Attunement Beyond Nuisance:

Olfactory Techniques of Power, Regimes of Perceptibility and the Permission to Pollute

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ABSTRACT

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Anna Sigrithur Houston

This paper documents a research-creation project exploring the olfactory dimensions of the public perceptions of air pollution, via a case study of the public and media response in Montreal's Plateau-Mile End neighbourhood, to wood smoke, and subsequent municipal legislation against wood-burning. It employs the concept of *'nuisance'* through the creation of an augmented reality media game and other methods to explore the perceptual tensions between annoyance and injury, sensory and physical harm, and the power dynamics that render harms publicly legible or not within larger 'regimes of perceptibility.' Within this, the thesis explores how perceived environmental threats to bodily integrity can coalesce a 'visceral public', and specifically how odour impacts how such threats are perceived and responded to. The visceral response is contextualised within histories of smoke, smell and public health, studies of public risk perception of air pollution, and the implications of slow violence and uneven geographic distribution of harm from air pollution. Using the Situational Analysis-informed methodology of analytic abduction, the research-creation methods were messy mapping and smellwalking, all of which informed the creation of the interactive augmented reality web game, *Nuisances*. Through *Nuisances,* the olfactory 'techniques of power' that uphold permission to pollute are identified as Disgust, Diffusion and Differentiation. The game seeks to address these techniques by proposing to offer a the public an alternative mode of perceiving pollution, one that withdraws permission to pollute. Employing the concept of 'attuned sensing' in an augmented game experience, *Nuisances* encourages players to attune to both the sensory dimensions of smell and the broader situation to counter the techniques of power, and produce its own counter-regime of perception.

Keywords: regimes of perceptibility, smell, permission to pollute, attuned-sensing, visceral publics, augmented reality

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PLAYER INSTRUCTIONS

This written thesis accompanies and explicates the research-creation process that resulted in the augmented web game, *Nuisances.*

The suggested order is:

1. Play the game
2. Read the thesis

To play *Nuisances*:

Option A: Access the game at this url: https://montrealnuisance.itch.io/nuisances and click "Run Game" which will open the game in your browser tab.

The game takes between 20 and 30 minutes to play through to completion depending on pathway selection and reading/click speed.

Option B (Permanent): If for any reason, the above url does not work or is no longer active, follow these instructions for permanent access to the game directly via the html game file.

1. Go to www.twinery.org.
2. Choose the option to use in browser.
3. Go to Library > Import > select the file **index.html**
4. Open game. Upon the full passage (map) view, click on the "Start Here" passage near the top left corner to select it.
5. Then, in the top menu bar, click "Test from Here", which will open the game in another browser tab. Play from there.

ACKNOWLEDGEMENTS

This project is the result of feeling around in the dark. I have always learned by making but I have never been terribly good at explaining how I do it; for me the creative process has always been subterranean and inexplicable. Therefore, I came to this program believing that in order to produce something valid, I would have to conform to an alien process that sacrificed my usual instincts. I was ready to do this, believing that after more than a decade of working outside of the academy, I was unruly and in need of discipline.

I was, of course, partly right about this! But if there is one thing I have learned in these last two years, it is that there *are* in fact ways to articulate-- with some rigour, even-- my own creative methods, however meandering and instinctive they are. This revelation for me, which has been the gift of this program, is also, I know, the gift of research-creation. So I wish to begin by acknowledging those who have bruised their shoulders pushing the door open for research-creation, and held it for those of us coming through. I do not know yet where exactly I am going, but wherever it is, I promise to hold doors open wide behind me.

I am profoundly grateful for my supervisor, Liz, whose patience, expertise, curiosity, wisdom and deep understanding of my positionality as a fellow hybrid media-maker-academic helped me see how perhaps, even in my subterranean process, there is room for me here, too. Liz, I cannot begin to express the difference you made in my experience, and how I would not be here today if it weren't for your encouragement and support. Thank you.

I would like to acknowledge my committee members, Kim Sawchuk and Fenwick McKelvey, both of whom have offered insights at critical moments in my journey that illuminated the darkness. Thank you for both for this brilliance.

Immense gratitude is owed to my intrepid research-creation team[1] mates, Hana Woodbridge and Cori Volfson, without whom this second year would have felt much more desolate. I am grateful for your moral support, generous problem solving, and the sense of camaraderie and joy you inspired in me during this weird and murky process. Team HAC for the win!

A special thanks to Justin Roberts who generously shared hours of his time and expertise in game-creation, instructing me in using Twine and giving me my very first experience in computer coding. Thanks also to Isabelle Boucher, Maya Hey, Jean-Thomas Tremblay, Andrée Gutierrez Uranga and Alice Jarry-Girard, all of whom have been so generous as to let me unspool my questions on the topics of smells, air, pollution and the world of grad studies more generally.

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[1] An informal adaptation to the infamously isolating second year of the Media Studies MA, the three of us met weekly for ~six months during the 2022-23 school year to workshop ideas and provide support to one another.

I wish to especially acknowledge my partner, Craig Fisher, for his loving support of me on this journey, not least of which included uprooting his life and moving with me across the country during a pandemic in order to begin it. Craig, you have patiently endured my restlessness and have been my ethical compass, holding my ideas to account for their real-world implications. You have so many times insightfully sharpened the form and the message of my project (and saved my butt when it came to Photoshop.) Chi-miigwetch, my red fox!

And, last but not least, I wish to thank all those who have been with me on my journey, and who have each added bricks to the path that I am so lucky and grateful to walk down. This includes my parents, Marty Helgerson and Don Houston who always trusted me to find my own way through the dark; my *deer* friend and mentor Audrey Logan who taught me that the wise gardener first builds the soil; my brilliant little sister Mary "Peebs" Houston, who made grad school look fun; my creative dreaming co-conspirators, especially Audrey, Laura Tyler, Laura Tait, Nathan Enns and Zorya Arrow; and all my best friends, Annie Eastwood, Elizabeth Worden, Akosua Knowles, Phoebe Chard, Maxine Anguk, Chloé Carpenter. I love, and am grateful for, you all.

PREFACE

For as long as I can remember, I've been oriented to the world through my nose. As a child, I concocted fragrant potions in the backyard with crushed up flowers and plants and carried them around with me to ward off carsickness and other childhood afflictions. As a teen and young adult working in culinary arts and food media, this extended to an interest in the flavours and lore of wild herbs and medicines. Later, taking up perfumery as an arts practice, I extended my culinary skills to distil and blend the essences of fragrant ingredients; a kind of cooking via the air. Perhaps because of my experience in the trades, my orientation to smell is not just Proustian or aromatherapeutic but practical, functional. I have learned to nose out the aromatic compounds found in fragrant materials, and then to identify them in other materials; a kind of personalised olfactory taxonomy. With an interest in chemistry, I also gained insights into the molecular basis for these phenomena, and am particularly curious about the materiality and chemical behaviour of aromatic compounds; how to extract them, and how their properties lend to their use in fragrances.

The hands-on exploration of aromas leads directly, I feel, into smell's other function as semiotic. For me, there is almost nothing that is a more fitting demonstration of the nexus between materiality and semiosis than smell. Smoke-- fittingly, a main character in this research-- is the example *par excellence* of semiotics: where there is smoke, there is fire. This, I know, is usually taught on the visual register, but I think that somehow, underneath of that, smell is present, lending its truth-bearing power to the aptness of the semiotic example. Smoke is a signal that delivers on multiple sensory dimensions, but any person who possesses these senses knows that *seeing* smoke and *smelling* smoke produce very different impressions. Odours are tiny material fragments of the object in question coming into direct contact with our body's central nervous system. Smell is therefore more felt, more visceral… and therefore feels more true. After all, we say *our eyes are playing tricks on us*, but *the nose knows*.

While the molecular chemistry revolution which yielded artificially synthesised flavours and fragrances broke this elemental semiotic link between signifier (fragrance) and signified (fragrant object), in day-to-day life (and outside of the grotesque caricatures of real-world fragrances recreated in mass produced scented candles) smell still functions epistemically as much as aesthetically. If, on the street, you smell a strong odour, the first thought tends to be "what is that?" However, underneath of this conscious question, is a deeper more affective appraisal based on your long-term memories and other cognitive and cultural factors. This appraisal tends to categorise the smell instantly as either good or bad-- what sensory researchers call hedonicity. There is a lot more to say about the psychological, cognitive and behaviour aspects of smell-- for that, I cannot recommend the book *Smellosophy,* written

by cognitive neuroscientist, A.S. Barwich, enough-- but for now, my point is that smell fascinates me because it is bound up equally in material and representation, fact and feeling-- and, as I believe hedonicity hints at, however innocently -- morality and power.

So, when Liz asked me to help her write some interactive prompts for urban waste sites in her augmented app, WasteScapes, I noticed that while many sites, being infrastructural and therefore deliberately visually nondescript, still emitted a smell. Seeking a new direction for my thesis, this inspired me to follow my nose in the direction of waste and olfaction. *What could smell reveal about waste systems that would be interesting and valuable to explore?*, I wondered.

In following this question, I started to pay attention to how waste smells were noticed and understood, permitted and controlled. I quickly stumbled upon a seemingly important distinction: the difference between a bothersome and a harmful smell. This distinction, I also discovered, was tangled up in the word 'nuisance'-- at once the legal-bureaucratic term for a bothersome or offensive sensory entity, and, an etymological derivative of the Latin word which means 'to injure or harm'. In French, the word 'nuisance' means the former, but the latter meaning is still clearly represented in the verb 'nuire', to harm. As a project located in a bilingual city, I found the contradictive polysemy of this word an especially rich starting point: it seemed like nuisance captured a complexity about sensory perception, emotion, and harm. For these personal and practical reasons, I wanted to study this complexity within the context of smell.

Thinking through bad smells versus harmful smells (a dichotomy this thesis demonstrates is anything but), I decided to shift my topic from the smell of waste to specifically the smell of air pollution-- which I do via a case study of public response to wood smoke in Montreal's Plateau-Mile End neighbourhood. Expanding out from the case study, I explore how the sensory plays out in logics that uphold the permission to pollute, and how to denaturalise those logics. The months that I produced my thesis also happened to be a period of historic low air quality across North America due to massive climate-change induced wildfires. In this era, in which the wickedest environmental problems of our time are often diffused or otherwise intentionally obscured by the powerful systems behind them, the necessity of sharp, critical, sustained public attention becomes paramount. And so, I hope that this work will be a small contribution toward this-- toward exploring what an attuned and sensitive public could look like, one that does not get distracted by mere nuisance, but that seeks to sniff out the bigger picture with critical curiosity.

"Like no other sense, olfactory experience mediates observations of material changes in the environment in correspondence with our own physiological and psychological states."

-- A. S. Barwich, Smellosophy

A CASE STUDY of AIR POLLUTION and SMELL in MONTREAL

What's the (Fine Particulate) Matter with Montreal's Air?

      At the time of writing, June 25, 2023, due to forest fire smoke from the province's north, Montreal has earned the fleeting and dubious distinction of having the worst air quality in the world.[2] Earlier this year, Montreal was ranked by a thin margin the most polluted city in Canada in a study of air quality data conducted by HouseFresh, an indoor air purifier consumer advocacy website[3]. HouseFresh compared living in Montreal to smoking the equivalent of 124 cigarettes per year[4], a conversion based on data from the World Air Quality Index Project that listed the average daily amount of fine particulate matter ($PM_{2.5}$) pollution in the air of major cities. According to the HouseFresh study's rankings, the second most polluted city in Canada after Montreal was Windsor, ON, at 123 cigarettes per year.[5] The worst polluted city in the world, by contrast, was Dhaka, Bangladesh where a year of breathing was equivalent to smoking over 1,176 cigarettes, over a pack a week.

      Fine particulate matter, or $PM_{2.5}$ for short, is airborne matter of 2.5 microns in diameter or less, often produced by combustion, that is dangerous to human health due to its small size and ability to penetrate into the lungs and heart tissue[6]. While PM_5 and PM_{10} also exist, the smallest size classification of 2.5 microns was determined to be a critical size at which more tissue damage can occur.[7] $PM_{2.5}$ is something of an outlier: unlike the other pollutants measured in most air quality programs-- sulphur dioxide, nitrogen dioxide, and ozone, to name a few-- $PM_{2.5}$ is defined not by its chemical composition but its size. Perhaps because of this taxonomic latitude, it is a promiscuous pollutant: it is emitted by a wide range of activities and sources, including burning organic material, fossil fuel combustion, and industrial activities producing microfine dusts and vapours[8]. Because of this ubiquity, the World Health Organization describes $PM_{2.5}$ as a proxy indicator for total air pollution.[9]

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[2] Kelsey Patterson, "Montreal Has World's Worst Air Quality as Wildfire Smoke Blankets Quebec," *City News*, June 25, 2023, https://montreal.citynews.ca/2023/06/25/montreal-worst-air-quality-wildfire-smoke/.

[3] Hayatullah Amanat, "These Are the Most Polluted Cities in Canada," *CTV News*, February 17, 2023, https://www.ctvnews.ca/climate-and-environment/these-are-the-most-polluted-cities-in-canada-1.6279351.

[4] John Cole, "Secondhand Smoke World Map - HouseFresh," February 1, 2023, https://housefresh.com/secondhand-smoke-world-map/.

[5] Cole.

[6] "WHO Global Air Quality Guidelines: Particulate Matter (PM2.5 and PM10), Ozone, Nitrogen Dioxide, Sulfur Dioxide and Carbon Monoxide" (Geneva, 2021).

[7] "WHO Global Air Quality Guidelines: Particulate Matter (PM2.5 and PM10), Ozone, Nitrogen Dioxide, Sulfur Dioxide and Carbon Monoxide."

[8] "Ambient (Outdoor) Air Pollution," December 19, 2022, https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health.

[9] "Ambient (Outdoor) Air Pollution."

Though these pollutants may take on a somewhat disembodied and abstracted quality when described by their official, chemical names, their sources are diverse and regionally specific: in Dhaka, fine particulate matter is caused by diesel traffic and industrial manufacturing, notably brick kilns[10]. In Montreal, the unique regional contributor to air pollution is the burning of wood and other solid fuels for heating and cooking. For those who know that Montreal is in Quebec, a province with the cheapest and most abundant hydroelectricity in the continent,[11] this scenario is at first perplexing.

However, as an old city in Canadian terms, Montreal's municipal infrastructure maintenance is in an ever-present state of catch-up. Most power lines in the city are still above-ground, making them vulnerable to being downed by trees, a common occurrence during the city's frequent winter ice storms[12]. During these times, wood-heating is a common back-up for residences in Montreal. A 2008 survey of Quebecers showed a strong preference for at least partial home wood heating for this reason[13][14]. This reluctance by homeowners to give up wood-burning means that, at one time, their smoky emissions ranked second in overall contributors to $PM_{2.5}$ pollution in Montreal[15], an outlier in Canadian terms.

The primary cause of $PM_{2.5}$ pollution however, is fossil fuels, including petroleum refining along the city's shipping port and traffic emissions from the densely populated city-- Montreal Island alone is home to over 2 million residents, while the greater metropolitan area contains over 4 million,[16] an urban population density far higher than the Canadian average.

Where there's smoke, there's… bagels

In 2015, the Ville de Montréal city council finally acted on years of knowledge that the burning of wood for heating and cooking in the densely populated city was causing air pollution levels

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[10] Cole, "Secondhand Smoke World Map - HouseFresh."

[11] Hydro Quebec, "Comparison of Electricity Prices in Major North American Cities" (Hydro Quebec, 2022).

[12] Matthew Lapierre, "Bury the Wires? Trim the Trees? What Hydro-Québec Could Do to Prevent Another Mass Outage | CBC News," April 13, 2023, https://www.cbc.ca/news/canada/montreal/hydro-power-outage-map-montreal-1.6808180.

[13] Diane Bélanger et al., "Use of Residential Wood Heating in a Context of Climate Change: A Population Survey in Québec (Canada)," *BMC Public Health* 8, no. 1 (December 2008): 184, https://doi.org/10.1186/1471-2458-8-184.

[14] One need not go back as far as the historic 1998 ice storm in order to see the impacts of these power outages on air quality. A spring storm on April 5, 2023 caused over 1 million homes and businesses on Montreal Island to lose power, some for up to a week. 48 hours after the storm, the city's air quality readings showed an elevated reading of 37 with $PM_{2.5}$ as the main pollutant, indicating a possible increase in wood burning by residents with sustained power loss. My field notes from the time lend anecdotal credence to this; I noted a foggy air quality on the 6th and the significant smell of woodsmoke on the air in the NDG and Plateau boroughs on the 7th and 8th.

[15] "2014 Environmental Assessment Report: Air Quality in Montréal" (Réseau de surveillance de la qualité d l'air, 2015), Archives Nationales du Québec.

[16] Institut de la statistique du Québec, "Principaux indicateurs sur le Québec et ses régions," Institut de la Statistique du Québec, 2022, https://statistique.quebec.ca/fr/vitrine/region/06/mrc/66.

far beyond acceptable health limits, and passed a bylaw banning wood burning across all sectors. The ban (an amendment to the bylaw reglement 09[17]) came into fuller effect in 2018, stipulating that businesses burning wood, coal and charcoal, as well as household wood fireplaces not upgraded to meet stringent environmental standards would be prohibited from operating[18]. But by 2019, residents of Montreal's Plateau-Mile End neighbourhood were not convinced that the ban was being as stringently followed by some local neighbourhood businesses, especially the iconic wood-fired bagel shops (as well as pizza and chicken restaurants) the city is well-known for.[19]

Residents of buildings near these establishments had passed advice to one another for years, advising times of day to not open windows or let their children play outside to avoid smoke exposure. But the smoke seemed to be becoming an increasing problem. Many longtime residents, as well as parents to young children, began complaining to the city and then to the media. Eventually, something of a grassroots organising effort formed. A resident named Sarah Gilbert who became an activist and media spokesperson for her Mile End neighbours explained the basic stance of her and her neighbours' position to Montreal Gazette reporter Michelle Lalonde who reported on the issue for several years: "We don't mind the smell. This isn't just sensory. It's the fact that we are getting lungfuls of carcinogens and fine particulate just by living here with our children."[20]

As governing bodies across Canada try to mitigate the thousands of deaths[21] and rising healthcare costs incurred annually by air pollution by tightening up air quality regulations, the Canadian public has also become increasingly aware of the effects of environmental pollutants on their health[22]. St-Viateur bagel owner, Joe Morena, spotlighted this growing public awareness when he responded to Lalonde's question about the neighbourhood objections. "We are in a densely populated city. As you become sensitized and become aware of things, I think it's a good thing."[23]

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[17] Sonia Melançon, "The Impact of the Wood-Burning by-Law" (Montreal: Environment Department | Emissions control and environmental monitoring, 2021), https://portail-m4s.s3.montreal.ca/pdf/en-impact_du_reglement_sur_le_chauffage_au_bois_2009-2019_20210623_version_finale_3.pdf.

[18] Michelle Lalonde, "Montreal Bagels and the Pollution Problem," *Montrealgazette*, June 18, 2017, https://montrealgazette.com/news/local-news/montreal-bagels-and-the-pollution-problem.

[19] Michelle Lalonde, "Montreal Stalls on Plan to Curb Wood Smoke from Bagel Shops and Pizzerias," *Montreal Gazette*, July 9, 2019, https://montrealgazette.com/news/local-news/montreal-stalls-on-plan-to-curb-wood-smoke-from-bagel-shops-and-pizzerias.

[20] Lalonde, "Montreal Bagels and the Pollution Problem."

[21] Health Canada, "Outdoor Air Pollution and Health: Overview," guidance, January 21, 2022, https://www.canada.ca/en/health-canada/services/air-quality/outdoor-pollution-health.html.

[22] Sally Radisic et al., "Factors Influencing Health Behaviours in Response to the Air Quality Health Index: A Cross-Sectional Study in Hamilton, Canada," *Environmental Health Review* 59, no. 1 (March 2016): 17–29, https://doi.org/10.5864/d2016-002.

[23] Lalonde, "Montreal Bagels and the Pollution Problem."

While Sarah Gilbert perceives her problem with the smoke as driven by concerns about health, Joe Morena observes the process by which neighbours like Gilbert have come to pay attention to the smoke, implying that this attention-- or sensitivity-- has grown. Whereas smoke in other places and at other times, is a feature of everyday life-- so much so that it fades into the background-- with new knowledge of its ill effects, come new modes of paying attention to it: smoke takes on new meaning. For Sarah Gilbert, what the smoke is signalling is more than sensory nuisance-- it is signalling harm.

Figure 1. The St. Viateur Bagel shop in Montreal's Mile End neighbourhood. Photo by the author.

Lying by Emissions

Smoke is a shifting vapour, complex, and laden with meaning and emotion. Architect David Gissen describes smoke as "both matter and metaphor for the emerging paradoxes of modern civilization"[24], in which "smoke often intertwines ideas about bodies and buildings with additional concepts of class and health."[25] French historian Alain Corbin explains how smoke and class are entwined.[26] Like the particulate matter it contains, smoke is material; the atomised trace of a discrete

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[24] David Gissen, *Subnature: Architecture's Other Environments: Atmospheres, Matter, Life*, 1st ed (New York: Princeton Architectural Press, 2009), 49.

[25] Gissen, 44.

[26] Alain Corbin, *The Foul and the Fragrant: Odor and the French Social Imagination* (Cambridge, Mass: Harvard University Press, 1986).

object. And those objects change over the decades and eras of civilization. With the forces of industrialization and urbanisation came their new, anthropogenic emissions-- and new cultural associations to them. The impression of smoke curling from a homey chimney evokes very different response than that of smoke billowing from industrial smokestacks.

During the drawn-out process of instating progressively more stringent wood-burning bylaws, the City's executive committee recommended natural gas and electric ovens as two "clean" alternatives for restauranteurs.[27] Natural gas, like woodsmoke, is a vapour loaded with contested meanings. The fossil fuel lobby has been successful in marketing natural gas as a 'clean' fuel[28]. When combusted, it does produce lower levels of pollutants, especially $PM_{2.5}$, than do solid fuels like wood[29]. Though while *appearing* to be clean-burning, producing virtually no smoke or scent[30], gas cooking still creates significant indoor air pollution[31]. And while it might seem strange that the city would recommend one polluting entity to replace another, it is the analytical purpose of this project to expose the reasons underlying such a misperception.[32]

And so, what I focus on in this research is not only smoke or other forms of pollution, but the presence of $PM_{2.5}$ across multiple types of emissions and how those sources are differently perceived. Through the case study analysis, a question emerges: what to make of the fact that the source responsible for the majority of the pollutant in question ($PM_{2.5}$) is not wood-burning but the burning of fossil fuels-- largely from vehicular transportation?[33] And, why, aside from a bylaw against vehicle idling[34], has there been little regulatory action taken against vehicles-- and no visceral public response? Theses questions becomes sticker still considering the suggested replacement of wood by gas.

The nose knows… sort of

Critical to this study is the fact that with smoke, unlike with natural gas, most instances of vehicle exhaust and many other airborne pollutants, there *is* a clear signal perceivable by the senses:

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[27]Lalonde, "The Montreal Bagel Is Not Endangered. Wood Smoke, However, Is | Montreal Gazette," January 4, 2020, https://montrealgazette.com/news/local-news/the-montreal-bagel-is-not-endangered-wood-smoke-however-is.

[28] Amy Westervelt, "Gas Knew, Too + Everything You Need to Know on Climate This Week," Drilled, January 27, 2023, https://www.drilledpodcast.com/gas-knew-too-everything-you-need-to-know-on-climate-this-week/.

[29] And this is only to mention the consumption end. See Part 3 (Differentiation) of Literature review for a brief discussion of the pollution caused by natural gas extraction.

[30] The recognisable scent of stove gas is in fact an odourant added to otherwise odourless methane gas to help customers identify leaks.

[31] Shan Zhou et al., "Time-Resolved Measurements of Nitric Oxide, Nitrogen Dioxide, and Nitrous Acid in an Occupied New York Home," *Environmental Science & Technology* 52, no. 15 (August 7, 2018): 8355–64, https://doi.org/10.1021/acs.est.8b01792.

[32] Har, har.

[33] "2014 Environmental Assessment Report: Air Quality in Montréal."

[34] Ville de Montréal, "Motor Vehicle Idling," January 12, 2021, https://montreal.ca/en/topics/motor-vehicle-idling.

that signal is smell. While, as a bodily sense, olfaction makes up part of the human sensorium and is a feature of perception, it is not the physiological ability to smell alone that concerns its role in perception. The role of smell is slippery because it is both a factor and not; both absent and present, lending an understandable, though outsized epistemic and rhetorical influence to understandings of what is in the air, and subsequent horizons for action.

In my study, I explore the types of urban air pollution that are smellable in Montreal -- like smoke-- and those that aren't -- like traffic emissions or gas pollution -- and how odour/lack of odour exerts a social force. Particularly, I look at how perceived environmental threats to bodily integrity can coalesce certain types of public feeling of an intense and visceral kind. Contextualising this within a broader frame of olfactory perception, I briefly examine histories of smell and public health, particularly the pre-germ theory etiological concept of miasma and current scholarship exploring its continued impact on public perceptions of smell. I explore how all these concepts are deeply implicated in questions of power and how the forces of smell and deodorisation are mobilised as techniques within power systems to uphold the logics that permit pollution. My media component, an interactive augmented web game called *Nuisances,* seeks to address these topics by offering the public a counter mode of perceiving pollution, through smell and other forms of attunement, one that might make pollution logics a bit less common-sensical.

To sum, in this project I aim to answer the following questions:

1. What is smell's role in public perceptions of air pollution in Montreal?
2. How does olfaction play a role in the regime of perception that upholds the permission to pollute?
3. How could a media project assert a different regime of perception that does not uphold the permission to pollute?

"As long as we breathe, we're porous, and as long as we're porous, we cannot fully shield ourselves from airborne toxins and toxicants as well as other ambient threats."

-- J.T. Tremblay [35]

THEORETICAL FRAMEWORK

For the theoretical approach to this project, I draw from feminist science and technology studies to employ the following concepts: Murphy's concept of *regimes of (im)perceptibility***;** the Discard Studies definition of power as "the integrity of systems"[36] that seeks to protect its boundaries and maintain the distinctions between *insides and outsides.* Finally, I employ Nerea Calvillo's concept of *attuned sensing* as a counter technique to dominant regimes of perception.

Insides and Outsides: Techniques of Power and the Permission to Pollute

Métis scientist Max Liboiron describes how pollution is a property right[37] under Canadian law and thus a material, ontological enactment of colonialism[38]. Land (and air, and water) is seen as private property that an individual can use in a manner of their choosing to maximise its economic utility. In an example under this logic, choosing to pollute your own pond does not constitute pollution; it only becomes pollution if it leaks into your neighbour's pond. This, says Liboiron, upholds the fantasy of separation[39] and of closed and controllable boundaries which serves to maintain the inside-outside distinction that upholds systems of power. In reality, however, land, air and water (and people) *are* porous and interconnected-- a fact that is paradoxically required to uphold another critical pollution logic: the logic of "the sink".

Liboiron traces the ontological assumptions that permit land, air, water and other common resources to be seen as sinks-- possessing a "self-purifying" capacity to absorb or disperse a certain amount of toxins, pollutants and other chemicals without damage[40]. The idea of a sink is so deeply embedded in Western environmental management practices that terms like "assimilative capacity" and "carrying capacity" pass by unquestioned. But, as Liboiron emphasises in their 2020 book, *Pollution is Colonialism,* these concepts, far from being universal, empirical properties of the environment, are the products of a laboriously crafted[41] and narrow logic that enables what is known as the "permission to

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[35] Jean-Thomas Tremblay, *Breathing Aesthetics* (Durham: Duke University Press, 2022), 1.
[36] Max Liboiron and Josh Lepawsky, *Discard Studies: Wasting, Systems, and Power* (Cambridge, Massachusetts ; London, England: The MIT Press, 2022), 63.
[37] Max Liboiron, *Pollution Is Colonialism* (Durham and London: Duke University Press, 2021), 67.
[38] Liboiron, 57.
[39] Liboiron, 48.
[40] Liboiron, 47–50.
[41] I borrow this phrasing from Max Liboiron. Liboiron, 51.

pollute". The permission to pollute and its logics was required for industry and colonial expansion to progress. "Instead of changing systems that allowed industrial effluents to begin with," Liboiron writes, "governance could turn to technical efforts to locate and manage allowable limits."[42] On the one hand, flows of matter are required to disperse, displace and render imperceptible the effluent resulting from power's material demands. Yet on the other, the inside-outside distinction must be maintained.

The concept of insides and outsides was made famous by the work of anthropologist Mary Douglas. Douglas's 1966 book, *Purity and Danger*, analysed the processes by which cultural norms are ordered and maintained through ritualised acts of purification. Douglas's assertions are taken up by Liboiron and Lepawsky, who turn their focus away from purity, and toward the acts of discarding that are critical to the upkeep of power. This constitutes the basis of the emerging field of discard studies, which is an analysis of power: "where there is a system, there must be rejected elements…and one way to investigate systems is by studying what and how they reject, abject, and oppress.[43]"

Liboiron and Lepawsky then offer an "unfaithful"[44] use of Mary Douglas's list of techniques for keeping dirt/waste in place which they call "techniques of power"[45]. These techniques include labelling of events or objects as anomalous or dangerous, and physically controlling these events or objects.[46] Inspired by their approach, I seek to name the techniques of power that uphold the permission to pollute in Montreal's air, and argue that these techniques share an important olfactory dimension.

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[42] Liboiron, 51.
[43] Liboiron and Lepawsky, *Discard Studies*, 76–77.
[44] Liboiron and Lepawsky, 85. (They explain that while Douglas's work was "primitivist and reductive" the techniques are still useful to draw upon.)
[45] Liboiron and Lepawsky, 85.
[46] Liboiron and Lepawsky, 86–95.

Figure 2. A sign by Montreal's port tells passersby that no entry-- or perhaps, taking a poetic approach to translation, that no feeling/ smelling-- is allowed? Photo by the author.

Regimes of (Im)Perceptibility

I now turn to historian of science M. Murphy's concept of 'regimes of perceptibility'. Murphy's study that originated the concept looked at indoor air pollution after the emergence of the mid century office building, and the ways in which the mostly middle class female workers suffered a range of health problems that later came to be known as 'sick building syndrome'[47]. The cause of the widespread respiratory and health effects experienced by the office workers were the noxious fumes offgased by the preponderance of new synthetic materials -- like carpets, upholstery, and adhesives-- that lined these enclosed spaces. Murphy charts the mechanisms through which these materials as the cause of sick building syndrome was rendered uncertain. They argue that these office buildings were discursively constructed as the paragon of modern, post-industrial, white, middle-class labour. The racial privilege and distance from toxicity expected by these workers was being transgressed by the toxicities of the materials that made up their supposedly sanitary work environment. Because of this, it was much more difficult to locate the source of the health concerns as coming from 'inside the house', so to speak. Instead, it was easier, in the beginning, to locate the problem in the individual; as the

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[47] M. Murphy, *Sick Building Syndrome and the Problem of Uncertainty: Environmental Politics, Technoscience, and Women Workers* (Duke University Press, 2006).

majority of the sufferers were female, the gendered dismissal of women's symptoms as being psychosomatic was an easy move.

In another hypothetical workplace however, one full of male workers doing manual labour, say, or one full of soot, smoke, and industrial chemicals, the causes of the workers' ill health might be more epistemically certain. But why is this? It seems natural to innately know that soot, smoke and chemicals cause harm, but that is Murphy's point: that knowledge has been historically generated and implemented so as to be seen as natural or common sense. Yet this rather belies its function as a regime of perception. To explain, it is worth quoting Murphy at length:

> Perception is characterized by historically specific modes of paying attention, which always necessitated strategic suspensions of perception. Perception involves historically produced disengagements from a broader field of bombardments for the sake of concentrating on and rendering intelligible a more narrowly differentiated set of phenomena. In other words, focusing on a single signal entails a learned inattention to other noise. These suspensions of perception, moreover, result not just in passive disengagements but also the production of historically specific terrains of invisibility, the outcome of what I am calling regimes of perceptibility.[48]

The new class of office workers in Murphy's study may or may not have been able to individually perceive that the toxic exhalations of the synthetic carpets and adhesives were making them feel sick. The regime of perception foreclosed not only on this causal connection, but the ability for worker to identify their feelings as such to themselves. A regime of perceptibility then draws questions of sensory perception into an onto-epistemological framing that centres address of the structures of power that prioritise attention to certain things over others.

Attuned Sensing

Guiding my methodological approach is the concept of "attunement" that has emerged from feminist science studies, and specifically "attuned sensing" proposed by STS scholar Nerea Calvillo[49]. Calvillo's concept comes from her study of regimes of monitoring air pollution in Madrid. She explains it as "a heuristic of a mode of sensing toxicity that is sensitive to the processual, material and affective encounters…which take place within institutional spaces but also in everyday life."[50] Attuned sensing thus connects notions of affect, harm and sensory perception within an epistemic framing to

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[48] Murphy, 111.
[49] Nerea Calvillo, "Political Airs: From Monitoring to Attuned Sensing Air Pollution," *Social Studies of Science* 48, no. 3 (June 2018): 372–88, https://doi.org/10.1177/0306312718784656.
[50] Calvillo, 376.

offer a process of re-sensitising and re-attuning oneself to the atmosphere. This re-sensitised re-attunement, she says, might configure "a different regime of perceptibility than the monitoring one, what I am calling an 'attuned sensing' regime, which produced other forms of citizen relations with toxicity."[51]

In her paper she outlines a controversy in which the city of Madrid attempted to gerrymander its air pollution readings to meet EU regulations by redistributing air quality monitoring stations to less polluted areas. She subsequently documents the efforts of different municipal groups and stakeholders to "sense" and "attune to" these actions of the government— enacting their own ways of relating to the toxicity in the air, and contesting the quantitative techno-scientific regimes that govern what is toxic and what is not. She does not refute the potential value of air quality data, but proposes "to find other arenas in which to deal with the toxic air."[52]

What I find especially useful in Calvillo's framing is her 'both-and' approach: she describes toxicity as both the feminist science studies notion of toxicity as enacting relations between bodies *and* a technopolitical category. She is sensitive to the tensions of her term, given other scholars Jennifer Gabrys's and Katheleen Stewart's contrasting uses of 'attunement' to apply to material environments *and* social situations respectively. She writes that, "keeping the tension between the two is productive …it includes a diverse range of kinds of sensing and things sensed."[53] It is the flexibility of the concept that makes it useful methodologically, particularly as the goal of my game is to attune the player to both their embodied experience of smell, and the broader political situation that dominant regimes of perception may obscure via deodorisation.

 In attempting to engender both forms of attunement, my hope is that my research-creation media project, *Nuisances,* might begin to offer its own regime of perception, one that counters the permission to pollute, via attunement *beyond* nuisance in all its forms.

Bringing these theoretical concepts together, I turn to offer a review of the literature relevant to my questions pertaining to air pollution, power, olfaction and regimes of perception. They are organised by section according to the olfactory techniques of power that emerged as key findings from my study. Those techniques I call *Disgust, Diffusion* and *Differentiation*. Later, I explicate my research-creation process along those same three concepts, and how I hope my media piece, the interactive augmented web game *Nuisances,* offers ways to these counter-techniques via attuned sensing.

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[51] Calvillo, 382.
[52] Calvillo, 373.
[53] Ibid.,

LITERATURE REVIEW

PART 1: DISGUST

By 2017, Plateau-Mile End residents were growing upset about the slow movement on the part of the city to update the 2015 bylaw that regulated the burning of solid fuels in the city. Their neighbourhood was intolerably smokey, they said, and seemed like it was getting worse, thanks to what they believed to be the local bagel shops ramping up their production to meet higher and higher customer demand. In a 2018 article, Gazette reporter Michelle Lalonde quotes a resident of the Mile End, who characterises the visible smoke coming out of smokestacks from restaurants on Rachel St. as "obviously and clearly not appropriate for a residential area." The resident goes on to say that, "[i]n a modern western city, it's disgraceful. This is the 21st century.'"[54] This resident perfectly articulates the contemporary North American perception of smoke as Architect David Gissen would describe it: a 'subnature'; an abject environmental entity (like mud and dust) that modern life does its best to eliminate, or at least contain.

Of the dozen-plus articles Lalonde wrote between 2014 and 2022 on the subject of the wood-burning bylaws, the ones that contained reference to the smoke's odour tended to be the human-interest stories that painted the picture of a neighbourhood of parents, children, and seniors in acute distress. "Every time I smelled wood smoke in my house I wondered if it was affecting the health of my daughter. Now that it's gone I feel better. That benefit is clear," a resident told Lalonde.[55] Other neighbours said they could tell whenever one bagelry's chimney smoke scrubbers failed, citing the sudden smell of wood smoke, which the bagelry's owner vehemently refuted when asked.[56] Why such strong emotion, seemingly on both sides of this civic issue?

Visceral Publics, Olfactory Publics

Jenell Johnson's case study of the intense public response that coalesced around the introduction of fluoride to drinking water in a mid-century New England town offers, by way of description, what she calls a "visceral public". Drawing from the Habermasian theory of the public as "a collection of private individuals organized through discourse", Johnson proposes that visceral publics specifically "emerge from discourse about boundaries, and they cohere by means of intense

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[54] Michelle Lalonde, "Montreal Will Take Action on Wood-Fired Businesses 'in the near Future,'" *Montrealgazette*, January 5, 2022, https://montrealgazette.com/news/local-news/montreal-will-take-action-on-wood-fired-businesses-in-the-near-future.

[55] Lalonde, "Montreal Stalls on Plan to Curb Wood Smoke from Bagel Shops and Pizzerias."

[56] Lalonde, "The Montreal Bagel Is Not Endangered. Wood Smoke, However, Is | Montreal Gazette."

feeling."[57]. By studying public records and news media, she pieced together a rationale for this phenomenon, one that counters the historical assumption that the anti-fluoridation movement was purely ideological, stemming from postwar anticommunist conspiracy theories around public health measures.[58] Instead, she argues, citing rhetorician Celeste Condit, ideology alone does not produce political action; what does is intense affect or feelings-- particularly those of anxiety and fear[59].

She draws from Sara Ahmed's assertion that fear is an emotion that stimulates in people the impulse towards "the production and maintenance of borders, which serve to clearly delineate 'self' and 'other,' 'us' and 'them,' 'inside' and 'outside,' as a means of security and protection."[60]. Hence Johnson's choice of the word *visceral*. As she explains, visceral:

> refers to more than just the body or the body's insides. It concerns the surfaces and orifices—the skin, the mouth, the lungs, the alimentary tract—that link the inside to the outside and the body-as-subject to the body-as-object, the porous membranes that bring the body and world into relation.[61]

The intense viscerality of the New England residents' response to the fluoridation of their water was a fearful rejection of this unknown substance entering their bodies and also, as per Liboiron and Lepawsky, a threat to the coherence of their perceived system of power. Though the medium of contamination is different-- water versus air-- I frame the Montreal situation as a visceral public due to the similar degree of revulsion expressed about the wood smoke and the key role of media in the construction of the public discourse.

A key distinction to highlight between Johnson's study and mine is that woodsmoke *is* harmful to the body. However: this does not diminish the salience of the visceral public concept to my case. To borrow Johnson's logic, political ideology alone likely would not have caused these Mile End residents to take up the years of public action against the smoke. If that were the case, they would be speaking out against the issue of the 2023 forest fire smoke, or against chronic vehicular traffic pollution in the city, or even their wood-burning residential neighbours. What spurred their action is the visceral feeling of threat to bodily boundaries that the smoke caused, and that this viscerality originates in the ability to perceive it via smell.

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[57] Jenell Johnson, "'A Man's Mouth Is His Castle': The Midcentury Fluoridation Controversy and the Visceral Public," *Quarterly Journal of Speech* 102, no. 1 (January 2, 2016): 2, https://doi.org/10.1080/00335630.2015.1135506.
[58] Johnson, 7.
[59] ibid.,
[60] Johnson, 8.
[61] Johnson, 5.

In discard studies, the word for the technique of ejection and rejection is discarding. However, drawing upon the distinctly olfactory quality of this situation, plus the especially visceral response evoked in the neighbours' characterisations of the smoke, a more appropriate word might be *disgust.* Perhaps due to its material transgression of bodily boundaries through the nose, no other sense has the ability to trigger disgust like smell. Smell produces behaviours that are conditional on psychological context: writes neuroscientist A.S. Barwich, "things tend to smell differently if you are hungry or sated, bored or engaged, joyous or enraged… Your nose conveys information not only about the world but about yourself."[62] To feel disgust at a smell therefore requires the preexisting psychological context of one's own orientation to the smelly object. This orientation is akin to fear as Ahmed describes it, but while fear wants to assert boundaries for security, disgust is the even more visceral feeling of those boundaries already having been crossed.[63]

Figure 3. Some of the Plateau-Mile End neighbours who viscerally opposed the wood smoke pose for a photo featured in an article by Lalonde. Photo credit: Montreal Gazette, January 5, 2022.

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[62] A. S. Barwich, *Smellosophy: What the Nose Tells the Mind* (Cambridge, Massachusetts: Harvard University Press, 2020), 81–82.
[63] Paul Rozin and April E. Fallon, "A Perspective on Disgust.," *Psychological Review* 94, no. 1 (1987): 23–41, https://doi.org/10.1037/0033-295X.94.1.23.

From Miasma to Deodorization: Smell from Epistemic to Rhetorical

In my case study, smell functions in a dual manner-- signifying the presence of smoke, and then arousing emotions relating to health. This connection between smell and health is explained by historian William Tullett, who describes a common interpretation made by historians of public health in which contemporary anxieties over bad smells are holdovers from the 19th century miasma theories of disease. Miasmatists believed the causes of disease to be "harmful odors, mists, or substances … particularly resulting from organic matter in the environment."[64] Historian Emily Winderman discusses the 'all smell is disease' paradigm of British public health in the 19th century as one that saw "bad smells as threats to individual and collective health."[65] The sanitary imperative, therefore was to deodorise. The result, say many historians, is that contemporary society has an outsized visceral response to bad smells, even though logically, germ theory[66] should have displaced this anxiety.

However, as Tullett argues, though the common Victorian may have believed that a foul stench transmitted sickness, it is unclear whether the medical profession, including the sanitarians, ever truly did. What Tullet points out is that the sanitarian movement[67], astutely recognizing the affective power of smells, took hold of the public's anxieties around miasmic stench, giving it rhetorical force in sanitary literature[68]. Smell as a social force, he says, transformed from epistemic (bad smells cause disease) to rhetorical (bad smells are bad/ signify badness). While they lost out to germ theory, the sanitarians largely succeeded in the deodorisation of the public sphere that persists to this day. Writes Tullett, this paradoxically "resulted in a reodorization of urban space *in the noses* of sanitary investigators and the texts that they produced." [69] In other words, as the deodorization of the public sphere progressed, social sensitivity to smells increased.

This shifting sensitivity is the central focus of historian Alain Corbin's study of France, where "what had occurred between 1750 and 1850 was a 'perceptual revolution' in which 'odours were more keenly smelled and thresholds of tolerance abruptly lowered'. This shift produced new…measures in which the deodorization of urban space was both the goal and material outcome."[70] Presently in the

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[64] Marjorie A. MacDonald, "From Miasma to Fractals: The Epidemiology Revolution and Public Health Nursing," *Public Health Nursing* 21, no. 4 (July 2004): 382, https://doi.org/10.1111/j.0737-1209.2004.21412.x.

[65] Emily Winderman, Robert Mejia, and Brandon Rogers, "'All Smell Is Disease': Miasma, Sensory Rhetoric, and the Sanitary-Bacteriologic of Visceral Public Health," *Rhetoric of Health & Medicine* 2, no. 2 (July 2019): 116, https://doi.org/10.5744/rhm.2019.1006.

[66] Germ theory is now scientific fact-- that microbes transmit communicable disease and infection.

[67] The Sanitarian movement opposed germ theory, however it pushed for public health approaches that are surprisingly modern in other respects.

[68] William Tullett, "RE-ODORIZATION, DISEASE, AND EMOTION IN MID-NINETEENTH-CENTURY ENGLAND," *The Historical Journal* 62, no. 3 (September 2019): 765–88, https://doi.org/10.1017/S0018246X18000286.

[69] Tullett, 766.

[70] Tullett, 767–68.

West, the majority of smells are contained, sanitised, suppressed or displaced away. Art critic Jim Drobnick describes the contemporary West as being full of "'blandscapes': those aseptic places, created by the modernist drive towards deodorization"[71]. Smoke has a particular significance within such blandscapes: Gissen writes that we are "in an era in which the sophistication and wealth of contemporary cities is defined by the absense of smoke."[72]

This general absence means that when there *is* smoke, one can more easily discern it. In the Mile End, the epistemological and rhetorical function of the smell of smoke was clear. But as Murphy reminds us, "focusing on a single signal entails a learned inattention to other noise."[73] If smoke's strong aroma was the signal that focalized attention and signified harm, what was the 'noise' to which the neighbours learned inattention? Geographer Douglas Porteous writes that in a city, "individual smell events are as figure to a ground of omni-present vehicle vapours, dimly-perceived because of habituation."[74] The vehicular smellscape may very well constitute the noise to which urban dwellers have become habituated. In this next section, I will explore some of these conditions of habituation and propose that the public acquiescence to more omnipresent forms of harm is produced by the absence of sensory signal.

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[71] Jim Drobnick, "Toposmia: Art, Scent, and Interrogations of Spatiality," *Angelaki* 7, no. 1 (April 2002): 34, https://doi.org/10.1080/09697250220142047.

[72] Gissen, *Subnature*, 44.

[73] Murphy, *Sick Building Syndrome and the Problem of Uncertainty: Environmental Politics, Technoscience, and Women Workers*, 111.

[74] J. Douglas Porteous, "Smellscape," *Progress in Physical Geography: Earth and Environment* 9, no. 3 (September 1985): 364, https://doi.org/10.1177/030913338500900303.

PART 2: DIFFUSION

I now turn to explore what I have defined as the second olfactory technique of rendering air pollution imperceptible: *diffusion*. The visceral reaction to the smoke from the restaurants led to a clear governmental solution: it was up to each business to curb its emissions. This approach both in scale and in type is contrasted by the city's approach to dealing with its most significant source of $PM_{2.5}$: vehicular emissions. While the city does have a bylaw against vehicle idling, the governance of diffuse and complex issues like fossil fuel emissions is arguably beyond the scope of city bylaws. Rather, the diffuseness of the problem of fossil fuel emissions is mirrored in the diffuseness of these strategies to curb them: they tend to be handled in a piecemeal manner by multiple levels of government and through a range of structural approaches including regulation, taxation, and subsidies[75].

This approach arguably diffuses the onus of responsibility from individual large polluters, and therefore the discipline they face. A May 2023 CBC article reported on the province's 2030 carbon emissions targets; in it, Environment Minister Benoit Charette was quoted on emissions reductions talks with the province's largest polluters, saying he would not "bring out the stick"[76] and impose targets on them *just yet*. This lenient governmental approach to curtailing the most pressing existential threat of our time contrasts to the strict, individualised regulatory approach that was taken at the city level against solid fuel burning.

In exploring why this might be, the material principle of diffusion bears examination. Air is a material substance that diffuses, meaning that the closer one is physically to a source of the pollution, the more concentrated it will be. Therefore, even though the bakeries and restaurants contribute a relatively small amount of $PM_{2.5}$ to Montreal's air overall, at the localised level, their concentrated emissions are genuinely significant to neighbourhood health concerns. At the time of Lalonde's writing between 2017 and 2022, around 70 restaurants contributed together around 60 tonnes of $PM_{2.5}$ annually into the air.[77] While this amount is dwarfed by the amount produced by vehicular traffic (over 800 tonnes annually[78]), and the amount produced by residential wood burning (prior to the ban, over 600

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[75] Angela V. Carter, Gail S. Fraser, and Anna Zalik, "Environmental Policy Convergence in Canada's Fossil Fuel Provinces? Regulatory Streamlining, Impediments, and Drift," *Canadian Public Policy* 43, no. 1 (March 2017): 61–76, https://doi.org/10.3138/cpp.2016-041., Dave Sawyer and Seton Stiebert, "Fossil Fuels - At What Cost? Government Support for Upstream Oil Activities in Three Canadian Provinces: Alberta, Saskatchewan and Newfoundland & Labrador," *SSRN Electronic Journal*, 2010, https://doi.org/10.2139/ssrn.1701792.

[76] Cassandra Yanez-Leyton and Antoni Nerestant, "With 2030 Deadline Approaching, CAQ Boosts Spending to Reduce Quebec's Emissions | CBC News," CBC, May 19, 2023, https://www.cbc.ca/news/canada/montreal/legault-environment-emissions-plan-carbon-1.6849055.

[77] Diane Boulet, "Bilan Environnemental 2014: Qualité de l'air à Montréal" (Service de l'environnement Division de la planifi cation et du suivi environnemental, 2015), http://ville.montreal.qc.ca/pls/portal/docs/PAGE/ENVIRO_FR/MEDIA/DOCUMENTS/RSQA_bilan2014_FR.pdf.

[78] Lalonde, "Montreal Bagels and the Pollution Problem."

tonnes annually[79]), the smaller number of individual contributors to this 60 tonnes meant that the smoke was much more concentrated near each contributor, especially in the zones 500 m radius from each establishment.[80] This concentration in the air, both of harmful particulate and other pollutants, as well as smell[81], is significant. The following table illustrates the diffuseness of pollution by source.

Table 1. Diffusion of PM$_{2.5}$ pollution emissions by source in Montreal

	Top Sources of PM$_{2.5}$ Pollution in Montreal	Estimated tonnes PM$_{2.5}$ emitted per year[82]	Approximate number of emitters	Estimated tonnes released per emitter per year
More Diffuse	Vehicular traffic	818	2.40 million[83]	0.0004
	Solid fuel burning by homes	701	48,000[84]	0.0145
	Solid fuel burning by restaurants	60	70[85]	0.857
More Concentrated	Petroleum refining	55.48[86]	1[87]	55.48

[79] Ibid.,

[80] Lalonde, "Montreal Will Take Action on Wood-Fired Businesses 'in the near Future.'"

[81] For a more full discussion on the role of concentration and diffusion on the smell of pollutants, see Method 2: Smellwalking, and Appendix A.

[82] Boulet, "Bilan Environnemental 2014: Qualité de l'air à Montréal." All figures in this column from this source except for figure for petroleum refining.

[83] Sum of 2020 data for "Vehicules en circulation" including passenger vehicles, commercial vehicles, and restricted vehicles from "Transport: Grand Montréal en statistiques," Observatoire du Grand Montréal | Communauté Métropolitain de Montréal, 2020, https://observatoire.cmm.qc.ca/produits/notes-de-lobservatoire-grand-montreal/.

[84] Jay Turnbull, "Montreal Bylaw on Wood-Burning Stoves Comes into Effect Today | CBC News," CBC, October 1, 2018, https://www.cbc.ca/news/canada/montreal/montreal-bylaw-wood-burning-stoves-1.4844083.

[85] Boulet, "Bilan Environnemental 2014: Qualité de l'air à Montréal."

[86] "Registre des émissions de contaminants atmosphériques," CSV (l'Environnement et de la Lutte contre les changements climatiques, March 10, 2023), https://www.donneesquebec.ca/recherche/dataset/34a55740-b030-4618-9558-9c69d8e93ac4/resource/49de48d8-6c7d-4ccf-9075-f8e908e03567/download/registre_contaminants.csv.

[87] "Registre des émissions de contaminants atmosphériques."

Liboiron writes that the permission to pollute relies on the fantasy property of land, air, and water functioning as 'sinks' such that, so long as the rate of pollution does not exceed the sink's 'carrying capacity', the pollution will diffuse away to the point of near-magical evanescence. While most forms of pollution do not truly disappear, at a certain threshold of diffusion, they may become virtually imperceptible from a sensory point of reference. This has consequences for the different health risks *and* visceral feelings produced by different kinds of pollutants whose causes are more concentrated or more diffuse.

A meta analysis by Karen Bickerstaff looked at the psychometric factors of 'dread' and 'unknownness' as factors in public risk perception of air pollution. She found that risks considered to be more familiar or everyday "scored low on both [factors], despite being judged a more likely cause of harm in expert evaluations."[88] Fossil fuel pollution is both "more familiar and of known consequences"[89] and would therefore be expected to score low for both 'dread' and 'unknown'. This implies that fossil fuel pollution, which is more harmful overall, is less associated with perceived risk. The familiarity with fossil fuel pollution seems a clear result of its widespread, and indeed, diffuse, presence within urban life. She also points out that an individual's perception of their own agency in face of risk is highly influenced by the "scale or spatial reach"[90] of air pollution, saying that for larger, looming risks like climate change, "personal action is seen to be increasingly futile."[91] These factors lend further validity to the logics of the visceral public in face of the far less familiar and spatially concentrated smoke.

Thresholds and The Slow Violence of Diffusion

I now turn to explore a tool that figures in my case study, one that at one time renders pollution perceptible, while at the same time, I argue, upholds it's continued permission to exist by normalising a standard amount of diffused, ambient pollution. The tool is the Air Quality Index (AQI), an average measure of air pollutants over time. The AQI is used by Montreal's Réseau de Surveillance sur la Qualité de l'Air (RSQA) to produce air quality data in the city of Montreal using sensors at its 11 permanent monitoring stations[92]. The AQI contains the classifications of Good, Acceptable and Poor

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[88] Karen Bickerstaff, "Risk Perception Research: Socio-Cultural Perspectives on the Public Experience of Air Pollution," *Environment International* 30, no. 6 (August 2004): 829, https://doi.org/10.1016/j.envint.2003.12.001.

[89] Ibid.,

[90] Bickerstaff, "Risk Perception Research," 833.

[91] Ibid.,

[92] Réseau de surveillance de la qualité de l'air, "Environmental Assessment Report 2022 |Air Quality in Montreal" (Montreal: Service de l'environnement, n.d.), https://portail-m4s.s3.montreal.ca/pdf/bilan_qualite_air_2022_en_final_v2.pdf.

air quality, where a reading of 0-25 is Good, 26-50 is Acceptable, and 50+ is Poor. The choice of these terms is weighty, implying that there is some level of pollution that is not only acceptable, but good.

As media and technology theorist Jennifer Gabrys points out, tools like indexes and the sensing apparatuses that provide their data are not neutral; they "do not simply detect external phenomena to be reported"[93]. Instead, she says, sensing technologies reproduce the ontological and epistemological assumptions they were created with:

> The production of air quality data through environmental monitoring generates distinct subject-superject entities and occasions for generating and making sense of that data—as scientific facts, matters of concern, or even as inchoate patterns produced through unstable technologies or sporadic monitoring practices.[94]

For our context, this only begins to illustrate how tools like the AQI can serve to uphold regimes of perception.

In their 2019 study of Quebec's air quality warning system, Masselot et al. point out that the AQI is only a measure of statistical risk based on mass population data correlating pollutant concentrations with excess moralities[95]. An AQI reading of Good (25 or under) simply means that the air pollution has not breached a statistical threshold at which it is likely to cause excess mortalities at the population level. As such, they argue, the AQI is not a useful tool for warning the public of actual risks to their individual health, even more so for those who suffer health conditions. In this case, the metaphysics of 'carrying capacity' that Liboiron criticises is extended to the human body, which is seen to carry the capacity to 'cleanse itself' of a certain amount of pollutant.[96] The thresholds between the AQI categories rely on a universal definition of what harm *is*. What the AQI does not address is individuals whose bodies the so-called "good" amount of pollution *will* harm.

Seen in this light, the threshold-based index not only upholds the logics of carrying capacity and permission to pollute-- it is biopolitical in the sense that it lets die[97] the most vulnerable individuals in a population. These deaths are not only permitted, but rendered invisible. Calvillo discusses how cities partake in obfuscating airborne violence: sensing and monitoring tools like the AQI involve "a

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[93] Jennifer Gabrys, *Program Earth: Environmental Sensing Technology and the Making of a Computational Planet*, Electronic Mediations 49 (Minneapolis: University of Minnesota Press, 2016), 160.
[94] Ibid.,
[95] Pierre Masselot et al., "Toward an Improved Air Pollution Warning System in Quebec," *International Journal of Environmental Research and Public Health* 16, no. 12 (June 13, 2019): https://doi.org/10.3390/ijerph16122095.
[96] The body, Liboiron points out in *Pollution is Colonialism*, citing the famous Paracleseus adage that 'the dose makes the poison' is the original site of the concept of there being an acceptable amount of pollution.
[97] Paul Rabinow and Nikolas Rose, "Biopower Today," *BioSocieties* 1, no. 2 (June 2006): 195–217, https://doi.org/10.1017/S1745855206040014.

process of stabilization of a figure that involves mathematics and statistics"[98] through which death is normalised. In her case study of Madrid, the placement of air quality monitors themselves was intentionally orchestrated in low pollution areas (particularly low traffic pollution areas) to stabilise and diffuse the city's overall pollution data. While there is no indication that any gerrymandering of this type has happened in Montreal, it does point to the material conditions that underlie the production of air monitoring data. Calvillo expresses how the bias and dominance in monitoring regimes is magnified when data are taken as tacit truth. She also points out other issues with the way data impedes social progress:

> First, the quality and quantity of data are limitless, as actors can always argue that data is not good or insufficient, and hence delay action. Second, it translates to citizens the responsibility to act, either by managing their own health by paying attention to the Air Quality Index, or by reducing emissions, as the spokesperson of the City Council Area of the Environment suggested: 'it is citizens, who have to be aware of the problem and make a more reasonable use of cars'.[99]
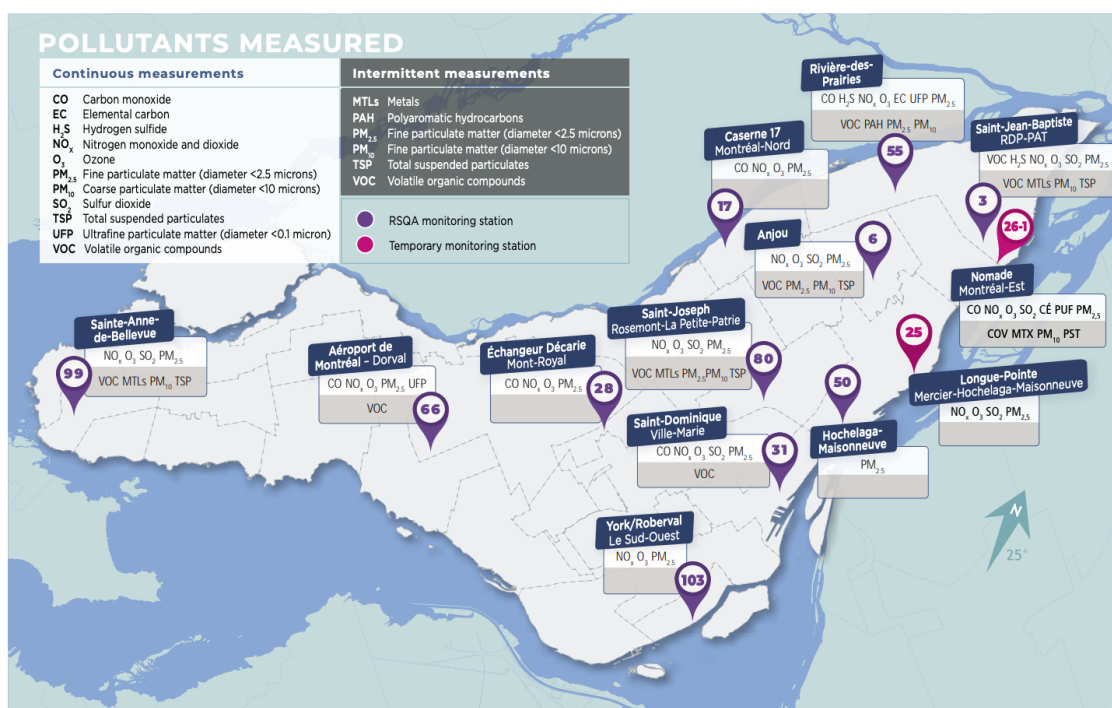
Figure 4. A map of Montreal Air Quality Monitoring Stations. The stations measure pollutants in the air at the localised scale to deliver the AQI-- i.e., telling residents how likely it is that there will be more deaths at the population level due to the air pollution that day. Source: RSQA 2022[100].

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[98] Calvillo, "Political Airs," 377.

[99] Calvillo, 379.

[100] Réseau de surveillance de la qualité de l'air, "Environmental Assessment Report 2022 |Air Quality in Montreal."

There is, however, another air quality index that does capture other types of impacts to health. The Canadian Air Quality Health Index (AQHI)[101] is scaled to express the risk to individual human health based on health guidelines, not population statistic thresholds of excess mortality. Further, the AQHI takes into consideration the health impacts of multiple pollutants working in tandem, as well as regional factors such as heat and humidity, which the AQI does not.[102] Masselot et al. conclude that "thresholds do not necessarily accurately reflect the impact of AQIs or air pollutants on public health"[103] In other words, an AQI reading of Good could quite conceivably contain (and conceal) levels of pollution that are extremely harmful to many city residents. By labelling the categories as such, the AQI renders imperceptible the harms in the air, and invites public acquiescence.

This demonstrates the AQI's role as a tool in the regime of perceptibility that upholds permission to pollute in Montreal: it assumes that, at some level of diffusion, pollution functionally disappears. Yet, contrary to this logic, lower concentration does not always equal less harm. Lower concentrations of certain toxins have also been shown to produce particularly detrimental effects: Liboiron illustrates this clearly in their study of bisphenol-A, which has unique endocrine-disrupting properties *only* at low concentrations[104]. In the case of air pollution in places like Canada with relatively clean air, a worrying study shows that "small variations in exposure at lower concentrations can result in large health differences."[105] In other words, thresholds of harm are assumed to have a linear scaling-up effect, when in practice, there is a great deal of harm from lower thresholds of ambient, chronic air pollution.

Many have named this creeping, slow form of harm precipitated by chronic exposure to pollution: philosopher Peter Sloterdijk identified the shift, effected by dawning of the age of pollution and chemical warfare, in the conceptualisation of air itself from a taken-for-granted non-entity, to an explicit and vulnerable one-- "an air-conditioning system."[106] Jasbir Puar proposes how this produces 'debility'[107]-- a form of distributed harm that contrasts to individualised notions of 'disability'-- and

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[101] Environment and Climate Change Canada, "Air Quality Health Index," January 11, 2008, https://www.canada.ca/en/environment-climate-change/services/air-quality-health-index.html.

[102] Tze Wai Wong et al., "Developing a Risk-Based Air Quality Health Index," *Atmospheric Environment* 76 (September 2013): 52–58, https://doi.org/10.1016/j.atmosenv.2012.06.071.

[103] Masselot et al., "Toward an Improved Air Pollution Warning System in Quebec," 2.

[104] Liboiron, *Pollution Is Colonialism*.

[105] Amanda Giang and Kaitlin Castellani, "Cumulative Air Pollution Indicators Highlight Unique Patterns of Injustice in Urban Canada," *Environmental Research Letters* 15, no. 12 (December 16, 2020): 2, https://doi.org/10.1088/1748-9326/abcac5.

[106] Bruno Latour, "Air," in *Sensorium: Embodied Experience, Technology and Contemporary Art* (Cambridge: MIT Press, 2006).

[107] Jasbir K. Puar, "Prognosis Time: Towards a Geopolitics of Affect, Debility and Capacity," *Women & Performance: A Journal of Feminist Theory* 19, no. 2 (July 2009): 161–72, https://doi.org/10.1080/07407700903034147.

Rob Nixon calls it environmental 'slow violence'.[108] Hsu points to the aesthetic dimension of slow violence[109] and how the social forces of deodorisation have effectively let these diffuse and sensorily imperceptible harms remain. Having explored the manner in which diffusion conditions the air, renders harms imperceptible and thus upholds the permission to pollute, I now turn to another technique of deodorisation, one that functions in a very different way.

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[108] Thom Davies, "Slow Violence and Toxic Geographies: 'Out of Sight' to Whom?," *Environment and Planning C: Politics and Space* 40, no. 2 (March 2022): 409–27, https://doi.org/10.1177/2399654419841063.
[109] Hsuan L. 1976- Hsu, *The Smell of Risk : Environmental Disparities and Olfactory Aesthetics* (New York: New York University Press, 2020), 61, https://doi.org/10.18574/9781479805372.

PART 3: DIFFERENTIATION

Montreal's Shadowlands

In this final section, I turn to explore the third and last olfactory mechanism that emerged from my study which I am calling *differentiation.* I borrow the term from literary scholar Hsuan Hsu whose work on smell as a means of representing the slow violence of air pollution has resulted in his concept of 'atmospheric differentiation'. Hsu explains atmospheric differentiation as the "frequently overlooked flow of lively materials between differentiated spaces and across geographic scales…an important element for theorizing social relations and affect in material terms"[110] Hsu contends with both the semiotic nature of smell and the materiality of air, and how the two combine to produce unevenly distributed affect and violence. Nerea Calvillo points out the techno political re-making of this unevenness, asserting that even something so simple as the location of air quality monitoring stations is never neutral.

While the technique of diffusion served its function within Montreal's dense urban centre-- and became smokily apparent when it failed-- to inhibit visceral public response to pollution, there are places where pollution must necessarily be concentrated. In Montreal, one sole polluter, Suncor Energy, a petroleum refinery, reported emissions of over 50 tonnes of $PM_{2.5}$ to Montreal's air in 2021[111]. This nearly matches the amount of $PM_{2.5}$ emitted by the 70 or so solid-fuel-burning restaurants and bakeries combined prior to the ban (See Table 1 above for a side-by-side comparison). And yet, no trace on social media or news media of neighbourhood opposition to Suncor's pollution could be found[112]. This could be explained by the fact that the multinational petroleum company's plant is located on the northeast industrial side of the island, where there is less residential population than the residential Mile End. It could then be argued that Suncor's olfactory nuisance and harmful emissions have been kept *far enough awa*y from the majority of residents so as to remain imperceptible to most.

But what about those who live and work in these *away* places? Liboiron writes, "'[a]way' is not so much a physical place…as a designation of a devalued periphery created in the interest of the more powerful centre."[113] Philosopher Val Plumwood referred to such peripheries as "shadowlands"-- "the unrecognised places that provide material and ecological support to market economies and

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[110] Hsu, 57.
[111] "Registre des émissions de contaminants atmosphériques."
[112] The company has at times issued public odour alerts but, no neighbourhood response is visible from a search, nor was there any news reporting on the issue except for one 2019 instance of students being treated after smelling a strange smell from the refinery. (See: Montreal Gazette, "Urgences-Santé Treats Students after Strange Odour at Elementary School," *Montreal Gazette*, January 22, 2019, https://montrealgazette.com/news/local-news/urgences-sante-treats-elementary-students-after-strange-odour-at-school.)
[113] Liboiron and Lepawsky, *Discard Studies*, 71.

modern dreamworlds."[114] While the burden of pollution is both debilitating *and* sensory, the ejecting and displacing of pollution arguably takes place in the realm of the aesthetic[115]. Jennifer Gabrys describes how, in the push to clean up the "sulfur-saturated skies" of the West's post-industrial landscape, pollution "may have been displaced rather than remedied"[116], shifting the burden of heavy pollution to other industrialising nations such as China. Gabrys's use of of "sulfur-saturated skies" serves as both a visual and olfactory cue, reminding of the pivotal role of the senses in public tolerance of air pollution.

Petrocultural Displacements

The Suncor refinery's geographic location indicates that petroleum refining sites are hugely polluting, and therefore must be displaced, even at a regional scale. This displacement takes place at a larger scale, however, in the direct example from our case study: the replacement of wood ovens with natural gas. The natural gas distributed to local customers by Énergir, Montreal's natural gas monopoly, is produced and transported by Enbridge via its southern Ontario Dawn Hub, after being extracted in the Utica and Marcellus shale regions[117] that span several eastern States, including Ohio, Pennsylvania, West Virginia, and New York. The gas is extracted by hydraulic fracking, a method of injecting high-pressure water into shale rock formations that contain gas wells in order to release the gas for extraction. Fracking has often been cast by environmentalists as the most destructive and polluting fossil fuel extraction method due to its violent and visible damage to the landscape and immense demand for water, which also results in water supply contamination[118].

All this considered, the dissonance between the image of natural gas as 'clean' and its actual environmental damage is resounding. This dissonance is muted however by this large-scale displacement that, for end-consumers, creates plausible deniability of gas's horrors. As Georgiana Banita writes, these horrors are best understood as sensory:

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[114] Eben Kirksey, "Chemosociality in Multispecies Worlds," *Environmental Humanities* 12, no. 1 (May 1, 2020): 24, https://doi.org/10.1215/22011919-8142198.

[115] David Howes writes that in its original sense, aesthetics does not refer to beauty, but a "unity in perception" such that things known by the senses are truths distinct from that which is intellectually knowable, like mathematical proofs. (David Howes, "Epilogue: Futures of Scents Past," in *Smell and History: A Reader*, ed. Mark M. Smith, First edition (Morgantown, West Virginia: West Virginia University Press, 2019), 205.)

[116] Gabrys, *Program Earth*, 163–64.

[117] "The Dawn Hub: Reliability. Liquidity. Security. | Enbridge Gas," accessed March 9, 2023, https://www.enbridgegas.com/storage-transportation/doing-business-with-us/our-dawn-facility.

[118] Amanda Staller, "How Has Air Quality Been Affected by the U.S. Fracking Boom?," *ECS* (blog), November 1, 2017, https://www.electrochem.org/ecsnews/air-quality-affected-u-s-fracking-boom/.

> While the abundant plastics of fossil fuel culture and its mobile lifestyles engender pleasure, we are repelled by their crude source and toxic residues. Reading oil through the lens of the senses makes the abject underbelly of this unbridled hedonism blatant and unbearable.[119]

Therefore, the petrocultural[120] logic of gas as a replacement for wood can only be maintained with this displacement of harm, and sensory horror alike-- atmospheric differentiation at the continental scale.

The case study at hand is concerned primarily with the two main sources of $PM_{2.5}$ (a toxin) in Montreal, woodsmoke and vehicular pollution. This has permitted a controlled comparison between the health impacts and affective sensory responses to these two sources of the same pollutant. However, a distinction must now be made between two other different *kinds* of pollution: toxins and greenhouse gases. One suggested replacement of wood is natural gas. Natural gas by another name is methane, the most potent greenhouse gas with multiple times the warming properties of carbon dioxide. Some scientists argue that fracking's effects, while terrible, pale in comparison to the climate effects of natural gas[121]. And so, the petrocultural logics not only require the displacement of the sensory horrors of gas production, but, by another token, the disavowal of climate change-- whose impacts are arguably palpable and sensory. Thanks to the recent climate change-fuelled forest fires during which smoke blanketed half the continent delivering historic poor air quality, especially of $PM_{2.5}$, a bleak full-circle picture has been revealed: the move of replacing wood with gas only served to stave off localised $PM_{2.5}$ pollution[122] from one source temporarily. The smoke has returned. A by-law will not help us this time.

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[119] Sheena Wilson, Adam Carlson, and Imre Szeman, eds., *Petrocultures: Oil, Politics, Culture* (Montreal ; Chicago: McGill-Queen's University Press, 2017), 451.

[120] The assertion that "contemporary life is founded on oil" (Wilson, Carlson, and Szeman, *Petrocultures: Oil, Politics, Culture*.

[121] Valerie Volcovici, Kate Abnett, and Matthew Green, "Explainer: Cleaner but Not Clean - Why Scientists Say Natural Gas Won't Avert Climate Disaster," *Reuters*, August 18, 2020, sec. Commodities, https://www.reuters.com/article/us-usa-gas-climatebox-explainer-idUSKCN25E1DR.

[122] Énergir has promoted gas as helping Quebecers "breathe easier", a perverse statement in light of differentiation. "Liquefied Natural Gas," Energir, accessed July 22, 2023, https://energir.com/en/about/our-energies/natural-gas/liquefied-natural-gas.

Figure 5. Fossil fuel (including liquified natural gas) storage at the Port of Montreal. Photo by the author.

The Smell of Risk in Montreal

Aesthetically perceptible pollution as the object of disgust and discard once again invokes questions of power. Who gets to feel disgust? As noted in a previous section, with the social push for deodorization came increased sensitivity[123] to smells. Critically, that sensitivity was discursively constructed along lines of social difference, with white and higher class individuals seen as more sensitive, and non-white (particularly Black) individuals and lower classes constructed as less sensitive. This served to justify often squalid and toxic conditions that these people were forced to live and work in. Therefore, the Mile End residents' response to the smoke, typified in the word "disgraceful", betrays a certain performed sensitivity based on a belief that they are not supposed to smell smoke. Unspoken in this statement is that, someone, somewhere *is* supposed to.

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[123] There is a large scholarly discussion around the concept of sensitivity that is too big to attend to here, but it bears mention at least in a note. Scholars of race, gender, and disability have taken up this question, pointing out the way that bodies and their sensoria have been constructed as differently sensitive has been used to justify different forms of violence and oppression. See: Fretwell, *Sensory Experiments* and Andrew Kettler, *The Smell of Slavery: Olofactory Racism and the Atlantic World* (New York, NY: Cambridge University Press, 2020).

Hsu articulates how smell has been used by writers of environmental fiction to push back upon "antimodern discourses of wilderness, imperialism" and racism[124] found in descriptions of pollution in naturalist literature, and to focalise attention to the poor, marginalised, and racialised who bear the disproportionate burdens of pollution. This literary device he calls the "smell of risk". In this final section, I explore the smell of risk in Montreal as it pertains to the technique of differentiation in the case study at hand.

Many studies on public perceptions of air pollution risk point to the important role of the senses. Bickerstaff's meta analysis finds olfactory and visual cues to be key determinants in public perception of health risk[125]. Xu et al.'s more recent meta analysis makes a bolder assertion, that sensory cues correlate to *validity* of risk perception.[126] However, these findings merit a glance through the lens of Hsu's concept, which brings a power analysis to bear upon risk perception. Bickerstaff underscored several trends in people's beliefs: wealthier residents were more likely to believe (correctly or not) that health impacts from air pollution is a problem faced by poorer residents living close to industry; and that with greater social privilege comes a *lower* degree of perceived risk, but also a *greater* degree of perceived agency to control the risk.

A 2020 study by Giang and Castelani compared the spatial distribution of marginalised residents and poor air quality in Vancouver, Toronto and Montreal[127]. Marginalisation was defined by racialized, Indigenous, and those living below the LICO, while the study's air quality data was taken from the city of Montreal's RSQA. The study used three different mathematical models for determining Cumulative Hazard Indices (CHI) of air pollution. CHI is a measure of the probability of negative health outcomes. It found that in Montreal overall, racialized residents faced higher CHI than did white residents, and immigrants faced higher CHI than non-immigrants. Both these contrasts were more pronounced in racialized and immigrant residents who also lived at or below the LICO.

Montreal's inner suburbs had the worst levels of $PM_{2.5}$ due to traffic pollution drift from the congested downtown, O_3, which is produced photochemically downstream of traffic exhaust, and SO_2, a precursor from nearby industry[128]. These inner suburbs include the area encompassing the Saint Michel neighbourhood in Villeray/ Park Extension north towards Saint Sulpice in Ahuntsic, which had both the worst pollution and the highest percentage racialized residents in greater Montreal. (See Figure 6 below).

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[124]Hsu, *The Smell of Risk : Environmental Disparities and Olfactory Aesthetics*, 70.
[125] Bickerstaff, "Risk Perception Research," 831.
[126] Jianhua Xu, Cheryl S.F. Chi, and Kejun Zhu, "Concern or Apathy: The Attitude of the Public toward Urban Air Pollution," *Journal of Risk Research* 20, no. 4 (April 3, 2017): 482–98, https://doi.org/10.1080/13669877.2015.1071869.
[127] Giang and Castellani, "Cumulative Air Pollution Indicators Highlight Unique Patterns of Injustice in Urban Canada."
[128] Giang and Castellani, 7.
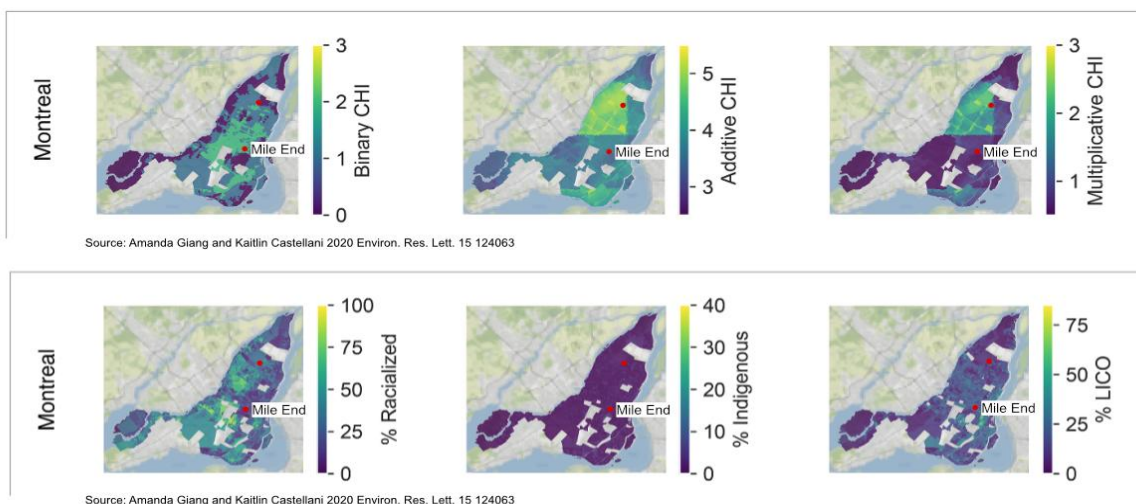
Figure 6: Cumulative Hazard Indices of air pollution and social inequality in Montreal (with Mile End added by the author for added clarity). Source: Giang and Castellani[129]

The Mile End, in comparison, scores low score on two of the three Cumulative Hazard Indices. It also shows one of the lowest percentages for racialized and LICO residents in the city. While the map did not specify the areas of Montreal with more or less recent immigrants, a 2017 report from the City of Montreal[130] showed the Mile End's demographic make up as compared to the city average to contain less than half as many visible minorities, and one third fewer immigrants. Mile End residents were also more educated than the city average and had higher incomes than the city average[131].

Reviewing this information in light of Bickerstaff's psychometric risk perception trends, it does not seem implausible that the Mile End neighbours believed, consciously or not, that they were not supposed to be impacted by pollution, possibly in the way that those who live and work in Montreal's shadowlands areas are. It also explains that perhaps, given the relative social privilege granted by their higher-than-average socioeconomic status, that they would feel empowered to speak publicly to the media about their complaints. For all these same reasons, it is similarly implausible that would the media be as responsive to the working class neighbours of the Suncor petroleum refinery if they were to make a complaint about the pollution nearby.

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[129] Giang and Castellani, "Cumulative Air Pollution Indicators Highlight Unique Patterns of Injustice in Urban Canada."

[130] Montréal en statistiques, "Profil de District Électoral: Mile End" (Ville de Montréal Service du développement économique, 2017), https://ville.montreal.qc.ca/pls/portal/docs/PAGE/MTL_STATS_FR/MEDIA/DOCUMENTS/34_MILE-END_V2.PDF.

[131] Ibid.,

METHODOLOGY

This research-creation project seeks to address the olfactory perceptual techniques of Disgust, Diffusion and Differentiation explored above that uphold permission to pollute. The interactive narrative game *Nuisances* was both built around, and was a critical method for determining, these techniques. In fact, it was through crafting an interactive narrative that might *remedy* the the way that smell focalized attention to certain forms of pollution and obscured others (informed by attuned sensing), that the olfactory techniques of the regimes of pollution emerged from the research. In this way, while the project could be seen as a creative presentation of research (research-for-creation, as per Chapman and Sawchuck), it is also creation-as-research[132].

Informing my methodological approach is the attuned sensing mode offered by Calvillo. Through it, she asserts a way of pushing back against the dominance of data and techno political regimes of knowledge production about air quality and its impacts, and the way it is leveraged to maintain the status quo, or, the permission to pollute. She proposes instead an 'attuned sensing regime of perceptibility' that aims to "move away from 'how much' to 'what' or 'why', to find other modes of dealing with polluted air."[133] In this chapter, I will do my best to account for the rationale, process, methods and conceptual approaches that resulted in my game, *Nuisances*.

Method 1: Borrowing from Situational Analysis

I began by conducting a series of widely-cast web searches for the topics of Montreal, smell, and pollution. It was not long before a scenario emerged that interested me: the unfolding issue of wood smoke pollution in the urban centre, and the saga of the Mile End residents fighting the city about its dawdling implementation of a solid-fuel burning ban. I chose to tackle my proceeding research into the scenario by drawing from the methodology of Situational Analysis (SA), an interdisciplinary set of tools for the examination of the factors and contexts making up a 'situation', the unit of analysis in SA[134]. SA emerged out of the social constructivist Grounded Theory, a "deeply empirical qualitative research approach to the study of social life"[135], and was carried around the interpretive turn to prioritise the analytical value of reflexivity and context. SA's proponents take the view that "science [natural and social], like all human endeavors, is rooted in a context of meaning

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[132] Owen B. Chapman and Kim Sawchuk, "Research-Creation: Intervention, Analysis and 'Family Resemblances,'" *Canadian Journal of Communication* 37, no. 1 (2012), https://doi.org/10.22230/cjc.2012v37n1a2489.

[133] Calvillo, "Political Airs," 383.

[134] Adele E. Clarke, Carrie Friese, and Rachel Washburn, *Situational Analysis: Grounded Theory after the Interpretive Turn*, Second edition (Los Angeles: SAGE, 2018).

[135] Clarke, Friese, and Washburn, 47.

which is itself a social reality"[136] and that interpretation itself ought to be situated. I thus chose SA due to this reflexive approach which is in alignment with my my feminist STS framework, as well as its useful tools. While I did not follow a strict SA methodology from start to finish, I borrowed from it the analytical tools that were most suited to my project. These tools were situational mapping and analytic abduction.

Analytic abduction, explain Clarke et. al., is "the research process of tacking back and forth between the empirical materials of a study and trying to analyze and conceptualize them more abstractly toward making a more general set of claims about the phenomenon."[137] They emphasise that a test of successful abduction is the feeling of surprise when one returns to empirical data with an emergent theory only to find it incongruent. As I tacked between reading and analysing the news articles and scholarly literature, conducting smellwalks, and iteratively[138] testing research-creation media, I was frequently surprised (and frustrated) by the failure of my ideas to stand up to empirical testing. Nevertheless, this drove my persistence to develop my thinking and find the appropriate media form. Though I mention it here, analytic abduction extended through my entire research process.

Situational mapping was a critical methodological step for me, and in fact, my game and its narrative would not have come together without it. The tensions between the forms of map and narrative plays a role in my project: Clarke et. al. point out that, as opposed to narratives, maps "helpfully rupture"[139] standard modes of research by revealing relations in an open, reconfigurable way. While narratives usually require a chain of causality, "maps allow unmapping and remapping-- one can change both one's mind and one's map and do so more easily than rewriting a narrative"[140]. Through mapping, I could easily move pieces and actors around, explore connections and add to the growing picture of the situation.

I created several situational maps, first a few iterations of a "messy map" and then an "ordered situational map" (See Figures 7 and 8 below). Doing this exercise enabled me to understand the broader situation of the wood-burning ban-- which included the push for replacement with natural gas-- and how that connected to the perceptual mechanisms of pollution that became central to my thesis. After I was sure my map was as accurate and empirically tested as possible, I was able to use it to craft the narrative for my game. Later in my research, when the forest fire smoke descended on Montreal for weeks, the mapping work helped me connect the fires with climate change and petrocultural logics, making for a strong, open ending to the game.

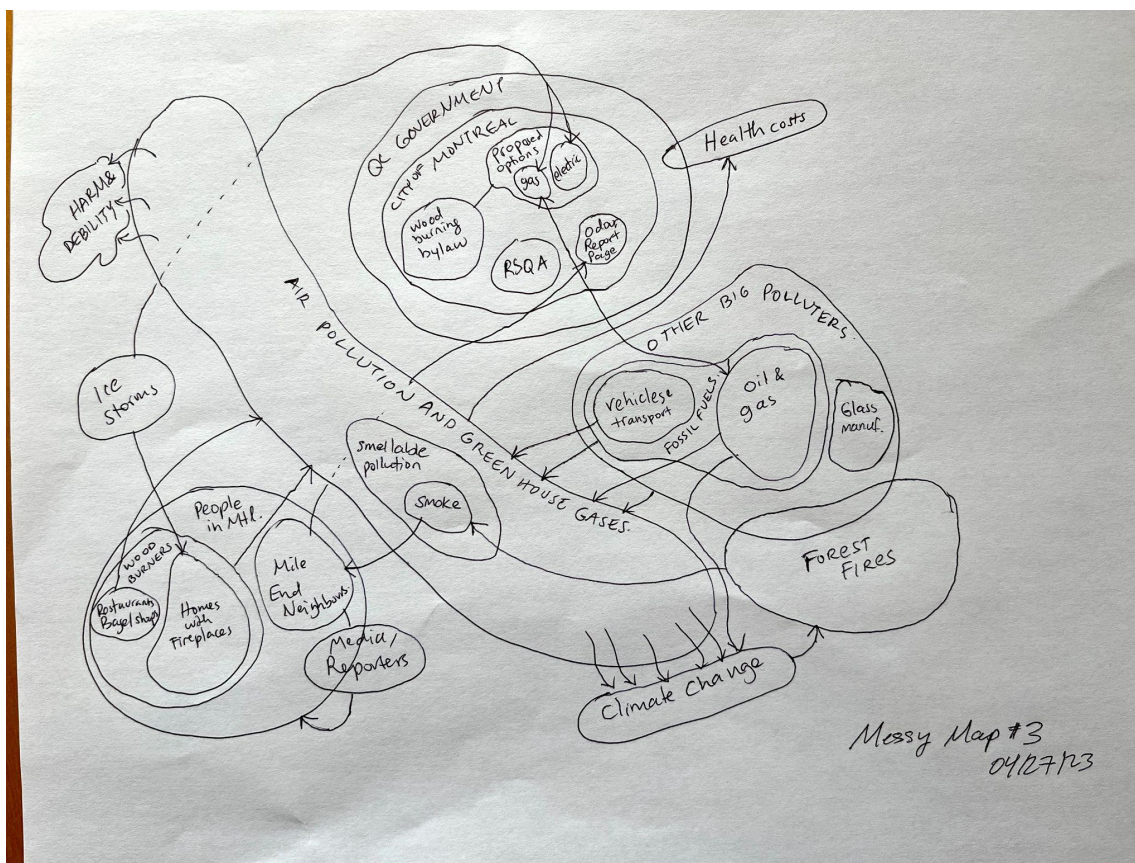---

[136] Clarke, Friese, and Washburn, 51.
[137] Clarke, Friese, and Washburn, 66.
[138] See discussion of this iteration in the footnote in Critical Reflection on p. 52
[139] Clarke, Friese, and Washburn, *Situational Analysis*, 84.
[140] Ibid.,

Figure 7. A messy situational map created as part of the situational analysis.

SA encourages research done with extant materials such as news media in order to gain as holistic a picture of the situation as possible. I chose to focus on news media as my primary source for practical reasons: air pollution is a localised issue and I was interested in local, current public discussions around it. Secondly, I was interested in observing what discursive representations of it emerged from news sources, not just scholarly perspectives. I chose to focus on the Montreal Gazette articles by Michelle Lalonde as my primary corpus again largely for practical reasons because the Gazette is the only large English-language newspaper in Montreal that covered such issues. Further, Lalonde's reporting on the issue was extensive, and constituted most of the media coverage on this topic. I conducted a cursory content analysis of all of the Lalonde articles on the subject between 2014 and 2022 on the topic, searching them all for the keywords "odour", "smell", "stink", "stench" and "smoke".

I complemented the review of these articles with other extant material on the situation, including other news articles that mentioned the topic, scholarly research on the topic of air pollution, plus a review of City of Montreal bylaws, other public documents about pollution and air quality, and

the city's Données Ouvertes open data website for air quality. I also consulted Fenwick, who suggested this situation might benefit from a framing through public theory, in particular Johnson's notion of a visceral public. This was a hugely generative suggestion as it helped me theoretically bridge conceptualisations of pollution from a discard studies framework and the visceral public via the role of affect. This grounded my understanding of the olfactory mechanism of *disgust*.

Individual human elements/ actors - me (researcher) - businesses that use wood ovens - residential wood fireplace owners - residents of area around wood-smoke hotspots - reporters reporting on these stories	**Collective human elements/ actors** - Ville de Montreal - Air quality commission Montreal - Group of Mile End neighbours - City commission recommending natural gas ban - Energir
Nonhuman elements/ actants - Air quality monitoring stations - Air quality index/ smog warning systems - news media - natural gas - woodsmoke - Bagels and BBQ Chicken (local prized cuisines) - wood burning ban - Montreal ice storms	**Implicated/ Silent Actors/Actants** - people and nonhumans impacted by natural gas extraction/ refinement/ transport - people and nonhumans impacted by general urban pollution - Enbridge/ the petroleum industry
Other: Olfactory & Perceptibility Elements - the appearance and smell of smoke - affective power of smell - historical deodorization of cities - the thresholds of odour detection for pollutants often being higher than thresholds of harm/ health hazard for pollutants	**Discursive Constructions of Individual or Collective human actors** - Businesses that use woodsmoke make the city dirty - Wood fireplace owners justified because of winter storms/ power outages - Residents who are impacted by smoke as victims
Discursive Constructions of Nonhuman Actants - Smoke as dirty and outdated - Cooking with fire as authentic - Natural gas is 'cleaner' and 'safer' than wood burning - Smells in the city as bad - Wood ovens as top target for smog reduction	**Political/Economic Elements** - City dawdling implementation of wood ban - Energir's monopoly - costs of energy transition away from fossil fuels/ retrofitting (on multiple scales)
Sociocultural/Symbolic Elements - cultural significance of bagels to Montreal - attitudes towards clean air in Canadian cities	**Temporal Elements** - Winter weather increases fireplace use by residents - Forest Fires occurring at time of writing
Spatial Elements - wood fired restaurants and homes in densely populated areas (harm localized) - source of natural gas far away / out of sight and mind (harm dispersed) - distribution of air quality monitoring stations - invisibility of natural gas infrastructure - pollution 'differentiation' in city - nearer to poorer/ marginalized residents	**Major Issues/ Debates (Usually Contested)** - Natural gas whether it is 'clean' or not — and trade off with climate effects - City waffling and delayed in delivering on composting facilities AND wood burning bans - various attitudes to gas stoves and fire = authenticity in cuisine
Related Discourses (historical, narrative, and/or visual) - Climate Crisis - Energy Crisis - Air Pollution/ smog issues in Montreal - Public Health and air pollution - Infrastructure issues in Montreal	

Figure 8: Ordered Situational Map.

Method 2: Smellwalking/ Olfactory Field Work

From the very start, I began conducting site visits to the places named in my review of the news media, loosely employing the "smellwalking" methods initially proposed by Douglas Porteous and since taken up by an increasing number of scholars.[141] Smells have been classically considered within Western knowledge hierarchies as less reliable, more subjective, and therefore not within the realm of the "empirical".[142] However, Louisa Allen points out in her work with the method that "smell enables access to, and generation of knowledge, which eludes easy written description, enabling the researcher to capture more than traditional methods might."[143] I found that, given my study of the force smell (and the lack of it) exerts on public understandings and reactions to air pollution, my smellwalks in fact lent an important-- albeit highly situated and contextual-- empirical validation to my study. As Allen writes, the "sensuous embodiment of the researcher plays a vital role in knowing an environment."[144] I therefore approached smellwalking, per Calvillo, as an 'atmospheric attunement': "engaging with material practices and sensing and politicizing –distributing what can be perceived – other aspects of the air"[145] that is apart from the data produced by monitoring stations.

The smellwalking method is fairly open, and in its essence only requires that one practice mindful embodied awareness with a focus on tuning into one's sense of smell as one moves through a place.[146] Some researchers combine smellwalking with mapping, saving the locations of odours[147]. Many find it useful to record their insights in a log that also records conditions like time, temperature and weather which I did, though not consistently (See Appendix C). Moreso, my approach was similar to that of Allen which "was more sociological, aiming to understand what access smell might give to [people's] experience"[148]. Though I am an experienced nose and my skills in identifying and classifying smells enriched my study, it was the smell's intensity and its character/ hedonicity[149] that I

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[141] Such as: Louisa Allen, "The Smell of Lockdown: Smellwalks as Sensuous Methodology," *Qualitative Research* 23, no. 1 (February 2023): 21–37, https://doi.org/10.1177/14687941211007663. Katherine Jane McLean, "Nose-First: Practices of Smellwalking and Smellscape Mapping" (England, Royal College of Art, 2019), https://researchonline.rca.ac.uk/3945/.; Janine Natalya Clark, "Following One's Nose: 'Smellwalks' through Qualitative Data," *Qualitative Research*, September 19, 2022, 146879412211284, https://doi.org/10.1177/14687941221128496.; Kevin Peter Bingham, "The Foul and the Fragrant in Urban Exploration: Unpacking the Olfactory System of Leisure," *International Journal of the Sociology of Leisure* 3, no. 1 (March 2020): 15–36, https://doi.org/10.1007/s41978-019-00045-z.

[142] Allen, "The Smell of Lockdown."

[143] Allen, 22.

[144] Allen, 22.

[145] Calvillo, "Political Airs," 379–80.

[146] McLean, "Nose-First: Practices of Smellwalking and Smellscape Mapping."

[147] Peter Zumthor, *Atmospheres: Architectural Environments. Surrounding Objects*, 10th ed. (Boston: Birkhäuser, 2021).

[148] Allen, "The Smell of Lockdown", 28.

[149] Hedonicity refers to a relative measure of pleasantness.

hypothesised would be relevant to the study. From the research I did on public odour complaints, these were the characteristics of smell that register most in public response.[150]

Smellwalking therefore became a key method of testing my assumptions and pushing for deeper analysis of the situation. Abducting from my earlier messy maps, I repeatedly visited the St. Viateur and Fairmount bagel shops, and, smelling very little smoke at different times of day, I returned to research to discover that both shops had recently switched to alternative heat sources, including natural gas. Curious to contextualise this empirical lack of smell from the bagelries, I decided to gain a sensory baseline of the smells of air pollution and determined that I should conduct an olfactory calibration exercise: I conducted a review of the chemical odour thresholds of the common air pollutants (See Appendix A for a table of values and thorough explanation) which indicated that the common pollutants would theoretically be detectable at ambient concentrations. Then, I visited the sites of the Montreal air quality monitoring stations that reported consistently highest levels of pollution ($PM_{2.5}$ and others) and see if I could correlate an odour. I did this on several days, and concluded that there was no discernible correlation between AQI and smell. Though in theory, odours could have been detected, in practice, much higher concentrations would likely have been required to provide a discernible olfactory impression. I became aware of the fact that the absence of perceivable smell was as critical a feature in my study as the presence of smell; this grounded the understanding of the mechanism of *diffusion.*

After mapping the wood-burning ban's connection to natural gas, I visited the Port of Montreal, which I read was the hub of natural gas (and other fossil fuel) storage on the island. There, I was overwhelmed by the wash of chemical and petroleum aromas and combusted fuels on the air. This experience, in combination with the book I had been reading, *Smell of Risk* by Hsuan Hsu, materialised for me his concept of atmospheric differentiation. I delved further into research materials that would help me understand the regional patterns of air pollution in Montreal, particularly with a focus on social inequality and slow violence. As I worked to explore this new understanding both in my situational map and my media creation, Hsu's concept became the grounding for the mechanism of *differentiation.*

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[150] I.H. Suffet and P. Rosenfeld, "The Anatomy of Odour Wheels for Odours of Drinking Water, Wastewater, Compost and the Urban Environment," *Water Science and Technology* 55, no. 5 (2007): 335–44.

Method 3: Writing for Attunement in Narrative Game Design

Because my priorities as a media scholar/practitioner are to make scholarship accessible[151], my goal from the beginning was to create a media piece that would be pedagogical in nature. When public perception emerged as a key dimension of the study, that goal only grew more pressing: my approach now sought to teach a new way of perceiving. Therefore, my guiding question in creating the game was how to invite the player into the mode of attuned sensing as a manner of countering the regimes of perception that uphold the ontological permission to pollute. This became an interesting problem to solve. First, following Calvillo, I had to ask "how do we come to know the toxicity of the chemical infrastructure of the polluted air?"[152]. While the glib response to this question would be "smell", actually answering the *how* in earnest was a complex affair. I wanted to understand the precise conditions and mechanisms that permitted the visceral public response to the olfactorily perceptible pollution of woodsmoke, and then to offer counters to those mechanisms. My Twine game *Nuisances* was a key method for answering these questions.

Twine is a very simple and flexible software. At its most simple, it permits you to construct branching pathways connected by hypertext that deliver a story or game played on a browser. Developed by writer/programmer Chris Klimas in 2009 as an interactive narrative tool in the vein of 'choose-your-own-adventure' books, Twine's flexibility has led it to be taken up by an ever-growing list of ardent creators, especially video game designers.[153] Notes game scholar Alison Harvey, Twine's universalist affordances make it quietly radical, and thus it has been taken up by amateur, indie and queer game designers to counter the hegemony of the gaming industry.[154] She notes however that some game theorists have pushed back against the use of the word 'game' to describe Twine creations; this touches on a much larger debate within the scholarly literature between the narratological and ludological approach to games[155], which though interesting I will not expand upon here as game studies theory is outside the scope of my research-creation aims.

For my purposes, Twine was an excellent tool for my goal of kindling in the player a mode of attuned sensing, a goal I approached by treating *Nuisances* like a augmented reality (AR) media game.

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[151] I do not use the word accessibility here in a disability studies sense, but more a general sense meaning few barriers. Game scholar Alison Harvey writes of Twine, "A great deal of Twine's power lies in its multiple axes of accessibility. It is a free to download, open-source tool for the creation of texts that export to HTML, requiring only an Internet connection to share and access. The output of Twine is a file so small that it can be emailed or copied to small capacity storage devices, including a CD-ROM or even a floppy disc." Harvey, 97.

[152] Calvillo 375

[153] Alison Harvey, "Twine's Revolution: Democratization, Depoliticization, and the Queering of Game Design.," *Game: The Italian Journal of Game Studies*, no. 3 (2014): 97.

[154] Harvey, "Twine's Revolution: Democratization, Depoliticization, and the Queering of Game Design."

[155] Thomas H. Apperley, "Genre and Game Studies: Toward a Critical Approach to Video Game Genres," *Simulation & Gaming* 37, no. 1 (March 2006): 6–23, https://doi.org/10.1177/1046878105282278. (Ludology refers to game play.)

Rather than fully immerse the player into the storyworld of the game, I used the AR principle of blending virtuality with reality[156] to "provide the learner easy access to unobservable phenomena."[157] In *Nuisances*, players are led to tune into their bodies and their actual surroundings, as well as given access to real-life tools such as the city's open data portal for air quality. My hope was that, in experiencing the augmented shift between the storyworld of the game and their own embodied experiences, the player would begin to be able to connect their immediate *sensory* attunement with a more *conceptual* attunement to a broader situation and context, and thus producing a counterpublic response with, as Calvillo says "its own regime of perceptibility"[158].

Despite the outward appearance to the contrary, of all the mediums I considered, a game was the most familiar medium for me: in essence[159] it required me to script a story, something I have extensive experience with. However, writing for Twine required learning how to use the platform in a manner conducive to my lofty goals. I quickly learned, thanks to early testing with my research-creation group, that the less text displayed on screen at once, and the more interactivity (in the form of hyperlinks and multiple choices), the more engaged players felt. Using the coding features such as "click-rerun" allowed short amounts of text to appear on screen at once, with the user clicking repeatedly to deliver the next sentence. I used this especially in the beginning to create an augmented moment where the player is invited to tune into their body and sense of smell as a baseline attuned-sensing exercise. I also used it later at different times to mimic the process of sniffing and trying to determine the cause of a smell. I hoped that using the same game mechanism in this case would evoke that earlier embodied exercise, and begin to build sensory attunement.

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[156] Juan Garzón, Juan Pavón, and Silvia Baldiris, "Systematic Review and Meta-Analysis of Augmented Reality in Educational Settings," *Virtual Reality* 23, no. 4 (December 2019): 447–59, https://doi.org/10.1007/s10055-019-00379-9. (For an even more low/slow tech example of AR, see: https://www.deepfun.com/a-super-simple-low-tech-augmented-reality-game/)

[157] Garzón, Pavón, and Baldiris, 448.

[158] Calvillo, "Political Airs," 10.

[159] Of course, I did have to learn to use Twine, which included my first foray into coding. I am grateful to Justin Roberts for his generous and skilled tutoring on this matter!
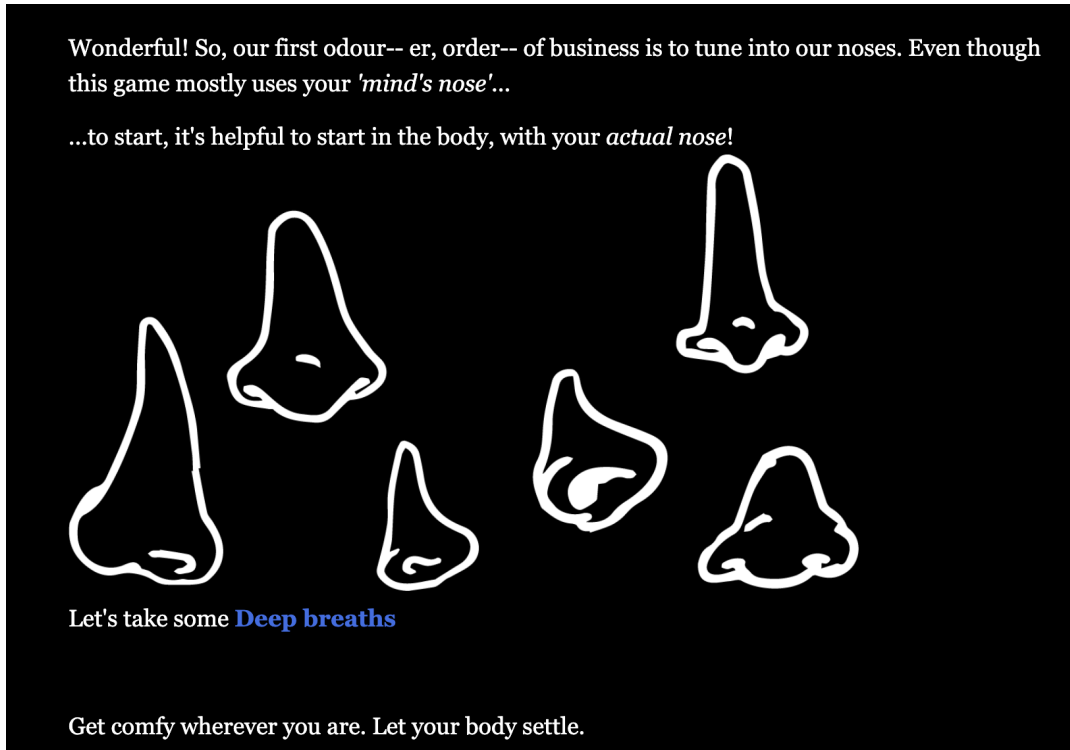
Figure 9. A passage in *Nuisances* that uses the click-rerun code to facilitate a sensory tuning exercise for the player, and illustrates the AR dual attunement process to both a conceptual and embodied sense of smell.

The delivery of these smaller amounts of information at a time keeps players engaged, and I suspect, helps them absorb the information. This seems especially relevant to my accessibility goals in an age of increased attention scarcity. Even if media is made theoretically accessible by reducing barriers to playing it, if it is not enjoyable or engaging, it will be left unused by most people.

As mentioned above, the narrative of the game was developed abductively in tandem with my other methods. I began the story where I did: with the situation of the wood smoke, the bagel shops and the Mile End neighbours, and expanded outward away from the visceral mechanism of Disgust in order to guide the player's attunement towards the less-readily perceptible Diffusion and Differentiation. I used my ordered situational map to create the story nodes -- or *passages* in Twine-- and tested different ways through. I initially began using player stats as a pathway logic, in which the players' choices would raise or lower their scores of "pollution harm" and "olfactory sensitivity" that would then accumulate to open up pathways and events in the game. I ultimately abandoned this as a feature in the game mostly due to my novice proficiency with the software. However, articulating how the situational components would impact these two variables in the simplified setting of the game helped me to consider the relationships between perception and harm and was thus critical to my analytical process.

As for the style of writing that voiced the game, the at-times wry playfulness that emerged was an intuitive choice, one that, if Liz didn't point it out, I would not have remarked upon. But on reflection, I believe I knew that the game needed some levity to diffuse its didacticism, and to add a bit of a reflexive irony. Anthropologist David Graeber proposes a similar idea of "ludic freedom", a sense of playfulness stemming from freedom to explore that creates enjoyment[160]. This kind of play is not a cornerstone of academic learning, and yet what academics and games share *is* a central commitment to curiosity. I have a hypothesis now, having created this game, that curiosity might be a feeling strong enough to counteract the fearful viscerality of disgust and encourage attunement *towards* the bothersome entity of the sort I propose. Even if this is even partly true (further testing is required), playfulness is nonetheless a satisfyingly subversive attitude to assume within academia, and is a unique affordance of research-creation. It is my hope then that *Nuisances* has a chance of doing what Natalie Loveless writes of research creation: to "trouble disciplinary relays of knowledge/ power, allowing for more creative, sensually attuned modes of inhabiting the university as a vibrant location of pedagogical mattering."[161]

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[160] David Graeber, "What's the Point If We Can't Have Fun?," *The Baffler* (blog), June 12, 2014, https://thebaffler.com/salvos/whats-the-point-if-we-cant-have-fun.
[161] Natalie Loveless, *How to Make Art at the End of the World: A Manifesto for Research-Creation* (Durham: Duke University Press, 2019), 3.

CRITICAL REFLECTION

In this section I will critically reflect on the research-creation process, how I arrived at each research question, how I was able to address them, what limitations emerged in doing so, and what my findings present in terms of implications and areas for future study. In writing this section my hope is to be transparent and reflexive. My research questions, again, are:

1. What is smell's role in public perceptions of air pollution in Montreal?
2. How does olfaction play a role in the regime of perceptibility that upholds the permission to pollute?
3. How could a media project assert a different regime of perceptibility that does not uphold the permission to pollute?

What is smell's role in public perceptions of air pollution in Montreal?

I began my research with only this question clearly formed in my mind. I began with the initial theory that smell could be leveraged as a sensory education tool to teach the public about air pollution in Montreal. From my previous olfactory work, I believed that most people have become disconnected from their senses of smell; I thought if I could train myself to discern the odours of pollutants, I might be able to produce something of a codex of pollution smells with which to educate others. My underlying assumptions were, first that air pollutants have odours, and second, that the concentration thresholds of olfactory perception would be scaled similarly to the thresholds at which air pollutants exist in the ambient air. While most pollutants have olfactory warning properties[162] (i.e. are olfactorily perceptible at concentrations that emperil health), in practice, these concentrations are far higher than exist in Montreal's air. The normal Montreal pollution concentrations of the chemicals that *do* have odours (SO_2, O_3 and NO_2) are below the thresholds at which they are discernibly smellable[163], so this was a dead end. (See Appendix A for a table of threshold values). Liboiron would call this a scalar mismatch[164]-- like trying to make an argument with apples and oranges.

In assuming a scalar match in concentration thresholds of smell and harm (trying to force a connection between smell and AQI) I recognize I also fell prey to an issue that Gabrys identifies in her work on air monitoring and regimes of perception, in which citizen air monitoring projects end up reinforcing the dominance of technoscientific monitoring regimes because they mobilise epistemic

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[162] Barsan, *National Institute for Occupational Safety and Health Pocket Guide to Chemical Hazards*.
[163] Ibid.,
[164] Liboiron, *Pollution Is Colonialism*, 85.

tools like the AQI in similar, albeit inconsistent ways[165]. Also, as much as it was tempting to believe, using an embodied method such as smell does *not* inherently challenge knowledge hierarchies. In fact, as I discovered, the visceral public mobilised smell in a manner that *upheld* the dominant polluting regime of perception by rejecting the smoke-- and effectively displacing the harm and nuisance to places deemed discardable. For these reasons, a liberatory hermeneutics of pollution smells did not emerge as a useful research outcome.

The situation of the visceral public became the ground that helped me test my assumptions. Analysing it with the help of the theoretical tools offered by Murphy, Liboiron and Johnson, and the methodological tools offered by SA, I could consider both the wider situation, and the epistemic forces at play within it. A few challenges came up during the SA that bear mention however: first, I had hoped to be able to speak with Lalonde, and to gain her insights for the case study. I attempted on multiple occasions to reach out to her for an interview, which for scheduling reasons did not end up happening. This means that, though I did my best to find other source material to expand my framing, my SA is highly influenced by her reporting. I should therefore perhaps qualify my study as a situational analysis *of Lalonde's reporting* on the topic. Secondly, I encountered quite a real challenge of doing research in a bilingual city. This was not necessarily due to a language barrier, but because there were often two different versions of government documents, one in French, one in English, often with slightly different information in each, and frequently hosted on completely different pages of websites. This made it difficult to ever be sure that I had done a comprehensive review of available information, though I did do as exhaustive a search as I could.

At the heart of my inquiry was the affect of the smell of smoke: was it so visceral because of its sensory properties, or because of the meanings attached to it, or both? Knowing from previous work that there is a long history of smell and public health, I could not help but to delve into this question. I stumbled into a quite lively niche debate in current sensory history scholarship about the historiography of miasma theory, and whether odours were ever seriously believed to themselves be the medium of disease. Tullet's proposition that smells rather functioned in a similarly semiotic manner as they do now, to signify harm, was an interesting notion for me, as it touched on the same murkiness as in my research around the lines between cause and effect, sensory unpleasantness and harm, and disgust and fear-- in other words, *nuisance.* Tullet pointed out that, whatever individuals' beliefs actually were, smell was undeniably wielded by sanitarians in a rhetorical manner to advance their agenda. It focalized the rhetorical, and thus affective, quality of smells as exerting a social force through which meanings about harm are made, and thus harm is perceived or obscured.

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[165] Gabrys, *Program Earth*, 177.

It bears mentioning again, however, as I tried to address in the review of literature, that smoke is a different vapour than miasmic stench; indeed, smoke is harmful to breathe. In reflecting, there is a possibility that my research will be seen as too critical or unfair to these neighbours, which is not my goal in the least. No one deserves to experience such nuisance and burden, and I certainly do not believe their actions were cynical or even inappropriate. I only hoped to shed light on the conditions that made their actions possible by exploring connections to a larger system or regime of perceptibility. By revealing the larger regime of (im)perceptibility, in fact, a different harm emerges that these same residents are exposed to: that of chronic, omnipresent fossil fuel pollution. These residents may over time face larger health impacts from this chronic pollution than from the isolated smoke incidents, therefore it is ethically important to consider all variables.

The questions that these considerations raise are: that if smell focalizes and channels the perception of airborne harms, what to make of those harms that do not smell? And how does the dominant regime of perceptibility rely on air pollution being sensorily imperceptible? These questions helped me narrow down my second research question.

How does olfaction play a role in the regime of perception that upholds the permission to pollute?

Inspired by Liboiron and Lepawsky's "unfaithful" use of Mary Douglas's techniques for keeping dirt/waste in place which they call "techniques of power"[166], I sought to identify the techniques of power that upheld the permission to pollute Montreal's air. As I answered via SA in my first research question, smell functions to focalize attention and create a signal-ground effect rendering smoke pollution more perceptible, and it also produced a visceral discarding response, which I called disgust.

Therefore, it followed that if pollution that smelled produced a visceral public disgust response, then the techniques of power would aim to keep pollution from being smellable. In other words, the corresponding techniques of power and permission to pollute must operate via regimes of *im*perception, which I saw as playing out via deodorisation. This is an insight in hindsight, however. In practice, discerning the mechanisms of deodorisation was a lengthy process, and largely emerged in the later phase of research-creation during which I wrote and tested the game using my smellwalking field notes, my SA maps and notes, and reading notes as source material.

Creating the game was thus a kind of puzzle process. I began by thinking form-specifically, using player scores as a feature that could open up pathways in the game. In my field notes, I wrote, "try to find ways to articulate the aspects of the case study -- thresholds, harm, ability to smell-- and reenact them." As I mentioned, I did this at first by exploring the relationship between situational

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[166] Liboiron and Lepawsky, *Discard Studies*, 85.

aspects and the variables of harm and olfactory sensitivity. While this ultimately didn't stick, playing with these variables using the schematic model of the game helped to organise my fieldwork observations, such as finding out that the Air Quality Index had no strong correlation with smell, or that the petroleum refinery near the port was far smellier than the Mile End was at its worst. Therefore, using the game as a simplified model for the situation was key for parsing a working theory toward these deodorising mechanisms. Indeed, its map-like quality (see Figure 10 below) lends itself well to the method's mapping tools; indeed, further exploration of Twine as a tool of SA is warranted.

Figure 10: Full view of the passages and pathways of *Nuisances,* demonstrating its map-like quality.

I ultimately chose to frame these mechanisms as odour/deodorisation, however, I could have more deeply explored the framing of of sensitivity/desensitisation. I did not do so for the sake of scope of study, but this choice continues to dog me. Erica Fretwell's book *Sensory Experiments* explores the ways that bodily difference (racial, gendered, ability) was reinscribed with a hierarchy in bodily sensitivity and thus used to justify violent and oppressive systems[167]. Applying this notion more centrally to my analysis of social power in my case study I believe would have been valuable, as it would have helped explicate more deeply why the Mile End residents' complaints were validated. It also could have lent a pathway for greater insights into why visceral publics do not form in places

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[167] Fretwell, *Sensory Experiments*. See also: Kettler, *The Smell of Slavery*.

where pollution is far worse[168]. Though I tried to address the same issue with my mention of social power and risk perception, I think the concept of sensitivity offers a richer politics that better befits my argument. My methodological approach of attuned sensing accomplished the activist and pedagogical goals of countering the techniques of power. However, this did render the site of sensitivity as the individual player, and in doing so possibly obscured the broader dimension of (de)sensitisation as a force in the case study.

3. How could a media project assert a different regime of perception that does not uphold the permission to pollute?

Liboiron and Lepawsky note how activists have made use of understanding the techniques of power so as to "create threats to power, or at least mitigate oppression."[169] I determined that attuned sensing could be a viable counter-technique to threaten the permission to pollute by inducing broader conceptual and sensory awareness in residents of Montreal. In this final section, I will reflect upon the possible successes and failures of *Nuisances* in achieving this goal.

Nuisances is the perceptible end product of my research-creation process. Yet, as the game itself aims to teach, there is more to it than meets the eye (or nose!). I did not set out to create a Twine game, nor when I started was I familiar with games, game studies, or even Twine. I chose the medium pragmatically, owing to what I believed to be the most effective way to address my third research question of how to create a piece of media that could potentially cultivate a mode of attuned-sensing. To give a full picture of the degree of form-agnosticism[170] of my research-creation process, my first proposed medium was an augmented map of the smells of waste and pollution in Montreal, which turned to a pollution-smelling workshop, which then shifted to a set of aroma wheels to be used as an air pollution identification kit, which then turned into an interactive decision tree to help identify, from a smell, what pollutant might be in the air, to, finally the interactive narrative game[171].

My goal was to teach the public to find more complexity beyond the question of presence/absence of odour. On the one hand, diffusion demonstrates that just because we cannot smell

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[168] The book *Flammable* (Javier Auyero and Débora Alejandra Swistun, *Flammable: Environmental Suffering in an Argentine Shantytown* (Oxford ; New York: Oxford University Press, 2009) makes a strong case for this in its ethnography of residents of an extremely polluted town in Argentina and how people make sense of their experiences when surrounded by a sensory and debilitating onslaught of pollution.

[169] Liboiron and Lepawsky, *Discard Studies*, 95.

[170] Thank you Liz for this term!

[171] While going into detail of each of these different forms would require more space than is suitable here, the Appendix contains a brief documentation of some of these iterations. I acknowledge that iteration is a key method of arts-based and practice-led research-- see, for example, Estelle Barrett and Barbara Bolt, eds., *Practice as Research: Approaches to Creative Arts Enquiry*, Paperback ed (London: Tauris, 2010). I could have chosen to centre iteration in my methodology, but, as I wanted to prioritise the analytic value of using multiple research methods, not just media format, I centred analytic abduction.

anything, it doesn't mean the air is innocent[172]; its pollutants may just be too diffused to sense. It also teaches that there are times that, with embodied practice and attunement, there is more to be smelled than first meets the nose. Differentiation, on the other hand draws attention outward to the fact of the heterogeneity of atmospheres and the underlying social and structural reasons for this. My hope was that, in becoming an attuned sensor, players could, as Calvillo promotes, become more aware of both registers-- embodied and situational-- that at once make up perception.

In experiencing the augmented shift between the storyworld of the game and their own sensory and embodied experience, the player might begin to experience a mode of attuned sensing, that, over time can produce its own activist regime of perceptibility-- one that threatens the regimes of *im*perceptibility that uphold permission to pollute. A kind of attunement *to* nuisance, as well as attunement *beyond* nuisance. I ultimately don't know if I accomplished this, as, besides some informal testing and feedback from friends, the game has not been exhaustively reviewed and tested.

In admitting this, I also admit that my research-creation is incomplete in a most critical aspect. I have only been able to hypothesise what the attuned sensing counter techniques are[173]: they have not been tested in the game. And, so, user testing the game specifically to observe what attuned sensing techniques emerge as key would be my top priority if I were to turn *Nuisances* into a finished product. I plan to begin exploring funding options to do so once this stage of the project is complete.

I also plan to continue to explore Twine in future projects, both as a planning tool and a medium for delivering a finished product. In a manner reminiscent of Calvillo's dual registers of attunement, and AR's dual engagement with reality and virtuality, I have found that Twine's affordances enable a dual approach to creative problem solving, one that allow the creative and analytical mind to work together in very fruitful ways. For this reason, it has been a most excellent tool for both planning and delivering this project.

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[172] A callback to the etymological roots of *Nuisance.*
[173] See Table 2, below, for these hypothesised counter techniques.

CONCLUSION

To conclude, I will summarise my research-creation findings and provide a final thought reflecting on the lessons from the case study in light of the theoretical framework of the study. A table below summarises my findings (columns one through four), and what I hope the game offers by way of a creative intervention (column five). Finally, an epilogue adds some last thoughts on process.

How filing an odour nuisance report is like recycling

The case study of the Mile End neighbours' response to the wood smoke was framed through that of a visceral public and analysed with a discard studies lens. In closing, I wish to invite one final point made by Liboiron and Lepawsky: that it is useful to defamiliarise those modes of discarding that have been burnished with a positive image that serve to uphold power. Liboiron and Lepawsky give the example of recycling, whose "green and good reputation is crucial for allowing the production of disposables— that is, recycling as currently practiced enables waste and wasting"[174]. In my case study, the city responded to years of odour complaints and bad press with a ban on wood-burning and the suggested replacement of wood with natural gas. In this case, the clean-burning reputation of natural gas is crucial for keeping its place in city infrastructure, even though its production and refinement is extremely polluting. The reputation of natural-gas-as-clean relies on the moves identified by Liboiron and Lepawsky of displacing or recategorising it 'away'. In doing so, "business as usual is able to proceed…and… [t]he pollution 'disappears'".[175] By this framing, the visceral public, though a fair response by citizens to unfair burdens of harm and sensory bother, serves to maintain the integrity of the wider system of power that demands continued public acquiescence for its permission to pollute-- acquiescence which is subsequently achieved by the techniques of diffusion and differentiation.

If disgust is visceral because it acknowledges a potent, intimate threat to bodily integrity, then its solution must be to render neutral these threats. In this case study, that rendering is olfactory, taking place via techniques of deodorisation. The deodorising techniques of diffusion and differentiation neutralise perceived threats in two distinct yet synergistic ways: diffusion relies on the fantasy of the carrying capacity of both the environment and the human body. At a sensory level, it produces an omnipresence of, and habituation to, concentrations of pollution low enough to not-- or barely-- smell. These concentrations are high enough, however, to incur death and debility at the population level, a fact that is normalised by tools such as the AQI.

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[174] LIboiron and Lepawsky p. 69
[175] Ibid., p. 87

Differentiation relies on the opposite ontological presumption of the maintenance of boundaries, and effects a segmentation of atmospheres along lines of social power and privilege, thus always creating a possibility for displacement of pollution away from the powerful centre towards the periphery. Differentiation renders pollution sensorily imperceptible to those from whom it has been displaced away; the people living in the polluted shadowlands have less agency and recourse to respond to such a sensory onslaught with viscerality.

The neighbours' disgust, levied in a public manner, eventually focalised wider public and governmental response and displaced the smoke 'away', via substitution with fossil fuels and its attendant, albeit displaced, pollution. Because this move-- one that might otherwise be seen as activist-- served to maintain the insides-outsides distinction and rendered pollution imperceptible to those in the powerful centre, like recycling, it could be viewed as upholding the permission to pollute.

With the olfactory techniques of power of the case study identified, I turned to tools that could subvert them (and thus the dominant regime of perception), and I took up the possibility of smelling as part of a mode of 'attuned sensing' regime of perceptibility. The mode of attuned sensing I proposed aimed to engender this regime in the players of the game, *Nuisances*, one that aims to deny the permission to pollute and to render pollution perceptible via different techniques including olfactory and atmospheric attunements, sensory curiosity, and contextual attunement to the broader atmospheric *and* techno political situation.

These findings are summarised in this table, below.

Table 2: Olfactory Techniques of Power and Attuned-Sensing Counter-Techniques

Olfactory Technique of Power	Elements as found in Case Study	Associated concepts from the Literature	Tools of the technique	Attuned Sensing Counter-Techniques (Nuisance-Attunement)
Disgust	- Neighbourhood visceral public response to woodsmoke	- Visceral publics - Miasma theory - Discarding - Insides/Outsides	- Nuisance reporting process - News Media - Bylaw on wood burning	- Sensory curiosity, playfulness - Atmospheric attunement
Diffusion	- Vehicular traffic exhaust	- Thresholds - Permission to	- AQI/ monitoring	- Olfactory attunement and nose training to

	- Forest fire smoke/ climate change	pollute - Air conditioning - Slow violence - Land/Air as a Sink - Biopower	regimes - Quebec emissions registry	subtle smells - Critical examination of the AQI - Awareness of vehicle pollution
Differentiation	- Suggestion of natural gas replacing wood - Petroleum infrastructure - Different CHIs in Montreal neighbourhoods	- Atmospheric differentiation - Shadowlands - Displacement - Insides-Outsides	- Geographic location of petroleum infrastructure - Social inequality	- Awareness of regional air quality differences in Montreal, both via monitoring data and experiential learning - Presencing deliberately invisible infrastructure of petroleum.

Epilogue: Nuisance, and a Note on Process

I started this paper by expressing that I have always found it tricky to account for the process that accompanies my creative endeavours, as concepts only become fully clear when the bulk of the work has been done. Concepts are not intentional products of my labour; they feel like customised tools that I build for myself as I go and that help me tackle the questions at hand. But they nonetheless exist, strangely lingering and attractive little objects, after the research is done. Now, at the end of my thesis-writing process, after my pragmatic, procedural methods have been explained, how do I account for such conceptual excess? I do not know, but I will I attempt to do it here, in this section that doesn't quite fit at the beginning, in the middle, nor the end of this paper.

Though this study addresses smelling and pollution-- focussing on the *content* of the air, so to speak-- I discovered in the process that it would be a failure to not address the *form*[176] that permits it: breathing. To breathe, as J.T. Tremblay writes, is to be porous, to be intimately co-constituted with the environment surrounding us through our membranous contact with the air. Air is material; it is a gas that moves about, mixes, flows, and carries other materials with it. As literary scholar Hsuan Hsu writes, air is an index of the environment it surrounds.

And so, I grew interested in finding the point where air's form meets its content; where lung meets nose; where automatic breathing meets cognitive perception. This semiotic process is also and often a negotiation of our own bodily vulnerability to the air that surrounds us. Writes Hsu, "engaging with olfaction thus requires a method of environmentally 'paranoid' reading."[177] This paranoia arises from knowing we cannot fully trust what our noses tell us: *is there something there I cannot smell? Is this bad smell bad for me?* It was through Hsu's framing that I embarked upon a slightly paranoid line of questioning of my own, as uncertain about my own abilities as I was about what was in the air.

This uncertainty, as I have also written above, is captured in the very word that cities use to handle malodors: *nuisance*. Nuisance is at once the legalese for an annoying or offensive (usually sensory) entity and a derivative of the Latin word which means 'to injure or harm'. Annoyance and harm are different, surely-- so what then? One possible use of this semantic murkiness is to point out that, in fixating on sensorily perceptible offences-- common examples being loud noises and bad smells[178]-- that more nefarious harms may be slipping by unnoticed. Nuisance then might raise the

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[176] J. T. Tremblay, personal communication, 2023.
[177] Hsuan Hsu, "Smelling Setting," ed. Hannah Freed-Thall and Dora Zhang, *Modernism/Modernity Print Plus* 3, no. 1 (March 23, 2018): 2, https://doi.org/10.26597/mod.0048.
[178] It is not inconsequential that the word pollution is also commonly used to describe these sensory offences: noise pollution, light pollution, etc., capturing again the definition of pollution as something that has broken inside-outside rules pertaining to spatial boundaries.

stakes of Hsu's paranoid reading to include not only anxiety provoked by the unknown and unfixed location of harms, but to misleading olfactory signals of harm, too.

This was my initial sense of nuisance: a useful way to illustrate the gap between signal and noise within a regime of perception through which harm can seep. However, as I continued, the continued nagging paranoia I felt told me this was not the end of nuisance's analytic usefulness. Grappling with the material, I found it: the central tension of nuisance is not in the question of signal misdirection between mild offence and genuine harm (though that does matter). It is in the question of what *kind* of harm -- physical or *emotional*[179]?

This question emphasises the role of the senses in their overlapping modes of providing direct sensation and affect. The writer Elaine Scarry famously wrote that the pain of others is the origin of doubt,[180] while conversely, Johnson above describes how truth is galvanised by the social transmission of visceral fear. While both fear and pain are encompassed by the word "feeling", they elicit very different social responses. And so, the tension at the core of nuisance then might be *inter*subjective-- a question of recognition. This is reinforced by the fact that a critical aspect of the legal definition for nuisance is its publicity: a public nuisance is defined as a bothersome entity *for which there is existing legal recourse*[181]. Legal recourse is perhaps the most official form of recognition of harm done. A nuisance then is a harm or bother made legible and recognised under the dominant regime of perception. The more useful question arising from nuisance then is about those harms and bothers-- like with Scarry's pain, or Murphy's workers-- that aren't publicly recognised or rendered legible. In other words, taking this approach, the location of uncertainty shifts from that point of interpretation (where the lung meets the nose), to the circuits of power between individuals.

Identifying this may permit nuisances to be tactically used for an activist purpose: in exposing both the epistemic uncertainty of sensory perception, the rhetorical-affective power of the senses, *and* the ways in which harms are rendered perceptible and imperceptible according to power, the concept of nuisance invites consideration of how meanings pertaining to harm are discursively constructed, and how those meanings then influence what we perceive. It also invites consideration of experiences outside of our own. The word *innocence,* incidentally, shares the same Latin roots as nuisance. As perhaps is more readily understood about innocence, that which appears innocent is not always so; innocence only truly matters as it is in the eyes-- or noses-- of one another.

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[179] Multiple dictionary definitions of the word reference both.

[180] Elaine Scarry, *The Body in Pain: The Making and Unmaking of the World* (New York: Oxford university press, 1987).

[181] Oxford English Dictionary, "Nuisance, n. & Adj." (Oxford University Press, July 2023), Oxford English Dictionary, https://doi.org/10.1093/OED/9966160686.

APPENDIX

Appendix A) Thresholds of Olfactory Perception and Harm for Common Air Pollutants[182].

Values provided in μgm^{-3} (micrograms per metre cubed)

|	Olfactory Thresh.	OSHA[183] permissible exposure limit (PEL)	OSHA Immediately Dangerous to Life/Health	Warning Property (Olfactory)[184]	Odour at low concentration [185]	Odour at high concentration
O$_3$	0.03	0.2	9.82	Odour, all	Static electricity	Acrid bleach
SO$_2$	2.62	13.1	262	Odour, all	Struck match	Pungent, irritating
NO$_2$	0.75	9.4	37.6	Odour, acute	Bleach-like	Acrid, irritating
PM$_{2.5}$	-	various	various	-	Various	Various

[182] Attempting to create this table helped me to understand that PM$_{2.5}$, the pollutant implicated in my study, was itself odourless (isolated from accompanying gases found in smoke or fuel emissions) and was the subject of a lot of variable and conflicting standards for health exposure. It therefore helped me determine that it would be more analytically useful to scale my focus toward the PM$_{2.5}$-containing entities of smoke and exhaust, which *do* have smells. There were also a lot of technical challenges in researching these data due to converting figures between the multiple given units for concentration which ranged from micrograms per metre cubed, to parts per million, to parts per billion. Further, each gas has its own coefficient of volumetric conversion. This is not to mention how these values are obscured or lost during the translation into the AQI or AQHI which takes multiple pollutants into consideration. All told, I would have also needed more technical supervision in order to produce something of this kind that was rigorous enough to derive any certain conclusions.

[183] Values attained from the Occupational Safety and Health Administration's Occupational Chemical Database. Permissible exposure limit is the highest point of concentration of a pollutant that workers can be exposed to during an 8 hour shift. Immediately dangerous to life and health indicates a concentration that will, as it says, cause immediate harm. These two values bracket the range of exposure concentrations scaled to human health.

[184] Olfactory warning property refers to the scalar overlap of odour detection thresholds and threshold of harm; in other words, the odour of a chemical provides adequate warning of its presence at concentrations that are dangerous to health. There are two warning levels, one for chronic exposure, one for acute exposure. (A warning property for chronic exposure means the chemical has an odour at a lower concentration). For the common pollutants I studied, the threshold of olfactory perception is lower than the permissible exposure limit, but it is not clear how faint or strong the odour would be for each chemical. As mentioned above, it was difficult to empirically/ experientially test this as I did not have access to these chemicals in an isolated form to serve as olfactory referents. However, from my attempts to detect ambient pollutant odours in the city air, I was not able to discern anything in particular. This is likely due to the diffusion of the pollutants and the fact that in a city atmosphere, there are many competing odours and smells which make the discernment of any single low grade odour more difficult unless it is far stronger/ more concentrated. (The signal-ground effect that Murphy and Porteous describe).

[185] I researched qualitative descriptors of the odours of pollutants at both low and high concentrations (which, as mentioned above, helped me understand that PM2.5 has no odour on its own) in order to provide a semantic cue for searching out these smells in the air, but, again, I did not detect any of these odours in any of my smellwalks.
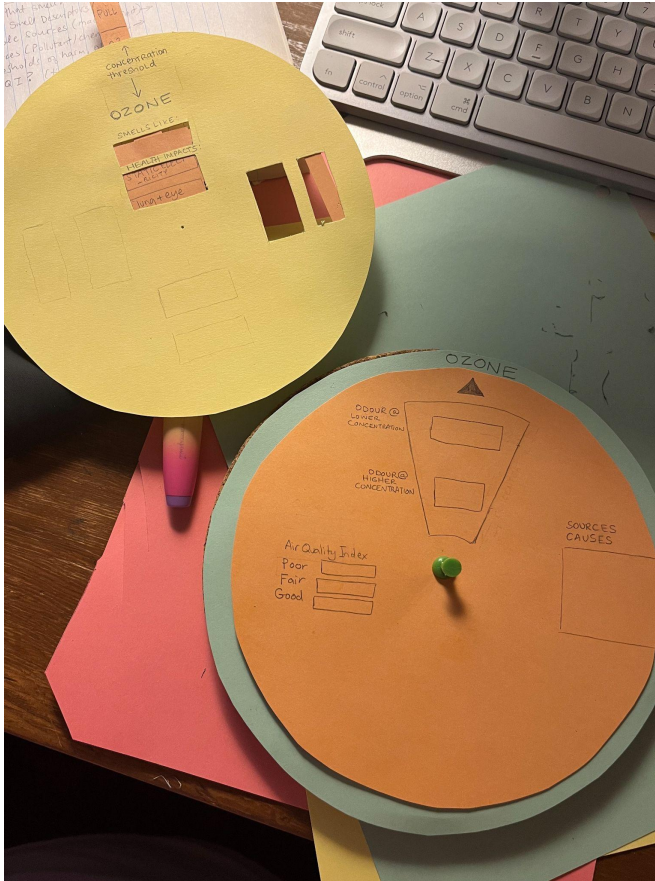
Appendix B) Odour Wheel Iterations
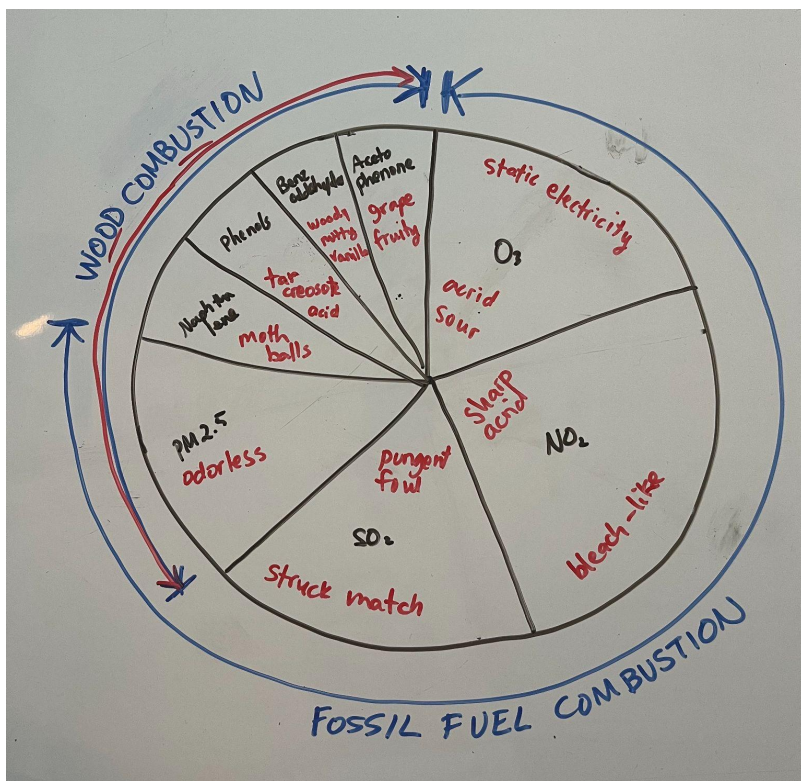
B.1: olfactory notes of primary pollutants in fossil fuel and wood combustion
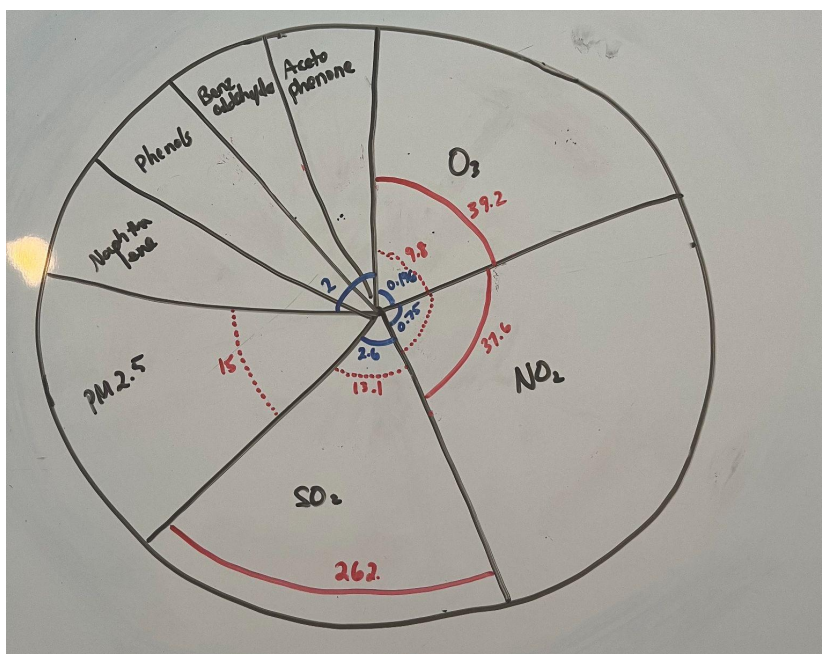
B.2: concentration thresholds of harm and olfactory perception for primary pollutants in fossil fuel and wood combustion

B.3. Prototype for interactive aroma wheel showing relations between olfactory and harm thresholds and the AQI.

Appendix C) Smellwalking Field Notes[186]

Date/ Time	4pm April 18						
Weather & Air Description	Windy, overcast, chilly (7C)	How I'm feeling	pretty tired and a bit under the weather.				
Overall Mtl AQI							
Main Pollutant							
			SITE VISIT FIELD NOTES		*FILL IN AFTER SITE VISITS*		
		Location	Smells Recorded	Other Notes	Nearest RSQA Station	AQI Reading	Main Pollutant	Secteur
		Fair mount bagel	Bagels cooking smell, smokey, sweet, yeasty, bready. Not off-putting smokiness, not too strong. Mingled with garlic tomato basil fragrance from gnocchi shop next door.	Smelled most strongly in the laneway next to the bakery	31	20	Ozone	Centre Ville
		St. Viateur bagel	Very faint bagel smell on the wind. Less pleasant than Fairmount, more alkaline.	Smelled most strongly downwind. Healthfood store across the street smelled most strongly of anything in the area.	31	20	Ozone	Centre Ville

Date/ Time	12pm April 20						
Weather	Chilly 4C, sunny, light wind	How I'm feeling	a bit tired, but otherwise ok. Sense of smell doesn't feel terribly on point.				
Overall Mtl AQI	21						
Main Pollutant	Ozone						
			SITE VISIT FIELD NOTES		*FILL IN AFTER SITE VISITS*		
		Location	Smells Recorded	Other Notes	Nearest RSQA Station	Nearest RSQA Reading	Main Pollutant	Secteur
		Fair mount bagel (and surrounding street)	Gnocchi tomato sauce, very very mild bagel smell	Smell became more pronounced in middle of alley.	31	23	Ozone	Centre Ville
		St. Viateur bagel (and street)	Bagel smell downwind, more yeasty and caramelly than the day before, almost a cinnamon churro smell		31	23	Ozone	Centre Ville
		Industrial alleyway by the weird bike path by Austein and Belmirs place	Lucky charms marshmallows! Very strong effusive. Could not discern what the possible cause was!		31	23	Ozone	Centre Ville

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[186] I abandoned this method in favour of audio recordings in my phone, which was more easy to do on site.

	9:30-10:30AM, April 25							
Date	9:30-10:30AM, April 25							
Weather	Sunny, no wind, 6C							
Overall Mtl AQI	15							
Main Pollutant	Ozone							
			SITE VISIT FIELD NOTES				*FILL IN AFTER SITE VISITS*	
How I'm feeling	Good, energetic, nose very clear and sensitive	Location	Smells Recorded	Other Notes		Nearest RSQA Reading	Main Pollutant	Region Name (for atmos. diff. purposes)
		Log 1	Biking down maisonneuve (from home to downtown)	Automotive exhaust. Pretty odourless otherwise. Many other smells "indoor" smells: grody restaurants, parking garages, food cooking,	At what concentration can you smell exhaust? Is there a known threshold? Could be helpful point. What exactly am I smelling when I smell exhaust? Atmosphere is DIFFERENTIATED at a much smaller granularity than the 11 AQ stations. Temporal differentiation as well: a truck goes by you.			
		Log 2	75 Ontario est (Fire Station, RSQA monitoring station)	gasoline exhaust from pressure washer, sooty-dry smoke, mechanical smelling rubber friction kind of smoke smell, soap smell (possibly from washing fire trucks), cooking food (pizza shop kitty corner). Dusty oil, garbage	Lots of cars in the area. Realizing that you just need to dial down your sense of perception. A lot of urban smells exist at the edge of perception. How to do "attuned sensing" -- i.e., dial in/down to less pronounced smells? > method.	Station 31	22 Ozone	Centre Ville

	Log 2	Maisonneuve & Saint Dominique	Solventy smell - pear drops, acetone, sharpie. Super strong smell	-				
	Log 3	St. Catherine & St Laurent	SOLVENT SMELL SUPER STRONG	Solvent source: street work. rehabilitation de collecteur d'égout. Heavy steam rising up from machinery. No sewer smell				
	Log 4	Biking down Ste Catherine east into the village,	Asphalt from construction, exhaust, cut wood	Nose plugged all of a sudden, drippy. Biking past all the construction?				

Date/ Time	1pm April 27									
Weather & Air Description	Mild Wind, Smoggy, Sunny, 11C	How I'm feeling	Pretty good, a bit tired, nose feels sensitive though. As I biked through the polluted port zone, I felt worse and worse.							
Overall Mtl AQI	45									
Main Pollutant	PM 2.5									
				SITE VISIT FIELD NOTES				*FILL IN AFTER SITE VISITS*		
		Location	Smells Recorded	Other Notes		Nearest RSQA Station	StationAQI Reading	Main Pollutant	Secteur	Secteur Overall AQI
	Notre-Dame Est Bike Path (Centre Ville) downtown to rue Curatteau					50 Hochelaga	35	PM 2.5	Centre-Ville	53
	4/27/-- 1	Notre Dame Papineau/ Molson Brewery	Strong whiff of sewer repair sealant smell: strong metal-body sharpie marker smell. Just a pocket of it though on the wind, not atmospheric	Visibly smoggy and foggy in the morning earlier. High AQI with particulate matter. How does humidity and dew point affect smog reading?		50 Hochelaga	35	PM 2.5	Centre-Ville	53
	4/27--02	Port de Montreal 3550 Notre Dame	Vinyllic, chemical sour faint	As we enter into the port area, the chemical smells begin to really dominate		50 Hochelaga	35	PM 2.5	Centre-Ville	53
		Biking towards Lantic sugar on SE sidewalk	Exhaust fumes, very strong. Dusty smell, exhaust ranging from sweet, gasoline to really dirty smoky sooty diesel. Garbage smell too, as we bike along towards Lantic Sugar. Putrid sour garbage (at first thought was sugar factory but realized too putrid)	Lots of traffic! You can feel the grittiness of the air on your face, in your teeth, in your nostrils. Hard to know if the exhaust fumes aren't only from the noisy dirty street, but it seems probable that the clandestine/ hidden/ walled off activities of the port are generating much of these fumes		50 Hochelaga	35	PM 2.5	Centre-Ville	53
	4/27-- 3	Lantic Sugar side street	Sweet, brown sugary, fig newton smell.	Go down the side street off of Notre Dame Est, and you will really catch the whiff		50 Hochelaga	35	PM 2.5	Centre-Ville	53
	April 27 -- 4	Notre Dame in front of La Fleur restaurant, surrounded by VOPAK gas storage	Fried Donuts and Tootsie pops, then back to dirty diesel exhaust. A little farther East, can smell more acrid solvent smell, burning chemicals smell	Strange to smell something sweet and appetizing in this area!		50 Hochelaga	35	PM 2.5	Centre-Ville	53
	Notre-Dame Est Bike Path (Montreal Est) up to Bellerive					3 St Jean Baptiste	28	Ozone	Est	36
	April 27 -- 5	Notre Dame and Curatteau	The level of air pollution and non-stop exhaust smells along the port. Truly nonstop. Crazy thick tar/ asphalt burning rubber smell, nostril-clogging, thick, acrid.	Both of us feeling unwell, head ache, mouth and face/ eyes gritty, blowing soot out of our noses. None of the infrastructures next to port were really very labelled - consistent with the inocuous/ nondescript-ness of pollution/waste. This site could be a place to go that is a "living perfume"... site as perfume. Here is a place that presences the smells we want to otherwise avoid.		3 St Jean Baptiste				
		Bellerive	clean!	Clear air palpable as soon as we got out of the port zone and into the town of Bellerive which is along the St. Lawrence but a nice "natural" bank -- fresher, cleaner, less gritty. Even more grass smells, etc.		3 St Jean Baptiste				

Appendix D) Nuisances Twine Game Full Passage Map

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