CLIMATE EDUCATION AS A FACTOR IN THE DEVELOPMENT OF COMPETENCIES IN THE ERA OF THE CLIMATE CRISIS

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Abstract. *The article explores the urgent need for systemic climate education in response to the accelerating climate crisis. The author argues that traditional humanistic and anthropocentric perspectives have contributed to ecological degradation by placing human needs above those of the non-human world. Drawing on posthumanist thought, the text emphasizes the necessity of redefining humanity's relationship with nature to overcome cognitive biases, short-term thinking, and deeply rooted illusions of human superiority. The article examines how industrial, technological, and cultural developments have disrupted the Earth's climate system, leading to rising temperatures, extreme weather events, and biodiversity loss. Despite increasing scientific evidence, public awareness remains insufficient, hindered by denialism, misinformation, and a lack of comprehensive climate education. The author proposes climate education as a holistic, cross-sectoral, lifelong learning process aimed at shaping climate competences. These include knowledge about climate mechanisms and human impact, critical reasoning against climate myths, ethical reflection, and practical skills for promoting sustainable behavior at individual, local, and global levels. Climate education, grounded in scientific research and environmental humanities, is presented as an essential tool for adaptation, mitigation, and fostering intergenerational and interspecies solidarity. Only widespread, coordinated educational actions can help humanity respond effectively to the looming climate crisis.*

Keywords: *climate education, climate crisis, anthropocentrism, posthumanism, environmental degradation, climate competence.*

INTRODUCTION

This text is a continuation and deepening of the reflections that the author has been developing for some time on education understood in a posthumanist sense (Kaminska, 2022a, 2022b). In one of the earlier articles, the author drew attention to a number of troubling and – still, it seems – barely noticed and insufficiently acknowledged civilizational challenges arising from an egoistic, anthropocentric vision of the world and of life on the planet, with the human being placed at its center. Despite the passage of time, the

power and scale of global threats continue to grow. Consequently, questions emerge regarding the strength and wisdom of our humanity and the real chances of the evolutionary survival of the species Homo sapiens, which – although its progress owes much to its unique capacity for thought, for creating narratives in the form of ideas, and for acting in cooperation – also possesses an extraordinary ability to make catastrophically poor choices and to repeat harmful behaviors as a result of insufficient capacity for anticipating consequences or, worse still, ignoring evidence, warning signals, and downplaying the potential effects of our decisions. Anthropological and historical analyses show that the human species has never been distinguished by particular humility or empathy toward other species inhabiting the Earth. Rather, we humans seem to possess an evolutionarily ingrained tendency toward pride and a susceptibility to delusions of grandeur. Tom Phillips describes this while characterizing the mechanisms of cognitive errors in human thinking: "We divide the world according to patterns that may not even exist; we make hasty judgments based on whatever first comes to mind; we choose only the arguments that support our beliefs; we desperately try to fit into the group; and for no particularly good reason, we steadfastly believe in our own superiority" (Phillips, 2019, p. 43). We still stubbornly persist in the belief that we should "subdue the Earth," and that humanistic ideas will protect our humanity and the environment in which we live and create our cultural heritage. We continue to believe in the assumptions of the humanistic project of education, the realization of which is expected to make us better people.

Global climate risk and the associated uncertainty about what will happen in 30 or 50 years are slowly but steadily undermining this faith and its dogmas. Education grounded in humanism has brought many benefits; however, today it is already evident how strongly it has entrenched an anthropocentric view of reality. Meanwhile, posthumanism – as Siân Bayne rightly notes – "broadly engages with questioning human exceptionalism and the fundamental role of 'humanity' as it has been constructed in the contemporary era. By rejecting any clear distinction between 'nature' and 'culture,' it works against dualisms and binaries that we have traditionally drawn upon to define what it means to be human" (Bayne, 2018). Therefore, when thinking about education in a posthumanist sense, attention should be paid to the need for non-anthropocentric education, which is fundamentally based on deconstructing the way we think about the relationship between humans and the world, aiming to reduce and flatten the division between what is human and non-human. This need arises from the fact that, for centuries, humanity has approached life on the planet with little reflection, treating everything around us in an objectifying, instrumental, and excessively short-sighted manner. Knowledge was primarily used to increase material goods and facilitate human existence by satisfying ever more sophisticated civilizational needs, regardless of the consequences. By carrying out numerous technological, biotechnological, and digital revolutions, we simultaneously generated serious crises – including the climate crisis. Today, we know that the Anthropocene era has brought (and continues to bring) more harm than benefit to human–culture–nature relations. Environmental education or the concept of education for sustainable development has done little to help. In the current situation, it is therefore necessary to urgently promote climate education as a category of non-anthropocentric education, both in formal and non-formal contexts.

1. The non-obvious algorithm of anthropocentrism: have we solved the problem?

The civilizational tipping point, which can be said to have already become a reality, was not generated out of nowhere or by chance. The idea of humanism, over the centuries, has entrenched in people a way of thinking and acting dominated by an anthropocentric worldview, according to which "human beings are the most important entities, their expe-

rience is the primary perspective for perceiving the world, and their needs and values are the overriding criteria for evaluating all aspects of reality" (Jasikowska & Pałasz, 2022, p. 781). Here, ontological, cognitive, and axiological anthropocentrism all resonate. According to Ewa Bińczyk, the least controversial is "cognitive anthropocentrism, according to which we cannot avoid interpreting all issues from a human perspective. We are inevitably bound to adopt the human viewpoint, both in our reasoning and in making moral choices" (Bińczyk, 2018, p. 258). It seems that an anthropocentric view of the world is, for humans, both a blessing and a curse. This can be called the "non-obvious algorithm of anthropocentrism". Non-obvious, because the outcomes of our actions are ambiguous and sometimes unpredictable, despite proper and hopeful intentions. In theory, an algorithm is a carefully developed procedure aimed at solving a given problem or task. Such a procedure assumes the existence of appropriate input data, from which the desired outputs are generated. Along the way, specific conditions and rules are established, the fulfillment of which at each step is supposed to guarantee success – that is, the solution of the problem. We assumed that our anthropocentric pattern of thinking and acting was the most perfect and would lead to solving humanity's problems. Consequently, it turned out that while we successfully eliminated some civilizational issues, others were not only left unresolved but multiplied, or even exacerbated existing ones.

Anthropocentrism (especially ontological and axiological) and the implementation of the idea of a permanent revolution – from cognitive, through agrarian, to industrial – have, in the long term, caused the degradation of the natural environment and the collapse of ecological balance. As Yuval Noah Harari writes, "The Industrial Revolution brought new methods of energy conversion and goods production, freeing humanity from dependence on local ecosystem resources. People cut down forests, drained marshes, dammed rivers, irrigated plains, laid thousands of kilometers of railway tracks, and built skyscraping metropolises. In the process of transforming the world to suit the needs of Homo sapiens, entire habitats of plants and animals were destroyed, resulting in species extinctions". "Our once green and blue planet has become a concrete-and-plastic shopping mall" (Harari, 2019, p. 426). We have been let down by thinking guided by cognitive anthropocentrism, which should have directed humanity toward "not cutting the branch on which we are all seated". Our choices and decisions began to threaten ourselves. The transformation of the world according to the motto "We are the rulers of the Earth" has evidently proceeded (and continues to proceed) according to a morally flawed algorithm. Ryszard Kulik (2010) captures this insight accurately and rather radically describing anthropocentric thinking as a "narcissistic usurpation", a "historical and developmental anachronism", and a worldview that assumes an "irreconcilable conflict between humans and the rest of nature".

The effects, manifested in the acceleration of the climate crisis, are already being felt in everyday life. Scientists also write about the global consequences. It is true that the climate has always changed, but never at such a dizzying pace. In the current state of science, the concept of the climate system is used (Ziernicka-Wojtaszek, 2020, p. 145) encompassing the entire planet. The elements of this system, which are interconnected and interact through complex functions, include the atmosphere, hydrosphere, cryosphere, part of the lithosphere, and the Earth's biosphere. Therefore, any change within the system triggers more or less pronounced transformations of the entire system. Aleksandra Kardaś and Szymon Malinowski emphasize that "the foundation of the climate is always the role of solar energy and the interactions of radiation with the atmosphere surrounding the planet, followed by its flow between the individual elements that make up the structure of the Earth" (Kardaś & Malinowski, 2021, p. 151). Climate stability, in terms of energy balance, requires that the amount of energy received by the Earth be balanced by its radiation, in which, among other factors, the shape and properties of the Earth's surface and the related albedo play a crucial role –

the higher the albedo, the greater the portion of radiation reflected and the smaller the portion absorbed, as in the case of snow albedo. The flow of solar energy and its radiation occurs through the atmosphere surrounding the planet, whose appropriate composition determines the achievement of a balance suitable for maintaining temperatures conducive to the existence of such diverse forms of fauna and flora (Kardaś & Malinowski, 2021, p. 21–22). When this balance is disrupted, undesirable meteorological phenomena emerge, or more precisely, changes occur in their frequency and intensity. The final stage may be a global and irreversible change in the Earth's climate.

The main factor that should raise serious concern in the context of climate change is the increase in global temperatures and the directly related anomalies in the amount and intensity of precipitation, glacier melting, and destructive hurricanes. The WMO report states that "the beginning of the 20th century was characterized by average temperatures of 13.6°C – 13.8°C, which did not exceed 14°C for fifty years, before gradually starting to rise. At the turn of the century, a clear upward trend in global temperatures emerged, reaching a difference of half a degree Celsius in the years 2001–2010" (World Meteorological Organization, 2013, p. 3) in the years 2011–2020, they exceeded it by 1 degree Celsius compared to the second half of the 19th century. These seemingly small deviations are significant because the increase in global surface temperature since 1970 has occurred faster than during any other 50-year period in the past two thousand years (IPCC, 2023, p. 1–34). Everything that occurs as a result of rising temperatures has an impact on life on Earth. Researchers have revealed that the variability of warming and glaciation periods typically followed cycles with a frequency of approximately 120,000 years. This, in turn, led to the formation, around 11,500 years ago, of relatively stable yet diverse climatic zones (Sadowska, 2013, p. 13). However, the ingenious yet largely irresponsible human species, through its activities aimed at civilizational development, has generated a dangerous risk of ecological catastrophe due to the unprecedented scale of greenhouse gas emissions into the atmosphere.

About 50 years ago, we began to notice symptoms indicating that the path we had chosen in shaping and realizing the vision of the human and non-human world was flawed. A key impetus was the 1972 report The Limits to Growth by the Club of Rome, which demonstrated that continuous economic growth could have negative consequences for both humans and nature. At that time, we realized that "the natural world is not our playground" (Phillips, 2019, p. 52), although we are still far from full awareness of climate threats and risks. This is where the realm of education and access to it comes into play, which I understand as access to reliable, verified sources of knowledge, because ignorance in this area may be a lesser problem than relying on popular – often false – opinions and views spread by representatives of so-called denialism (Bińczyk, 2018, p. 258) – people who adopt an irrational stance by ignoring, rejecting, or denying scientific findings. Unfortunately, sometimes such false information is deliberately fabricated and cynically used for political or economic lobbying purposes. We may also encounter a milder form of this phenomenon, known as climate change denial (Bińczyk, 2018, p. 259), that is, skepticism toward anthropogenic climate change.

The importance of climate education and potential solutions, as one of the conditions enabling adaptation, is emphasized by the authors of the IPCC 2021 report. In this document, adaptation is recognized as a key factor in reducing exposure and vulnerability to climate change. In human systems, adaptation is defined as the process of adjusting to the current or projected climate and its effects in order to mitigate harm or take advantage of opportunities associated with climate change. In natural systems, adaptation is the process of adjusting to the prevailing climate and its impacts, and human actions can support this process (IPCC, 2021, p. 6). The authors of the report stated that "expanding knowledge about risks, hazards,

and their consequences, as well as available adaptation options, promotes the undertaking of social and political actions (high confidence)" (Bińczyk, 2018, p. 258). Broad access to sources, as well as top-down, bottom-up, and cross-cutting processes, can deepen climate knowledge and its dissemination, including building competencies at all levels, educational and informational programs, the use of art, participatory modeling and climate services, incorporation of Indigenous and local knowledge, and citizen science (high confidence). Such actions increase awareness, enhance risk perception, and influence behavior (high confidence) (IPCC, 2021, p. 30).

Of course, there will always be naysayers who criticize, doubt, and look for "flaws in everything". However, when we pay attention to the reports and arguments of scientists, we cannot – as the so-called "rulers of the Earth" – ignore the results of research, observations, measurements, and statistics. As Łukasz Lamża writes, "when 95 percent of climatologists tell you that there is a 95 percent probability that human greenhouse gas emissions are responsible for current long-term climate changes, and that there is a 75 percent chance that over the next half-century the situation will worsen to the extent that millions of people will be in immediate life-threatening conditions (…), one can, of course, nitpick about the 'missing percentages', but in return we will have nothing better to offer" (Lamża, 2022, p. 194).

2. From environmental education to education for sustainable development: why climate education matters?

It is thus evident that there is no shortage of evidence showing that anthropocentrism has led humanity into a dead end. Environmental education has, to some extent, helped steer us away from the path to catastrophe. Later, we turned to the concept of education for sustainnable development. However, it seems that too little attention is still being paid to climate education. For a long time, we appear to have adhered to the romantic "model of protecting nature" instead of moving toward a model of repairing and restoring it, which essentially means compensating the planet for the damage caused by human hands (Bińczyk, 2018, p. 258). This means that we are unable to shed the anthropocentric perspective, which dictates the protection and care of something that is external to humans and dependent on their actions.

Environmental education emphasizes "orientation in the surrounding socio-natural reality and the development of a positive attitude toward the holistically understood socio-natural environment, implying pro-environmental actions aimed at maintaining the stability of the biosphere" (Gola, 2018, p. 172). The curricular pillars of this education include, among others, (…) promoting environmentally friendly behaviors and attitudes, including its protection, (…) fostering unity in caring for the environment, and creating an ecological culture by appealing to the axiology of environmental protection (Klimski, 2014, p. 44). The idea of sustainable development refers – interestingly enough – to maintaining balance and stability. Indeed, the 2015 UN resolution on Sustainable Development Goals calls for "urgent action to combat climate change and its impacts", and one of the tasks explicitly states the need to "enhance education, awareness, and human and institutional capacity on climate change mitigation, adaptation, impact reduction, and early warning systems for hazards" (Organizacja Narodów Zjednoczonych, 2015, p. 26). However, researchers increasingly point to the exhaustion of the idea of sustainable development, whose main message is "limiting our current exploitation of natural resources in such a way that future generations also have the opportunity to meet their own needs. This idea assumes that economic development should be in harmony with ecological requirements and the principle of social justice" (Bińczyk, 2018, p. 133). Robert Jurszo rightly calls sustainable development "patch ecology" (Jurszo, 2014, p. 19), because it represents an anthropocentric, objectifying reduction of the concept of na-

ture to a resource that we protect so that it serves humanity for as long as possible. We aim to mitigate the effects of climate change without addressing its root causes.

That is why we need wise, reliable, thoughtful, and long-term climate education, which should be implemented across all social and educational environments (regardless of the age or social status of the recipients), using all possible methods, forms, and means. Climate education is both education about the climate and for the climate. It is education that is deep in both axiological and cognitive terms, responsive to scientific achievements in the field of climate studies, as well as in the area of environmental humanities. The goal of this education is to raise social and ecological awareness regarding the impact of human activity on the climate, as well as to promote actions aimed at mitigating the negative effects of climate change. It should be linked to the development of climate competence, which includes: knowledge about climate change, its manifestations, causes, and consequences; skills in identifying problematic human behaviors contributing to the climate crisis; and the ability to take effective actions at the individual, local, and global levels to eliminate causes and reduce effects that pose real threats to the planet and human populations. Climate education should foster the development of appropriate pro-climate attitudes and habits based on a coherent and universally understandable system of ethical norms and principles. From a posthumanist perspective, this primarily concerns interspecies and intergenerational solidarity, a sense of community with the non-human world, and a departure from the anthropocentric hierarchy of values. Important directions for climate education include:

- proper understanding of the concept of climate and raising awareness of the causes of climate change;
- correct interpretation of the consequences of climate change (heatwaves, wildfires, dieoff of trees and forests, invasions of species altering specific ecosystems, droughts, cyclones, floods, "hydrological uncertainty," deterioration of drinking water quality, and loss of access to water) (Bińczyk, 2018, p. 26);
- replacing so-called "shallow ecology" with "deep ecology" (Kulik, 2007, p. 3–4);
- promoting "green consumerism," i.e., choosing products based on how they are produced (e.g., organically grown food), while also understanding phenomena such as greenwashing (Bińczyk, 2018, p. 258);
- combating climate myths (Kardaś & Malinowski, 2021, p. 97–99);
- informing about the positive outcomes of scientific research on climate change and global achievements, such as the recovery of the ozone layer (Fialka, 2023);
- showing the benefits of pro-climate actions, instead of provoking irrational fear (Stoknes, 2015, p. 149);
- evaluating the extent to which school curricula and textbooks are filled with scientifically verified knowledge about climate change (Niesporek-Szamburska & Przybyla, 2021; Kozłowska, 2021);
- promoting the naturalistic approach of forest pedagogy (Paluch, 2022) as well as educational concepts such as outdoor education, adventure education, and environmental education (Bąk et al., 2017, p. 41).

CONCLUSIONS

As the results of nationwide studies show (Wójcik, 2021), More than half of Polish women and men consider climate change to be one of the main global threats. At the same time, around 40 percent doubt the possibility of halting the ongoing changes. This may result from a low level of knowledge, as only one in three respondents is aware of the difference between climate change and general air pollution (smog); only 40% of people know that the current climate change is not part of a natural cycle (Budziszewska & Świderska, 2021, p. 111). This means that we do not ignore the threat, but we demonstrate helplessness in the

face of its scale. Certainly, individual actions to curb the climate crisis are very important, yet they are clearly insufficient. Actions in the field of climate education will also be much more effective if they take on a widespread, organized, and purposeful character. Research findings clearly show that this imperative cannot wait. We can no longer avoid serious consequences of climate change, but through intensive, thoughtful education, we can ensure that we unite to prevent an irreversible catastrophe.

REFERENCES

Bąk, A., Leśny, A., & Palamer-Kabacińska, E. (2014). *Przygoda w edukacji i edukacja w przygodzie. Outdoor i Adventure education w Polsce*. Fundacja Pracownia Nauki i Przygody.

Bayne, S. (2018). Posthumanism: A navigation aid for educators. *Journal for Research and Debate, 1*(2), 1–7. https://www.research.ed.ac.uk/en/publications/posthumanism-a-navigation-aid-for-educators

Bińczyk, E. (2018). *Epoka człowieka. Retoryka i marazm antropocenu*. PWN.

Budziszewska, M., & Świderska, A. (2021). Jakie są bariery dla zachowań prośrodowiskowych? In M. Budziszewska, A. Kardaś, & Z. Bohdanowicz (red.), *Klimatyczne ABC*. Wydawnictwa Uniwersytetu Warszawskiego.

Budziszewska, M., Kardaś, A., & Świderska, A. (2021). Mity klimatyczne. In M. Budziszewska, A. Kardaś, & Z. Bohdanowicz (red.), *Klimatyczne ABC* (pp. 97–99). Wydawnictwa Uniwersytetu Warszawskiego.

Fialka, J. (2023). Jak zwietrzałe skały mogą złagodzić zmiany klimatyczne. *Scientific American*. https://www.scientificamerican.com/article/how-weathered-rocks-can-lessen-climate-change

Gola, B. (2018). *Etyka środowiskowa w edukacji ekologicznej*. Impuls.

Harari, Y. N. (2019). *Sapiens. Od zwierząt do bogów* (J. Hunia, Trans.). Wydawnictwo Literackie.

IPCC. (2021). *Podsumowanie dla decydentów* (H.-O. Pörtner, D. C. Roberts, E. S. Poloczanska, K. Mintenbeck, M. Tignor, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, & A. Okem, Red.). W *Zmiana klimatu 2022: Zagrożenia, adaptacja i wrażliwość. Podsumowanie dla decydentów. Wkład II Grupy Roboczej do Szóstego Raportu Podsumowującego Międzyrządowego Panelu ds. Zmiany Klimatu* (H.-O. Pörtner, D. C. Roberts, M. Tignor, E. S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, & B. Rama, Red.). Cambridge University Press. https://pan.pl/wp-content/uploads/2022/12/Zalacznik_Raport_IPCC_cz2.pdf

IPCC. (2023). Summary for Policymakers. In H. Lee & J. Romero (red.), *Climate Change 2023: Synthesis Report*. IPCC. https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf

Jasikowska, K., & Pałasz, M. (2022). *Za pięć dwunasta koniec świata. Kryzys klimatyczno-ekologiczny głosem wielu nauk*. Uniwersytet Jagielloński w Krakowie, Biblioteka Jagiellońska. http://za512.uj.edu.pl/

Jurszo, R. (2014). Poza zrównoważony rozwój. Ekologia ojczyźniania i jej horyzonty edukacyjne. *Refleksje, 4*, 18–20.

Kamińska, M. (2022a). Iluzje postedukacji. Jaka drogę przebyliśmy od wiedzy do antywiedzy? *Refleksje, 3*, 26–31.

Kamińska, M. (2022b). Koncepcje edukacji w dyskursie posthumanistycznym. *Rocznik Pedagogiczny, 45*, 23–35.

Kardaś, A., & Malinowski, S. (2021). Jak zmiana klimatu wpływa na przyrodę nieożywioną? In M. Budziszewska, A. Kardaś, & Z. Bohdanowicz (red.), *Klimatyczne ABC. Interdyscyplinarne podstawy współczesnej wiedzy o zmianie klimatu*. Wydawnictwa Uniwersytetu Warszawskiego.

Klimski, M. (2014). Edukacyjne wyzwania etyki środowiskowej. In W. Welskop (red.), *Przyszłość edukacji – edukacja przyszłości*. Wydawnictwo Naukowe Wyższej Szkoły Biznesu i Nauk o Zdrowiu.

Kozłowska, A. (2021). Edukacja ekologiczna w polskiej podstawie programowej. *Rocznik Pedagogiczny, 44*, 123–150. https://pressto.amu.edu.pl/index.php/rp/article/view/30783

Kulik, R. (2007). *Odkrywanie natury. Praktyka głębokiej ekologii*. Pracownia na rzecz Wszystkich Istot.

Kulik, R. (2010). Dlaczego antropocentryzm jest kompromitujący? *Dzikie Życie, 9*(195). https://dzikiezycie.pl/archiwum/2010/wrzesien-2010/dlaczego-antropocentryzm-jest-kompromitujacy

Lamża, Ł. (2022). *Światy równoległe. Czego uczą nas płaskoziemcy, homeopaci i różdżkarze*. Wydawnictwo Czarne.

Niesporek-Szamburska, B., & Przybyla, O. (2021). Edukacja ekologiczna/klimatyczna w podstawie programowej i podręcznikach szkolnych do języka polskiego. *Postscriptum Polonistyczne, 2*(28), 1–30. https://journals.us.edu.pl/index.php/PPol/article/view/12311

Organizacja Narodów Zjednoczonych. (2015). *Przekształcamy nasz świat: Agenda na rzecz zrównoważonego rozwoju 2030*. https://www.unic.un.org.pl/files/164/Agenda%202030_pl_2016_ostateczna.pdf

Paluch, M. (2022). Pedagogika lasu i pierwsze ścieżki jej teoretycznych konceptualizacji. *Forum Pedagogiczne, 2*(12), 17–30.

Phillips, T. (2019). *Ludzie. Krótka historia o tym, jak spieprzyliśmy wszystko* (M. Gębicka-Frąc, Trans.). Wydawnictwo Albatros.

Sadowska, A. (2013). *Edukacja z klimatem. Przewodnik dla nauczycieli szkół gimnazjalnych*. Fundacja Aeris Futuro.

Stoknes, E. (2015). *What We Think About When We Try Not To Think About Global Warming*. Chelsea Green Publishing.

Wójcik, A. (2021). Postawy wobec zmiany klimatu w Polsce. In M. Budziszewska, A. Kardaś, & Z. Bohdanowicz (red.), *Klimatyczne ABC* (pp. 106–110). Wydawnictwa Uniwersytetu Warszawskiego.

World Meteorological Organization. (2013). *The global climate 2001–2010: A decade of climate extremes – Summary report* (WMO-No. 1119). https://reliefweb.int/report/world/global-climate-2001-2010-decade-climate-extremes-summary-report

Ziernicka-Wojtaszek, A. (2020). Okiem klimatologa. In B. Gulla, B. Tucholska, & A. Ziernicka-Wojtaszek (red.), *Psychologia kryzysu klimatycznego*. Uniwersytet Jagielloński.

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