1, *Mockups for the testing*

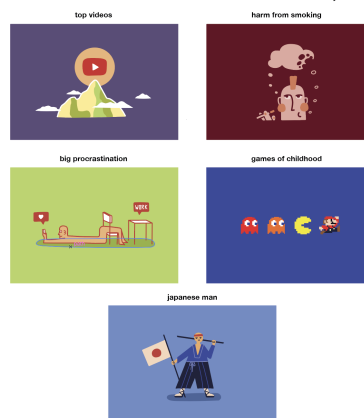


FIGURE 4.7: The illustrations for articles. Part 2, *Mockups for the testing*

These illustrations composed the second mockup. Having both of these mockups, we can test conduct the testing.

4.4 Testing the hypotheses

In this testing, our goal is to verify the following hypotheses:

- Illustration triggers a memory and makes content more memorable;
- Illustration elicits emotions and makes an experience more pleasurable;
- Illustration accelerated perception of the content;

For this, we are asking our participants to do two tasks that were mentioned previously. In this research, we will have 40 participants divided into two groups, 20 people in each. The first group will test the mockup that contains only text. The second one will test the mockup with text and illustrations. In order to create equal conditions for all participants, it was necessary to create a testing scenario.

4.4.1 Creating a testing scenario

At first, we needed to create an intro where we would explain what the study is about and what we want the participants to do. It is essential to say the same phrase

to each participant, as this will avoid mistakes in the formulation of the task and, accordingly, each participant will receive the same instruction as everyone else.

Also, in order to collect metrics in both tasks, we needed to provide some additional screens. In the first task, we are counting for 50 seconds while the participant is reading the content on the first page. To do correct measurements, we added starting screens with instructions at the beginning of each page in both mockups in order to enhance the intro and explain how to start the test. When the participant is ready, he says the starting phrase, and the facilitator starts counting. After 50 seconds, the facilitator asks questions about the info from the first page and evaluates them with the following metrics:

- 3 points - if the participant thoroughly recalled the content, with the possibility of making a mistake in some words;
- 2 points - if the participant overall recalled the essence of the content;
- 1 point - if the participant recalled some of the words from the content;
- 0 points - if the participant did not recall anything;



FIGURE 4.8: The instruction on the first page

In the second task, apart from the starting screen, it was necessary to add some elements that would end the task. For this, we made each article clickable. Before doing the task, each participant is told to find and click on the right article. When the participant says a starting phrase, the facilitator turns on a stopwatch and waits until the participant clicks on the chosen article. After this, the participant is redirected to the page where it is said if the chosen article was correct. When the participant clicks on the article, the facilitator stops a stopwatch and notes the results.

Чудово, відповідь правильна.

На цьому експеримент закінчений, я дякую тобі за участь.



Упс, відповідь неправильна.

Нічого страшного, помилитись це ок. На цьому експеримент закінчений, я дякую тобі за участь.



FIGURE 4.9: The ending screens of the second mockup, *Mockups for the testing*

Prepared all this, we developed the testing scenario:

1. Tell the intro to the participant and head to the mockup;
2. Wait till the participant reads the instructions on the first page, and when he says the starting phrase start counting for 50 seconds;
3. After the participant has finished reading, temporary hide the mockup and ask him the following questions about the info from the first page: "Do you remember what the thesis is about," "Do you remember any of the points that described how this study is conducted?," "Do you remember any of the facts from the thesis?". Evaluate the answers according to the metric and note the results;
4. Bring back the mockup and ask the participant to read the description of the second task and, if ready, head to the second page;
5. Wait till the participant reads the instructions on the second page, and when he says the starting phrase turn on the stopwatch;
6. After the participant has picked an article, stop the stopwatch and write down the time;
7. In order to evaluate how pleasurable this experience was, hide the mockup and ask the following question: "How pleasant was it to read the information from the first page? Rate it from 0 to 10. 0 is very bad, and 10 is excellent. Explain your choice". Note responses;
8. After this, ask the following question to find out how the participant found the right article: "What helped you to find the right article?". Note responses;

4.5 Analysis and results

Overall, we conducted testing with 40 participants divided into two groups, 20 people in each. All of them were interviewed according to the testing scenario. All the gathered data can be found in *the Thesis Research*. At first, we tested how well the participants remembered the content of the first page. This test is aimed to verify the first hypothesis.

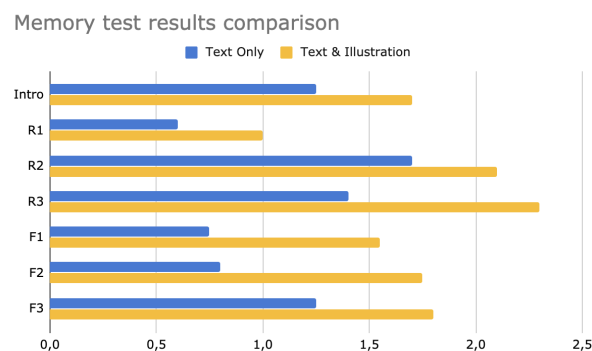


FIGURE 4.10: The results of the memory test

Figure 4.10 shows the result of the first task. Intro, R1, R2, R3, F1, F2, F3 stand for the parts of the content that the participants were asked to recall (R - stands for Research, and F - stands for Facts).



FIGURE 4.11: Corresponding parts of the content

On average, the group that tested the text-only mockup memorized content for 7.5 out of 21 points. Meanwhile, the group tested the mockup with illustrations memorized content for 12.2 out of 21 points. Based on the visualization in Figure 4.11, we can see that participants, who interacted with the illustrated mockup memorized more than the participants from the other group. After completing both tasks, we questioned the participants about their experience. During the interview, 12 out of 20 participants who tested the mockup with illustrations indicated that the illustrations helped them to perceive the content better. Moreover, 5 of them emphasized that they were able to recall the content only with the help of illustrations.

Furthermore, 10 out of 20 participants who tested text-only mockup indicated that an illustration or a picture should be added to the mockup. 7 of them said it would help them understand the content better. When we asked the participants who tested mockup with illustrations to describe how they remembered the content, most of them said that at first, they recalled what illustration depicted. After it, they were able to recall the content. Based on these results, we can see that illustration enhanced the memorability of the content.

Another interesting moment is shown in Figure 4.11. As we can see, blocks F1 and F2 in the text-only mockup were memorized quite poorly. However, in contrast, the participants who tested the mockup with illustrations memorized them almost 49% better. During the interview, some of the participants who tested text-only mockup highlighted that they needed some visual explanation in the "Facts from the thesis" section, in order to comprehend the content more accessible. F1 and F2 blocks described such abstract things as an emotion. As we can see from the results of the memory test, the illustration was a useful tool in explaining complex ideas.

In the second task, the participants were asked to find the article that was about pets. Here we measure the speed of perception of participants from both groups. This test is aimed to verify the third hypothesis.

According to the results, participants who tested mockup with illustrations on average spent 12,5 seconds to find the correct article, whereas participants who tested text-only mockup spent 18,3 seconds on average. After finishing the task,

we asked the participants from both groups, which helped them to find the correct article. Based on their answers, we derived several patterns of search. 15 out of 20 participants who tested the illustrated mockup said that they found the article by the illustration. All of them had a similar pattern: they scanned images first, and when found something relatable to pets, they read the title and then made a choice.

In contrast, the participants from the opposite group had the following pattern: they were reading every title, one by one, till found the keyword that was relative to the pet topic and then made a choice. What is also interesting, some people read differently: 14 out of 20 of them read in row manner from left to right, 4 in a column manner from left to right, one in diagonal from left to right and one randomly jumped from title to title. As we can see, the majority of the text-only group makes much more effort to find the correct article. In this case, the illustration allowed the participants from the first group to reduce the search circle, thereby increase the speed of perception.

After finishing both tasks, we asked the participants how pleasant it was for them to read the information from the first page. Apart from that, we asked them to rate their experience from 0 to 10, and explain their rate. Doing this, we are aimed to verify the third hypothesis.

According to the results, the participants who tested text-only mockup on average rated their experience at 7,05, whereas the participants who tested the illustrated mockup rated at 8,9. Even though the ratings can be subjective, we asked the participants a few follow-up questions in order to find out what they considered pleasurable in their experience. 11 out of 20 from the text-only group liked the typography and that the text was well-structured. Despite this, 8 out of 20 participants said that the page lacked some imagery and colours. In contrast, 12 out of 20 participants who tested the mockup with illustrations indicated that the illustrations made the reading more enjoyable. They highlighted that illustrations created a positive feeling and complemented the content. Based on these results, we can see that illustrations increased the pleasurability of participants' experience.

Chapter 5

Conclusion

In this study, we analyzed the influence of illustration on HCI. We explored how people perceive an illustration, figured out the relation between an illustration, emotions and memory, and how this is used in creating interfaces. Further, we conducted interviews with the designers and asked them how they use an illustration. Based on their answers, we were able to understand the process of creating illustrations, the tasks that can be covered with illustrations in UI design, what value it can give to the products. Finally, we conducted usability testing with 40 participants in order to measure the impact of illustration and obtain data from which we could analyze the influence of the illustration on HCI. Based on the results of this testing, we verified three hypotheses:

- Illustration triggers a memory and makes content more memorable;
- Illustration elicits emotions and makes an experience more pleasurable;
- Illustration accelerated perception of the content;

The results of the research can be found in *the Thesis Research*. The mockups on which testing was conducted can be found in *Mockups for the testing*. This study is dedicated to clarifying that an illustration is a functional tool for communication rather than a decoration for an interface. Moreover, as findings show, illustration has some properties that can significantly improve HCI.

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