# The Persistence of Plastic: Environmental Public Art and Micro-Plastic Pollution

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## Abstract

*Microplastics are ubiquitous environmental contaminants that cause harm to the health and reproductive capacity of living creatures. As humans are the sole source of plastic contamination, changes in human behavior are vital to mitigating micro-plastic contamination. Climate Change Communicators and Environmental Psychologists have found that messages delivered in the form of the Arts and Humanities can play an instrumental role in motivating sustainable behaviour. In this exploratory study, these findings are tested in an Australian context by examining audience responses to a public work of art addressing micro-plastic pollution. In addition to confirming the findings reported in the literature, the use of a beautiful form in a work of art has been identified as a strategy that can stimulate audience engagement with environmental messaging. Beautiful form rather than a beautiful subject can engage viewers and educate through imaginative interpretation.*

**Keywords:** *Aesthetics, Art Theory, Arts Communication, Microplastics, Environmental Communication, Pollution.*

Microplastics are ubiquitous and persistent contaminants that pollute the air, land, and sea (Cox, 2019). Micro-plastics particles, less than 0.5mm in size can cross the blood-brain barrier and the human placenta. Exposure to micro-plastic particles through ingestion or inhalation, and the chemicals hitchhikers they carry, can cause cell damage and adverse health effects (Vethaak & Leslie, 2016). Human behaviour is the sole source of micro-plastic pollution, and therefore changing human behaviour is key to limiting further environmental degradation (Henderson & Green, 2020).

Climate Change Communicators, Cultural Geographers, Cultural Studies researchers and Environmental Psychologists are identifying forms of communication that can be used to motivate sustainable behaviours. Researchers from these four fields have concluded to date that messages delivered in the form of the Arts and Humanities can have a greater impact than predictions based on scientific modelling; deleterious future climate sonorous in such models have been found to polarise public opinion and situate climate change as a geographically and temporality distant phenomena beyond and outside the remit of an individual (Moser, 2016). By contrast, messages delivered in the arts as reported in the literature and in this case study, have been found to engage the audiences through the use of visual form, narrative content, metaphor and beauty, thereby stimulating cognition, emotions and moral and aesthetic judgements (Riley, 2019). Works of art are noted for their cultural sensitivity and interpersonal connectivity; in terms of climate communication they can normalise change and transform a problem focus to scenarios of personalised solutions (Moser, 2016;

Webb, 2009; Roosen et al., 2019; Graham 2005). Audience feedback to a public work of art, *Microplastics Found in Human Embryo* (Figure 1.) is examined in this exploratory study to ascertain the veracity of the literature, to establish whether a work of art can influence understanding that might instigate sustainable behaviour. This preliminary and important step (opening a dialogue between art and understanding, before consideration of the commitment to action leading from this) aims to understand the mechanisms at play in the reception of environmental works art with a view to assist artists in honing knowledge to enhance environmental messaging.

## Beauty and allure

*Microplastics Found in Human Embryo* was made to raise awareness of the deleterious consequences of plastic pollution for humans, and symbolically on all forms of life. Beauty was used judiciously in the work lure the audiences' attention physical and cognitive. By tarrying with the work, I hoped that people would invest time and imagination reconstructing the meaning of the work, at their own pace and in accordance with their value system. Artists personalise issues through their works while demonstrating their commitment to addressing the need for change. This interpersonal message delivery, along with the engagement of the imagination which can foster multiple associations and meanings are noted values of environmental messaging in the arts (Moser, 2016; Riley, 2019; Web, 2009). As Sommer & Klöckner note "…we cannot change our cultural environment to be more sustainable without being personally engaged" (2019, p. 14.). The allure of beauty in *Microplastics Found in Human Embryo* was a strategic devise to garner attention and provoke thought, and yet there was another and rather sinister claim for beauty.

Figure 1. Robyn Glade-Wright, *Microplastics Found in Human Embryo* (2018)
One thousand plastic recycled bottles, paint, cable ties. Cairns Institute, James Cook University, North Queensland.

## Subversive beauty

Philosopher John Armstrong (2004) claims that we find beauty in the relationships we form with animate items or inanimate objects that we love such as our pets or gardens. Our reverence for beauty extends to hope for others to experience beauty even when we do not share the experience, as philosopher Elaine Scarry (1991) indicates. This is why we are saddened to learn of the extinction of a large kelp forest when in all likelihood we would never be able to see the forest (Scarry 1991). Further

ideas that informed the use of a human embryo in *Microplastics Found in Human Embryo* include the human tendency to seek connections with other forms of life as indicated in the Biophilia Hypothesis (Wilson 1984) and the biological drive for reproduction. Formative in my decision to depict a human embryo were the following: ideas of the beauty of relationships, the hope of future experiences for audiences and their progeny, and the tendency to value connections with other forms of life. While playing the heartstrings of beauty, my indication that plastic contamination has been found in a human embryo alongside the materiality of the work (made form one thousand plastic bottles), presents a terrible horror. What if microplastics robbed us of future progeny and the beauty of these relationships to come? In this way, I suggest that my use of beauty in my art is subversive. By threatening what is precious, and by suggesting this threat to the furtherance of life, I goad audiences into recognition of the role humans play in polluting the environment and consequently threatening all forms of life - including our species.

## Beauty, moral nature, stewardship

Beauty is entwined in the design of *Microplastics Found in Human Embryo* in relation to a moral call. I anticipated that recognition of the hand we play in producing plastic contamination might induce concern that could instigate pro-environmental behaviour. Immanuel Kant claimed, "we cannot understand aesthetic experience except by relating it to our moral natures" (White, 1995, p. 293). Kant indicates that aesthetic experience serves as an introduction for morality, in that "the beautiful prepares us to love something, even nature" without desiring something in return.[ii] Therefore, environmental art such as *Microplastics Found in Human Embryo*, that invoke an aesthetic experience of this nature, may be well positioned to elicit both concern for the furtherance of life and the desire for stewardship of environment.

Beauty in art, according to Scarry, can encourage a feeling of reverence for something that is greater than us, and promote an affinity with nature and the desire to value and protect the beauty of the world (1991). In a similar manner, art philosopher John Armstrong contends that an "experience of beauty involves a sense of kinship between an object and one's soul" supporting the view that beauty in art can promote interconnectedness between people and nature (2004, p. 72). These concepts of beauty, kinship and stewardship have led Sommer and Klockner to advocate for environmental works of art that "emphasize the beauty and interconnectedness of nature" to foster a personal connection and pro-environmental behaviour (2019, p. 14). The desire to protect the beauty of a world that is impacted by anthropogenic litter may awaken the slumbering potential for hope, and it may nurture the citizens of our small planet.

## Art and imagination.

Amongst the affective characteristics of message delivery in the arts are visual and narrative form, the use of metaphor and the stimulation of the imagination. Paul Klee, observed: "Art does not reproduce reality; rather, it makes visible" (Gale, 2013, as cited in Brinck, 2018, p. 212).[iii] Works of art render new ideas visible rather than depicting reality, and they do so by stimulating a range of emotional, moral, and cognitive responses (Riley, 2019, p. 438). Art theorist Ross Gibson uses different terminology to describe the concept of "rendering visible" when he wrote, "you know you are encountering art when you are engaging with an intentional process or product that causes surprising transformations in matter or in a moment" (2010, p. 4). The concept of "surprising transformations" and "rendering visible" was also recognised by art theorist, Author Danto who coined the term "wakeful dreams" to encapsulate the transformative experience of great art (2013). Danto recognises that serious works of art present a new vision of reality that can foster multiple associations and meanings awaken us to ideas and perspectives that we may not have seen or elected to overlook (Web, 2009; Graham, 2005). In a similar vein, art theorist Kendal Walton wrote of the experience of art as an interlude that punctuates the flow of time, suspending, and supplanting our regular mental activity with new and surprising revelations (1990). Given the capacity of art to cause surprising transformations that might

awaken some humans from complacency regarding environmental degradation, we can conclude that a clarion call might be sounded for artists and writers to use environmental communication to promote sustainable behaviour.

Environmental art aims to stimulate people's relationship with nature through aesthetic experience and to raise awareness of factors impacting the Earth's ecosystems (Hulme, 2020). Environmental art can function as a source of understanding by engaging the imagination of an audience and prompting discussion and/or action around environmental issues (Graham, 2005; Marks et al., 2016). Works of art can transport environmental problems from being geographically and temporally distant concepts to local and current concerns (Roosen et al., 2018). This may shift the focus from a conversation form imagining problems reside in remote locations at a future time to what can be done here and now. Environmental works of art can raise questions for people to answer at their own pace and may provide a path for people to think differently and "even to be something different" (Steelman et al., 2018, p. 785). Therefore the provocation of environmental art may explain the findings of environmental psychologists who have confirm that messages transmitted through the arts can promote pro-environmental attitudes and behaviour (Rosen et al., 2018).

## Democratic space and 'tangible visuals'

Works of art exhibited in openly accessible locations on a temporary or permanent basis such as the installation on *Microplastics Found in Human Embryo* on the outside of the Cairns Institute, James Cook University mean that the work is accessible to people who do not regularly visit art galleries. Public exhibitions of environmental art demonstrate a community's willingness to deal with such issues, which helps to normalise concern for the environment (Sommer & Klöckner, 2019; Rodidoux & Kovas, 2018) and thus lead to confidence in undertaking action. Contextualising information such as the title of the work in an artist's statement, a catalogue, and in artists' talks and fora, has been shown to increase audience appreciation and understanding of the work (Keller et al., 2019). Given that Epstein has argued that experiential knowledge gained from viewing art "is often more compelling and more likely to influence behaviour than abstract knowledge" (1994, p. 711), the use of contextualising information can be seen as an important aspect of public environmental art.

To awaken the slumbering potential for hope and nurture amongst the citizens of our small planet: this principle is at the heart of the task I created in making the work of art *Microplastics Found in Human Embryo*. The piece aims to communicate the harm caused by microplastics and the persistent of petroleum-based plastics. Petroleum-based plastics are virtually indestructible; they do not biodegrade yet over hundreds of years, UV radiation, impacts of living organisms, wave action, and abrasion can cause these plastics to fragment and break up into micro-plastic and nano-plastic particles (Diaz, 2018). As plastics are cheap to produce, lightweight, mouldable, and durable, production since 1950's has increased rapidly from 16.5 million tons to the present 364 million tons, with a forecast of tripling this number by 2050 (Laura, Marcos, & Hernández, 2020). Approximately three-quarters of the plastics ever produced are now wasting. Only 9% of all plastic has been recycled, 12% incinerated and 79% is deposited in landfill or the natural environment" (Mendenhall, 2018, p. 3). Regardless of the longevity of plastic, 40% of plastic products are used once before being discarded (Waring et al., 2018, p. 64). Microplastics from car tyres, laundering of synthetic clothing and abrasion of plastic products has resulted in an estimated 5.25 trillion plastic particles that circulate in the world's oceans (Smith et al., 2018). In the ocean, microplastics can harm cause cell death to tiny organisms such as phytoplankton which reduces the supply food at the base of the food chain and diminishing the produce oxygen that is vital for life on Earth (Sekerci & Ozarslan, 2020). Micro-plastics ingested by plankton are then transferred up the food chain, eventually appearing in food sold for human consumption (Zeynep & Guvan, 2019). As micro-plastic contamination in the air, food and water cannot be seen without magnification, it is out of sight and out of mind, or beyond perception and cognizance. The large-scale of *Microplastics Found in Human Embryo* sought to *make visible* the unseen threat of micro-plastic contamination while the perturbing content of the work sought to broadcast the harm caused by microplastics.

Each year people ingest 39,000–52,000 micro-plastic particles and inhaled a further 74,000-121,000 particles (Cox et al., 2019). People who drink only bottled water ingest 9,000 particles and those who drink tap water ingest 4,000 micro-plastic particles. (Cox et al., 2019). Chemicals from plastic packaging leach into food and drink, and yet, an estimated 1000 plastic bottles are purchased every minute around the globe (Diaz, 2018). Plastic particles can cross cell membranes including the blood-brain barrier and the human placenta, causing inflammation, changing cell expression and even cell death (Smith et al., 2018; Vethaak & Leslie, 2016). Plastic fragments contain flame retardant chemicals that "disrupt the endocrine system and reproductive systems, leading to cancers, insulin resistance, decreased sex hormones, birth defects, and immune suppression" (Diaz, 2018, p. 89). Micro-plastic particles in the ocean attract and harbor toxic pathogenic hitchhikers, in concentrations ten times higher than the surrounding environment, including Zika, dengue, and human pathogenic bacteria (Wilcox et al., 2015). Micro-plastic contamination is been recognized as a major health risk, however, as this threat cannot be seen without magnification, the arts can play a role in exposing the issue.

My work develops research findings on the impact of visuals on community knowledge of plastic marine pollution conducted in 2016 and 2017 in the United Kingdom (Henderson and Green, 2020). In this study 42 participants across 6 focus groups were interviewed to ascertain 'what' people knew and 'how' they had come to know about plastic marine pollution (2020, p. 6). Henderson's and Green's findings showed that media reports depicting images of marine animals who had died due to plastic entanglement or ingestion were the main source of the participants' understanding of plastic marine pollution: "Media storytelling arguably has a central role to play in shaping public understandings, bringing the topic of plastic pollution to public attention in vivid and powerful ways" (Henderson & Green 2020, p.12). However, the media images resulted in many participants forming the view that plastic pollution is a "far away" or "on-screen" problem (Henderson & Green 2020, p. 12). Furthermore, the connection between using plastic and micro-plastic pollution was entirely missed by many participants, with Henderson & Green reporting that as microplastics cannot be seen with the naked eye, they lack "tangible visuals" for media and personal stories (p. 6). This study of community understanding in the United Kingdom provides insights and background information that are helpful in considering the Australian context. My analysis of the study suggests a need for *tangible visuals* such as artefacts that can render the unseen microplastics *visible* in a manner that *personalises* environmental issues.

## Case study

The literature indicates that messages delivered in arts can influence individual and collective ways of thinking and acting. However, Jacobs et al. advise that more research is needed to better "understand how we might co-create opportunities to thrive and adapt to these changes, positively care for, repair, celebrate and maintain our natural environments" (2017, p. 1172). Rodidoux and Kovas advocate the need for further research into viewer feedback when they wrote, "engaging the viewers and documenting their feedback can result in more meaningful outcomes, regardless of the nature of their critiques" (2018, p. 166). In my case study, communication strategies in the visual arts are tested by examining audience responses to the environmental work of art *Microplastics found in Human Embryo* (Figures 1 & 2.) and presented in public at James Cook University, located in a regional centre in Australia.

## Method

The work of art, *Microplastics found in Human Embryo* (shown above) depicts a human embryo encased in a blue/green pool. The work, measuring 4.5 x 5.5 meters, was made from one thousand used plastic drink bottles that were collected from accommodation cleaned, painted and assembled. The aim for the work was to create the most perturbing image imaginable to highlight the threat posed by microplastics. While concerns regarding plastic contamination extend beyond humans, the intention

was to activate human concern by focusing on the potential health risk to future progeny. The idea was fictitious, which is a common feature of socially engaged art. However, art is not real life and yet works of art relate to life, and therefore we can come to a greater understanding of life's experiences (Graham, 2005). By implying that future progeny where at risk of harm from microplastics, I imagined that people would be perturbed and think about the impacts of our use and disposal of plastics. Research for the information included in the contextual sign that was placed at eye level under the work was conducted after the work was completed. It indicated that *plastic particles can in fact pass through the placenta, generating a very troubling and prescient reality.* The completed work was hung on the exterior of the Cairns Institute, James Cook University in Cairns for six months from November 2017 to March 2018 with a sign detailing the artist's name, date, title, materials, and the following information:

> *This work of art aims to magnify the impact of plastic on life forms and the delicate systems that support life on Earth. Some might say that microplastics are out of sight as they cannot be seen without magnification. However, eco-toxicologist Heather Leslie (2015) has demonstrated that plastic particles can pass through the placenta and the blood-brain barrier. Plastic particles can also be taken up in the gastrointestinal tract and lungs, potential sites where harm can occur including immune-toxicological responses, altering gene expression, and causing cell death.*

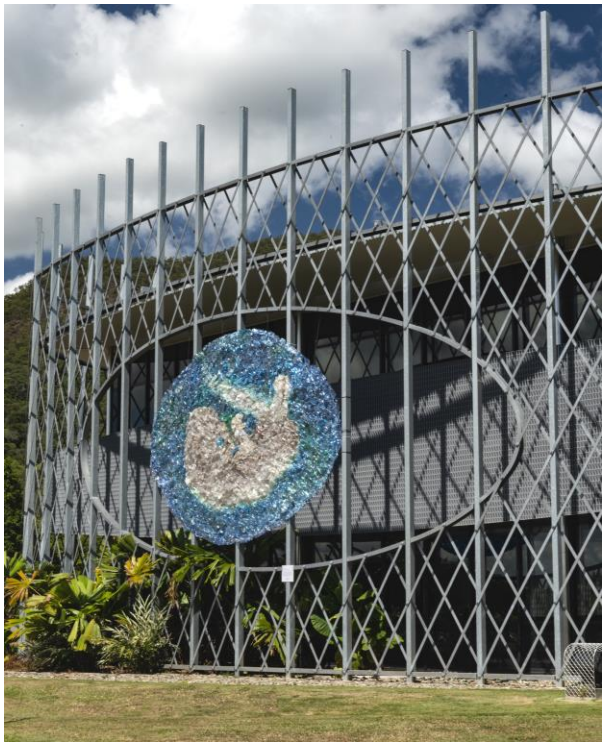

Figure 2. Robyn Glade-Wright *Microplastics Found in Human Embryo* 2018
1000 plastic recycled bottles, paint, cable ties. Cairns Institute, James Cook University, North Queensland.

After the artwork had been installed for one month and with ethics approval from a University committee, an online survey was created. Invitations to participate in the survey was posted on noticeboards across the University campus located near the Great Barrier Reef with active research and teaching facilities in marine biology. Of the twenty participants, who were staff students and visitors to the University, eleven were male and nine were female, with an age range of 25 to 64.

## Results

Levels of concern about plastic pollution were central to the survey. Participants responded in terms of Concerned (20%) or Very concerned (80%). When asked about knowledge of microplastics the

responses were: Not much 20%; Some knowledge 65%; or Expert knowledge 15%. Online documentaries, news reports, and formal studies at the University were cited as sources of knowledge. When asked for their overall impression, over 90% of respondents described the work as Engaging. Of the two respondents who thought the works was 'somewhat engaging', one mentioned they thought it was 'a pro-life statement' and the other participant thought the message was 'lost 'in the way it was displayed.

In a thematic analysis, the following categories were identified:

- Beautiful, subtle, positive and enjoyable (mentioned in twelve responses)
- Thought-provoking, meaningful, powerful message about the issue and the future (mentioned in eight responses)
- Significant, urgent, environmental issue (mentioned in seven responses)
- Challenging, confronting, and disturbing (mentioned in five responses)

Comments included: "It is beautiful. Although it draws attention to a significant environmental issue, and is thought provoking, at the same time it is a beautiful artwork. The colours change throughout the day. In the morning sun it is magnificent."

Another respondent wrote: "There is a delicate balance of craftsmanship and conceptual depth. The embryo signifier demands attention, whilst the blue colour bias and construction materials aid in almost effortless reading." In an open-ended question that allowed for further feedback, respondents reiterated three of the overall impression themes and mentioned: beautiful, thought-provoking, and raises an important issue. Responses included: "The best sort of art is both beautiful and thought provoking, which this is". Another person wrote: "The scale of the work, coupled with the fact that it depicted something 'microscopic' [an embryo], provided a curious juxtaposition which inspired further thinking about the work, and indeed about the impact of microplastics on the future of the planet and humanity."

When asked if their understanding of microplastics has changed after viewing the work, responses where: 75% Changed a lot; 10% Changed somewhat and 15% No change. The group with expert knowledge may have been amongst those who said their understanding had not changed, as they reported that the work could promote understanding among others. All participants reported that works of art could communicate environmental concerns. One participant mentioned a behavioural change and wrote: *I think about microplastics more when shopping. It has affected how I shop. I have stopped buying plastic glitter and recently I chose wooden hangers rather than plastic hangers covered in plastic fluff.*

Comments that indicated that the work of art had been effective in raising awareness of microplastics and the potential threat to health were recorded from 90% participants while 10% were neutral. One participant wrote: *The work is exemplary in that it successfully communicates a pressing issue with a degree of immediacy and specificity often required by public works.* When asked if installations of public art enhance or detract from the built environment, 90% of respondents reported it enhanced, and 10% were neutral. One response read: *Enhance. Public works are an important component of cultural health and possess unique transformative properties as they have the ability to affect those who would not normally enter a gallery space.* Two people mentioned the need for signage, indicating that they had not visited the work. A further respondent recommended that the work should have been launched to the University community in a public event. Two respondents requested ongoing exhibitions of public art on the University campus.

## Discussion

The purpose of the *Microplastics Found in Human Embryo* was to raise awareness, stimulate people's awareness of our relationship with nature, and prompt discussion and action around micro-plastic

pollution. It was pleasing that 85% of participants reported a change in their understanding of microplastics after viewing the work, confirming reports in the literature (Roosen et al., 2019). The capacity of art to educate through the engagement of the imagination was indicated by a response that read: *It certainly has raised my awareness of the horrendous side effects of our plastic addiction. It makes me long for the days of recycled glass milk bottles and paper wrapped sandwiches. Look at what it unleashes in me. I hadn't thought of that until now.*

The university context may have contributed to a higher level of knowledge about microplastics amongst survey respondents than those reported in the study by Henderson and Green (2020). The proximity of the University to the Great Barrier Reef and the University's focus on scholarship in marine biology likely contributed to increased existing knowledge levels amongst respondents. The problem of media outlets struggling to present information about microplastics due to the absence of a visual hook reported by Henderson and Green (2020) was mitigated by this work of art. *Microplastics Found in Human Embryo* was reported in the press and broadcast in a television news report confirming the value of the art in terms of visualising an unseen threat.

The terms *beauty* and *beautiful* were mentioned 12 times in the respondents' feedback. In *Microplastics Found in Human Embryo,* the materiality or form of the work was viewed as being beautiful, despite the horror of the message. The colours of the plastic bottles, combined with the plastic surface that glistened in the sun were mentioned in terms of beauty. As a respondent commented: *Glittering in morning sun this is a beautiful, but disturbing pollution message.* The 12 references to beauty in the study indicated that it was the form and materiality of the piece that was attractive, rather than a depiction of the beauty of nature. This was a different use of beauty to that described by Sommer and Klockner who advocate that environmental artists should presents "beautiful and colorful depictions of sublime nature" (2019 p.12) or images that "emphasizing the beauty and interconnectedness of nature" (2019 p.14) in their works of art. However, this was not a feature of *Microplastics Found in Human Embryo,* where the form and materiality were attractive. This research suggests that environmental artists can use a beautiful form in their work as a strategy to attract attention for the delivery of arousing stories.

One of the thematic threads that appeared in the data related to the use of contextual information. A request for signage by two participants indicated that they had not noticed the sign that accompanied the work of art. Their request suggests that additional contextualising information could have been produced such as an online catalogue presented on the University website. This was reinforced by the response that read: *the work should have been presented officially and linked to an event,* supporting the value of exhibition openings and artists' talks mention in the literature (Keeler et al., 2019). Artists may shy away from public speaking, artist statements, and catalogues, imagining their work might be the complete form of message delivery. In this study, as in the literature, regardless of the capacity of the work to stand on its own, contextualising information has the potential to increase audience interest, aesthetic appreciation and importantly, their understanding of the message at play in the work.

A limitation to this study is the small sample size. Further research with an increased number of participants is required to further analyse the impact of environmental arts messaging. However, small-scale studies focusing on small segments of the population, "provide insights into the particular understandings, perceptions and engagement of the group studied" (Wolf & Moser, 2011, para. 11). Valuable lessons emerged from this study of audience feedback, including the benefits of contextualising information, the efficacy of public art as a means of environmental communication, and the applicability of beauty to the form of the work of art for environmental artists.

## Conclusion

By analysing survey responses, this article presents further evidence for the efficacy of message delivery in the arts to engage people in environmental communication. In this case study, the appeal

of beauty in the form of the work of art has been identified as an effective strategy to educate through imaginative interpretation. This is a positive finding for artists and community leaders given the complexity of making and exhibiting environmental art in public spaces. Hulme notes that while it is too late to change the past, "it is essential for humans to continue to seek out the sources of hope, creativity, respect and solidarity that characterise the human reflex at it best" (2020, p. 5). Artists can be sources of hope, creativity and respect, capable of delivering environmental messages that foster personal connections, increase understanding and influence behaviour in the urgent pursuit of conserving our fragile environment.

## References

Armstrong, J. (2004). *The Secret Power of Beauty.* Allen Lane.

Brinck, I. (2018). Empathy, engagement, entrainment: the interaction dynamics of aesthetic experience. *Cognitive Processing, 19*, 201-213. https://doi.org/10.1007/s10339-017-0805-x

Cox, K. D., Covernton, G. A, Davies, H. L., Dower, J. F., Juanes, F. & Dudas S. E. (2019). Human Consumption of Microplastics. *Environmental Science and Technology, 53*(12), 7068-7074. https://doi.org/10.1021/acs.est.9b01517

Danto, A. (2013). *What Art Is.* Yale University Press.

Diaz, H. M. (2018). Plastic: Breaking down the Unbreakable. *Coastal, 8*(19), 85-113. Retrieved April 18, 2020, from https://www.fcsl.edu/userfiles/files/Diaz.pdf

Epstein, S. (1994). Integration of the cognitive and the psychodynamic unconscious. *American Psychologist, 49*(8), 709–724. https://doi.org/10.1037/0003-066X.49.8.709

Gibson, R. (2010). The known world. *TEXT Special Issue, 8,* 1-11. Retrieved April 18, 2020, from http://www.textjournal.com.au/speciss/issue8/Gibson.pdf

Graham, G. (2005). *Philosophy of the Arts: An introduction to aesthetics*. 3rd ed. New York: Routledge.

Henderson, L., & Green, C. (2020). Making sense of microplastics? Public understandings of plastic pollution. *Marine Pollution Bulletin, 152*(110908). 1-15. https://doi.org/10.1016/j.marpolbul.2020.110908

Hulme, M. (2020). Is it too late (to stop dangerous climate change)? An editorial. *WIREs Climate Change,* 11(1), 1-7. https://doi.org/10.1002/wcc.619

Jacobs, R., Abbott, F., Urquhart, L., & Price, D. (2019). Performing the future: an artist-led project engaging with risk, uncertainty and environmental change, *Journal of Risk Research, 22*(9), 1171-1185. https://doi.org/10.1080/13669877.2019.1569104

Kant, I. (1987). *Critique of Judgment*, trans. Werner Pluhar, Hackett.

Keller, A., Sommer, L., Klöckner, C. A., & Hanss, D. (2019). Contextualizing information enhances the experience of environmental art. *Psychology of Aesthetics, Creativity, and the Arts*, 1-12. http://dx.doi.org/10.1037/aca0000213

Laura, R., Marcos, R., & Hernández, A. (2020). Potential adverse health effects of ingested micro- and nanoplastics on humans. Lessons learned from *in vivo* and *in vitro* mammalian models, *Journal of Toxicology and Environmental Health, 23*(2), 51-68, https://doi.org/10.1080/10937404.2019.1700598

Marks, M., Chandler, L., & Baldwin, C. (2016). Re-imagining the environment: using an environmental art festival to encourage pro-environmental behaviour and a sense of place. *Local Environment*, *21*(3), 310-329. https://doi.org/10.1080/13549839.2014.958984

Mendenhall, E. (2018). Oceans of plastic: A research agenda to propel policy development. *Marine Policy, 96*, 291-298. https://doi.org/10.1016/j.marpol.2018.05.005

Moser, S. C. (2016). Reflections on climate change communication research and practice in the second decade of the 21st century: what more is there to say? *WIREs Climate Change, 7*, 345–369. https://doi.org/10.1002/wcc.403

Riley, H. (2019). Aesthetic cognitivism: Towards a concise case for doctoral research through practices in the visual arts. *Arts and Humanities in Higher Education*, *18*(4), 430–443. https://doi.org/10.1177/1474022218757151

Robidoux, M. & Kovacs, J. F. (2018). Public Art as a Tool for Environmental Outreach: Insights on the Challenges of Implementation. *The Journal of Arts Management, Law, and Society, 48*(3), 159-169. https://doi.org/10.1080/10632921.2018.1450315

Roosen, L. J., Klöckner, C. A., & Swim, J. K. (2018). Visual art as a way to communicate climate change: a psychological perspective on climate change–related art. *World Art, 8*(1), 85-110. https://doi.org/10.1080/21500894.2017.1375002

Scarry, E. (1999). *On Beauty and Being Just.* Princeton University Press.

Sekerci, Y., & Ozarslan, R. (2020). Dynamic analysis of time fractional order oxygen in a plankton system. *The European Physics Journal Plus, 135*(88). https://doi.org/10.1140/epjp/s13360-020-00111-6

Sommer, L. K., & Klöckner, C. A. (2019). Does activist art have the capacity to raise awareness in audiences? - A study on climate change art at the ArtCOP21 event in Paris. *Psychology of Aesthetics, Creativity, and the Arts,* 1-12. https://doi.org/10.1037/aca0000247

Smith, M., Love, D. C., Rochman, C. M., & Neff, R. A. (2018). Microplastics in Seafood and the Implications for Human Health. *Current Environmental Health Report*s, 5, 375-386. https://doi.org/10.1007/s40572-018-0206-z

Steelman, T. A., Andrews, E., Baines, S., Bharadwaj, L., Bjornson, E. R., Bradford, L., Cardinal, K., Carriere, G., Fresque-Baxter, J., Jardine, T. D., MacColl, I., Macmillan, S., Marten, J., Orosz, C., Reed, M. G., Rose, I., Shmon, K., Shantz, S., Staples, K…… (2019). Identifying transformational space for transdisciplinarity: using art to access the hidden third. *Sustain Sci 14*, 771–790. https://doi.org/10.1007/s11625-018-0644-4

Walton, K. (1990). *Mimesis as Make-Believe.* Harvard University Press.

Waring, R. H., Harris, R. M., & Mitchell, S. C. (2018). Plastic contamination of the food chain: A threat to human health? *Maturitas, 115,* 64-68. https://doi.org/10.1016/j.maturitas.2018.06.010

Webb, J. (2009). *Understanding Representation*. SAGE.

White, J. (1993). Morality and Art. In D. Cooper (Ed), *A Companion to Aesthetics*, Cooper, (pp. 293-297). Blackwell.

Wilcox, C., Van Sebille, E., & Hardesty, B. D. (2015). Threat of plastic pollution to seabirds is global, pervasive, and increasing. *Proceedings of the National Academy of Sciences of the United States of America*, *112*(38), 11899-11904. https://doi.org/10.1073/pnas.1502108112

Wilson, E. O. (1984). *The Biophilia Hypothesis*. Harvard University Press.

Wolf, J., & Moser, S. C. (2011). Individual understandings, perceptions, and engagement with climate change: insights from in-depth studies across the world. *WIREs Climate Change,* https://doi.org/10.1002/wcc.120

Vethaak, D. A., & Leslie, H. A. (2016). Plastic Debris Is a Human Health Issue. *Environmental Science & Technology*, 50. 6825-6826. https://doi.org/10.1021/acs.est.6b02569

Zeynep, A. & Guven, B. (2019). Microplastics in the environment: A critical review of current understanding and identification of future research needs. *Environmental Pollution, 254*(113011). https://doi.org/10.1016/j.envpol.2019.113011

## Notes

1. Robyn Glade-Wright is a practicing artist and arts educator who seeks to create a sense of disquiet in her works of art to engender reflection about the kind of life (and death) we impose on sentient creatures. To provoke contemplation of feelings to foster sustainable futures for life on this small planet, Glade-Wright's artworks respond to the ecological crisis of the Anthropocene in forms that conflate allure and anxiety, beauty and dread.
2. General Remark following §29, 267
3. Ed.: Klee's statement from 1920 might be translated as follows: 'art does not reproduce what we see; it makes us see'.