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A torn generation: Dichotomies and dissonances on sustainability and technological change in in-depth interviews with university students

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ABSTRACT

In a research study among university students regarding technological change, equality and environmental sustainability, deep-seated dichotomies were found in the students' mental images of the future. This study aims to present these dichotomies as well as propose explanations for them, adding to our understanding of what kind of behavioural barriers inhibit sustainability transformations. The results show that the interviewees truly struggle to decide if the world really is on fire regarding environmental change, if technology is capable of solving the situation, if inequality is truly a problem, and how they can relate to all this. The dichotomies that we found suggest that on the one hand, they find no comfort in the dominant techno-optimistic, eco-modernisation narratives and, on the other hand, they are not aware of any alternatives. The results underline the existence of psychological phenomena such as optimism bias or psychological distancing. In our paper, we also address whether dichotomous thinking poses a problem or whether we may have to accept that dichotomies can become the norm when contemplating the world in its increasing complexity.

KEYWORDS

sustainability, techno-optimism, inequality, dichotomies, behavioural economics

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1. INTRODUCTION

Transdisciplinary research fields concerned with the unsustainable human modus operandi – like ecological economics – have long argued that the current way of organizing our society and economy needs serious transformation if we aim to stay within planetary boundaries (Daly 2019; Kallis et al. 2012). In its latest report issued in April 2022, the UN Intergovernmental Panel for Climate Change also suggested that our economic structures must change radically to mitigate climate change (IPCC 2022). Scholars argue that eco-modernization approaches vouching for an almost undisputed trust in technological solutions might derail and delay real answers to sustainability problems (Parrique et al. 2019). At the same time, any transition to a sustainable modus operandi would have to include strict policy measures that address inequality problems (Hickel 2020; Nightingale et al. 2020). Even the most environmentally conscious policymakers would struggle to introduce radical change due to current power structures and dominant narratives, but – putting that aside – both the support and the understanding of the general public remain crucial in the implementation of such measures. The political salience of issues depends to a great extent on the opinion of the general public, as policy measures are only implemented if the constituents really care about them (Király et al. 2015). Furthermore, the world has seen unprecedented finger-pointing as to who should initiate change (Peeters et al. 2015): economic actors point to consumer demands; political actors to voters; and citizens (who are also consumers and voters) point to economic and political decision-makers.

Academics have started analysing young people's visions of sustainability, as youth is a crucial period in the (re)production of environmental norms (Horton et al. 2013). As a review article (Lee et al. 2020) suggests, younger generations tend to take convenient actions to protect the environment (like switching off devices) rather than taking inconvenient actions (like consuming less), which is, to some extent, a contradiction in their attitudes. Additionally, further evidence proves that university students have very limited knowledge on sustainable development goals, that is, reducing poverty, protecting the environment, and ensuring peace (Zamora-Polo et al. 2019). These alarming findings have motivated us to investigate students' ideas, visions, and cognitive challenges in understanding the complexity of the necessary environmental and social changes that affect them. Hence, this paper focuses on Hungarian university students belonging to the Zoomer generation born after 1996 (Ho et al. 2022), representing one of the generations born into the global environmental crisis and who are most likely to face this challenge throughout their lifetime.

According to UNICEF's 2022 online survey, the overwhelming majority of young people in Hungary (the survey asked 13–25 year-olds) are concerned about climate change. Their responses suggest that they are willing to sacrifice their comfort and convenience to do something to curb the problem – however, this of course depends on how action is measured. At the same time, Special Eurobarometer 513 (2021) results show that all generations – including young people – within Hungary think that clothing should be as cheap as possible, regardless of the environmental impact or of the working conditions under which they were made. It is also worth noting that highly educated young people are more receptive, interested, and willing to act compared to those with lower levels of education (UNICEF 2022). However, previous research was mainly of a quantitative nature and did not consider sustainability issues in connection with technological change. Our research partly addresses this gap.

In 2020, as part of a wider research agenda, thirty in-depth semi-structured interviews were conducted with Hungarian university students to examine expectations of social and environmental sustainability in connection with technological change. We had presumed that students might be aware of local ecological damages (such as serious floods in the 2000s or the 2010 Ajka aluminium plant accident) or – due to wide internet access in Hungary – global ecological crises (such as the Australian wildfires). However, contrary to our expectations, our results showed that the interviewees were struggling with deciding whether the environment deteriorates beyond repair; whether technology can solve the ecological crisis, and whether inequality is indeed a problem that needs to be resolved. Students have truly contradictory arguments about the extent to which environmental problems could affect their futures. We discovered several dichotomies in their answers suggesting that they neither find comfort in the dominant techno-optimistic, eco-modernization narratives nor are they aware of any alternative and collective solutions. Through presenting the results of our qualitative content analysis, the paper illustrates the students' internal inconsistencies manifested in this dichotomous thinking.

Hence, the current work contributes to the literature by providing a qualitative investigation of dichotomic thinking and the mechanisms that might foster them. We analyse data from a country which has not yet been scrutinised by the related research field. The current paper advances the understanding of dichotomic thinking by exploring the specific topics that might attract contradictory beliefs and opinions when Zoomers share their visions on sustainability and technological development. Therefore, our main research question in this study is the following: What topics attract dichotomic thinking in and among students' visions on the future of the environment and in relation to technological development? In addition, we strived to understand the roots of their dichotomic thinking. We aimed to showcase that the generation we investigated face a high number of dissonances when it comes to fundamental issues they will have to face in their lifetime. Deciding whether the world really is on fire; whether technology plays a supportive or an obstructive role in the environmental havoc; whether inequality is a problem or an inherent trait of human societies; and what their individual role and future is in tackling these problems, constitutes a serious challenge for them. The paper also tries to uncover the manifestations of social cognitive phenomena behind these dichotomies such as moral distancing or optimism bias. The ambition behind this is not only a mere descriptive narrative of a research but also trying to find adequate interpretation on the roots for these dichotomies and suggest ways of moderating them.

2. METHODOLOGY

In our research, semi-structured interviews were conducted in April 2020 with 30 master students (12 male and 18 female) studying at universities in Budapest, Hungary. Their ages ranged from 22 to 27. We selected participants majoring in fields that were not directly related to technology or the natural sciences, but beyond that we aimed for a diverse sample: their majors included languages, law, accounting, psychology, management, design, teacher training, communication, special needs education, marketing, ethnography, and finance. As the current study was part of a bigger research project which investigated expectations of students regarding the future of work and automation, it was relevant that the students should not be studying technology or the natural sciences. Interviewees came from different universities in Budapest

and were not previously known to the authors of this paper, they were recruited through interns. The interns received quotas which contained intervals for how many participants could belong to each gender, each study field. They recruited interviewees through their acquaintance network. The aim was to have a sample with a similar ratio of men and women as in the target population of these non-technological university students.

Interviewees signed informed consent forms. The interview guide's first part contained questions about visions on the development of artificial intelligence and robotics. The second segment of the interview guide introduced questions related to expectations on sustainability, with a part of the questions focusing on the relationship between technology and sustainability projections. Within sustainability, the questions referred to social equality and environmental sustainability. Results of the first part of the interviews are discussed in another article (Herke – Vicsek 2022). Within this paper, we concentrate on answers that were given to the questions in the second segment. The questions were open ended questions, which were quite general with respect to environmental and sustainability issues. Main questions included: Please summarise how you think the natural environment will change in the next 40 years? And what role could technology play in this? How do you think the relationship between technology and the environment will evolve in the future?

Interviews were recorded and then transcribed, and we used Maxqda 2020 for our qualitative content analysis.

Based on our observations, we inductively created the positive and negative main categories containing 16 subcategories each (see Table 1 below in the results section). Every subcategory/subcode has a counterpart that represents the opposite scenario. For instance, "Technology resolves inequality" falls under positive codes, whereas "Technology increases or preserves inequality" is its reversed, negative counterpart. The subcodes mentioned above are in direct opposition, forming a dichotomy. In other words, if two categories are in the same line within Table 1, we consider them direct dichotomies. If a category is on the positive side while the other is on the negative, but they are not in the same line, we refer to them as "indirect dichotomies." For instance, "Technology decreases the need for energy" and "Less Green Space" create an indirect dichotomy.

Trained coders analysed the texts where a coding unit implied a specific question and the relevant answer. We also measured Krippendorff's alpha to provide intercoder reliability that proved to be 0.844; thus, coders' decisions can be considered sufficiently reliable.

3. RESULTS

Table 1 provides an overview of the codes we inductively created to analyse potential dichotomies in the interviews. The table contains direct quotes from interviews to give a feel for what the code stands for. It also provides the frequency of that code appearing in the interviews. As one code can occur many times in one interview, this does not indicate how many people talked about that issue. However, later on, when we analyse contradictions appearing within the whole sample, we will indicate how many interviews contained such a code.

Based on our results, positive codes had more hits (n = 513, 55.1%) than negative ones (n = 418, 44.9%). Amongst positive codes, the Redistribution is necessary (n = 193, 20.7%), Technology can solve the ecological crisis (n = 77, 8.3%), and Nice, clean environment (n = 40,

Table 1. Code pairs, codes, frequencies and exemplary excepts from interviews

Code pairs (−/+)	Code name	Sample excerpts (in brackets the interview ID)	Freq.
1−	Capitalism/ consumption are the problem	"We need to cut back a bit on the profit motive in big tech companies. I think that's the only thing that's not wrong with them making a profit, it's not wrong with them making a very good living out of it, it's absolutely not wrong, but it shouldn't be the absolute main thing, but it should have a very tiny social aspect to it." (No. 5)	21
1+	We need to maintain the current system	"Well, I would honestly choose a modern system that works. But only because I don't know another one, so I'd be afraid of it, I'd be afraid of how it works." (No. 3)	29
2−	I do not like thinking about this	"Well, if a robot were to increase the gap, of course we would have to intervene, but I have no idea how we could do that." (No. 20)	29
2+	I started thinking about this issue	"...we need to move North to escape global warming, but other than that... Well, obviously I'm going to think about it a lot, because I haven't gone into it that deeply." (No. 1)	2
3−	There will be no sudden/radical changes	"...in the future, I think we will be a little less destructive to the environment. I don't think there's going to be a sharp change where everything is going to be better." (No. 3)	29
3+	There will be a turning-point	"So, it might be destructive for a while and then after a while the solution will be that there might be technological solutions that will replace a lot of things and so there will be less pollution." (No. 26)	8
4−	It is not worth protecting the environment	"But if the environmental solution costs three times as much, people will not choose it. (No. 27)	5
4+	It is worth protecting environment	"...there's an economic issue behind it, and now going forward I think there's going to be a nasty equation of what's more important, protecting the air at the state level or letting the health care system be burdened with so many lung patients. So I think there's going to be some ugly math here, and at some point it's going to have to come out that it's worth to protect nature." (No. 3)	6
5−	There will be less green space	"There may be continued deforestation, continued river pollution." (No. 22)	14

(continued)

Table 1. Continued

Code pairs (−/+)	Code name	Sample excerpts (in brackets the interview ID)	Freq.
5+	There will be more green space	"...and I think that's how the world is moving towards a greener environment, a greener direction." (No. 18)	12
6−	Urbanisation will keep expanding	"However, as our lives become more comfortable, population growth is likely to continue and many of us will live in cities." (No. 29)	7
6+	We will see ruralisation	"...rural areas are also expected to attract a lot of people, because everybody is fleeing the cities at this level, and then the countryside will start to function with more people, which will again be an interesting question socially and technologically..." (No. 29)	2
7−	The world will be in flames	"Well, the planet is... (laughs) I see flames here and there, desert here and there, wars, so it's not a very bright situation." (No 1)	36
7+	Nice, clean environment	"Well, I think that by then there will be very, very protected natural areas, or forests, or parks, or I don't know, or there will be a lot of artificially created parks, which will also be very protected." (No. 12)	40
8−	Business-as-usual	"Interviewer: If the only two options were to either introduce a basic income or to keep a system similar to today's, which would you choose? And why? Interviewee: I'd prefer the current one, just a bit fairer." (No. 9)	5
8+	Alternative lifestyles	"I hope that people are a little bit more self-sustainable, and, uh, they've already cut back on this very strong consumerism." (No. 17)	15
9−	Technology demands more energy	"...if there are more electrical things, obviously they are battery powered, they also pollute the environment..." (No. 18)	12
9+	Technology demands less energy	"... but technology will hopefully also give back to the environment..." (No. 7)	24
10−	Technology deepens the ecological crisis	"And technology contributes to environmental pollution; I don't know exactly what it takes to produce these machines, but the gases and all sorts of things are released into the air, and the number of waste increases." (No. 30)	41

(continued)

Table 1. Continued

Code pairs (−/+)	Code name	Sample excerpts (in brackets the interview ID)	Freq.
10+	Technology can solve the ecological crises	"I think that all these new technological things, that they help people to make their everyday life easier and that people are improving and the whole planet is becoming more environmentally conscious, I think that's what it is." (No. 10)	77
11−	I am scared of not stopping the environmental crisis	"...if mankind continues with its current behaviour, it is very likely that water will be depleted or very scarce, green areas, trees will be cut down, oxygen supply may not be adequate..." (No. 15)	13
11+	Humanity will solve the environmental crisis	"...people pay more attention to the environment, less plastic, less carbon emissions, maybe." (No. 18)	17
12−	Horrible events somewhere	"...where the situation is even worse than it is now, I think it is likely that people are not really living, or if they are living, they are not living in prosperity." (No. 1)	1
12+	I will live in a nice environment	"...my room is very nice, modern, clean, and my garden is well kept." (No. 1)	2
13−	Overpopulation	"...it sounds nasty now, but if they don't die, then yeah, we're going to have a hell of a lot of people, and, and we're not going to have that natural selection in society, and, and then we could have a problem." (No. 17)	9
13+	Population decreases	Nobody mentioned this.	0
14−	Individuals must solve the problems	"...I think we have a responsibility to each other; we have a responsibility to help each other in society..." (No. 13)	22
14+	Decision-makers must solve the problems	"...but I think it's still in the hands of governments to control the role of quotas or to influence industrial technologies." (No. 22)	37
15−	Inequality is acceptable to a certain extent	"it's been done [aiming for equality] in history, it's called socialism, and it didn't really work,... it's just going to sound very heartless... so my answer is no, because I think it's an idealistic idea, it's impossible to implement, and it always goes to an extreme, which will result in some kind of totalitarian dictatorship or something like that..." (No. 14)	82

(continued)

Table 1. Continued

Code pairs (−/+)	Code name	Sample excerpts (in brackets the interview ID)	Freq.
15+	Redistribution is necessary	"So if, for example, if you could get the minimum food ..., going to the library or buying x number of books, which is also a value and important and motivating and etc., etc., then I say okay, but not that service, if we mean that everybody gets, I don't know, two tickets to two different nightclubs, (laughs), then no." (No. 14)	193
16−	Technology increases/ maintains inequality	"...in the same way, those who have more money will have access to better and more things and more advanced technology." (No. 12)	91
16+	Technology reduces inequality	"...economic advancement itself can be solved with robots and people should just enjoy the fact that robots produce the money and do everything, then it should be that yes, they will distribute the public money on the basis of something." (No. 25).	25

Source: authors.

4.3%) have the most hits. Inequality increases/remains ($n = 91$, 9.8%), Inequality, to a certain extent, is acceptable ($n = 81$, 8.7%), and Technology deepens the ecological crisis ($n = 41$, 4.4%) are the top three codes within the Negative categories. The percentages presented here stand for the entire database. The above outcomes suggest that the necessity of redistribution attracts the most dichotomies because interviewees tend to contradict themselves within this topic. The content analysis showed that individual interviews implied dichotomies ranging between 1 and 14 hits, while the average dichotomy proportion is 5.9. The code relation browser visualizing the relationships between codes unveiled that the top three dichotomies with high interconnectedness reaching at least 5% threshold of the code co-occurrences were the following dichotomies:

I. Redistribution is necessary – Inequality is acceptable to a certain extent ($n = 34$, 19.2%)
II. Technology can solve the ecological crisis – Technology deepens the ecological crisis ($n = 19$, 10.7%)
III. Redistribution – Technology increases/maintains inequality ($n = 10$, 5.6%).

The results above support that two out of three correlations were direct dichotomies. In other words, redistribution and technology could magnetize pros and cons based on the direct contradiction. Hence, redistribution and its reversed counterpart, acceptable inequality, are the most frequent topics that emerge *together* in students' visions when they talked about the ties of future environmental crises and technology. In Table 1, the two quotes (15- and 15+) are from the same person and quite a few occurrences happened when the dilemma was presented within one sentence, for example when one interviewee claimed that if they were unemployed, they would want a more equal society but if they have to pay for it, they "wouldn't bother" (No. 1).

Technology and its controversial role in the ecological crisis make up the second most frequent dichotomy, also often occurring within one line of thought. As an example, a statement about the current reality being that "even if we already have advanced technology, we still seem to aggravate ecological problems" is followed directly with the thought that things like nuclear energy will actually produce eco-friendly energy in the future.

Finally, positive attitudes towards redistribution and technology's harmful role in reproducing inequality are the ingredients of the third most frequent dichotomy manifested in thoughts like people would have to work even if robots take our jobs in the future as otherwise, they would not be able to survive. But even if robots could do all our work, we should still try to create workplaces and not provide a basic income to all, except to those who really need it or deserve it.

Turning our attention to controversies among the full sample, the following examples underline the dichotomies that we discovered. Most of the interviewees ($n = 24$) believe that they will live in a nice and clean environment. This positive vision of their environment is in strong contrast with the fact that more than two-thirds of the students ($n = 21$) can also imagine that the world will be in flames and manifest their anxiety about an environmental crisis. The interviewee quoted (Table 1, Code 12−/+) even implicitly divided the world into two regions: the Global North is the place where they can have a nice life while the Global South is in flames. Even though many students do not explicitly state that an extended ecological disaster would harm the Global North, many of them envisioned global environmental destruction. They spoke about the environmental crisis as a universal phenomenon by considering the severe effects of factories using poisonous materials, increasing quantity of waste, and air pollution.

Our results also show that slightly more than half of the students ($n = 16$) think that consuming and profit-maximising are problematic in terms of both environmental degradation and blue-collar workers' household incomes. In turn, several interview subjects tend to keep a distance from the latter problem suggesting that their jobs will not be lost to machines that will be introduced just to maximise profits. In order to understand this attitude, we must note again that the interview subjects were university students who did not think that robots, machine-learning software, or other artificial intelligence would replace them on the labour market because as white-collar workers, their knowledge will be unique and harder to replace.

When deliberating on the availability of green spaces, almost the same number of students presume that more green space will be accessible in the future ($n = 11$) than those who think the opposite ($n = 9$). Interestingly, we found answers where the same interview subjects depicted an oppositional and polarized picture on the future of green spaces in 2060 not being able to decide whether it is "*very nice, green, all planted with new trees and so on*" or "*deserted, factory-destroyed … where you can't even breathe the air because it's toxic and you have to breathe it through a purifier and everybody is bald and cancerous*." (No. 17) When contemplating the vision of green spaces, seven of the respondents envision increased urbanisation and only two ruralisation.

When it comes to who should act, half of the interviewees ($n = 15$) believe that citizens have the responsibility to act upon sustainability issues, while two-thirds ($n = 20$) claim that decision-makers must intervene. An interviewee argues that citizens and large corporations should both work on reducing the ecological crisis because both bottom-up and top-down efforts are necessary to sustain our planet. Even though interviewees frequently use a collective tone by emphasising the collective responsibility for these key issues, singular first-person expressions on

being active to handle these problems are remarkably rare in the conversations. However, some students claim that they do not know how to help in the issues above or they need feasible instructions: "*Well, everyone should do something, but now I'm in trouble, what I should do, for example.*" (No. 27) Moreover, half the students ($n = 16$) express that they do not feel comfortable talking about these issues due to their lack of information, inability to face the phenomenon's disturbing nature, or due to the topic's complexity.

Finally, the results of the research gave insights into the students' opinions on the interrelation between sustainability and social inequalities. Remarkably, every interviewee agreed with the need for fair redistribution to provide either financial support or useful services to every citizen. However, almost all of them ($n = 28$) think that inequality is acceptable to a certain extent, and it cannot be prevented entirely. Many respondents emphasize that perfect equality seems to be a utopistic vision, but they also suggest that further steps should be taken towards reducing inequalities. Students' inner tension between the necessity of redistribution and the legitimization of inequality is so powerful that several interviewees contradicted themselves multiple times within the conversation. For instance, one interviewee acknowledged the need for redistribution fifteen times, but the very same person challenged the need for redistribution five times.

In a nutshell, we see no denial of environmental problems and the social problem of inequality, but our interviewees were strongly divided whose problems these would be (Global North versus South, white-collar versus blue-collar workers) and what might constitute a solution.

4. DISCUSSION

Contradictions in cognition with regard to climate change have been studied relatively widely, especially in terms of sustainability policies that had caused problems of "disconnect" between decision and action (Geden 2016) or inconsistencies within narratives of the public (Adams 2014). Dissonance between talk and action or expressed views and behaviour (Wolf – Moser 2011; Gruber – Schlegelmilch 2014; Snelson-Powell et al. 2020) or inconsistencies in sustainability arguments constructed when buying products from different sectors (McDonald et al. 2009), or in local and tourist spaces (Cohen et al. 2013, Schütte et al. 2015) have also been discussed. Discrepancies have also been found between different spheres of life: at the workplace and at home (Dunphy 2014). However, the dichotomies we investigated were different from these as we concentrated on views regarding the future. In earlier research, cognitive tensions had emerged between different spheres, sectors, spaces, whereas in our research we found inconsistencies on how the same aspect of the future can carry contradictions: the same person at one moment could mention that technology will help solve environmental issues and, in another instance, say exactly the opposite. When discussing our results, we turn our attention on the one hand to the potential underlying causes for the challenges the interviewees faced when being questioned about their visions on sustainability and technology, and on the other to the role of dichotomies that emerged from our results.

Psychology and behavioural economics have long argued that the most pressing issues of our times, such as climate change, pose serious challenges to individuals in relating to them (Adams 2014; Gifford 2011; Markowitz – Shariff 2012; Peeters et al. 2015; Spence et al. 2012;

Wolf – Moser 2011). Our research showcased how these challenges manifest themselves in the forms of dichotomies and dissonances.

Some of the quotes in our results section underline how hard students found it to find their moral stances around these issues, even admitting to sounding "nasty" or "heartless". Moral reasoning is of utmost importance when analysing lay knowledge on adaptation to climate change. Vulnerability-based moral perspectives entail reasoning around the issues of solidarity, protection from harm and ensuring fair access to resources and entitlements as well as the fair distribution of burdens when it comes to either enduring negative impacts or sharing responsibility in tackling rising problems. System-based moral positions focus on the moral duty of maintaining the system, respecting authority, and preserving the sanctity and purity of nature (Adger et al. 2017). However, our results substantiate that abstract, complex, long-term, and highly uncertain problems such as environmental concerns pose a serious challenge to our moral intuitions as they do not constitute something blatantly wrong that must immediately be righted and hence have no pressing emotional impact. Moreover, as we find it difficult to clearly pinpoint someone to blame but subconsciously suggest that we ourselves are at fault to a certain extent, it invokes self-defensive biases (Markowitz – Shariff 2012). This is strongly linked to who should act first and just how much responsibility we as individuals should bear.

Strongly linked to this moral engagement is psychological distancing, especially in time and space (Spence et al. 2012; Seabright 2010) occurring quite often in our results. The most obvious one is the division between "other places" suffering the consequences of ecological degradation, while we see ourselves living in nice spaces. Other studies have also found evidence that people – especially from the global North - tend to think of environmental changes happening to people in the distant future and in distant locations (Leiserowitz 2006; Spence et al. 2012). They perceive that those social consequences are more serious than the likely impacts on their own individual lives (Uzzel 2002; Gifford et al. 2009). Another aspect of psychological distancing is uncertainty and scepticism. Prospect theory suggests that people prefer certainty over uncertainty in their judgments (Kahneman – Tversky 1979) and as current environmental and social problems entail a large array of uncertainties, people feel unease cognitively dealing with them.

Optimism bias – which often occurred with our positive codes – is also a cognitive limitation that is believed to hinder sustainability transitions. Optimism bias refers to the tendency of individuals to presume that they are facing detrimental future risks to a lesser degree than others (Weinstein 1980). Optimism bias has been proven to dominate individual beliefs with regard to environmental hazards as well (Gifford et al. 2009). Optimism bias has even been shown to moderate pro-environmental action taken based on media coverage of environmental issues (Jiménez-Castillo – Ortega-Egea 2015). However, risk perception also depends on the perception of individuals as to what constitutes individual and social risks and people tend towards being more optimistic when it comes to their own individual risks than those impacting the whole of society. Moreover, risks such as climate change that affect the whole of society bring with them greater optimism and acceptance (Costa-Font et al. 2009).

One of the most common precursors of optimism bias is techno-optimism itself. The occurrence of technology saving us far outweighed the frequency of technology deepening the crisis. Techno-optimism is not based on the knowledge of probability that technology will in fact save us from ecological and social peril but founds itself on the can-do attitude of humans. Wilson (2017) goes as far as saying that humans see technology in the role of saviour not based on their assessment of the state of play but instead of their assessment of our current conditions.

"It is this superstitious, almost taboo-like rejection of reality that allows the techno-optimist's overcoming of fate" (Wilson 2017: 349). The narrative of techno-salvation is probably the strongest worldview in our current societies. It promises rising material wealth with decreasing ecological burdens and the maintenance of the status quo (Nordhaus – Shellenberger 2015). It promises that without significant adjustments to our economic and social systems and to our current behaviours, we can avert ecological collapse. This links in well with another cognitive phenomenon, the status quo bias (Samuelson – Zeckhauser 1988) that occurs due to human beings' inherent aversion to change.

As there are absolutely no objective probabilities when it comes to future technological solutions, neither pessimism nor optimism is well placed (Wilson 2017). Therefore, it is partly the narrative of our liberal-capitalistic worldview that reinforces our widespread beliefs in techno-salvation and partly optimism bias and overconfidence (Johnson – Fowler 2011) that cognitively supports these. The interesting question arises why it has actually become a dichotomy in our research and why wishful thinking does not dominate the scene. We find this a more difficult issue to substantiate. A potential explanation is that Bayes' theorem (Jaynes 2003) plays a role here. According to this theory, we continuously upgrade our assessment of the future as facts on our current status keep coming in. This would suggest that despite techno-salvation being one of the dominating narratives, our respondents find that occurrences around them do not support the feasibility of this account. Another possible reason might be found in one of our respondent's quote: *"Well, [technology is] to help prevent the end of the world, which will probably be our fault when it comes."* (No. 8). This suggests that techno-salvation gets mingled with the irresponsibility of humankind to divert sustainability threats despite of the benevolence of technology.

All this has implications also for the way we communicate sustainability challenges. Both psychological distancing in terms of time and space and optimism bias suggest that we need to take into consideration communicating not just the social impacts of environmental change and related social problems such as inequality but the impacts on a highly personal level as well. While the effects of environmental concerns can be relatively easily imagined on a personal level, our research showed how important it would be for those in the more fortunate segments of society to understand that inequality impacts them personally even if the mechanisms are not that straightforward.

As our research substantiated that behavioural phenomena play a considerable role in what people think of sustainability, a logical response could be to suggest that behavioural tools such as nudges are to be used in transitions. Nudges (Thaler – Sunstein 2008) are tools that influence people's behaviour as well as decision-making not by providing additional information but by making use of our knowledge on behavioural phenomena just as the ones discussed in this paper. Even though these interventions involve a wide range of ethical concerns to be taken into consideration (Lades – Delaney 2022) and doubts about their effectiveness (Hummel – Maedche 2019), nudging for good purposes still seems to remain an available option.

Regardless of our personal attributes and the specificities of our backgrounds, we all seem to face the "psychological climate paradox" (Stoknes 2014). While scientific evidence is becoming less uncertain about humanity's role in environmental degradation and this is being widely communicated, people's concern for the planet is still being overtaken by a multiple of other concerns. As Stoknes (2014: 161) summarises, "*a number of tentative explanations of the climate paradox have been proposed, including: climate change perceived as distant in both time and*

space, the lack of a global treaty and political action, the quest for economic growth, the financial crisis, the complexity of the problem leading to numbing and helplessness, cultural filters, cognitive dissonance, limited individual responsibility, an active counter-campaign and denial as a fear-avoidance" Many of our research results showed evidence for the existence of these. However, in tackling these issues, the question we also pose in this discussion is what role dichotomies play in our quest for sustainability.

Turning our attention to the role of dichotomous thinking, the question arises whether the dichotomies that had emerged in the conversations with the "torn generation" can be assessed at all as being beneficial or detrimental, or are they the signs of the increased complexity we see in the world.

Dichotomous thinking attracts the evaluation of things or problems in terms of binary opposition: "good or bad" or "black or white" (Bonfá-Araujo et al., 2022; Oshio 2009). On the one hand, this thinking style is useful for quick comprehension, thus it is used in everyday society (Oshio 2009). On the other hand, such thought processes can bring immediate closure to debates or problems without discussing them profoundly. Specifically, in the case of sustainability, dichotomous thinking might make people perceive solutions to environmental challenges as either good or bad and fail to recognize the complexity of the situation. This can lead to oversimplifying a phenomenon, resulting in ineffective or even counterproductive suggestions for solutions. In other words, this black-and-white thinking style can potentially lead to a misunderstanding between people with incompatible opinions. Relatedly, dichotomous thinking connects to the intolerance of uncertainty (Dugas et al. 1997), which is a prominent issue regarding ecologic crises: individuals who do not tolerate uncertainty tend not to accept that a negative event, such as an environmental catastrophe, might happen in the future, regardless of the probability of its occurrence (Dugas et al. 1998, 2001). In sum, personal values might influence dichotomous thinking rather than objectively analysing the pros and cons of different options and outcomes.

Lehtonen et al. (2018) argue that it is dichotomic thinking itself that poses the problem. The dominant narratives of our times use dualistic rather than holistic arguments and are therefore incapable of handling the interrelatedness of a wicked problem such as sustainability. *"Dichotomized thinking, that is, dividing and separating ideas and objects into two opposing parts or classifications, is regarded as typical of the modern era"* (Lehtonen et al. 2018: 861). Even though systems thinking has been around for almost a century now (Capra – Luisi 2014), our educational systems as well as our economies still follow the Cartesian logic of human rationality and the objectivity of knowledge rather than the more holistic argumentation of massively intertwined networks of ecological and social realities. Dichotomies like individual/social; nature/culture; local/global; mind/body; reason/emotion; science/art prevent us from seeing the interconnectedness of these realms and lead to unsustainable human actions. Moreover, the emotional response given to sustainability issues (also uncovered in our research) is not only due to psychologically induced responses of the individuals discussed previously but is also socially constructed. In current social norms, it is acceptable to distance ourselves from these topics and repress consciousness in conversation (Norgaard 2010). The problems are also well reflected in our mainstream dichotomic solutions to environmental problems when we view society and the environment as interlinked, yet separate realms. This leads to the presumption that environmental pressures such as climate change are external to social processes (Nightingale et al. 2020). It is the role of science, philosophy and most importantly education to demolish

not only these social norms but also the most common dichotomies. It is also the experience of the authors that transformative learning can indeed dismantle these cognitive limitations to sustainability transitions by creating new frames of mind and induce critical thinking (Kiss et al. 2021). These include transdisciplinary course designs as well as participatory and collaborative learning approaches (Lehtonen et al. 2018).

"Dichotomies are useful, but when falsely configured they can be harmful. Dichotomies are frames, a means of presenting options in a simple "either/or" form. There are two types of dichotomies: true and false. For a dichotomy to be true, it must be based on an exclusionary affirming negative – if something is not one thing, then it can only be the other. As with binary coding, if a digit is not zero then it must be one. If a dichotomy is not true it must be false, and of false dichotomies there are two. The first false dichotomy understates available choices and the second overstates them." (Stevenson 2002: 263–264) This is an important message when we look at the dichotomies discussed in this research. Options both for action and non-action arise from both statements of dichotomies. Techno-optimism can drive investments into research for diverting ecological and social demise, while the recognition of technologies' limitations demands alternative systemic changes and ethical and distributional considerations regarding technological solutions. This leads us back to our previous discussion on Cartesian versus holistic understandings of our future. Acknowledging these dichotomies can lead to a varied range of potential interventions, while reducing these dichotomies may steer us towards limited options. As Stevenson (2002) suggests, dichotomies in society cover significant value choices and it is exactly these value choices we should collectively uncover through social dialogue. It comes to no surprise that many concerned with the interconnected complexity of our individual–social–universal existence in the light of our current ecological/social/economic/political/health crises also emphasise being conscious of value choices and value pluralism (e.g., Spash 2012).

5. CONCLUSION

The purpose of this paper was to introduce the dichotomies that manifest themselves in the thinking of the Zoomer generation in Hungary. The most important dichotomies investigated revolved around the gravity of the sustainability problems, the role technology and inequality play in them, and the perceived level of influence individuals place on themselves in transforming the state-of-play. As media coverage of climate change and sustainability issues also contain uncertainty, ambiguity, and inconsistency (Almiron – Zoppeddu 2015; Berecki 2012; Hart – Feldman 2014), it may come to no surprise that dichotomies exist in the cognitive realms of young adults. Dichotomies also exist in the scientific sphere on whether in the Anthropocene humans are to blame for the state of our environment; on whether technology leads to a transformed world for the better or to a dystopic future; and on whether we live in ecological catastrophe or a new geological epoch (Autin 2016). While it is doubtful if the blame rests well with individuals for the inactions regarding climate change as they are subjected to the competing interests of dominant liberal-capitalist worldviews (Peeters et al. 2015), it is also clear that transformations in these mindsets and turning towards green citizenship (Gabrielson 2008) would have an impact on the obvious procrastination. On the other hand, the cognitive dissonance (Cooper 2019) that arises through these dichotomies must also be considered if for no other reason than the psychological health and perceived self-autonomy of current generations.

Our findings imply that policymaking, communication, and education all need to account for the existence of these dichotomies but not necessarily by treating them as detrimental to change but as a sign that systems thinking and the complexity of these issues are to be embraced and interlinkages between economic, social, and ecological realms respected. Reductionist and simplified messages such as those based on eco-modernisation narratives where technology is implied to be the overall solution to our demise is not only harmful in ignoring these systemic interconnections but – as our research shows – ineffective as doubts persist despite of the dominant narratives.

We acknowledge, that as the sample was heterogeneous with respect to the field of study and typically only a few interviewees were taking the same major, the sample cannot be used for making comparisons between those with different majors. The limitations of our study also include the fact that the subjects only included Hungarian university students with particular socio-cultural embeddedness. Nonetheless, future lines of research could show us how other subgroups of society with dissimilar cultural backgrounds reiterate or diffuse these findings on dichotomous thinking regarding climate change. We also accept that coding dichotomies in conversations and presenting them without the wider context of the dialogue does not do justice to the wide choice of interpretations that we could have had when examining the details. However, as the codes that we used were inductive, when choosing them, we had already taken some of the context into consideration.

Dichotomies can be considered as tools to simplify complexity, by ordering phenomena into two categories. It is important that we do not treat dichotomous thought to ignore the overlap of categories and to focus more on differences than on similarities. We should also avoid implying hierarchical relationships with one of them becoming the privileged section, and the other subordinated, or suppressed. We need to understand dichotomic thinking in order to be able to turn them into systems thinking. In light of this, our paper argued that it is a relevant issue how inconsistencies, dissonances and dichotomies appear in individuals' narratives on sustainability.

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