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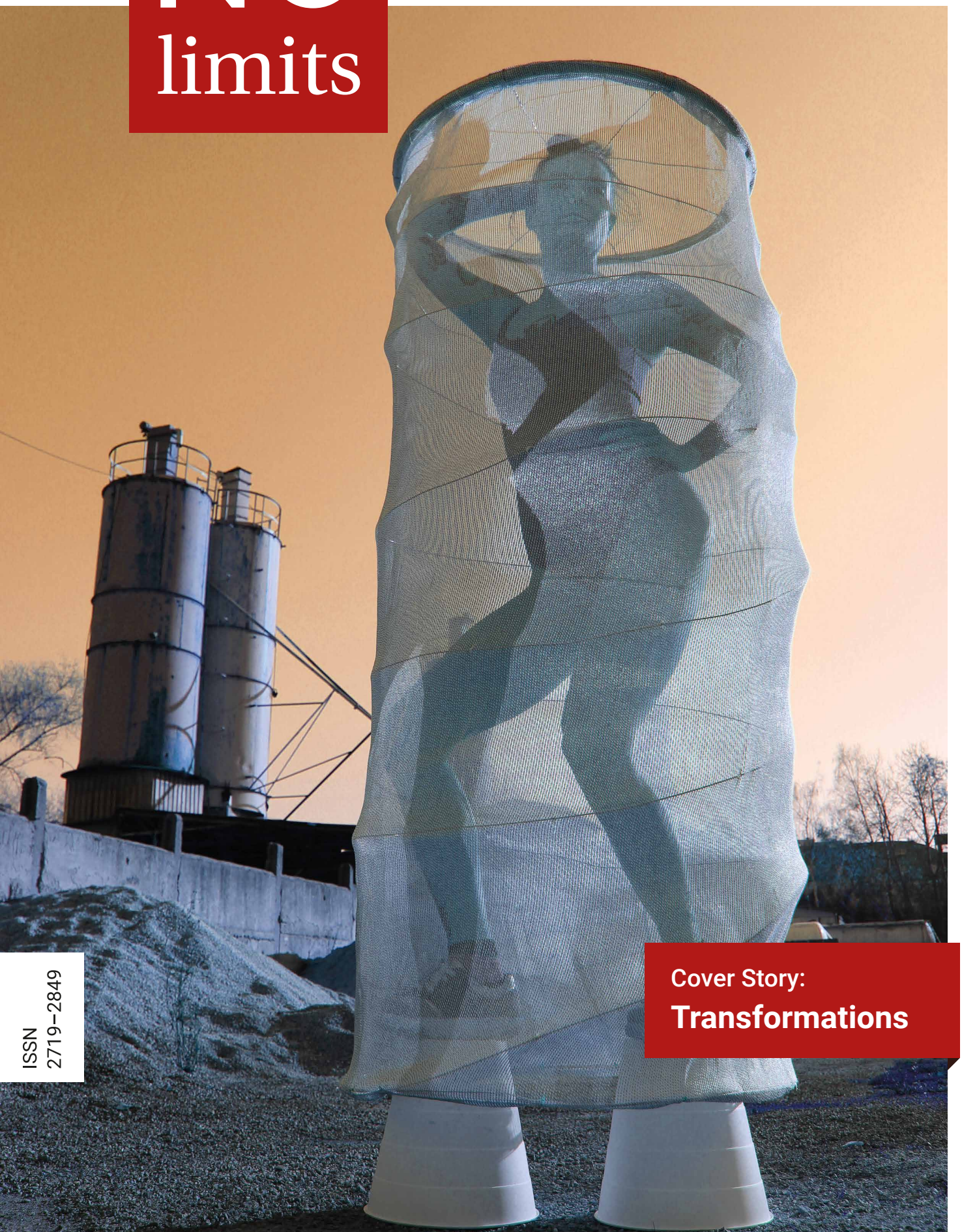

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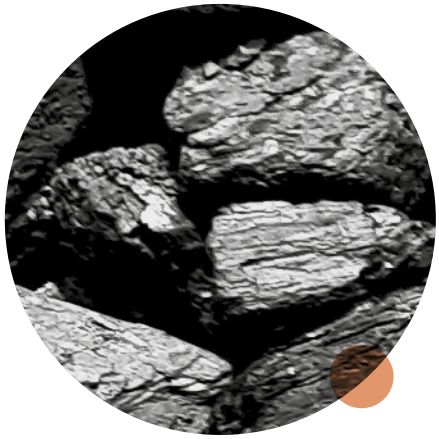

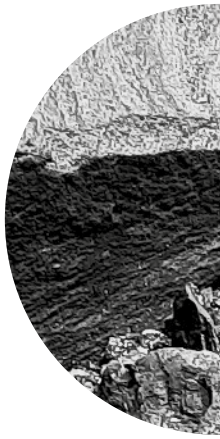
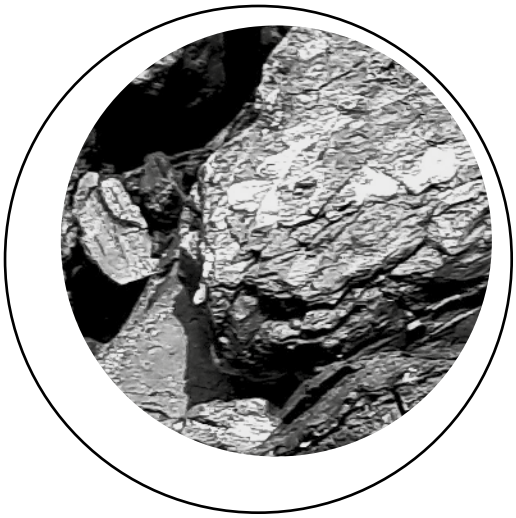

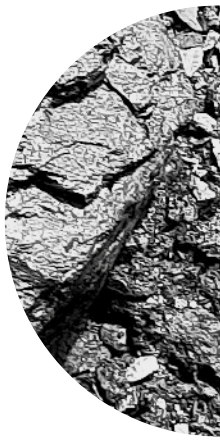

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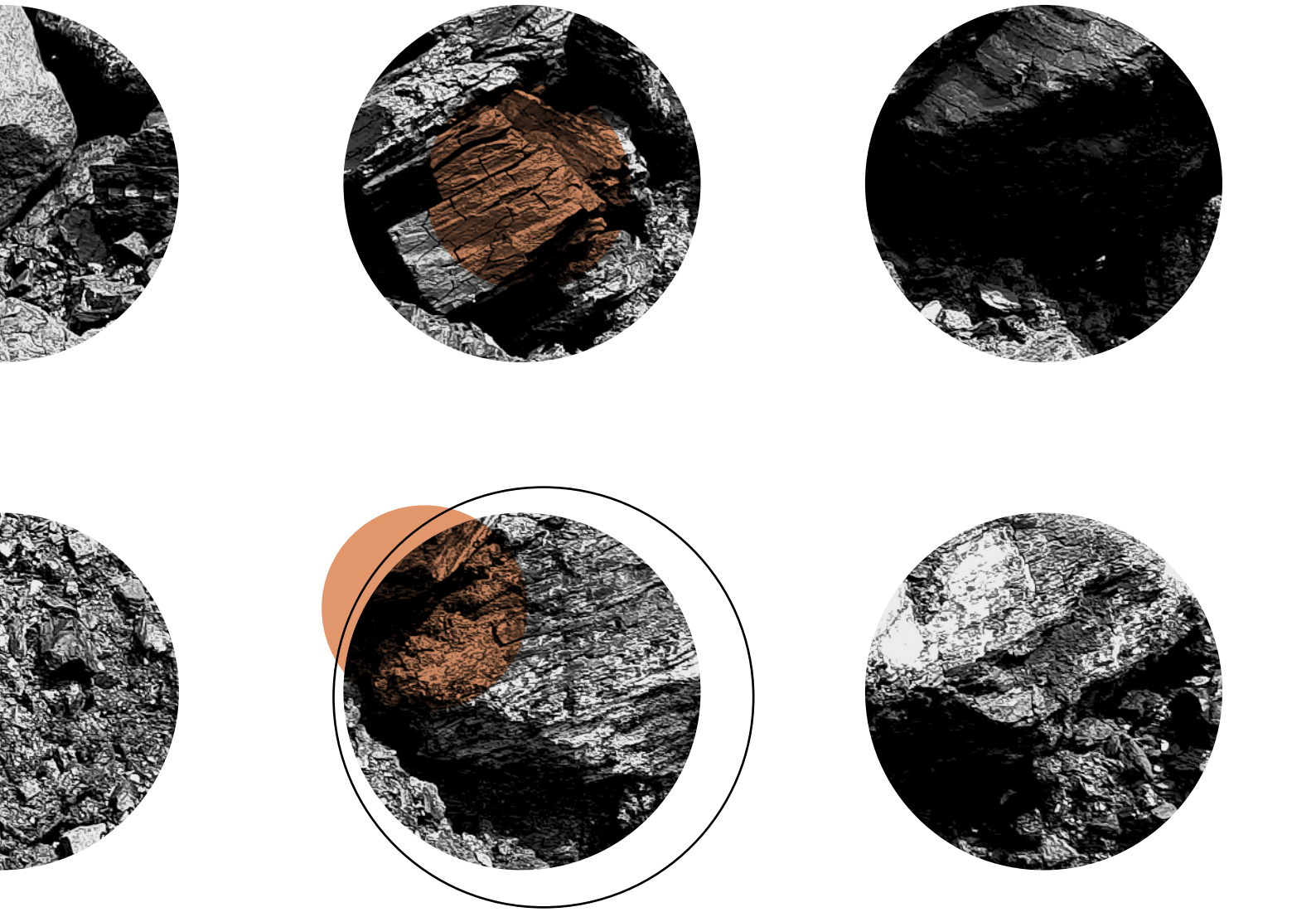

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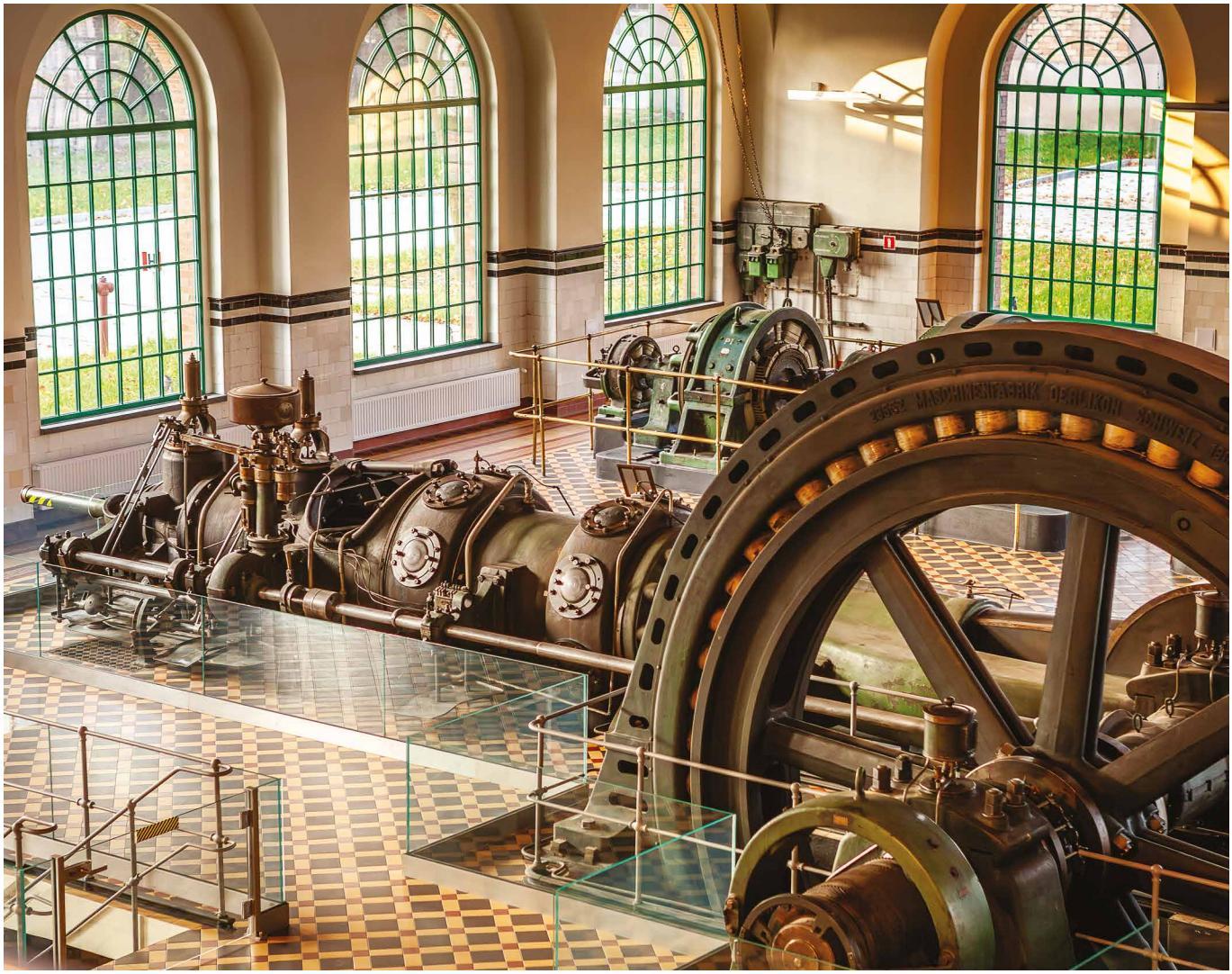
GOODBYE, COAL

The fossil fuel extraction era in the Upper Silesia and Zagłębie region is coming to an end before our very eyes. However, coal is here to stay, as evidenced by heavy metal laden heaps and land subsidence. The research conducted by Marta Tomczok, PhD, DLitt, Associate Professor, shows how large a role culture can play in taming decarbonisation.

Elektrownia Gallery of Contemporary Art in Czeladź | Photo: Rafał Opalski



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The historical building complex of the former Saturn mine in Czeladź | Photo: Rafał Opalski

Decarbonisation, i.e. the process of reducing CO_2 emissions, is a hot topic present in the centre of public discourse in many countries. In Poland, the debate temperature reaches scorching-hot levels. Perhaps the limited interest of authors and cultural practitioners who could convey valuable information to the public is to blame. The British films *Brassed Off* (1996) and *Billy Elliot* (2000) successfully depicted social unrest related to mine closures and miners' strikes. A few years ago, Germany officially concluded their coal extraction era in the Ruhr area by organising multiple initiatives, ranging from exhibitions to official ceremonies involving politicians. According to the scientist from the University of Silesia, in recent years Polish culture took a big step towards departure from the current coal-related problems.

'We are in need of good transformation narratives, which could introduce us to the transition process from coal fueled electricity to nuclear energy. Last year, the Ministry of Climate and Environment released a radio advertisement about the Atomicki family. It was only broadcast briefly, but certainly helped improve the image of nuclear technology in the eyes of the society. This is a good example of the so-called energy culture.

For many years, the industry of Silesia and Zagłębie region inspired authors, who would present the impressions of their stay in this mining region to readers right away, while they were still hot of the press. The image of industrial Sosnowiec at the end of the 19th century shown in *The Homeless* by Stefan Żeromski became quite iconic. When modern writers — such as Szczepan Twardoch or Zbigniew Rokita — take up coal in their writing, they refer primarily to its past. Female writers are more engaged in current decarbonisation issues. Magdalena Okraska and Agata Listoś-Kostrzewa describe cities deformed by the industry in Silesia and Zagłębie. Maja Wolny pictures an apocalyptic vision of the future, warning us of the dangers of nuclear power. Anna Malinowska, on the other hand, advocates for the revitalisation of Katowice while preserving the memory of the city's industrial heritage. The researcher from the Faculty of Humanities favours the latter idea, pointing out that Silesia and Zagłębie Dąbrowskie should further develop or create institutions with sufficient space for different narratives about coal.

'The Guido Coal Mine and the Queen Luiza Adit in Zabrze are both excellent, but they lack an educational and informational component, multimedia content, and above all a historical trail for children', believes Prof. Tomczok. 'You can get a taste of being in a training mine there, but all the knowledge and narration about history is provided by a guide. The Coal Mining Museum in Zabrze, which boasts long-standing tradition and plentiful resources, still isn't open to the public. I have high hopes for the Saturn mine in Czeladź, where I find freedom, space, and a certain mysticism. I also like the Sztygarka mine in Dąbrowa Górnicza, which shows the intellectual, scientific, and anti-communist face of mining'.

One of these facilities could become a space to present artworks and joint photography projects documenting the end of coal mining in Silesia and Zagłębie. Arkadiusz Gola, Marek Locher, and Maciej Mutwil know how to capture the atmosphere of this important historical moment — from the work of the last mining crews, through the empty interiors of the mine, to the demolition of the shafts. Their photographs would go well with the street art by Mona Tusz, the significance of which is emphasized by Prof. Tomczok. They feature Silesian landscapes and references to their industrial past, yet are often dominated by plants. After all, they now overgrow the cement plant in Grodziec or the Paciorkowce heaps in Bieruń — places frequently visited by the researcher.

'I would like our writers to visit Grodziec and see for themselves what it looks like today', says the researcher. 'I would like to read a piece or see an artwork telling us how the land changes here and what happens to the industrial ruins: that it does not turn into a rust belt but into large fields of green overgrowing the rust and the collapsing steelworks, cement works, and brickyards. I wish this work returned the environment and rivers to people, and invited them to relax and enjoy nature. We should start redefining transformation and stop thinking about it only in the anthropocentric way, i.e. that if we don't invent it and spend European funds on it, there will be no change. These changes are taking place constantly, we just don't see them.

LEAD

RUNS THROUGH OUR VEINS

It's 1974. Thousands of records laid out on the floor of doctor Jolanta Wadowska-Król's flat form a grim labyrinth. These are the medical records of children living near the Non-Ferrous Smelting Plant 'Szopienice' in Katowice. Many of them have blood lead levels well above the acceptable limit. The diagnosis is surprising — it's lead poisoning, an occupational disease affecting workers in daily contact with toxic metals, causing damage to the haematopoietic and nervous systems, among other things. And so, the fight for the health and lives of the doctor's young patients begins.

Małgorzata Kłoskowicz, PhD

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Buildings of the former Uthemann Zinc Smelter in Katowice-Szopienice | Photo: Rafał Opalski

'It was done quietly. Laboratories did the testing, but nobody talked about it', comments one of the interviewees of Lucyna Sadzikowska, PhD, DLitt, Associate Professor, who got interested in the history of leadlings, as the residents of Szopienice suffering from lead poisoning were called colloquially.

It all started with the discussions around the honorary doctorate degree of the University of Silesia received by doctor Jolanta Wadowska-Król. It was, among other things, a sign of gratitude for the actions she took. She treated thousands of children who in the 1970s were suffering from lead poisoning or were in risk of developing it due to the place where they lived. The houses located closest to the smelting plant were also demolished and the families living there were given flats in other areas of the city.

The literary studies expert decided to learn about the leadlings' history and create a narratives archive filled with recollections of people who lived through those events.

The 'Szopienice and the leadlings' case have been a popular topic in Poland for some time now. However, it seems that in the inflow of articles, interviews, reportages, and even a theatre performance, we have forgotten to include the voice of Szopienice's residents who witnessed it all. I felt that it was worth talking to them. I think that doctor Wadowska-Król thought so as well, and that's why she decided to help them. She accompanied me during most of the interviews. Her name alone opened many doors. After all, people did not necessarily have to agree to meet a complete stranger, that is, me', says Lucyna Sadzikowska, PhD, DLitt, Associate Professor, author of the study.

As she herself admits, the first meetings were difficult. They often took place in flats, stairwells, cafés, the places where the interviewees felt the most comfortable. She remembers the first person she interviewed, sitting almost completely still, keeping their back entirely straight, maybe because of stress or perhaps due to the maintained distance.

'I do not come from Silesia, I do not have a family in Szopienice, so for me it was all very new. I had to learn the words they used, their gestures, and to read their emotions to better understand the people who wanted to tell me something. The picture of Szopienice was slowly becoming the picture of myself. It allowed me to keep distance from my own personal matters and made me aware that even though we don't share the same past, we live in the same region in the same time', says the researcher.

She would compare discovering Szopienice to peeling an onion, layer by layer.

'When it seemed like I knew a lot, I would find out something new shedding a different light on this story. Each voice had something interesting to tell', she adds.

Transformation was the key word. Humans have been changing the natural environment since the beginning of their existence, in the name of industrial development, a better future, a strong country, or whatever else they came up with at each given moment. Upper Silesia in the 1970s wasn't any different. The collective effort was to be the source of satisfaction. The industrialisation of the region based on the mining and smelting industries was progressing quickly. As a result of hard but solid work of its residents, the landscape slowly began to change. You could earn a pretty penny there, so the subsequent industrial centres attracted not only people from nearby cities but also from other parts of the country, thus influencing both their own lives and lives of whole families, as well as getting etched into people's memory, which also changed with time.

So, the landscape kept changing. Worth noting is the fact that Szopienice's residents first and foremost remembered the unpleasant smells and colours.

I remember that when you lived at Burowiec [Katowice's district]*, when they let the lead flow, you could — as they say — smell rotten eggs. There was this brown, sometimes yellow smoke. The stench was unbelievable when we lived in there, by the smelting plant.*

Water tower belonging to the former Uthemann Zinc Smelter in Katowice-Szopienice | Photo: Rafał Opalski

And also, what stuck with me was that when it got warm, my mom would get annoyed that you couldn't open the window due to the stench of rotten eggs prevalent in Szopienice. It was as if they mixed something rotten with something sweet. I suspect that they let out the worst things they had at the plant at that time. Under the cover of the night.

I was working in the school there, in the smelting plant. As a teacher, I would show the kids around and tell them what is taking place there. I would ask them if they see 'colourful' snow. (...) I thought: 'It looks funny because the snow is purple, dirty'. On the other hand, I saw this 'desert' [desert meaning an area that lacks vegetation].

I remember that there were these holes and large puddles with yellow goo. There were lots of them, these swamps. Large wetlands, I think that there still should be high concentrations of lead there. And we were running around and playing there.

I set out (...) to try and cover our usual route: Wilhelmina, Drugie Szopienice neighbourhood, lakes. The weather was favourable, so we went towards Drugie Szopienice, where there is a moonscape, in the former steelworks area. There is a tower there, with a roof that is crumbling away. A building with a beautiful old clock sits right next to it. Then I noticed a large fence with barbed wire. I peeked in. There I saw huge plastic containers in metal grid. These containers were damaged, there was a brown liquid pouring out.

The first ever man-made desert was created in the vicinity of Uthemann in Szopienice. There was no grass there.

Something strange was happening to animals.

Dogs and cats were dying off. It came as a shock to everyone, they kept wondering what is killing the animals. Nobody suspected lead poisoning.

When I moved to Szopienice, we went to the market by Sokolska Street (...). We brought back a small dog. Back then I didn't know that the dog shouldn't be let outside. After two months we no longer had a dog, he died of lead poisoning.

A lot of people didn't connect what was happening with the smelter's activity. People interviewed by Prof. Lucyna Sadzikowska confirm this. Although the working conditions were tough, good pay made up for it. But that's not all.

My father-in-law thought the world of the smelting plant. During the family meetings, with grandparents and cousins, they would only talk about the plant because they all worked there. The smelting plant was their life. (...) Many people became depressed when the plant was closed down.

Szopienice were a poor area of Katowice. When the smelting plant was created, nobody was concerned with its impact on the health of the residents. It was seen as a place of work that brings in money. People weren't aware of the danger. While standing over a lead tank, no one suspected that anything was wrong. Meanwhile, the lead was accumulating in their bodies. It was only when people started talking among themselves about children getting sick that something began to budge in the local population's collective consciousness. The research carried out thanks to the determination of Dr Jolanta Wadowska-Król showed that the children living in Szopienice had significantly increased levels of lead in their blood and many of them also had worrying symptoms indicative of the disease.

When the doctor took the tests and the lead poisoning issue came up — how should I put it — it did not come as a shock to the workers. But the information about children getting sick was shocking. No one had investigated it before. We all thought that only workers, people working in the smelting plant, with lead, were susceptible to lead poisoning, but we didn't suspect that children could also get sick.

People would find out about it through word-of-mouth. Some believed it to be true, but others considered it a nothing-burger, only causing issues for the plant and its workers.

I found out about it from Mr Ryszard. Not from an official source, but in secret. The news spread around the plant anyway. He said it to me first: 'Janusz, if you can, take your little kid and move out of Szopienice as soon as possible'.

When it started, it became a big deal, I mean, it wasn't mentioned in the press at all, but people spread the news. And there has been much talk about the doctor [Jolanta Wadowska-Król]. *They called her Our Lady of Szopienice.*

The Sanitary Inspectorate director said that the queen has appeared — Our Lady of Szopienice — and was messing with people's heads.

Despite the radical opinions, children with elevated levels of lead in their blood were sent to sanatoriums. The employees, in turn, were sent off from their work stations for three months, so that the levels of this toxic element could fall, even though it also accumulated in their bone tissue. The houses closest to the plant were demolished. The soil from the area of the so-called marketplace was removed up to a depth of one metre. Where did they take it? No one remembers... Concrete and asphalt covered many places, effectively making the soil impossible to test today.

Metals cannot be destroyed. They can either float around or [get] *deposited,* says one of the interviewees. Lead was accumulating both in the soil and in the bodies of Szopienice's residents.

'While talking to more and more people, I wondered if everything possible had been done to extend care to leadlings. I have some doubts. I found it striking that many of them, to this day, do not see a cause-and-effect relationship between the disease experienced then, in the 1970s, and their current, often difficult, financial or health situation. If they were aware of this, perhaps they would be able to fight together for the support they undoubtedly deserve', emphasises the author of the study.

'Even though the Doctor is no longer with us, I will continue our joint project, the talks with Szopienice's residents, and I will finish what we have started', ensures Prof. Lucyna Sadzikowska.

All quoted statements are from the collection of interviews conducted by Prof. Lucyna Sadzikowska between 2021 and 2023. Its publication is planned at the end of 2023.

Fire on the waste heap slope in Katowice-Wełnowiec (2010) | Photo: Justyna Ciesielczuk

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SECOND LIFE OF WASTE HEAPS

Most likely, there isn't any place on Earth untouched by humans, intact and unexplored. We have left our mark everywhere, significantly influencing the environment around us. We are constantly finding plastic in the deepest and highest places on Earth, and its particles are scattered on the uninhabited areas of the Arctic. However, nature is an incredibly creative and resolute architect — it can come to life even in the most unpleasant conditions.

One of the most recognisable elements of the Upper Silesian landscape is the post-mining waste heaps — remnants of coal mining — which are connected with the region's industrial heritage that the community struggles with to this day. These sites, known to contain a mixture of toxic substances (often difficult to identify) and prone to fire, are sometimes also extremely biodiverse. Given sufficient time, the mining waste storage sites that scare away any potential passersby can turn into the so-called green islands with a spontaneously developing wildlife.

Foreground: thermal activity of the Anna heap in Pszów, background: Szarlota — the largest waste heap in Upper Silesia | Photo: Justyna Ciesielczuk

THE INFERNO OF WEŁNOWIEC

In Wełnowiec, a district of Katowice adjacent to Siemianowice Śląskie, there is a former waste dump remediated using waste from coal mining. Its dynamic ecosystem, consumed by fire on multiple occasions, has been the subject of research by Justyna Ciesielczuk, PhD, DSc, Associate Professor and Prof. Monika Fabiańska from the Faculty of Natural Sciences of the University of Silesia for a dozen or so years.

The scientists argue that all attempts to remediate the land failed to produce the desired effects and the nature fairs better at populating the heap all on its own, without human intervention. The excess of coal waste used during the remediation contributed to triggering self-heating of organic matter, culminating in a heap fire. As a result, harmful substances made their way into the environment. The air, water, and soil were contaminated.

'As a result of the ongoing firefighting operations on the northern slope of the site, the fire disappeared a few years ago and there are now plans to create a park in the area. Previously, for more than a dozen or so years, it was a place where jogging or taking your dog for a walk were strongly discouraged', says Prof. Justyna Ciesielczuk.

Hikers should also be alarmed by the relatively high concentrations of carbon monoxide, reaching up to 3% in 2011, which is a lethal dose for humans. One comforting fact is that such high concentrations were recorded only right by the ground.

Scientists from the University of Silesia warn us about the risks associated with self-heating of coal mining waste and the possibility of a repeat fire. Since the processes taking place at the waste dumps are chaotic and influenced by a variety of factors, it is difficult to predict when, or if, a fire could start again. The presence of organic matter, which is an excellent fuel, or bacteria, whose life processes generate heat, can be of significance here. Other characteristics, such as the shape of the land and the direction of wind, are also important. The researchers point out that it would be a challenge to find an old mining waste heap not affected by fires in the Upper Silesia.

AN ALL-YOU-CAN-EAT BUFFET

'The process of spontaneous vegetation overgrowing the heap in Wełnowiec is interesting. In between the self-heating incidents, it spontaneously gets covered in beautiful, often lush vegetation, which would entice local residents to treat it as a green space where you can take a walk or ride a bike', says Prof. Monika Fabiańska.

The researcher explains why this seemingly hostile place is so attractive for certain species of plants, although mainly those with particular environmental requirements. Many of them are endangered and listed in the *Polish Red Book of Plants*. Only the species which can withstand high temperatures, the presence of heavy metals, and the small amount of water seeping through the heavily permeable ground stand a chance of survival. The high temperature of soil, reaching up to 20-30°C in the winter, is favourable to them, allowing year-round growth.

'The growing season is completely disrupted here. We observe seedlings, blooming plants, and fruiting plants of one species all at the same time. In moderate climate it is impossible', explains Prof. Justyna Ciesielczuk.

The plants are also attracted to the abundance of nutrients, i.e. carbon dioxide and large quantities of nitrogen created in the process of self-heating. Such good growth conditions result in frequently-observed gigantism among plants growing on heaps: representatives of a given species several times larger than usual are quite a common sight. The researcher mentions her own observations of *Atriplex nitens*, which reached the height of two metres at the waste dump in Wełnowiec. The scientific literature states its maximum height to be around 1.2 metres.

Photo on the right: giant, exuberant *Atriplex nitens* (łoboda błyszcząca) in the part of the heap extinguished in 2009 (Wełnowiec) | Photo: Justyna Ciesielczuk

UNIQUE ECOSYSTEM

Some of the peculiar characteristics of the mining waste heaps' ecosystem can be seen at first glance. In Wełnowiec, the scientists witnessed the occurrence of the so-called first coloniser rule. A unique arrangement of plants, laid out in distinctive rows, appears in a burnt-out area. One row is populated by one species exclusively — the one that is the first to grow in an area free of competitors. This phenomenon is caused by the heating of the ground, which eliminates the natural seed bank.

The variety of plant species also often attracts other organisms. Prof. Monika Fabiańska mentions the results of research conducted in Czechia in 2013:

'There were many endangered species found at the mining waste dumps, including beetles, insects, birds of prey such as kestrels, buzzards, as well as many rodents. The ecosystem is disrupted, but interesting'.

Waste dumps, which as a general rule are places unfriendly to humans and rarely visited by them, provide favourable conditions for many animals to live and to raise their offspring. When left undisturbed by humans, they can live relatively quiet lives.

GREEN ISLANDS

Since nature is so skilful at managing heaps, the question arises whether attempts to remediate mining waste dumps are indeed the optimal measure. Such initiatives require sizable budgets, while their results are often disappointing.

Prof. Monika Fabiańska, invoking again the analyses conducted by our neighbours south of the border, argues that human interference may prove counterproductive. The Czechs noticed that the unremediated heap was richer in various organisms than the remediated one. Once the soil had been topdressed, other species were also introduced, resulting in a complete metamorphosis of the area. A small amount of grass was struggling to maintain itself and bushes were barely holding on.

The fact of nature recovering at the heaps alone is not enough to consider those places safe for humans. The risk of fire, even after many years of relative calm, is not the only thing we should be concerned about, because toxic substances can still accumulate in the deeper layers of waste. This is why the idea to create a park in such a place as the heap in Wełnowiec remains controversial.

'In my opinion, it is not a good idea to let people enter such areas. There is always the danger that a self-heating process will start somewhere and we won't notice it and the people in the area could be exposed to harmful emissions. I would recommend keeping people away from waste dumps', says Prof. Monika Fabiańska.

The solution recommended by the researchers would involve leaving such places as green islands where the nature develops spontaneously.

CIVILISATION AND NATURE

But what should be done with the waste left behind at the dumps? Could some of it be re-used?

A long-standing lack of monitoring is not an uncommon occurrence. It causes difficulties in finding out what quantities and what kinds of toxic compounds end up in the dumps today. In many cases, this problem was inherited from the 19th century mine owners, who weren't concerned with preserving the environment. We did not become aware of the dangers of excessive coal extraction and improper storing of waste until a century later.

The matter is further complicated by the fact that waste heaps may have been used by different owners over the decades, and in many cases the records have either been lost or they have not been kept at all. This is why we should remain cautious when considering ideas to re-use materials obtained from mining waste heaps. However, it is not entirely out of the question. Prof. Justyna Ciesielczuk mentions road construction and the use of materials that have already been burned out in a heap fire as an example of proper 'recycling'.

Environmental transformation — first by humans and then by nature — constitutes a proof of the power of nature and, at the same time, displays the limits of its flexibility and resilience.

The vision of imminent battle between civilisation and nature, in which one side always loses, does not have to come into fruition. Cooperation is possible, as Prof. Justyna Ciesielczuk points out with complete confidence.

'We have to remember that although humans created civilisation, they still remain a part of nature. We just need to understand it a little better. Nature can benefit from our activity and we can collect the fruits borne by it'.

The use of genetically modified micro-organisms (GMMs), as well as the chemical compounds they produce, has a universal tacit approval. Whereas, the production of food using genetically modified organisms (GMOs), mainly plants, is vehemently opposed. Some argue that GMO foods are harmful and should not be consumed, while others believe that they can do a lot of good, e.g. reduce hunger in countries facing food shortages and improve the living standards in developing countries. What are the actual benefits of GMOs – and do they carry any risks?

Many of us do not realise how often we come in contact with products created using genetically modified micro-organisms (GMMs). These often include life-saving pharmaceuticals. Prominent examples include insulin used to treat diabetes, as well as interferons used to treat various types of cancer and viral infections such as hepatitis. Thanks to GMM's production of recombinant proteins, such pharmaceuticals are widely available in pharmacies. Food enzymes produced by GMMs, e.g. α-amylase which breaks down starch, used in the baking and brewing industry, increase the efficiency of food production, providing society with greater food security, i.e. wide access to food products.

Barbara Wójcikowska, PhD, from the Faculty of Natural Sciences of the University of Silesia in Katowice, Chair of the Faculty Committee for GMMs and GMOs, defines the process of genetic transformation leading to the introduction of genetic modification as a technology based on processes occurring in nature. In turn, a genetically modified organism is one into whose genetic material (DNA) one or more genes (called transgenes) have been introduced from another organism: a virus, bacteria, plant or animal organism, using genetic engineering technology.

Is it possible to support the efforts of scientists and accept GMO food products with confidence? The researcher claims that it is.

'Despite the scientific research still being conducted with a view to protect human health, GMO crops or GMO-labelled foods have many opponents', says Barbara Wójcikowska, PhD. 'In highly developed countries, the need to grow GMO crops is not felt at the moment because there is no shortage of food there. The situation is different where there is poverty, a significant food deficit, or where the cultivation of plants is hampered by environmental factors or diseases caused by viruses, bacteria, or fungi'.

How about some examples? Hawaii is the most important papaya-growing centre in the USA, but for years it struggled with papaya ringspot virus (PRSV), which decimated the crops. The solution came with the genetic modification of the species by introducing a gene encoding the replicase of the PRSV virus, which made papaya immune to it. Due to climate change, more and more agricultural areas are affected by drought causing reduced yields. The genetic modifications carried out to date in maize (Genuity® DroughtGard™), soybean (Verdeca HB4), wheat (HB4), and sugarcane (NXI) are conditioning the crops for increased drought tolerance. And these are just two out of many examples of the potential use of GMO crops.

In 2019 alone, some 190.4 million hectares of fields were sown with GMO crops worldwide. 29 countries are involved in the cultivation of transgenic crops, with the United States, Brazil, Argentina, Canada, and India leading the way. The others are mainly developing countries that aim to raise their economic status through GMO plantations (it is worth mentioning that 43 highly developed countries import GMO plants for their food and animal feed production). Currently, it is possible to grow 32 species of GMO crops. However, four of them, namely soya, maize, cotton, and canola, represent as much as 99% of GMO crops. Genetic modification of plants concerns changes in 7 commercial traits, but more than 99% of crops are plants tolerant to herbicides or pests or having both those qualities at the same time. The cultivation of GMO crops is banned in Poland and such food must be appropriately labelled. The only exception practised is animal feed. For many years, legislation in Poland has postponed the entry into force of a law banning the use of transgenic feed on the grounds that the Polish market would not saturate the demand for non-GMO animal feed.

No reliable scientific studies, or international institutions such as the World Health Organisation (WHO), the US Food and Drug Administration (FDA), or the Food and Agriculture Organisation of the United Nations (FAO), have confirmed that products containing GMOs or produced using GMMs have an adverse effect on human health and well-being.

'GMO foods are just as healthy or unhealthy as any other food', notes Barbara Wojcikowska, PhD. 'It is worth noting that many diseases are not caused by food per se, but by improper diet and eating habits as well as global environmental pollution. Our health is affected by the way we live, the cleanliness of the air we breathe, and the purity of the waters we drink and bathe in. Under such circumstances, it is difficult to say that the observed health problems are undeniably related to transgenic food. If this was the case, the population of Americas, where GMO foods have been consumed on an everyday basis for years, would face enormous health problems. With the lack of GMO cultivation in most countries of the European Union (except Spain and Portugal) and the lack of public acceptance, Europe should be at the forefront of negative control and the population should enjoy much better health on a global scale, which is unfortunately not the case'.

Genetically modified pink pineapple (Rosé) | Photo: Rawpixel.com — Freepik.com

GMO

A NEW HOPE OR THE ROAD TO PERDITION

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Many of the genetic modifications are dictated by the desire to eliminate food waste and by restrictive consumer preferences. One such example is the apple, which turns brown when cut in two after a certain amount of time, thus becoming less appealing. The browning of the apple is related to naturally occurring oxidative processes that cause the flesh to change colour. A company in the United States has created a genetically modified apple tree, the Arctic® apple. Its oxidative processes have been inhibited by silencing the gene encoding phenol oxidase, which is responsible for the oxidation of phenols, thus leading to a change in the fruit's colour. As a result, the bitten apple does not turn brown and the juice squeezed from it remains bright at all times.

'Out of the many modifications we may come across, the pink pineapple (Rosé) is one of the more interesting cases. For this modification, the researchers used genes from closely related pineapple species to increase lycopene and carotene content, and simultaneously inhibit ethylene biosynthesis. Thanks to these changes, the pink fruit stays fresh much longer', says the researcher.

The labelling of food products as GMO foods is often equated with them being inferior in quality. People are willing to pay more for GMO-free food products, believing that by doing so they are protecting their bodies from something harmful. The expert says that although there are no confirmed scientific studies on the negative effects of consuming GMOs, the myth of its harmfulness is still alive and kicking.

CRYPTOCURRENCIES

A VIRTUAL GOLD

Cryptocurrency **is a term not coincidentally made up of two elements: the prefix *crypto-* and the noun *currency.* Przemysław Kudłacik, PhD Eng. from the Institute of Computer Science of the University of Silesia explains that cryptocurrency is basically a means of settlement. However, it is not stored in the computer system of any bank, but rather maintained by thousands of computers scattered around the world. It is built on a technology called blockchain.**

A REVOLUTIONARY METHOD

Before there were cryptocurrencies, there was public key cryptography, or two-key cryptography. What is it? We are used to the principle that if something is encrypted, you need a password to decrypt it. But what's the use of encrypting something if we then have to somehow communicate the password to the person who wants to read the message? This is why asymmetric cryptography was invented: unlike symmetric cryptography, it is based on two passwords. The method was revolutionary because it allowed something to be encrypted with one password and decrypted with another. This solution is widely used today, e.g. in electronic banking, electronic signatures, the military, and cybersecurity. Cryptography is also the basis of cryptocurrency technology.

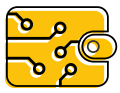
FREEDOM, ANONYMITY AND DECENTRALISATION

In 1982, American scientist and cryptographer David Chaum proposed using public key cryptography to create virtual, anonymously operated cash. That was a significant development because the basic carrier of IT media in operation at the time was magnetic tape, which provided more open access to online payments. His vision of digital currency included a fully anonymous system based on technology that did not quite resemble today's blockchain. Chaum's ideas became the foundations of the so-called cypherpunk movement born in 1992. People associated with this movement stood for total privacy, anonymity, and security through the use of cryptography.

In a way, it was a return to traditional currencies such as gold or silver. Before

Photo: panoramaphotos — Freepik.com

> Can something that does not physically exist have value?



the digital age, there was the bank note, which was a proof of ownership of gold or silver (the US dollar used to be backed by gold). David Chaum proposed to turn this bank note into digital currency, to which only those with a private key would have rights.

HOW ARE CRYPTOCURRENCIES CREATED?

Can something that does not physically exist have value? Gold and silver have value because not only do they physically exist, but it takes a specific amount of money, energy, resources, and human labour to produce them. In addition, there is a limited supply of these natural resources on Earth and it is impossible to mine more gold or silver than there is in nature. And how do you 'mine' cryptocurrencies?

Since the beginning of digital banking, people have been wondering how to secure databases, as hackers are constantly trying to break in. Often times, they also infect thousands of computers to simultaneously connect to a particular bank and put a strain on its servers that cannot handle such an onslaught of requests. These attacks are known as DDoS (Distributed Denial of Service) attacks. A way to protect against DDoS attacks was invented in the 1990s. The idea was born when working on countering email spam. Cynthia Dwork and Moni Naor proposed running a cryptographic task that would take up some of the computer's computing power. This puzzle of sorts involved having the computer solve a cryptographic task based on the content of the email before sending it. The result of the task, i.e. a specific number, was attached to the body of the email.

This solution was also used to implement the 'mining' of cryptocurrencies, and the process was called Proof of Work. The commitment of computer processing power is crucial. As mentioned earlier, in order for gold or silver to be acquired, expert knowledge, energy, or hardware must be involved. However, the same things are needed for cryptocurrencies to be created, only they are created in a digital form. In order to make it worthwhile for virtual 'miners' to support this distributed computing system, a competition has been introduced in which computers search for some special, rather complex number. The task is not easy and is dependent on the available computing power of the computer. The computer that finds the right number the fastest wins the right to add a new block to the chain and receives a reward in cryptocurrency, and so the race begins again. In bitcoin, it was assumed from the very beginning that a new page (new block) containing customer transactions in the database, or blockchain, would be added on average every 10 minutes. This has not changed to this day. An additional incentive for mining is earning commissions on approved transactions — you can get paid for mining cryptocurrency and for validating transactions.

SATOSHI NAKAMOTO

This is the nickname of the person (or group of people) who created bitcoin, the first cryptocurrency. It was they who came up with the idea of using the cryptographic puzzle process to create virtual gold. They announced it on 31 October 2008 in the manifesto entitled *Bitcoin: A Peer-to-Peer Electronic Cash System*.

On 3 January 2009, 30,000 lines of code were written in what is considered the beginning of the bitcoin network. From the start, it was assumed that there would be 21 million bitcoins (BTCs). Each BTC is divided into 100 million parts, known as satoshi, i.e. bitcoin 'pennies'. No one can add bitcoins to the system; the programme limits that the last BTC will be mined in about 100 years. It is worth mentioning that most bitcoins (around 19 million) have already been mined. Therefore, every four years the reward for the 'miners' is reduced by half, which is known as halving. On 5 October 2009, Satoshi Nakamoto 'mined' the first block and generated 50 BTC. After four years, the reward was already 25 bitcoins. Currently, it is equal to 6.25 BTC.

PROS AND CONS

The biggest advantages of cryptocurrencies certainly include the transparency of the system, decentralisation, and robust security. However, it has been noted that the competitive model can lead to huge energy consumption. Anonymity is also highly controversial. The lack of transparent information about users opens up opportunities for criminal activity.

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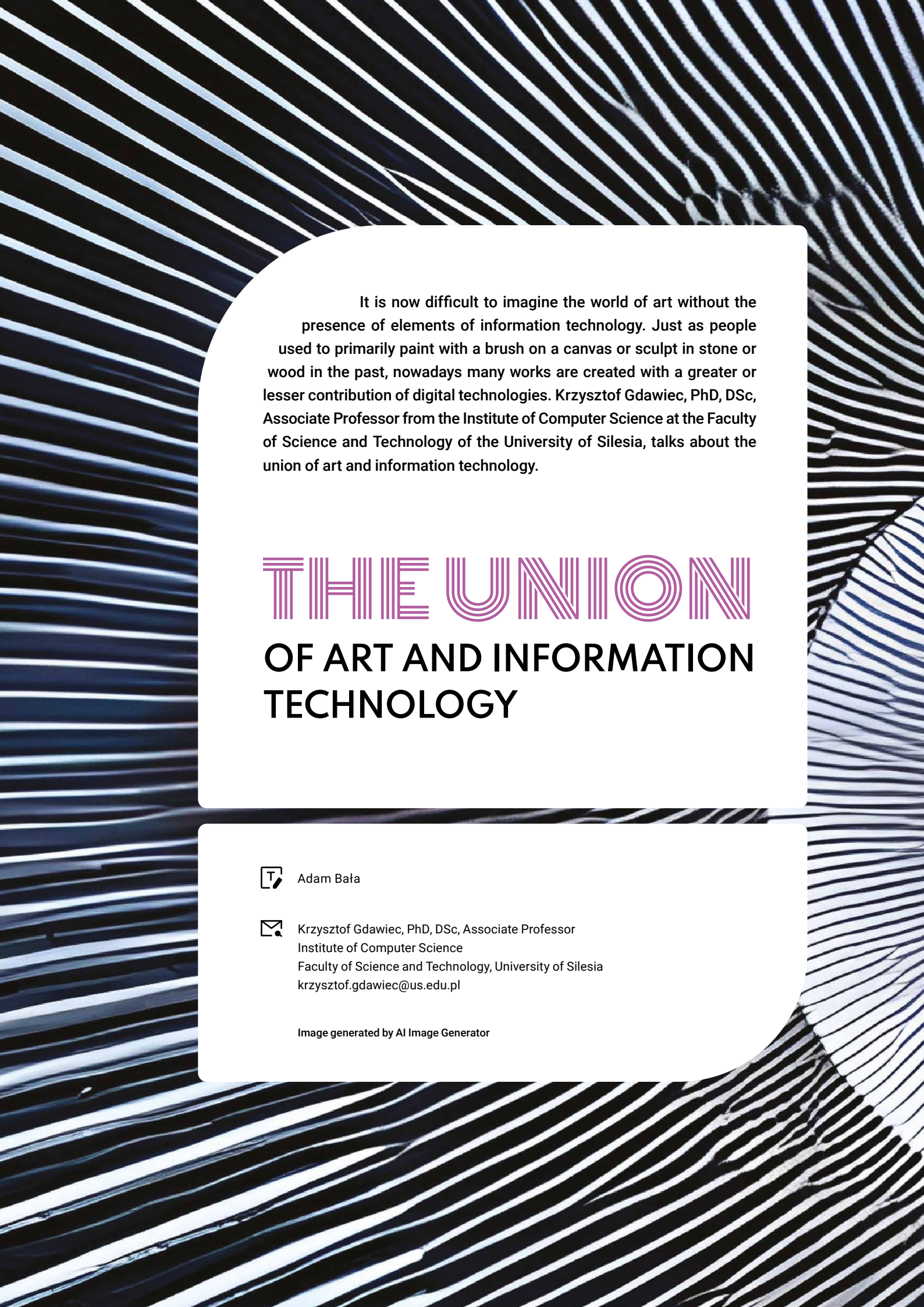

It is now difficult to imagine the world of art without the presence of elements of information technology. Just as people used to primarily paint with a brush on a canvas or sculpt in stone or wood in the past, nowadays many works are created with a greater or lesser contribution of digital technologies. Krzysztof Gdawiec, PhD, DSc, Associate Professor from the Institute of Computer Science at the Faculty of Science and Technology of the University of Silesia, talks about the union of art and information technology.

THE UNION OF ART AND INFORMATION TECHNOLOGY

Adam Bała

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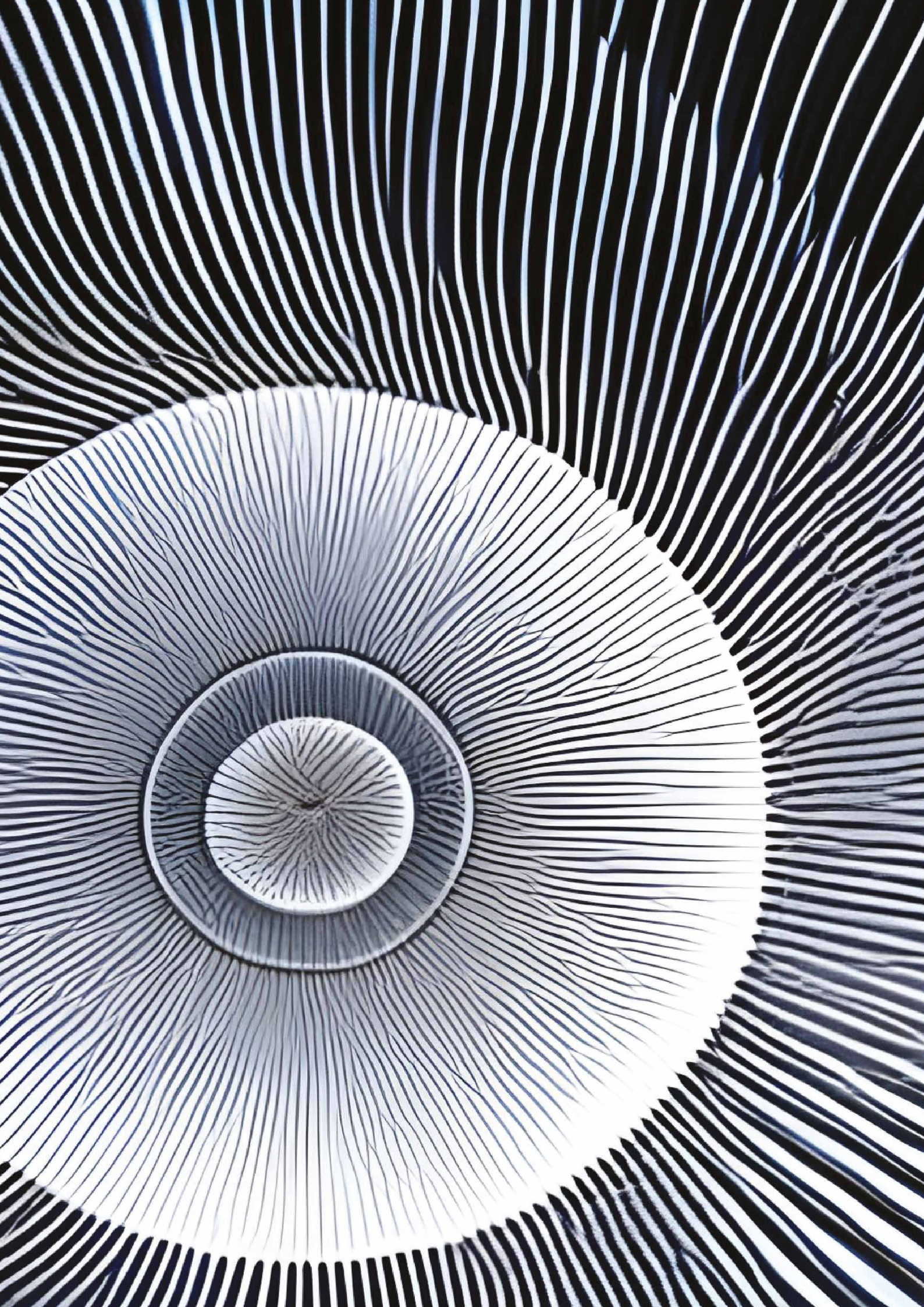
Image generated by AI Image Generator



NOT ONLY PHOTOSHOP

Although the first tools that spring to mind when it comes to creative cooperation between humans and software are Photoshop and Blender (or their various variants), art students are now learning about less obvious applications of information technology. At Stanford University, for example, we can find a subject dedicated to the use of microcontrollers, such as Arduino, to create interactive art installations.

Programming is another application of information technology in the arts. One of the pioneering programming languages designed for artists is the Processing language, first presented at the Massachusetts Institute of Technology (MIT) in 2001. It was created to make it easier for artists to turn their artistic visions into reality through code. It allows them to successfully experiment and visualise their ideas without having to write lengthy code.

VR, AR, AND 3D PRINTING IN ART

AR (Augmented Reality) and VR (Virtual Reality) technologies are now increasingly entering the domain of art. They enable static images to come to life and artists to create works in three-dimensional space, giving the audience a chance to explore and observe their work from different perspectives. The use of 3D printing also opens up new possibilities for artists, who design computer models in this way and print them with confidence that their vision will be given the right form.

WHERE IS THE AUTHOR?

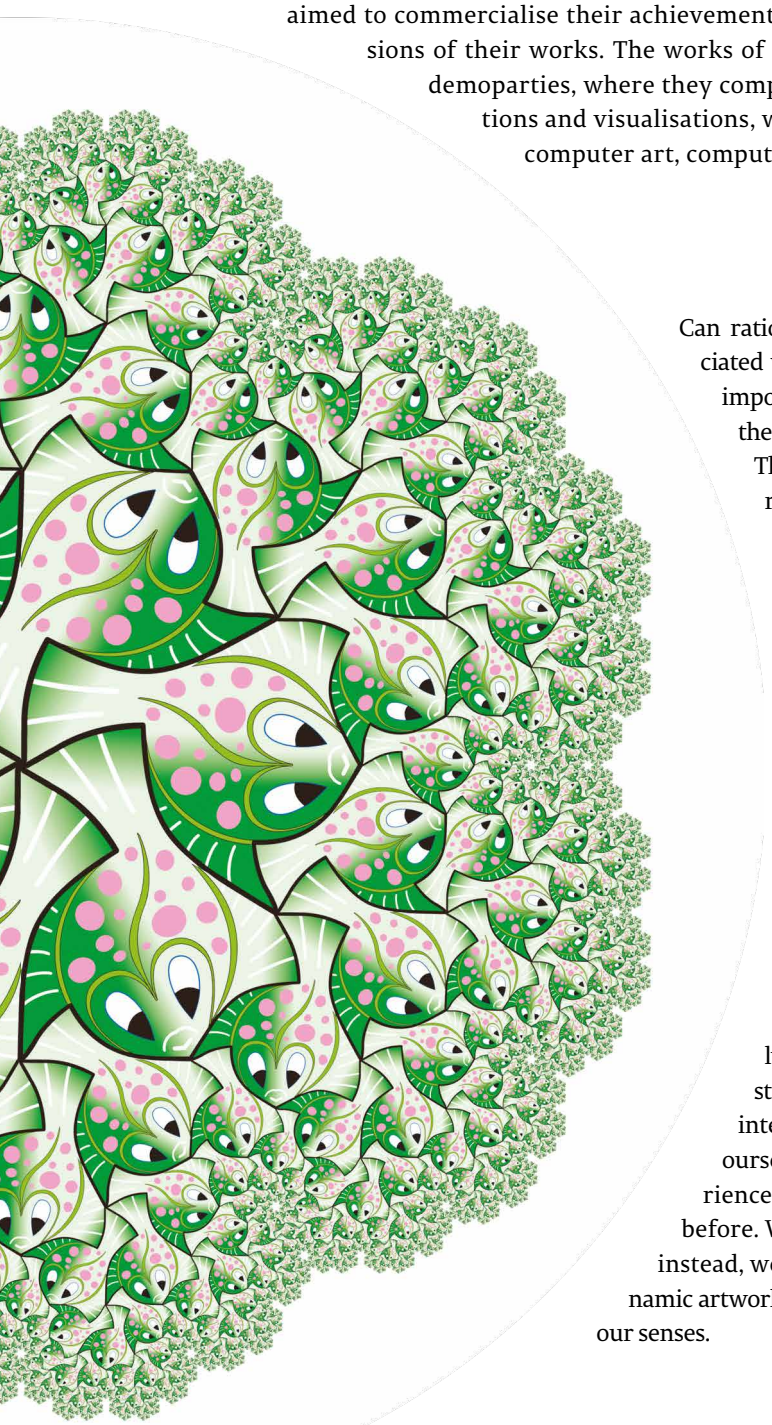
Contemporary art is inseparably linked to the use of AI (Artificial Intelligence). There are systems, such as DeepArt or Dall-E 2, that generate artworks using algorithms and neural networks. Artificial intelligence has become a tool to support artistic creation, enabling artists to explore new forms of expression and inspiring combinations. However, its use in art poses certain challenges, including the problem of authorship. The question whether the real author of a work is artificial intelligence or a human remains controversial and requires consideration from both legal and ethical perspectives. Researchers and lawyers are working on verification methods to distinguish AI contributions from creative work performed by humans. Regulations are being developed and, in the case of systems such as ChatGPT, clauses already exist to regulate the use of these technologies in scientific journals. Systems are also being developed to detect whether a particular content or image has been generated by artificial intelligence or is the work of a human. However, this is only the beginning of a long and complex process. The verification systems still require further development.

VAN GOGH 2.0

At the beginning of their journeys, artists learn their trade by imitating the style of other artists, and gradually develop their own. The same process takes place with artificial intelligence, which learns from the art world's contributions, present or past. The more relevant data it is provided with, the more original models it manages to generate. Of course, over time, these processes will evolve and AI creativity will start to move from better or worse reproduction of existing styles to creating entirely new works. Should then artists and representatives of any potentially 'replicable' industry already be thinking about expanding or even completely changing their professional competences? AI specialists reassure us that, despite the increasing contribution of artificial intelligence to the creative process, humans still play an important role and there is little to show that this might change any time soon. It is the human who provides it with the relevant data and parameters.

DEMOSCENE

The 1980s saw the emergence of the demoscene, an art form that revolutionised the way in which artistic creation had previously been perceived. This artistic movement, which was close to the subculture of crackers (people who were involved in breaking security features in commercial software), began to use programming to create small programmes that presented animations and other visual effects. The creators associated within this artistic subculture never aimed to commercialise their achievements, and the effects of their work are both demos and final versions of their works. The works of demoscene members are presented at special events, such as demoparties, where they compete, among other things, in creating the best possible animations and visualisations, while maintaining certain memory limits. This combination of computer art, computer science, and fun is an essential element of the demoscene.



MATHEMATICS AND ART

Can rational mathematics be reconciled with artistic activity often associated with sensibility? Yes, by all means. The queen of sciences plays an important role in generative art design. There are many mathematical theories and algorithms that prove extremely useful in this context. These include fractals, spherical geometry, hyperbolic geometry, spirals, and other elements of mathematics used to create algorithms that mimic 'live' art. Mathematics did not appear in art yesterday – an excellent example of the incorporation of its elements is the works of the 20th century Dutch painter Maurits Cornelis Escher (1898-1972). Today, mathematics is an integral part of generative art design.

THE KEY TO INFINITY?

The advocates of analogue art may see information technology as an abomination, accusing it of a lack of authenticity and creativity, being devoid of emotion or mass-produced. On the other hand, progressives such as Prof. Krzysztof Gdawiec believe that the combination of mathematics, computer science, and art opens up unlimited creative possibilities for artists. With their work, they prove that the use of augmented reality makes it possible to literally bring works of art to life and thus go beyond the limitations of a static image. The viewer can thus experience works of art in a more interactive, vivid, and profound way. AR makes it possible to immerse ourselves in a work of art, which fundamentally transforms our experience and guarantees an experience unlike anything we have known before. We are no longer constrained by a flat image or static sculpture; instead, we can explore space and expand our experience. Interactive and dynamic artworks created using AR and VR bring space to life and engage almost all our senses.

WHERE IS THE HUMAN BEING?

An artist can now use microcontrollers, such as Arduino or Raspberry Pi, to create interactive installations in which movement, light and sound play equal roles. However, this requires the presence of human factors not yet available to machines, namely imagination and programming skills. These two skills allow them to construct art installations and program microcontrollers in a way that suits their artistic vision and concept.

Picture inspired by the work of Maurits Cornelis Escher | Image generated by Krzysztof Gdawiec

Installation in east Belfast (2018) to soften the meaning of traditional Orange Order marches | Photo: Leszek Drong

On 10 April 1998 the governments of the United Kingdom and the Republic of Ireland adopted the *Good Friday Agreement*. The document, subsequently countersigned by Northern Ireland's main political parties, symbolically ended 30 years of bloody conflict in the region.

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BELFAST

REINTERPRETING THE CITY

WHO AGAINST WHOM

In the context of the tragic events that have been consuming Northern Ireland since the late 1960s, the parties at war are most often described as *Catholics* and *Protestants*, but this is a gross oversimplification. Yes, the denominational component is important, but it is not the only element of the opposing ethno-cultural identities. On one side we have a Catholic community referring to the Celts and Vikings as their ancestors on the island of Ireland and a republican-minded community dreaming of unification with the independent Republic of Ireland, which has been politically and economically discriminated against for decades. On the other side of the barricade is the Protestant community, privileged in many ways, primarily the descendants of Scottish and English settlers colonising Ulster in the 17th century. Their loyalty to the British Crown is described as *unionism*. It is also worth noting that among Protestants we can distinguish at least three different groups: the Presbyterians, whose ancestors were mostly Scottish immigrants (in the 2021 census this denomination was declared by 16.6% of the population of Northern Ireland), members of the Church of Ireland, which is essentially a province of the Anglican Church (11.5%), and the Methodists (2.4%).

'And yet, doctrinally, the Anglican Church is closer to Catholicism than to other Protestant denominations', says Prof. Leszek Drong, an English Studies expert from the University of Silesia in Katowice, who researches Irish (and especially Northern Irish) culture and literature in connection with the history, politics, and society of the entire region. 'Let us also be clear that this was never a religious war, as it is sometimes labelled. After all, the disputes were not over dogmatic issues of one kind or another! Given the complexity of the situation, I propose to refer to the conflict as a clash between Irish nationalism and British nationalism, although Catholics and Protestants are certainly useful simplifications'.

'TROUBLES?' AN ILLEGITIMATE EUPHEMISM

According to Prof. Drong, referring to the conflict in which more than 3,500 people (including 1,840 civilians) lost their lives as The Troubles is an unfortunate euphemism and should be avoided. The researcher advocates the use of the name *The Conflict*, capitalised.

Tensions on the Catholic-Protestant line had been occurring in Ulster with varying strength since the 17th century: in 1689, the troops of Catholic King James II besieged the settlement of Derry, where the Protestants were in power. After the creation of the region of Northern Ireland as part of the United Kingdom after World War I, the local Catholics had to recognise the political and economic supremacy of the Protestants — they had virtually no representation in Stormont, the Northern Ireland Parliament, and the local Prime Minister Sir James Craig coined the famous phrase 'A Protestant parliament serving a Protestant nation' in 1924. In 1969, Derry burst into flames again: the Catholic district of Bogside declared autonomy and incorporation into the Republic of Ireland, which resulted in a siege led by the local police (Royal Ulster Constabulary), made up virtually entirely of Protestants, and the British army, which was called in to help and was initially treated as a peacekeeping force. It is the Derry riots that are considered as the start of the unrest that defined the course of life for the population of Northern Ireland over the next three decades. In the same year, radicals from the Irish Republican Army (IRA) formed what became known as the Provisional IRA (PIRA) and, from 1970 onwards, all its factions began to fight against any manifestations of British statehood (as officials of the Crown — not even postmen were safe!). Perhaps the most well-known event in this period of Northern Irish history was the Bloody Sunday, referred to by the band U2 in the song *Sunday Bloody Sunday*. On 31 January 1972, during a demonstration in Bogside, soldiers of the British Parachute Regiment shot dead thirteen unarmed men and boys (the fourteenth victim died four and a half months later).

Over time, the Conflict moved beyond the borders of Northern Ireland. The atrocities that were taking place were increasingly appalling to world public opinion, and the United States became involved in resolving the situation — the large size of the Irish diaspora in the US was probably of significance.

AN AGREEMENT, AND NOW WHAT?

An increasing pressure from the international community, the political change in the United Kingdom (Labour came to power), but above all the growing fatigue with the Conflict among the people of Northern Ireland, in which the warring parties found themselves in a clinch (there was virtually no chance for unification with the Republic of Ireland), led to the signing of the *Good Friday Agreement* on 10 April 1998. The document introduced a number of legal and political changes designed to significantly improve the social relations between Protestants and Catholics. The agreement was adopted in a referendum held across the Emerald Isle in May, and in the autumn the Nobel Peace Prize was awarded to two Northern Irish politicians — John Hume, a Catholic, and David Trimble, a Protestant — the main architects of the agreement...

While everything looked great on paper, the reality proved more complicated. In August 1998, one of the cruellest attacks in the history of the Conflict took place — the detonation of a booby-trapped car by the Real IRA in Omagh killed 29 people (including nine children) and injured over 200 others. The process of disarming the IRA, although assumed in the agreement, did not begin until 2006-2007. On the other side, marches of the Orange Order supporters, i.e. people favouring committing to tightening the relationship with British Crown, have been organised to this day with a distinctly confrontational flavour.

THE PEACE WALLS ARE FINALLY STANDING TALL

The fact is, however, that the entire region also felt the very positive effects of the Good Friday Agreement. Almost overnight, EU money began to flow into Northern Ireland and investors began to arrive, mainly from the United States. This interest of foreign capital especially benefited Belfast, which saw the development of its inner city after 1998 and the restoration of the Titanic Quarter shipbuilding area, where Harland and Wolff built the famous Titanic between 1911 and 1912. Northern Ireland became very popular with filmmakers, who increasingly made use of the beautiful scenery of the north of the island (the tax incentives for filming there also play a significant part) — the fans of the *Game of Thrones* TV series will know that some of the events taking place in the north of Westeros were filmed in the Ulster countryside and in Belfast itself, not far from the Titanic Museum, is the Winterfell Castle set.

The year 1998 also marks a turning point for Northern Irish cinema and literature. Obviously, there had been novels with the Conflict in the foreground or background published before, but after the Agreement people began to look at the painful past somewhat differently. The examples include *Eureka Street* by Robert McLiam Wilson, published just before the signing of the Good Friday Agreement, *Where Are We Now?* by Glenn Patterson, 2018 Booker Prize-winning *Milkman* by Anna Burns, *The Truth Commissioner* by David Park, and *The Ghosts of Belfast* by Stuart Neville, which describes the city in the period immediately after the agreement.

'Research-wise, I see the transformation of Belfast as a certain reinterpretation of the city. For it is worth pointing out that the city's past and its history depend to a large extent on how we present these issues to tourists, including those who know nothing about it, and what kind of framework we propose for the story we want to tell', explains Prof. Leszek Drong.

A very interesting thing happened after 1998; both Catholics and Protestants started to use Belfast's past to attract tourists, including the bombers associated with each side, now released from prison. One form of tours offered in the city, for example, is the old-style taxi tours, whose driver, often with a criminal past, is also the guide. He tells the story of Belfast, referring to his own experiences and chooses the route according to the 'plot' of his own life. Thus, someone named Seamus, Séan, or Cilian will take a route commemorating the martyrdom of the Catholic community, while James, John, or Stuart will choose the sites of importance to Protestants. Moreover, the two routes will very often intersect at locations that are either neutral or important to both communities. Another manifestation of the specific shaping of the Northern Ireland capital's memory is the retention of the so-called peace walls, i.e. fences built over the years to separate the feuding sides — the longest such fence separates the Protestant Shankill Road from the Catholic Falls Road in the western part of the city. And while the walls of peace are a visible sign of the tragedy that played out in the past, there is a prevailing awareness that this is also a popular tourist attraction. This is why neither Protestants nor Catholics dismantle them, despite encouragement from the politicians. In this context, Belfast is a destination for *dark tourism*, which is all about extreme, violent experiences that evoke memories of dramatic events.

Everything that happened in Belfast after 1998 is a fascinating example of a peace process and gradually established consensus allowing the inhabitants of the change-oriented city to jointly benefit from the opportunities opening for them.

Mural in east Belfast referring to the activities of paramilitary organisations during the Conflict | Photo: Leszek Drong

Republican mural in the Ardoyne district
Photo: Leszek Drong

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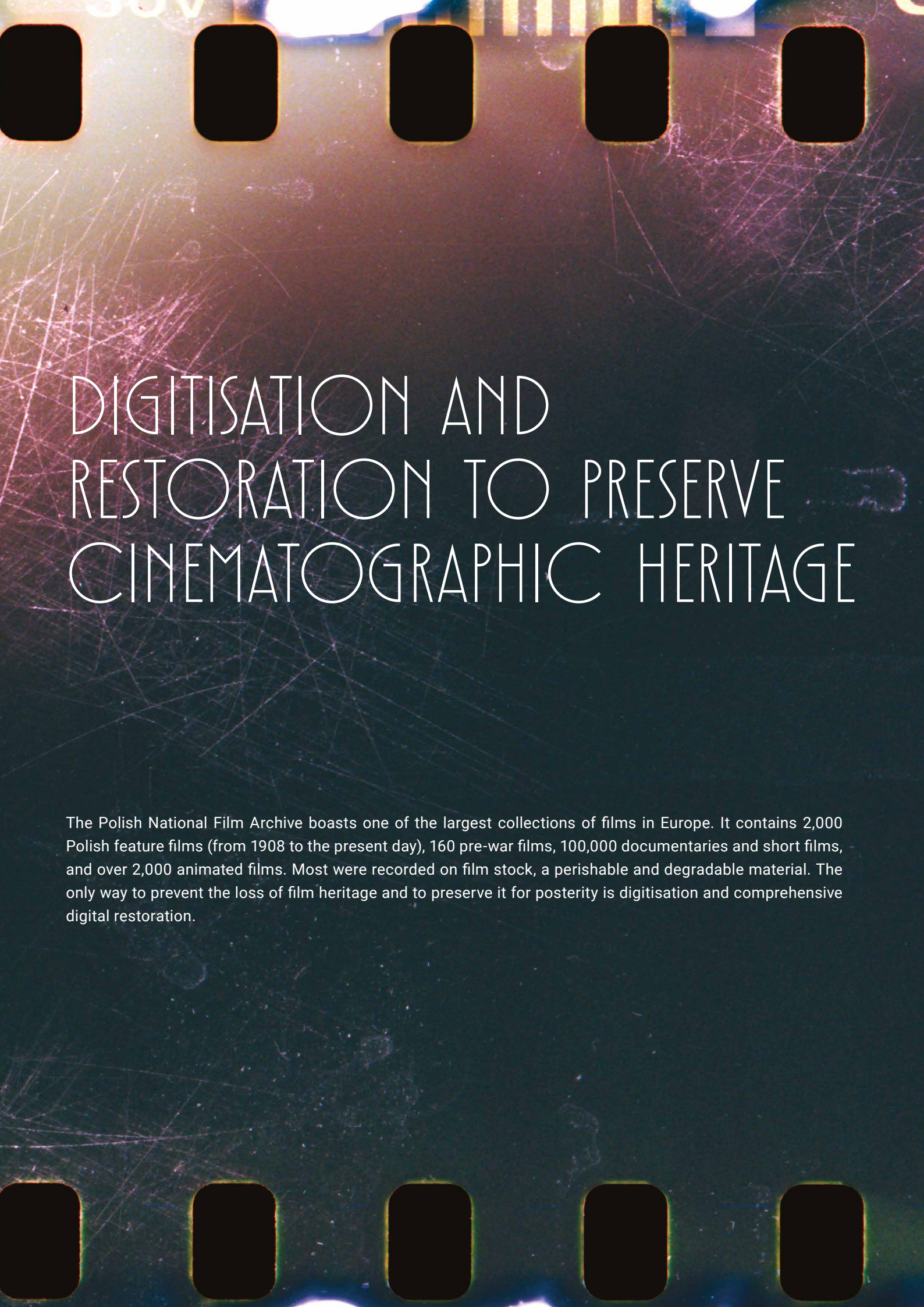

DIGITISATION AND RESTORATION TO PRESERVE CINEMATOGRAPHIC HERITAGE

The Polish National Film Archive boasts one of the largest collections of films in Europe. It contains 2,000 Polish feature films (from 1908 to the present day), 160 pre-war films, 100,000 documentaries and short films, and over 2,000 animated films. Most were recorded on film stock, a perishable and degradable material. The only way to prevent the loss of film heritage and to preserve it for posterity is digitisation and comprehensive digital restoration.

Thanks to the technological 'facelift', we can enjoy such pre-war productions as: *Ada! Don't do that!* (1936) directed by Konrad Tom and *Jadzia* (1936) directed by Mieczysław Krawicz. Not only can the contemporary viewer admire the cinema that captivated previous generations, but also follow the development of Polish cinematography.

The collection of 200 films digitised so far (data from 2023) includes works from the second half of the previous century. The catalogue opens, of course, with the first Polish post-war feature film, *Forbidden Songs* (1947), directed by Leonard Buczkowski. The inclusion of the most important works of the past century does not come as a surprise, contrary to the films made at the beginning of the 21st century, such as *The Revenge* directed by Andrzej Wajda (2002) or *My Nikifor* directed by Krzysztof Krauze (2004). The answer why turns out to be quite simple; the secret lies in the quality of film stock available at the time and the limited financial resources at the disposal of film crews. Back in the 1960s, film copies were made on the basis of a duplicate negative. By the end of the 20th century, the crisis forced film-makers to forgo making duplicates, so copies were pressed from the original negative, contributing to its destruction.

Photo: Krzysztof Szlapa

FROM ANALOGUE TO DIGITAL

Prof. Jerzy Łukaszewicz, a renowned cinematographer, will help guide us through the meanders of film digitisation and restoration. He is the director of cinematography for films such as *The Issa Valley* (dir. Tadeusz Konwicki), *Chance Meeting on the Atlantic* (dir. Jerzy Kawalerowicz), *Axiliad* (dir. Witold Leszczyński), both parts of Vabank, Sexmission, Kingsajz (dir. Juliusz Machulski), director, screenwriter, professor at the Krzysztof Kieślowski Film School at the University of Silesia in Katowice, author of more than 40 digital restorations of films by, among others, Andrzej Wajda, Jerzy Kawalerowicz, and Kazimierz Kutz.

The basic task in the restoration process of an analogue work is to digitise the components of image and sound, which are reproduced as a numerical form of colour and density information. These are extremely complex processes. The technological challenges have to be met by teams of specialised computer science experts, and the restoration of the images usually involves, if available, the creators of the specific films or, if they are no longer alive, their camera crew or those who knew the cinematographer well. Understandably, restorations evoke many emotions and raise questions as to whether the aesthetic values of the restored work are the same as in the original, analogue source.

Not so long ago, cinemas and television were dominated by imperfect analogue images, whereas nowadays we have grown accustomed to digital images. The differences are enormous. Analogue images are characterised by, among other things, reduced definition of visual components, i.e. lack of 'full' sharpness, 'vibration' of static elements, minimal colour scale with a low degree of saturation, and perceptible image structure (the so-called grain). On the other hand, digital recordings have high image definition, full image sharpness, deep blacks, bright whites, high colour saturation, a significant number of details, and a multidimensional colour scale.

'This habit, routine, and practised perception of the viewer requires the contemporary artwork to be configured with the same attributes' explains Prof. Jerzy Lukaszewicz.

This is the inalienable nature and mentality of today's message in multimedia presentations. Thus, the spirit of contemporary art is determined by technological change and the consequent implications of perceptual awareness. The digital image dominates mass media, social media, and contemporary film works.

ARCHIVING

The lifespan of filmstrips is limited; they undergo natural degradation, inevitably leading to their complete breakdown. This process cannot be stopped, and the only possible way of salvation is digitisation, i.e. scanning every single frame of the tape, and as one second of a film is made of 25 frames, the work is tedious and extremely expensive. Specialised software picks up all the distortions, defects, blemishes, dirt, scratches, tape sticking points, perforation damage, etc. occurring on scans.

The primary task of restoring analogue film for the purposes of recording in digital formats is to translate the image and sound into digital form.

'In this process, the analogue film is stripped of its isomorphic structure, which is based on silver salts and natural pigments. These elements are reproduced as a numerical value of the colour and density of the analogue and digital elements, and a unique colour correction of the whole is carried out', emphasises the cinematographer.

The technology makes it possible to eliminate the camera operator's 'slip-ups', such as a spotlight element making it into the recording. However, this provokes a debate among archivists who believe that since this spotlight has found its way onto the tape, albeit 'uninvited', it should remain in its digital form as is. After digitisation, the footage goes back into the archive.

INTERFERENCE LIMITS

The complex process of film restoration consists of, among other things, removing image grain, adjustment of contrast, black and white levels, and colour saturation. Graphic artists retouch stains and remove scratches and other defects in the image.

'When restoration encroaches on the elusive and hard-to-define aesthetics of a work, the procedure requires care and sensitivity, as well as knowledge not only of film arts but also of the psychology of perception, art history, art conservation, and cultural studies. Although a huge staff of experts is involved in the restoration process, the opinion of an average viewer may be decisive in the final assessment of the work', points out Prof. Jerzy Łukaszewicz. The filmmakers have never been unanimous about their restored works.

'Having watched *Issa Valley*, the director and scriptwriter Tadeusz Konwicki concluded that his restored film was... shiny clean. Coming from him, this sounded rather sarcastic', recalls the cinematographer.

Andrzej Wajda believed that an analogue picture loses its biology when it is restored. According to Prof. Jerzy Lukaszewicz, the aesthetic and technical qualities in the digital domain are far from the standards set by analogue images, but he adds that this is the opinion of the generation brought up in the era of analogue images.

Andrzej Wajda's position was that the filmmaker can intervene in any way he wishes, and therefore make changes and modifications. However, the 'Digital Restoration and Digitisation of Polish Films...' project, co-financed by the European Regional Development Fund, contains certain prerogatives and is under the strict control of archivists, who strive for a faithful transfer of the analogue image.

'One of the most difficult challenges', recalls the professor, 'was the reconstruction of *Forbidden Songs*. It took two years. The heavily degraded negative revealed many deficiencies, some scenes (shot at night, for example) were difficult to restore due to a lack of essential details. They had to be searched for in various archives, including the archives of Polish television, where fragments of the film were shown. The restored image, therefore, did not come directly from the negative but from various media, the parameters of which had to be aligned in such a way as to make the film a seamless whole and so that these modifications were not perceptible to the audience.

In the case of films by deceased filmmakers, the high-calibre cinematographer involved in the restoration can only appeal to their own sensibilities. In such a case, however, there is little doubt that the restored picture is a new piece of art. A 'poet of the camera' (as film critics referred to the cinematographer of the *Issa Valley* and his work) cannot overcome his own aesthetics, imagination, and way of perceiving the world.

'Tadeusz Konwicki's comment is very telling; the director did not reject the film in its digital version, on the contrary, he embraced it, but with certain reservations. He believed that those were not so much two different images as two different worlds entirely. He accepted the restoration procedure as a sign of the times, which force us to make certain modifications', continues Jerzy Łukaszewicz.

In the opinion of the cinematographer, the creator of brilliant images enchanting the audience with colour and light, the digital version adheres to the requirements and likes of the contemporary viewer.

'This is the world we live in. Appealing to old standards and visual rules may be valuable only for a narrow group of specialists and connoisseurs', states the professor.

To a wider audience, the technology provides the opportunity to appreciate a work of the past, installing it in the 'here and now'; the film's age can be gleaned only from the production date, and not necessarily from the image itself. Digitisation and restoration are an unquestionable boon for worldwide cinematography and the only salvation from its annihilation. It would seem that film stock has become a thing of the past, yet many world-class filmmakers are forcing their producers to return to analogue technology.

'I have worked both in analogue and digital, but deep down I am convinced that analogue, through its imperfections, also had a certain magic, a touch of craftsmanship, something that at times, although imperfect and underdeveloped, was more... human. The limitations of analogue technology, such as the number of retakes, unleashed creativity and imagination; in digital you can do anything. Artistic thinking and creativity seem all but crippled', concludes Jerzy Łukaszewicz.

Perhaps, then, the twilight of analogue films has not yet arrived. The renaissance of vinyl records has proved that not everything old has to be cast away for good. The largest laboratory, Technicolor in London, has not yet closed its gates.

There has never been a single and unified masculine ideal that has persisted over the centuries. On the contrary, while looking from a historical perspective, it can be concluded that masculinity has always been a category prone to transformation. It has been a reflection of economic, political, social, and cultural changes, which have undergone periodic phases of collapse and transformation. However, the postmodern definition crisis, which dates back to the last century and continues to this day, seems to have resounded the loudest. Ever since researchers began to study masculinity, it has become increasingly clear that masculinity, contrary to popular opinion, is not a monolithic construct.

TRANSFORMATIONS OF **MASCULINITY** IN THE 20TH CENTURY

For centuries, there have been certain patterns of masculinity dominating specific eras. One of the most prominent was the one fusing hegemony with militarism. We are talking about the idea of a soldier, and earlier a knight or a warrior. The soldier, honourable and loyal to his homeland, is the embodiment of the 'proper' masculinity, while the army, as a largely masculine institution, has significantly influenced the shape of European political and social consciousness since the dawn of time.

The symbolism of the soldier's body and uniform did not lose its relevance in the context of the outbreak of the Great War — the first large-scale conflict which saw a mass mobilisation of soldiers to form them into gigantic, masculine 'machines' taking part in the war that was sometimes justly referred to as a 'meat grinder'. For this reason, the 20th century, even if it was the age of war, was also the age of the devaluation of military activity in the West and thus the devaluation of the soldier myth. When it became apparent that the male body, previously hidden beneath a tough 'muscle armour' (Klaus Theweleit's words), was 'mutilated', the fundamental belief in a man cast in bronze was called into question. The Polish imagery, however, differs from that of the West — the dominant narrative is one that praises the fighting legionaries, and the war is followed by an apotheosis of heroic death. The Polish vision of the Great War is rather associated with a 'little war' or a 'trooper western' (in the words of literary historian Maria Janion).

The explanation for the above perspective should be sought in the period immediately following the war. At that time, the newly established Second Republic of Poland, which had not previously existed as an independent state, had to face additional problems; it was systematically dissociating itself from the reality preceding the war. However, this did not change the fact that its future citizens often participated in it as soldiers.

A permanently crippled soldier, unless he returned to the front again, would begin a new life with a prosthetic limb, no longer fulfilling an honourable role in the social consciousness among the privileged. Instead, he would become a half-man, usually placed right next to widows and orphans in the social hierarchy, because his incomplete body implied issues with the basic masculine competencies: power and the ability to fight or work. The war cripple, therefore, lost out to the strong and healthy body, lost the possibility to have a voice, and to participate in political and social life, as he disrupted the established social order.

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American soldier wounded in battle during World War I | Photo: US Library of Congress (ID hec.11310), public domain, via Wikimedia Commons

As a result, war cripples began to search for a space in which they could articulate what could not be expressed in public. These attempts resulted in the formation of veterans' groups of an institutional nature. The largest organisation that attempted to legitimise and stabilise the situation of war disabled veterans was the Association of War Disabled Persons of the Republic of Poland (founded in 1919). The Association tried to support veterans with disabilities in various ways: setting up suitable trolley-stalls to make trade easier for them, mediating in labour matters, and helping to obtain allowances. However, the allowances were not sufficient. Invalids were often condemned to poverty, which led to further consequences — the men were forced to beg on the streets, or to steal.

The growing resentment of the society led men with disabilities to intensify the tensions between their feelings and the shape of the official post-war narrative. Therefore, they attempted to adopt a strategy of inscribing themselves into the broad canon of national and historical memory by claiming that, in fact, their battle wounds may also have contributed to the restoration of independence. The abstract concept of 'regaining independence', however, did not refer to individual sacrifice and suffering, which instead was described quite generally — as the sacrifice of 'multitudes of those most unfortunate who sacrificed their health and the integrity of their bodies for the benefit of the Fatherland'. In no way did the dominant narratives in the discourse satisfy the soldiers with disabilities, who felt ignored and unappreciated. It was not uncommon for them to preach anti-war ideas in order to show the destructive nature of war and, in fact, to draw attention to their harm. To this end, they organised marches, during which they manifested their beliefs and feelings.

Although marginalised, crippled veterans frequently tried to draw the society's attention and raise its awareness. They were aided by certain institutions and cooperatives, and they could also count on the support from artists who, in prose and poetry, constructed figures of veteran heroes trying to face their disabilities, although often with poor results.

For the social definition of disability was always associated with a certain social incompetence, which in turn led to the dehumanisation of the crippled men. War cripples were heroes (they proved their masculinity on the battlefield), but in actuality, from the bodily perspective, they were deprived of this masculinity. Their voice had no influence on the shape of the official war narrative and, above all, on the construction of hegemonic and militaristic masculinity in interwar Poland.

Most likely, there isn't any place on Earth untouched by humans, intact and unexplored. We have left our mark everywhere, significantly influencing the environment around us.

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