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Digital Pasts Analog Futures

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DIGITAL PASTS ANALOG FUTURES

Ph.D. dissertation

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1. Subject of the dissertation: handwriting

People write for countless reasons. They keep diaries, leave messages, write reports, articles, love letters, memoirs, wills. The reasons are endless and essentially irrelevant to our research. What makes writing really important for us is the self-expression it involves. The means of writing can be many and varied, but it is handwriting that makes this ancient form of communication a true work of art. It makes it authentic and, beyond the message, it transmits and preserves the personality of the writer/creator.

Handwriting is one of the foundations of human communication. This fully analogue method of action and knowledge transfer is perfectly associated with and has supported the analogue nature of man for thousands of years. Like so many other things, handwriting is significantly affected by digitalisation. It is changing the way we use our tools, speeding up everyday events, creating new 'values' and marginalising old ones. The question arises: will we remain analogue beings in the new environment or will we be transformed into some other, as yet unknown, form of existence by digitalisation? Can the new digital values, without background, replace the analogue values with real physical action and real tools?

If we take only handwriting as an analogue human activity, we can conclude that this analogue activity has much more added value than we might think. We tend to trivialise it and consider it as obsolete, replaceable, abandonable. Why do we need it if we can type anything on our computer or dictate on our phone? Handwriting has played a key role in the history of mankind and its role today is undeniable in the development of the human mind, part of communication and of human existence in general. In addition to democratising the transmission of knowledge, it continues to play a role in the development of the human mind from childhood to old age. In our research, we have explored the impact of handwriting from the perspective of several disciplines and have made sure that its future needs and preservation are justified.

Although our research focuses on handwriting, its present and future, it is not the only analogue value that needs to be preserved in order to maintain our analogue existence. We

have identified several such values, and our aim is to develop a general methodology to enable us to preserve other values beyond handwriting that are proving necessary.

Will we remain analogue beings in the future? Can we preserve handwriting for the future, and if so, with what tools? Can we do something to improve the perception of handwriting? Can we find a way to communicate the impact of handwriting on humans, human development and human existence? Can handwriting be adapted to our significantly changed environment?

These are some of the questions we seek to answer through an examination of the present of handwriting and the predestinations generated by the results.

Figure 1. Etelburg r.feather modular writing and drawing tool

Source: Etelburg - Designer: Gábor Megyeri

The Etelburg r.feather writing and drawing tool, shown in Figure 1., is part of the rainbow family, which exemplifies the tools that can be created by combining the digital and analogue worlds. This development project can be seen as one of the motivations for this research, or rather as phase 0 of it. The devices are described in more detail in section 4.2.3 and in sections 4 and 5 of the Annex.

1.1 Initial ideas – motivation

Our hypothesis is that handwriting has a future and will play an important role in the digital life space, providing a link to our analogue existence. The contribution of handwriting is necessary for the development of the human mind in our accelerated, increased commuter life-space. This is tangible in our present and, experiencing and seeing the evolution of technology, it will become even more so in the future. We do not know exactly the impact of the dynamic development of digitalisation on human existence, but we can already recognise that our analogue existence is being replaced by a digital existence. This fundamentally threatens our culture and the values we have created and developed over time, both at the community and individual level. (Turel et al., 2019) We consider handwriting to be a prominent analogue value, the correspondence of which to the digital environment is important.

1.2 Research mission

Although we believe in our ideas, at the beginning of our research we also thought it was possible that our results could lead to the conclusion that classic handwriting is no longer compatible with our digital lives. Our preliminary research has already shown that there is a demand for the preservation of analogue values at both community and individual level, and confirmed that there is a need for this beyond the demand. Accordingly, we set ourselves the goal of formulating the stationery of the future using a combination of marketing research, design and design research tools, and we will manufacture the product(s) to confirm the above. Then, also as part of the research, we will validate our hypothesis in the market.

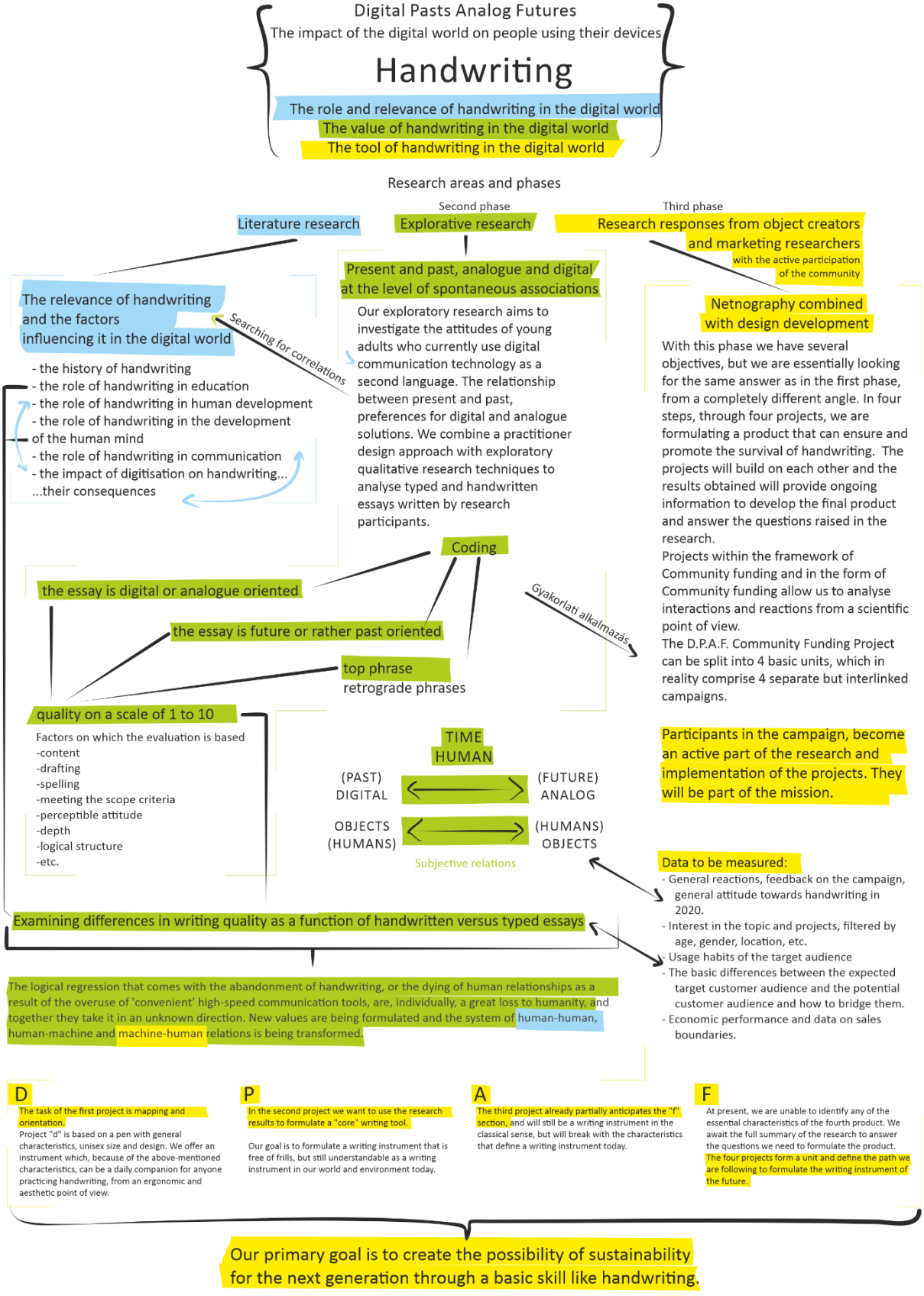
Our research focuses on the present and future of handwriting. Our aim is to preserve, maintain and, if necessary, reinterpret it. We do not see handwriting as an ancient but now obsolete form of communication, but as an analogous human activity and value that plays a prominent role in the proper development of the mind and its maintenance with age. Our four-phase research combines marketing research, design and design research tools to examine the results of each phase. From this multi-disciplinary, multi-perspective research, we expect to be able to formulate and create artifacts that validate our ideas both economically and theoretically. Although digitisation seems to have reached such a scale that the decline of handwriting is irreversible, we believe there is a real need to preserve it and we think that the way to do so can be explored. Our aim is to preserve the present and secure the future of handwriting for future generations.

In order to achieve our goal mentioned above, we are exploring the possibility of adapting handwriting to the changed circumstances, including rethinking its tools.

The unconventional nature of our research stems from the combined use and combination of different paradigms. The relationship between the paradigms we use together is horizontal and based on a respect for each other across disciplines. In doing so, we create a co-creation process combining marketing research, design research and design creation. Our marketing research follows a largely empirical realist paradigm, while our design approach and design research typically follow a pragmatist paradigm (Henseler and Guerreiro, 2020).

We believe that combining our marketing research approach with qualitative research tools and design thinking, connectivity and product creation leads to economically viable results. At the end of our complex research, we not only simply release one or more products, but also validate them in the market through a series of community funding campaigns. This process ensures the theoretical, scientific and practical contribution of our research.

Figure 2. Digital past - analogue future - research concept and map



Source: own edit

2. The context of the research: analogue - digital world in the light of human communication and writing - literature research

Figure 3. Digital past - analogue future - areas and themes of literature analysis

Literature analysis	
Fields examined	**Topics researched**
Scientific fields investigated: -marketing science -education -medical science -communication -management -history -design philosophy	Examining the role of handwriting: -historical aspects -educational aspects -impact on the development of humanity -role in the development of the mind -role in the development of communication -the impact of digitisation on handwriting -the present of handwriting -the future of handwriting

Source: own edit

2.1 Main topics: handwriting as a basic human activity and the consequences of abandoning it

We conduct literature research in several disciplines (marketing, education, medicine, communication, etc.)

- Our primary objective is to define the role of handwriting and to clarify the research question.
- We examine the past, present and future potential role of handwriting in education, from a historical and scientific perspective. To do this, we first looked at research that details and clarifies what handwriting means to humanity and why it is relevant in the digital world of today and tomorrow.

- We will examine the mental health/educational consequences of abandoning handwriting, the negative effects of which are supported not only by research based on educational case studies, but also by medical research using handwriting as a therapeutic and/or indicative tool for the treatment and detection of mental disorders and illnesses.
- By learning about the tools of writing, past and present, we want to formulate the potential writing tools and culture of the future.

The literature review of the different disciplines is an important part of the research, playing a role in confirming our preliminary hypothesis.

2.2 Analog - digital world in the context of human communication and writing

The development of personal communication and speech dates back to prehistoric times. This method was only suitable for simultaneous communication, but it also allowed for a certain level of mass communication. Writing, as we understand it today, dates back to the 8th century BC. As a result, knowledge could be recorded outside memory.

The age of printing began in 1450 with the invention of Gutenberg, a technology that took communication to a new level and made data, information and works of art widely available to the public, previously only available to the privileged. From the 1850s onwards we can speak of the real age of mass communication. By this time, technology had developed to the point where the mass press could be created. The turn of the 19th and 20th centuries saw the emergence of mass entertainment, with the development of technology for recording and broadcasting sound, images and moving images. Their intensive use started in the 1950s with the mass take-up of television and became truly global in the 1990s with the civilian access to satellite systems. By the 2000s, the internet became widely available and began its conquest. According to research by Morse et al. published in 2010, between March 2000 and April 2009, the number of people in the US who regularly used the internet increased from 46% to 79%. This compares to 92% of adults aged 18-29 in 2009 (Morse et al., 2011).

Today, with an internet-connected mobile phone, we can keep in touch with everyone we know, do our shopping, control our smart home, manage our finances, check the homework

or do the work we've been given… This makes us very flexible about where we are in space and time, but how long is this useful and when does it become a constraint?

Accelerated technological development has completely changed our culture of objects, our habits of using tools, turning it in a direction that is close to an unreachable point.

Technological progress, and progress of all kinds in general, is a fundamental, indispensable part of life. It is unreasonable to fight it, but we must remain able to understand and control it. If we look back at our development over the course of human history, we can see that we have undergone a greater, more intense technological transformation in the last 25 years than in the thousands of years of our history before that. Unfortunately, the human race has not evolved neither physically nor mentally at such a pace and scale. Technically, we are lagging behind our own technology in every aspect, whether it be processing, algorithmic ability, memorization, data management, etc. Emotional thought processes and the decision mechanisms and creativity that they drive are factors that have not yet been flawlessly reproduced and digitized, but recent developments in artificial intelligence are already providing our supercomputers with algorithms that function at a similar level.

The most thought-provoking manifestations of this fact are robots with humanoid features. In November 2017, Hanson Robotics Ltd.'s "product" Sophia, a robot with advanced artificial intelligence and sophisticated sensor systems, was granted Saudi Arabian citizenship (Chikhale, Gohad 2018).

In order to create our amazing technical achievements, we necessarily had to use the knowledge we had acquired and accumulated over thousands of years. Thanks to this knowledge, we are able to create meaningful order, or design (Papanek, 1971, Hippel, 2005): to create an algorithm, bake a cake, write an article, paint a painting, compose a symphonic piece, design an object, etc. These processes have been the result of the brain and hand working together over a long period of time.

Future generations will have to cope in a world beyond their comprehension if we cannot pass on to them our most important values from the past, because everything we have achieved is based on this knowledge. From birth to adulthood, every human mind must reach a level of development determined by its environment in order to be able to live a full life. It's

a natural and fundamental process, it's the skills and knowledge that make each person an individual, but there is a common ground that everyone must have.

The democratisation of technology (Bijker, 1996), the widespread availability of communication technology tools, the intense presence of everyday communication spaces in the digital space, have a strong impact on people, especially the young and the incoming generations. Should we take note of this trend? Do we turn our heads at their seemingly distorted actions and ways of thinking, blaming them on technological progress?

2.3 The relationship between the digital world and people in 2020

Pressing the controller and other interfaces does not develop fine motor movements properly. Experiments have shown that children whose education has abandoned handwriting and replaced it with a digital interface and keys soon experience a decline in logical development. (Planton et. al, 2013) In 2016, the Finnish Ministry of Education abolished the teaching of cursive writing in primary schools and replaced it with typing in the curriculum, citing the difficulty of learning the excessive similarities between the characters used in Finnish cursive writing and the expectation that keyboarding would speed up thinking.

Spear-Swerling (2006) found in her research that handwriting plays a prominent role in children's development and learning. Its teaching is an essential tool to address a variety of learning difficulties, whether reading difficulties, writing difficulties, non-verbal learning difficulties or hyperactive behaviour. Based on her experimental experience, she has found that not teaching handwriting enough, or not teaching it at all, not only reduces learning ability, but also technically reduces the brain's logical and receptive capacity in all areas. From the perspective of logical development, this may even lead to children who have received inadequate handwriting instruction learning to write; however, they can learn how to write, but are unable to concentrate on the content in addition to writing, which can lead to further developmental and learning delays.

This is supported by the research of Stevenson and Just, in England, who compared handwriting with typing in several ways. They examined the roles of the two writing methods in children's education. Comparisons have been made on the effects on motor skills

development, writing ergonomics have been mapped and the benefits of both writing styles have been investigated. Although benefits were found in both cases, the need to preserve handwriting was confirmed. Their study uncovered some alarming data on the questionable skills of teachers teaching handwriting, and they conducted questionnaire surveys to find answers to the question: how prepared do teachers feel to teach handwriting? Of the 174 handwriting teachers surveyed, only 12% felt adequately prepared to teach handwriting. Of the students surveyed (no data), 23% reported difficulties with handwriting. (Stevenson and Just, 2014)

A similar conclusion was reached by Feder and Majnemer in 2007, who attribute later learning difficulties to the development of inadequate handwriting during the early school years. In their opinion, this phenomenon is not only significant during the academic years, but is also critical in adulthood. (Feder and Majnemer, 2007)

According to Chassiakos (2016), at the current level of digital literacy, there is an even greater need for proper teaching of handwriting, as it provides children with the visual motor development that is essential for the proper development of eye-hand coordination. Having these is an essential requirement for the ability to learn. These facts are confirmed and the direction and reasons for the Finnish efforts are refuted by articles published in Trends in Neuroscience and Education in 2012 (James - Enmgelhard, 2010) and by research published in 2017 by researchers at the University of Washington (Berninger, et. al. 2017)

The research by Aragón-Mendizábal et al. (2016), *"A Comparative Study of Handwriting and Computer Typing in Note-Taking by University Students."*, has successfully demonstrated that although students can take notes faster on a keyboard, the information is less retained in short and long-term memory, as measured by the results of subsequent tests. In the assessments, students who took their notes by hand performed significantly better in both the written and oral exams. This was also confirmed by Mueller and Oppenheimer in 2014 (Mueller and Oppenheimer, 2014) and by Mangen et al., focusing specifically on word fixation (Mangen et al., 2015)

In their study, Stacy and Cain pointed out that, in addition to the disadvantages mentioned above, another danger of note-taking on a laptop is distraction. Students find it difficult to

maintain their focus amidst the opportunities offered by technology. These were confirmed by Mangen in his research (Stacy and Cain, 2015; Mangen, 2018)

The impact of digitalisation on an even younger generation (2-13 years) has been studied by Roy and Tang. In their study, they looked at children as consumers. In addition to the effectiveness of electronic advertising for children (sales of children's clothing through e-commerce generated global sales of US$169 billion in 2018, projected to exceed US$239 billion by 2023), they also highlighted the extreme addiction that digitalisation is causing and the other dangers that children face in the digital space (inappropriate content, cyberbullying, data security threats, etc.). 9 out of 10 parents said their child was a digital addict. They said they would like to wean their child off digital devices, but that it was too late because of their addiction. Parents surveyed were concerned about the deterioration of their children's vision and the rapid pace of change in their children's behaviour when using digital devices. Even with this knowledge, parents let their children play with digital devices, fearing their reaction.(Roy and Tang, 2020) Research has identified screen time of over an hour a day as digital overuse in children. This is backed up by Orben's research, which also underlines that it does matter how the hour is spent (Orben, 2022) Parents have a critical role to play in controlling children's time in the digital space.

Berényi's research shows that while digitalisation makes our lives easier in many ways, excessive and inappropriate use of its tools can cause serious health damage. The most critical of these are eye damage, spine and muscle problems, and fatigue, which affect all age groups who use digital devices on a long-term basis, regardless of age. (Berényi and Sárvári, 2020) While Berényi focused mainly on computer use, Kim and Koo, and Derakhshanrad et al, observed almost identical effects among people who used their phones for excessive periods of time and in inappropriate positions. (Kim and Koo, 2016; Derakhshanrad et al., 2021)

Ramgade and Patil's study shows that the use of digital devices has an impact on both mental and physical health. According to their research, spending an hour a day in front of a screen increases users' unhappiness levels measurably, there is a significant link between social media use and the development of depressive disorders, and it also highlights the link between regular phone 'checking' and increased stress levels. (Ramgade and Patil, 2021) In contrast, they refer to the positive effects of the "digital detox", in which the primary aim is to

learn about and rediscover analog values and their positive effects to offset the negative effects of digitalisation.

In the digital world, everything happens fast, which has its advantages, but there are limits to human attention and ability to comprehend. While there is an incredible amount of data and information coming at the user, they may not be able to encode and absorb it, and valuable information may be lost. Ebbers also looked at this in the effectiveness of digital and analogue notifications. In their research, they looked at government notifications and concluded that the effectiveness of paper-based notifications is more significant than notifications sent via email or other digital platforms. This is partly due to the over-divided attention of users in the digital space. (Ebbers and van de Wijngaert, 2020)

Tablets and other resistive or capacitive digital surfaces are increasingly being used as teaching tools in classrooms. Guilbert and his colleagues investigated their effectiveness. (Guilbert et al., 2018) It concluded that literacy exercises on tactile surfaces can be effective, especially through interactive video exercises that develop appropriate letter formation skills. These can develop writing continuity at age 5. An interesting finding is that a higher percentage of preschool children who use their fingers to write on a tablet can spell letters more accurately than those who use a stylus to write on a digital display. (Patchan and Puranik, 2016) In our opinion, this is not the right direction for the development of fine motor skills, which is one of the most important contributions and values of handwriting at this age. The results of this study may seem promising, but handwriting on current digital devices distorts fine motor skills not only in children, but also in adults. (Alamargot & Morin, 2015; Gerth, et al., 2016; Gerth, et al., 2016) This is partly due to the glossy, low-friction surface of the displays and the glide of the writing instrument. The combination of these has a distorting effect.

Ose Askvik et al. studied young adults and 12-year-old children in a classroom environment. They wanted to see if there was a difference in brain activity between children writing by hand, drawing by hand and typing. HD EEG[1] was used to measure and analyse spectral evolution and amplitude changes over time. As a result of the research, it was found that during handwriting (on a digital surface) and drawing, brain areas responsible for memory

[1] https://en.wikipedia.org/wiki/Electroencephalography

development and encoding of new information showed activity, thus providing optimal conditions for learning. While writing on the keyboard, different brain areas showed activity. They conclude that handwriting and hand-drawing should be preserved in education, as they contribute greatly to optimising and facilitating learning. (Ose Askvik et al., 2020)

For us, these results prove the importance of handwriting and its preservation and transfer to the digital world. We feel it our task to formulate this potential toolsystem. Based on the results listed above, this future device should be able to simulate writing on paper with the original pen without any compromise. We also need to investigate whether there is a possibility to reverse engineer digital technology to approximate analogue writing.

2.4 Writing and communication - historical overview, links, differences

Writing and communication have accompanied the development of humanity, but it is important to note that while the means of communication are constantly changing, writing itself and its tools are more permanent and its role more profound than that of communication.

2.4.1 The history and role of writing

Before the development of writing, people stored all knowledge in their minds. Remembering everything and passing it on to others is very difficult. But writing can bring information to people who are distant in space or time. Writing was not invented by one man or one society. It was created by natural necessity in different times and places. There are many forms of recording thought, from simple pictographic writing to stylised signs, all of which have one basic thing in common. To create them, we need tools. These tools have changed considerably over time.

These objects have played a much bigger role in the history of mankind than we might think. They have given man the opportunity to reach where he is today through the development and evolution of culture. This would not have been possible without the

necessary tools at their disposal. **The keystone of our culture is the pen and its different versions.**

It has made writing, a tool for all areas of life, one of the most important tools of humanity.

The Sumerians were the first to record their history on clay tablets. This writing is known as cuneiform, which dates back more than 6000 years (Glassner and Herron, 2003) (Armstrong, 2014) Clay or wax tablets were carved with a so-called stylus, one end of which was pointed for writing, the other end was wide and flattened for correction.

The first "pen" and "paper" system originated in the civilisation of ancient Egypt. The pharaohs and high priestly scribes used fibres of chewed reeds, the ends of which retained the ink. These were used to paint their hieroglyphics on the wall or papyrus. As dye materials improved, more sophisticated tools began to be used. Tools that were split and sharpened at the ends replaced the reeds. These now formed the pathway to the bird feather.

The development of cursive handwriting in the Anglo-Saxon-speaking world dates back to the 14th century, but its use was far from uniform. The term cursive was developed in the 18th century, from the Latin word cursivus, which is a combination of the verbs curs- (to run) and currere. (Armstrong, 2014)

The bird's feather, which appeared as a writing instrument in the 16th century, was in every aspect much more advanced than its predecessors. Its flexibility made it harder to break under the pressure of its user and it was much easier to sharpen than its predecessors, so the quality of writing improved dramatically. It remained the dominant writing instrument until the middle of the 19th century.

From then on, the tip was replaced by a metal one. The so-called "dipping" nibs stored ink under the head, but the amount of ink was quite limited, so the nib had to be dipped in ink regularly while writing. This caused several disadvantages. During the writing process, great care had to be taken to ensure cleanliness, as the tip was prone to dripping due to its limited ink holding capacity and the capillary open due to the lack of a reservoir. As a separate container was also needed to store the ink, transporting the instrument was also difficult.

In 1884, an insurance agent called Waterman became the first person in the world to create a device that revolutionised handwriting. He was fed up with the disadvantages of dipping technology. Although he had neither engineering nor scientific qualifications, he combined the inkwell and the pen. He discovered that a significant, dynamic atmospheric pressure could be achieved by following the capillary theory. In the dispenser, which transfers the ink to the paper at the back of the nib, Waterman designed two or three conduits or channels to allow simultaneous movement of air and liquid. The air was placed where the ink was used (Chabeur and Valax, 2006)

This started a revolution, resulting in a writing instrument that forms a unique link between writer, pen and paper. The fountain pen's unique feature is the creation of elegant variations in line width that vary in direct proportion to the writer's hand pressure. Its line on paper is the clearest and most even of all the writing instruments. The fountain pen writes best on acid-free, ply paper. As each person has different handwriting characteristics, there is a wide range of pens available with different widths, cuts and nib materials.

2.5 Writing and the human brain - a medical connection

The relationship between handwriting and the human mind is complex. In addition to its key role in the development of the mind in childhood and adolescence, regular practice of handwriting provides a useful service for the rest of our lives. In the medical science, it has been successfully used as a therapeutic tool for various mental illnesses. Among other things, it helps to maintain focus, develop concentration skills, and maintain and develop fine motor movements and the processes that control them. Handwriting is not only an effective therapeutic tool for these conditions. Continuous exercise and monitoring of changes in older age is also of crucial importance because it can indicate the presence of Parkinson's or Alzheimer's disease, among others, at an early stage, for which early detection can be critical for treatment and preparation. As handwriting emerges from a system of cognitive abilities,

Alzheimer's[2] és a Parkinson's[3] diseases have a significant impact on it, resulting in disorders. (Uzun et al., 2015; De Stefano et al., 2019)

Such changes may include a reduction in letter size relative to the personal average, "micrographia", or a drastic change in the writing pattern. With advances in technology, researchers have found new tools to study changes in handwriting. Using digital analysis tablets, it was found that micrography is only a small part of the potential indicators. Changes in writing speed, continuity, acceleration, pen pressure, can all predict these mental abnormalities. (Thomas et al., 2017)

In this area, too, it has proved that there is a future and a reality in combining modern technology with traditional handwriting. Currently, there are limitations to combining analogue handwriting with digital analysis techniques, mainly due to the frictionless surface contact between the writing instrument and the writing surface. This distorts the measurement data compared to traditional paper-based writing, but it still allows deviations and changes to be defined with a high degree of accuracy. It would be a great help for modern medical science to find a technical solution to these problems and to create a tool that can model pen-to-paper handwriting without compromises and without affecting the effects of the pen.

2.6 Writing as consumer behaviour

People write on a daily basis, with a wide range of tools at their disposal. In order to examine consumer behaviour in relation to writing tools, we need to distinguish between three categories with significant differences.

The first category **(I. Handwriting = routine)** is made up of individuals who use handwriting for practical reasons (typically on a daily basis), rather than for any of the above reasons or for the entertainment of writing.

[2] Alzheimer's disease is characterised by short-term memory loss in the early stages, followed by progressive cognitive and behavioural decline. Motor deficits are also common in Alzheimer's disease and in patients with mild cognitive impairment. (De Stefano et al., 2019)

[3] Parkinson's disease is a long-term degenerative disorder of the central nervous system, primarily affecting the motor system, which develops when dopamine production is steadily reduced. (De Stefano et al., 2019)

The second category **(II. Handwriting = ritual/self-expression)** includes those individuals who consciously use handwriting for pleasure, therapeutic reasons, or purely as a means of creation. (Rook, 1985, Otnes and Lowrey, 2004)

The third category **(III. Handwriting = collecting)** is for collectors. Within this category, we distinguish between collectors who use the pens in their collections and those who purchase pens either as art collectors or for investment purposes, but do not typically use them.

2.6.1 Handwriting = routine

Writing is still part of our lives, even in the digital world. Although we most often associate the digital world with speed, handwriting is still an excellent tool for making a quick note, not to mention its benefits, which are described in detail in the earlier sections of this chapter (2.).

As far as the device system is concerned, although higher-end, better-quality writing instruments - rollerball or fountain pen systems and notebooks made of good-quality paper - are also appearing in this area of use, this is not the norm. For these activities, we typically use cheap, poor quality, disposable, polluting pens that have a negative[4] impact on writing. The best-selling writing instrument of all time is the BIC Cristal, launched in 1950 by the French Société Bic S.A., which sold more than 100 billion copies in 2006. Production and sales of this ballpoint pen continue unabated to this day. The main raw materials used in its production are polyester, polypropylene, copper and other metals, which have a significant environmental impact. The disposable nature of the pen, combined with the use of different materials, makes it difficult to recycle. This is also due to the fact that there is no user attachment to these worthless objects, so they are discarded in large quantities and thus end up in the environment. (Chabeur and Valax, 2006)

In our opinion, this level of profit-oriented mass production cannot be the future of handwriting and these tools must be replaced by a more responsible way of thinking. This realisation was the main motivation behind the formulation of the characteristics of our product, which was the result of this research.

[4] The negative effects of ballpoint pens on handwriting are discussed in the next subsection.

It is important to look at consumer behaviour today from the perspective of sustainable and responsible consumer behaviour. This is as true for the analysis of the tools of writing as it is for writing in general. In the light of the above, it is in the self-interest of the speculators to recognise the adverse effects behind the low price. In terms of community interest, buyers need to understand the environmental impact of these disposable, partially and inconveniently recyclable devices. (Dudás, 2011) We believe it is important that this audience is aware of these impacts. We believe that our research can play a role in this educational process. Accordingly, this topic is an important element of the communication of our crowd funding campaign series, which is the final phase of the research.

2.6.2 Handwriting = ritual/self-expression

In the second category, we have included individuals who use handwriting even on a daily basis, but not for the reasons mentioned above. Members of this group use handwriting as a form of creativity and self-expression, for entertainment, to keep mentally fresh, for therapeutic or other purposes. There may be some overlap between the two categories, but the tools used by the Category II group are typically different from those used by the Category I group.

As mentioned earlier, low-end ballpoint pens have several negative effects on handwriting and on its experience factor. This is partly due to the fact that ballpoint pens use an ink with a dense consistency. As a result, when writing, the pen user has to apply significantly more pressure than with a fountain pen or rollerball pen. The ballpoint pen is closest in technology to the rollerball pen, but the latter uses a water-based ink with a significantly thinner consistency, typically used in fountain pens, which allows for a more comfortable, enjoyable use. Another reason why the ballpoint pen is not the best tool for writing is precisely because it is cheap. The production technology of low-cost, mass-produced ballpoint pens requires compromises, especially in terms of design. This results in ergonomically unsuitable pens and distorted writing, especially in the long term. The ballpoint pen is also present in the higher price range, and is part of the range of certain luxury brands. Their design is typically more ergonomically appropriate.[5]

[5] A felsorolt megállapításokat a tollak világában eltöltött éveink tapasztalatai alapján fogalmaztuk meg. Erre vonatkozóan, egyelőre nem találtunk tudományos értekezést.

Because the enjoyment of handwriting is important to people who fall into this category II, they are more easily persuaded of the benefits of using better quality extended lifetime products. These products are typically in the higher price range, but their added value and significantly lower environmental impact compensate for their higher price.

2.6.3 Handwriting = collecting

Category III includes collectors, who can be further divided into two groups in terms of consumer behaviour.

The first group includes collectors who accumulate large quantities of pens and use them on a rotating basis regularly. They do this for the pleasure of using different writing instruments with different characteristics. They are experimenters who enjoy trying out writing instruments, inks and papers with different technical solutions and qualities offered by manufacturers. There are those who focus on antique writing instruments and those who look for new forms and solutions. This group can also be differentiated in terms of price range, but they cover the whole range, so there is a target audience for each price category. This is the target audience for the "pen show" meetings and fairs that take place in many venues around the world. The largest of these events is "The Washington DC Fountain Pen Supershow"[6]. The event features more than 200 exhibitors welcoming visitors.

Within category III, the second group is made up of collectors whose collecting interests focus on stationery as an artefact. These collectors typically never use their pens and even take care to preserve them in their completely factory-new condition. The pens in these collections are from the upper mid-range to the highest price range. The most expensive pen ever sold[7] was the "Fulgor Nocturns by Tibaldi", with an auction knockdown price of $8,000,000 (USD). It was limited in one piece.

2.7 The social importance of writing

[6] https://www.dcpenshow.com
[7] https://wealthygorilla.com/most-expensive-luxury-pens/

The emergence of writing has played an important role in the development of culture. It democratised knowledge by transmitting it, creating a new form of communication. Today, in a world of digitisation, preserving this culture is one of the tasks of handwriting. Its regular practice connects us with our analogue past and our digital present, where the individual, we continue to exist as analogue beings. Although our environment has changed, becoming partly digital, the human condition has remained analog. **The next generations are expected to be born as analogous life forms and so they too will have to go through a journey of spiritual, mental development. An indispensable part and tool of this development is the acquisition and practice of handwriting. With this in mind, the social importance and role of handwriting is to help maintain analog existence.**

Handwriting was one of the tools that created our culture, now it is up to us to preserve it.

2.8 The links between handwriting and digitisation - a comparison of related empirical approaches

After the comprehensive literature review by discipline (Figure 2), I conducted a systematic literature search of the sub-disciplines of the research, where the aim was still to explore the position of handwriting as an analogue value and human activity in the digital world. Figure 4. presents the most typical disciplines studied.

Figure 4. Typically researched disciplines and major journals

	Psychology	Education	Neuroscience	R&D/Technology/ Engineering/IT
journals	-Frontiers in Psychology -Educational Psychology Review -Physical and Occupational Therapy in Pediatrics	-Reading and Writing -Educational Psychology Review -Journal of Occupational Therapy, Schools, and Early Intervention -SpringerPlus	-Trends in Neuroscience and Education -Frontiers in Neurology -Human Movement Science -Journal of Learning Disabilities	-Future Internet -Sensors -Interactive Learning Environments

Source: own edit

I have parameterised the search so that the results cover the main topics of the research. I conducted these searches by processing articles available from Scopus sources based on the

recommendations of Paul et al. (2021), García-Peñalvo (2022) and Mohame Shaffrill et al. (2021) (Paul et al., 2021; García-Peñalvo, 2022; Mohamed Shaffril et al., 2021) I also ran the search in Google Scholar with the same parameters. Although this search resulted significantly more hits (995 articles) than the Scopus search (73), in terms of proportions, both the number of articles partially related to the question and the number of articles deemed relevant were significantly lower. Using the same criteria, I also searched the PubMed database, but the number of hits was significantly lower than the results extracted from the other two databases. The number of articles found to be relevant to the research is high in terms of proportions, however, based on previous searches, these are typically considered to be repetitive results. The accessibility of these articles is very limited.

2.8.1 Handwriting and digitisation

In the first approach, I researched the aspects of handwriting and the digital age with the parameters and results detailed in Figure 5.

Figure 5. Research figures from the focused literature - comparison of results Scopus/Google Scholar/PubMed

handwriting digital age from 2010				
	Data source:	Scopus		PubMed
Search terms:	Keywords:	*handwriting digital age*	*handwriting digital age*	*handwriting digital age*
	Years:	*2010 to latest (2023)*	*2010 to latest (2023)*	*2010 to latest (2023)*
Data retrieval:	Data source:	*Scopus*	*Google Scholar*	*PubMed*
	Search result:	*[0] No error*	*[0] No error*	*[0] No error*
Metrics:	Reference date:	*2023*	*2023*	*2023*
	Publication years:	*2010-2023*	*2010-2023*	*2010-2023*
	Citation years:	*13 (2010-2023)*	*13 (2010-2023)*	*13 (2010-2023)*
	Papers:	***73***	***995***	***25***
	Citations:	***859***	***104559***	***0***
	Citations/year:	*66.08* (acc1=37, acc2=25, acc5=11, acc10=1, acc20=0)	*8043.00* (acc1=974, acc2=929, acc5=669, acc10=356, acc20=145)	*0* (acc1=0, acc2=0, acc5=0, acc10=0, acc20=0)
	Citations/paper:	*11.77*	*105.08*	*0.00*
	Hirsch h-index:	*15* (a=3.82, m=1.15, 627 cites=73.0% coverage)	*140* (a=5.33, m=10.77, 63310 cites=60.5% coverage)	*0* (a=5.33, m=10.77, 63310 cites=60.5% coverage)

Source: own edit

As detailed in the table below, the search found 73 articles, of which 41 were classified as irrelevant to the research. I classified 13 articles (SR) as partially/moderately relevant to the question asked and 19 articles (R) as relevant. All the articles rated SR and R were fully read and processed. After detailed analysis, two of the articles rated as relevant were found to be partially relevant to the research.

Figure 6. Articles processed in the focused literature search

Source: own edit

2.8.2 Studies directly related to the research

Alamargot and Morin's (2015) research has come to the foreground in several of my research phases. They investigate the impact of new technological devices that appear in classrooms on children's development. Examples of such devices are keypads, virtual keyboards, digital pens, styluses, and the use of the fingertip as a writing instrument on a digital surface. (Alamargot and Morin, 2015)

The use of keyboards has revealed three different types of disadvantages compared to handwriting.

1. There is a constant distraction while writing, as children regularly switch their attention between keyboard and screen. In contrast, with handwriting, attention is continuous, as writing takes place at the site of motor activity.
2. The lack of graphomotor activity during typing has an impact on intellectual development, which also affects the development of reading skills.
3. During the early, low, non-skill level of keyboard use, children expend unnecessary energy finding characters on the keyboard.

Ren and Zhou (2011) draw attention to the impact of digital styles/pen size on writing performance. The ergonomic characteristics of writing instruments are significant. (Ren and Zhou, 2011)

Several studies have shown that for children aged 4-11 years, only handwriting has positive benefits compared to typing. Compared to the developmental level of handwriting learners, keyboard-only learners show a two-year delay in fine motor development.

In later years, when children receive special training in typing, an increase in writing speed appears to be a positive advantage over handwriting.

Handwriting is a complex activity that takes years to learn. Its teaching typically starts at the age of 5-6 and studies show that children develop the final skill by the age of 14-15. During this time, movement control during writing changes from a retroactive mode to a proactive mode.

The smooth surface of the digital screen and the writing instruments, which typically have a plastic tip, do not make an ergonomically suitable combination. For this reason, the rate of fine motor development is reduced compared to using a pen/pencil on traditional paper. This is mainly due to different friction and pen pressure factors. The use of digital interfaces in the classroom for handwriting has different effects on lower and upper grade students, but for the reasons mentioned above, the negative nature of these effects is well demonstrated. (Alamargot and Morin, 2015) The same conclusion was reached by Guilbert in his 2019 research. (Guilbert et al., 2019)

Sheedy et al. (2019) investigated the readiness to learn handwriting of preschool children who are "digital natives", i.e. children who have been raised in a fully digital world (born after 2010). The results show that although the children tested reach an acceptable level, they are significantly below the norm. In addition, incorrect, static pencil grip was observed, which makes it difficult to learn to write. (Sheedy et al., 2021) Pencil grasp types were also studied by Odokuma and Ojigho. They distinguished five primitive, two transitional and two evolved types. (Odokuma and Ojigho, 2019)

Research by Van Drempt et al (2011) highlights the fact that handwriting researches focuses primarily on children and individuals with developmental or mental health problems. They emphasise the importance of increased handwriting practice for mentally healthy, older (65+) individuals. The study involved 30 subjects, typically highly educated, all over the age of 65 (avg. 75.1 years). They were mapped, pen grip method, writing speed, writing style, writing pattern and misspelling rate were examined. Both digital and analogue tools were

used to collect data. The results will assist in the medical rehabilitation application of handwriting. (Van Drempt et al., 2011)

Stacy and Cain (2015) focus their study on note-taking habits, examining the advantages and disadvantages of different methods, digital and analogue, in comparison to each other. With regard to digital note-taking, they highlight three advantages: speed, readability and searchability. However, there are also unexpected negative effects of digital tools in the classroom. Most notably, they highlight the distracting effect of these tools, which can negatively affect students' performance. In addition, as in several other studies on the subject, the lower level of retention of knowledge during digital note-taking is highlighted. (Stacy and Cain, 2015) This is confirmed by Piolat's research, although it is important to note that the technological development over the last 18 years has been rapid, but the basic premise remains the same. (Piolat et al., 2005) Stacy and Cain's research shows that the rise of digital technology in education requires a rethinking of the methodology of knowledge transfer and the way students learn. (Stacy and Cain, 2015)

The same conclusion was reached by Ose Askvik (2020), who investigated the importance of handwriting in classroom teaching. Using sophisticated medical brain mapping tools, they investigated brain function during handwriting and drawing as creative activities. These results were compared with the results measured during typing. It has been proved that different brain areas are activated during the three activities: handwriting, typing and drawing. This explains, among other things, the differences in the depth of knowledge retention. The Committee calls for handwriting to be retained in schools, including through the use of digital tools. (Ose Askvik et al., 2020)

Mangen's 2018 research seeks to answer the question of what new digital tools for handwriting and reading are available, and to explore the positive and negative effects of their diffusion. One of the methods he studied is the so-called "Write to Read" method, which is the use of the keyboard instead of handwriting in the first-years' literacy phase. The

primary advantage of this is the audio feedback from the computer providing immediate pronunciation assistance. (Mangen, 2018)

The number of scientific studies available on the effectiveness of this method is low, and the results are mixed, but there have been studies that have found that children who received teaching using this method had better structured, clearer content in longer texts. (Genlott and Grönlund, 2013)

It has also been found that learning to write on keyboard can significantly facilitate the learning process of children whose motor development is slower than average. These observations, examined from the perspective of psychology and neuroscience, have been disproved by a number of researchers. Some of these studies have been reviewed in this paper. According to Mangen, the use of digital tools in classrooms is inevitable, but handwriting must be preserved. (Mangen, 2018) Bonneton-Botte and colleagues (2021) are exploring solutions to this problem, with their research looking at the use of digital tablets in initial handwriting instruction to good effect, but also highlighting the need for other methods. (Bonneton-Botte et al., 2021)

Jordan et al (2016) chose to combine digital and analogue methods as their research tool. They wanted to find out: what are the results of combining traditional and digital fine motor development tools with digital (LetterSchool) and analogue (pencil and paper) letter writing education? The experiment was carried out in an English-speaking school in Switzerland, involving two classes (experimental and control). A ten-week literacy programme was set up, during which the children practised every day of the week. On Wednesdays there were 40-minute sessions, while on the other days of the week there were ten-minute sessions. They concluded that there were advantages to each method used. During Wednesday sessions, they spent 10 minutes on fine motor development exercises, 20 minutes learning 2-3 lower case letters using the LetterSchool programme and 10 minutes on paper pencil exercises. They concluded that learning to write on a digital tablet with tracing contributed to the fixation of motor mechanisms, while handwriting and copying on paper contributed to the memory fixation of letters. In tests comparing the pre-experimental groups, no significant differences were found between the groups. However, a comparison of pre- and

post-test results showed a difference in favour of the experimental group compared to the control group. (Jordan et al., 2016) The result of this thinking can be a product that mixes the digital and analogue worlds at the device level and appears as a complement to the method. Such a tool could be, for example, the "Hybrid Stylus", capable of writing on paper and digitising it at the same time. The development of this tool is described by Campos in his scientific thesis. (Campos et al., 2022)

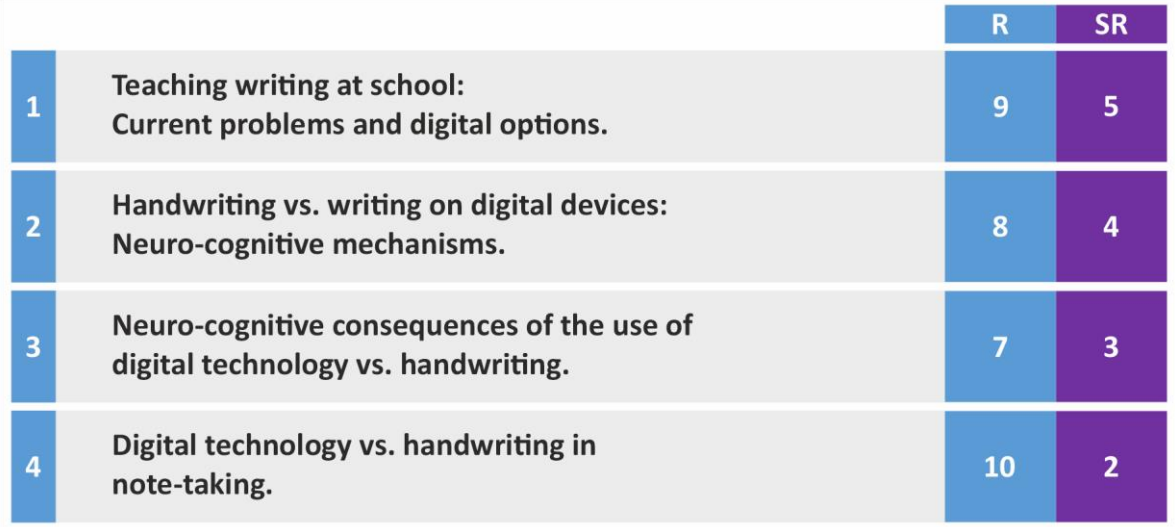
In their 2016 article, Kiefer and Velay provide an excellent summary of the state of handwriting in the digital age. They approach the issue from several aspects, so that, unlike previous articles, the reader is not presented with a single study on a specific topic, but with a truly comprehensive picture of the importance of handwriting in the digital age.

Nowadays, we can find statements predicting the end of handwriting on many platforms. New digital devices for writing are proliferating. In a world where children interact with digital devices almost from infancy, many are thinking of using them to replace handwriting and to base education on them and their use.

As simple as it may seem to apply these tools, compared with handwriting and its role in human development, the few advantages of digital tools are quickly lost, while their negative effects become clear, as we have seen in the analysis of previous articles. (Ren and Zhou, 2011; Alamargot and Morin, 2015; Jordan et al., 2016; Guilbert et al., 2019; Sheedy et al., 2021; Ose Askvik et al., 2020) Given the increasing use of digital devices in kindergartens, schools, workplaces and everyday life, it is important to examine their impact on literacy and cognitive skills in general. To that end, Kiefer and Velay (2016), in a paper published in Trends in Neuroscience and Education, approached the topic of handwriting and digital literacy from psychological, neuroscientific and educational perspectives. The figure below shows the four topics they cover in their study and the number of articles on the same or similar topics that were processed during the focused research phase described in this chapter. (Kiefer and Velay, 2016)

In the topic "Teaching writing at school: current problems and digital options", 9 (n=9) articles were rated as relevant and 5 (n=5) were rated as partially relevant, with the topic "Handwriting vs. Writing on digital devices: neuro-cognitive mechanisms." 8 (n=8) relevant and 4 (n=4) partially relevant, "Neuro-cognitive consequences of the use of digital technology vs. Handwriting" 7 (n=7) relevant and 3 (n=3) partially relevant and "Digital technology vs. Handwriting in note-taking" 10 (n=10) relevant and 2 (n=2) partially relevant articles. Figure 7 shows the topics covered in the study and how many of the articles (relevant and partially relevant) covered in the focused research touched on the topics.

Figure 7. The four main topics covered in the study.



Source: own ed., based on Kiefer and Velay, 2016

The teaching of handwriting in schools is facing new challenges thanks to new technologies. The basic aim is still to teach the analogue form of handwriting, but this seems to be increasingly challenging not only for children but also for teachers. (Stevenson and Just, 2014) For children with difficulties in learning to write, digital tools can be a useful alternative. According to a questionnaire study by Marquardt et al, 30% of female students and 50% of male students have difficulties in learning handwriting at a skill level. (Marquardt et al., 2016) This data is confirmed by Genna and Accardo's research, showing significant differences in the first class. (Genna and Accardo, 2011) Difficulties in writing appear in both the lower and upper grades. As children's time spent in the digital space has

already increased significantly before school, and as a consequence activities that develop fine motor skills (games, exercises, developers) are relegated to the background, the rate of development is not sufficient to make the learning process of handwriting unproblematic. The teachers interviewed continue to rate the teaching of handwriting in schools important and to encourage fine motor skills development in line with the new conditions. (Kiefer and Velay, 2016; Marquardt et al., 2016)

From a research point of view, this points to a potential direction of development; to find and define the tools that can be used to develop these skills, either by using digital tools or by combining them with analogue tools. There is a lot of research showing the need to learn handwriting, but at the same time children need to be equipped and prepared for the digital world. This includes the use of digital tools in education. The aim, in my opinion, is to develop this process and method in a way that enables and ensures the intellectual development that comes as a result of handwriting as an analogue activity. Its current toolkit does not provide this.

As several studies have reported, there is a significant difference between writing with pen and paper and writing on a digital display with a stylus or digital pen in terms of the cognitive motor features of the actions. (Alamargot and Morin, 2015; Kiefer and Velay, 2016; Guilbert et al., 2019) This significantly affects the intellectual development of school-age children. Different characteristics, but this effect can also be detected in keyboard writing. For both handwriting methods, a correlation has been shown with a slowing in the development of reading skills. (Kiefer and Velay, 2016)

In my research, I have reviewed several studies on the differences between note-taking by hand and by digital technology. The most striking phenomenon is the difference in knowledge retention. (Aragón-Mendizábal et al., 2016)

Although the increased speed of note-taking by university students in digital technologies is a positive sign, in the assessment, manual note-takers performed significantly better. This was confirmed and reproduced by Mueller, Oppenheimer and Mangen in their research. (Mueller and Oppenheimer, 2014; Mangen et al., 2015) Not all researchers share these

views, according to Parslow, with handwriting soon to be completely marginalised in higher education. Although he is aware of the importance of handwriting and its positive impact on the human mind, he believes that the benefits of digital tools will make handwriting unnecessary and it will remain a nostalgic act. (Parslow, 2013)

As a result of a systematic analysis of the literature on the different areas of research, the following conclusions can be drawn:

- The various disciplines, whether psychology, neuroscience or education, all support the importance of handwriting and confirm the importance of preserving it.
- Digital technology should be used not as a barrier but as a tool to achieve this goal. In the coming period, researchers and developers will have the important task of integrating analogue tools and methodologies in the digital space and tool environment.
- The combination of digital and analogue worlds can deliver the expected results, but it is of paramount importance to combine them in the right proportions.
- In addition to the use of digital-analogue interfaces, it is also necessary to preserve purely analogue, traditional methods, especially in the initial stages of literacy education. The effects of the technological tools used experimentally in the present context are lagging behind, and in some cases harmful, compared with the traditional use of pen/pencil and paper and the positive effects that result.

- The role of handwriting is crucial in the development of the human mind and in maintaining mental freshness in old age.

Both the comprehensive literature search by discipline and the systematic literature search have produced the same result: handwriting has an important role in the development of the human mind and this will not change with the development and advance of digitisation. Handwriting, drawing and creating with analogue tools have a neurological and psychological impact on the human mind that cannot be replaced by digital tools alone at present.

In the course of my research, I searched with particular attention for articles that refute this theory, but I could not find any that scientifically prove the dispensability of handwriting, whether in education or in everyday life. The skills-based use of the tools that have emerged as a result of digitalisation will make teaching, learning and working much easier in certain areas. This convenience and practicality may motivate us to let go of analogue activities that are more difficult to apply, but research shows that this may have negative consequences that are not yet or only partially known

2.8.3 Studies partly related to the question asked

Of the moderately relevant articles, 5 studies explore the relationship of children with dyslexia and dysgraphia to handwriting and the impact of the difficulties they encounter in developing fine motor skills.

Gargot and associates (2020) conducted a scaling experiment on handwriting involving 280 school-age children. Their research found that 5-10% of children are affected by dysgraphia, which is associated with language problems, various motor development problems, visual motor problems, coordination difficulties, and cognitive disorders such as attention disorders and hyperactivity. The aim was to detect these children. The tests were carried out using a combination of digital tablets and paper to measure different variables such as speed, pressure, tilt and time spent away from the surface during writing. The research detected 13 children with dysgraphia. It was also discovered that the physical characteristics of the digital tools and the writing experience they create affect the detection results, but the usefulness of the data they provide, which would be difficult to obtain using only traditional analogue tools (pen and paper), is undeniable. As a result of this research, it has been demonstrated that specific pressure variation-, as well as tilt-angle corrective iris training can be an effective therapeutic tool in the treatment of this phenomenon. (Gargot et al., 2020)

The research by John and Renumol (2018) also aims to help children with dysgraphia. They used an app for Apple iOs called "Dexteria" to help children with dysgraphia improve their skills. The app develops fine motor and literacy skills in three steps. The results are encouraging, but several directions for improvement have been identified. (John and Renumol, 2018)

-digital for analog-

Three other studies have examined the problems caused by dyslexia and the handwriting aspect.

Pagliarini et al (2018) used digital tools to map the difference in literacy skills between children with dyslexia and children with normal development. They found that children with dyslexia write more slowly. The reason for this was thought to lie in the rhythm of writing. (Pagliarini et al., 2015) This finding is also discussed and supported by Gosse and Van Reybroeck (2020) in their research (Gosse and Van Reybroeck, 2020) Sumner and Connelly (2020) they compared 32 dyslexic and 32 normal developing university students (age ~20 years). As a result, they discovered that not only did misspellings occur more frequently in the dyslexic group, but the quality of the essays written was also lower than that of the control group. (Sumner and Connelly, 2020)

Duda et al. (2019) used handwriting as a tool to support their hypothesis. 32 children (ages 9-15) participated in the study, 16 children with ADHD and 16 healthy children as a control group. All subjects participated in a 30-step developmental procedure. The children with ADHD were not on medication. The results show a developmental difference between children with and without ADHD. This explains the negative results seen in adults with ADHD. (Duda et al., 2019)

Araújo et al. (2022) conducted 50 independent experiments with 1525 participants to demonstrate the effect of handwriting on the development of visual recognition. As a result of the fine motor development of handwriting, it was found that with age, they are reactivated in the case of a visual recognition (e.g. graph interpretation) and support

sensorimotor recognition. Hence, handwriting has a significant role not only in fine motor development, but perhaps more importantly and, according to the present study, more relevantly in the development of perceptual ability. The results conclude that handwriting remains relevant in the digital age. (Araújo et al., 2022)

Rosenblum (2013) investigated anatomical, physiological and chemical changes in the brain with 80 subjects (age 31-76) using handwriting as a tool of experimentation. These changes have implications for the performance of everyday complex tasks, problem solving, conceptual thinking and decision making. Handwriting was found to be an appropriate tool for investigating these characteristics and variables and significant differences were found between the four age groups. (Rosenblum et al., 2013)

Begum et al. (2021) use person-specific handwriting as an analogue human activity to identify individuals in the digital space. To do so, they analyse and encode a context-independent writing image generated in real-time on a digital surface and turn it into data. The variables under investigation are writing time, pen pressure, position on the x- and y-axis, horizontal and vertical angle. Based on their results, they can identify users safely and reliably. (Begum et al., 2021)

Wu and Chang (2022) investigated the effectiveness of keyboard use in English language learning. Their primary research focused on word fixation. They used a special program that provides audio feedback on pronunciation after words are typed. Faster and deeper retention was observed for students, but difficulties and barriers were identified, mainly due to low keyboard using skills. (Wu and Chiang, 2022) It is important to note that the experiment was carried out with Chinese children, so it is worth highlighting the differences in the language's alphabet, which cannot be applied to other language areas.

Yamada et al. (2022) investigated hand drawing as a tool for early detection of Alzheimer's disease and dementia. Early detection in these diseases is very important, it can increase

the effectiveness of therapy. The drawings were made on a digital interface by the subjects. During the studies, subjects in the early stages of the diseases showed decreasing line drawing speed, decreasing pen pressure, increasing pauses and total duration. (Yamada et al., 2022)

Chang and Yu (2010) investigated the rate of developmental delays in children with different literacy difficulties compared to children with healthy development in learning Chinese characters. They used digital technology in their experiment. The data extracted was provided by kinetic and kinematic measurements. (Chang and Yu, 2010)

3. Research characteristics - Key features of the empirical research

3.1 Motivation of the research

One of the motivations for our research is the realisation that the digital world, in addition to making life more convenient and faster, has a strong impact on the preservation of knowledge. In this case, the question is not whether the community is responsible for the seemingly unstoppable spread of this phenomenon, or those who are creating digitalization at a breakneck pace day by day, but how we as researchers and creators can influence it to survive, how we can interpret our results, find metaphors that are meaningful to us and to the community. (Horváth - Mitev, 2015) Knowing the contribution of handwriting to the present of humanity, the need to preserve it motivates our research.

3.2 Aim of the research

Writing is much more than we think it is. Over the centuries, its everyday use has been so natural that we haven't thought about what it really means. Now, as we begin to move away from its use, we are increasingly experiencing the negative effects of its abandonment. As implicitly and naturally as we used handwriting in the pre-digital age, the social disengagement in everyday human life is as imperceptible in the digital present.

In his research, Fasoli draws attention to digital overuse and its negative effects. Digital overuse is presented as an action that subjects perceive as meaningless and worthless afterwards. Four in 10 internet users think they spend too much time in the digital space. These users gave detailed accounts of the negative impact on their social lives and human relationships. (Fasoli, 2021) Chassiakos and Stager also draw attention to this. In their study, they show, among other things, that 24% of teenagers who regularly use social media and the digital world believe that digitalisation has had negative effects. The reasons cited include the reduction or loss of personal contacts (45% believe that the use of social media platforms has a neutral effect, 31% believe it has a positive effect). (Chassiakos and Stager, 2020)

According to Hanin, 94% of the US population had a mobile phone in 2019. More significant than this figure is the fact that US teenagers spend an average of 7 hours and 22 minutes in the digital space for entertainment (social media, video sharing, communication platforms, etc.), not including the use of digital tools for school and educational purposes. (Hanin, 2021) These activities are too distracting and in return they convey little real, questionable value. Too much information overload makes it almost impossible to recognise these values.

In their research, Gui and Bühi identify digital communication and the social pressure to generate intensively in the digital space as the main cause of this phenomenon. (Gui and Büchi, 2021) In addition to leading to addiction, digital overuse causes psychological and social problems.

The recognition of this, combined with an understanding of the role of handwriting in life, inspired our research.
If we do not inherit the values of our past, of which writing is a key element, future generations may face many problems in the future, because they will not be able to understand their environment, as they will not have the skills that were necessary to create the present and which are essential to sustain progress.

Logical skills and development are only one part of the whole on which the acquisition and active use of writing has a significant impact. The effect of handwriting on mental hygiene and its role in communicating cultural values is of paramount importance at all stages of human life.

Although handwriting is the primary focus of our research, we were able to identify several other values through the research phases. During our exploratory research, the essay writers, unsolicited, articulated a number of analog values and described in detail how they view their present and future, and any fears they have about their eclipse in the digital world. The most outstanding of these, and also the most frequently mentioned analogue value, was the personal human connection. A detailed picture of how people in the digital world perceive the weakening of personal human relationships, which is also affected by the advance of digitalisation. The recent global pandemic has pushed humanity even deeper into the digital world and made physical, personal human contact completely impossible. The exponentially increasing number of scientific studies published on the subject indicates the seriousness of

the situation and reveals the mental and psychological impact of the purely digital environment on analogue man. (Boursier et al., 2020) We might think that this phenomenon has a real effect on those of all ages who have been socialised in physical communities, but Ye's research shows that this effect can be observed in all age groups and can cause significant harm even among the very young. Research shows that children separated by quarantine due to a pandemic are more likely to develop depression and stress symptoms, and that longer periods of separation lead to poor mental hygiene and withdrawn behaviour. (Ye, 2020) While it is undeniable that the global crisis caused by COVID-19 would have been more difficult to live and manage at both individual and community level without the achievements of digitalisation, the above observations also highlight the dangers of digitalisation. We need to look at what are the analogue values that need to be transmitted in some form into the digital world, or preserved and maintained as analogue values.

Everything seems to be faster in the digital world, but speed, while it can add value in certain situations, can be at the expense of quality.

This can be easily observed in the case of many objects whose services have not been abandoned, but the digital world has replaced them with a new set of tools that are of lower quality than the originals, but whose ease of use is better suited to a faster world. One of these is the vinyl record, which has remained a means of listening to quality music for a considerable time after the advent of competing technologies. It was first threatened by the advent of the cassette recorder, then eclipsed by the CD, and finally all but eradicated by digital music formats and music sharing sites. (Nokelainen and Dedehayir, 2015) In the mid-twenties, every other music playback device outperformed the vinyl record and seemed to have disappeared forever. Then, almost unexpectedly, the vinyl record and its playback devices came back to the foreground and are now enjoying an undisputed renaissance. It has also appeared several times in our exploratory research. As described in the essays, those who stick to vinyl recordings cite the higher quality of musical enjoyment as an argument and describe the more complicated use as a positive part of the process, rather than a negative.

The same can be said of analogue photography, although its survival is not so much generated by the high quality of the images as by the mood and fashion they convey.

The position of the printed book and reading has also changed dramatically as a result of digitisation. Nevertheless, printed books and the printed press remain, as do textbooks and printed learning materials, which continue to play a key role alongside digital educational materials. Delgado et al's research looked at the differences between digital and print learning materials, and the effects of students learning from print materials. They found that paper-based reading leads to better text comprehension than digital. (Delgado et al., 2018) While there are undeniable advantages of digital education, such as easier access or lower costs, there is a significant added value to paper-based reading. Reading and learning on digital platforms cannot and should not be excluded at this stage of digitisation (Sage et al., 2019), but paper-based reading should be preferred and should be given the opportunity to be used whenever possible. Modern digital book readers (e-readers) can simulate the characteristics of paper-based reading to a high degree. In a comparative study, Schwabe et al. investigated whether they could find detectable, significant differences in the use of book readers and print books. Based on data from 207 participants, they could not find any differences in text comprehension. (Schwabe et al., 2021) We see great potential in this hybrid technology, and its further development could lead to useful entertainment and educational tools.

The case of writing is very similar to the above. We need to find a way to match its maintenance and its tools. If necessary, a complete rethink of handwriting.

These findings have raised further questions, the answers to which may lead us to our research objectives.

Are we capable of reformulating and, if necessary, reinterpreting an analogue value such as handwriting so that it becomes relevant and applicable to those living in the digital world?

The tools of the digital world are specific and designed to maximise digital existence. All its peripherals serve speed and focus of attention in a practical way. Although some of the tools are derived from the analogue world, such as the digital style, they cannot fully replace the source device. (Patchan and Puranik, 2016) These devices, controllers and platforms have a negative impact on users, and their excessive use can lead to health problems. (Planton et. al, 2013) We believe we are capable of creating a tool, a system of tools, that can deliver all the

positive effects of handwriting to users, even in the digital environment. By combining the analogue and digital worlds, we can increase the added value of handwriting. We expect developments mainly in the fields of medical analytics and medical therapy and rehabilitation.

Will we find additional analogue values that are worth preserving?

As a result of our exploratory research, we observed several unsolicited, spontaneous expressions by respondents that indicated analogous values. The retrograde theme with the highest frequency was human contact. In an accelerated digital world, people are distancing themselves from each other, reducing communication and contact to a shallow, digital communication. Respondents are experiencing this, fearing the negative effects, but it is apparently difficult to reverse this process in an accelerated, over-digitised world. Unfortunately, such changes in human relationships in the digital environment represent a qualitative decline that affects our analogue way of life. Another interesting aspect of our observations is also identified with quality and the subsequent desire to do so. A large number of vinyl records, analogue photography, wristwatches and pens also appeared, which were generally described by respondents as offering a higher quality and a higher experience factor than their digital counterparts. These objects are enjoying a renaissance and are becoming increasingly popular. We are convinced that with more focused research, even with other research tools, we can discover further analogous values whose preservation can serve humanity. Analysing the analogue values that fit and work in the digital world can contribute to our research goal.

Can we create a general method that can be validated for values beyond handwriting?

We do not currently have a concrete answer to this question, but we believe that our research and design methodologies, applied in synergy, can help us to assess the characteristics of a given analogue value, to identify the properties that make it indispensable or of high added value for humanity. With this knowledge, we can determine whether the object, device and its use require modification for use in parallel with the digital space. If so, we need to assess the extent of the need for integration and reformulate the object.

How can we communicate to a digital society the need for handwriting and its contribution to the development and maintenance of the human mind?

In the previous chapters we have described the relationship between man and handwriting, and the role of handwriting in human development and existence. Unfortunately, the perception of handwriting has now sunk to the point where many people see it as a meaningless skill that is no longer needed in the world we live in. In our opinion, today the role of handwriting is even more important than ever. Given that we are still analogue beings, we need to preserve the characteristics and qualities that make us what we are. Examining the status of handwriting in the digital world, we wonder what future can be imagined for the remaining analogue values? What will they become, will they survive? This is particularly alarming in terms of human relationships, for example. Our aim is to educate people about the values of handwriting in relation to the human being and to secure its future.

3.3 The mission of the research

Our priority is to create the future of handwriting for the next generation. To achieve this, we are exploring the possibility of adapting handwriting to changing circumstances, including by rethinking its tools. The most important cornerstone and constraint of this idea is the maximum preservation of the values of handwriting. In order for handwriting to play its original role in the life of humanity, we need to look at how we can model and reproduce it in the digital world without compromise. The gliding of the pen on the paper, the flow of the ink, the hand position, the continuity and rhythm of the writing, the movements of forming the letters, the concentration it generates, the freedom of attention it gives, all contribute to the role of writing and its impact on the mind, body and spirit. This is what we need to preserve and, if necessary, reinterpret in the digital environment.

The evolution of the human mind must also take place in the modern world. The digitalised world's inter-ecological environment results in limited, distorted development. The signs of this can be clearly seen in the physical and mental changes, regression, or inadequate or incomplete development of skills in non-digital, but adaptive, distorted users of devices.

Today, the overuse of digital devices is a serious problem, with physical and sensory deformities and the emergence of new public diseases. General visual and hearing impairment, deformities of limbs and joints, spinal problems, mental and logical regression. (Kim, Koo 2016)

Once they become generalised, they can also lead to a diversion of the evolution of the human species. Throughout history, technological milestones have had a major impact on humans. For the most part, they have made life more 'comfortable', such as modern transport and mechanised manufacturing, but in all cases there have been negative consequences.

3.4 The scientific contribution of the research

Although in the business, product creation and sales world, rational and scientific marketing and the more creative and intuitive product design as an art/technology can work together, in the scientific world there are tensions between them. (Lindahl and Nordin, 2015) (Bauer et al. 2016)

The methodological toolbox of marketing science is broad, and it is worth exploring the interdisciplinary intersections that can further enhance its effectiveness and efficiency in our dynamically changing digital world. (Henseler and Guerreiro, 2020)

We believe that combining marketing science and design approaches can be effective and open new horizons for both fields. (Bloch, 2011) Researchers need to be open to these intersections between science and design and their combined application. (Kotler and Keller 2016) Design cues and design communication can be a vital form of non-verbal communication. This communication conveys meanings and emotions to the target audience in a clear and understandable way. (Henseler et al., 2021) The social science study of these intersections is important because in this process the designers, the first actors in the designer's interaction, encode a message into the products they design. These 'products' are also messages, non-verbal messages.

In his study, Henseler describes design as the process of developing a system, component or process to meet a desired need. To create these processes, designers apply, among other

things, the natural sciences, mathematics, and engineering to achieve the goal. In his study, Henseler describes design as the process of developing a system, component or process to meet a desired need. To create these processes, designers apply, among other things, the natural sciences, mathematics, and engineering to achieve the goal.
In design and other applied arts higher education, marketing is part of the curriculum. And rightly so, as marketing professionals and designers have similar responsibilities.

The purpose and mission of design research is to generate knowledge for the design of art and utility objects. (Henseler and Guerreiro, 2020)

We believe that marketing researchers should ask themselves how design and the approach of designers and design researchers can contribute to the further development of marketing science. Recognising and jointly applying this synergistic relationship could open up new horizons in the scientific and practical world of product and service creation. In the field of digital transformation and changing management practices, researchers can benefit from a more creative and innovative approach to design. They can contribute to the understanding of consumers and their behaviour, drawing primarily but not exclusively on empirical and theoretical developments. As a result, research efficiency can be increased and the product risk factor reduced.

Of course, the above is just as valid the other way round, marketing science can play a very important role in product design and development. Openness is expected and encouraged in both paradigms. **In our research, we follow this spirit.**

Through our exploratory research and netnographic analysis, the design process has changed significantly. In addition to the intuitive processes, the results of our scientific research have become a strong, supportive leg in the design process. We have developed concrete, interpretable concepts to formulate product features. This took our design process to a new level.
In addition to my research role, I am also actively involved in the project as a design artist. The research results have opened up a whole new dimension in terms of design tasks. They contributed not only to the formulation of the basic characteristics of the product, but also highlighted areas that required a specific design approach, making the design process more specific and definable. I believe that scientific research and approach has contributed to the

success of the product. It has helped us to understand the general needs that we could not formulate and integrate into the design by default or only by inference. Accordingly, not only our research can be considered multi-, inter- or transdisciplinary, but also the design and product creation processes themselves. By combining the empirical realist and pragmatist approaches, a well-grounded design process with a lower risk factor has been created. As a result of this hybrid process, we have created a market validated product.

3.4.1 Designer-researcher perspective

In the following, we summarise our introspection of design and research (Gould, 1991), which provides a slice of the work of design and research.

The defining products of my own design career are limited-edition writing instruments dedicated to a famous, historical person or event. This specialised, sophisticated branch of object design is about the design of limited edition, usually high-value objects and, perhaps more importantly, the research that goes into them. The products, produced in limited quantities, are made for a specific target audience. Be they collectors or new customers. These products have a prestige value for most manufacturers and therefore require special care in every stage of their creation, especially in the research that precedes everything. Past and present people, events, or anything that is commemorated or honoured can be divisive, thanks to the diversity of humanity. This requires making the most of the available research opportunities to ensure the success of the product. We provide these products with added intellectual content, which typically determines their value more than the materials and technologies used in their production.
The primary objective of research prior to the design of limited edition products with added intellectual value is for the designer to understand the subject matter in its fullest spectrum. By interpreting and processing it, you should be able to code a system of symbols and attributes to visually communicate the results you have found on a given topic. You must then create an essential extract that can be interpreted in the creation of the object. This complex system ('object') must meet basic user and client expectations and communicate the subject it pays homage to in a way that is meaningful to the target audience.

The question may arise as to whether objects created in this way can be classified as objects of everyday use, or whether they can be considered works of fine art in the classical sense.

In my opinion, these objects are something of a hybrid, thanks in part to the research that went into their creation. Since they are entirely functional objects, they can be seen as utilitarian objects, but they can also be interpreted as works of art or even visual literature, thanks to the stories and emotions they contain and communicate.

I think it is important to highlight my own research situation in an introspective way. (Gould, 1991)

This is just one example of design research, which can be extended to include the other disciplines mentioned above, depending on the nature of the task. In our view, the design research approach can add value to marketing research work and vice versa.

Figure 8. Montegrappa writing instruments dedicated to persons or other subjects.

Source:Montegrappa - Designer:Gábor Megyeri

Figure 8. shows some examples of writing instruments dedicated to people or other subjects. They are limited editions and their value is mainly determined by their intellectual added value. Their design, development and production require extensive research. 8a. The "Montegrappa - Hemingway Collection - the Writer" is part of a series that commemorates the work and life of Ernest Hemingway. The presentation of the writer and his work on a writing instrument, without using too obvious attributes (portrait, signature, dates), requires extensive literary, historical and artefactual (personal, period-specific) research.

-,, In order to visualise Ernest Hemingway's greatness as a writer, I had to examine, among other things, what made him a recognised author. In the course of my research, I came to the conclusion that his greatness as a writer lies, among other things, in the fact that the reader, regardless of social background or gender, can imagine himself in Hemingway's stories from the first page. To visualise this, I created an engraved picture frame on the top of the cap, which I had polished on the inside to form a mirror. The pen user looks into it and sees a reflection of himself. This symbolises the above statement.''-

Figure 8b. shows the pen designed for the Bugatti Chiron sports car, the interesting thing about it is that the pen had to be designed while the design of the car was still a top industrial secret, which could only be known and memorised in a short time (15 minutes). The pen was presented to the public alongside the car during its premiere in Geneva. Figure 8c. shows the Montegrappa Grappa Pen, which commemorates the famous Italian grappa brew. The Montegrappa Sophia Loren pen, shown in Figure 8d., is the result of one of the most complex design processes to create a pen in honour of an internationally renowned living person.

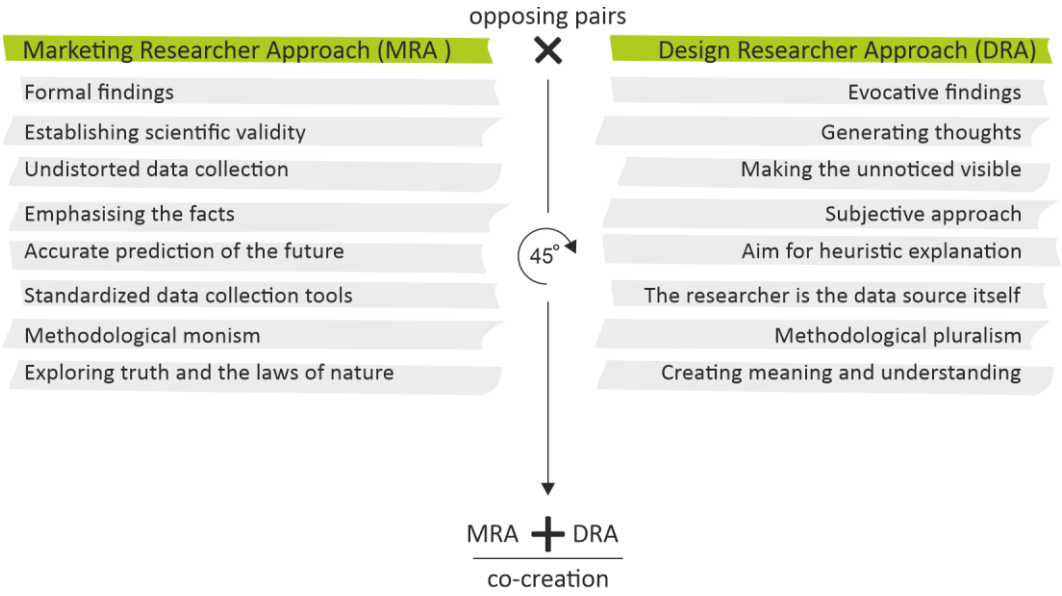
Marketing and design are in every aspect of our lives. Both are about customers and their needs. The common goal is to create better products and services. (Henseler et al., 2021) The future of the two disciplines lies in their synergy. Finding and managing the intersections in product creation is a joint task for the two disciplines. The marketing researchers and designers involved in our research were all positioned in opposing roles, creating a hybrid approach that facilitates the success of the research.

As a designer, a large part of my work involves various research processes. Whether it is historical background research, technological research, ergonomic research, sociological or

psychological analysis, the goal is always the same; to create the best possible product for the widest possible range of people. Marketing science plays a prominent role in the life cycle of a product. (Matthyssens and Johnston, 2006) Moreover, its objectives are the same as those of design. We believe that the combination of design thinking and approach and marketing science can add value to the success of a product and further increase its value.

In order to understand the benefits of combining and integrating marketing science and design with design research, it is worth looking at some of the differences between them. In the figure below (Figure 9.), we present some examples of the differences between scientific and artistic approaches to research.

Figure 9. Differences between scientific and design research approaches.



Source: own editing (Horváth - Mitev, 2015)

3.5 Researchers and their roles

3.5.1 Researcher's perspectives

A key part of our research is to examine the results from multiple perspectives. We combine scientific research / scientific approach and design to find answers to our questions. We

expect the most complex response possible from a cross-disciplinary examination of the issue. The basic anomaly and the partial results of the research, from the perspective of marketing research and (object) art, will shed light on new, meaningful and usable contexts. (Lindahl and Nordin, 2015) They will help to create the product philosophy necessary to rethink the tools of this old skill and adapt them to the new, changed environment. This newfound thinking, with a mission, adapted to commercial products, is not limited to handwriting. There are many other areas whose customs and products are worth and should be passed on and preserved. In order to formulate this complex philosophy, it is essential to draw on the different research and creative backgrounds of the research participants. As researchers with different perspectives and different scientific and professional backgrounds, we can provide more complex answers to the questions that arise. (Hemonnet-Goujot et al., 2020) This also provides an opportunity to create a philosophy and a toolbox that can be applied to marketing science and the creation of objects.

Accordingly, we believe that combining our marketing research approach with qualitative research tools and design thinking, interaction and product creation will lead to economically meaningful and validatable results.

3.5.2 Interdisciplinary communication - Dis:co

As a first step in our research, we will explore the relationship to the future, to the devices (analogue and digital) and habits (writing, watching, reading, etc.) that surround us, and will then turn it into a tangible object, supported by further research, proving that design communication is also research. All in all, design communication represents an interconnection approach that is *a bridge between different disciplines and discourses, between social and economic phenomena.* Its interdisciplinary and inter-professional approach allows for real-time links between education, research and development. (Cosovan - Horváth, 2016:43).

According to Henseler and Guerreiro, the differences between marketing researchers and designers and design researchers lie in their different worldviews. (Henseler and Guerreiro, 2020) The method and direction of approaching the task and problems is also done from a different perspective. In our opinion, approaching the same problem from two different

perspectives in science and in the creative world, and rationalising the results together, can lead to the success of this collaboration. Sirnivasan attributes these differences to training differences between marketing researchers, marketing professionals and design researchers, designers. (Srinivasan et al., 1997) Industrial designers are basically trained to see the product they are designing and the environment in which they have to place it as an integrated whole. Accordingly, the product attributes formulated, such as price, aesthetics, function, usability and ergonomics, manufacturing technology and quality, are horizontal, equivalent and interrelated, thus reinforcing each other. From this we can infer differences in the approaches of designers and marketing researchers, which are essentially rooted in a reliance on rational, decompositional techniques and statistical survey tools for product development. The tension between these disciplines stems from this. However, the two fields are complementary, and their combined application in product development may yield more successful results than their separate application. We believe that instead of competing with each other on the basis of disrespect, it makes sense to create a set of co-ordinated, joint research and creation processes, which can be applied generally to product design processes in different fields.

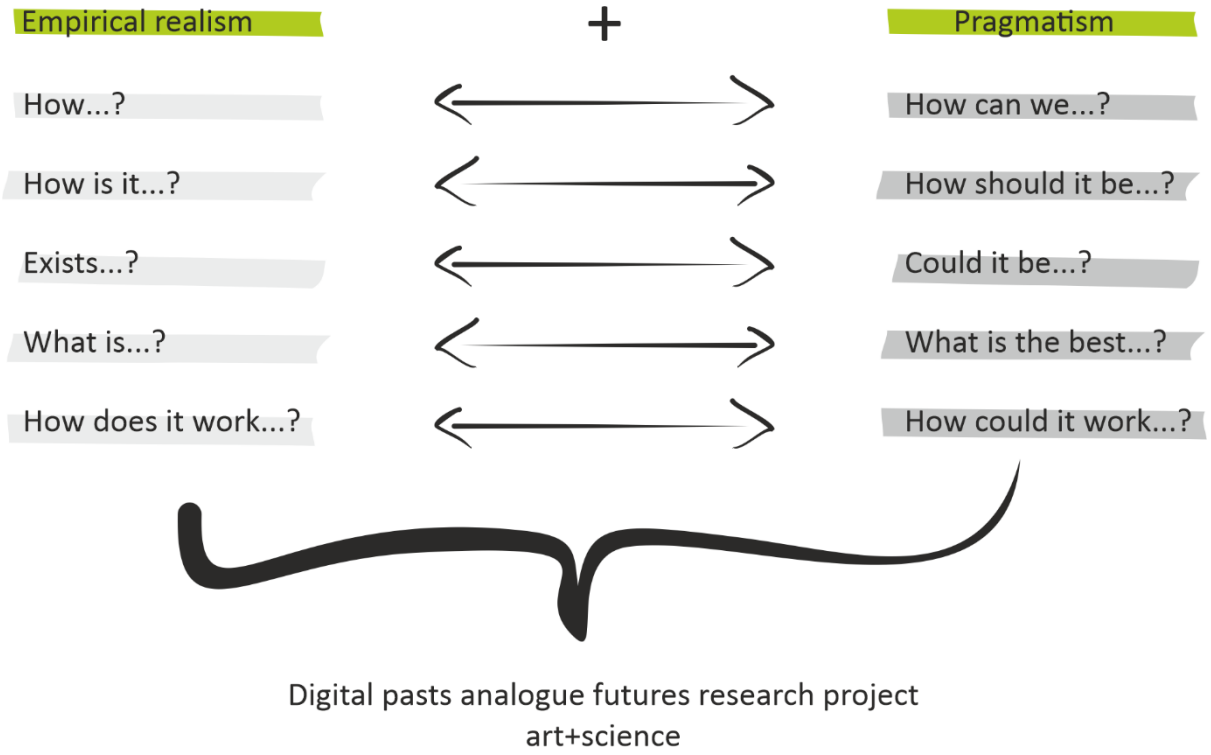
In their research, Figueroa-Perez et al. concluded that research tools used in marketing science contribute greatly to increasing the quality of the products created during product development and reduce the risk of market failure of the resulting product. (Figueroa-Perez et al., 2019)

Although learning about these disciplines is part of the education in marketing and design (Blijlevens, 2021), it is also important to familiarise students with the methods of their collaboration. This includes exploring the reasons for the differences and translating them into productive characteristics. We need to be able to demonstrate the horizontal co-management of rational and intuitive approaches. The joint application, synergy and effective cooperation of the two fields play an important role in the development of innovation.

Marketing research largely follows an empirical realist paradigm, aiming to understand the current world and seeking the validity of its concepts in their existence. (Henseler and Guerreiro, 2020) Design research typically follows a pragmatist paradigm, aiming to shape the world of the future. Assesses the functioning of the objects created during product development and their compliance with the criteria systems. Function, ergonomics, aesthetics, intellectual content.

Combining paradigms and finding common answers opens up new perspectives in product creation. They influence the formulation of research questions (Figure 10.), complement and motivate each other. The mixing of different perspectives, paradigms, rational and intuitive approaches brings product creation to a new level and, by making the link, a successful co-creation process is created.

Figure 10. Research questions typically formulated by research paradigms.



Source: own ed., based on Henseler and Guerreiro, 2020

This vision and approach guides the whole process of our research and one of the main communication elements of our community funding campaign to validate our project was created to celebrate this.

Shrivastava et al. report on their research on the linking of arts and sciences. They explore this as a method for addressing sustainability issues and solving global problems. They describe this process as a transdisciplinary process, which they distinguish from interdisciplinary and multidisciplinary research in its quality. In their view, transdisciplinary

work takes the problems to be solved out of the real world, rather than exploring disciplinary gaps in knowledge or combining different disciplines to make innovative new discoveries and understandings. Transdisciplinarity is presented as a process of co-creation, involving the joint creation of integrated knowledge across disciplines. It does this through collaboration between stakeholders to solve problems on the ground. (Shrivastava et al., 2022) This is the approach of our research. We believe that interdisciplinary and multidisciplinary research and problem-solving methodologies, positioned horizontally with transdisciplinary methodologies, can be part of co-creation processes in both a supportive and collaborative role. A holistic approach to solving a problem, cross-disciplinary research, answer-seeking, product creation, development and generalisation of research and design methodologies play an important role. The combination of all these increases the likelihood of success and appeals to a broader spectrum of research and user audiences.

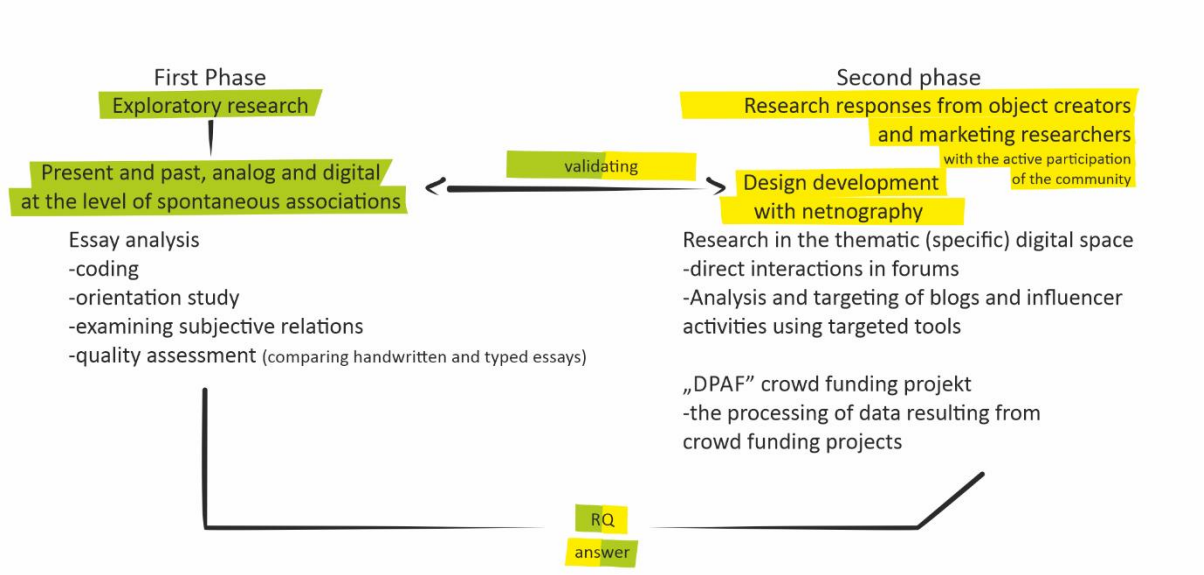
The digitised world has changed the way we live and the habits we used to have. The new environment, and the problems and tasks that it presents, require a very different approach to the one we are currently using. Although the above mentioned analyses the details of the marketing science and design research approach in the context of combining art and science, it is worth exploring the possibility of integrating further disciplines. Our task is to provide future generations with the knowledge necessary to shape the moral and philosophical norms of digitization. Al-Radaideh's research explores the integration of the arts into science education from an educational perspective. In his experience, this method has already achieved significant success in primary and secondary education. In addition to improving academic performance, it also makes the work of teachers easier. This approach to teaching helps students to develop global and multidimensional thinking. It develops social and moral attitudes towards values. (N. Al-Radaideh, 2020) In our opinion, this is necessary for analogue people to be able to keep up with the changes in the digital environment while preserving their moral and social values.

4. The research plan

We have used qualitative tools in the past and ongoing phases of our research. The nature of the problem requires us to accumulate the deepest, most in-depth knowledge possible in order to provide real answers to our research questions and to be able to formulate our philosophy and our method of objectification in response to the new, changed environment in a way that is economically successful and applicable to other projects.

Humanity's move away from handwriting is an invisible process with huge dangers. Although many question the negative impact of this phenomenon, the convenience of the digital world and the services it provides are more powerful than stopping this process. The results of our research so far (Megyeri, Horváth, Cosovan 2019) show that, beyond handwriting, many values are being lost with the advance of digitalisation, despite the fact that a large number of essayists participating in the first phase of the research refer to and mention these lost values themselves. It is thanks to these references that we can effectively apply the narrative approach in the first phase of our research, providing real-life information. (Horváth - Mitev, 2015)

Figure 11. Digital pasts - analogue futures - first and second research phases



Source: own editing

We consider it important that in the course of our exploratory and netnographic research (following the line of thought of our exploratory research), we get to know the basic, self-explanatory, detailed thoughts of the subjects on the topic. Our aim is to map the culture of the online community, to learn about the operating principles and decision-making mechanisms of consumer groups in their natural environment. This information is essential for understanding the process. The information from the first exploratory research phase and the second, netnographic research phase (Figure 11.) will be collated and jointly evaluated in the research process to provide a broader, more complex picture.

The unpredictable pace of digitization has brought unfamiliar situations and effects, so we need to be creative in our approach to data collection and processing. The environment in which the research phases take place and the research topic are becoming difficult to reconcile, and we need to choose and design the methodology accordingly. The digital landscape offers written communication tools that are more about speed and convenience than quality and value. By using emojis, young people are returning to the world of hieroglyphics, except that instead of having to carve the pictorial characters in stone or clay tablets, they simply press a virtual button and the symbol appears as a substitute for a round sentence. These influences on intellectuality and linguistic values not only threaten the quality of the human mind, but also have a knock-on effect on human relationships. The first phase of our research proved to be a good tool to assess the various negative impacts and how respondents feel about the values we want to preserve and pass on in a changing and ever-changing cultural world. We get a picture of what has been preserved as a value and what is now completely incompatible with today's environment and its tools. We need to find contexts which, by highlighting and amplifying them, can be interpreted and provide answers to the basic questions of the research. This is essential to be able to formulate objects and services that represent and convey real value.
In some aspects, our research can be described as reverse choreographed. Instead of confining the interviewees to specific, guided questions in the first phase, they were given a (provocative) title as a guideline for writing the essay, and were free to express their thoughts. These resulted in clear but complex sets of information. Reactions, associations, packages of opinions, the coding and extraction of which help us to formulate concrete, direct

questions for the second phase, to determine the direction of the research (Horváth - Mitev, 2015).

Our interpretative approach is subjective, which is essential to understand the changes in the community as a result of digitalisation. This information has helped us to formulate the methodology for the second phase and continues to shape the research process. (Gelei, 2006)

By interpreting the research results, we will be able to formulate an object that fits and can be used in the digital living space, while at the same time perpetuating the values of the past, be it handwriting, communication, human interaction or other values that seem to be lost. As a result of this research, we expect to gain insights into the object preferences, changing habits, desires, buying habits and attitudes of the study group towards the past and the future. We would like to define a vision, supported by details, into which we can integrate objects and services. This is the aim of both research phases, so that they can be compared and validated (Figure 2.).

The information obtained during the research phases, after a thorough qualitative processing, can be quantified and processed with quantitative tools, which can be a way to support the results of our qualitative research. From the results of coding exploratory research, we can create databases (qualitative rating on a scale of 1-10, age, gender, etc.). This is also true for netnographic research, if part of the research is focused on the first phase of quantified data (by directly asking for gender, age, shopping habits and scaling the quality of the responses), this data is automatically available in the community research.

4.1 Elements of the research

One of the main aims of our research is to explore the attitudes of the young generation living in the digital world and regularly using its tools towards analogue values and objects. We want to understand the direction in which the use of analogue devices is evolving with the development of digital devices, and to understand the emotional, mental and health effects of this phenomenon.

We also investigate whether the analogue values that we hypothesise are key to humanity, especially handwriting, can be preserved for the future. If so, in what form. What new marketing research and product design approaches, mindsets and collaborations are needed to achieve this. Our research design is divided into four main parts: units of analysis, individuals, social product-social interactions, trend analysis. (Babbie, 2017)

4.1.1 Analysis units

In our research we consider a change of unit of analysis necessary. While in the exploratory phase we generally examine a group of students belonging to a specific age group, for which we assume relevant and useful data based on the average age of the students, in the netnographic unit of the second phase we try to find a specific group and research area, which we know for certain that their interests are closely related to analogue subjects. Finally, in the final stage, we were able to apply the information from the two units of analysis to a generalised set of customers.

4.1.2 Individuals

Like a significant proportion of researchers in general, we want our research to be applicable to all people. We are unlikely to be able to achieve this, but we have managed to define and examine both of our units of analysis in such a way that we can define them as social groups overall. As a result of coding and processing the data we have obtained, we have produced results that are highly generalisable and widely interpretable.

4.1.3 Social product - social interactions

In the case of our research, the use of digital tools and the creations created with the help of these tools, as well as the performance of various activities previously carried out with analogue tools, constituted the social product under investigation. Their analysis and comparison provided interesting and relevant data for the research.

Our exploratory research has given us a picture of the impact of the digital world on social interactions and relationships. In this context, we received a remarkable number of references in the essays.

Table 1. Illustrative comments on the evolution of human relationships in the digital world

„While the economy is evolving exponentially with digitization, human connections and contact with nature are gradually disappearing." *Lilla, 20*
„The overuse of social networking sites has clearly been to the detriment of community programmes, face-to-face meetings and relationships." *Dóra, 23*
„Recent times have shown how much people need social interactions and personal relationships." *Benjámin,21*
„If I look at the last few months, when I was locked up and could only keep in touch with family and friends online, I would have liked to escape the online space." *Annamária, 21*
„I think that digital tools are very much degrading the quality of human relationships and making it difficult to get to know people." *Mariann, 20*
„Where is the time spent with friends, when we forget about the outside world and laugh, play cards, play sports, cook... just be happy?" *Anikó, 22*

Source: own editing

The manifestations listed in the table above are only part of the manifestations relating to human relationships. The coding of the essays gave us a real picture of the dangers that people who use the tools of the digital world on a daily basis perceive and discover, but it did not provide a clear answer as to how these processes could be reversed. There have been essayists who, after making these discoveries, have consciously acted to make a change, but this has not been typical.

In addition to personal human relations as an analogue value, we received feedback from the essayists on a number of other values. As an interesting anomaly, we observed that handwriting and its tools were mainly mentioned by essay writers who wrote their essays by

hand. Students typically perceived and reported the fact that they had to write the essay by hand as a positive experience.

4.1.4 Time dimensions

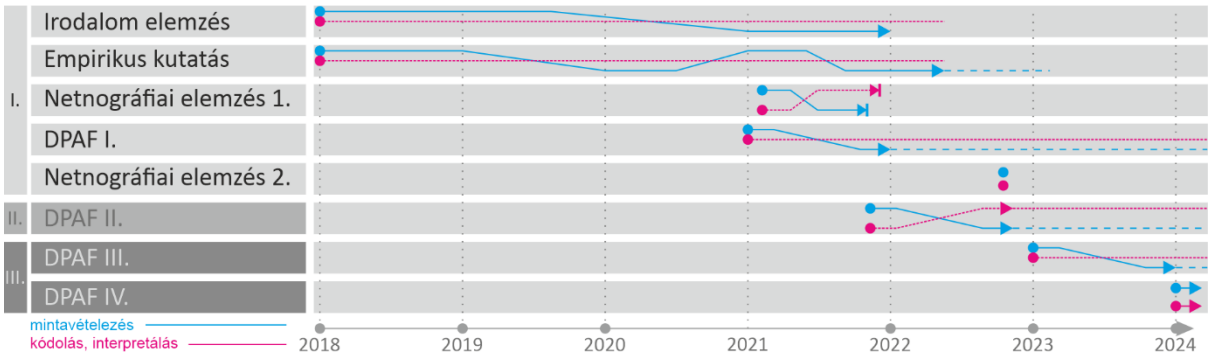
Although everything happens fast in the digital age, the four years of research would not have given us enough time to confirm or refute our assumptions with trend studies. However, an unexpected event has occurred in the world that has brought about major changes and unintentionally accelerated certain "development" processes. This is the COVID-19 pandemic (Liu et al., 2020), which has pushed people further apart and into the digital space. (Matias et al., 2020) The pandemic and its consequences have presented humanity with unprecedented challenges and difficulties, which have left all those affected mentally distressed. (Cullen et al., 2020)

As much of our research started before the outbreak and continued during and after the outbreak, we have observed interesting changes. We made observations before the outbreak, mainly in social areas, which were of concern and which rose to a high level during the outbreak. Figure 12. shows our research timeline. Bar I. shows the research phases that have already been implemented, bar II. shows the phases that are in progress, and bar III. shows the phases that are in preparation.

The phases of our research are cross-sectional studies in terms of time dimension, with the exception of the literature analysis. We want to explore the present situation of handwriting by analysing the samples taken, while at the same time we are looking for answers to questions that focus on the future. Our literature analysis can be considered as a longitudinal research. We will examine the evolution of handwriting and its impact on humanity from its inception to the present day. Using this knowledge, we will identify the characteristics that we can use in our product creation processes to make them sustainable in the digital age.

The pace of development and change in the digital world is so rapid and unpredictable that it is difficult or impossible to infer or predict longitudinal processes in the field under study from cross-sectional data. (Babbie, 2017)

Figure 12. Research timeline



Source: own editing

4.2 Three phases of empirical research

Figure 13. Research phases - research questions, research subjects, research object

Research phase Method	Question examined	Respondents of the research	Subject of the research
Narrative technique Written personal datastories	Habits of people active in the digital world.Attitudes towards analogue values. Associations with the title "Digital past analogue future".Personal attitudes towards handwriting personal perceptions of handwriting.	CUB students Hungarian and foreign gender: mixed age: 20-24 years	Personal memories Personal experiences Associations
Netnographic analysis -observational netnography -contributing netnography	Writing instrument preferences of regular users of the pen. Buying habits. Interest in the subject/ support/commitment.	Subject-specific (writing instruments), international internet members of communities. gender: mixed age: 20-85 years	User comments at community level User comments at individual level
DPAF -crowd funding project -product development -design research -netnographic analysis	Validating of design and research results. Pen preferences of the supporters. Consumer habits. Interest in the topic/ support/commitment.	Pen users, pen buyers International	DPAF I. pen Buyer's comments at community level Buyer's comments at individual level Sales results

Source: own editing

4.2.1 Exploratory phase - Preliminary exploratory research: associations with the concepts of "digital past & analogue future"

The second unit is an exploratory study of essays written by young adults (also BCE students) (typed and handwritten) about analogue and digital experiences. This aims to explore and validate the problem and the issues raised in detail.

In this phase, from the perspective of two designers and marketing researchers, we conducted an exploratory qualitative research to investigate how members of the young adult generation spontaneously react to the seemingly contradictory phrase "digital past and analogue future" and to what extent these associations correspond to general expectations. We ask to what extent the answers are useful not only from a (marketing) researchers' perspective, but also from a designers' perspective. As a result of the research, a formulated and modified object culture emerges, which plays a role, among other things, in the formulation of our designed products, and models and represents the philosophy created. The focus of the research is on the evolution of handwriting in the digital world and the relationship of young people who actively use digital tools to writing.

The empirical research was partly aimed at gaining an insight into the habits of people in the digital world and their attitudes towards analogue values. This data was used to formulate our research concept for the next research phases and to establish an indirect linkage, which partly supported and underpinned the product development phase.

4.2.2 Designer connectivity - a netnographic study supporting a 4-stage product development process based on crowd funding

The third unit, our crowd funding project, is based on. The detailed analysis and coding of the data collected during the processes will provide the basis for the planning processes.

This approach creates an experimental medium, but also takes shape in the real community space. It can therefore be analysed from both a scientific and a design perspective. Based on the opinions of the participants in the netnographic study, the exact characteristics of the products can be formulated, a process we consider as co-creation. At the end of this phase, the product designs are developed and the pre-production phase takes place.

To define the steps of the research phase, we used the Alternative Qualitative Research Guidelines by Horváth and Mitev. (Horváth - Mitev, 2015) In the first step, we formulated the research questions we wanted to answer from our netnographic analysis. These were typically aimed at understanding the expectations needed to formulate the product. We identified the online communities to be studied: the forums of communities using and buying

stationery (Facebook, Reddit) and the communication tools (communication tools offered by the platforms). These also determined the method of our netnographic study, which used both observational and participatory netnography.

In identifying the sources, we focused on finding the forums with the largest possible number of followers dedicated to handwriting. Several of these were identified, and their content was found to be relevant when reviewing their archives. The archive research was already part of the observational netnographic analysis, and the content was processed using qualitative content analysis.

The results of our netnographic analysis are presented in section 9.1.

4.2.3 Design action - Crowd funding project

The product, formulated with the help of a netnographic analysis, will be commercialised through a Crowd Funding (CF) project. Existing research results will also help to prepare the campaign. (Belleflamme et al., 2014) The creation of the future writing instrument, our mission, will be carried out in four steps, each of which will be a separate CF project. As a result, four products will be created, an economic outcome will be realised and, hopefully, a meaningful set of data will be generated, which will contribute to the success of the project series and the final confirmation of our hypothesis. The four projects ("D", "P", "A", "F") are interdependent from both an economic and a research point of view. We will design and create a writing tool for each of the four campaigns. We hope that the results of the first three design-research projects will enable us to create the fourth F=Future writing instrument in a way that will respond to changing habits of object and instrument use, while preserving the fundamental value of handwriting. During the first three phases, we will also examine whether the changed user environment requires changes to the basic characteristics of the product. Is it justified to add additional functionality to the product beyond the handwriting.[89]

One of the sources of inspiration for our research was Etelburg's first "rainbow" product range. This innovative range of writing instruments and accessories consists of a modular

[8] https://etelburg.com/hu/pages/r-feather - retrived: 15/08/2023
[9] https://etelburg.com/hu/pages/r-app?_pos=2&_sid=23c69be5a&_ss=r - retrived: 15/08/2023

pen, an application and a special device (Figure 14.) that can sample colour from digital photographs, then, at the touch of a button, mix this colour in 45 seconds from a specially developed ink and load it into a cartridge that can be used in the pen (Annexes 4. and 5.). The pen is commercially available, the application and the colour mixer are available as working prototypes and are in pre-production phase. This combination of digital and analogue solutions is a novelty in the world of writing instruments.

Figure 14. Etelburg r.pro ink mixing device.

Source: Etelburg - Designer: Gábor Megyeri

The analogue mind works in a complex way. The perception and processing of inputs is carried out simultaneously by several brain areas. (Brown et al., 2011) Colours and their combinations play an important role in the visual enjoyment of a work of art, in the retention of a memory, in the communication of emotions and feelings. (Borkin et al., 2013) The role of colours in memorisation processes is significant. (Oberauer and Lin, 2017) These characteristics motivated the development of the "r.pro" device, which combines digital and analogue solutions. The current tool is quite complex, but at the same time quite simple to use. It is basically designed for a target group of people who use colours for writing, drawing and work as a target use or for their enjoyment. The device has an international patent and is in pre-production. Due to the positive effects of the use of colours mentioned above, we are

planning to produce a fully analogue version (r.adventure), which can be used in both home and school environments, to help children in their learning. The aim is to use colours to enhance the efficiency of the memorisation process. The tool will be accompanied by workbooks that can be linked to different subjects. In this case we are also exploring the possibilities of how to combine digital tools with this analogue tool while maintaining the right balance. (Royakkers et al., 2018) While r.pro maximizes the benefits and services offered by digitalization (digital hosting, dedicated community platform, colour manipulation, etc.), r.adventure focuses more on analogue assets to support educational goals.

The rainbow range includes the r.feather fantasy, a modular writing, drawing and creative tool. In itself, this pen goes beyond traditional writing and drawing tools. Thanks to its modularity, it can be transformed in seconds from a fountain pen to a rollerball, marker, brush, etc... It is therefore suitable for both traditional and professional use, and comes with two different barrels. A short one that allows its everyday use, its rational size makes it easy to carry around. The pen also comes with a so-called studio barrel, which is considerably longer and more ergonomic and suitable for working with. Its centre of gravity is adjustable, so the instrument can be easily adjusted to the user's preference. The r.feather is made of perunal, a special aluminium alloy used primarily in the aerospace and aircraft industries. Its physical characteristics are optimal; low weight, high strength. This is to maximise the lifespan of the product, optimally for several generations. In order to ensure the sustainability of the product, in addition to the above, we are working to make further improvements compatible with this device. There are no perishable parts, all units are serviceable.
Our r.feather product is the closest to reaching the F - Future point of the DPAF project, with further development and optional digital solutions.

Figure 15. Etelburg r.feather in use (version with studio barrel).

Forrás: Etelburg – Tervező: Megyeri Gábor

Our research also seeks to find out whether these solutions can be adapted to the digital world. Is this one of the answers to perpetuating analogue values, or can a solution based on a similar philosophy be applied more generally in other areas?

To achieve these goals, we explore extremes in our projects. We want to understand how handwriting can fit into the digital world. Our experiment will explore the transition from minimalist analogue solutions to digital solutions. This will give us an accurate, realistic picture of the preferences of our supporters who use pens and pencils on a daily basis (in our experience, this target audience makes up the largest proportion of our supporters). Crowd funding projects also reach customers and supporters who approach the above category from below or above (in terms of pen use intensity). Here we are thinking primarily of people who use pens only for signing, occasional note-taking and drawing, but we are also interested in the collectors who do not buy pens to write or draw with.

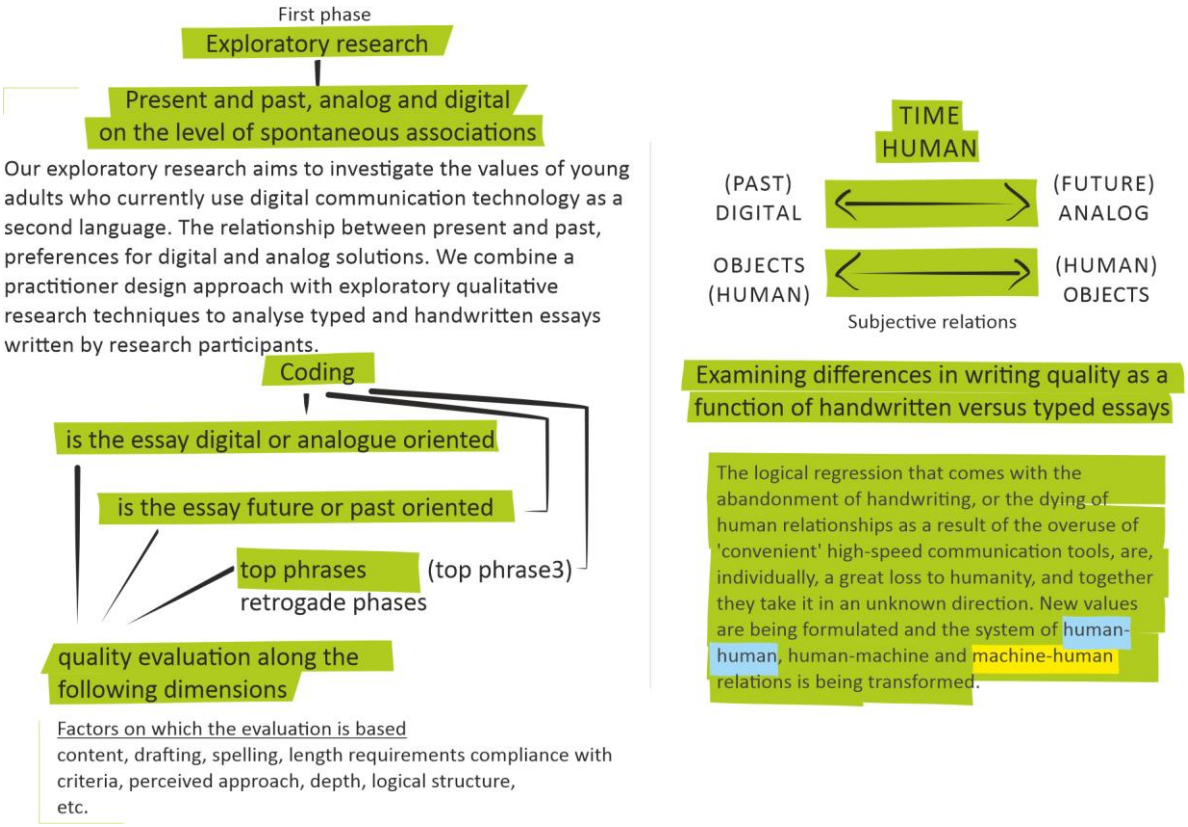
Analysing and comparing the habits of the users in these categories provides us with data to formulate the characteristics of the final object.

As with the Community Funding project, we hope to obtain such data from both netnographic analysis (4.2.3, 7) and exploratory research (4.2.2, 5).

We also examine whether the products resulting from this research, beyond defining the future of handwriting, can serve as tools for other disciplines. They could also be analytical and therapeutic tools for the medical sectors researching Alzheimer's and Parkinson's diseases and other diseases involving neurological disorders. (Thomas et al., 2017, De Stefano et al., 2019)

5. Exploratory phase: present and past, analogue and digital spontaneous associations

Figure 16. - Exploratory research



Source: own editing

In our exploratory research (Figure 16.), we combined a practitioner design approach and an exploratory qualitative research technique (narrative approach) to investigate how the values of young adults (Veszelszki, 2015) who currently use digital communication technology as a second language reflect their preferences for digital and analogue solutions.

The participants in the research are university students who have voluntarily taken part in the research for extra credit points above the course requirement. The research started by examining several age groups. As a result, we found that for us the most comprehensive and valuable results were obtained from the 20-24 age group. This is the age group whose parents were socialised and born into a fully analogue world, but whose lives have been sufficiently influenced by digitization to provide relevant information. The nostalgic thinking of the older generation and the lack of knowledge of analogue devices among the younger generation all

have a negative impact on the quality of the samples. These conclusions were drawn from the analysis of the initial experimental samples. The quality of the data was used to narrow down the age range of the study.
Participants summarised their thoughts in a short personal essay based on the following instructions.

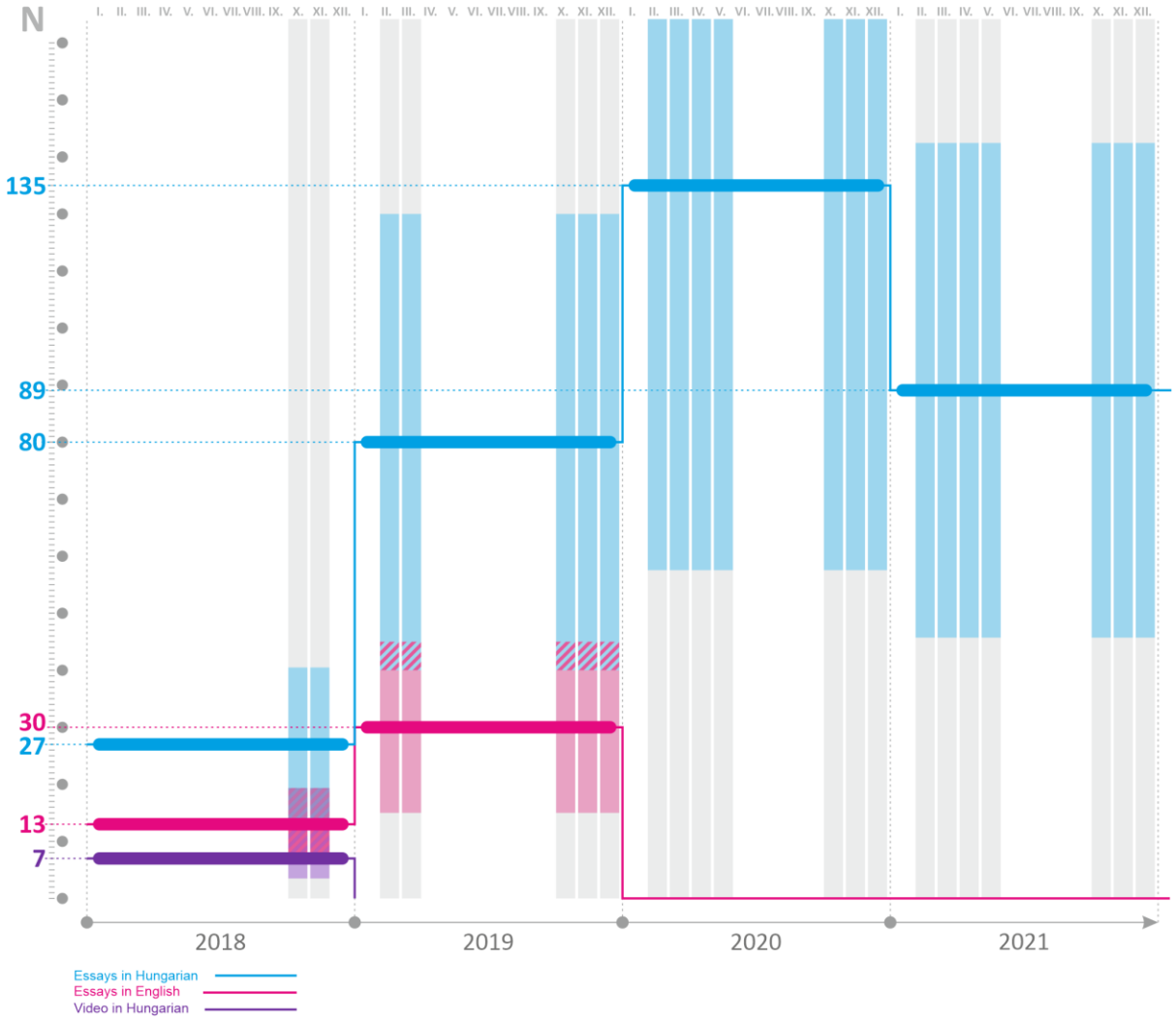
The collection of essays and videos started in 2018 and ended in 2021 (Figure 9).In 2018, 27 essays were collected in Hungarian and 13 in English, and 7 videos in Hungarian. The results of the coding and processing of these samples were used to define the focus of the age group studied (20-24 years). In 2019, we collected 80 essays in Hungarian and 30 in English. The processing of essays was ongoing. In 2020, the number of sample items increased by 135, and by a further 89 in 2021. In total, n=381 samples were collected and processed in the above mentioned period.
The majority of the essays were typed n=332. Essay writers typically followed and adhered to the instructions (Figure 17.). Samples that did not meet the pre-defined criteria were removed from the sample set and did not participate in the research. The relatively low number of handwritten essays n=42 can be explained by the fact that we did not impose the writing method in the first three periods of the research phase (2018-2020), while in the fourth period (2021) we made handwriting optional and encouraged it over typing.

It is perfectly noticeable now that my hand is getting tired of writing, even though this is not a very long essay.

The videos collected in 2018, n=7, while meeting the content expectations, were considered to be too different in nature from the research expectations. Videos that were already available were not included in the comparative analyses. As of 2019, in the instructions issued, the option to produce a video was no longer included. Figure 17. describes the basic instructions of the essays and the timeline of the collections with quantities.

Figure 17. Initial instructions and sample element numbers.

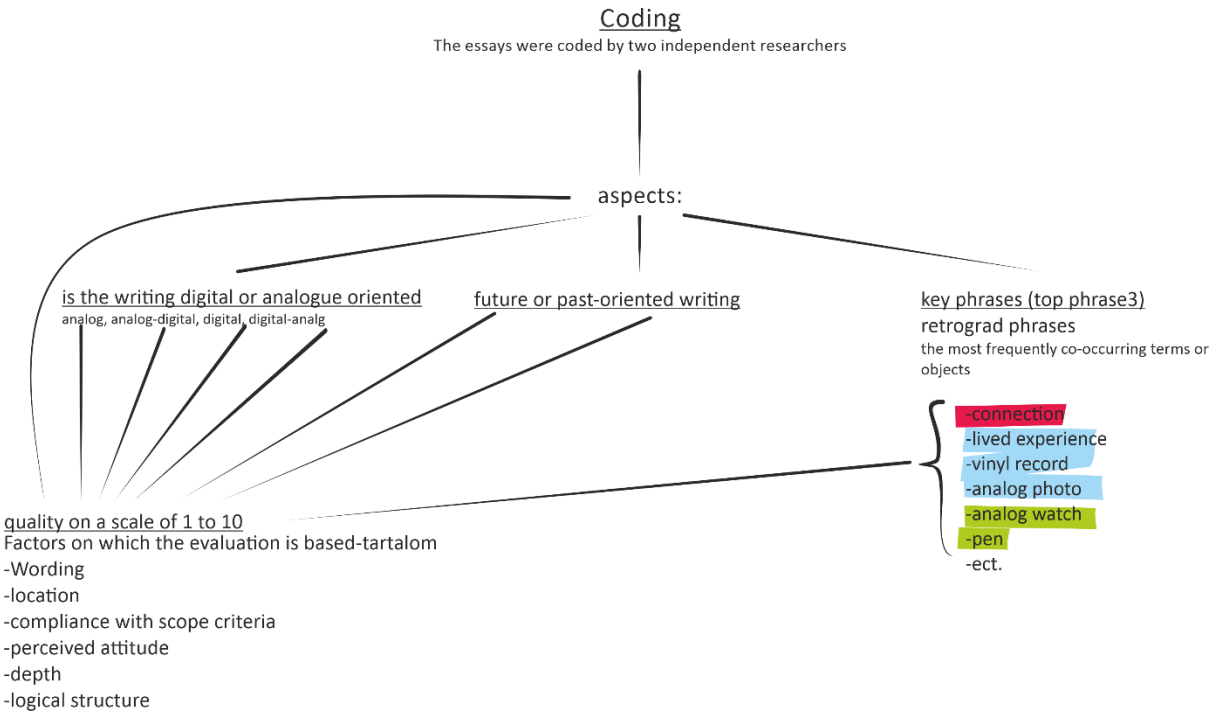
	Instructions in Hungarian	Instructions in English
Instructions for the essays in English and Hungarian	Digitális múlt, analóg jövő Írjon személyes hangvételű esszét arról, hogy mit jelent az Ön számára a következő kifejezés "Digitális múlt, analóg jövő". Elvárás: egyes szám első személyben írott szubjektív hangvételű írás Alternatíva: amennyiben könnyebb, a fogalmazást kiválthatja egy saját készítésű videó Terjedelem: maximum 2 oldal vagy maximum 3 perc	Digital Pasts Analogue Futures Write a personal essay about what you associate with the title "Digital Pasts, Analogue Futures" Expectations: subjective essay about your thoughts Alternative: If you prefer, you may shoot a short video with the same title Length: maximum 2 pages (video: maximum 3 minutes).



Source: own editing

The recorded essays were coded by two independent researchers (Figure 18) according to the following criteria: (1) whether the writing was digital or analogue oriented; (2) whether the writing was future or past oriented; (3) whether the key sentence of the essay was highlighted. For the essays, we have also recorded the top phrase of the text, which is the most frequently occurring word in the text. These occurrences corresponded to the codes of the two independent coders.

Figure 18. - Main stages of the coding process



Source: own editing

5.1 Reactions to "digital pasts, analogue futures".

The research has several unexpected results. One of these is that essay writers typically - in almost every single case, commented on the essay title "digital pasts & analogue futures" as a wrongly worded, inverted category.

Table 3. Illustrative comments on "digital pasts analogue futures".

The first thing that came to my mind about the title was a strange contradiction, that they had actually swapped the past and the future. "It should be the other way round."
After reading the title I froze and had no idea what I could write about it. Many things came to mind: the world of computers, electronics, smartphones... After several days of thinking, the picture came together,
The first thought that came to my mind when reading the exercise was that the title was worded backwards from the way it was originally intended. After all, you can read everywhere today, and we learn it in class, that we live in the age of digitization and that the digital world is the future. As we move forward in time, the use of the internet and other digital 'gadgets' has become part of everyday life for generations Y, Z and the newest generation, Alpha. For older people, who have grown up in the analogue world, it is a foreign and unfamiliar world, but it can also offer many benefits
In my opinion, this sentence suggests that in the future, humanity will return to its roots and reject the massive digitization that is currently taking place.
I'm not going to lie, I had to think a lot about what the phrase "digital pasts, analogue futures" means to me. This was also a challenge for me because, as an "engineer's kid", if it came to breaking bread, I would go for the digital future //. I could imagine this title as the title of a movie, which brought two scenarios to mind
The term mentioned in the title is a paradox, since the word analog is by default derived from the Greek, which is more a reference to the past, while digitization is more associated with the present, with future developments.
I was surprised that the topic was digital pasts, analogue futures, rather than analogue pasts, digital futures. But the more I thought about it, the more the reality of it made sense to me.
At first reading, I found this statement to be very strange, as I could imagine the reverse to be true, if I had to choose between the two statements (Digital pasts, analogue futures, or Digital futures, analogue pasts).
I was a bit at a loss at first to interpret the phrase, because at first I found it very confusing, almost annoyingly meaningless. With the development of science, the shift from analogue to digital technologies has appeared in all fields and has spread rapidly since the 1990s, so the sentence could be seen as a kind of retrogression. It also gives it a certain humour and makes you wonder what it could refer to.
When I first read the topic of this research project, my first thought was how strange the title was. Most people, I feel, look at the present as a fully digitized, modern era, while at the same time most of the technology of the past is seen as analog, possibly outdated and obsolete.

Source: own editing

The unsolicited criticism and indignation that characterises this entire sample shows how the issue and its consequences have a profound impact on respondents' daily lives, interests and ideas for the future.

The spontaneous associations show that the first association with digitization is that it is perceived as a modern concept linked to the present and the future, while analog solutions are perceived as older and more evocative of the past. For the few comments highlighted, those that already indicated that they could interpret the word pairs in reverse, despite the first logical inconsistency, are marked in grey.
In the case of those essays which, after coding, are typically analog or digital-analog oriented, almost always a correction, reinterpretation, recognition followed the initial associations mentioned above. The essayists have reinterpreted, formulating a new direction in which to approach the subject.

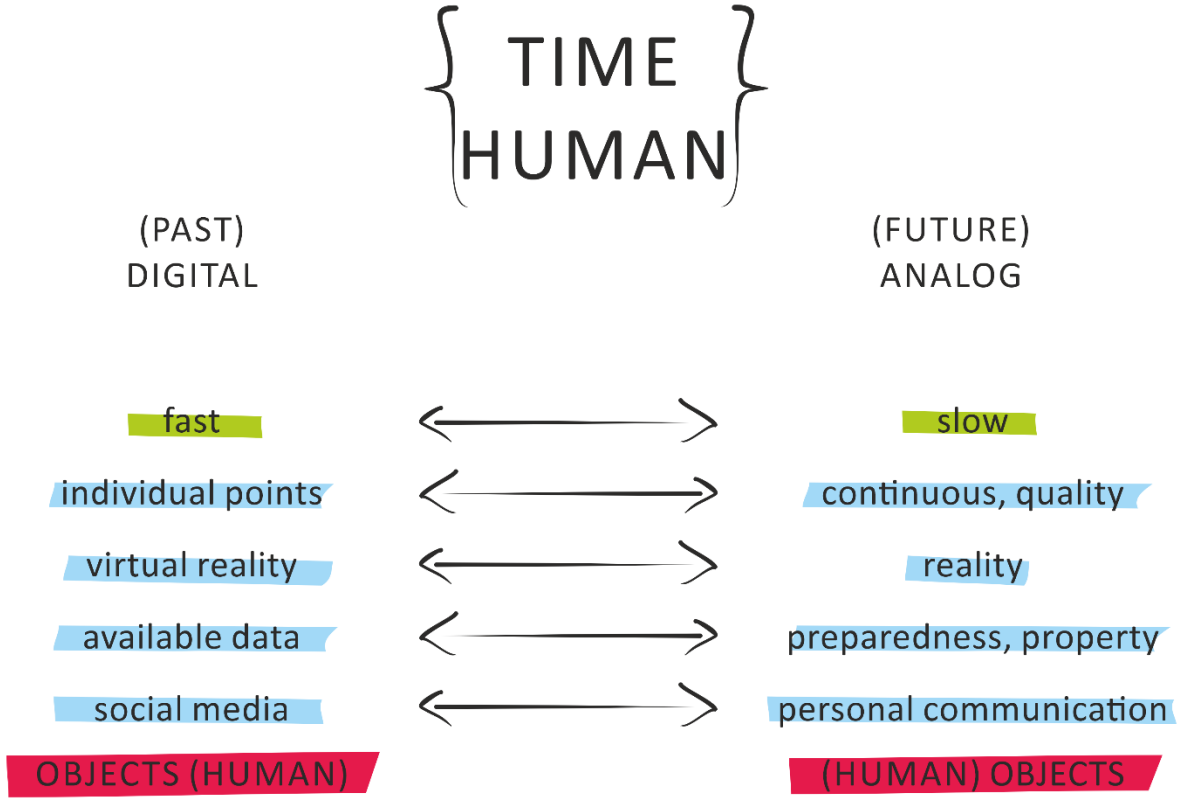
5.2 Man & Time - subjective attitudes to the analogue and digital world

> *„I think that digitization is a bit like a sports car that a kid gets as a present for his 18th birthday and then crashes it the first time. Masterful engineering, wonderful design, speed, a myriad of features to help the driver, and yet the story ends badly."*
> (quote, digital pasts analogue futures exploratory research, 2018)

Despite the first author's doubts, the essays can be interpreted according to whether they prefer the advantages of the analog or the digital world. In essence, all the essays discussed here interpret the relationship between man and time in terms of past-present-future, analogue and digital solutions (see Figure 19).

In this context, the most prominent concepts related to digitalisation are: *speed, discrete or discontinuous points, virtual reality, easily accessible data, social media platforms.* Concepts associated with analogue solutions in the future context: *slowness, continuity, quality, reality, preparedness, ownership, personal, face-to-face communication,* ***personal contact****, real experience, value.*

Figure 19. Typical associations - in the context of digital past & analogue future



Forrás: saját szerkesztés

Analogue or digital? Did the reader look at the previous page and check "see Figure 1, Table 3"? Now on this page, perhaps he looked at the irregular writing here? Perhaps he did. Scrolling through the paper without reading, at which parts did you stop? You may have looked at the ('analog') figure above, because it is an unexpected twist in an article like this. Does it lose sight of the most valuable part of the research, the large table on the next page, which includes the most important illustrative sentences highlighted in our research analysis? And yet, these literal quotations are the most helpful for a more complex understanding of the phenomenon under study (Horváth - Mitev, 2015). The words and associations of the respondents clearly show that, despite their initial indignation, they are contemporary, relevant and meaningful at the level of the analogue world, personal relationships, communication and objects. Do we choose analogue illustration?

The associations recorded, although titled "digital pasts & analogue futures", are about the relationship between man and time: speed and slowness, the relationship between present, future and past, the role and possibilities of the technology that surrounds us.

The research participants, who are young adults and whose second language is communicating on and with digital devices, strongly express that there is no substitute for the future of people and their analogue environment:

> *" People have had more time for each other, and with digitization speeding up almost all of life, we can't live in the moment and enjoy what is happening to us."* (quote, digital pasts analogue futures exploratory research, 2018)

5.3 Man and man - the evolution of human relationships in the digital world

As we received an unexpectedly large number of (critical, questioning) reactions to the title of the essays, we noticed another anomaly. A large number of essay writers, regardless of their orientation, highlighted the negative changes in human relations and their quality. **Many listeners complained of distancing, be it from broken family ties, friendships, love life.**

Table 2. Typical associations - digital pasts & analogue futures context (digital summary)

	Illustrative quotes	
DIGITAL (past)	we are analog beings in a digital world	ANALOG (FUTURE)
OBJECTS (HUMAN)	In my view, the degree of hectic change should be reduced in some cases, because we will slowly come to love objects and use people, rather than love people and use objects.	HUMAN (OBJECTS)
fast	People have had more time for each other, and with digitization speeding up almost all of life, we can't live in the moment and enjoy what is happening to us.	slow

separate points	if analog is a continuous timeline, digital is essentially a set of individual times, events. And if I apply this view to life itself, what can we say about the past? Because of the limitations of our human consciousness, we only remember certain events, important moments and perhaps the formulas for tomorrow's final exam, but not the whole continuum. So my past is digital - even if only part of it is on a digital platform the old analog technology gives a much higher quality product, the amplifier and the vinyl record can give a fuller, clearer, undistorted sound, or, as in the case of the watch, more accurate, more reliable operation.	continuous, quality
Virtual reality	The star of social media will die, just as other trends have. Perhaps people will eventually become disillusioned with influencers, hyped profiles and a constant online presence	reality
Available data	technological progress with fantastic results is taking place, and it requires highly skilled people	preparedness, property
social media platforms	The vision is that we will reach an age where the level of digitization will become saturated, humanity will become fed up with the electronic, digital world around them, both in terms of health and spirit, and will slowly return to analogue solutions in all areas, which promise a more complex but safer way of working I only have a few friends who still take the trouble to meet in person, go on trips, go to parties, but most of them often don't understand why we should meet more often when we can keep in touch via Messenger	personal, face-to-face communication

Source: Megyeri et. al. (2019) 718

5.4 Examining differences in writing quality as a function of handwritten versus typed essays.

The majority of the samples collected were submitted in typed form (304 typed, 70 handwritten, 7 video). In the second round, the definition of the assignment included, in some cases, a stipulation that students must write the essays by hand. This was done in order to introduce a new method of analysis into the research. We are interested to see whether there is a parallel or similar phenomenon between the quality (or other characteristics) of typed and handwritten essays as observed in (Aragón-Mendizábal et. al 2016). He has successfully demonstrated that there are differences in long-term memory, depth differences in favour of handwritten notes, which he was able to demonstrate in the account.
We would like to carry out a comparative study between handwritten and typed essays. We are investigating whether there is a detectable difference in quality between essays written in analogue and those written and recorded using digital means. For the qualitative assessment, the same characteristics will be used for both types. Such as the orientation of the essays, content, formulation, spelling, etc. We would like to know to what extent the writing skills of the target group have been distorted by the use of digital tools, and whether we receive a similar critical reaction to the fact that we have requested essays by hand as we did to the title "Digital pasts, analogue futures".

5.5 Digital and analogue preferences

The essays will be processed and assessed by two independent researchers on a scale of 1 to 10, including a qualitative assessment. Numerous features influence the scores, such as content, (drafting, spelling, compliance with the length criteria, perceived approach, depth, logical structure, etc.). Based on our current results, there are very few essays scoring 10 points, but even fewer scoring less than 3 points. However, we did notice an interesting correlation, whereby essays with an analogue and digital-analogue* orientation almost invariably scored better than those with a digital orientation. We found that a large number of essay writers who were extremely pro-digitalisation barely met the length requirements (minimum 1, maximum 2 pages), and the essays were often shallow, with ideas not developed or supported in a meaningful way.

„What is the point of this? I find it a complete paradox, because we left analog techniques behind us a long time ago, and in the future I cannot imagine any instrument or instrument being analog.“

* We have classified as digital-analog-oriented those essays that prefer the features and tools of the analogue world to the advantages of digitization.

5.6 Future?

From a design perspective, the answers are invaluable. The methods that have evolved over thousands of years of making objects have for a long time corresponded to a world of values that are very different from our present and future. The time has come when we need to examine, from an object-making point of view, what we can and should inherit into the new environment(s), and what we need to reinterpret.

Apparently, what worked as an object in our analog world is being consumed in the digital environment we have created. This phenomenon is part of a "natural" process in this harsh environment. The most worrying consequence is the loss of value attached to objects. The logical regression that comes with the abandonment of handwriting, or the dying of human relationships as a result of the overuse of 'convenient' high-speed communication tools, are individually a great loss to humanity, and together they take it in an unknown direction. New values are being formulated, and the system of human-human, human-machine and machine-human relations is being transformed. The values that can be physically possessed are replaced by a volatile value that is intangible, elusive and immaterial.

Thanks to the incomprehensible speed of progress, the future is shrouded in a blur, little of it is known and understood, and it is constantly changing, making our task even more difficult. The past has already happened, we are responsible for our present, but the future will be shaped by future generations, and we must do our best to help them. This is why the responses of this generation are important, they reveal details from the mist, helping to shape the object culture of the future. This is our key mission, both as researchers and as creators.

The pandemic caused by the COVID-19 virus and the resulting unforeseen situation on a global scale, unknown to modern man at this level, makes the basic idea of our research much more valuable. The educational environment and human interaction has suddenly been forced into an environment for which it is not prepared. Although the full digitization of human life has not just begun, it is clear that we are not fully prepared for it, neither technically, nor emotionally, nor at the skill level.

The weakening of human relationships, the distancing of people from each other, is one of the most important phenomena of digitization. In the second phase of our research, this phenomenon and the negative perception of this phenomenon by the digital generation emerged. The current situation exacerbates this.

It is difficult to foresee the (distorting) effects and the damage that will be caused by the persistent separation of people and their interactions exclusively in the digital space, both at individual and society level.

More and more research is examining the negative effects of excessive use of digital devices. (Toh et al., 2019; Stiglic and Viner, 2019; Goel et al., 2021; Guglielminetti et al., 2022; Griffith, 2023) **Researchers are raising awareness of the dangers and looking for rational ways to tackle the problem, but the widespread use of digital devices has created a living space with problems that are as yet unknown or only partially known, and in which our analog values seem to be lost.**

This unstimulating environment makes people's emotional lives more difficult when they are disconnected from their loved ones, friends and everyday social contacts. As an unintended consequence of this situation, it is feared that handwriting will be further marginalised, with unforeseeable consequences. This confirms our hypothesis that there is a need to modernise handwriting in terms of both ideas and methods and to adapt it to the changed circumstances.

We want to educate people about the importance of handwriting and give them the opportunity to practice it on a daily basis.

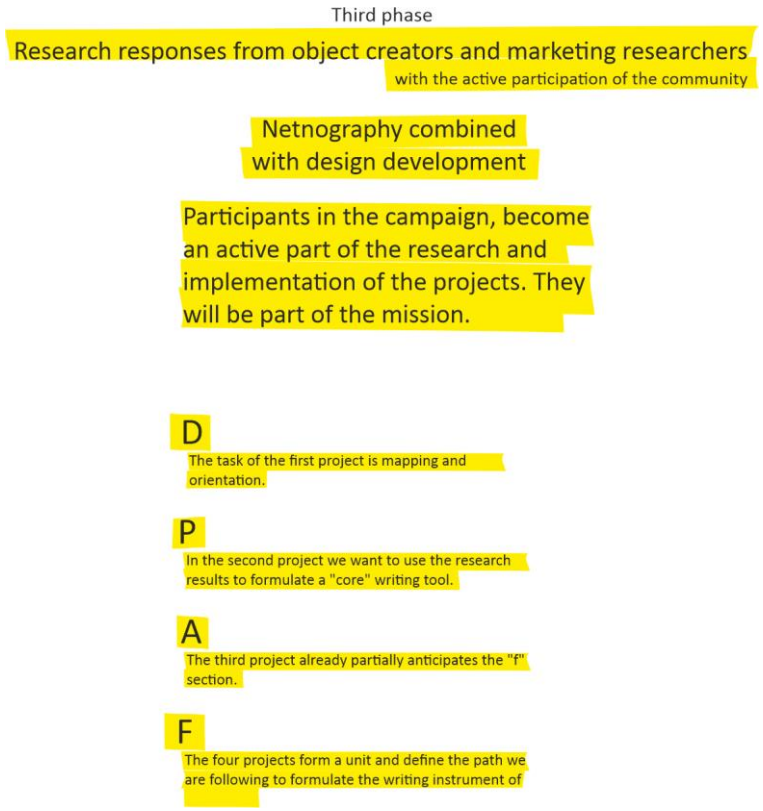
Handwriting and its tools are not the only analog values that have been threatened by digitization. The convenience that digital development provides seems to override the values that the analog world and its tools can provide. For this comfort, we are

apparently willing to give up real quality. This can be seen in almost every area, from language distortion in communication, to quality entertainment, to personal experiences and relationships. The question is: if we are able to let go so easily of the human characteristics, qualities and tools that have defined our analog existence, what value remains for us? The present generation is still in the phase of losing these values, but what will happen to the generation that will no longer be able to know these values?

As a result of the present research phase, we can conclude that the generation under study typically recognises the phenomenon described above and does not consider the direction outlined to be appropriate. They are open to addressing the problem. This line of thought does not imply a rejection of digitalisation, whose values are undeniable. In our opinion, supported by both our literature analysis and our exploratory research phase, the solution lies in combining digital and analog values. Moderation in the face of digitization is important, and a balance must be sought at the individual level.

6. Designer contacting: a netnographic analysis of a community-funded project by a designer

Figure 20. Phase 3. - Seeking responses from designer's and marketing researcher's perspective



Source: own editing

We started the third phase of our research with a netnographic survey. This research phase consisted of participatory and observational **netnographic** analyses. (Dörnyei, Mitev, 2010, Kozinets, 2010)

Given that the age group and target group we are researching spend a significant part of their lives in the digital space, it was logical to conduct this part of our research there as well. (Kozinets, 2019)

In this research phase, our aim was to find out about the habits of regular users of analog devices, especially writing instruments, and their expectations of writing instruments.

The channels to be included in the research were identified through a targeted, topic-specific search. The targeted platforms were selected by examining the available archived content to determine which platforms best corresponded to the research topics and which platforms were likely to provide relevant data for our research.

In order to achieve our goal, we have decided to set out our goals and mission in a concise and understandable way for the communities we want to involve in the study, in the form of an introductory post. In the first instance, we were looking for a general response.

Next, we formulated specific questions about the object to be created as part of the research and its intended marketing. The aim was to use the data received to formulate characteristics for the design of the pen. We also wanted information on the attitude of the communities studied towards crowd-funding as a form of distribution.

To get the attention of the communities, knowing that their interests and tool use habits are focused on writing tools, we phrased our messages and questions in a way that would have an (emotional) impact on them. We stressed that our aim was to preserve and define the future of handwriting. Information was given on the role of handwriting in human development and the negative effects of digitalisation. The main difficulty was to do this in a way that our description was not too long, kept the reader's attention and had the effect of generating interaction. At the end of the introductory post, we informed the community members in advance that we intended to ask further questions and we look forward to their cooperation. The responses to this section were intended to gauge willingness to cooperate.

The targeted platforms are divided into two main groups. The first group is the forums group, which is a thematic online platform based on interest. In these asynchronous chat platforms, participants can post or reply on topics of interest to them. (Horváth - Mitev, 2015) Community members typically have the opportunity to start new topics. The forums are moderated.

The other group we have chosen is thematic community pages, which are a community structure of links between individuals or organisations, containing social links and information between actors. (Horváth - Mitev, 2015) In our case, the organisation around the theme and the resulting social network was promising because of the spectral network of relationships.

6.1 Netnographic analysis and results

Our plan was not only to be an observer on these platforms, but to inform communities about our project, our mission and our research, and to code the reactions and interactions and use them for research. Through these platforms we can potentially reach a large number of audiences who may be interested in our mission. We also expected our participant and observer analysis to provide data to formulate product features.
We launched our netnographic analysis on several web portals (Facebook, Instagram, Reddit) with varying degrees of success.

On instagram, we experimented with direct posts and story posts on our own platforms, but the effectiveness of this was heavily influenced by the low number of followers. While the reception was positive, these platforms are cumbersome and time-consuming to extract relevant data, interactions and reactions. Accordingly, this experiment was of little contribution to our research.

On Reddit, we asked questions in a guided way in the largest stationery group with 196,000 members. Unfortunately, it quickly became clear that this platform was not suitable for us, as it would require much longer preparation to achieve the expected results. The community is infinitely distrustful of new members. Posts that are perceived to be repetitive trigger an immediate negative, offensive reaction from forum members, resulting in a steep decline and the post being invisible or, in the worst case, negatively labelled as such by the potential target audience.

On Facebook, we have also carried out experiments in several fountain pen and handwriting groups. Introductory, conversation-starting posts were made and proved to be the most

successful. Almost all our experiments were successful. The best results were achieved in the Fountain Pen Network community.

6.1.1 Facebook-Fountain Pen Network group [10]

The closed group has 33,600 members (32,000 registered followers at the time of the study), was created 13 years ago and has an average of 20 new posts per day. The site operates exclusively in English. Based on preliminary studies, we did not expect outstanding results, despite the relatively high number of members, the group seemed rather inactive in terms of reactions and interactions. On average, there are 25-35 reactions to a post, but often more comments than reactions. Topics relevant to the group: #fountainpen (2.600 posts) #pencollecting (1.400 posts) #penhero (1200 posts) #inktober (416 posts) #fountainpennetwork (351 posts) #ink (318 posts) #fpn (259 posts) #fountainpenday (234 posts) #fountainpencommunity (168 posts) #handwriting (154 posts) ("The Fountain Pen Network (FPN) | Facebook," n.d.)

6.1.2 Facebook-Fountain Pen Network closed group, introductory post

In our introductory post, we briefly explained who I am and where I come from, and then we explained the Digital Past Analogue Future research, its topic and purpose. We informed readers that we look forward to their answers and questions. To make the post more interesting, we created a photo montage of some of my previous works that we considered relevant to the target audience. These were mainly limited edition writing instruments.

There were 304 reactions to the post. 239 likes, 36 heart emoji, 27 wondering emoji, 2 heart hugging emoji. Based on these, we received no negative reactions and we have attracted the interest of our readers. Besides the reactions, 127 comments were generated, all of them positive, inclusive and friendly. In addition to these, we have had several enquiries in the form of private messages and conversions have started. This provided an excellent opportunity to collect data and start analysing and processing it.

[10] Forrás: https://www.facebook.com/groups/fountainpennetwork

Figure 21. Comments on our post in the Fountain Pen Network Facebook group.

Source: Facebook-Fountain Pen Network group

The highlighted comments are part of the overall comment stream (Figure 21.). All comments were responded to, with several of these starting a two-way conversion. The data extracted helped us to understand the preferences, price sensitivity and buying habits of potential customers. This information played an important role in the formulation of product features. It was interesting to experience how positive the reception was during the co-creation process, a lot of valuable data was collected and interest and conversions were maintained throughout the process. The finished product was also well received by the participants. Once the campaign was launched, we placed a post to promote it, which was declared as advertising and occasionally spam. As a result, the expected reactions were not forthcoming, but the campaign did result in a significant number of customers from the community.

7. Design action, concept phase: d-p-a-f - Community funding project

Crowdfunding is a method of raising money from a wide audience for a project, rather than a large capital investment (Shneor et al., 2020) This phenomenon is a collective effort of people who network and thus pool their money, usually on an internet platform, to invest in projects of other people or organisations, taking the risk that the project will not go ahead. (Ordanini et al., 2011)

Our Crowd Funding Project (CFP) can be divided into 4 basic units, which in reality comprise four separate but interlinked campaigns. The campaigns are named D, P, A, F and each one covers the rapid design, development and limited distribution of a writing instrument. By combining the results of the first phase and the data of the research carried out in the first three projects, we would like to reach the stage where we are able to formulate an object that could be a suitable tool for the preservation of handwriting.

Due to the nature of the CFP, it is expected that a large amount of economically meaningful data will accumulate. We would like to supplement this with a questionnaire block, which we encourage applicants participating in and/or supporting the project to complete by making exclusive content available. The first of these stimulus packs will be a document containing design insider secrets on stationery design, which may be of general interest to the target audience.

7.1 The target group

Basically, the target group for a writing instrument as a product is relatively easy to define (users who practice writing and drawing on a daily basis, collectors, people who use the pen as an accessory, status symbol, etc.) This also means that it can be clearly defined.

By merging the CFP project with the research project, our aim is to significantly broaden the basic user target group and to attract the interest of people who have moved away from writing, or who consider that a penny "advertising pen" can be a good tool for writing.

7.2 The name and what's behind it

The four projects are named after **D**igital **P**asts **A**nalog **F**utures, essentially branding the research itself. The main aim of the CFP is to collect as much data as possible. From an economic point of view, the basic expectation is that the four projects should be able to run in a self-financing way without major investment.

7.3 The data to be analysed:

- General reactions, feedback on the project, general attitude towards handwriting in the 2020s.
- Interest in the topic and projects, filtered by age, gender, location, etc..
- Usage habits of the target audience
- Identifying the basic differences between the expected target customer audience and the potential customer audience beyond and how to bridge them.
- Economic performance and data on sales margins.

7.4 „d” The first project

The first project is a survey and orientation. The CFP is a new sales area for us, but our preliminary research on the subject shows that this method is the most appropriate for the project, in order to promote the product and to communicate our mission, philosophy and purpose in a simple way. We hope that this will attract additional potential customers.

Project "d" is based on a pen with general characteristics, unisex in size and design. We offer an instrument which, because of the above-mentioned features, can be a daily companion for anyone practising handwriting, both ergonomically and aesthetically.

7.5 „p” The second project

In the second project, we want to use the research results to formulate a family of writing instruments that could potentially be of interest to a wider audience than the products offered in our first project. In this project, in addition to the fountain pen and rollerball versions, we will offer additional options, so that those techniques fit into our already established modular

system. Our aim is to provide solutions for more situations in life where people need writing and drawing utensils, thus increasing the number of potential customers.

7.6 „a” The third project

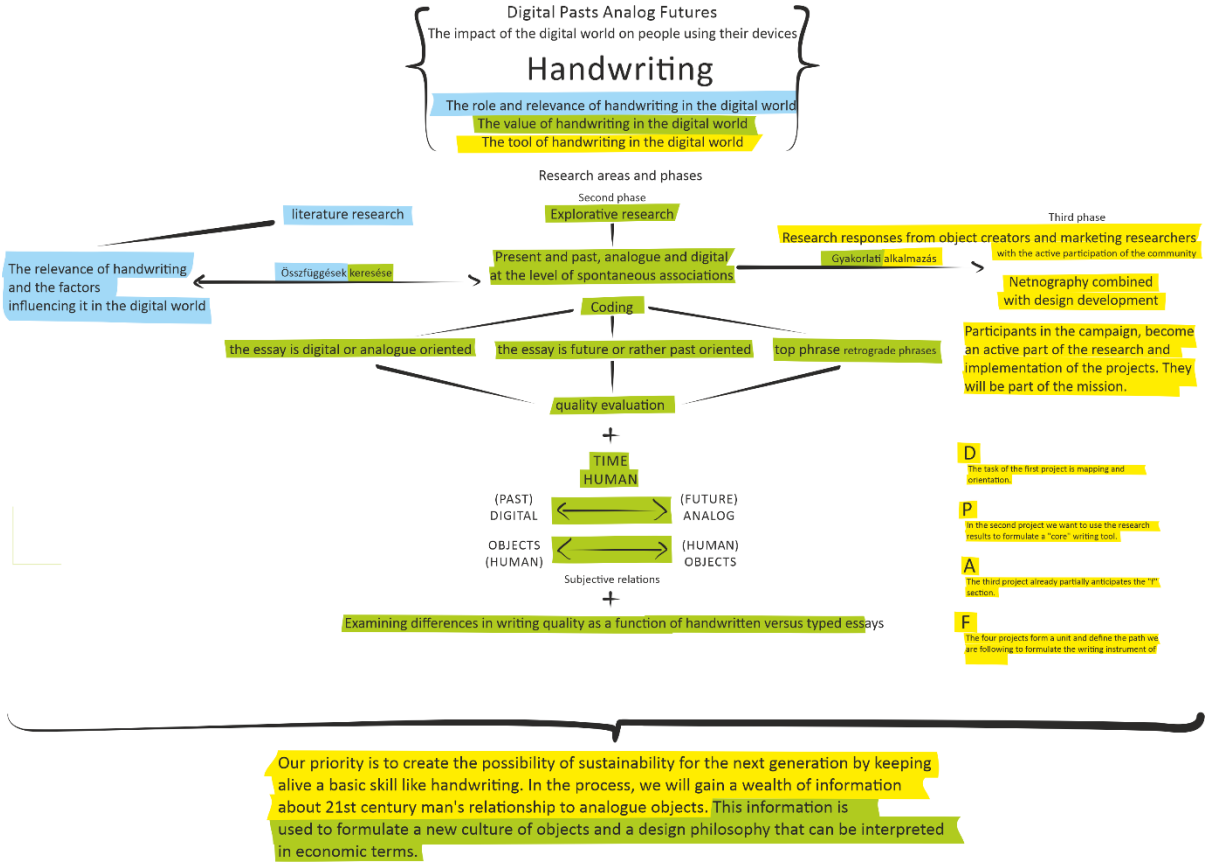
The third project already partially anticipates the "f" section, and will still be a writing instrument in the classical sense, but will break with the characteristics that define a writing instrument today.

7.7 „f” The fourth project

At present, we are unable to identify any of the essential attributes of the fourth product. We await the full summary of the research to answer the questions we need to formulate the product.

The four projects form a unity and define the path we are following to formulate the writing instrument of the future. We are confident that there will be potential funders who will support the cause and see our work through. For those investors who financially support all four phases, we will put together a special collector's package, which will include not only a collector's gift box, but also a summary of our research.

Figure 22. General map of the planned research



Forrás: saját szerkesztés

7.8 Etelburg[11]

The Etelburg brand was established as a Hungarian family business in 2016. The basic philosophy and mission of the company is the same as our research. Etelburg's first product range consists of a special modular pen system, a machine for mixing any colour and the corresponding app. These internationally patented devices approach handwriting and hand use in the digital world from the perspective of colour and the variety of writing and drawing possibilities. From a technological point of view, these tools are a blend of digital and analogue achievements. The products resulting from our research are intended to continue this line of work. The procurement, manufacturing and logistical resources for this research were provided by Etelburg.

[11] www.etelburg.com

8. Design action, implementation phase: project „d”[12]

The "DPAF" crowd funding project and the studies and analyses that preceded and accompanied it constitute the second phase of our research. With this phase we have several objectives, but we are essentially looking for the same answers as in the first phase, from a completely different perspective. The questions that arise will be continuously answered by the project, so that we can formulate one or more solutions and get a live reaction. We have the opportunity to analyse interactions and reactions from a scientific point of view.

8.1 Product specification, pricing

The formulation of product attributes was based on our previous experience and data extracted from netnographic analysis, a process that can be considered as a "co-creation" process, where potential customers actively participated in the formulation of the values for the product attributes. This allowed us to get a detailed picture of the basic expectations of the product. (Ind and Coates, 2013)

Co-creation processes are applicable to both marketing and design. (Henseler and Guerreiro, 2020) They help to develop products and services in a creative and innovative way, and build up a picture of customer expectations and habits. (Zuniga Huertas and Pergentino, 2020)

The data extracted from conversions with the target group classified as experts (collectors, dedicated pen users, stationery dealers, geeks, etc.) were coded. During the coding process, several needs emerged, some of them overlapped, while others led to the conclusion that we could not cover all the needs in one product.

These needs, expressed as characteristics, are shown in Figure 23. Two categories have been created: applicable, not applicable. The applicable features were integrated into the design process and formed the basis of this process. There were some features (in several cases occurring at repeated frequencies) that would have added value to the final product, but the extra costs of manufacturing meant that we were unable to incorporate them into the design.

[12] Erről a kutatási fázisról már részben beszámoltunk a 2021-es EMOK konferencián (Megyeri, 2021)

These were typically features or technical solutions found in much higher price range (price difference >10x) writing instruments.

Figure 23. Key words developed during co-creation processes.

keywords	integrable	non-integrable
1a	Modern	
1b	Classic	
2a	Timeless	
2b	Durable	
3a		Piston mechanic
3b	Cartridge/converter	
4a	Steel nib	
4b		Gold nib
5a	Rollerball	
6		Cheap
7a	Black	
7b		Blue/red
8		Fém
9a	Könnyű	
9b		Heavy
10a	Unisex	
11a		Small/big
11b		Oversized
12a		Flex nib
13	Eco-friendly	

Forrás: saját szerkesztés

The figure above shows the keywords that emerged during the co-creation process and that we were able to apply when formulating the product attributes. On the basis of the suggestions **1a, 1b** for the style of the pen, we could not define an exact guideline, so we concluded to co-create the two most frequently encountered features (modern and classic). The pen has a classic shape, with a few unusual details, and modernity is ensured by the materials used. We have received a lot of feedback on the durability of pen **2a** and the lifespan of pen **2b**. These features are also provided by those listed under **1a** and **1b**. A large number of respondents indicated that they would like a **3a** piston mechanism pen, but this

technology was not within their budget, so we used a **3b** cartridge/converter mechanism instead, which is also a popular choice and in many cases more practical than the former. As for the nibs, most people prefer the gold nib **4b**, but the purchase price of a piece of this nib exceeds the selling price of the pen. This was offered as an extra product during the campaign. The base pen was offered with a steel nib **4a**. There was a great demand for the rollerball **5** system version, so we also made that. The pen was designed in an unconventional modular system, so it can be converted from a fountain pen to a rollerball in a few seconds. No relevant feedback was received on the price of the pen. For the colour **7a**, **7b**, the colour characteristics of the chosen material **8** were used as a guide. This also applies to weight **9a, 9b**. For size **10a, 11a, 11b** we found significant differences, so we could not draw a consistent conclusion. There was a strong demand for flexible tips **12a**, but this was not within the budget of this project. Environmentally friendly **13** solutions were also a recurring theme, so this was a constant theme throughout the design process, production and communication.

After processing the data, it was decided that the first product of the four-step project would be the **medium sized** (136.4 mm) pen shown in the figure below, available in both **fountain pen and rollerball** versions. The pens can be used with a traditional cartridge as well as with a converter. As for the nibs, the German Schmidt steel nibs were chosen (we offered gold nibs for the fountain pens (7 in total) for an extra charge of USD 110), all of which were sold out. The weight of the pen has been reduced to **32 grams**, with the centre of gravity shifted from the middle of the pen towards the grip section, ensuring **comfortable**, long-lasting writing. This weight and size puts the pen firmly in the unisex category. In terms of shape, the pen is "cigar-shaped". The main body of the cap and shaft are symmetrical, the shape is uniquely interrupted and given a modern effect by a metal barrel ring instead of a cap ring. The main material of the pen is 3K twill cross-weave carbon fibre, which many pen manufacturers use in tubular form, but we used shaped, a process predominantly used for pens over a thousand dollars. We used a high gloss polished clear resin to impregnate and coat the carbon fabric. To increase the durability of the cap and the barrel, a copper sleeve was applied under the carbon fabric. Environmental requirements were met in two ways. **Durability** was a criterion in the choice of the pen materials, extending the lifespan of the pen. The pens are modular, and we aim to design our developments for the whole project to be compatible with the full range of DPAF products.

The figure below shows the pen in its closed state. The cap is threaded and contains a spring-loaded, so-called "airtight" inner cap, which prevents the pen from drying out even after long periods of non-use, even months.

Figure 24. Etelburg - DPAF I. pen

Source: Etelburg - Designer: Gábor Megyeri

In terms of packaging, we completely abandoned the unnecessary, polluting materials used by our competitors, and instead created a paint and glue-free cardboard box, into which we manufactured a sorting grid from corn-based plastic using 3D printing technology. The packaging is described in detail in section 8.2.

In order to protect the pens during transport and later use, each pen is supplied with a durable, rigid, genuine leather case. All pens purchased during the kickstarter campaign come with a desk stand and 3 plugs for unused cartridges and converters to be resealed. *It is a technical innovation designed to make the pen more comfortable to use*. The box also contained 3 ink cartridges per pen and a signed certification.

Figure 25. DPAF I pen with the additional stand

Source: Etelburg - Designer: Gábor Megyeri

To determine the price, we also took into account the relevant data from the research, but the results did not lead to an exact figure.

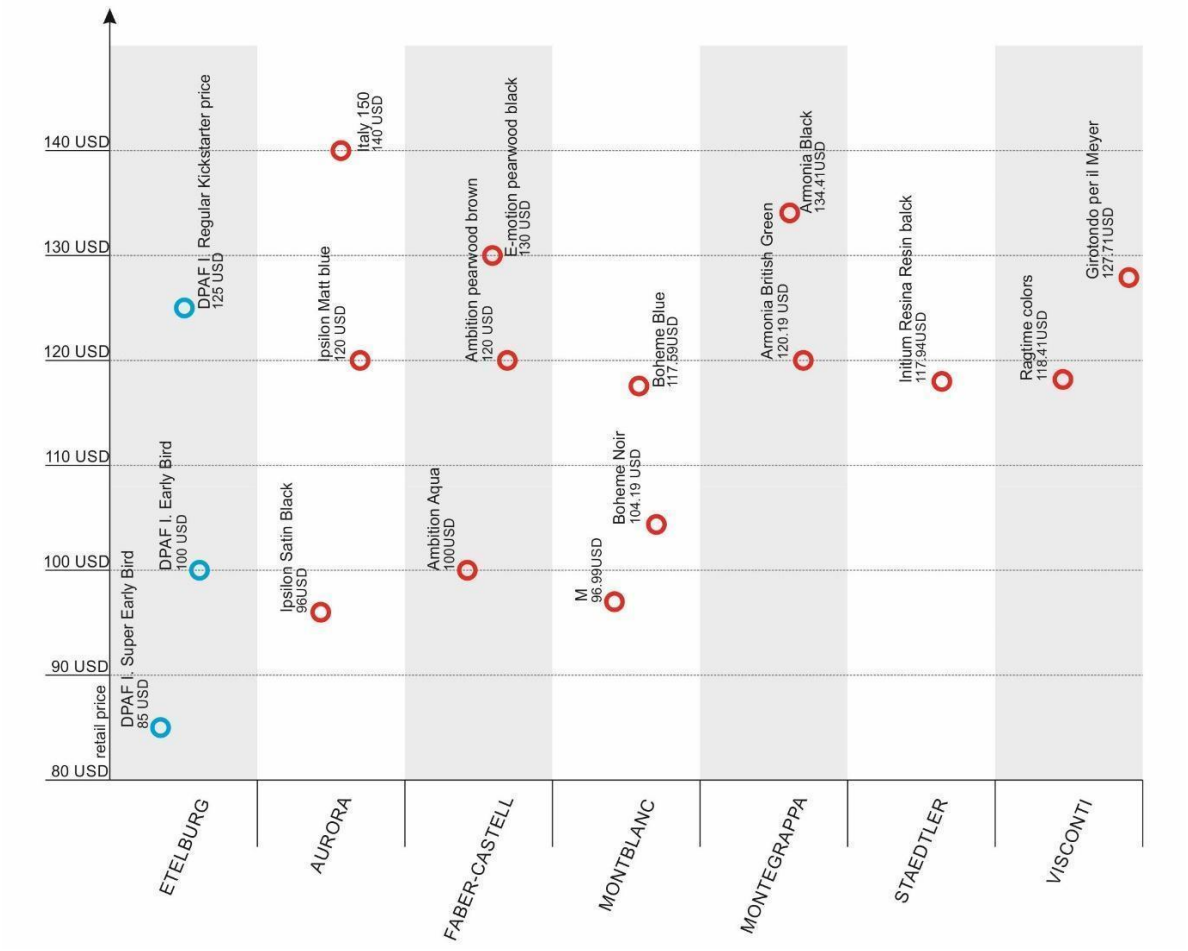
A significant percentage of respondents (we call this group everyday pen users. They typically do not use disposable pens, prefer fountain pens, but use a large number of rollerballs. Their purchases are not characterized by products from classic premium brands.) Their willingness to pay for general pens is estimated at $35-45. (This price range typically includes mass-produced pens with exceptionally high volumes.) When asked, we found that approximately 50% of this group of buyers are willing to pay $180-200 for a more specialised pen. In this category, competing brands offer almost exclusively resin-based plastic pens or other cheap materials mass-produced using mass production techniques. We have tried to compensate for the lack of brand awareness with the materials and solutions we use.

The price sensitivity of the collector class is less significant, essentially willing to pay anything from $75 for a piece of stationery if it is of interest to them, but they have much higher expectations than the group of buyers described earlier. They do not use rollerballs, and are only interested in fountain pens. At a price of over $175 a piece, they demand a gold

nib (which is not feasible or very difficult to do in a factory setting.) They are open to new things, respectful of tradition, and looking for unusual solutions.

Based on this data, we have looked at the range of competing companies from $80 to $150, a sample of which is shown in the figure below.

Figure 26. Comparison of pens for retail goods between USD 80-150.



Source: own editing

The pens in red are highlighted in our research for comparison (Figure 26). The common feature is that all except two of them are made of resin-based plastic. The two more expensive Faber-Castell pen barrels are made of wood. The production cost and machining complexity of these materials is inferior to the moulded metallic carbon fibre we chose.

We have looked at the prices of several carbon pens to help set the price of our own product.

- Kaweco AC sport FP 190 USD (carbon is used in the form of a tube),
- Pineider La Grande Bellezza LE 998 USD (forged carbon body, requires special tooling)
- Monteverde Inuncia Deluxe 115 USD (massproduction)
- Montblanc Meisterstück Solitaire Carbon 1215 USD (shaped carbon fiber)
- Montblanc Starwalker Carbon FP 1100 USD (shaped carbon fiber)
- Montegrappa Miya Carbon 1250 USD (shaped carbon fiber)
- Montegrappa Extra Hi-Tech FP 1895 USD (shaped carbon fiber)

Source: internet market research (extract)

Using this data, we have decided to make our pens available in three price ranges. We have made no price distinction between fountain pens and rollerballs.

- The first 10 pcs., „super early bird" **85 USD**
- 11-49, „early bird" **100 USD**
- 50- „regular kickstarter price" **125 USD**

We then produced the final designs and prototypes to start preparing the campaign.

8.2 Packaging concept - a new direction in the world of luxury

Although we don't like to use the word luxury, the product that is the result of our work falls into this category. Although corporate responsibility is increasingly evident in the communication of luxury brands, it is difficult to judge the level of real action behind the communication. As we can see from Costa Pinto's study, these activities can even have the opposite effects and create negative perceptions among customers. (Costa Pinto et al., 2019) (Kunz et al., 2020) In formulating the features of our product, we were confronted with a number of ethical and sustainability issues. As Kapferer and Michaut's research shows, the attitude of luxury brands towards sustainability is becoming increasingly important to luxury

consumers, significantly influencing their purchasing decisions. (Kapferer and Michaut-Denizeau, 2014)

Some of the questions we asked on this topic were answered during the research, but there were also questions that arose after a stage where we were no longer able to seek answers using applied marketing research methods.

We made a packaging decision that is completely unusual in the luxury world. We placed our products, sold through a Kickstarter campaign, in a paint-free corrugated cardboard package (Figure 12), inside which we created a plant-based 3D printed divider to avoid the contents of the package shifting. This has created a fully recyclable, low-cost packaging. It's a radical departure from conventional packaging, which is overwhelmingly more damaging to the environment than the product it's wrapped in. This is also true of its manufacture and its potential for recycling. Luxury companies see packaging as a marketing tool and accordingly want to communicate their identity and exclusivity through this tool. (Poturak, 2014)

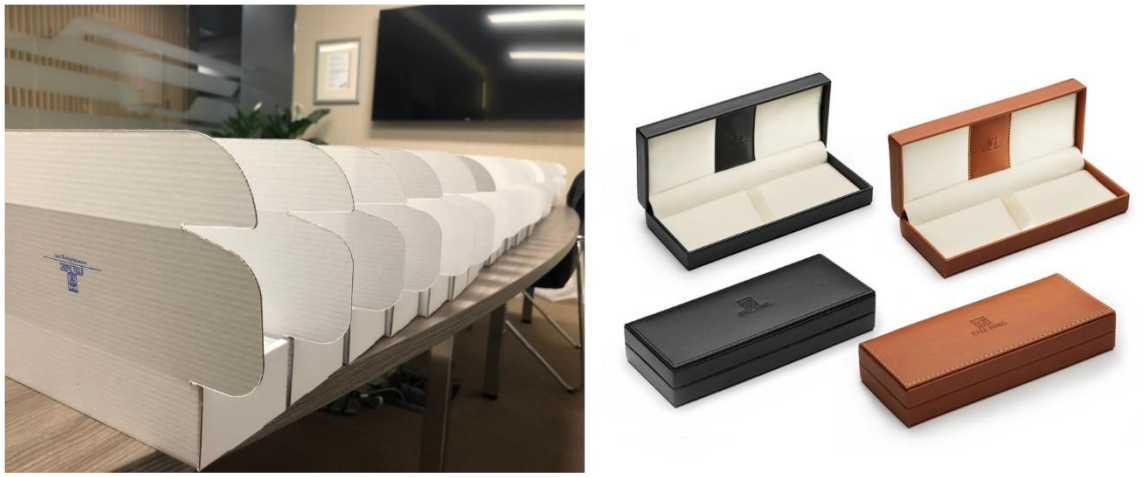
While this study highlights the marketing and sales benefits of high production cost, "quality" packaging for luxury industry products, our experience is that neither in-person nor online sales are focused on packaging these products. For many shoppers, there is a desire to visually communicate their purchases in a highly visible way, but the primary means of doing this is through the use of so-called gift bags and paper bags, which are much more environmentally friendly to produce than expensive packaging.

Consumers do not add any after-market functionality to these packs, and consequently the shelf-life of these packs is disproportionately short and costly to produce.

During the campaign, our packaging concept was well received by customers, with no negative comments and many complimenting the idea. Later, the concept was further refined and after the campaign, we offered an optional "gift box" made from recycled and recyclable synthetic materials, but the packaging of our pens sold under the basic concept remained the fully recyclable version described earlier, which cost less than a tenth of the cost of our optional "gift" box. In our experience, people who buy pens for their own use do not need the expensive, more polluting packaging. Those who buy for collectors or as a gift are willing to

pay for packaging that can be purchased separately. It is important to note that there are some markets where our products cannot be sold with the basic packaging, such as the Middle East.

Figure 27. Basic packaging (left) and optional packaging at extra cost (right)

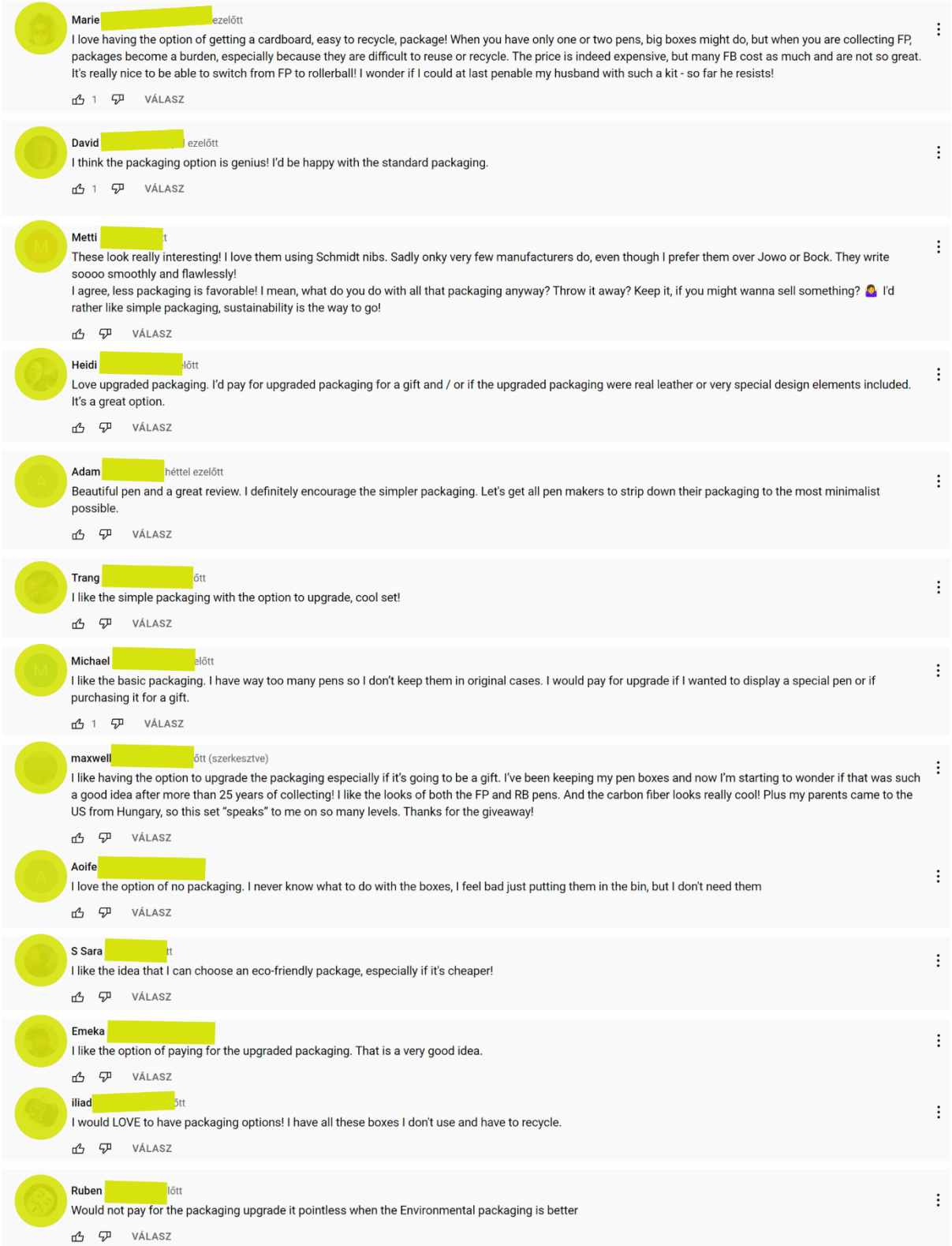


Source: Etelburg - Designer: Gábor Megyeri

To confirm our theory, we have recently undertaken another netnographic study. We asked a major influencer in the world of pens to create a video presentation of our product on his YouTube channel, detailing not only the product but also the packaging and asking his followers for their opinion on our packaging concept with a call-to-action question. In the video, she explained the concept in a clear and understandable way and demonstrated both packaging versions. In the first 2 weeks, the number of views rose to over 1000 and 83 comments were received, some of which are shown in the figure below. The community of followers is typically made up of pen users and pen collectors. There were no negative comments and we received valuable information about why people would choose the basic or the extra package.

The social responsibility activities of companies in the luxury goods world are greeted with strong scepticism by consumers, environmentalists and other social impact bodies. (Costa Pinto et al., 2019) We are trying to succeed in this difficult field by using real tools to ensure the environmental compliance of our products. All our products are expected to be building blocks of our core philosophy and useful tools to achieve our mission.

Figure 28. Comments received during a netnographic study of the packaging concept on YouTube



Source: YouTube

Bhandari et al's research shows that the fashion, accessories and luxury industry is one of the industries with the largest ecological footprint in the world. (Bhandari et al., 2022)
In our opinion, thanks to the external social, economic, environmental and technological influences, our drastically changing world has reached a stage where luxury brands and consumers are recognising and embracing real values, all for the sustainability of the industry. This is particularly true in the face of the growing scarcity of raw materials. Our concept is that the quality of our products is based on extended lifetime, guaranteed user experience and added intellectual value. Our aim is to create a product category in the world of luxury products, free from the excesses and waste that have made the word luxury pejorative and the industry ethically questionable in recent times. (Gardetti, 2020)

8.3 Preparing the campaign

From the outset, we planned to run the campaign with a minimum of financial outlay, allowing the campaign to be self-financing. The campaign operates on a pre-order system, whereby donors/investors pre-order the product of their choice with their payment, and although there is a scheduled delivery date, there is no obligation to strictly adhere to it. (Belleflamme et al., 2014) This is one of the reasons why detailed preventive research was essential. Based on what we had learned during the preparatory research, we were able to formulate the message we wanted to convey and produce a short introductory video and a detailed description of the campaign, which is a basic requirement for crowdfunding projects. We prepared the visual content and the graphics showing the different features and functions.

In the two-minute campaign video, after a short introduction, we explained the research and our objectives. According to Mollick's study, there are few things more important to the success of a crowd funding campaign than the existence of a video. (Mollick, 2014) A detailed description of the campaign was also produced, giving people detailed information not only about us, but also about our mission, product and accessories, and timing.

8.3.1 Community funding campaign platform - Kickstarter

We chose the US-owned Kickstartert [13], founded in 2009, as the platform for our campaign. It is the community funding platform with the most projects. To date, 224,322 successfully funded projects have been completed on the platform, worth $6,759,222,072 U.S. ("Kickstarter Stats - Kickstarter," n.d.) The success vs. failure ratio of projects on Kickstarter is 39.37% successful, 60.63% unsuccessful. (“Kickstarter,” n.d.)

8.3.2 Timing

Timing is one of the most important factors in community funding campaigns. To be successful, a precise plan of when each process is going to be launched needs to be in place and should be followed closely (Burtch et al., 2020) This includes choosing the right launch date for the campaign and timeline planning for updates during the campaign.

When we started planning the Kickstarter project, one of our key commitments was to deliver the products by Christmas, hoping that the Christmas shopping spree would generate more purchases. This was also an important part of our communication, and as a result there was a strong pressure to deliver, which increased as time went on.

We had a lot of technical difficulties with setting up a company in the United States, which is also a basic requirement for Kickstarter, you can't start a campaign from Hungary. As a result, the originally planned campaign launch was delayed by a month. Unfortunately, we lost a lot of time, which led to unforeseen consequences. We were able to launch the campaign on 14 October and to give ourselves a chance to meet our delivery commitment, we shortened the usual 30-35 day campaign period to 21 days. Although we were aware that this decision was risky for the outcome of the project, we were not prepared for the consequences. Our situation was further complicated by delays in the supply of raw materials and the failure to meet deadlines set by external partners.

8.3.3 Goals

[13] www.kickstarter.com

Knowing the minimum order quantities from suppliers, calculating the shipping costs and other additional costs, we decided to set the campaign's success limit at USD 30,000. According to the kickstarter's operating principles, the campaign is valid when the project reaches the predefined target amount, and the process of disbursing the money raised is only started after that. As a result of our subsequent research, we found that we had set the target amount too high. Presumably this also influenced the development of the project. From a production point of view, it would have been ideal to reach the target amount in the first third of the 21-day run, but instead this happened on the penultimate day. As a result of the delayed disbursement mentioned above, we faced another delay.

8.4 The campaign

On Kickstarter, projects are divided into categories. Our project fell into the "Design and Technology" category. This category, thanks to the fact that backers receive a product for their money after the project is completed, is characterised by the need to have a detailed production and delivery plan and to provide detailed information about it. This includes risk factors and potential run-offs. (Mollick, 2014)

One of the key elements of crowdfunding campaigns is to connect and communicate with the investors involved in the project. (Wang et al., 2018) The first is the so-called "Update" section. This is a public interface through which project promoters can provide project promoters with updates and news on project developments. (Block et al., 2018) Regular use and updates are key to the project's outcome. (Mollick, 2014) The second, also public, tool is the comment section. Here, supporters can ask questions and express their views openly. The third, non-public tool is the direct message.
Throughout the campaign, we have been in constant communication with supporters through these tools. This meant up to several conversions a day, both at individual and community level. From these dialogues, as well as from the previous analysis, we extracted a wealth of valuable data that we could use to make the necessary adjustments on the go, as well as to guide us in our next projects.

The campaign did not run smoothly. In keeping with our decision during the project planning phase, we did not spend on external marketing activities, but used only the "guerrilla"

marketing processes that we could carry out ourselves. (Hutter and Hoffmann, 2011) (Behal and Sareen, 2014) (Pir, 2019) We used all our tools to inform people about the existence of the campaign, both online and in person.

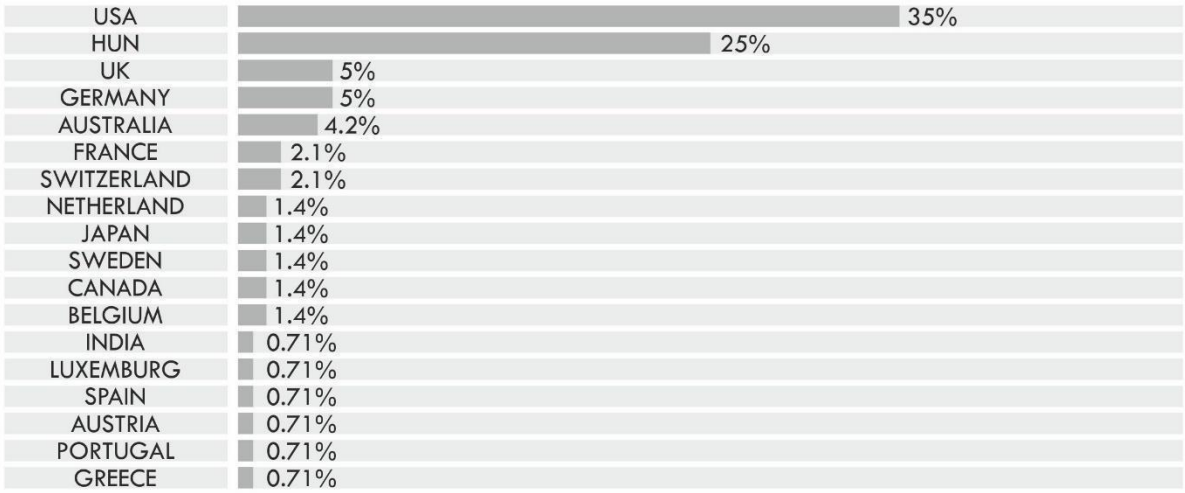
Although sales started from the first day, our sales curve did not rise at the right pace and by the end of the first week, based on predictions, it was doubtful that we would be able to close the campaign successfully. We then made the decision to use external marketing help, but unfortunately we found that the waiting list for the channels we considered worthwhile was longer than the duration of our campaign, so we couldn't use them.

8.4.1 The impact of press coverage

On 26 October, Péter Uj published an article on our project entitled "Hungarian should have a Hungarian fountain pen" [14] on the 444.hu news portal. The writer used the Kickstarter page as a source. The author used the Kickstarter page as a source. The article has been published without modification by Microsoft News, and has served as the basis and inspiration for several articles published online, including those on oktogon.hu and hvg.hu. These articles have significantly increased visitor traffic not only on the campaign's kickstarter platform, but also on our website and, according to the statistics, have contributed to the fact that we are able to sell 25% of the pens in Hungary (Figure 29.).

[14] https://444.hu/2020/10/26/magyarnak-magyar-legyen-a-toltotolla

Figure 29. Percentage distribution of buyers by country.



Source: own editing

8.4.2 Campaign statistics

We raised $31,144 through our campaign, which is 104% of our goal. 140 purchases were made during the official campaign (each supporter can only purchase one item, one time). This number does not include extra purchases made between the campaign close and delivery. 212 followers were recorded, of which 21 were purchased, giving a conversion rate of 9% for followers. Our launch video was viewed 2448 times, with 51.06% of the total views. Of the 15 different products, the "early bird" fountain pen, offered at a medium price, was the best seller.

During the project, 17 updates were posted on the site (this is a form of communication to inform supporters about news, events, etc. The update is public). A total of 125 comments were generated. In addition, we kept in touch with all our donors personally, continued the guided research, and got to know their expectations of the project, as well as their opinions and suggestions for future projects.

8.5 Campaign evaluation

Our crowdfunding campaign, Digital Pasts Analogue Futures 1., was a success from both a marketing research and a design perspective. Although we had limited resources for marketing activities, we were successful in reaching our target audience. (Belleflamme et al., 2014) Throughout the campaign, we maintained dynamic two-way communication with both supporters and interested parties, providing us with a wealth of information that we were able to use to make the campaign a success. (Wang et al., 2018) Although we have converted interested parties into donors, this conversion rate needs to be improved. (Ordanini et al., 2011) As described above, the preparation of the campaign, as well as the participatory analysis through communication during the campaign, has yielded results and provides valuable information for the preparation of further planned campaign phases. The interest-based composition of our customers proves that we did not only succeed in attracting customers and supporters who are daily pen users or collectors, but also a large number of people who use pens almost only for signing and are content with a simple ballpoint pen.

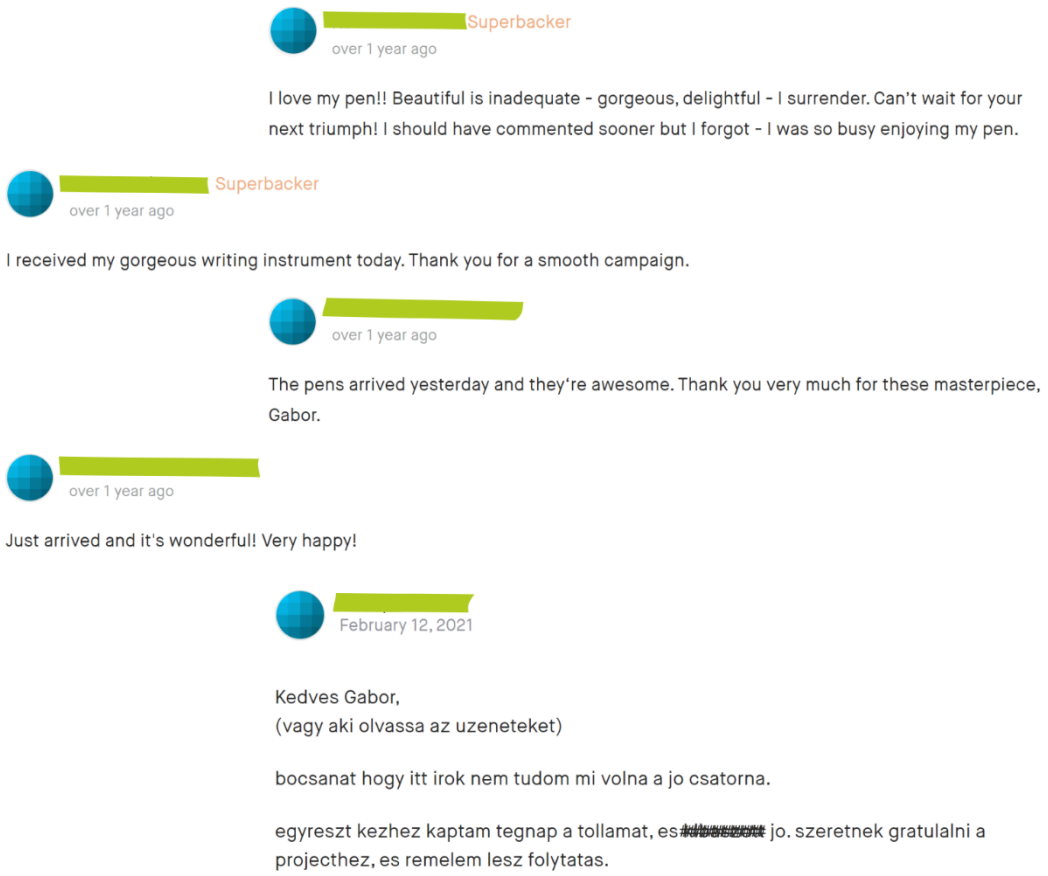
From a design perspective, the information and data obtained, requested or unsolicited during the campaign is invaluable to inform further design processes. It has helped us to gain a deeper understanding of our customers' expectations and their vision for the future of writing.

The economic success of the project, in addition to confirming our vision and supporting us in achieving our objectives, made the project self-financing and opened the way for the preparation of the next phase.

We are pleased with the outcome of the project and believe that its success is also a testament to the effectiveness of our multidisciplinary research. From a research point of view, we have collected valuable data that contribute to defining the present and future of handwriting. The results provide a more detailed picture of the future and a greater insight than in previous research phases, as the samples in this phase are more mixed than in previous phases.

DPAF I. has become a successful product. During and after the campaign, we received a lot of positive feedback and customer satisfaction is 100%.

Figure 30. Unsolicited backer comments [15][16] received on Kickstarter after the project closed and products were shipped.



Source: www.kickstarter.com - own edit

[15] Az utolsó kommentben egy szó cenzúrázva lett a nem megfelelő nyelvhasználat miatt.

[16] Az ábrán látható kommentek csupán egy töredékét képezik a projektre vonatkozó pozitív visszajelzéseknek. Válogatás nélkül kerültek az ábrába

9. Project P

9.1 Preparation of project „P”

Preparations for Project P are currently underway, and we plan to launch the campaign in the beginning of the last quarter of 2024. The design of the first project has been minimally modified, and the pens will be extended with an additional analogue and, conditionally, a digital solution.

As our main goal is to preserve handwriting and one of the ways to do this in the course of our research, we have teamed up with a specialist in the art of calligraphy and the science of graphology to develop a workbook that can be used by all, and which will enable those who use it to improve their handwriting skills. All our supporters receive this product in digital format free of charge, so they can print and use it in the quantities they need.

9.2 Expectations of the project

We expect to obtain additional data that can add to our scientific results. We would like to get an idea of whether the changes in the economic, health and social situation that we are witnessing today are affecting the chances of achieving our research objectives? If so, in what direction?

9.3 Risks that may affect the project and influence its success

The changes in our daily lives mentioned in the previous point call into question the effectiveness of the project, which may distort the results. Hectic raw material supply, inaccurately estimated supplier deadlines and significantly rising raw material and service costs all threaten the success of the project.

10. Limitations

During the exploratory research, we conducted a preliminary study to identify the age group from which we could extract the largest amount of relevant data. This was determined on the basis of the results for 20-24 years. As a continuation of the exploratory, empirical phase of the research, the age group can be extended to provide a broader picture of the extent of digitalisation and attitudes towards digital-analogue values.

By expanding the criteria used for coding, increasing the number of samples and extending the sampling location, the final data can be further refined. Our primary sample source is the student population of Corvinus University of Budapest. Involving more universities would give a more diverse picture, and comparing results from different places would provide new perspectives for analysis. A larger sample of handwritten essays would be needed, so that a more accurate, detailed comparison could be made between the content and quality of handwritten and typed essays. More in-depth analyses could be carried out in terms of layout and spelling.

Our netnographic studies were carried out in the context of online communities with an interest in writing, handwriting and writing instruments. This has the advantage of providing data from one of the potential target groups of our crowdfunding campaign. However, after the first Kickstarter project, it became clear that they are not the only target group, so extending the netnographic studies to other communities with different interests could provide useful information for the preparation of further campaigns. This includes people interested in digitization, information technology and artificial intelligence. This environment, as an extreme from our point of view, would presumably provide data on the preferences and attitudes of individuals in the digital-focused community. Although we were able to gather some data on these topics from the digitally oriented essayists in our exploratory research, it would be worthwhile to confirm or refute them with analyses conducted in this different context.
The most significant inhibiting factor for a Crowd funding project is the self-financing nature of the target, which does not allow for the use of costly marketing activities to help it succeed. There are 'hub' websites specifically dedicated to the promotion of design-related

community projects. One example is "Yanko Design"[17]. At our request, they sent us a proposal, which showed that in order to be successful, we would need to spend between US$10,000 and US$25,000 on this marketing activity.

Partly due to a lack of resources, partly due to a lack of contacts, we were unable to get our project out to a sufficient number of media outlets. The first project showed the positive impact that press coverage can have, so our development in this area could be expected to make a major contribution.

[17] https://www.yankodesign.com/

11. Future vision

11.1 The dark side of digitization

Alongside the positive aspects of digitization, it is important to understand and, where possible, manage the negative impacts of its excessive advance. Knowing these will give us a better understanding of the future and its threats.

Turel discusses the dark side of digitalisation in his study, which explores the negative effects of digitalisation from the perspective of several researchers, highlighting IT security risks, the addictive effects of the digital world, the blurring of boundaries between work and private life, the emergence and effects of "technostress". (Turel et al., 2019) In conclusion, digitalisation adds to our everyday lives, especially the comfort part, but it is very difficult to keep the balance and it brings with it a number of risks that are not recognised by users at an individual level due to the divided attention and false sense of comfort. In their study, Milenkova and Manov point out that, as digital tools and their use have completely taken over not only personal living space, but also the work space and the social space. (Milenkova and Manov, 2020) These virtual threats do not only affect events and actions in virtual space. They also have a profound impact on our lives outside the digital, virtual world. **The balance has shifted dramatically and digitization is overwhelming reality. A reality where values do not exist as ones and zeros, but as real values.** The dangers and negative effects of digitalisation are a real threat for responsible adults, but the real problem is for the younger generation. According to research, today's children get their first internet-connected device at the age of 2. (Milenkova and Manov, 2020) This could be a parent's mobile phone or an unbreakable tablet designed specifically for underage children. These devices provide children with a level of stimulation that keeps their attention fully engaged and stops them crying immediately. Unfortunately, like so many things in digitization, this is only a pseudo-solution and actually causes much more harm than the perceived benefits attributed to these tools.

In this situation, it is adults, parents, who have the biggest role to play in protecting children from digitization. This is a problem today because the way adults live is an example for

children. It is difficult to set a good example for our children because the use of digital devices has become a pervasive and technically present part of our lives.

In their study, Sivrikova et al. (Sivrikova et al., 2020) also investigated the effects of digital devices from 0 to 8 years of age, and described the abnormalities and negative effects of digital device use, supported by psychological and other medical studies. (Bozzola et al., 2018) These include visual and hearing impairment, negative effects on metabolic and cardiological functions, and sleep disturbance. In addition, psychologists have identified asymmetries in thinking development, including the development of clip thinking, the risk of developing "digital dementia" and mental retardation. They also describe the decline in children's creative activity, aggression and addiction caused by the virtual world as alarming. Sociologists report a breakdown in socialisation, while other experts point to deficits in language development, emotional problems and a weakening of family models.

The use of digital tools has undeniable benefits in many areas of life. They help us learn, work, connect, socialise, have fun, build communities, communicate… At the same time, negative effects can be detected regardless of age, the level of danger of which cannot even be assessed. In addition, it is worth considering the real value of the relationships, communities and virtual assets created in the digital space.

We believe that our research can play a real role in the discovery, preservation, interpretation and maintenance of human analog values. These processes and their results can help to preserve the control threatened by digitalisation and allow people to ***remain human*** *in the digital space, instead of being one and zero.*

According to Royakkers, digitalisation is penetrating every aspect of human existence. It is embedding itself in humans through brain implants, for example, in human relationships through social media, it is gaining more and more knowledge about us through big data systems and technologies such as emotion recognition, it is constantly learning human behaviour through artificial intelligence and the robots and software that power them. The wave of digitization is having a radical impact on our culture and its values. These raise serious ethical and social problems that we are currently ineffective in addressing. One reason for this is that we do not have an accurate, comprehensive picture of the impact of digitalisation. (Royakkers et al., 2018)

12. Closing thoughts

We are not aware of what lies ahead as digitization continues to evolve. It is important to stress that our research is not against digitization and its development. On the contrary! We are looking at how we can use its achievements to create a combination of digital and analog existence that allows us to preserve our values and thus enhance the values that digitization has created. Articulating the future of handwriting is part of this process. We want to use it to create a methodology that allows us to do the same process for other values. It has taken a long time in the evolution of man to develop handwriting as a means of communication and knowledge transfer. Its role has been unchanging and indispensable for thousands of years. The research findings presented in this dissertation have also shown that, in addition to being a fundamental means of communication, handwriting has a multifaceted role to play in the proper development of the human mind. Abandoning it completely can have unforeseen negative consequences.

Our research does not end with the completion of the PhD programme. Our aim is to formulate the writing instrument of the future. Based on the feedback and research results, we believe we are on the right track and have a rational vision of the next steps.

We know that simply creating a tool will not achieve our goal. Accordingly, we see it as our responsibility to educate current and future generations about the benefits of handwriting and to provide them with opportunities to use it. We need to create the tools to adapt to the new, changed environment. We need to ensure that handwriting is not a nostalgic practice of the ageing generation, but part of the everyday life of future generations.

We see handwriting as a real analogue value, the preservation and future of which is in the social interest of humanity. Our research results are thought-provoking. They have confirmed our initial assumption that *handwriting has a future*, although this assumption now needs some reformulation. *Handwriting must have a future*(!), as must personal human relationships, direct communication and all the analogue values that help us preserve our humanity in the digital space.

This is true as long as the digital, virtual space is built around the human being and we need our analog organs, our analog senses to receive it.

Our research is based on a combination of different paradigms. We create a co-creation process combining marketing research and design research and design creation.
We believe that our research combines design aproaching, connecting and product creation to make a scientific and practical contribution.

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14. Annexes

Annex 1. Digital pasts, analog futures, typed sample essay, (2018)

Language: Hungarian
Length: 4201 characters

Henrietta, 21

Digitális múlt, analóg jövő

Álláspontom szerint napjainkban egyre gyakrabban érezhetjük úgy, hogy mindenhová csak rohanunk és nincs időnk semmire. A gépek még gyorsabb információtermelést hoztak az életünkbe. Minden exponenciálisan felgyorsult és az emberiség is mindent gyorsan szeretne elérni. Viszont hová fog ez vezetni a későbbiekben?

Alapvetően azt érezhetjük, hogy lemaradunk, ha nem haladunk együtt a technológia egyre jobban való fejlődésével. Ebből alakulnak ki a mai rohanó világban a különböző féle pszichikai betegségek (például: szorongás) is. A modern technológia alkalmazása az élet minden területén felértékelődik, az informatikai eszközök használata iránti igény egyre erősödik. Mivel az interneten mindennek utána tudunk nézni, mindent meg tudunk rendelni, mindenkit el tudunk érni, ezáltal hozzá is szoktunk az azonnalisághoz. Mindent aznapra akarunk, félünk, hogy valamiről lemaradunk. Példaként említhető, hogy általánosságban reggel mindenki „csekkolja", hogy mi történt másokkal, amíg ő aludt. Egy nap átlagosan 2-3000-szer érünk hozzá az érintőképernyőhöz a telefonunkon. A virtuális világból folyton impulzusokat akarunk szedni.

Az ember 150 000 éve is nagyjából ugyanúgy nézett ki és ugyanott élt, mint most. De az elmúlt kétszáz évben több változás történt életterünkben, mint eddig valaha. Jellemezhetnénk úgy, hogy analóg lények vagyunk egy digitális világban. A technológia kapacitása exponenciálisan fejlődött az évek során. Ezekre a változásokra alaposan fel kell készülni, és ebben kiemelkedő szerepe van az oktatásnak is. Folyamatosan zajlik a gépek okosítása, a mesterséges intelligencia fejlődése, amely gyökeresen változtatja meg a világot.

De vajon mi lesz ötven év múlva? Mivel az állandó fejlődés óriási fordulatokat hoz magával, ezt egyre nehezebb lesz megjósolni.

Megfigyelhető, hogy lassan a gépek átveszik a hatalmat az emberiség felett, amely arra vezethet, hogy mi emberek már nem is kell, hogy dolgozzunk, hiszen a gépek mindent megcsinálnak helyettünk. Van az a hiedelem, hogy ha már XXI. század meg internet, akkor mindennek automatikusnak kell lennie. Az ember leül a számítógépe elé, létrehoz egy honlapot. Beállítja az automatákat, és ő a székben hátra, a pénz pedig a bankszámlájára dől. Semmi dolga nincs vele, automata hirdetések hozzák az érdeklődőket, önműködő videó üzenetek kezelik a vásárlók kérdéseit és panaszait. Ez az, ami nem vezet sok jóra, hiszen nem lesz munka. Korábbi olvasmányi ismereteim alapján kijelenthető, hogy az előrejelzések szerint ez a veszély a harmincas évekre akár a munkahelyek felét is érintheti. Miközben ez a fantasztikus eredményeket produkáló technológiai fejlődés zajlik, befogadására rendkívül felkészült emberekre van szükség. Ebben pedig mérhetetlenül nagy szerepe van a gondolkodásra nevelő, korszerű oktatásnak. Egy másik problémaként vetném fel, hogy tíz-húsz év múlva a Föld lakosainak a száma meghaladja a tízmilliárdot. Jelenleg 7-7,5 milliárdnál tartunk, de már most is hatalmas ellátási gondok vannak. Nem véletlen az óriási népvándorlási hullám, amelynek nemcsak politikai, hanem gazdasági okai is vannak. Felmerül a kérdés, hogy miként lehet ellátni ezeket az embereket, akiknek ráadásul azzal is szembe kell nézniük, hogy azoknak a munkáknak a nagy részére, amelyeket a szerencsésebbek ma még végezhetnek, nem lesz szükség, mert a beprogramozott gépek, a robotok az alacsony képzettséget igénylő, egyszerű tevékenységeket sokkal pontosabban és gyorsabban tudják elvégezni.

Viszont én úgy gondolom, ha ésszel és felelősséggel használjuk ki a technológiai fejlődést, akkor nem kell annak veszélyeitől tartani. A mesterséges intelligencia fejlődésével párhuzamosan mindent meg kell tenni az emberi intelligencia fejlesztéséért is. Fel kell ismerni, hogy melyek az előnyök és melyek a hátrányok, és ebben az esetben az emberi intelligencia képes lesz kézben tartani és az előnyök irányába fordítani a gyors technológiai fejlődést. Hiszen amíg régen még internet és mobiltelefon sem nagyon létezett, korlátozottak voltak az emberiség lehetőségei, addig a mai korban már minden adott ahhoz, hogyha megfelelően alkalmazkodunk a technológiához, akkor kihasználhatjuk annak megfelelő opcióit is.

Annex 2. Digital pasts, analog futures, typed sample essay, (2018)

Language: English

Length: 3244 characters

Ekaterina 21

Digital Pasts, Analogue Futures

Ownership. A strong wish to own has been a driving force since the human being appeared on Earth. Ownership defines us, our well-being, our social status, even our personality. Since the ancient times until today people spend time and money on getting new stuff. Noone actually needs 10 dresses or collection of watches, but we still buy and buy, being driven by this wish to own.

Digitalization is a trully amazing process of making our lives simplier, our businesses more effective, our knowledge broader, our possibilities – approximately infinite. We can make professional photos, using our smartphones; we can reach people from any point of the Earth and even Space whenever we want; we can have thousands of books in our libraries without filling the shelves or carrying heavy books in our hands. The only problem that occurs is that we don't own all these photos, letters or books from the physical point of view. We have property rights, but we do not have our property in the conventional sense, which makes us unsure about the "reality" of what we possess. Being a typical youngster, I do have an IPhone and take photos everyday, but since last year every month I print out my favourite photos and put them on the wall on in a "Memory box". I write messages online 24/7, but I leave written notes for my husband and do collect his paper notes or letters. I never read books online. But surely, this is a quite romantic attitude. There are much more logical and practical reasons to be devoted to the analogue format.

Concentration of large volumes of information in one place (say, server, Cloud etc.) makes it vulnerable. Though blockchain technologies try to solve this problem, we are still far from it, so with the increase of personal information volumes people tend to be more careful: diversify storages, have hard copies or printed out documents, for example.

Sofisticated IT-language is another struggle that modern people face. Many webusers

can’t or don’t want to learn how this or that system operates, so it remains a kind of “miracle”, to which people are afraid to trust their private information, money and possessions.

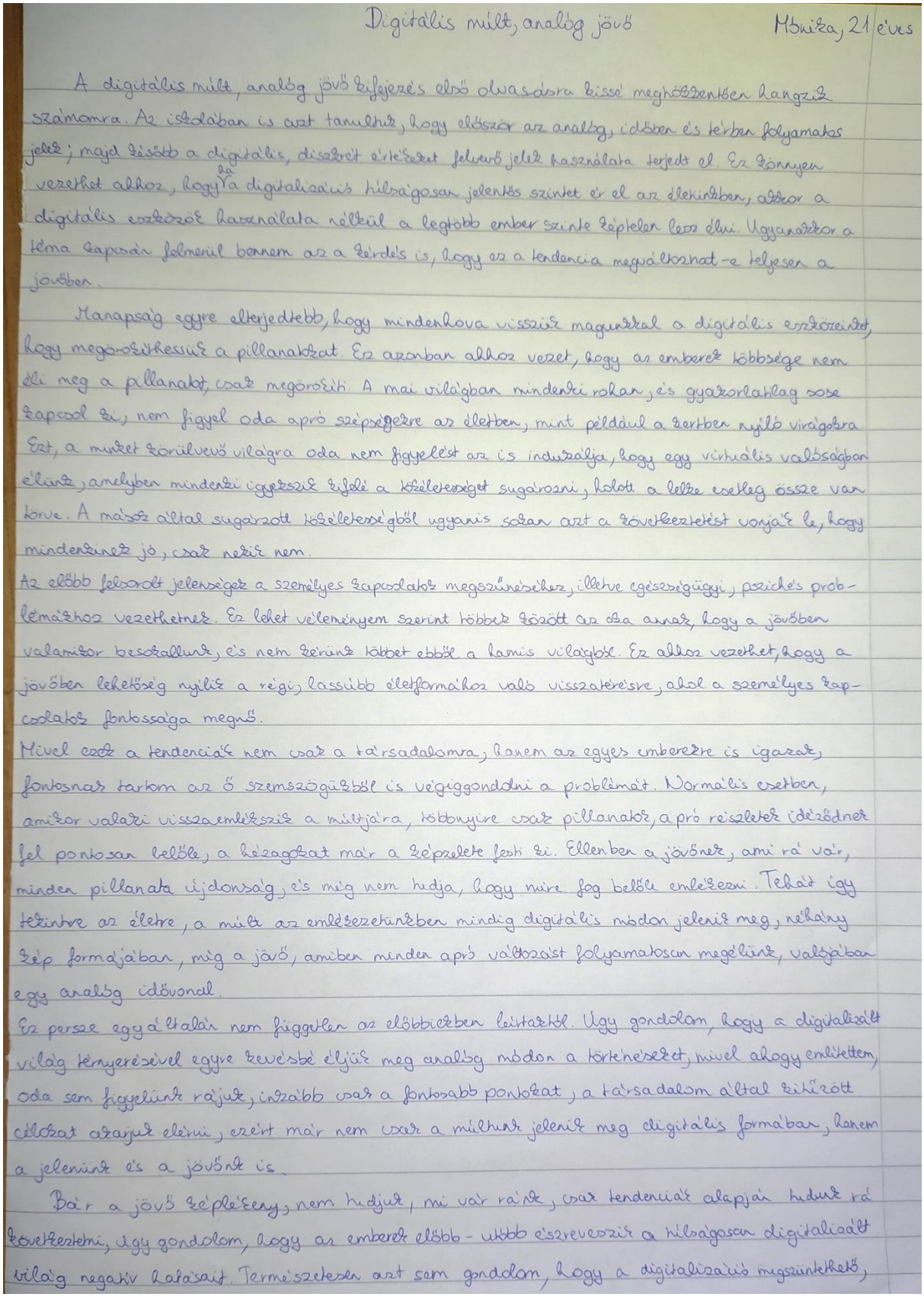
It is also a tough challenge for governments of different countries to introduce all the digital phenomena that have come to our mundane lives into the legislative system. Therefore, issues concerning intellectual rights and digital property are still not regulated in the majority of countries. Which also makes it more preferable to have tangible assets rather than digital ones.

Technological boom, when we were crazy about digitalization is left behind (or almost is). Overloaded with uncountable sources of information, programmes and applications, online communication and digital property, we feel this strong need for socalled “real” things, hard copies, tangibility and sense of true ownership. This is my perception of Analogue Future – world, where people, tired of Digital Past, are still attached to tangible things, despite all the technological advances.

About myself: I’m 21 years old girl from Moscow, Russia. Since the early childhood I have used computer and all the up-to-date devices (my father is a true fan of all those advancements). Now I work in digital marketing (SMM).

Annex 3. Digital past, analogue future, handwritten sample essay, (2020)

Language: Hungarian



Digitális múlt, analóg jövő — M.Anikó, 21 éves

A digitális múlt, analóg jövő kifejezés első olvasásra kissé meghökkentően hangzik számomra. Az iskolában is azt tanultuk, hogy először az analóg, időben és térben folyamatos jelek; majd később a digitális, diszkrét értékeket felvevő jelek használata terjedt el. Ez könnyen vezethet ahhoz, hogy ha a digitalizáció hihetetlen jelentős szintet ér el az életünkben, akkor a digitális eszközök használata nélkül a legtöbb ember szinte képtelen lesz élni. Ugyanakkor a téma kapcsán felmerül bennem az a kérdés is, hogy ez a tendencia megváltozhat-e teljesen a jövőben.

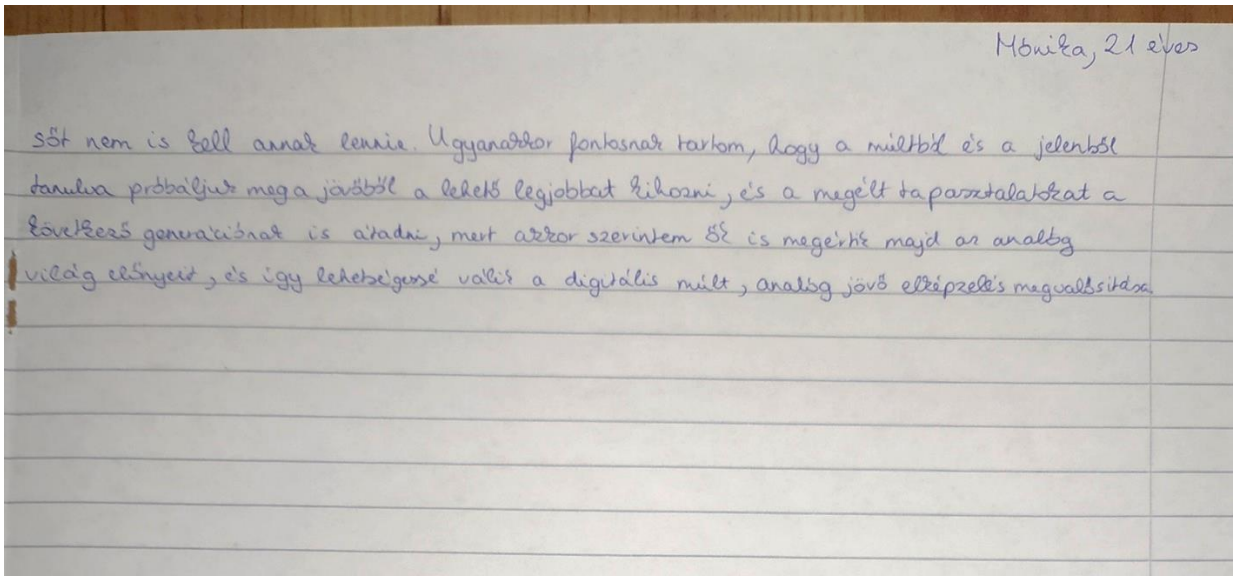
Manapság egyre elterjedtebb, hogy mindenhova visszük magunkkal a digitális eszközeinket, hogy megörökíthessük a pillanatokat. Ez azonban ahhoz vezet, hogy az emberek többsége nem éli meg a pillanatot, csak megörökíti. A mai világban mindenki rohan, és gyakorlatilag sose kapcsol ki, nem figyel oda apró szépségekre az életben, mint például a kertben nyíló virágokra. Ezt, a minket körülvevő világra oda nem figyelést az is indukálja, hogy egy virtuális valóságban élünk, amelyben mindenki igyekszik kifelé a tökéletességet sugározni, holott a lelke esetleg össze van törve. A maszk által sugárzott tökéletességből ugyanis sokan azt a következtetést vonják le, hogy mindenkinek jó, csak nekik nem.

Az előbb felsorolt jelenségek a személyes kapcsolatok megszűnéséhez, illetve egészségügyi, pszichés problémákhoz vezethetnek. Ez lehet véleményem szerint többek között az oka annak, hogy a jövőben valamikor besokallunk, és nem kérünk többet ebből a hamis világból. Ez akkor vezethet, hogy a jövőben lehetőség nyílik a régi, lassúbb életformákhoz való visszatérésre, ahol a személyes kapcsolatok fontossága megnő.

Mivel ezek a tendenciák nem csak a társadalomra, hanem az egyes emberekre is igazak, fontosnak tartom az ő szemszögükből is végiggondolni a problémát. Normális esetben, amikor valaki visszaemlékszik a múltjára, többnyire csak pillanatok, apró részletek idéződnek fel pontosan belőle, a hézagokat már a képzelete festi ki. Ellenben a jövőnk, ami rá vár, minden pillanata újdonság, és még nem tudja, hogy mire fog belőle emlékezni. Tehát így tekintve az életre, a múlt az emlékezetünkben mindig digitális módon jelenik meg, néhány kép formájában, míg a jövő, amiben minden apró változást folyamatosan megélünk, valójában egy analóg idővonal.

Ez persze egy általán nem független az előbbiekben leírtaktól. Úgy gondolom, hogy a digitalizált világ tényezésével egyre kevésbé éljük meg analóg módon a történéseket, mivel ahogy említettem, oda sem figyelünk rájuk, inkább csak a fontosabb pontokat, a társadalom által kitűzött célokat akarjuk elérni, ezért már nem csak a múlnak jelenik meg digitális formában, hanem a jelenünk és a jövőnk is.

Bár a jövő képletes, nem tudjuk, mi vár ránk, csak tendenciák alapján tudunk rá következtetni, így gondolom, hogy az emberek előbb-utóbb észrevesszük a hibásan digitalizált világ negatív hatásait. Természetesen azt sem gondolom, hogy a digitalizáció megszüntethető,


Mónika, 21 éves

Sőt nem is fáll annak lennie. Ugyanakkor fontosnak tartom, hogy a múltból és a jelenből tanulva próbáljuk meg a jövőből a lehető legjobbat kihozni, és a megélt tapasztalatokat a következő generációnak is átadni, mert akkor szerintem Ő is megérti majd az analóg világ előnyeit, és így lehetségessé válik a digitális múlt, analóg jövő elképzelés megvalósítása.

Annex 4. Extract from the patent specification of the Etelburg r.pro ink mixing device with illustrations

DESCRIPTION OF THE INVENTION

The primary object of the invention is to provide a mixing apparatus and mixing system which is free of disadvantages of prior art approaches to the greatest possible extent.

An object of the invention is to provide a mixing apparatus and mixing system that has a configuration allowing for more efficient operation compared to known approaches, such that it is suitable for dispensing the particular fluids (e.g. inks) precisely, preferably provides improved protection for the different coloured fluids against drying out, preferably enjoys improved protection against wasting source materials (e.g. due to leaks), and preferably provides improved mixing efficiency.

A further object of the invention is to provide a mixing apparatus and mixing system that can be implemented more ergonomically compared to known approaches, providing an improved aesthetic appearance and a relatively compact design.

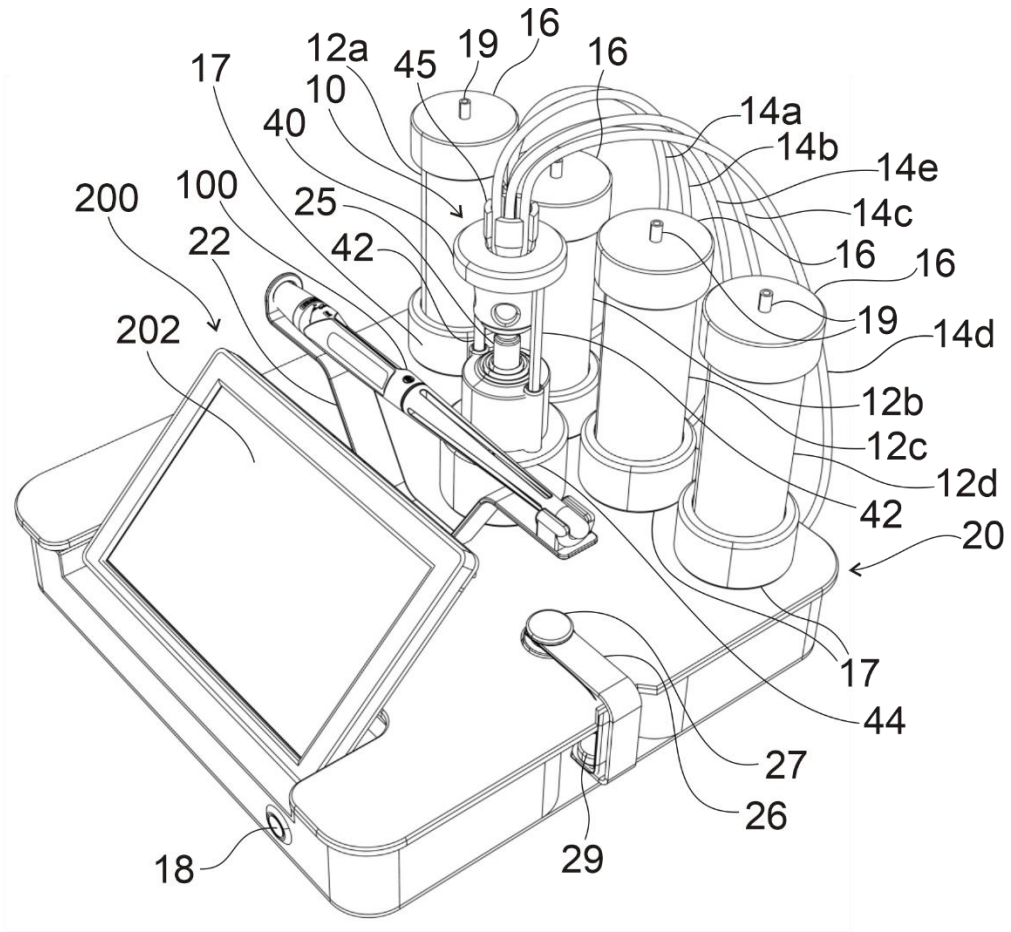
The objects of the invention can be achieved by the mixing apparatus according to claim 1, the mixing system according to claim 16, and the fountain pen according to claim 17. Preferred embodiments of the invention are defined in the dependent claims.

The mixing apparatus and mixing system according to the invention is adapted basically for mixing different coloured inks (typically the base colours of a widely applied colour space), and in the case of the mixing apparatus according to the invention, typically for mixing (preparing by mixing) an ink having a colour corresponding to a preselected colour. Utilizing the commonly applied colour spaces (for example, the CMYK colour space) is preferable because any arbitrarily chosen colour can be mixed from the base colours of these colour spaces. A colourless ink may also be preferably applied together with the colours of these known colour spaces. Applying the mixing apparatus and mixing system according to the invention it can be provided that any colour of a colour palette (for example the Pantone colour palette) can be mixed utilizing fountain pen inks.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the invention are described below by way of example with reference to the following drawings, where

Fig. 1 is a spatial drawing of an embodiment of the mixing apparatus according to the invention,



Source: Etelburg - Designer: Gábor Megyeri

Annex 5. Etelburg r.feather modular writing instrument

Source: Etelburg - Designer: Gábor Megyeri

Source: Etelburg - Designer: Gábor Megyeri

Source: Etelburg - Designer: Gábor Megyeri

Source: Etelburg - Designer: Gábor Megyeri