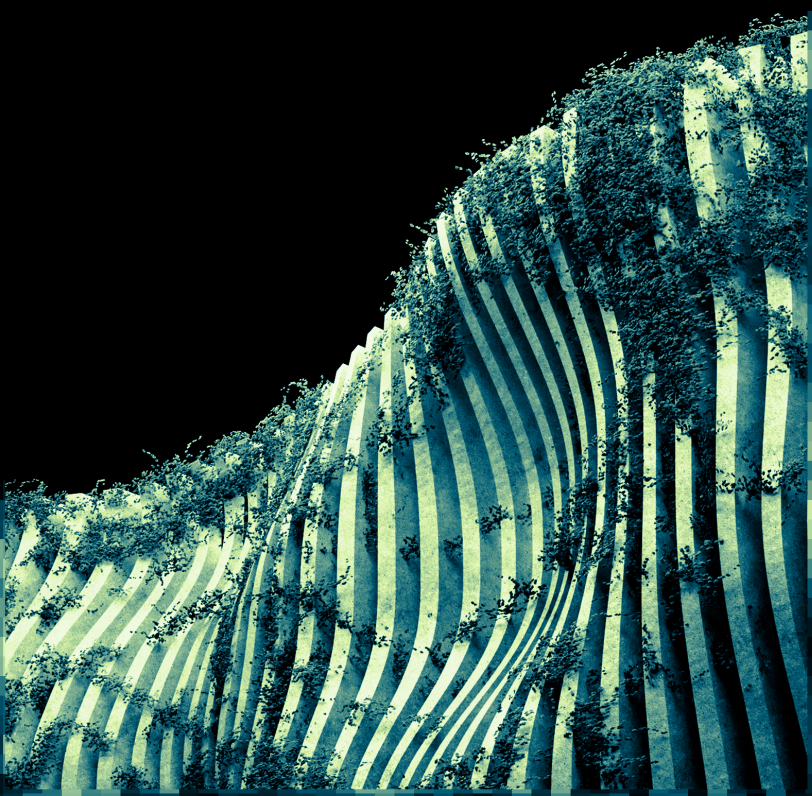
Humanities | Social Sciences | Sciences

ARBOR

Journal of Undergraduate Research



Volume 6

The Arts and Science Students' Union
University of Toronto

No. 6

Letter
from the Editors

Dear Readers,

It is with great honor and joy to present to you the sixth volume of the Arbor Journal of Undergraduate Research on behalf of the Arts and Science Students' Union. Bringing this journal to life has truly been a fulfilling journey, made special by the enthusiasm, dedication and teamwork of our incredible editorial board of eighteen passionate members. Their tireless work in selecting, refining and designing this volume has been essential to its success. We deeply appreciate their hard work and commitment – we could not have done this without them.

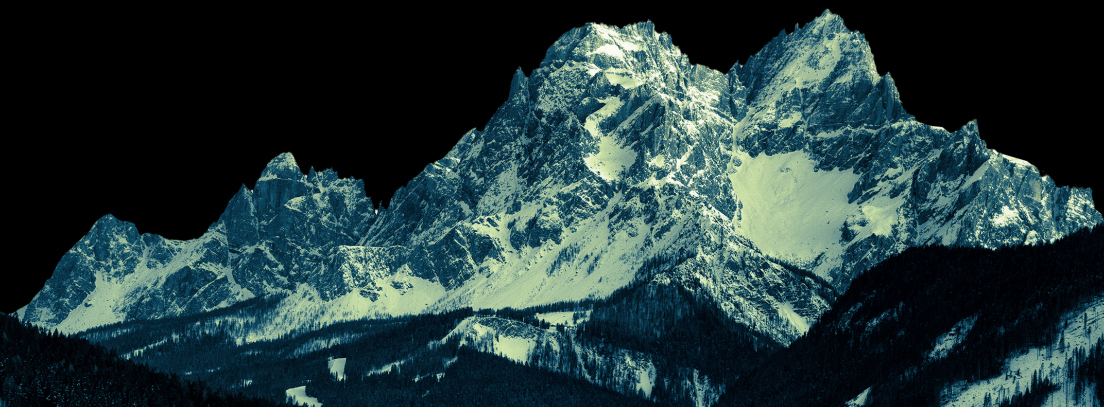
In this edition, you will discover outstanding contributions from students across the University of Toronto's humanities, social sciences and science programs. These pieces not only showcase the impressive diversity and depth found within Arts and Science but also illustrate meaningful connections among these disciplines. The Arbor Journal continues to celebrate our vibrant undergraduate student community and the impressive scholarship it produces.

We extend our heartfelt gratitude to our talented authors for their thoughtful insights and engaging research – work that will undoubtedly resonate throughout their lives and careers. And to you, our readers, we express our sincere gratitude for your ongoing support and curiosity. We hope this volume sparks inspiration, encourages reflection and makes you proud to know these exceptional pieces are crafted by your fellow peers. We hope you enjoy reading this edition of Arbor.

Warmest regards,

Farida Kayed
Co-Editors-In-Chief

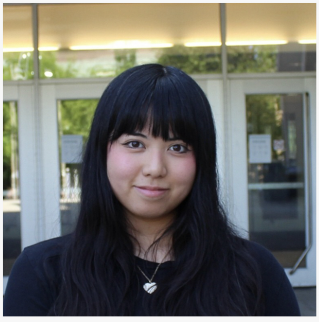
Mia Rodrigo
Co-Editors-In-Chief



Meet the Team
Arbor Journal 2025

Editors-in-Chief

Farida Kayed
Co-Editor-in-Chief



Mia Rodrigo
Co-Editor-in-Chief

Social Sciences

Shania Winter
Managing Editor

Jacob Marr
Associate Editor

Elliot Savin
Associate Editor

Isabel V. Reny
Associate Editor

Annie Li
Associate Editor

Eno Ma
Design Editor

Humanities

Sharanya Tissera
Managing Editor

Emily Carlucci
Associate Editor

Natalie Lau
Associate Editor

Vanessa Salvati
Associate Editor

Callie Zhang
Associate Editor

Sciences

Franco M. Valencia
Managing Editor

Cynthia Ji
Associate Editor

Arshad N. Saleh
Associate Editor

Miguel Villegas
Associate Editor

Judy Zhu
Associate Editor

Humanities

Table of Contents

Social Sciences
Table of Contents

Sciences
Table of Contents

Humanities

♣

♣ 1

Activism, Legal Work, and Ritualized Abortion: *The Satanic Temple's Religio-Political Position in the Struggle for Reproductive Rights*

By Jade Parks

The following paper will aim to explore the New Religious Movement, The Satanic Temple, and its position and involvement in the battle for reproductive rights in the United States following the overturning of Roe v. Wade. I will argue that The Satanic Temple utilizes its position as an inherently politically charged non-theistic religion to position itself as an integral opposition to the limitations that have been placed on reproductive autonomy. To support this claim, my research will centralize on the pillars of Satanism's interaction with the struggle for abortion which I will identify as its role as a religious political-activist organization, its contribution to the legal fight for reproductive freedoms, as well as its role as a non-theistic religious organization through its subversive use of rituals.

The Satanic Temple (TST hereafter), is a non-theistic New Religious Movement and political organization founded in 2012 that denies any form of celestial being but appeals to the use of rituals and symbolism to aid in its transgression of traditional oppressive forces of authority (Laycock, A 'proper' black mass: the rhetorical struggle over a deviant ritual, 37). The group attempts to function in accordance with its "Seven Fundamental Tenets" which advocate varying sentiments, the first being to live with compassion and empathy towards all and that the struggle for justice is a necessary and ongoing pursuit that should win over laws and/or institutions (Koleva, 18-19). The group also utilizes various degrees and iterations of 'magic' in rituals, mostly as a symbolic way to actualize the self in a tangible way to test its capabilities and maximize its possibilities (Petersen, 108). TST is best known for its philanthropy and uncommon methods of political activism through its use of rituals and religious imagery to demand secularism be maintained; TST frequently protests the preferential treatment of Christianity by holding prayers in political meetings, proposing the erection of statues of satanic deities beside Christian monuments, and even offering an "After-School Satan" program in schools around country to add an antithetical option to after-school Bible Clubs (Laycock, Black Mass, 37-38).

Roe v. Wade acted as a foundational precedent for the bodily autonomy of reproductive bodies in America after its decision in 1973 to uphold a fundamental "right to privacy" which permitted and protected the rights of people to choose to have an abortion or not (Temme, 2023). Although it did not, as many people believe, 'legalize abortion', it opened up ways states can regulate abortion and framed the medical procedure as one that was covered under the 14th amendment (Temme, 2023). When it was overturned, it was regarded as a significant win for religious institutions over secularism and was heavily pushed by the desire to intertwine the adherence to Christian faith back with restrictive law at a societal level (Turtle & Bloomer, 1). It is not difficult to find that the alliance between the 2022 Trump administration and the religio-political strengths of American Christian and Evangelical groups was the tipping point for the already vulnerable decision to be overturned (Turtle & Bloomer, 1).

With TST's position as a politically present religious institution aiming to engage in public dialogues to maintain religious pluralism, it is frequently seen arguing against the Christian bias which has been ingrained in American politics and culture since its colonization in the nineteenth century (Koleva, 16). This insistence on secularism has remained consistent, if not escalated, in the fight for reproductive rights after Christian groups played their religio-political role in its overturning. TST seems aware of the political nature of its organization and utilizes it to approach political issues in subversive ways while also being able to dominate the discourses because of the reputation attached to its brand (Koleva, 14). TST has become a present political force in many ways, but most notable is its 'effective' form of nonviolent protest which tries to tear down the hegemonic forces that silence voices outside of the dominant ideology (Koleva, 24). While active in a myriad of political debates currently afflicting America like religious segregation within public schools and the blatant religious discrimination of minority groups, TST has truly mobilized in its opposition surrounding Roe v. Wade after its overturning was clearly religiously motivated,—a clear conflict for a group aiming at secularism (White & Gregorius, 95).

Whilst being politically active through its use of protest, TST differentiates itself from other political groups or religious institutions by leveraging the legal privileges granted to recognized religions and utilizing it to address and resolve issues within realms of political uncertainty (Tasin et al., 249). After the overturning of Roe v. Wade, 'heartbeat bills' have been implemented in various states which ban individuals from getting an abortion after six weeks of pregnancy—the usual time an ultrasound can detect a heartbeat in the fetus—since in most Christian presumptions, this fertilized embryo is a human life (Wimberley, 2). To regain some access to abortions in America, TST has pursued a legal aperture through its right to fulfill its Abortion Ritual which is intended to sanctify the process of abortion by reinstilling faith and comfort in one's bodily rights while undergoing the procedure (Wimberley, 15). With this ritual, TST has already begun to push back on restrictions on abortions in states like Missouri and Texas by arguing that its members are exempt from forcibly complying with the states' requirements since it conflicts with their religious beliefs (Wimberley, 16). With this ritual, they brought up the Religious Freedom Restoration Act to seek religious exemptions from the restrictions and have allowed the group to file lawsuits against certain district courts on the grounds that these restrictions offend the convictions of the temple (Tasin et al.,257). The legal pursuit of TST even goes beyond its active lawsuits against various states and its fight to receive acknowledgement for its Abortion Ritual. The group has also begun filing letters to the Food and Drug Administration, declaring its members should have easy access to abortion drugs and should be allowed to avoid regulatory impairments. The idea is that Satanists who desire or require an abortion could receive a doctor's note outlining the medications permitted. TST can be the distributor of the medication to its members rather than state providers (Tasin et al.,258).

Though the Abortion Ritual is most pertinent to the topic of reproductive rights, there is plenty of insight to be gained around the usage of rituals throughout the religion which can contextualize the struggle to legally legitimize the Abortion Ritual. Two pioneers in the study of TST Joseph Laycock and Jesper Aagaard Petersen both go into a thorough analysis of the 'deviant rituals' and use of 'magic' (Laycock, 49; Petersen, 93). Petersen explores how, although non-theistic Satanists do believe in a form of magic that can be informed from books, media, or previous spiritual affiliations; Satanists appropriate the original ideas of Anton LaVey, the founder of the Church of Satan, and use ideas of 'greater magic' when performing rituals and ceremonies, and 'lesser

magic' when engaging in more discrete or relaxed practices to engage in whatever 'magic' may mean to them (Petersen, 95). Additionally, Laycock addressed the usage of 'ritual inversion' where parodies of Christian practices are performed in ways that use symbolism and shock to induce revelations (Laycock, 46). Bearing these perspectives in mind, it is easy to acknowledge that the Satanic Abortion Ritual is not a one-use practice but instead continues on a tradition of Satanic rituals that embolden Satanists and divulge aspects of themselves that may have previously been suppressed or unknown. It is such rituals that enable Satanists to explore self-centrism and physically realize the self within a tangible and observable process (Petersen, 93/101). The Satanic Ritual acts as a multipurpose practice as Setfors would illustrate in the claims that these rituals contain four fundamental elements: activism, play, identity, and community (Setfors, 77-133). As such, the Abortion Ritual can be seen as a practice that advocates for the freedom of individuals to choose freely on decisions pertaining to their bodies, allows pleasure and comfort to be derived from a commonly taxing experience, empowers the individual to maintain control of and self-actualize their own existence, and to do so with an underlying social bond and support (Setfors, 77-133).

From its position as a non-theistic politically active organization, TST has successfully situated itself in the fabric of the legislative debate over reproductive rights in America and has cemented itself as a key opposing force in lobbying for change through its activism, legal pursuits, and its politically disruptive use of rituals. Despite the real changes and pursuits of TST, its attempts of aid are often delegitimized by both sides of the debate to be substantial or genuine and are often framed as futile seditious acts that appeal to the imagery of 'black magic' as a scare tactic (Escamilla, 60). This is typically a large reason why observers of TST often ask whether or not its name as 'Satanists' or designation as a 'New Religious Movement' are truly relevant to the political intentions of the group (Duclos-King, April 4). After all, it is plainly recognizable that the name commands the attention of those who hear it, formulates an immediate idea of the group which usually latches on to the demonic nature of the name, and postulates its religious malevolence or political insincerity (Koleva, 14). Yet, it seems better fitting to recognize the group first as a legitimate religion and then account for its political position as 'opposition'. It is devaluing the holistic nature of the group to address it as a singular political or religious force since its greatest strength is that it is both and more; TST is an organization that amalgamates its ritualistic and symbolic practices with its activism because it lives in accordance with its tenets. The political charge is latent within its practice when advocating for bodily autonomy (iii) and the respect of personal freedoms (iv), which is uniformly represented through the political charge in its name(Wimberley,14). By utilizing such a recognizable symbol as 'Satan'; TST immediately receives recognition for its causes, whether negative or positive; and actively challenges the assumptions it may have made on the group and its initiatives (Laycock, 51). Thus, the religio-political group referred to as The Satanic Temple is making waves in the struggle for reproductive rights in a post-Roe v. Wade America not just in its ritual performance and flashy name, but also by acting in accordance with its tenets and becoming notable combatants of abortion regulation through its activism and legal intervention.

References

Tasin, Lydian Florina, Achmad Munjid, and Galant Nanta Adhitya. "ESPOUSING ABORTION RIGHTS: A CASE STUDY ON THE SATANIC TEMPLE." Rubikon: Journal of Transnational American Studies 10.2 (2023): 249-262.

Wimberley, Hannah. "Satan and the Law: How the Satanic Temple is Fighting Christian Hegemony in Reproductive Healthcare." Houston Journal of Health Law & Policy (2023): 1-36.

Laycock, Joseph P. "A 'proper' black mass: the rhetorical struggle over a deviant ritual." Journal of Contemporary Religion 36.1 (2021): 37-55.

White, Manon Hedenborg, and Fredrik Gregorius. "The Satanic Temple: Secularist Activism and Occulture in the American Political Landscape." International Journal for the Study of New Religions 10.1 (2019).

Koleva, Zhivka. "Satanic Battle for Social Change: A Discourse-Analytical Study of The Satanic Temple's Activism." (2020).

Petersen, Jesper Aagaard. "The seeds of Satan: Conceptions of magic in contemporary Satanism." Aries 12.1 (2012): 91-129.

Setfors, Ida. "Celebrations in Dark Guise: A Definitional Study of Contemporary Satanic Ritual." (2022).

Laycock, Joseph P. Speak of the devil: How the Satanic Temple is changing the way we talk about religion. Oxford University Press, 2020.

Zwissler, Laurel. "Religiously Nonreligious: The Secular Activism of The Satanic Temple." Religion and Society 1.aop (2023): 1-16.

Thomson, Judith Jarvis. "A defense of abortion." Ethics: Contemporary Readings. Routledge, 2004. 267-274.

Turtle, Kellie, and Fiona Bloomer. "Roe v. Wade: The religious response." feminists law 11.2 (2022).

Temme, L. (2023, March 17). Roe v. Wade Case Summary: What You Need to Know. FindLaw. Escamilla, Ramón. "Whose Satan? US mainstream media depictions of The Satanic Temple." Discourse & Society 34.1 (2023): 54-76.

Duclos-King, Stephanie, "RLG235 Tutorial" RLG235, April 4, 2024, University of Toronto

♣ 2

Cognitive Dissonance Under Serfdom in Tsarist Russia

By Khaliun Enkhbold

Cognitive dissonance is a psychological theory that refers to the mental discomfort that arises when an individual holds two or more conflicting beliefs or values. People often experience this discomfort when they are met with information that challenges their existing beliefs. In the long run, this tension can affect mental, emotional, and physical health.[1] For many serfs in Tsarist Russia during the 19th century, it can be inferred that cognitive dissonance was a common and inevitable experience. Serfdom in Russia was a system of agricultural labor and social hierarchy. Millions of peasants were placed under the direct control of landowners. As a result, peasants had few legal rights and were severely limited in their freedom and mobility.[2] This stark contradiction between the serfs' subjugation (contradicting information) and their natural desire for self-autonomy (existing beliefs), created a psychological tension that can be understood through the lens of cognitive dissonance.

Drawing on the autobiographical accounts from the Four Serf Narratives, I explore how serfs experienced cognitive dissonance as they were forced into compliance with a repressive system. They experienced cognitive dissonance as their desire for autonomy clashed with their imposed subservience. To alleviate this dissonance, many serfs turned to various psychological coping mechanisms. For instance, religion provided a means of rationalizing their suffering by offering a justification of their place in society through divine will. Others might have reduced feelings of conflict through emotional detachment, selectively avoiding emotions to distance themselves from the pain and frustration of their situation. While much of the existing literature focuses on the socio-political and economic dimensions of serfdom, this analysis introduces a psychological lens on serfdom, highlighting how cognitive dissonance shaped serfs' beliefs and behaviors. This approach provides a more nuanced view of the everyday struggles of serfs within the broader framework of Russian serfdom.

As serfdom transformed from a localized form of land tenure to a widespread institution of social and economic control, growing oppression towards the serfs intensified over time.[3] Many serfs rationalized their suffering by embracing religious teachings that framed their hardships as part of a divine plan. Believing that their endurance would lead to heavenly rewards allowed serfs to reconcile the gap between their oppressive circumstances and the promise of salvation. One account of this is seen in the Autobiography composed by Nikolai Smirnov. Born into a serf family belonging to the Golitsyn, a prominent household of the Russian autocracy, Smirnov led a life different from most serfs. As his father was the manager of all the estates and property

1 Joel Cooper & Kevin M. Carlsmith, "Cognitive Dissonance." International Encyclopedia of the Social & Behavioral Sciences, (December 2015): 76. 10.1016/B978-0-08-097086-8.24045-2

2 William C. Hine, "American Slavery and Russian Serfdom: A Preliminary Comparison." Phylon, (1975): 379. https://doi.org/10.2307/274.

3 Roger Bartlett, "Serfdom and State Power in Imperial Russia." European History Quarterly 33, no. 1 (January 2003): 38. https://doi.org/10.1177/0265691403033001638.

of their master, Smirnov was able to receive ample education in various sciences. This education opened Smirnov's eyes to the world beyond serfdom. Smirnov asked for manumission from his master several times in hopes of escaping serfdom. However, all of Smirnov's requests were denied. Having seen his family marginalized by the oppression of serfdom, Smirnov made the brave decision to flee. Smirnov was caught and received an inhumane punishment for fleeing. In hopes of getting his punishment revoked, Smirnov repents his actions in his narrative.[4]

In Smirnov's narrative, he places blame on himself for his actions, stating, "I began to see just what a terrible labyrinth my unreasonable temper and youthful inexperience had led me into & a thousand times I cursed my empty-headed lack of foresight and my straying down the wrong path." [5] This growing sense of self-blame reflects the cognitive dissonance he feels as his impending punishment draws near. The threat of punishment clashes with his desire for freedom and his previous action of fleeing, creating psychological tension. To ease this discomfort, Smirnov turns to religion, seeking solace in a higher power. He prays fervently, saying, "I sent prayers to almighty God, asking for His generous help in my so pitiful and desperate situation." [6] His reliance on faith deepens when he admits, "I deserve not only the punishment prescribed by law but even greater chastisement. All my hope and faith I place upon the infinite mercy of God." [7] Through these statements, it becomes clear that Smirnov is rationalizing his punishment as a necessary consequence, even going so far as to view it as a path to spiritual salvation. By accepting and justifying his suffering, he transforms what would have been an unbearable trial into something meaningful; a coping mechanism to reconcile the dissonance between his actions and the harsh reality of his situation. This rationalization allows Smirnov to find a sense of peace in the face of punishment, as he reframes the trial as one for spiritual growth rather than mere retribution.

It is important to note that serfdom was not just an economic system but also a tool of state power. It allowed the state to control the peasantry and the nobility, funded military expansion, and most importantly provided economic stability. As Russia's power and wealth became deeply tied to agricultural production, the state feared the radical consequences of dismantling the system. This notion of potential instability led to the further exploitation of serfs, pushing them to their physical and emotional limits.[8] Under such oppressive conditions, many serfs coped by focusing on external activities and avoiding engagement with their own emotions and larger aspirations. This coping mechanism allowed them to endure suffering without fully internalizing its emotional impact.

An example of this coping mechanism can be seen in the Notes of a Serf Woman, where Vasilieva, a young serf orphan who was under the control of the Bolotin family, endured a series of traumatic events during her childhood. Brought into the manor to serve the youngest daughter of the family, Vasilieva experienced physical violence and unnecessary punishments from her masters. In one instance, she was beaten by Varvara Ivanovna, the mistress of the manor, not for her own faults, but because

4 Nikolai Smirnov, "Autobiography" in Four Russian Serf Narratives, ed. John MacKay (Wisconsin: University of Wisconsin Press, 2009), 23-37.

5 Smirnov, "Autobiography", 32-33.

6 Smirnov, "Autobiography", 34.

7 Smirnov, "Autobiography", 35.

8 Hans-Heinrich Nolte and Elena Smolarz, "Slavery and Serfdom in Muscovy and the Russian Empire." The Palgrave Handbook of Global Slavery throughout History, (June 2023): 288. https://doi.org/10.1007/978-3-031-13260-5_16.

Ivanovna's youngest daughter refused to study. This pattern of cruelty extended beyond her own suffering, as she witnessed the killing of a family cat by the Bolotin son and, most devastatingly, the death of a fellow serf boy who had stolen food.[9]

Due to these overwhelming traumas, Vasilieva's seemingly lack of personal opinion and emotional reaction can be understood as a way of coping with the uneasiness of her dissonance. Her lack of self-expression, particularly in the face of constant abuse, suggests that she may have found it mentally and physically safer to adopt a passive role by focusing on the opinions of others. This distancing allowed her to avoid the emotional intensity of her trauma and transformed her experiences into something she could endure, never needing to have an opinion of her own. She only mentions the cruelty and violence of her masters from the perspective of the other serfs. She states, "Varvara Ivanovna received no praise from the domestic; she was very rude and not only beat her servants…" [10] This illustrates how as a young child, Vasilieva distanced herself from the pain of her situation through emotional detachment achieved by selective focus. Another account is when she says, "Although the maids liked the young barin Egor Petrovich for his beauty, they complained that his endearments were painful." [11] The aforementioned highlights how Vasilieva does not have a personal opinion of her masters. This lack of personal opinion can translate into how she avoided direct confrontation with her masters, and seems never to employ thoughts of life beyond the manor walls. Despite the severe beatings and injustices she endures, Vasilieva fixates on her daily routines and the tasks associated with serving the youngest daughter, diverting her attention from the broader oppressive system in which she is trapped. By narrowing her focus to her immediate responsibilities, she avoids the full emotional impact of her servitude, exemplifying how emotional detachment can serve as a critical coping strategy under conditions of extreme oppression.

Serfdom, far from being merely an economic institution, left profound psychological imprints on generations of Russian citizens. The narratives of individuals like Smirnov and Vasilieva reveal how serfs navigated the dissonance between their desire for autonomy and the harsh realities of subjugation. These autobiographical texts show that serfs did not passively accept their fate. Instead, they employed various psychological mechanisms, such as religious rationalization and emotional detachment to reconcile with their dissonance. Through my analysis, I hope to underscore the significance of considering the psychological aspects in historical contexts of oppression. I believe that approaching serfdom in this way highlights the resilience and adaptability of serfs who were constantly navigating the tension between their internal desires and their harsh realities.

---

9 M. E. Vasilieva, "Notes of a Serf Woman" in Four Russian Serf Narratives, ed. John MacKay (Wisconsin: University of Wisconsin Press, 2009), 197-212.

10 Vasilieva, "Notes of a Serf Woman", 203

11 Vasilieva, "Notes of a Serf Woman", 204

Bibliography

Cooper, Joel, and Kevin M. Carlsmith. “Cognitive Dissonance.” International Encyclopedia of the Social & Behavioral Sciences, (December 2015): 76–78. https://doi.org/10.1016/b978-0-08-097086-8.24045-2.

Hine, William C. “American Slavery and Russian Serfdom: A Preliminary Comparison.” Phylon 36, no. 4 (1975): 378–84. https://doi.org/10.2307/274636.

Bartlett, Roger. “Serfdom and State Power in Imperial Russia.” European History Quarterly 33, no. 1 (January 2003): 29–64. https://doi.org/10.1177/0265691403033001638.

MacKay, John. Four Russian serf narratives translated, edited, and with an introduction by John Mackay. Madison, Wis: University of Wisconsin Press, 2009.

Nolte, Hans-Heinrich, and Elena Smolarz. “Slavery and Serfdom in Muscovy and the Russian Empire.” The Palgrave Handbook of Global Slavery throughout History, (June 2023): 279–96. https://doi.org/10.1007/978-3-031-13260-5_16.

♣ 3

Investigating the Legal Encounter between Ontario and Sharia Law through the 2006 Family Statute Law Amendment Act

By Arshiya Bhatia

The creation and operation of law is inherently political. This argument is substantiated in the political operationalization of Canadian law when encountering Sharia law during the 2004-2005 Ontario Sharia Arbitration Debate. This legal encounter is characterized as legal orientalism, wherein Sharia Law was viewed as inferior due to its perceived adverse effects on women and deviation from Ontarian legal norms. These biases, rooted in xenophobia and Islamophobia, underscored a broader political agenda that infiltrated the legal discourse. Moreover, the debates prompted inquiries into analytical jurisprudence, particularly regarding how legal "norms" are created and enforced in Ontario. To delve into this, it is essential to delineate the actors involved in shaping legal norms and those excluded from the process. By acknowledging the inherently political nature of lawmaking, we can better comprehend how legal frameworks reflect political motives. The subsequent amendment of the Family Statute in 2006, as a result of these debates, serves as a case study illustrating the political nature of the lawmaking process and the encounter with diverse legal systems. This essay examines how the 2006 Family Statute Law Amendment Act which was deemed as a change to support the Ontario citizens, in reality, was a strategic political maneuver to protect the legal sovereignty of Ontario law and devalue Islamic legal systems. This assertion is supported by three frameworks: the politics of inclusion and exclusion in imagined communities which define power structures, Legal orientalism which perpetuates the image of pre-modern Sharia law in comparison to modern, and lastly, the lack of juxtaposition between Ontario and Islamic law, which proves the counter solution of legal pluralism as valid. It is imperative to note that while this argument is situated between Ontario and Canadian Law versus Sharia Law, all faith-based arbitration was banned through the amendment, affecting multiple religions, however, the argument was honed into Islamic law.

Using Teemu Ruskola's analysis of how law is a medium to instantiate values of political beings and building on David M. Friendenriech's explanation of 'imagined communities', one is able to understand how political alliances that created and supported Family Statute Law Amendment Act devalued Islamic law. As the law is beyond the rules that it has created, it is a source of political imagination, "to imagine the real" (Ruskola 2013, 2). Freidenreich concurs with the idea, explaining that legal systems and procedures are influenced by markers of identity and the maintenance of boundaries within these imagined communities (2011, 8). He specifically links this concept to the role of religion in forming and regulating these communities (2011, 8). In this case, the Islamic religious alliance is portrayed to 'exclude' the rights of women to be free from abuse. Thus, the two crucial imagined communities highlighted in the Ontario Sharia Arbitration Debate, are either in support or in opposition to Islamic law. The opposition claims that women's rights are not recognised in the Islamic legal system, and female Canadian citizens are often negated in Sharia Arbitration procedures (Bryant 2005). It is important to evaluate if that is the reality of outcomes or an ideology that is perpetuated

to delegitimize the system by strengthening the political alliances of the opposition. The Ontario commissioned report by Marion Boyd advocated for the preservation of the 1991 Arbitration Act proving that faith based arbitration was not discriminatory towards women and beneficial to all the people of Ontario "subject to safeguards" (Times 2005). However, by focusing on the Premier's statement on the protection of the "Ontario Public '', it is clear that this amendment excludes Muslim women who benefit from Islamic Family Arbitration in its protection (Times 2005). Hence, the political coalition advocating against Sharia law is reinforced, fostering a politics of exclusion by rejecting Sharia family arbitration based on political ideologies. This argument is strengthened by Emon's analysis of whether the "liberal nation's rule of law (is able to) tolerate a minority group exerting autonomy?" (2008, 392). In denying Islamic law authority, Ontario's legislation not only defines what is lawful but also enhances the credibility of its legal system. In the following section, we will examine the origins of these politicized perceptions of Islamic law as regressive that are utilized to strengthen Ontario's legal sovereignty.

Historical analytical recounts are imperative to understand how political ideologies of Islamophobia are rooted in the legal orientalist perspectives, portraying Islamic Law as a reductive "code of law" (Emon 2008, 395). Translated in the Amendment, Ontario Premier Dalton McGuinty's specific inclusion of "Sharia Law" in his statement, further identifies the political ideology of the Province (Times 2005). This portrayal is rooted in historical manipulation of legal texts and interpretations to serve the interests of colonial governments, often through devaluing Islamic legal systems. Anver M. Emon signifies how the West's current interpretation of the Islamic legal system is inaccurate, as it is based on the Colonial governments manipulation of Islamic law to serve their interests (2008, 400). David Powers's examination of Sharia family endowments in Algeria and India reveals that laws like the Anglo-Mohammedan Act (1772 to 1879) in India, which invalidated religious and family endowments sanctioned by muftis. Motivated by the British Colonial government's fear of the financial power of Muslim endowments and inability to levy taxes, this is one example of how laws were distorted to serve the Colonial agenda (Powers 1989). Furthermore, the International community's understanding of Sharia law is based on the "text-based" approach that ignores the context and contingency of the institution, which is signified through the inclusion of Usul-al-Fiqh, Qadi's and Mufti's interpretive abilities and application to real-life (Emon 2012, 61). Therefore, political alliances opposed to Sharia law in the Debates are strengthened by the historical perceptions of rigidness, a predetermined position influenced by colonial practices. In this moment of legal encounter in Ontario, Islamic law is positioned as the "other". Emon explains how International law, which is considered standard of law, initially is seen to juxtapose Sharia law on the grounds of issues such as the human rights agenda. As Ruskola states, when the "other" system does not adhere to the "international norm" they are often titled as either void of law or inadequate in their legal systems. In the case of the Amendment, Ontario law is seen to be the pinnacle of "universal" law that is able to serve and protect the present multicultural community (Ruskola 2013,15). This further devalues the Islamic legal system through reinforcing historical legal orientalist perceptions, thus, establishing their sovereignty with "one law for all Ontarians" (Bryant 2005).

Despite Ontario's insistence on a unified legal system, Emon's analysis demonstrates the feasibility of incorporating Sharia law into family arbitration within a legal pluralistic framework. Premier McGuinty's persistent push for a singular legal standard for all Ontarians reflects his belief that Sharia law is incompatible with the Canadian legal system. However, this perspective is influenced by a political ideology

of legal orientalism, which views Sharia law as a "pre-modern tradition" incompatible with the liberal principles of the Province (Ruskola 2012, 15) (Emon 2008, 395). With limited efforts made to propose alternative jurisprudential paradigms, it becomes evident that Ontario has not afforded Sharia law the opportunity to evolve. Through Emon's illustration of the integration of liberal principles in family arbitration within Tunisia, whereby divorces necessitate court intervention eliminating a husband's unilateral ability to divorce his wife under Islamic law, it is demonstrated that legal systems can indeed evolve (2008, 419). This also challenges Western perceptions that Sharia law is inherently unable to adequately protect the rights of women. The crucial indication of Sharia law's compatibility lies in the Minister's omission of the advantages of retaining the arbitration system outlined in the provincial commissioned report by Boyd (Bryant 2005). This deliberate exclusion suggests a political motive to establish Ontario law as sovereign and unchallenged by alternative arbitration methods. The provincial government's concerns with integrating Sharia family arbitration into their legal framework were due to undermining their sovereignty, especially if it became a preferred method for certain citizens, which maintains their Muslim identity. Their concerns stemmed from a perceived misalignment between Sharia law and their political liberal agenda, as well as uncertainties surrounding its ability to safeguard the welfare of women to the same extent as their established legal system. Consequently, proving how law is inherently political.

In conclusion, this essay has examined the 2006 Family Statute Law Amendment Act, revealing it to be a calculated political maneuver masquerading as a measure to safeguard Ontario citizens. Instead, its underlying objective was to fortify the sovereignty of Ontario law while devaluing the stature of Islamic legal systems. The apprehension surrounding the integration of Sharia law stemmed from historical biases which shape perceptions depicting it as incompatible and antiquated. However, with appropriate regulations, Sharia law arbitration could potentially complement Ontario law. By rejecting Sharia arbitration, an opportunity to explore novel pathways for coexistence between Islamic and Canadian law is forfeited. Hence, the discourse surrounding Sharia law in Ontario underscores the intricate dynamics of legal and political interactions and emphasizes the necessity of challenging biases to cultivate inclusive legal frameworks.

References

Bryant, Hon. Michael. "Statements by the Ministry and Responses: Family Law Arbitration / Arbitrage en droit de la famille." Presented on November 15, 2005. 38th Parliament, 2nd Session. https://www.ola.org/en/legislative-business/house-documents/parliament-38/session-2/2005-11-1 5/hansard#PARA249

Emon, Anver M. 2012. "2 Shari'a and the Modern State." In Islamic Law and International Human Rights Law. Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199641444.003.0003

Emon, Anver M. 2018. "Islamic Law and the Canadian Mosaic: Politics, Jurisprudence, and Multicultural Accommodation." In Debating Sharia, 192–228. Toronto: University of Toronto Press. https://doi.org/10.3138/9781442694439-009

Freidenreich, David M. 2011. Foreigners and Their Food : Constructing Otherness in Jewish, Christian, and Islamic Law. Berkeley: University of California Press. Law Times. "No More Faith-Based Arbitration." September 19, 2005. https://www.lawtimesnews.com/news/general/no-more-faith-based-arbitration/258767

Powers, David S. 1989. "Orientalism, Colonialism, and Legal History: The Attack on Muslim Family Endowments in Algeria and India." Comparative Studies in Society and History 31 (3): 535–71. https://doi.org/10.1017/S0010417500016030

Government of Ontario. Family Statute Law Amendment Act, S.O. 2006, c. 1, Bill 27. https://www.ontario.ca/laws/statute/s06001

♣ 4

Mistresses: The Feminization of the History of Slave Ownership

By Shane Joy

Historically, scholarly writing about the plantation complex and the institution of slavery in the New World has focused narrowly on the stories of men. Women's exclusion from historians' works has caused misapprehensions such as the notion that women did not have a crucial role to play in nor impact on the plantation complex and the institution of slavery. Teresa Prados-Torreira challenges these assumptions in her book, The Power of Their Will: Slaveholding Women in Nineteenth-Century Cuba (2021), arguing that slaveholding women were common and integral to the successful running and legitimization of the plantation. Her conclusions complement Jennifer Morgan's work to consider the roles of enslaved women while complicating Patterson's theories about the role of honour in the master-slave relationship, thereby feminizing the history of slave ownership. By putting her work in conversation with the writings of Morgan and Patterson, this essay will argue that Prados-Torreira disruptively fills some and highlights other crucial gaps in the literature by demonstrating how slaveholding women were integral to the success of plantation slavery in the New World.

Women's exclusion from histories of slavery and the plantation complex is not simply attributable to historians' neglect of their voices. The limited education provided to slaveholding women resulted in wider illiteracy compared to men, meaning they left fewer sources for historians to draw from.[1] This was even truer for enslaved women, for whom education and literacy were extremely rare.[2] Further, topics such as sexual rivalries between women and their slaves were considered too inappropriate for letter-writing.[3] Additionally, women's legal and political subordination to men also likely led many historians to assume they had little influence over the institution of slavery.[4] In addition to willful omission, the limits placed on women's power by patriarchal societies and silences in the archives must also be understood as reasons why scholars historically presented masculinized stories of slavery.

To re-insert women into the history of slavery, Prados-Torreira argues they had a major economic role in upholding the institution. Slaveholding women, whom Prados-Torreira calls mistresses (as a female equivalent to master),[5] possessed a great understanding of the needs of the household, sifting through hundreds of newspaper notices advertising slaves for sale or rent every day, with transactions taking place in their houses.[6] Prados-Torreira suggests these actions made the home an extension

1 Teresa Prados-Torreira, The Power of Their Will: Slaveholding Women in Nineteenth-Century Cuba (Tuscaloosa: University of Alabama, 2021), 6.

2 Prados-Torreira, The Power of Their Will, 6.

3 Prados-Torreira, The Power of Their Will, 7.

4 Prados-Torreira, The Power of Their Will, 7.

5 Prados-Torreira, The Power of Their Will, 5-6.

6 Prados-Torreira, The Power of Their Will, 15-16.

of the slave market.[7] For wealthy white women, employing a skilled group of slaves in the household brought a large measure of comfort to their lives, while women of middle- and lower-class backgrounds bought and hired skilled slaves for income.[8] Furthermore, Prados-Torreira provides the example of Maria Luisa Dinet, a single woman who independently ran coffee plantations with many slaves,[9] and Ms. Coninck, a widowed American mistress who had full control over her property and the treatment of her slaves.[10] By explaining their management of the household, and sometimes entire plantations, Prados-Torreira compellingly shows the major economic influence women had over the institution of slavery.

Prados-Torreira convincingly argues slaveholding women played an integral role in reinforcing the asymmetrical power structure of the master-slave relationship. While instilling moral principles and Christian values in the slaves, Prados-Terreira argues mistresses reinforced their authority through acculturation.[11] By providing work, food, and housing, and giving them new names, the mistress established the slaves' dependency.[12] On the plantation, slaveholding women visited the sick, heard the slaves' grievances, and intervened on their behalf to prevent them from being punished.[13] For mistresses who took their nurturing role seriously, their seeming benevolence likely brought a measure of relief to the slaves while legitimating and accommodating them to their condition.[14] Indeed, Prados-Torreira notes that Maria Luisa Girard believed her kind rulership kept order on the plantation.[15] In demonstrating their cultural and moral influence on the plantation, Prados-Torreira effectively shows the importance of slaveholding women to the legitimation of slaveholder dominance.

Like Prados-Torreira, Jennifer Morgan examines women on the plantation, but focuses instead on the enslaved. In Labouring Women: Reproduction and Gender in New World Slavery (2004), Morgan seeks to reassess the importance of enslaved women to plantation economies. Drawing on the disciplines of African American history, women's history, colonial American history, and feminist theory and cultural studies, Morgan demonstrates that like men, women worked in all spheres of the plantation, making them crucial to its profitable functioning.[16] Furthermore, their role on the plantation was made more important by the procreative labour they performed. Speculating on their reproductive potential, slave owners identified slaves of childbearing age as "increasers" in their wills, allowing them to appropriate enslaved women's children to ensure prosperous futures for their progeny.[17] Slave women's dual role made them important to the present and future success of the plantation, and Morgan fills a major gap in the literature by showing how they were valued equally, if not more than enslaved men.

Prados-Torreira and Morgan both centre the stories of women's presence and roles on the plantation. By explaining the economic and cultural importance of

---

7 Prados-Torreira, The Power of Their Will, 15.

8 Prados-Torreira, The Power of Their Will, 25.

9 Prados-Torreira, The Power of Their Will, 64-65.

10 Prados-Torreira, The Power of Their Will, 45-46.

11 Prados-Torreira, The Power of Their Will, 40-41.

12 Prados-Torreira, The Power of Their Will, 55.

13 Prados-Torreira, The Power of Their Will, 38.

14 Prados-Torreira, The Power of Their Will, 47.

15 Prados-Torreira, The Power of Their Will, 59-60.

16 Jennifer L. Morgan, Labouring Women: Reproduction and Gender in New World Slavery (Philadelphia: University of Pennsylvania, 2004), 4.

17 Morgan, Labouring Women, 82-83.

mistresses on the plantation, and by describing the dual role enslaved women played in the early English colonies through their reproductive labour, Prados-Torreira and Morgan respectively challenge historical assumptions that the institution of slavery and the plantation complex were exclusively male domains. Rather, they demonstrate that women were fundamental to their success and perpetuation. Indeed, like Morgan, Prados-Torreira devotes a chapter to the examination of wills, but instead for slaveholding women, demonstrating that it was not simply men who sought to ensure their relatives would prosper from the wealth they left behind.[18] While Prados-Torreira limits her geographic and temporal scope to 19th-century Cuba, slaveholding women likely played similar roles in plantations throughout the Americas. The same goes for Morgan, whose focus was mostly on Barbados and Carolina. With further research, a common experience for slaveholding and enslaved women across space and time can be established using their works.

Unlike Morgan, Orlando Patterson's definition of slavery does not centre the gendered experiences of women on the plantation, warranting a comparison with Prados-Torreira's examination of the mistress-slave relationship. In his seminal work, Slavery and Social Death, Patterson argues that slavery is "the permanent, violent domination of natally alienated and generally dishonoured persons."[19] Seeking to understand what constitutes slavery, he breaks the condition down into three constituent elements. Through violence or threats thereof, Patterson asserts that the domination of the slave and their powerlessness in relation to the slaveholder is the first constituent element of slavery.[20] Further, Patterson suggests that having been torn from their kinship ties, culture, and heritage, the slave is natally alienated, having ceased to possess an independent, formally recognized social existence.[21] Rather, the slave's belonging was dictated by the master, whose authority, Patterson argues, derived from his ability to integrate or marginalize the slave from his household.[22] Finally, Patterson claims that the slave's powerlessness and marginality in relation to the master generates their lack of honour, which he suggests is the third constituent element of slavery.[23] This is not only reflected by the slave's servility and self-hatred, but the slaveholder's gaining of honour through mastership over others.[24] Thus, according to Patterson, powerlessness, natal alienation, and dishonour are constituent elements of the condition of slavery across space and time.

Prados-Torreira's demonstration of slaveholding women's role on the plantation challenges Patterson's notion of generalized dishonour. Intimately tied to masculine identity, Patterson's use of honour as a constituent element of slavery presents a masculinized interpretation of the master-slave relationship. While the slave lost respect as a man due to his subordination, the slaveholder gained it at his expense through mastery and the wielding of violence. However, this framing marginalizes women's experience of slaveholding and how gender shaped their experiences. Prados-Torreira disrupts Patterson's interpretation by providing examples proving some women were full accomplices in the violence of slavery. In addition to telling the story of Sarah Jenkes, an American widow who oversaw the financial and managerial decisions of a plantation with

18 Prados-Torreira, The Power of Their Will, 70.

19 Orlando Patterson, Slavery and Social Death: A Comparative Study (Cambridge: Harvard University Press, 1982), 13.

20 Patterson, Slavery and Social Death, 4.

21 Patterson, Slavery and Social Death, 5.

22 Patterson, Slavery and Social Death, 63.

23 Patterson, Slavery and Social Death, 10.

24 Patterson, Slavery and Social Death, 12.

150 slaves,[25] Prados-Torreira writes about Madame X, who subjected her slaves to harsh punishments such as teeth-pulling.[26] On the other hand, through her demonstration of Cuban women petitioning the government for the return of their slaves following the Ten Years' War, Prados-Torreira shows that poor education and literacy, as well as an upbringing around slaves made women far more reliant on slave labour for survival and comfort than men.[27] Additionally, married women's confinement to the governance of the household often led to stronger relationships between them and their slaves.[28] In these ways, Prados-Torreira shows that reassessing how gender complicated the experience of slaveholding and the master-slave relationship is an area that has yet to be studied.

Slaveholding women were integral to the proper functioning of the plantation complex and the success of the institution of slavery. Teresa Prados-Torreira demonstrates that contrary to previous scholarship which presented masculinized stories of slavery, women carried out the management of plantations and the acculturation of slaves. Her work to centre women's experiences complements that of Jennifer Morgan, who demonstrates that women's procreative labour meant that they played dual productive and reproductive roles on the plantation, making them crucial to the future success of slaveholding families and plantation economies. Further, Prados-Torreira's demonstration of women's gendered experience of slave ownership disrupts Patterson's masculinized definition of the master-slave relationship, highlighting that more work must be done to understand how slaveholding men and women experienced and understood mastery over others. While filling major gaps in the literature, Prados-Torreira shines a light on those that still exist, making her short monograph a subversive piece of scholarship about slavery and the plantation complex. Prados-Torreira's work and others like hers are key to reversing long-held assumptions that the world of slavery was an exclusively male realm.

25 Prados-Torreira, The Power of Their Will, 54.

26 Prados-Torreira, The Power of Their Will, 62.

27 Prados-Torreira, The Power of Their Will, 87.

28 Prados-Torreira, The Power of Their Will, 17-18.

Bibliography

Morgan, Jennifer. Labouring Women: Reproduction and Gender in New World Slavery. Philadelphia: University of Pennsylvania, 2004.

Patterson, Orlando. Slavery and Social Death: A Comparative Study. Cambridge: Harvard University Press, 1982.

Prados-Torreira, Teresa. The Power of Their Will: Slaveholding Women in Nineteenth-Century Cuba. Tuscaloosa: University of Alabama, 2021.

♣ 5

Representations of Women During the Second World War as the Socially Archetypical Influencer and Influenced of Mythology

By Boško Garaca

Introduction

A revision to traditional psychoanalytic and semiotic theory may illustrate the influence of American propaganda representations of women during the Second World War as a bidirectional relationship between social archetypes and a manufactured myth of the "empowered woman of war." By leveraging preconceived societal norms of women, present in a socio-historiographical collective unconscious, propaganda was able to exploit said norms and promote a politically motivated message through media representations: American women, during the Second World War, were encouraged to join the war effort, in a falsely "progressive" moment, while still being encouraged to adhere to traditional norms, reinforcing social archetypes.

1. Social Unconscious and Myth

A "sociologically styled collective unconscious" is a revision to the psychoanalytic theory of Carl G. Jung's "collective unconscious." According to Jung, a distinct unconscious separate from the "personal unconscious"—i.e., the individual's unconscious—exists, whose contents do not arise from personal experience or personal acquisition.[1] The "collective unconscious" is universal and impersonal: it is identical across all individuals and heritable, since its contents have never been consciously possessed.[2] Its contents are "archetypes": pre-existent forms of psychopathology.[3]

What is difficult to accept about the Jungian approach is the universality of archetypes: vast cultural and societal differences exist, almost entirely undermining universal psychopathologies. An archetype, e.g., the Mother, may be entirely different between a Western culture, with the nuclear family structure, compared to one which does not participate in said structure. For this reason, a historically based approach to the unconscious, rooted in the consumption of specific societal norms that have constituted it over time, appeals not only to collectivity but also to heredity.

Martin Klüners proposes that a major fault in historical psychoanalysis has been that psychoanalysts or historians have neglected the "exterior" influence (e.g., political, social, economic) in favour of the "interior" (viz., unconsciousness, irrationality); and historians have similarly neglected the interior in favour of the exterior.[4] But what Klüners proposes is that the psychoanalytic theory of the unconscious, as an interior-exterior

1 Carl G. Jung, The Portable Jung, ed. Joseph Campbell, trans. R. F. C. Hull (Penguin Books, 1985), 59–60.

2 Ibid., 60.

3 Ibid.

4 Martin Klüners, "The Unconscious in Individuals and Society: On the Application of Psychoanalytic Categories in Historiography," History and Theory 63, no. 1 (March 2024), 81.

relationship, may contribute to a better understanding of their interdependence,[5] such that the exterior influence sheds light on the interior unconscious and its contents in a historical moment. For this reason, Klüners's discussion of Johann G. Droysen's commentary on the ego (i.e., the self) as a historical result shaped by cultural and societal factors, along with his discussion of Miriam Gebhardt, who proposed identity formation (of the ego) as being a lifelong influence of representations and role expectations that allow for "intergenerational transmission,"[6] demonstrates the exterior's influence upon the interior. Moreover, Klüners's discussion of the interior-exterior relationship between ego and society supports a revised Jungian framework such that unconscious societal factors (from Droysen) and their heritability (from Gebhardt) can be understood as a form of social unconscious. Within the social unconscious, we find societal factors that constitute part of a non-universalized ego (contra Jung), instead reflecting specific cultural factors: an archetype, e.g., the Mother, is no longer a universal notion that applies equally in and outside societies with nuclear family structures, but instead varies between specific societies depending on unique family structures. This redefined notion of the archetype is a social archetype: a sociotype. Pre-existent universality is abandoned and specific preconceptions shaped by exterior social influences become embedded in the interior social unconscious of a given society.

Additionally, my analysis of American propagandistic representations of women during the Second World War requires Roland Barthes's concept of "myth." Mythology is a semiological approach to understanding how discursive ideas become politicized. Barthes notes that mythology is a system of communication, like speech, that aims to convey specific messages.[7] Whatever the specific message may be, it is confined purely to historicity: myth is not eternal as speech is, but instead is relevant to a historical moment.[8] As Linda Åhäll elucidates, myths cannot be universalized because they require specific cultural and social conceptions, which both specify and limit them to a historical moment.[9]

Myths concern only particulars and work on the presupposition that there exists the capacity for a "signifying consciousness," which refers to human thinking that can interpret meaning while discrediting materiality.[10] The damning implication is that myths succeed in transforming history into nature: myth is no longer read as motive but instead as reason.[11] Arbitrary and artificial concepts that were once the raw material of myths are converted into naturalized representations, leading them to be viewed as factual instead of semiotic; mythical speech is thus depoliticized, presented as default and as natural.[12]

My investigation aims to integrate these two concepts. By first analyzing the history of media representations and their transformations, both prior to and during the Second World War, American society's notion of "woman" can be uncovered. This historically entrenched notion manifested itself into an American social unconscious qua woman. The sociotypes of women were manipulated by propaganda agencies and advertisers during the Second World War as the influencers of myth—specifically as

5 Ibid.

6 Ibid., 83, 85.

7 Roland Barthes, Mythologies, trans. Annette Lavers (Hill and Wang, 1972), 109.

8 Ibid., 110.

9 Linda Åhäll, "Motherhood, Myth and Gendered Agency in Political Violence," International Feminist Journal of Politics 14, no. 1 (March 2012), 108.

10 Barthes, Mythologies, 110.

11 Ibid., 129.

12 Ibid., 143.

the "empowered woman of war"—for political gain. Yet simultaneously, to preserve the social unconscious, those very same propaganda agencies and advertisers exploited the historical sociotypes and propagated them in the myth; they too became influenced by myth.

2. Building the Social Unconscious Through Historical Representations of Women

To reconstruct the social unconscious surrounding the Second World War, we begin by scrutinizing the turn of the century. The public image of women in the United States before the Second World War's outbreak was exceptionally limiting, relegating women to traditional wives and mothers.[13] Although women had made progressive strides during the First World War, particularly in entering male-reserved industries, it was a temporary phenomenon: women persisted as being thought of as wives and mothers first and foremost.[14] Even if the image of the "New Woman," a myth prevalent at the time, was thought of as a groundbreaking character, she was nonetheless limited: intelligent only for social circumstances, competent only for the sake of maintaining the household, and dominant over her husband only in minor affairs.[15] In essence, the New Woman was not nearly as progressive as she was perceived to be.

Though women had gradually begun to work more, the notion of women as wives and mothers persisted and was actively promoted; representations of women during this time focused especially on the virtues of motherhood.[16] Literary Digest, in 1922, posed, "Can a woman run a home and a job, too?" to 250 women: the results demonstrated that a majority felt that women should primarily be concerned with their homes and families.[17] Furthermore, motherhood was illustrated as a patriotic duty, as it was in the American tradition that women be educated to become mothers of sons.[18] This notion of "woman" was featured prominently in women's magazines, specifically addressed to housewives who did not require to forego housewifery, reinforcing existing attitudes and justifying their perpetuation.[19]

The notion of "woman" in the prewar period, as illustrated by Leila J. Rupp, is relatively unremarkable: a wife and mother, predominantly middle-class, subordinate to her husband and children, cultivating her talents for the sake of motherhood and skilled housewifery.[20] This image would become the primary representation utilized by propaganda agencies and advertisers during the Second World War to appeal predominantly to middle-class mothers and housewives. However, as Yesil Bilge notes, 29 percent of women workers in 1944–45 had already worked for more than ten years prior to the war, and another 19 percent for five years.[21]

Nonetheless, the public image of "woman," as described by Rupp, must have been passed down to the next generation in a "stream of culture," as Peter Gay calls it:

---

13 Leila J. Rupp, Mobilizing Women for War: German and American Propaganda, 1939–1945 (Princeton University Press, 2015), 51.

14 Ibid., 55–56.

15 Ibid., 57.

16 Ibid., 63.

17 Rupp, Mobilizing Women, 62.

18 Ibid., 63.

19 Ibid., 66.

20 Ibid., 71.

21 Bilge Yesil, " 'Who said this is a Man's War?': propaganda, advertising discourse and the representation of war worker women during the Second World War," Media History 10, no. 2 (2004): 105.

the next generation of children was predisposed to socialization of these cultural norms from their parents.[22] This suggests that these notions of "woman" from the prewar period found themselves in a social unconscious present in the United States through cultural inheritance. Resulting from the public image of women emerged sociotypes that assigned women to specific role expectations and societal norms. These sociotypes that would go on to influence the myth of the "empowered woman of war" in the United States. Two sociotypes are most prominent: the "Mother," a potential producer of offspring; and the "Subordinate Woman," always relational and underling to men.

3. Sociotypes as the Influencers of Myth

As the Second World War began, these preconceived sociotypes from the prewar period set the stage for how American propaganda would capitalize on them to address labour shortages by recruiting women into industrial jobs. Propaganda could not ignore the necessity of women entering traditionally male-dominated fields, requiring a drastic transformation of the image of the American woman,[23] one that directly opposed the prewar public image. Following suggestions outlined by the Office of War Information (OWI) in their Magazine War Guide, pulp magazines emphasized the importance of blue-collar work as a means of increasing industrial production.[24] As per the OWI's suggestions, pulp magazines began dedicating significant space encouraging women to occupy male-dominated jobs, in industry, short of workers (e.g., aircraft and electrical equipment manufacturing).[25]

As Maureen Honey notes, representations of blue-collar work were notably aimed at middle-class women,[26] aligning with the sociotypical notion of "woman" from the prewar period. Female authority was glamoured and nontraditional jobs were promoted to middle-class audiences.[27] One possible explanation may be that, since working-class women had been employed in industrial jobs before the war,[28] the next group that needed persuasion to enter these industries was middle-class women, the demographic most strongly associated with the prewar sociotypical notion of "woman." Industrial jobs were presented as familiar by relating traditional activities to industrial tasks. The OWI's 1944 Women in the War for the Final Push campaign encouraged magazines to claim that industrial jobs were very similar to domestic activities, like using a sewing machine or a vacuum cleaner.[29] In Glamour Girls of 1943 (1943)—a propaganda film by the Bureau of Motion Pictures of the Office of War Information—domestic tasks were explicitly compared to industrial work: a "drill press" is compared to a "juice extractor."[30] Popular propagandistic imagery, such as Rosie the Riveter, emerged. As Rupp mentions, the image of the woman in the factory dominated the public image of "woman" participating in the war, even though most women did not work in factories but occupied other traditionally male-occupied jobs.[31]

---

22 Klüners, "Unconscious in Individuals," 83–84.

23 Rupp, Mobilizing Women, 138.

24 Maureen Honey, "The Working Class Woman and Recruitment Propaganda during World War II: Class Differences in the Portrayal of War Work," in Signs 8, no. 4 (Summer 1983), 675.

25 Ibid., 677.

26 Ibid., 681.

27 Ibid., 682.

28 Yesil, " 'Who said," 105.

29 Yesil, " 'Who said, " 107.

30 Zachary Baqué, " 'So Long as They Are Maintaining a Bona Fide Family Relationship in the Home': Women in World War II American Film Propaganda," in New Perspectives on the War Film, eds. Clémentine Tholas, et al. (Palgrave Macmillan, 2019), 166.

31 Rupp, Mobilizing Women, 143.

What arose was a starkly oppositional notion of "woman" compared to the prewar notion found in the social unconscious, which had been inherited in the manner previously discussed by Klüners. Indeed, what this propaganda created was the myth of the "empowered woman of war": the woman who defied traditional boundaries of prewar sociotypes by taking on male-dominated industrial work. As influencers, the relationship between the sociotypes promoting traditionality was negated by propagandistic representations to construct the "empowered woman of war" myth. The purpose of this myth, then, was to incentivize women to join the war effort in a political manoeuvre to fill labour shortages. Propaganda naturalized the myth, framing industrial labour as an extension of traditional domestic work, which aimed to make the transition appear less radical. Evidently, the negation of the prewar sociotypes led to their manipulation such that a new mythological representation of "woman," as an empowered participant in the war effort, was produced. However, as Rupp discusses, these changes were largely superficial.[32]

4. Sociotypes as Influenced by Myth

Many propagandistic representations were double-edged: they promoted the "empowered woman of war" myth while simultaneously ensuring that traditional, prewar norms remained intact. Two sociotypes, i.e., the "Mother" and the "Subordinate Woman," can be seen as influenced by myth: they are affirmed in a positive relationship, reinforced through those very same propagandistic representations which attempted to superficially "negate" them and "promote" empowerment.

The popular conception of motherhood relies on the female body's ability to give birth, connoted as being a "natural" activity, juxtaposed against the "unnatural" notion of taking away life. This construction ultimately constrains women's agency during times of conflict.[33] Thus, propagandistic representations reaffirmed that a woman's primary concern should be mothering and childrearing. The War Manpower Commission (WMC), though actively recruiting women, nonetheless maintained that a woman's first duty was always to her children.[34] Yet when labour shortages arose, the WMC requested that employers refrain from discriminating against women with children.[35] This suggests that the function of motherhood shifted on a political basis, as needed.

Similarly, representations in propaganda films, such as in the film Three Cities (1943), reinforced traditional roles, especially mothering and childrearing. Women in the film are reproached for poorly controlling their children, yet they are applauded for possessing general intelligence[36]— an example of superficial "empowerment." The myth of the "empowered woman of war" seemingly promotes non-traditionality yet the propaganda itself maintains the priority of motherhood through the "Mother" sociotype, a prominent constituent in the notion of "woman."

Many of the representations in propaganda films of the time attempt to equate women to the same level of authority as men, but ultimately fail due to contradictory on-screen representations. In Glamour Girls of 1943, a male-voiced narrator states that women's place in the war is "on an equal footing with men," while at the same time, on-

32 Rupp, Mobilizing Women, 138.
33 Åhäll, "Motherhood, Myth," 109–10.
34 Rupp, Mobilizing Women, 138.
35 Yesil, " 'Who said," 105.
36 Baqué, " 'So Long," 164.

screen, a group of women are shown following in-line behind a higher-angled man.[37] While the narrator attempts to promote the myth of the "empowered woman of war," the visual imagery contradicts this claim, reinforcing that women remain in a subordinate position to men.

During another scene, using the documentary style known as "direct address"—where a person on-screen directly addresses the viewer—working-class women are questioned about their war effort participation. Notably, all frame their motives in relation to prominent men in their lives, namely their sons, husbands, or fathers.[38] In It's Your War, Too (1944), a collective of women recite that it is time they "live up to the legends of our fighting men," once more creating a relational dynamic whereby women's participation in the war is motivated solely by an appeal to men.[39]

In all attempts to "empower" women, a persistent structural hierarchy remains: women are relegated as less authoritative than men. The relational hierarchy persists in the myth of the "empowered woman of war" and women remain confined in the sociotype of the "Subordinate Woman."

Conclusion

The prewar notion of "woman," as a public image composed of various sociotypes rooted in traditional norms, was seemingly challenged in the United States during the Second World War through the myth of the "empowered woman of war." But this seemingly "empowering" myth, which arose through propagandistic representations, was just one component of a bidirectional relationship with prewar sociotypes that reinforced women's traditional roles. The formation of the myth necessarily required a rejection of those sociotypes, to serve a naturalized political function, while simultaneously affirming their perpetuation. Though I have outlined this sociotype-myth relationship particularly concerning representations of women in this historical moment—as a specified analysis, pertaining to a specific historical moment—its contents may be applicable to historiographical analyses focussed on other historical periods in various global regions.

37 Ibid., 162.

38 Ibid., 163–64.

39 Ibid., 164.

Bibliography

Åhäll, Linda. “Motherhood, Myth and Gendered Agency in Political Violence.” International Feminist Journal of Politics 14, no. 1 (March 2012): 103–20.

Baqué, Zachary. “ ‘So Long as They Are Maintaining a Bona Fide Family Relationship in the Home’: Women in World War II American Film Propaganda.” In New Perspectives on the War Film, edited by Clémentine Tholas, Janis L. Goldie, and Karen A. Ritzenhoff, 159–77. Palgrave Macmillan, 2019.

Barthes, Roland. Mythologies. Translated by Annette Lavers. Hill and Wang, 1972.

Honey, Maureen. “The Working Class Woman and Recruitment Propaganda during World War II: Class Differences in the Portrayal of War Work.” Signs 8, no. 4 (Summer 1983): 672–87.

Jung, Carl G. The Portable Jung. Edited by Joseph Campbell. Translated by R. F. C. Hull. Penguin Books, 1985.

Klüners, Martin. “The Unconscious in Individuals and Society: On the Application of Psychoanalytic Categories in Historiography.” History and Theory 63, no. 1 (March 2024): 71–93.

Rupp, Leila J. Mobilizing Women for War: German and American Propaganda, 1939–1945. Princeton University Press, 2015.

Yesil, Bilge. “ ‘Who Said This Is a Man’s War?’: Propaganda, Advertising Discourse and the Representation of War Worker Women during the Second World War.” Media History 10, no. 2 (2004): 103–17.

♣ 6

'Subject Exhibits Extreme Hostility': *The Role of Scientific Jargon in Horror*

By Eva Fazari

The language of horror is typically the last aspect one would pay attention to, with jump scares and monsters taking precedence. Nevertheless, language is the very element that truly conveys the terror of the horror narrative. The SCP (Secure, Contain, Protect) Foundation, an online global writing community, uses this idea to its advantage and forces its readers into uncomfortable scenarios through its database of 'scientific' reports on various creatures. The language of science is also the last place where one would think horror appears, yet the clinical tone of the language creates an atmosphere of unease. Through the writing style and use of clinical terms, the SCP Foundation mimics the language of scientific jargon in order to create a layer of fear within its narrative.

The Foundation typically uses two words when referring to the creatures within its reports:'entity' and 'anomaly'. According to the Oxford English Dictionary, 'anomaly' was first used in a grammatical context and was described as "an exception to the prevailing linguistic system" ("Anomaly"). From 1631 onwards, it took on its general meaning of "an irregular fact, characteristic, or circumstance" (ibid.); however the context in which it is used subtly alters its definition. For example, the medical definition refers to something out of place within the body, yet 'anomaly' also acquires distinguishing words such as 'genetic anomaly' or 'congenital anomaly'. The first meaning of 'entity' was originally abstract, as its first use in 1596 defined it as "being, existence, as opposed to non-existence" ("Entity"). In 1628, it acquired a more concrete sense, aligning with the modern definition: "something that has a real existence" (ibid.). 'Entity' derives from the Latin 'entitat-em' and, although the entry for this word is not fully revised, it is one of the two thousand most common words in modern written English. 'Entity' and 'anomaly' are often interchangeable within the context of the SCP Foundation, their distinctive definitions influencing and overlapping with one another. These words not only refer to the creatures, but also imply that their existence is somehow unnatural. Referring to one of the subjects as an 'anomaly' makes the subject sound as if it should not exist, yet calling it an 'entity' grounds it in reality, as per the definition. The Foundation presents these words as sophisticated terms, yet they function as vague wording in an otherwise precise language.

The classification system of the SCP Foundation uses words from various contexts, mimicking the tone of scientific or technical terms. The main three classes are 'Safe', 'Euclid', and 'Keter', each with a unique definition assigned by the Foundation. Beginning with 'Safe', this class is self-explanatory, as creatures under this class pose no harm. The Foundation defines 'Euclid' as "anomalies that require more resources to contain or where containment isn't completely reliable" ("Object Classes", n.d.), yet the OED defines 'Euclid' as the "mathematician of Alexandria who flourished about 300 b.c.". Furthermore, the first use of this word appears in a scholarly context, in schoolmaster Richard Mulcaster's Positions Concerning the Training Up of Children, where Mulcaster vents his frustrations about the school structure of the time. Finally, the Foundation

defines 'Keter' as "anomalies that are exceedingly difficult to contain consistently or reliably" (ibid.); yet the word has religious roots in Hebrew. This word does not appear in the OED, as it stems from the Hebrew word 'Kether', meaning 'crown'. The Oxford Reference Dictionary mentions that this word can only be found in the Book of Esther, where it refers to the royal diadem and "came to be used metaphorically for the highest virtues ('crowning glory' in English) ("Keter").

The use of a religious word in the context of horror is quite ironic—a word denoting heavenly virtues is used to classify a potential monster. It is precisely because this word is unfamiliar that it fits within the class system, its true definition obscured by one that the narrative ascribes to it. The Foundation reappropriates these words and subverts their original definitions to make the reader uncomfortable with unfamiliar terms. Creating an unfamiliar environment adds a layer of fear as the reader is removed from their comfort zone, signaling a distrust of scientific language— one that is typically associated with precision.

The SCP Foundation reports frequently use 'sophisticated' terms that raise more questions than answers about their subjects. Beginning with SCP-939, this entry describes a group of "pack-based predators" that appear to lure and devour humans. Their description is full of unfamiliar words, making it hard for the reader to visualize the creatures. The writing style is also important to examine, 'stylistics' is defined as: "'the way in which language is used in a given context…or serves a particular artistic function'" (qtd. in El-Sayed 234). The language used in this report is quantitative and clinical, which accomplishes the function of creating an unfamiliar environment for the reader and igniting a fear of the unknown. The creatures are also described as "endothermic", "similar to troglobitic creatures", "covered in setae", along with many other unfamiliar terms ("SCP-939", n.d.). This is a good example of Fowler's theory of overlexicalization, which is an abundance of terms for an object or concept (qtd. in El-Sayed 234). This lexical density may confuse the reader, but it also fuels their imagination. By getting to know the creatures only through measurements and sophisticated terms, the reader does not have access to the creatures' true nature. The abundance of terms makes the report appear as if it were only meant to be read by other scientists, making the reader feel as though they are reading something they should not be. What is more unsettling is that, even though various terms are used to describe nearly every aspect of SCP-939, the lab officials are still unsure of how the creatures operate while hunting. SCP-939 mimics its victims' voices to lure others, but "how SCP-939 acquires voices is not currently understood" ("SCP-939", n.d.). This creates a level of distrust in the narrative — the language of scientific language is expected to show an elevated level of understanding of the subject, yet the jargon of the profession still cannot describe the truly horrific nature of these creatures.

SCP-087, 'The Endless Staircase', is a good example of creating fear by subverting a common concept. This entry describes a staircase discovered in an undisclosed location, where the horror emerges from how little is known about a seemingly normal object. The only information disclosed is the object's measurements — the staircase "descend[s] on a 38 degree angle for 13 steps", then reaches a semicircular platform where "descent direction rotates 180 degrees at each platform" ("SCP-087", n.d.). Upon analysis of the staircase's description, Simpson's 'Schema Theory'(qtd. in El-Sayid 232) can be applied to SCP-087. The theory defines a schema as a "cognitive structure which provides information about our understanding of generic entities, [and] events. [It] contains common default information which aids comprehension by allowing a reader to extrapolate details which are either not mentioned at all…[or] not fully specified" (ibid.).

The report presents the reader with information about a common entity, however the writing subverts the reader's knowledge of this concept. This is demonstrated through Cook's theory of 'defamiliarization', which "'make[s] strange' what is normal to the readers" (qtd. in El-Sayed 233). The reader is given a common concept but presented in an uncanny manner; there is something sinister about the entity that the language of the report does not quite capture.

The final entry discussed in this paper is SCP-055-PT, a "system projected as a matrix in the form of highly-adaptive personal body armour" ("SCP-055-PT", n.d.). This entry may not be as disturbing, but it provides a great example of scientific jargon. The SCP is described as having "Oneiricweave" integrated into its system, as well as having components resilient to "biological,...thaumaturgical, psionic,...ontokinetic [stimuli]" (ibid.). Without searching up most of these terms, the language of the report can easily confuse the reader. SCP-055-PT is also an example of 'technobabble', which the OED defines as "incomprehensible or pretentious technical jargon" ("Technobabble"). This word is quite modern, as its first use was documented in 1981 in The Wall Street Journal. This word is also an example of compounding, as it combines the prefix of 'techno-' with the verb 'babble'.

Finding a comprehensible description among all of the sophisticated terms within the report is difficult, once again toying with the fear of the unknown. However, the entry for SCP-055-PT still succeeds in creating a sense of horror by taking inspiration from H.P Lovecraft. In an article by Thomas Hull, he mentions Lovecraft's use of "math concepts to describe the indescribable" (Hull 12) which helps build mood within the narrative. Using mathematical and scientific concepts to describe an entity is not inherently scary, yet Lovecraft uses these explanations to heighten the horror of it (ibid.), creating an "unfamiliar and uncomfortable territory" (Hull 10). The reader is unsure what to make of the SCP's nature, as unknown words themselves can be unsettling. Hull goes on to commend Lovecraft's use of mathematical language to "convey a sense of an unknown…yet powerful landscape" (Hull 11). Even though this language may be unknown to some readers, it still adds a sense of mystery and legitimacy within the environment (ibid). SCP-055's confusing description thus instills fear within the reader through its use of scientific terms, which 'legitimize' the entity within the reality of the narrative—the report's sophisticated wording makes it seem well-understood by lab officials, which further suggests that it has the possibility of truly existing if the report can quantify it so accurately.

The SCP Foundation constructs a vast universe of scientific horror, one in which language immerses the reader through its complexity and mystery. The lack of codification of science-fiction words leaves room for linguists (and the science-fiction community) to truly define the genre, as the SCP Foundation has demonstrated creative ways of adapting words to fit within its narrative. Although the Oxford Dictionary does not include many contemporary words from the horror narrative, the genre continues to reshape and define itself through new words.

References

Ali El-Sayed, Wesam. “Language Performativity and Horror Fiction: A Cognitive Stylistic Approach.” International Journal of Language and Literary Studies, vol. 3, issue 3, 2021, pg. 232-234, https://ijlls.org/index.php/ijlls/article/view/647/275

“anomaly, n.”. Oxford English Dictionary, Oxford University Press, July 2023, <https://doi.org/10.1093/OED/7336758005>

“anomaly, n., sense 1”. Oxford English Dictionary, Oxford University Press, July 2023, <https://doi.org/10.1093/OED/3497788814>

“anomaly, n., sense 4.a”. Oxford English Dictionary, Oxford University Press, July 2023, <https://doi.org/10.1093/OED/6885168710>

“entity, n.”. Oxford English Dictionary, Oxford University Press, July 2023, <https://doi.org/10.1093/OED/2291723010>

“entity, n., sense 1”. Oxford English Dictionary, Oxford University Press, July 2023, <https://doi.org/10.1093/OED/8417371041>

“entity, n., sense 3.a”. Oxford English Dictionary, Oxford University Press, July 2023, <https://doi.org/10.1093/OED/8333909743>

Grossman, Maxine. “KETER.” The Oxford Dictionary of the Jewish Religion. Ed.

Berlin, Adele. : Oxford University Press, , 2011. Oxford Reference. <https://www.oxfordreference.com/view/10.1093/acref/9780199730049.001.0001/acref-9780199730049-e-1705>

Hull, Thomas. “H.P. Lovecraft: A Horror in Higher Dimensions.” Math Horizons, vol. 13, no. 3, 2006, pp. 10–12. JSTOR, http://www.jstor.org/stable/25678597

n.d. “Object Classes.” SCP Foundation, https://scp-wiki.wikidot.com/object-classes n.d. “SCP-087.” SCP Foundation, https://scp-wiki.wikidot.com/scp-087 n.d. “SCP-939.” SCP Foundation, https://scp-wiki.wikidot.com/scp-939

n.d. “SCP-055-PT.” SCP Foundation, https://scp-wiki.wikidot.com/scp-055-pt “technobabble, n.”. Oxford English Dictionary, Oxford University Press, September 2023, https://doi-org.myaccess.library.utoronto.ca/10.1093/OED/1107908673>

♣ 7

Transformation: *Diet and Madness in Don Quixote*

By Lily Mengual

In this essay, I will argue that Don Quixote's diet—or sometimes even lack of food—is an extreme influence on his madness throughout the novel. Don Quixote is the titular character of Miguel de Cervantes's magnum opus "Don Quixote," a book that parodies chivalric romances through the characterisation and madness of the protagonist. Throughout the novel, Don Quixote's diet has an inextricable link to his madness, both influencing and curbing it. Not only does Don Quixote go through particular periods of lucidity following his ingestion of food, but the lack of it sends him into intense hallucinations such as what occurred during the episode of the Cave of Montesinos. Despite this, the lack of food eventually breaks Don Quixote out of this madness, transforming him back into Alonso Quixano. In addition, I propose that Don Quixote's diet itself contributes to his madness, with his potential zinc deficiency and consumption of food high in salt. Overall, though diet is not the only factor in his madness, it is definitely an element that contributes to it.

Don Quixote may suffer from a zinc deficiency due to the food he chooses to eat, and this deficiency heightens his madness. Zinc has been shown to depict a "reversal of schizophrenia-like behaviours," (Onaolapo and Onaolapo), Don Quixote attacks wineskins in place of a giant, and accuses friars of kidnapping a princess. These are both examples of how his madness presents similar symptoms to those of a schizophrenic patient through his re-interpretation of reality over the course of the novel, as the condition itself "causes people to interpret reality abnormally" (Substance Abuse and Mental Health Services Administration). Though Don Quixote's madness is never explicitly defined, aspects of his condition do echo those of schizophrenia, hence studies that analyse schizophrenic patients and their diet may still apply to Don Quixote. In the novel, Don Quixote eats an abundance of meat, particularly beef (De Cervantes 19), but does not consume much vegetables or fruit. He is described as having hash most nights (1), which is primarily made of meat, as well as onion and potato. "Red meat is a great source [of zinc]... all kinds of meat have zinc, including beef" (Healthline). Since Don Quixote eats a large quantity of beef, it is fair to assume that he might get around "44%–60% of the daily value" of zinc he needs from the "hash" he consumes, since this "44%-60%" refers to 100 grams of beef a day (Healthline). This is positive, since having more zinc reduces schizophrenia in those afflicted. Despite this, it is unlikely that Don Quixote would fulfil 100% of his daily value since other sources of zinc include shellfish and "some vegetables" like kale, which he does not tend to eat (Healthline). In addition, schizophrenia patients tend to consume less "fresh vegetables" than control subjects in studies, which reflects Don Quixote's diet (Amani). A reader would be hard-pressed to find a mention of vegetables in the novel, let alone in the mouth of the protagonist. Since Don Quixote's diet in some ways reflects those of schizophrenic patients and does not consume enough zinc to match the daily recommended values, it can be speculated that Don Quixote may suffer from a zinc deficiency, which therefore contributes to his madness.

Don Quixote frequently consumes food that is high in salt, which may be a factor that contributes to his "dried up [brain]" (21), which in turn "causes him to lose his mind," actively contributing to his madness (21). Don Quixote's diet at the beginning of the novel is varying in its level of salt, as the "beef" and "eggs" (19) he consumes are themselves not particularly high in sodium, but Don Quixote has "hash most nights" (19), which alone contains "42%" of one's recommended daily intake of sodium (Eat This Much). If one eats too much salt, they can become dehydrated, which can dry out the mind. This indicates that while his salt intake is not astronomically high, it is certainly at a slightly worrying level due to his high consumption of hash, which would build up his salt content. Drinking wine, also, "dehydrates" (Next Health), which is unfortunate as Don Quixote frequently has wine —he hardly touches water—including at inns, with goatherds, and whilst with the Duke and Duchess (De Cervantes 29). Quixote's ingesting of hash, along with his high consumption of wine frequently throughout the novel, could be a factor in his brain drying up and him going mad, as well as what Cervantes attributes to the condition—"too little sleep and too much reading" (21). Even on his journey, Don Quixote is served "smoked cod" (28), which contains "[a] high sodium content," (Acme Smoked Fish) rendering him unable to escape high sodium levels even on his quest. As a result, madness and diet are once again linked in reference to the character of Don Quixote, as the high salt content in his food and drink may dry out his mind, elevating his madness.

The Golden Age speech and Arms and Letters speech are two notable passages in the novel that showcase the strength of Don Quixote's lucidity within them. Don Quixote explains his ideas and opinions without delving too deeply into the fantastical, as opposed to viewing windmills as giants and prostitutes as fair maidens. Another noteworthy thing about both speeches is that they occur after Don Quixote eats. Immediately prior to his Golden Age speech, Don Quixote "has satisfied his stomach" with acorns, cheese, and meat (De Cervantes 76). Before his Arms and Letters speech, "the innkeeper [at the inn Don Quixote is staying at] had been diligent and careful in preparing the best supper he could" (328). Once again, Don Quixote has been presented with a feast, and he actually "stopped eating" to deliver the Arms and Letters speech, seemingly moved by the food before him (328). In both cases, Don Quixote has eaten, prompting a period of lucidity in which he delivers great, fluid speeches to a larger audience outside of himself and his own mind. In fact, during his Arms and Letters speech, Cervantes states that Don Quixote has "rational arguments," and that nobody present could see him as a "madman" (329). The use of "rational" itself is ironic given the irrationality Don Quixote presents throughout the rest of the novel, the only difference between his state as a "madman" and as a man with "rational arguments" being the consumption of a substantial amount of food. Overall, then, his consumption of food subsides his madness for long enough for him to make fluid, comprehensible statements, where he teeters on the edge of madness, in some ways almost reverting back to the mind of Alonso Quixano rather than being Don Quixote.

Don Quixote frequently doesn't eat over the course of his most imaginative adventures, indicating that his lack of nutrition on the whole also contributes to his madness. One evening with Sancho, Don Quixote feels "no need of food" and (60), the next morning, "did not wish to eat breakfast" either (61). The next morning, Don Quixote undergoes a bout of madness in which he attacks friars (62), thinking that they're holding a princess captive in their carriage. The extent of Don Quixote's madness is underlined here, as friars are clergymen, which connotes religious purity and faith—in short, the complete opposite of kidnappers, who are morally impure. This madness then escalates further, turning into a joust and resulting in Don Quixote losing "half an ear" (69). Now,

thanks to his empty stomach and amplified madness, Don Quixote undergoes a physical deformity and is about to behead the innocent man until he is stopped. This episode is therefore one of the most intense in terms of the magnified nature of Don Quixote's madness, underlined by his empty stomach. At other points in the novel, such as when Don Quixote misinterprets clouds of dust for armies and loses his teeth following the emptying of his stomach via the balsam, and when he frees the galley slaves and is attacked by them, he had last eaten the evening before and, in both cases, it was then afternoon. During both of these adventures, a similar formulaic event occurs—Don Quixote doesn't eat, is attacked by an extreme bout of madness, and suffers physical consequences as a result. Consequently, there is a direct correlation between his empty stomach and the height of his madness, which is severe enough that at one point he even loses "half an ear".

Developing this point, following the Cave of Montesinos (a period of intense hallucinations and madness for Don Quixote), he "asked them [Sancho and the cousin] for something to eat, for he was very hungry" (De Cervantes 604). Don Quixote's hunger is important here, since it indicates that during the period in which he was experiencing severe madness, his stomach was empty. A lack of food and diet in itself, then, may have intensified his madness, since after Don Quixote asks for food and eats, he is able to articulate himself properly. Though this meal does not completely sate his madness, as he retells his hallucinations to Sancho and the cousin following it, it does allow him to be more comprehensible and communicate what happened more clearly. What is most interesting here, however, is that Don Quixote seems to recognise that he needs to eat food in order to progress back to his more fluid self, showing awareness amongst his madness. He mentions how the enchanted "did not eat" either (610), like him, as he says: "not a mouthful has broken my fast" (610). Here, he begins to recognise that both his hallucinations, though he may not yet view them as such, and himself, have empty stomachs—beginning a link that follows through to the end, when he transforms back into Alonso Quixano. After a great period of fasting which doubles the length of time that Don Quixote believed he spent in the Cave of Montesinos—from "three days" (610) to "six" (934)—his madness heightens to such a level that it breaks and he returns to himself. During his "fever" that kept him in bed, there is no mention of his eating—implying he fasted for these six days (934). Before this occurrence in the novel, Don Quixote has never fasted for so long, so it is plausible that this length of fast was enough to cause his madness to subside, or at the very least be a factor within that. Due to his fast, Don Quixote is now grounded in reality, linking his empty stomach and lack of a diet altogether to his madness—and referencing the way in which he overcomes his madness: fasting for long enough that, like the "fever", it shatters.

In conclusion, Don Quixote's diet is a significant factor in his madness. Not only does his diet influence and curb his madness through the nutrients in his food—lack of zinc and high salt content—but also through his lucidity after eating and his empty stomach exacerbating his madness. When he eats a feast, and clarity breaks through his madness, it is almost as if he becomes himself once again; Alonso Quixano rather than Don Quixote. In this manner, it is almost as if food bridges the gateway between the two for the man in limbo, and it is only when he eats that he can unlock the mind of his true self. By the end, however, Don Quixote fully reverts back to a version of Alonso Quixano both physically and mentally through extreme fasting, which, like the fever he experiences, causes his madness to break. Though this version is not the Alonso Quixano he was before—he now detests chivalric romances altogether—it demonstrates the power of diet on the whole, as well as its links to madness in the novel.

Works Cited

Acme Smoked Fish. "Is Smoked Fish Healthy?" Acme Smoked Fish, acmesmokedfish.com/blogs/news/is-smoked-fish-healthy#:~:text=Smoked%20fish%20products%20may%20contain. Accessed 12 Nov. 2023.

Amani, Reza. "Is Dietary Pattern of Schizophrenia Patients Different from Healthy Subjects?" BMC Psychiatry, vol. 7, no. 1, May 2007, https://doi.org/10.1186/1471-244x-7-15. Accessed 12 Nov. 2023.

De Cervantes, Miguel. Don Quixote / a New Translation. Translated by Edith Grossman, HarperCollins, 2003.

Eat This Much. "Hash / Corned Beef - Spartan." Eat This Much, www.eatthismuch.com/food/nutrition/hash,160421/. Accessed 12 Nov. 2023.

Healthline. "The 10 Best Foods That Are High in Zinc." Healthline, 19 Apr. 2018, www.healthline.com/nutrition/best-foods-high-in-zinc#TOC_TITLE_HDR_2. Accessed 12 Nov. 2023.

Next Health. "Does Wine Dehydrate You?" Www.next-Health.com, 22 Aug. 2023, www.next-health.com/post/does-wine-dehydrate-you#:~:text=Even%20though%20wine%20contains%20some. Accessed 12 Nov. 2023.

Onaolapo, Olakunle James, and Adejoke Yetunde Onaolapo. "Nutrition, Nutritional Deficiencies, and Schizophrenia: An Association Worthy of Constant Reassessment." World Journal of Clinical Cases, vol. 9, no. 28, Oct. 2021, pp. 8295–311, https://doi.org/10.12998/wjcc.v9.i28.8295.

Substance Abuse and Mental Health Services Administration. "Living Well with Serious Mental Illness." Www.samhsa.gov, SAMHSA, 11 Apr. 2023, www.samhsa.gov/serious-mental-illness#:~:text=Schizophrenia%20is%20a%20chronic%20and. Accessed 12 Nov. 2023.

♣ 8

When Caring Hurts: *Untangling Compassion Fatigue through the Predictive Processing Framework*

By Andrew Chung

Abstract

Compassion fatigue can be described as when individuals experience aversive symptoms after supporting others in distress. Although there has been significant concern surrounding compassion fatigue, many conceptualizations have suffered from theoretical ambiguity. In this paper, I will provide theoretical clarity on compassion fatigue using the Predictive Processing framework (PPF). To begin, I will explain how the role of empathy has been misframed in existing theories of compassion fatigue. To untangle the gap of empathy, I will use the PPF to investigate the social nature of cognition to evaluate the importance of empathy and why it can become a source of distress. I will then build on these ideas to show that compassion fatigue forms due to the inability to resolve persistent suffering and how this can be reinforced through maladaptive behavior that makes caring hurt more.

Compassion fatigue refers to a state of exhaustion and distress from caring for suffering individuals (Vu & Bodenmann, 2017). There is an ongoing concern around compassion fatigue and its various symptoms, such as, burnout and somatic symptoms (Joinson, 1992). Despite the growing concern, there remains theoretical ambiguity in the underlying causes of compassion fatigue (Sinclair et al., 2017). In the first section, I will briefly overview Figley's (2002) seminal work on the role of empathy in compassion fatigue and review major criticisms. Then, I will review Coetzee's and Laschinger's (2018) model of compassion fatigue and argue that they are also insufficient because of how they neglect the distressful nature of empathy. To clarify the role of empathy, I will introduce the Predictive Processing framework (PPF) to explain why empathy can become a source of distress. I will build on these ideas to show that compassion fatigue may form due to the inability to resolve persistent suffering and how this can be reinforced through maladaptive behavior that makes caring hurt more. Lastly, I will end with some directions for future research.

Empathy Debate in Compassion Fatigue

Research based on Figley's seminal work (2002) focused on how excessive empathy is the cause of compassion fatigue. Figley claimed that compassion fatigue is a form of secondary traumatic stress (STS), meaning caregivers experience symptoms of trauma from "bearing witness to the suffering of others" (2002, p. 1435). The author described how an empathetic concern (i.e desire to reduce suffering) for others can create the conditions for prolonged stress, stemming from experiencing the trauma of others, which can result in the development of compassion fatigue. As this model places empathy as one of the key causes of compassion fatigue, there are a few problems with this explanation. Sabo (2011) criticized Figley's model for failing to clarify a definition of empathy and assuming a binary model of compassion fatigue (you have it or you do not). Lastly, the assumption that all empathetic concerns lead to distress is not true. Not every caregiver exposed to traumatic stressors develops symptoms of compassion fatigue, furthermore empathetic relationships can enhance patient relationships (Sabo, 2011). Hence, empathy cannot be the sole cause of compassion fatigue.

In response to the excessive empathy model, compassion fatigue is argued to be a byproduct of stress factors and stress appraisals that degrade one's ability to provide care (Coetzee and Laschinger, 2018). Rather than attributing compassion fatigue to empathy, Coetzee and Laschinger (2018) argue that compassion fatigue arises from a "lack of resources, an absence of positive feedback, and the response of personal distress" (p. 14). Individuals have a finite amount of resources and will care differently based on their appraisal of resources. Those with relatively high resources will engage in other-focused care, while those with low resources will engage in self-focused care. In the other-focused mode, individuals can appropriately differentiate between their own emotions and the suffering of their patient and empathize, whereas those in the self-focus mode can confuse the suffering of others with their own emotions, which creates distress and prevents empathy. This means that those engaging in other-focused processing are more likely to portray compassion care and receive positive feedback, whilst those who are self focused will portray uncompassionate care and receive negative feedback–making them more likely to develop compassion fatigue (Coetzee & Laschinger, 2017). Thus, despite the push to show that empathy has no role in compassion fatigue, Coetzee and Laschinger's model (2017) suffers from a narrow conception of empathy.

Coetzee and Laschinger's model (2017) suffers from a narrow conception of empathy. The authors fail to acknowledge the lack of consensus on empathy (Cuff et al.,

2016) and rely on claims about empathy that have been challenged. Empathy is defined as "the ability of the caregiver to perceive, imagine, or infer the client's suffering, sorrow, or pain, and express motivation to improve the patient's experience, with full awareness of the distinction between themselves and the patient" (Coetzee & Laschinger, 2017, p. 11). The claim that empathy requires a motivation to alleviate suffering is problematic because empathy is a biased process that can lead individuals to favour salient events or, ingroup individual members, which leads to poor moral decisions that can perpetuate further violence (Bloom, 2022). In addition, empathy requiring a full distinction between self and other is concerning, as individuals need to have some kind of merging between themselves and others so that they can experience other's affective state (Cuff et al., 2016). Lastly, dividing empathy into separate cognitive and affective dimensions is misguided because converging arguments show that the emotion and cognitive elements of empathy are deeply intertwined (Miller, 2011). Hence, empathy has been misconstrued by Coetzee and Laschinger (2017), which leads to the problematic conclusion that empathy has no role in compassion fatigue.

Based on the Coetzee and Laschinger's (2017) model, empathy has to play some role in compassion fatigue by being the foundation in how one cares and by impacting how one evaluates their care. Regardless of the appropriate mode of empathy, individuals can experience empathetic distress, which is stress associated with being empathetic towards others (Klimecki & Singer, 2012), and stress resonance (Engert et al., 2019), where individuals mirror other's perceived stress responses. The authors do not seem to acknowledge that the associated stress from empathy still indirectly plays a role in compassion fatigue and it remains ambiguous exactly how resource and feedback is appraised. Overall, Coetzee and Laschinger (2017) need to acknowledge that empathy still plays a role in compassion fatigue and requires further explanation in how resources and feedback to changes in resources are appraised.

In this section, I showed how models of compassion fatigue rely on simplistic models of empathy. Figley (2002) overemphasizes the role of empathy which ignores the environmental and appraisal factors of compassion fatigue. However, regarding empathy as an altruistic process (Coetzee & Laschinger, 2017) also neglects the biased and distressful nature of empathy and fails to explain exactly how individual appraisal can lead to compassion fatigue. In the following section, I will introduce the Predictive Processing framework (PPF) to explain how appraisals occur based on predictions. First, I will introduce the PPF to demonstrate how cognition can be described as anticipatory. Then, I will use this framework to propose that compassion fatigue occurs when individuals are faced with significant amounts of prediction errors from caring for others and get stuck in maladaptive ways of attuning to their volatile environment, thus reinforcing their inability to reduce error.

Predictive Processing Framework and Compassion Fatigue

The Predictive Processing framework (PPF) is a unifying theory of cognition that proposes that all cognitive processes are based on anticipatory dynamics for organisms to adapt to their environment (Clark, 2013; Clark, 2015; Nave et al., 2020). Based on the PPF, cognitive agents rely on inferring the hidden causes of their sensory signals through their body to navigate their environment (Nave et al., 2020). The main purpose of these anticipatory processes is to minimize prediction error, reducing the discrepancy between top-down predictions and bottom-up sensory signals, in order to enact a model of the world. There are two ways to minimize prediction error: perceptual inference or active inference. Perceptual inference refers to changing the prediction to better fit the sensory

signals or the environment and active inference refers to acting in the world to minimize the prediction error (Deane et al., 2020; Nave et al., 2020).

The crucial aspect of cognition is that it is a flexible and dynamic process that changes to meet the demands of the ill-defined environment. Cognitive agents need to distinguish between relevant errors and noise by relying on precision weighting; creating predictions about the reliability of predictions (Nave et al., 2020). Precision weighting is attuned based on affective and social aspects of our cognition. First, minimizing prediction error requires cognitive agents to track error dynamics, which is the relative change in rate of error to select the appropriate actions that can maximize error reduction over time (Deane & Miller, 2020; Miller et al., 2022; Nave et al., 2020). Second, humans are encultured beings, meaning predictions are always informed by others. The main proposal is that individuals are encultured by "thinking through other minds," i.e forming inferences about others (Veissiere et al., 2019, p. 1). Error minimization occurs in relation through others because culture provides a significant amount of epistemic resources – shared beliefs in how to navigate through environments to reduce prediction error. Using the PPF, I will explain why empathy would be important and how it can become a source of error.

Since individuals depend on anticipating others, they have to rely on empathy to understand others. Therefore, it is a basis for how individuals can reduce error and gain resources, such as through prosocial behavior (Decety & Holvoet , 2021). Consequently, since "shared affective reactions just are affective reactions" (Miller, 2011, p. 32), when others experience error, their negative valence could be experienced as one's own, which can be found through empathetic distress (Klimecki & Singer, 2012). As a result, rather than viewing cognition as simply changing predictions and acting in the world to fit momentary needs, minimizing error over time requires agents to change how precision is deployed to be flexible enough to disrupt rigid behaviors (Kiverstein & Miller, 2023). When individuals fail to balance the need to adapt precision to disrupt fixed attractors, individuals can maladaptively attune to their environment. Using the PPF, I will establish that individuals placed within a context and in a caregiving role can be prone to tremendous amounts of prediction error that create the conditions for compassion fatigue.

Individuals that are met with persistent stressors and who are unable to meet their environmental demands, i.e resolve prediction error over time, are thought to develop an inefficient energy regulation system which can lead to depression-like symptoms (Barrett et al., 2016). For compassion fatigue, the suffering of the other (e.g patient, family member) and the environmental context are two main sources of prediction error that can become overwhelming for an individual. For example, caregivers may be required to navigate through difficult experiences like supporting a chronically ill patient, navigating a patient's death, or sharing news of a patient's death with their family. This can be further exacerbated by environmental stressors such as a heavy workload, a lack of staff, long work hours, or sleep deprivation (Sinclair et al., 2016; Grover et al., 2019). These have all been found to be reliable predictors of burnout, measured as mental and physical exhaustion, depersonalization, and a lack of perceived personal achievement (Grover et al., 2019). Since individuals can empathize with others' stress (Engert et al., 2019) and prolonged stress can lead to burnout symptoms (Grover et al., 2019), I argue that individuals supporting others are susceptible to energy dysregulation. Energy dysregulation can lead to maladaptive ways of reducing prediction error. Specifically, someone who is inefficient at regulating their metabolism and energy can begin to anticipate and engage in sickness behavior, where they try to conserve their

energy by narrowing the actions that they can employ to reduce error (Barrett et al., 2016; Miller et al., 2022). As a result, they often select behaviours that are comfortable, meaning they will likely select behaviors that are reliable and can momentarily reduce error short term (Miller et al., 2022) because they are stuck in an inefficient system. For example, both compassion fatigue and burnout are associated with substance use and patient avoidance based behavior, where physicians are found to disengage and distance themselves from their patients (compassion fatigue - Sinclair et al., 2016; burnout - Grover et al., 2018). Unfortunately, relying on comfortable action policies may result in poor error reduction and even reinforce prediction errors. Burnout and its related symptoms like substance use are associated with medical errors (Oreskovich et al., 2015), and avoidance behaviors are associated with poor patient satisfaction and poor quality of care (Grover et al., 2021). In fact, medical errors seem to have a reciprocal effect on physicians, where physicians often experience significant distress after reporting a medical error and association with increased burnout symptoms (Roberston & Long, 2018). Consequently, physicians have higher rates of depression compared to other workplace populations (Harvey et al., 2021). This is not surprising because the inability to handle uncertainty has been found to manifest into depression where individuals maintain a persistent negative affective state (Barrett et al., 2016) and lose confidence in their efficacy to resolve errors (Deane & Miller, 2020; Miller et al., 2022). This would create a dangerous parasitic process (Vervaeke & Ferraro, 2012), where the same adaptive processes become biased to seek opportunities that confirm their inefficacy by avoiding uncertainty and actions that reinforce their negative state (e.g comfortable priors). Hence, I propose that compassion fatigue occurs when there are unresolvable prediction errors, leading to maladaptive ways to resolve errors which only narrow the ability to reduce the prediction error.

In this work, I attempt to untangle existing theories of compassion fatigue and use the PPF to clarify a new understanding of how compassion fatigue may emerge. I show how existing theories of compassion fatigue rely on poor conceptions of empathy. The PPF shows how empathy should not be reduced to just a prosocial process, but instead, it shows how shared affect can become distressing if not managed appropriately. I use this argument to convey how compassion fatigue involves the persistent inability to handle prediction error, resulting in a self narrowing process of attuning to the environment in maladaptive ways that decrease one's ability to care for others and reduce their perceived self-efficacy. Future research can examine the roles of socio-cultural expectations on compassion fatigue to explore possible interventions for compassion fatigue.

References

Barrett, L. F., Quigley, K. S., & Hamilton, P. (2016). An active inference theory of allostasis and interoception in depression. Philosophical Transactions of the Royal Society B: Biological Sciences, 371(1708), 20160011. https://doi.org/10.1098/rstb.2016.0011

Bloom, P. (2022). Empathy and Its Critics. In T. DuJardin & M. D. Eckel (Eds.), Faith, Hope, and Love (Vol. 10, pp. 177–187). Springer International Publishing. https://doi.org/10.1007/978-3-030-95062-0_12

Clark, A. (2013). Whatever next? Predictive brains, situated agents, and the future of cognitive science. Behavioral and Brain Sciences, 36(3), 181–204.

Clark, A. (2015). Surfing uncertainty: Prediction, action, and the embodied mind. Oxford University Press.

Coetzee, S. K., & Laschinger, H. K. S. (2018). Toward a comprehensive, theoretical model of compassion fatigue: An integrative literature review. Nursing & Health Sciences, 20(1), 4–15. https://doi.org/10.1111/nhs.12387

Cuff, B. M. P., Brown, S. J., Taylor, L., & Howat, D. J. (2016). Empathy: A Review of the Concept. Emotion Review, 8(2), 144–153. https://doi.org/10.1177/1754073914558466

Deane, G., Miller, M., & Wilkinson, S. (2020). Losing ourselves: Active inference, depersonalization, and meditation. Frontiers in Psychology, 11, 539726.

Decety, J., & Holvoet, C. (2021). The emergence of empathy: A developmental neuroscience perspective. Developmental Review, 62, 100999.

Engert, V., Linz, R., & Grant, J. A. (2019). Embodied stress: The physiological resonance of psychosocial stress. Psychoneuroendocrinology, 105, 138–146. https://doi.org/10.1016/j.psyneuen.2018.12.221

Figley, C. R. (2002). Compassion fatigue: Psychotherapists' chronic lack of self care. Journal of Clinical Psychology, 58(11), 1433–1441. https://doi.org/10.1002/jclp.10090

Grover, S., Adarsh, H., Naskar, C., & Varadharajan, N. (2018). Physician burnout: A review. Journal of Mental Health and Human Behaviour, 23(2), 78–85.

Harvey, S. B., Epstein, R. M., Glozier, N., Petrie, K., Strudwick, J., Gayed, A., Dean, K., & Henderson, M. (2021). Mental illness and suicide among physicians. The Lancet, 398(10303), 920–930. https://doi.org/10.1016/S0140-6736(21)01596-8

Joinson C. (1992). Coping with compassion fatigue. Nursing, 22(4), 116–121.

Klimecki, O., & Singer, T. (2012). Empathic distress fatigue rather than compassion fatigue? Integrating findings from empathy research in psychology and social neuroscience. Pathological Altruism, 5, 368–383.

Miller, M. (2011). The Nature of Empathy: Defending a Dynamic Systems Approach to Sharing Emotion. University of Edinburgh.

References

Miller, M., Kiverstein, J., & Rietveld, E. (2022). The Predictive Dynamics of Happiness and Well-Being. Emotion Review, 14(1), 15–30. https://doi.org/10.1177/17540739211063851

Nave, K., Deane, G., Miller, M., & Clark, A. (2020). Wilding the predictive brain. WIREs Cognitive Science, 11(6), e1542. https://doi.org/10.1002/wcs.1542

Robertson, J. J., & Long, B. (2018). Suffering in Silence: Medical Error and its Impact on Health Care Providers. The Journal of Emergency Medicine, 54(4), 402–409. https://doi.org/10.1016/j.jemermed.2017.12.001

Sabo, B. (2011). Reflecting on the concept of compassion fatigue. Online Journal of Issues in Nursing, 16(1).

Sinclair, S., Raffin-Bouchal, S., Venturato, L., Mijovic-Kondejewski, J., & Smith-MacDonald, L. (2017). Compassion fatigue: A meta-narrative review of the healthcare literature. International Journal of Nursing Studies, 69, 9–24.

Veissière, S. P., Constant, A., Ramstead, M. J., Friston, K. J., & Kirmayer, L. J. (2020). Thinking through other minds: A variational approach to cognition and culture. Behavioral and Brain Sciences, 43, e90.

Social Sciences

♣ 1

Bridging the Divide: *The Success of the Toronto Public Library Wi-Fi Hotspot Lending Program in Promoting Digital Inclusion*

By Kaelem Moniz

The Problem

Over 23,000 of Toronto's households are disconnected from home internet (Andrey et al., 2021). Many of these households report that cost prevents their connection (Hager, 2019). Other key factors include scarcity of affordable digital technology and a depression in digital literacy rates - altogether creating a "digital divide" (Thompson et al., 2014). The divide's consequences are worsened by a societal shift online. Following the COVID-19 pandemic, many integral resources like education and government services have shifted to a digital format, making access increasingly difficult for those disconnected. This is felt acutely where "working from home" is still possible, as is the case for many professions. The problem is clear-set: a lack of internet is no longer just a barrier to online information but to society.

In 2020, the Toronto Public Library (TPL) outlined "Digital Inclusion and Literacy" as one of its five "strategic priorities" for investment (TPL, 2020). Based on the realization that the library is already used by residents "to look for jobs, check email, study or fill out government forms," the TPL Wi-Fi Hotspot Lending Program aims to negate the impact of the digital divide on "individuals living in low-income households that do not have internet access at home" (TPL, 2022). Begun in 2016 and bolstered in 2022, the program seeks to provide 1000 Wi-Fi Hotspot devices to Torontonians without home internet (Warren, 2015; City Librarian 2022). Ultimately, this evaluation seeks to assess the effectiveness of the TPL's Wi-Fi Hotspot Lending Program in reducing the digital divide, based on key metrics identified in literature and stakeholder interviews. This assessment will conclude that the TPL intervention is effective at reaching its target demographic, through accessibility and resource provision, and yet is limited by budget and capacity.

The internet is a pathway to economic participation and social inclusion (Powell et al. 2010). Individuals without internet access are hindered in their ability to find "education, affordable housing and critical government services" (UN Habitat 2021). A lack of access to the internet and digital literacy has quickly become a gateway into poverty, or a means by which poverty continues (Parsons and Hick, 2008). Indeed, some researchers such as Brake, Livingstone and Helsper (2007) have identified Information and Communications Technology (ICT) as a "key functional skill."

The digital exclusion crisis is significant in Toronto with 34% of households reporting concern over paying internet bills, with this rate highest among low-income residents (Andrey et al. 2021). Canada has the fifth-highest internet rates globally (UN Habitat, 2021). This is largely due to the oligopolistic nature of the internet market (Bourke, 2016; Decloet and Thanthong-Knight, 2022). Living in Toronto is expensive - and rising inflation and food prices, coupled with rising internet rates, can force low-income residents to choose the best of bad options. Furthermore, a need for internet-providing interventions is evident in Toronto. Despite inroads made by the Federal Government

with the Universal Broadband Fund, the initiative primarily targets rural areas and families receiving the maximum Canada child benefit - leaving many Torontonians out (Prime Minister's Office, 2022). The City of Toronto has previously tried to deliver an intervention through their "Digital Canopy" project, providing free internet to low-income neighbourhoods. This was cancelled after a single year due to being "hardly scalable and not economically sustainable" (UN Habitat, 2021). There currently exists a gap in the literature surrounding the effectiveness of post-COVID hotspot lending initiatives, necessitating further research into solutions for the digital divide.

Researchers like Thompson et al. (2014) have outlined libraries as "relied upon more than any other cultural institution to overcome the digital divide." 51% of people surveyed by the TPL in 2020 reported that the library was their only source of internet access (UN Habitat, 2021). The TPL asserts that 100,000 Torontonians use the library every day (TPL, 2020), and the hotspot program itself lends out 1,000 hotspots over six-month periods (City Librarian, 2022). Theoretically, due to its high visitation rate and digitally progressive program, the TPL is well-suited to address the digital divide.

Literature Review

This review has consulted a range of sources, including practitioner "roadmaps" and academic case studies. Later, from key themes found in current scholarship, each source was coded according to two categories: Availability of the internet and access to digital technology and digital literacy enrichment.

Access to affordable or free internet for those who need it has been touted as essential. UN Habitat (2022) advises that internet-providing interventions must provide "usable broadband internet in the home." The National Digital Inclusion Alliance's "Start-up Manual" agrees and emphasizes affordability post-program. In collaboration with Chicago's digital inclusion plan, Chicago Connected, it advocates for participant transition to affordable service after the lending program is over (Siefer, Callahan and Balboa, 2020). The TPL must provide internet and also a path forward for participants post-program.

Scholars have also established the ability to access digital technology and troubleshooting ("Technology Maintenance" theory) as essential for eliminating the divide. Via interviews and ethnographic research of library internet users, Comi et al. (2022) found that resolving the divide would require the supplying of material technology "to address access and capacity." Interestingly, in their research comparing the South Korean and United States models of digital inclusion through public libraries, Noh (2016) highlighted providing "diverse" technology, like laptops and tablets, along with necessary accessibility equipment through libraries themselves, making them more widely available. Noh also posits that by "securing qualified librarians", those trained in digital literacy and technology, digital inclusion would increase. An effective intervention would provide technology and librarians who help participants with their devices; hotspots and technology.

Lastly, most sources concur that allowing intervention participants to access training in digital literacy, and even in many cases English literacy, is crucial to the success of a program. Hudes (2021) touts the National Digital Inclusion Alliance's "Digital Navigator" program, which supplies "basic digital literacy education" and "one-to-one dedicated technological support via phone services." Carmi and Yates (2020) advocate prioritizing "[l]ong term and ongoing literacies programmes" and providing an "ongoing

learning experience" for monitoring progress and troubleshooting when needed. Unlike the national "Digital Navigator" campaign, they argue against a one-size-fits-all approach. The TPL must provide digital literacy training while catering to individual needs.

Scholars debate the importance of digital literacy training compared to technology dissemination. One school of thought, the "Technology Maintenance" theory, posits that prioritizing the dissemination of affordable or free technology addresses the divide more effectively than prioritizing digital literacy programs. One study of disconnected residents of a large city found that access to internet technology is their most significant barrier, not training (Gonzales, 2016). Thompson et al. (2014) disagree, calling prioritizing providing digital technology "misguided" (135). While they agree that "lack of access [to the internet] is the primary reason for nonusage of the Internet", they find that a "lack of [digital literacy] skills" is far more significant (138). UN Habitat (2022), meanwhile, argues that successful interventions will take both approaches. An effective intervention should thus bridge the debate: providing hotspots along with training, for those who need it.

Hypothesis

The Wi-Fi Hotspot Lending program will be successful in promoting digital inclusion if it accessibly provides internet to its target demographic (low-income Torontonians) and the program's participants can use the internet with digital technology and access to device training, including troubleshooting.

Methods

Research methods involved a literature review and stakeholder interviews. The key concept of "digital inclusion" is defined as having the knowledge and ability to access the internet without significant external challenges. This concept was assessed based on participant access to the internet, along with access to digital technology and literacy training for internet usage. Information from the Toronto Public Library, Statistics Canada and the City of Toronto have been used to review the Program's efficacy quantitatively. Five semi-structured interviews supplemented assessment metrics (Appendix A). Interviews were all conducted virtually, at the preference of each interviewee, and were recorded using Zoom software with their consent. Interviewees were chosen based on their proximity to and experience with public hotspot lending programs. Two visits to hotspot-lending branches and informal phone interviews with librarians were also conducted for this research project.

Findings

Ultimately, this assessment finds that the TPL distribution program is effective based on a focus on accessibility and participant digital technology and literacy support. Hotspots are distributed from individual branches, so assessing these select branches can help determine the intervention's efficacy. Interviewee A, a policy analyst who recently mapped Toronto's digital divide, outlined that "more than half" of participating libraries must be located in below-average income neighbourhoods for target demographic accessibility. Indeed, 27 of the 29 hotspot-offering branches operate in census tracts below Toronto's Average Individual Income (Appendix B). The two branches situated in above-average tracts, Jane-Dundas and Richview, border lower-income tracts. Furthermore, 16 branches are located in "Neighbourhood Improvement Areas" (NIAs), defined by aggregating poverty-related factors like income, unemployment and graduation rates (City of Toronto, 2020).

Interviewees A and B (from the Los Angeles Public Library) also emphasize prioritizing geographically distanced distribution points, including even low-income residents in high-income neighbourhoods. The TPL focuses on this metric as well. Torontonians can access hotspots across the city (Appendix C). There still, however, exists room for improvement. Interviewee C, representing the Denver Public Library's hotspot lending program highlights the benefit of offering hotspots from every DPL branch as reaching the maximum number of possible participants. For this reason, the LAPL also plans to expand their lending program across all 72 locations. Additionally, the TPL model leaves distribution "islands": unserved low-income neighbourhoods. South Etobicoke and (especially) North Scarborough all have low-income neighbourhoods with libraries, but they don't distribute hotspots. The TPL distribution scheme leaves no hotspot unborrowed (all 1,000 hotspots are currently checked out) yet attention to geographical distribution can improve accessibility (TPL, 2022).

Carmi and Yates (2020) argue that an effective digital inclusion program will be "long-term and ongoing." Indeed, Interviewee A argues "one year" is ideal, stating that this period allows participants to "find other resources to access the Internet on a long-term basis." The TPL only offers six-month loans. Interviewee D, manager of the TPL's Lending Program, however, highlights that the hotspot program's "demand far outstrips [their] supply" - preventing longer loans from reaching more participants. Indeed, the TPL's loan period already exceeds that of other libraries: the DPL and LAPL, which only offer three-month periods. Interviewee E, founder of an NGO aimed at promoting digital inclusion, then argues that after the hotspot loan is over, libraries should point participants towards "affordable programs" offered by "the government [or] internet providers." The TPL has made this a key focus. Interviewee D's office distributes flyers, advertising affordable internet options (Appendix D). This information is provided "as soon as they get the hotspot" to allow participants to plan their post-hotspot path. However, Interviewee D highlights the program's purpose as a "bandaid" solution - a bridge for needy Torontonians until policy catches up. By providing longer-than-standard loans and affordable internet resources, the TPL offers a sustainable, albeit imperfect, solution.

Interviewee B argues that participant surveys are crucial to a successful intervention "when [the hotspots] are returned". They can provide insight into participant needs and whether the intervention is reaching its target demographic. In fact, the TPL does just this, also conducting mandatory-for-participant surveys at device pickup. While the return rate on dropoff surveys is low, data from the pickup survey revealed that 51% of participants have annual incomes below $30,000 - below the poverty line.

Lastly, Interviewee A argues that some form of means testing should be implemented to ensure that participants who don't need hotspots can't obtain them. Interviewees B, C and D, however, all disagree. Interviewee D notes that this can disclude people "who don't have an address." While there have been some misuses by participants intending only to use their hotspot "on the way to the cottage", Interviewee D insists low abuses. Indeed, Interviewee D cites that the TPL has found success against misuse by abstaining from external advertising, without flyers or brochures. TPL instead advertises on a branch-by-branch basis through partner non-profits working with their target demographic. This allows each branch to serve its community individually, and ensure that the intended audience is effectively serviced. The TPL bypasses means-testing through individualizing service on a community basis - a strategy argued by both Interviewees and the literature.

Another key variable identified is the participant's ability to use the hotspot, through access to digital technology and digital literacy training. Interviewee E argues that an essential metric for success is the provision of "someone [who] will actually take the time to go through it with [the participant]....as there's a lot of people without computer literacy." Each TPL participant receives a personal "five-minute" orientation on using their device. Participants are also provided with "[written and in print] instructions." Upon hearing a description of these instructions, Interviewee A stresses the significant impact of having large images and text, as the instructions do. Interviewee A also argues that a successful intervention will offer multilingual instructions. Indeed, a 2018 study found that 1 in 20 Torontonians speak no official language and that this community has a disproportionately high poverty rate (Joshi, 2018). Interviewee B has offered the LAPL's resources in Spanish (the second largest language in Los Angeles) and Mandarin (to serve its Chinatown location). Thus, the TPL's intervention is limited as it does not distribute multilingual instructions. Their website does not have a translation function on its homepage either (Appendix E). Instead, participants may use an in-branch "on-demand" translation service inaccessible from home. While the intervention finds success through in-person device training and highly-visual instruction sheets, multilingualism may allow the program to better reach its target demographic.

Interviewees A and E also argue that effective programs provide digital literacy training by offering in-print resources. Indeed, Interviewee D highlights many participant aids. Participants receive a handout with digital literacy opportunities upon receiving their hotspot. Interviewee D also emphasizes the availability of flyers advertising digital literacy opportunities that can be found in-branch. This literature is less available in practice. Of the two hotspot-lending branches I visited, one lacked take-home flyers, while the second only had information regarding higher-level Adobe workshops. Librarians in both branches however knew to point me to the library's online digital literacy schedule. Furthermore, the TPL makes troubleshooting widely available, a factor that all interviewees agree is essential to a hotspot intervention's success. The library operates an answer line for participant troubleshooting. Should it fail, participants may "Book a Librarian" for 30-60 minute sessions and receive help at all 100 branches. To improve the program's efficacy, in-print resources should be more available - although the resourcefulness of librarians and availability of troubleshooting compensates.

Lastly, Interviewees B and C prioritize making lendable digital technology available with hotspots. Both the DPL and LAPL offer computers with hotspots through their program. Interviewee D, however, disagrees. Instead, TPL offers Internet Connectivity Kits (ICKs) as part of a separate program in collaboration with community partners. These ICKs give (not lend) computers and hotspots to those referred to the library by local non-profits. However, this donor-driven program is reliant on the TPL Foundation. Hotspot program participants are thus expected to have their own digital technology. This is inherently limited by the low-income nature of the TPL's target demographic - but from a lack of funding, perhaps necessary. Interviewee C even argued that the DPL would need to move to a similar model to the TPL to offer more sustainable service. Giving computers instead of lending them offers more sustainable technological access to participants. While the TPL cannot provide technology to hotspot lenders, the ICK program helps to make the difference.

Conclusion

Given gaps in public policy that allow rates to skyrocket while low-income Torontonians struggle to pay for groceries, interventions like the TPL's are essential.

After consulting subject-matter experts, this paper has demonstrated that the literature-based hypothesis is true for a successful hotspot-lending intervention. Interviewees identify prioritizing hotspot distribution to those who need them and offering participants access to troubleshooting and digital literacy resources. Offering digital technology is essential too - but not always through the same intervention. Further research should be conducted into the efficacy of device troubleshooting and digital literacy resources. These lie outside the immediate scope of this assessment, as separate interventions in and of themselves, and so should be assessed as well.

The TPL's initiative prioritizes getting hotspots to those who most need them and provides troubleshooting while focusing on digital literacy. The TPL largely follows the model outlined in the literature and by interviewees. It even surpasses the LAPL and DPL's programs for loan duration and troubleshooting. And yet, crucially, the LAPL and DPL have an advantage that the TPL doesn't: funding. The American Federal Government provided both systems with "CARES" funding in response to the COVID pandemic. Meanwhile, Interviewee D highlights that the Lending Program has not received any significant increases in funding over the same time. This difference has allowed the LAPL to distribute 9,000 hotspots and the DPL to distribute over 2,000, despite having significantly fewer branches than the TPL (72 and 27, respectively). Additional funding is crucial to a hotspot program's success. Interviewee D estimates that each hotspot costs around $1,400, and the internet itself is provided via a $1.2 million biannual contract with Rogers (City Librarian, 2022). While this paper finds that eliminating unserved "islands", boosting multilingualism and making participant-aiding literature would improve outcomes, an increased budget would undoubtedly have the greatest impact. Supply is met every cycle, and Interviewee D estimates that "hundreds" are turned away. In a perfect world, this assessment would be conducted using a program without such a significant budget constraint. Future research should be conducted to find a qualified program, as with the LAPL, which better meets demand. The TPL Hotspot Lending Program is progressive in its field, but a bandaid solution. Future research should be done into long-term solutions - ways to take internet access past the six-month mark. The TPL effectively supports its target demographic through short-term digital inclusion, but would do so better with more funding.

References

Andrey, Sam, M.J. Masoodi, Nisa Malli, and Selasi Dorkenoo. "Mapping Toronto's Digital Divide." City of Toronto. The Ryerson Leadership Lab, the Brookfield Institute and the City of Toronto, January 2021 https://www.toronto.ca/wp-content/uploads/2021/07/95dc-Mapping-Torontos-Digital Divide.pdf.

Bourke, Patrick. "Which Internet Service Provider in Canada Is Best for You?" Moving2Canada, April 10, 2016. https://moving2canada.com/internet-service-providers-in-canada-a-guide/.

Bowles, Vickery. Rep. Wi-Fi Hotspot Lending – Award of Contract for Data Communications. Toronto Public Library, April 25, 2022. https://torontopubliclibrary.typepad.com/board-meetings/2022-04-25/16-wi-fi-hotspot -lending-award-of-contract-for-data-communications.pdf.

Brake, David R., and Sonia Livingstone. "Chapter 3.1: Uses and Opportunities of ICT." Essay. In Meeting Their Potential: the Role of Education and Technology in Overcoming Disadvantage and Disaffection in Young People , edited by Ellen Johanna Helsper, 47–59. ResearchGate, 2007.

Carmi, E, Yates, S.J., 2020. What do digital inclusion and data literacy mean today? Internet Policy Review, 9(2).

Comi, Matt, Sarah Smith, Walter A Goettlich, Perry Alexander, Drew Davidson, and William G Staples. "Digital Home-Lessness: Exploring the Links between Public Internet Access, Technological Capital, and Social Inequality." Current Sociology, 2022, 001139212211118. https://doi.org/10.1177/00113921221111819.

Decloet, Derek, and Randy Thanthong-Knight. "Judge Asks Rogers, Shaw, Competition Bureau to Consider Compromise ..." The Financial Post. Bloomberg News, November 1, 2022. https://financialpost.com/telecom/rogers-shaw-competition-bureau-judge-compromise

Gonzales, Amy. "The Contemporary US Digital Divide: From Initial Access to Technology Maintenance." Information, Communication & Society 19, no. 2 (2016): 234–48. https://doi.org/10.1080/1369118x.2015.1050438.

Hager, Mike. "Anti-Poverty Group Calls for Cheaper Internet Access for Low- and Moderate-Income Canadians." The Globe and Mail. The Globe and Mail, August 14, 2019. https://www.theglobeandmail.com/business/technology/article-anti-poverty-group-call s-for-cheaper-internet-access-for-low-and/.

Hudes, Kevin. Rep. Dimensions of Digital Inclusion: A Review of Research and Practice, Part 2. Toronto, Ontario: City of Toronto, 2021.

Joshi, Ravi. "Life in Toronto without English: 130,000 Residents Do Not Speak English and Seek Reduced Barriers to Language Programs." Social Planning Toronto, June 9, 2018. https://www.socialplanningtoronto.org/life_in_toronto_without_english_130_000_residents_do_not_speak_english_and_seek_reduced_barriers_to_language_programs.

References

Noh, Younghee. 2016. “A comparative study of public libraries’ contribution to digital inclusion in Korea and the United States.” Journal of Librarianship and Information Science 51, no. 1 (October): 59-77.

Office of the Prime Minister of Canada. “Connecting Canadians with High-Speed Internet in New Brunswick and across Canada.” Prime Minister of Canada. Office of the Prime Minister of Canada, November 8, 2022. https://pm.gc.ca/en/news/news-releases/2022/11/08/connecting-canadians-high-speed internet-new-brunswick-and-across#:~:text=The%20Universal%20Broadband%20Fu nd%20(UBF)%20is%20a%20%243.225%20billion%20investment,UBF%20dollars% 20go%20even%20further.

Parsons, Cheryl, and Steven F. Hick. “Moving From Digital Divide to Digital Inclusion .” Currents: Scholarship in the Human Services 7, no. 2 (2008): 1–7. https://doi.org/https://journalhosting.ucalgary.ca/index.php/currents/article/view/1589 2/12589

Powell, Alison, Amelia Bryne, and Dharma Dailey. 2010. “The Essential Internet: Digital Exclusion in Low-Income American Communities.” Policy & Internet 2 (2): 159–90. doi:10.2202/1944-2866.1058.

Rubin, Josh. “Canada’s Inflation Falls to 6.9% in September as Food Soars to 41-Year High.” thestar.com. Toronto Star, October 19, 2022. https://www.thestar.com/business/2022/10/19/annual-rate-of-inflation-for-september-e xpected-to-fall-to-68-per-cent-economists-project.html.

Siefer, Angela, Bill Callahan, and Paolo Balboa. The Digital Inclusion Startup Manual. Columbus, Ohio: National Digital Inclusion Alliance, 2020.

Social Policy Analysis and Research, and Social Policy Analysis and Research, City of Toronto, TSNS 2020 Neighborhood Equity Index Methodological Documentation § (2014).

Thompson, Kim M., Paul T. Jaeger, Natalie Greene Taylor, Mega Subramaniam, and John Carlo Bertot. Digital Literacy and Digital Inclusion: Information Policy and the Public Library. Lanham, Maryland: Rowman and Littlefield, 2014.

“TPL: Vital to Toronto - Building Success, Resilience and Well-Being for Our City .” Toronto Public Library. Toronto Public Library, 2020. https://www.torontopubliclibrary.ca/about-the-library/strategic-plan/2020-2024/index. jsp.

Tulk, Cameron, and Natasha Grzincic. “Do Your Neighbours Make More than You? Search Our Map of Income in the GTA.” thestar.com. Toronto Star, November 9, 2017. https://www.thestar.com/news/gta/2017/11/09/do-your-neighbours-make-more-than-y ou-search-our-map-of-income-in-the-gta.html.

UN Habitat. “Addressing the Digital Divide: Taking Action towards Digital Inclusion.” Nairobi: United Nations, 2021.

Warren, May. “Toronto Public Library to Lend out Internet through Wi-Fi Hotspots.” thestar.com. Toronto Star, December 31, 2015. https://www.thestar.com/news/gta/2015/12/31/toronto-public-library-to-lend-out-inter net-through-wi-fi-hotspots.html.

“Wi-Fi Hotspots.” Toronto Public Library. Toronto Public Library, 2022. https://www.torontopubliclibrary.ca/using-the-library/computer-services/wifi-hotspots /index.jsp.

♣ 2

Economic Reform and Social Consequence: *Structural Adjustment Programs and the Right to Health in Ghana*

By Onyi Ogu

Abstract

Structural Adjustment Programs (SAPs) were introduced in Ghana in the 1980s by the IMF and World Bank. They were aimed at resolving economic crises in developing nations through financial restructuring and policy reforms. While these programs helped achieve economic stabilization and growth in Ghana, their broader social and health-related impacts remain deeply contested (Heidhues & Obare, 2011; Konadu-Agyemang, 2000; Loxley, 1990). This paper argues that although SAPs contributed to improvements in GDP and reduced inflation, they also intensified socioeconomic inequalities, primarily affecting access to health and education. SAP requirements, such as reducing public sector spending and implementing trade liberalization, led to increased urban-rural disparities and limited access to essential services for many marginalized populations (Konadu-Agyemang, 2000). The Ghanaian experience demonstrates a fundamental difference between economic reform policies and human rights, particularly the right to health. Although SAPs achieved their economic objectives, they did so at the cost of social equity and created barriers for vulnerable communities in accessing necessary healthcare and other vital services (Loxley, 1990). This analysis highlights the need for policy frameworks that balance financial stability and human rights to support sustainable, inclusive development.

Introduction

In the 1980s, many African countries, including Ghana, faced severe economic crises marked by high inflation, stagnant GDP growth, mounting debt, and widespread unemployment. These crises were caused by a combination of internal mismanagement, external debt burdens, structural weaknesses, and declining global commodity prices, particularly in cocoa and gold exports (Heidhues & Obare, 2011; Loxley, 1990). Additionally, reliance on external loans exacerbated the debt crisis as interest payments outpaced national revenues. The lack of diversification in the Ghanaian economy also heightened its vulnerability to global market fluctuations (Konadu-Agyemang, 2000). In response, the IMF and World Bank implemented Structural Adjustment Programs (SAPs) to stabilize economies through economic reforms like currency devaluation, trade liberalization, and reduced government spending (Heidhues & Obare, 2011; Loxley, 1990). While SAPs initially led to economic improvements in Ghana, including higher GDP and lower inflation, they also had deep social impacts (Konadu-Agyemang, 2000).

These programs, which caused cuts to public spending,exacerbated social inequalities. They particularly affected rural and marginalized populations. Reduced investments in public health, sanitation, and social welfare compromised essential health determinants, raising concerns over SAPs' compatibility with the right to health, defined as equitable access to services and resources essential for well-being. This analysis examines how SAPs influenced social determinants of health in Ghana, revealing that, while economically stabilizing, SAPs created significant barriers to achieving the highest attainable health standards. Ghana's experience shows there is a need for policies that balance financial stability with human rights and inclusive development.

What are Structural Adjustment Programs?

Structural Adjustment Programs (SAPs) are economic reform policies that were mandated by international financial institutions, primarily the International Monetary Fund (IMF) and the World Bank, as conditions for receiving financial assistance. Implemented in the 1980s, SAPs aimed to address widespread economic instability in many developing nations by fostering fiscal discipline, stabilizing currency, and encouraging market liberalization. These policies typically required recipient countries to implement specific reforms, including currency devaluation, trade liberalization, privatization of state-owned enterprises, and huge reductions in government spending (Heidhues & Obare, 2011). By shifting these economies from state-driven models to free-market systems, SAPs were expected to stimulate economic growth, improve export competitiveness, and attract foreign investment (Konadu-Agyemang, 2000). Although SAPs aimed to restore economic balance, critics argue that the quick implementation of efforts to reduce public sector involvement often resulted in unintended negative consequences, especially for the most vulnerable populations within these countries.

Impact of SAPs on Health Determinants in Ghana

The health impact of SAPs goes beyond direct changes to healthcare systems, affecting broader social determinants of health. In Ghana, SAP-mandated fiscal austerity measures led to cuts in public sector employment and social services, which deeply influenced health indirectly. For example, reductions in public spending forced cuts to subsidies for utilities, such as water and sanitation, which are essential for preventing communicable diseases and maintaining public health standards (Konadu-Agyemang,

2000). Water, being a fundamental human right, became less accessible to marginalized populations as privatization increased costs and reduced affordability.

Additionally, privatization and trade liberalization raised the cost of essential goods through increased reliance on international markets and the removal of price controls. Imported food and medical supplies became more expensive due to currency devaluation and market-driven pricing mechanisms, further straining the purchasing power of low-income households (Loxley, 1990). Research suggests that this economic shift towards higher food prices disproportionately affected rural and low-income communities, resulting in increased food insecurity, malnutrition, and higher rates of childhood illnesses (Yeboah, 2016).

Furthermore, cuts to education spending restricted educational access, contributing to lower health literacy and reducing the population's capacity to make informed health-related decisions. Education is a critical determinant of health outcomes, and reduced investment in this sector perpetuates cycles of poverty and poor health (Owusu, 2014). So, while SAPs sought to achieve economic stability, their impact on critical health determinants indirectly compromised the overall health and well-being of Ghana's population, particularly among its most vulnerable groups.

The Relationship Between SAPs and the Right to Health

The relationship between SAPs and the right to health is complex, as SAP policies often create obstacles to attaining equitable health standards. The right to health, as defined by the World Health Organization (WHO), includes access to timely, acceptable, and affordable healthcare of appropriate quality, as well as to underlying determinants like clean water, nutrition, and shelter. In Ghana, SAP-induced policies, such as reduced public sector investment, undermined this right by limiting access to these essential services, especially in underserved communities (Heidhues & Obare, 2011). For example, devaluation measures increased the cost of imported medical supplies, lessening access to essential healthcare. Additionally, cuts in public services further marginalized communities with limited private healthcare options, effectively excluding them from achieving optimal health and well-being.

Specific rights impacted by SAPs include the right to water, sanitation, nutrition, and access to affordable healthcare. These rights were compromised through fiscal austerity measures, reduced subsidies, and privatization of essential services. As seen in Ghana's experience, SAPs may therefore impede the right to health by prioritizing economic goals over equitable access to resources essential for maintaining health.

Conclusion

Ghana's experience with Structural Adjustment Programs (SAPs) demonstrates the complex consequences of economic reforms imposed by international financial institutions. While SAPs achieved some economic stabilization and growth, their impact on social structures—particularly the determinants of health—reveals significant drawbacks. Reduced public spending, privatization, and market liberalization efforts deepened social inequalities, limiting access to essential resources like nutrition, education, and sanitation. These indirect effects on health determinants highlight how SAPs, despite their economic goals, often conflict with the right to health by prioritizing fiscal objectives over equitable access to fundamental services. This analysis underscores the need for more balanced economic policies that support financial stability without compromising

social welfare and human rights. Policymakers must prioritize inclusive development strategies that address the structural barriers created by SAPs and ensure access to essential services for all citizens. By aligning economic reforms with human rights principles, it is possible to create policy frameworks that foster both economic resilience and social equity.

References

Heidhues, F., & Obare, G. (2011). Lessons from structural adjustment programmes and their effects in Africa. Quarterly Journal of International Agriculture, 50(1), 55-64.

Konadu-Agyemang, K. (2000). The best of times and the worst of times: Structural adjustment programs and uneven development in Africa: The case of Ghana. The Professional Geographer, 52(3), 469-483. https://doi.org/10.1111/0033-0124.00239

Loxley, J. (1990). Structural adjustment in Africa: Reflections on Ghana and Zambia. Review of African Political Economy, 17(47), 8-27. https://doi.org/10.1080/03056249008703845

Owusu, F. (2014). Economic reforms and human capital development in sub-Saharan Africa. African Development Review, 26(1), 75-88.

Yeboah, T. (2016). Food security and economic policies in Ghana. Journal of African Policy Studies, 19(2), 45-62.

♣ 3

Green Tea: *From Small Chinese Tea Farms to Supermarkets in Downtown Toronto*

By Luke Lee

In early spring at Jinxi Tea Farm in rural China, labourers start the first harvest of the year. Row by row in the hill-side gardens, they pick leaves from Camellia sinensis plants, the bush used to produce most varieties of leaf-based tea, including green tea (Walcott 2012, 351). At the same time, in Toronto, consumers might be preparing green tea to go in their tumbler using Lipton green tea bags purchased at a local grocery store. What happens in between? Despite the demand for sustainable green tea in Toronto, the lack of transparency within its commodity chain poses a significant obstacle for consumers to fully comprehend the labour, social conditions, and environmental impacts entailed in its production. This opacity favours multinational corporations, such as Lipton, that are involved in the blending and packaging processes of green tea. Furthermore, it detaches consumers from the ethical considerations tied to their consumption of a commodity they perceive as healthy. In this paper, I draw on scholarly research and an ethnographic process to outline green tea's commodity chain and analyze the environmental consequences, labour, and social conditions of its production, distribution, and consumption. Moreover, throughout my analysis, I discuss the role of Lipton Tea and Infusions[1], a tea company owned by the British multinational corporation Unilever, in the commodity chain.

Brief Overview of Green Tea's Commodity Chain

Green tea starts as leaves on a Camellia sinensis plant in small farms or large tea estates in several countries, most notably China, India, and Kenya. While Lipton's website highlights that it owns large tea plantations in East Africa, it fails to mention a similar trail of ownership in China, indicating that it purchases from small Chinese farmers instead of directly managing the production step of the commodity chain (Lipton Teas and Infusions 2024). Once the leaves are harvested, they must be processed within a few hours, so processing facilities are generally located near the site of harvest (Voora et al. 2019). At the processing plant, the leaves are steamed, dried, and ground to produce green tea (Walcott 2012, 351). According to Bermúdez et al. (2014), this is where multinational tea corporations that do not directly control the production process enter the commodity chain: companies such as Lipton purchase the processed tea either through auction houses or private contracts (1). The tea is then exported to consuming countries, where the blending and packaging occur, which adds the majority of the economic value to the good (Bermúdez et al. 2024, 16). Finally, Lipton sells the finished product—in this case, tea bags—to retail and wholesale stores, since it does not have its own direct-to-consumer channels.

Environmental Conditions of Production

While Lipton has obtained an environmental sustainability certification, due

1 Referred to simply as 'Lipton' throughout the rest of the paper.

to a minimal definition of what constitutes a 'small farm,' such certifications fail to comprehensively address all environmental externalities of green tea production. Green tea production and processing rely heavily on water, energy, and agrochemicals (fertilizers and pesticides), which may contribute to environmental problems like global warming, eutrophication, soil erosion, river pollution, and resource overconsumption (Sun et al. 2024, 2). Moreover, agrochemicals pose health risks for labourers due to inadequate safety practices and repeated exposure (Ionescu-Somers and Seifert 2014, 69). Upon reviewing Lipton's website, I found that 98% of the company's tea production is certified sustainable by the Rainforest Alliance, an international non-profit organization whose aim is "to protect nature and improve the lives of farmers and forest communities" (Rainforest Alliance 2024). However, further investigation of the certification criteria revealed that the organization defines small farms as any farm "with fewer than 10 permanent workers" (Rainforest Alliance 2023). With no limit on temporary workers, large farms with substantial temporary workforces can exploit this definition for less stringent eligibility requirements for small farms. For example, small farms are exempt from energy efficiency standards and water conservation requirements, which include policies on irrigation systems, water waste, and erosion (Rainforest Alliance 2023). Agrochemical management obligations are also more relaxed for small farms, heightening the risk of contamination for both temporary workers and the final green tea product. Hence, for the average consumer, the Rainforest Alliance seal on Lipton's products obscures the realities of the environmental issues that affect green tea production.

Labour and Social Conditions of Production

The decentralized supply chain in China and the auction system enable Lipton to neglect labour and social considerations in the production and processing of green tea. Lipton does not own tea estates in China but rather procures processed tea leaves from smallholder farms (small-scale farms that are typically family-owned and operated), effectively shifting the responsibility for worker welfare onto farm management. These farms employ temporary labourers, who are ineligible for "social security provisions or guaranteed minimum wages" (Bermúdez et al. 2024, 15). Workers face other issues such as endemic diseases (e.g. infectious diseases and malnutrition), long hours, and gender discrimination (Ionescu-Somers and Seifert 2014, 69). The anonymous auction system exacerbates these labour conditions, by allowing multinationals like Lipton to easily switch suppliers, driving prices down and reducing margins for farmers (Voora et al. 2019). Compounding the issue, Chinese legislation prevents small tea farms from exporting directly to consuming countries, forcing them to go through anonymous auction houses (Bermúdez et al. 2024, 17). Furthermore, after Lipton purchases processed tea, it is exported to consuming countries where the most profitable steps of the commodity chain—blending and packaging—occur (Bermúdez et al. 2024, 16). Consequently, Lipton retains control over the means of production that add the most economic value to the commodity while detaching itself from the labour and social considerations of the labour-intensive work in China.

Transportation & Distribution of the Commodity

A lack of publicly available information on Lipton's transportation practices raises concerns about the company's commitment to sustainability in this area. I consulted public reports available on Lipton's corporate website[2] in March 2023 as well as watchdog

2 https://www.liptonteas.com/

organizations, such as the Slow Food Movement[3], to find out how the processed tea leaves are transported from Chinese tea farms to Toronto. My research yielded little success. Hence, I make two inferences: (1) given the extended shelf-life of processed tea leaves, Lipton likely uses long-haul marine shipping and (2) Lipton must not be taking any exceptional measures to make the transportation and distribution processes more sustainable since its website fails to make any mention of it. I know, however, that Lipton is not a direct-to-consumer seller, and that it is itself a supplier to retail and wholesale stores, which accounts for the majority of the tea market worldwide (Jain and Deshmukh 2023).

Green Tea Consumption in Toronto

As consumers in Toronto increasingly perceive green tea as a healthy alternative to coffee, the drink is dissociating from its East Asian cultural origins and entering the collective imagination of all consumers as a go-to beverage. Informal ethnographic interviews I had with other students of diverse cultural backgrounds revealed a common association of green tea with health benefits such as weight loss, boosting immunity, and improving focus. This observation aligns with findings from my literature review, with Bermúdez et al. (2024) even suggesting that the COVID-19 pandemic exacerbated this trend in the United States in Canada (7). Notably, the growing demand for green tea in North American markets is especially prominent among urban youth consumers (Voora et al. 2019). During my ethnographic research, some participants mentioned that their green tea consumption also increased with the growing availability of shops specializing in green tea, which boosted its visibility, helped normalize its consumption, and encouraged home preparation. Lipton is capitalizing on these trends; its recent social media campaign encourages consumers to incorporate green tea into their daily routine: "2 cups to goodness every day" (see Appendix). Coffee giants like Starbucks are adapting to this threat of substitution by pushing their own green tea products (Walcott 2012, 359). Furthermore, despite its roots in the culinary heritage of East Asian cultures, my discussions with ethnography participants revealed that many do not instinctively associate green tea with these cultures anymore, and instead see green tea as a more mainstream commodity. This path mirrors that of another type of tea, chai, which was once only found in South Asian stores but is now a permanent fixture of large brands like Starbucks. Therefore, as green tea demand continues to rise due to increasing interest in its perceived health benefits, the commodity is steadily becoming a staple of beverage consumption in Toronto.

Conclusion

Green tea undergoes a complex path from small tea gardens in China to busy retail stores in Toronto. Most consumers of Lipton green tea in Toronto remain oblivious to the loopholes in the environmental sustainability certification standards that allow Lipton to procure processed green tea leaves from small tea farms that may not be following best practices to mitigate harmful environmental impacts. They will not know that Chinese legislation creates an anonymous auction system that squeezes small farms' revenues, preventing them from establishing good working conditions for temporary labourers. Rather, consumers see green tea as a healthy beverage that is increasingly becoming a beverage of choice to satisfy their cravings, and are, as Mintz ([1997] 2019) puts it, "separated by the workings of the world economy from so-called meanings of the substances themselves" (411).

3 https://www.slowfood.com/

Bibliography

Bermúdez, Steffany, Vivek Voora, Cristina Larrea, and Erika Luna. 2024. “Global Market Report: Tea Prices and Sustainability.” Sustainable Commodities Marketplace Series. International Institute for Sustainable Development. https://www.iisd.org/system/files/2024-01/2024-global-market-report-tea.pdf.

Jain, Amit, and Roshan Deshmukh. 2023. “Tea Market Size, Share, Competitive Landscape and Trend Analysis Report by Type, by Packaging, by Application, by Distribution Channel: Global Opportunity Analysis and Industry Forecast, 2022-2031.” Allied Market Research. https://www.alliedmarketresearch.com/tea-market.

Lipton Teas and Infusions. 2024. “LIPTON Teas and Infusions: The Tea Global Leader.” 2024. https://www.liptonteas.com/.

Mintz, Sidney W. (1997) 2019. “Time, Sugar, and Sweetness.” In Food and Culture: A Reader, by Carole Couhnihan, Penny Van Esterik, and Alice Julier, 4th ed., 401–13. Taylor & Francis Group.

Rainforest Alliance. 2023. “Rainforest Alliance Sustainable Agriculture Standard, Farm Requirements.” https://www.rainforest-alliance.org/wp-content/uploads/2022/06/SA-S-SD-1-V1.3-2020- Sustainable-Agriculture-Standard-Farm-Requirements_Rainforest-Alliance.pdf. ———. 2024. “About the Rainforest Alliance.” Rainforest Alliance. 2024. https://www.rainforest-alliance.org/about/.

Somers, Aileen Ionescu-, and Ralf W. Seifert. 2014. “Leapfrogging to Mainstream; Unilever Makes Lipton Tea Sustainable.” Supply Chain Forum: An International Journal 15 (1): 68–75. https://doi.org/10.1080/16258312.2014.11517334.

Sun, Mengqi, Xuexiu Jia, Dong Yang, Bin Lu, Feng Han, and Feng Shi. 2024. “Life Cycle Environmental Impact Assessment of Green Tea Production in China.” Journal of Cleaner Production 434: 140377. https://doi.org/10.1016/j.jclepro.2023.140377.

Voora, Vivek, Steffany Bermúdez, Cristina Larrea, and Sofia Baliño. 2019. “Global Market Report: Tea.” Sustainable Commodities Marketplace Series 2019. International Institute for Sustainable Development. https://www.iisd.org/system/files/publications/ssi-global-market-report-tea.pdf. Walcott, Susan M. 2012. “Brewing a New American Tea Industry.” Geographical Review 102 (3): 350–63. https://www.jstor.org/stable/41709191.

♣ 4

Hunting for Masculinity: *On the Exploits of William T. Hornaday*

By Gabrielle Bridi

In the late 19th century, the population of the North American bison of the Great Plains exponentially decreased, from approximately 30 to 50 million (Shackelford) to approximately 1091 in 1889 (Hornaday 525). William T. Hornaday, the Smithsonian's chief taxidermist, travelled to Montana to hunt and collect bison specimens for their preservation in the National Museum. After returning from his expedition, he mounted an exhibit of taxidermied bison and authored Extermination of the American Bison. Hornaday's detailed accounts of his bison hunt and Smithsonian taxidermy exhibit demonstrate how the hunt reaffirms masculinity. Rooted in the conquest of nature, the hunt intertwines physical dominance, primal instincts, and social validation to construct masculine identity. Beyond the act, the hunt and hunter are commemorated in stories, art, photography, and taxidermy trophies. These representations immortalise the hunt, transmitting messages of the hunter's courage and dominance to spectators. This essay examines the near extinction of the bison from a gendered perspective, arguing that Hornaday's hunt of the bison and taxidermy, while presented as conservation efforts, primarily served to assert and confirm masculinity.

He-Man, the Hunter

I will start by developing a framework to explain how hunting game species like bison reaffirms masculinity. Jones employs a theoretical framework of hunting as a performance that explains how the hunt establishes masculinity. This begins with the pursuit and capture of game species, with the hunting grounds framed as wild places that can be controlled; the hunter's personal terra nullius to conquest. The hunting act is an exertion of primal impulses and physical masculine power where the hunter imposes their will and weaponry against animal adversaries. The climactic kill represents the prime moment of reaffirmed masculinity, often marked by the hunter gazing at or standing over the conquered animal to assert dominance (Jones 265-269). Wonders adds that the aggressive animals killed by hunters are regarded as worthy adversaries based on their size, strength, agility, and ferocity. By conquering them, the hunter is perceived as appropriating and embodying these qualities (Wonders 283-284).

The hunting experience continues by describing and commemorating the hunt and hunter. Sharing the story and receiving the validation of others cements the hunter's identity, relating to Judith Butler's idea that gender needs to be repeatedly performed to be 'real' (Butler qtd. in Jones 272). This process reinforces the dominance of men. Further, as game species decline in population, hunters can continue to reaffirm their masculinity through story telling rather than hunting (Jones 271-274).

Finally, the hunting experience is immortalised through material representations of the hunt and hunter including literature, art, photography, and taxidermy. These artefacts perpetually signal to and reaffirm the hunter's masculinity while transmitting the hunt's narrative and the hunter's image to spectators. The trophies of the hunt, like

taxidermy, prove the hunter's valour, asserting their masculinity (274-275).

Wonders identifies two categories of game trophies. Primary displays involve the objects themselves, like taxidermy exhibits in museums; and, secondary displays involve illustrations, like photographs (Wonders 269-270). She argues that these trophies contribute to defining hunters in terms of their masculinity (271). She outlines iconographic motifs associated with these trophies: the process of producing displays, including the role of artists involved and the production process (271); the ideological messages conveyed by displays (272); and, the ways hunters pose with animals' bodies, often standing next to or over them with a rifle in hand (279; see Figures 1-9). Jones' and Wonders' frameworks will be used to analyse Hornaday's expedition and taxidermy trophies, highlighting their roles in reaffirming masculinity.

Hornaday's Hunt

Using excerpts from Extermination of the American Bison, I will now analyse how Hornaday's expedition declares and establishes masculinity. In his book, Hornaday recounts "The Hunt" (Hornaday 534-546) as a narrative that aligns with the frameworks of Jones and Wonders. His excited and enthusiastic prose coincides with Jones' argument that the hunt represents a moment of restored masculinity. Hornaday quips, "[w]e had a most exciting and likewise dangerous chase after the herd […]" (537). Later, he remarks, "the cowboys went after the buffalo, and by a really brilliant exploit killed them all" (537). He also describes in detail the chase of "my buffalo" (542). After shooting the bison once, Hornaday pauses to look at it and sketch it in his notebook. Finally, he says, "[h]aving studied his form and outlines as much as was really necessary, I gave him a final shot through the lungs, which soon ended his career" (542).

Hornaday's narrative portrays masculinity by emphasising traits traditionally associated with dominant archetypes of men. Words like exciting, dangerous, and brilliant, depict the hunt as a daring and high-stakes adventure, glorifying resilience and bravery. Referring to the bison as his own stresses dominance and ownership, reducing the animal to an instrumental object valued only through its relationship to the hunter, and used to reinforce masculinity. The gun becomes an extension of his body and will, symbolising his power and control over nature. Killing the bison demonstrates strength and precision. The climactic moment, marked by a brief pause before the kill, highlights deliberate action, solidifying Hornaday's authority and determination. This portrayal depicts masculinity as centered on power, control, and the triumph over external challenges (the bison) and internal struggles (fear or hesitation), reflecting broader cultural ideals of the dominance of men.

Hornaday's account of his team's arduous journey through Montana's harsh weather and terrain depicts the hunting grounds as wild places awaiting conquest. He recounts their encounters with mud, snowstorms, and blizzards, which at one point forced them to abandon their wagon to seek shelter and drove his colleague, trapped in a blizzard, to resort to extreme methods of self-preservation to keep warm and survive (544). He writes, "[t]he storm which set in on the 20th soon developed into a regular blizzard. A fierce and bitter cold wind swept down from the northwest, driving the snow before it in blinding gusts. Had our camp been poorly sheltered we would have suffered, but [as] it was we were fairly comfortable" (541). This navigation through unforgiving terrain and extreme weather represents masculine strength and perseverance, showcasing their ability to adapt and survive in life-threatening conditions. Further, their triumph over the challenges of the landscape illustrates how they modified and reshaped

it to suit their needs, ultimately conquering and transforming it into a space marked by hu(man) intervention and control.

Hornaday's account of the hunt and hunter in his book is described, commemorated, and immortalised. By portraying himself as a hunter engrossed in the hunt, he repeatedly performs and validates his masculinity. Even in death, the book ensures that Hornaday's masculine character is eternally preserved.

Hornaday's Prize

Hornaday's presentation as a masculine figure is reinforced by the eternalisation of the hunt through taxidermy trophies (Figure 10), which Wonders refers to as primary game trophies. Following his expedition, Hornaday mounted the taxidermied bison exhibit in the National Museum, labelling a photograph of it, "Trophies of the Hunt" (Cosmopolitan Magazine; Hornaday 543). This label suggests that the taxidermied bison symbolise more than the animals; they embody the strength and courage of the hunter who endured significant challenges to earn them. Displayed publicly, the exhibit communicates the message of the hunter's masculinity to spectators, ensuring the continual validation of the hunter's masculinity.

Hornaday's Hypocrisy

I will finally discuss how Hornaday frames his bison hunt as distinct from other game hunters by emphasising conservation and knowledge building. According to Hasian Jr and Muller, Hornaday distinguishes "killing animals for sport and killing animals in the name of science [; …] "good" hunters and "bad," […] nature-lovers and nature-destroyers" (291). Hornaday makes this distinction by intentionally differentiating the killing of bison by game hunters versus by himself. He states, "the white men who engaged in the systematic slaughter of the bison were savages just as much as the Piegan Indians" (Hornaday 487) and "many men who were properly classed as sportsmen […] did engage in useless and inexcusable slaughter to an extent that was highly reprehensible" (498). Further, when describing game hunters, he says:

In no way does civilized man so quickly revert to his former state as when he is alone with the beasts of the field. Give him a gun and something which he may kill without getting himself in trouble, and, presto! he is instantly a savage again, finding exquisite delight in bloodshed, slaughter, and death, if not for gain, then solely for the joy and happiness of it. There is no kind of warfare against game animals too unfair, too disreputable, or too mean for white men to engage in […] (487).

Consider the change in rhetoric between Hornaday's description of the game hunters' hunts and his portrayal of his own hunt. Game hunters are savage, reprehensible, and sadistic; their hunt is useless and inexcusable slaughter. In contrast, Hornaday's hunt is described with pride as an important endeavour to collect specimens for bison preservation at the Smithsonian, allowing knowledge building. By making this distinction, Hornaday justifies his actions (Hasian Jr and Muller 294). Consequently, his hunt and taxidermy are beyond reproach; they are seen as noble and intelligible efforts. This enables Hornaday to assert a distinct form of masculinity, reinforced not only by the hunt and taxidermy, but also through his conservationist efforts, distinguishing himself from other game hunters and broadening his masculine traits to include nobility and intelligence.

Conclusion

My analysis of Hornaday's bison hunt and taxidermy exhibit reveals that his hunting expedition and its immortalisation in literature and taxidermy serve as a means of expressing and reinforcing masculinity. He attempts to conceal his reaffirmation of masculinity by distancing himself from other game hunters, using notions of conservation efforts and knowledge dissemination. Ultimately, Hornaday uses the eternalised hunt, like other game hunters, and the conservationist trope to assert and confirm his masculinity. Further inquiry into this topic might consider how masculine performance contributes to empire or colonial expansion, or the kinds of material infrastructures of empire (Cowen) that relate to the near extinction of the bison.

Appendix

Figure 1

This photograph depicts men posing with bison skulls outside the Michigan Carbon Works in Rougeville, Michigan.

Men standing with pile of buffalo skulls. Michigan Carbon Works. Detroit Public Library, 1892, https://digitalcollections.detroitpubliclibrary.org/islandora/object/islandora%3A151477.

Note: Image edited to grayscale by the author.

Figure 2

Fraga, Kaleena. “Man standing with a bison and rifle.” All That’s Interesting, 12 Nov. 2021, allthatsinteresting.com/american-bison-extinction-1800s#31.

Note: Image edited to grayscale by the author.

Figure 3

Fraga, Kaleena. “Man standing in front of bison skulls.” All That’s Interesting, 12 Nov. 2021, allthatsinteresting.com/american-bison-extinction-1800s#31.

Note: Image edited to grayscale by the author.

Figure 4

Fraga, Kaleena. “Two men kneeling over bison.” All That’s Interesting, 12 Nov. 2021, allthatsinteresting.com/american-bison-extinction-1800s#31.

Note: Image edited to grayscale by the author.

Figure 5

Fraga, Kaleena. “Men posing over bison heads.” All That’s Interesting, 12 Nov. 2021, allthatsinteresting.com/american-bison-extinction-1800s#31.

Note: Image edited to grayscale by the author.

Figure 6

Fraga, Kaleena. “Men posing with piles of bison skulls.” All That’s Interesting, 12 Nov. 2021, allthatsinteresting.com/american-bison-extinction-1800s#31.

Note: Image edited to grayscale by the author.

Figure 7

Fraga, Kaleena. “Men on horses with rifles and a hunted bison in front.” All That’s Interesting, 12 Nov. 2021, allthatsinteresting.com/american-bison-extinction-1800s#31.

Note: Image edited to grayscale by the author.

Figure 8

Fraga, Kaleena. “Men posing with piles of bison hides.” All That’s Interesting, 12 Nov. 2021, allthatsinteresting.com/american-bison-extinction-1800s#31.

Note: Image edited to grayscale by the author.

Figure 9

Fraga, Kaleena. "Man resting foot on a bison with a rifle." All That's Interesting, 12 Nov. 2021, allthatsinteresting.com/american-bison-extinction-1800s#31.

Note: Image edited to grayscale by the author.

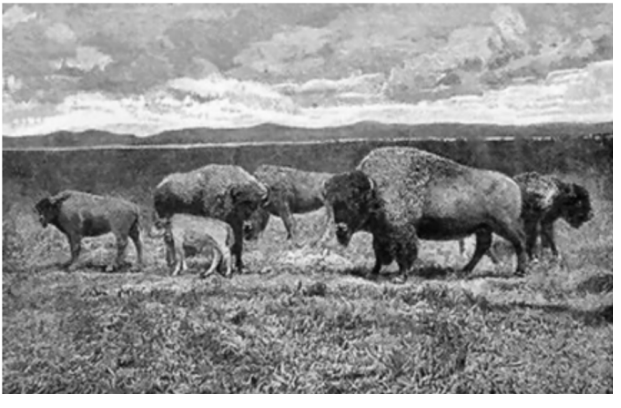


Figure 10

This is a photograph of the taxidermied bison exhibit Hornaday mounted at the Smithsonian following his exhibition.

Cosmopolitan Magazine. Trophies of the Hunt. Extermination of the American Bison, by William T. Hornaday, 1889. Good Press, 2019, p. 542. https://www.gutenberg.org/cache/epub/17748/pg17748-images.html#vii_preservation_of_the_species_from_absolute_extinction.

Note: Image edited to grayscale by the author.

Works Cited

Cosmopolitan Magazine. Trophies of the Hunt. Extermination of the American Bison, by William T. Hornaday, 1889. Good Press, 2019, p. 542. https://www.gutenberg.org/cache/epub/17748/pg17748images.html#vii_preservation_of_the_species_from_absolute_extinction. Edited to grayscale by the author.

Cowen, Deborah. "Following the Infrastructures of Empire: Notes on Cities, Settler Colonialism, and Method." Urban Geography, vol. 41, no. 4, 2020, pp. 469–86, https://doi.org/10.1080/02723638.2019.1677990.

Detroit Public Library. Men standing with pile of buffalo skulls, Michigan Carbon Works. 1892, Detroit Public Library, https://digitalcollections.detroitpubliclibrary.org/islandora/object/islandora%3A151477. Edited to grayscale by the author.

Fraga, Kaleena. "Man resting foot on a bison with a rifle." All That's Interesting, 12 Nov. 2021, allthatsinteresting.com/american-bison-extinction-1800s#31. Edited to grayscale by the author.

Fraga, Kaleena. "Man standing in front of bison skulls." All That's Interesting, 12 Nov. 2021, allthatsinteresting.com/american-bison-extinction-1800s#31. Edited to grayscale by the author.

Fraga, Kaleena. "Man standing with a bison and rifle." All That's Interesting, 12 Nov. 2021, allthatsinteresting.com/american-bison-extinction-1800s#31. Edited to grayscale by the author.

Fraga, Kaleena. "Men on horses with rifles and a hunted bison in front." All That's Interesting, 12 Nov. 2021, allthatsinteresting.com/american-bison-extinction-1800s#31. Edited to grayscale by the author.

Fraga, Kaleena. "Men posing over bison heads." All That's Interesting, 12 Nov. 2021, allthatsinteresting.com/american-bison-extinction-1800s#31. Edited to grayscale by the author.

Fraga, Kaleena. "Men posing with piles of bison hides." All That's Interesting, 12 Nov. 2021, allthatsinteresting.com/american-bison-extinction-1800s#31. Edited to grayscale by the author.

Fraga, Kaleena. "Men posing with piles of bison skulls." All That's Interesting, 12 Nov. 2021, allthatsinteresting.com/american-bison-extinction-1800s#31. Edited to grayscale by the author.

Fraga, Kaleena. "Two men kneeling over bison." All That's Interesting, 12 Nov. 2021, allthatsinteresting.com/american-bison-extinction-1800s#31. Edited to grayscale by the author.

Hasian Jr, Marouf Arif, and S. Marek Muller. "Decolonizing Conservationist Hero Narratives: A Critical Genealogy of William T. Hornaday and Colonial Conservation Rhetorics." Atlantic Journal of Communication, vol. 27, no. 4, 2019, pp. 284–96, https://doi.org/10.1080/15456870.2019.1624543.

Works Cited

Hornaday, William T. Extermination of the American Bison. 1889. Good Press, 2019. The Project Gutenberg eBook, https://www.gutenberg.org/cache/epub/17748/pg17748-images.html#vii_preservation_of_the_species_from_absolute_extinction

Jones, Karen. "The Bison in the Room: Hunting, Settler Colonialism and Gender Performance on the American Frontier, 1865-1895." Journal of Imperial and Commonwealth History, vol. 52, no. 2, 2024, pp. 260–83, https://doi.org/10.1080/03086534.2024.2325734.

Shackelford, Dayton. "Near Extinction of the Great Plains Bison 1820–1900." Environment & Society Portal, www.environmentandsociety.org/tools/keywords/near-extinction-great-plains-bison-1820-1900#.

Wonders, Karen. "Hunting Narratives of the Age of Empire: A Gender Reading of Their Iconography." Environment and History, vol. 11, no. 3, 2005, pp. 269–91, https://doi.org/10.3197/096734005774434511.

♣ 5

"Right Here with You in the British West Indies": The Death of Left-Nationalisms and Dr. Eric Williams' Imagined Community in Trinidad and Tobago, 1919-1962

By Luca Rampersad

The Republic of Trinidad and Tobago rode to independence along the early 1960s wave of decolonization. However, the Trinidadian nationalist vision looked very different from how it would have looked if Trinidad gained independence just three decades earlier. The form of Trinidadian nationalism changed from an explicitly socialist, Pan-African vision led by the predominantly Afro-Creole labour movement in the 1930s to a moderate, non-ethnically-defined national project undertaken by Prime Minister Dr. Eric Williams and the People's National Movement (PNM) after independence in August 1962.

Initially it seemed based on Dr. Williams' academic endeavours that he would not derogate from this left-nationalist tradition. So what accounts for Dr. Williams' eventual reticence? This essay will argue that the form of Williams' nationalist project is a political calculation, in consideration of three core realities of post-colonial Trinidadian society: ethnic and class divides between Afro- and Indo-Trinidadians, economic reliance on large multinational corporations, and the staying power of colonial cultural hegemony. The negative aspect of Williams' national vision is a minimization of the differences between the peoples of a heterogenous island with developing African and Indian national consciousnesses, which demonstrates the development of an "imagined community" between the peoples of Trinidad and Tobago. Willams' dissociation from the socialist and pan-African traditions of Trinidadian left-nationalisms defined Trinidad's firm non-aligned status, illustrating the intersections between the "nation" and a state's international presentation.

To understand how and why Dr. Williams' national project represented a departure from the preceding dominant conceptions of Trinidadian nationalism, we must briefly consider the form of these preceding nationalisms. The first enduring demonstrations for meaningful self-government in Trinidad came out of the labour movement, instigated by the consequences of the First World War. At home, inflation — estimated at about 145 per cent from 1914-1919 by the Colonial Office — aggravated the Trinidadian populace (Brereton, 1981). Labour unrest surged during the war despite strict repression and strike-breaking; the government broke a 1917 oil workers' strike through military force, imprisoning five union leaders.2 Meanwhile, members of the British West India Regiment (BWIR), incensed by rampant systemic racism within the military, secretly formed the Caribbean League: an explicitly pro-labour, pro-self-government political vehicle that would lead strikes for higher wages upon their return to their respective homelands (Glenford, 2011).

One of the captains of the British West India Regiment was Arthur Andrew Cipriani. A white Trinidadian of Corsican descent, a Fabian socialist and a supporter of the Caribbean League's demands, Captain Cipriani immediately became an active part of the growing intersection between labour disputes and increasing calls for self-government.

He actively participated in the Trinidadian labour movement, becoming President of the Trinidadian Workingmen's Association (TWA) in 1919 and infusing the labour movement with both explicitly economically left-wing and pro-self-government sentiments. Under his leadership, the TWA joined the Labour and Socialist International and forged an affiliation with the British Labour Party. Cipriani also published and distributed a popular pamphlet entitled "The Case for West-Indian Self Government," where he forwarded arguments for Trinidadian self-governance infused with class undertones, "The (colonial) system is wicked, because to an extent far more than is immediately obvious it permits a privileged few to work their will on hundreds of thousands of defenceless people… Governors and governed stand on either side of a gulf which no tinkering will bridge, and political energy is diverted into other channels or simply runs to waste" (Cipriani, 2016).

When challenges eventually came to Captain Cipriani's leadership of the TWA and to his symbolic leadership of the Trinidadian labour movement, they came from the further left. As the Great Depression ravaged the West Indies, by 1937, Cipriani's brand of Fabian socialism fell out of favour with the working class in revolt yet again. A new crop of Trinidadian activists espousing explicitly Marxist ideas of revolutionary class revolt came to the fore, and the fire-breathing Tubal Uriah Butler was both a leader of the 1937 labour riots and a symbol of the shifting tides of Trinidadian nationalism. Initially a member of the TWA from 1931 to 1935, Butler created his own "British Empire Workers and Citizens Home Rule Party" (BEWCHRP) in 1936 as a political vessel for his revolutionary socialist, explicitly Christian national vision.5 His movement drew strength from the growing population of Afro-Trinidadians who were quickly developing a pan-African national consciousness due to British inaction during the Italian invasion of Abyssinia in October 1935 (Ewing, 2013). By mobilizing the "Ethiopian Tent", the BEWCHRP defined the terms of Trinidadian left-nationalism in both a more aggressive and an explicitly Afro-Trinidadian direction. While Butler himself was loyal to the Empire and was happy to organize within the context of the colonial system, the succeeding tradition of Afro-Trinidadian nationalism was taken with socialist liberation theories. Young West Indian public intellectuals such as C.L.R. James, Alfred Gomes, and Albert Mendes would read socialist literature smuggled into the country by European sailors and became enamored with the Soviet example, while still seeking to instill racial pride amongst the working- and middle-class Afro-Trinidadians (Brereton, 1981). By 1939, the dominant conception of Trinidadian anti-colonial nationalism came from the growing labour movement and was dominated by both Marxist and Pan-Africanist ideals.

During his first life as a historian and professor at Howard University, Dr. Williams fit squarely within this growing population of radical academics from the Caribbean islands. His first major text, Capitalism and Slavery, was its own exercise in historiographical decolonization. As Hillary Beckles argues, Williams' thesis on the central role of slavery and exploitation of the West Indies in the development of British financial hegemony and industrial maturity "attacked and reduced the intellectual credibility of many English scholars who had hitherto dominated Anglo-Caribbean historical writing" (Beckles, 1984). The young historian drew deep inspiration from the works of C.L.R. James, his teacher and mentor. Dr. Williams gives credit explicitly to James' 1938 The Black Jacobins as a point of inspiration and a precise statement of Capitalism and Slavery's thesis, and the two would share a deep friendship and camaraderie in Trinidadian political life (Williams, 2020).

Not long content with opposing British hegemony solely in academic journals, Dr. Williams returned to Trinidad in 1948. Over the following years and through popular public lectures and debates, he gained a massive following with the same mostly Afro-

Trinidadian middle class that took a leading role during the formation of the Trinidadian anti-colonial movement (Brereton, 1981). In 1955, his political career would officially begin with a speech at Woodford Square: "I was born here, and I stay, with the people of Trinidad and Tobago… I am going to let down my bucket where I am, now, right here with you in the British West Indies" (Brereton, 1981). He would spend the rest of 1955 delivering public addresses on his vision for a post-colonial Trinidad, and by January of 1956 he inaugurated his political party: the People's National Movement (PNM). Now with his own political vessel, Dr. Williams set about his vision for a Trinidadian nationalism that proved distant from his radical scholarship. He deliberately cultivated a moderate civic nationalism, seeking to unite labour and capital, Afro- and Indo-Trinidadian, under a universally inoffensive vision. Such a suppression of sub-nationalisms was central and necessary to the endurance of the Trinidadian national project that Williams would pursue, both in his de facto leadership of the Trinidadian independence movement and as the first Prime Minister of independent Trinidad and Tobago.

At first, his vision accounted for the racial divide in Trinidadian society. This essay has thus far focused mostly on the Afro-Creole population of Trinidad, who served as the major force behind the political rise and the ideological prominence of the labour movement's national vision. However, the Afro-Trinidadians were not by any means a dominant ethnic group; there was none. In 1959, out of a population of around 815,000 Trinidadians, only about 470,000 were Afro-Creoles whose ancestors were mostly brought to the island colony as slaves (Augelli & Taylor, 1960). Another 300,000 or so were Indo-Trinidadians, whose ancestors mostly came to Trinidad as indentured servants in the early to assuage demand for cheap, exploitable labour following the British Empire's abolition of slavery between 1834 and 1838 (Augelli & Taylor, 1960). As such, the Indo-Trinidadian minority developed its own political interests. Indians developed a diasporic national consciousness in sympathy with the Indian National Congress' demonstrations against the British Raj throughout the 1930s, and Indo-Trinidadians would write in support of Indian independence in the same publications where Afro-Trinidadians would call for Pan-African consciousness (Brereton, 1981). In the only legislative elections of the short-lived West Indies Federation (WIF) in 1958, the PNM was contested by, and lost to, the Democratic Labour Party led by Bhadase Sagan Maraj. Maraj's campaign outwardly appealed to and relied upon the Indo-Caribbean population, and Williams only further inflamed the divide with an infamous political blunder in 1958, where he delivered a speech railing against: "… the recalcitrant and hostile minority of the West Indian nation masquerading as 'the Indian nation' and prostituting the name of India for its selfish, reactionary political ideals" (Teelucksingh, 2016).

This antagonism aside, Williams recognized the grave threat that ethnic divides would play in the nation's stability. The divide between Indo- and Afro-Trinidadians would present a semi-permanent fault line in Trinidadian politics. As such, he did not follow in the tradition of playing into Afro-Trinidadian sub-nationalism, despite the mostly Afro-Creole constitution of the PNM's following. Instead, he made material concessions to the Indo-Trinidadian minority, notably by advocating a bicameral post-independence Legislature, with an elected lower house and an appointed upper house. Williams argued that it was necessary to institutionalize the role of certain "vested economic and religious interests" in the country's governance (Ryan, 1972). In effect, because of the plurality status of the Afro-Trinidadians, any such arrangement as juxtaposed with pure democratic will would result in further Indo-Trinidadian and Hindu representation in the upper chamber. This represents not only a material effort to bridge over the ethnic divides in Trinidadian life, but also a departure from the radical nationalist norm; as Selwyn D. Ryan notes,

Williams' support for an appointed upper house put him at odds with the "whole radical tradition in Trinidad and Tobago" (Ryan, 1972).

Williams' rejection of socialism partially served the same purpose due to the disinterest of non-African Creoles — and some intellectuals — in socialism (Ryan, 1972). However, Williams' economic moderation also served to appease the continued influence of capital from the developed world. At one time, Dr. Williams advocated a political and economic federation of the West Indies to avert external economic control. Williams reasoned in a 1943 academic conference at Howard that such a federation would provide West Indians with a sort of collective bargaining leverage against the forces of capital from the developed world (Getachew, 2017). However, parallel to the WIF experiment of 1958-62, the PNM embarked upon an "Industrialization by Invitation" campaign in the late 1950s to spur foreign investment into the economy by multinational corporations (MNCs) (Godfrey, 2021, 2640). Nestle, Haliburton, BP, Texaco and Shell, among many others, all either entered the Trinidadian market or expanded their existing business under the PNM's pro-business policies (Godfrey 2021, 2640). The failure of the WIF to establish economic unity in the West Indies, and its subsequent collapse in 1962, made it a relative non-factor in the PNM's economic plans despite Williams' support for economic integration in his first life.

On the other hand, the aggressive disposition of President-General of the Oilfield Workers' Trade Union (OWTU) George Weekes represented both a foil to Williams' concessionary ambitions and an example of the antagonism Williams wished to avoid. Weekes was affiliated with the Pan African League and the Trotskyist Workers and Farmers Party, under C.L.R. James' influence, and supported the 1959 Cuban Revolution. Labour agitation, for this highly ideological union leader, was as much a call for economic reorganization as it was a fight against neo-colonial and neo-imperial encroachment (Godfrey 2021, 2641). MNCs reacted predictably to his election. British Petroleum threatened layoffs at the Point Fortin refinery not too long after Weekes took over, and this would be only the first of many struggles between Weekes and the OWTU versus the MNCs and the PNM government (Godfrey 2021, 2642-2645). While Williams was not oblivious to the rapaciousness of foreign MNCs, capital flight represented a worst-case scenario for Trinidad's economic future.

Finally, British supremacy and hegemonic complacency were still a salient aspect of Trinidadian culture and society. The rise of a figure like Williams — Oxford educated, well respected in academic circles in London and Washington and ever voluminous and articulate in his speech no matter the audience — owes to the dominant West Indian interest in "the winning of recognition in status-defining metropolitan cultures" (Ryan, 1972). Colonialism is so baked into the institutional, educational, and historical context of the West Indies that full disassociation with all colonial symbols would be too much, far too soon, especially for local colonial elites whom the PNM had to appease (Trotman 2012, 33-34). Thus, the PNM elected not to embark upon a mass campaign of symbolic decolonization through "acts of possession," such as renaming streets or public places. The Churchill-Roosevelt Highway between Barataria and Wallerfield retains its name today, and the Princess Margaret Highway only became the Tubal Uriah Butler Highway seven years after Williams' death in 1981. Woodford Square, in the heart of Port-of-Spain, was named for colonial governor Ralph Woodford. That most of these place names still have not changed illustrates the lack of appetite for aggressive dissociation with otherwise inoffensive relics of colonial-era history.

To conclude, Dr. Eric Williams rejected the radical iterations of Trinidadian anti-colonial nationalism that preceded him and partly influenced his academic career. He instead embraced a civic nationalism that sought to unite all Trinidadians, characterized by moderation in its economic message, dissociation with explicit ethnically-charged messaging, and apprehensiveness to accelerate past British colonial relics that played a major role in the pre-independence Trinidadian experience. As if Dr. Williams had engaged with Benedict Anderson's seminal work himself — a near chronological impossibility, given he died in 1981 —- his national project exemplifies perfectly the negating aspect of building an "Imagined Community." Anderson posits that the project of building the "imagined" nation is at once a positive determination of uniting characteristics, and a minimization of the differences between individuals who will never meet or interact with the entirety of their nation (Benedict 2016, 6). Williams' project fulfilled this requirement by vesting Trinidadian identity in shared responsibilities – to uphold democracy, and to honour the national watchwords of "Discipline, Production, Tolerance" – rather than an ethnically charged or socialist vision in the tradition of preceding left-nationalisms.

While Trinidad plays a small role in international affairs broadly, it is among the richest and most influential of the West Indian islands, then and now. In this sense, the form of Williams' national project, especially at a time of ambitious, revolutionary fervour in colonies across the world, demonstrates the impact of the national upon the international. A socialist, Pan-African Trinidad could very well have gone the route of Cuba and Grenada and become an ally of the Soviet Union during the 1970s, rather than a member of the Non-Aligned Movement and advocate for West Indian integration. Instead Trinidad stood, and stands today, a united — if imagined — community and continuous democracy, shaped by Dr. Williams' design.

Works Cited

Anderson, Benedict. Imagined Communities: Reflections on the Spread of Nationalism, Revised Edition. London: Verso Books, 2016.

Beckles, Hillary. "Capitalism and Slavery: The Debate over Eric Williams." Social and Economic Studies 33, no. 4. Kingston, Jamaica: Institute of Social and Economic Research, University of the West Indies, 1984. 171-89. https://www.jstor.org/stable/27862095?seq=2

Brereton, Bridget. A History of Modern Trinidad, 1783-1962. Kingston, Jamaica: Heinemann, 1981.

Ewing, Adam. "Caribbean Labour Politics in the Age of Garvey, 1918—1938." Race and Class 55, no. 1. London: SAGE Publications, 2013. https://doi.org/10.1177/0306396813486586

Getachew, Adom. "Reparations and the Recasting of Eric Williams' Capitalism and Slavery." Items: Insights from the Social Sciences, Social Science Research Council, February 22, 2017. https://items.ssrc.org/reading-racial-conflict/reparations-and-the-recasting-of-eric-william ss-capitalism-and-slavery/

Howe, Glenford D. "A White Man's War? World War One and the West Indies." BBC History. March 10, 2011. https://www.bbc.co.uk/history/worldwars/wwone/west_indies_01.shtml

James, Cyril Lionel Robert. The Life of Captain Cipriani: An Account of British Government in the West Indies, With the Pamphlet The Case for West-Indian Self Government. Durham: Duke University Press, 2014. https://doi-org.myaccess.library.utoronto.ca/10.1215/9780822376866

Ryan, Selwyn D. Race and Nationalism in Trinidad and Tobago. Toronto: University of Toronto Press, 1972. https://books-scholarsportal-info.myaccess.library.utoronto.ca/en/read?id=/ebooks/ebooks 6/upress6/2021-03-03/1/9781487582081#page=1

Taylor, Harry W. and John P. Augelli. "Race and Population Patterns in Trinidad." Annals of the Association of American Geographers 50, no. 2. 1960. 123-38. http://www.jstor.org/stable/2561472.

Teelucksingh, Jerome. Ideology, Politics, and Radicalism of the Afro-Caribbean. New York: Palgrave Macmillan, 2016. https://link-springer-com.myaccess.library.utoronto.ca/content/pdf/10.1057/978-1-349-94 866-6_7

Trotman, David V. "Acts of Possession and Symbolic Decolonization in Trinidad and Tobago." Caribbean Quarterly 58, no. 1, March 2012 21-43. https://www.proquest.com/docview/1022052614?accountid=14771&parentSessionId=G YXGY1nHTMzctjQd0sAlVOoXTlB4x%2BNM3ngIhYk4JSs%3D&pq-origsite=primo& sourcetype=Scholarly%20Journals

References

Vincent, Godfrey. “Trinidad and Tobago: George Weekes and the Oilfields Workers Resistance to Imperialism, 1962-1987.” In The Palgrave Encyclopedia of Imperialism and Anti-Imperialism, edited by Immanuel Ness and Zak Cope, 2639-2650. Cham: Palgrave Macmillan, 3 July 2021. https://link.springer.com/referenceworkentry/10.1007/978-3-030-29901-9_333#copyright -information

Williams, Eric Eustace. Capitalism and Slavery, Third Edition. Chapel Hill: University of North Carolina Press, 2021.

Williams, Eric Eustace. “Independence Day Address, 1962.” Trinidad: University of Trinidad and Tobago, 2012. https://utt.edu.tt/index.php/index.php?articles=1&article_key=2429&for_internet_announ cements=1/index.php&show_archive=1Tasin, Lydian Florina, Achmad Munjid, and Galant Nanta Adhitya. “ESPOUSING ABORTION RIGHTS: A CASE STUDY ON THE SATANIC TEMPLE.” Rubikon: Journal of Transnational American Studies 10.2 (2023): 249-262.

♣ 6

Stolen Land to Major Tom: *A Historical Analysis of the Space Colonization Industry in Hawai'i*

By Franca Ciannavei

To humans, outer space is an unfathomable expansive landscape of possibility. Humanity has forever been captivated by Earth's place in the universe and the subsequent meaning of human life. Through this reverence for space, the "final frontier" has been mobilized by big science[1] to justify the creation of an international arms race to space beginning in the early twentieth century which has yet to cease with the current missions of excavation on Mars and the search for life on exoplanets. The line between scientific inquiry and colonial practice becomes blurred when considering the lengths to which institutions upheld by imperialist legacies will go in the name of modernity. The United States' government formed the National Aeronautics and Space Administration (NASA) in 1958 based on the belief that understanding our Earth would only be possible through leaving it - setting a precedent of valuing extraterrestrial possibilities over Earthly environmentalism[2]. NASA's valuation of science over everything else reveals itself to be nefarious as soon as one considers the colonial history of the "50th State" of Hawai'i. The illegal overthrow of the Hawaiian Kingdom's government and the subsequent transference of the Hawaiian Public lands to the US federal government in 1898 was not done for the betterment of the Hawaiian people. The sacred lands of Hawai'i, and specifically the wahi pana[3] Mauna Kea has been desecrated since the Apollo missions in the name of the betterment of humanity. Kanaka Maoli, the Indigenous people of Hawai'i, have been radically opposed to scientific development on their land as 'Ōiwi[4] thought regards the Mauna as an ancestor, spiritual being, and a source of life through baring water[5]. Despite the validity of these concerns, Western views paint Kanaka Maoli as primitive anti-modernists for their opposition of the continued colonial-scientific practices of building astrological infrastructure on sacred lands[6] as the Western view science over spirituality. Furthermore, Thirty Meter Telescope (or TMT) and NASA maintain their performative claims of kinship[7] and support for Indigenous kia'i[8], despite the persistence of financially invested organizations and governments to build the TMT with the permission from a body that claims to be representative of Kanaka Maoli[9]. This paper will explore the historical context in which land usage by the American government has been possible through conquest, and the retroactive justification of imperial land displacement and desecration via neocolonial movements toward settlement in space.

---

1 TallBear, 2021, 67

2 Launius, 2016, PG

3 "Legendary place" Ulukau, 1986

4 "'a' Indigenous, native" Ulukau, 2003

5 Jewett, Chas, and Garavan, 2018, 3

6 Casumbal-Salazar, 2017, 22

7 The phrase performative kinship here is meant to invoke the work of Iokepa Casumbal Salazar in their concept of fictive kinship by colonial powers as cited in endnote 4.

8 Hawaiian translation of "caretaker" or "watchman" specifically used here for Indigenous land protectors

9 Casumbal-Salazar, 2017, 20

Prior to 1848, the ahupua'a system was used to create physical divisions of Hawaiian land that ensured the equitable distribution of resources. Islands were divided into Moku, or regions, that were made up of several ahupua`a that followed the natural contours and boundaries of the landscape, often extending from mountain ranges into bodies of water. This kind of land division predated private property, as 'Ōiwi political systems revered the 'āina over all[10] which opposes Western conceptions of human ownership over the natural. The ahupua'a system of land division ensured the prosperity of the land and those who took care of it, with chiefs appointing konohiki[11] to oversee the distribution of resources to support the communities living in a given ahupua`a. Communal land stewardship is a large part of Hawaiian society with the understanding that all 'Ōiwi are entitled to receive the life-giving resources the land provides without a question of ownership[12]. This community organization through land tenure changed with the creation of the Board of Commissioners to Quiet Land Titles in 1845, catalyzed the shift away from collective land tutelage, and favored the privatization of proprietary interest. The Land Commission made it so parcels of land could be claimed with unambiguous ownership to quell land disputes and create stability in land tenure. This changed in 1848 with the enactment of the Māhele Act, meant to serve and disseminate the vested proprietary interests of the Hawaiian ali'i – leading to the creation of Kings Land and Government Lands. The Māhele drastically impacted the pre-existing systems of land tenure, as it shifted to a system of allodial title and land ownership as opposed to land leasing[13]. During the time of the Māhele act, foreign title to land was prohibited, which changed in 1850 with the Resident Alien Act that enabled foreign bodies to purchase Hawaiian lands in fee simple[14], allowing said foreigners to own land in the Hawaiian Archipelago and buy, sell, or bequeath it[15]. In 1850 the Kuleana Act provided maka'āinana with the same ability as foreign bodies to acquire land as fee simple, as a way to divide out land interests and allow land claims through allodial title. This created issues where maka'āinana had to make appeals in court to be able to fish, farm, graze, or have access to water systems that weren't on claimed land – taking away the previous tenants of communal resource sharing and allocation[16]. Thus, those who benefitted from this shift in proprietary distribution were often haole settlers and businessmen[17], not the kanaka maoli population as a whole[18] despite the previous claims of economic prosperity that was supposed to come with the privatization of land.

After the Kuleana Act, the amount of government lands grew to reach approximately two million acres through commutation as Konohiki gave fractions of land, or exchanged the monetary value for interest in land with the government[19]. The Crown Lands were recognized federally as private property of the Mō'ī[20], until 1894 when the Republic of

10 Osorio 2002, 49

11 Headman of an ahupua'a land division who had control of land or fishing rights

12 Kauanui, 2018, 85

13 Kamehameha III: Kauikeaouli, 92

14 A type of land ownership that is permanent, and allows complete freedom of the owner to act on the land at will.

15 Kamehameha III: Kauikeaouli, 93

16 Lâm, 1989, 246

17 Osorio cites this overhaul of the land distribution system in Hawai'i by the ali'i at the time as a critical downfall that made way for the current debates over the ownership and land rights of the 'āina today.

18 Kauanui, 2018, 83

19 Lā Kū'oko'a 2020 Donovan Preza

20 "Sovereign/monarch" Ulukau, 1986

Hawai'i ratified its constitution in which it was stated that Crown Land would become the property of the Hawaiian Government[21]. This land was often leased for the sugar industry in Hawai'i, as sugar was a powerful commodity for both economic prosperity and political power. Thus the leasing of these lands to sugar plantations generated a large amount of revenue for the ali'i who possessed these lands before 1894[22], later making them a point of interest after the coup d'etat and illegal overthrow of the Hawaiian Kingdom.

Annexation and 'Āina

The illegal annexation of Hawai'i as a sovereign state saw the complete erosion of Kanaka Maoli sovereignty at the hands of wealthy Euro-American businessmen interested in commodifying Hawai'i's natural resources through the conquest of Hawaiian lands as domestic investments[23].In 1893, Queen Lili'uokalani was overthrown after the creation of the Committee of Safety[24], which claimed to protect the interests of the Hawaiian people from the framed tyrannical reign of the ali'i. This came following the monarch's attempt to overhaul the constitution with the purpose of protecting and favouring the rights of Kanaka Maoli people[25]. This was deemed a threat United States Marines were deployed under the impression that they were to protect the interests of the American people settled in Hawai'i, hence when faced with the threat of violence, Queen Lili'uokalani temporarily gave up power to protect the people of the Hawaiian Archipelago. Shortly after, a provisional government formed to bar Queen Lili'uokalani from redress and named itself The Republic of Hawai'i, claiming to be the de facto ruling authority. The temporary government named The Republic of Hawai'i consisted of Hawaiian citizens with genealogical and financial ties to the United States and thus acted in the interest of Euro-American settlers to pursue annexation[26]. Kanaka Maoli vehemently rejected this provisional government and took to radical acts of defiance through in order to reinstate the rightful power to the ali'i despite the aforementioned constructed discourse. One year after the illegal overthrow and the establishment of the Republic, a constitution was ratified which stated that the Crown Lands and Government Lands were unified and became the charge of the Republic of Hawai'i's government under one body of power. These lands are an estimated 1.8 million acres across the archipelago, many of them sacred sites for Kanaka Maoli people, such as Mauna Kea or Mauna 'Ala. In 1895 during the reign of the Republic of Hawai'i, the Land Act was passed, once again changing the way land tenure was claimed on the Hawaiian islands. The Land Act added three types of agreements that allowed for easier American settlement as a means of encouraging immigration to the Hawaiian archipelago. This legal change would prove to be an integral part in the annexation and statehood referendum[27]as these haole colonizers were able to construct narratives about the viability of American statehood due to the concentration of American-owned land settlements within the Hawaiian archipelago.

In 1897 the Hawaiian anti-annexation movement was in full swing with the legality of the overthrow also being called into question by many of the members of American

---

21 1894 Constitution of the Republic of Hawaii," The Archival Collections at the University of Hawai'i School of Law Library

22 Kauanui, 1999, 125

23 Osorio, 2017, 196

24 The committee of safety was primarily made up of members of the Hawaiian kingdom who were of American descent, or missionaries that had settled in Hawai'i. Their plans to overthrow the government were backed by the US marines and US government officials were complicit in their negligence to justice and restoring the rightful government despite being ruled as unconstitutional by many officials.

25 Koeppe, 2007, 3

26 Silva, 2004, 124

27 Van Dyke, 2002, 188

congress at the time due to Hawai'i's status as an internationally recognized sovereign nation prior to its overthrow[28]. Nevertheless, the president of the United States William McKinley signed the annexation treaty along with representatives from the supposed Republic of Hawai'i before going to the Senate and having the motion passed by a simple majority[29]. Henceforth, Hawai'i became a political territory of the United States and was illegally incorporated to reflect American laws and society through the sterilization of Indigenous aloha and the figuration of a tropical paradise acting as the suppression of authentic Indigenous language and culture. Through the political and subsequent social shift of Hawai'i, the Crown These lands remained under the bureaucratic portfolio of the federal government until the statehood referendum in 1959 which declared the territory of Hawai'i as the official 50th state. Lands were then given to the state government under the Admissions Act as ceded lands for public institutions to use for the "betterment" of Hawaiian society despite the unrelinquished claims of native Hawaiians that continue to protest the illegal overthrow in favor of a return to Hawaiian sovereignty that would grant these "ceded" lands back to a governing body of Kanaka Maoli opposed to foreign occupation through governmental structures.

Land Usage and Space Travel

The echoes of Hawaiian land dispossession cannot be temporally restrained to the past, as the space-industrial complex continues to destroy ecologically and spiritually significant lands in the present day. One year before Hawai'i statehood referendum was passed, the United States government created an official branch to lead a civilian space exploration program in response to pressures placed on the American government due to The Soviet Union's public advancements in space technology[30]. The first mission for the newly operational NASA was Project Mercury, which aimed to make the US the first country in the world to have a human outside of Earth's orbit. This intended to show technological prowess and empire over other countries around the world attempting to do the same. Hawai'i's position in the Pacific 2,400 miles away from mainland America made it ideal for the placement for an observatory where the state government could utilize its power to build on land within the ceded trust. In 1961 the observatory was built in Kōkee State Park on the Garden Isle of Kauai, where it was functional in Project Mercury, the Gemini Program, and the Apollo Space Flights until 1989.

During the Apollo missions, Pearl Harbour was utilized by NASA and the American Military as the recovery point for astronauts after reentering the atmosphere and dropping into the Pacific Ocean. Apollo 11 was a turning point for the space industry when Neil Armstrong became the first man to land on the moon, catalyzing decades of missions dedicated to lunar geology to better understand the composition of the moon and its relationship to the Earth. To train for these missions, NASA set up training for crewmembers beginning with Apollo 15 on sacred Mauna Kea (dubbed "Apollo Valley"[31]) where scientists would set up parameters similar to what they would encounter in space and on the moon, and perform training tests on astronauts at 11 500 feet. Scientific expeditions continue to take place utilizing Hawaiian land for space conquest, most

28 Deduced from reading the Transcript of Joint Resolution to Provide for Annexing the Hawaiian Islands to the United States (1898)

29 The motion in reference here is the Joint Resolution 259, known as the "Newlands Resolution" despite heavy debate about the legality, and logistics of how one independent nation could absorb another despite the action of which the motion came to be was also described as an "act of war". Ultimately the financial benefits of taking on a wealthy territory such as Hawai'i with its natural resources that were already benefiting many American tycoons was favorable regardless of legality.

30 Werth, 2004, 564

31 Uri, 2018

recently with the usage of Kilauea volcano to simulate the terrain of Mars as the US has begun its quest to create a settlement on the red planet to better study the terrain and its possible life forms.

During the many operations on the Hawaiian Islands, NASA has preached a fictive narrative about reverence for Native Hawaiian culture while utilizing ceded lands that are only available to them because of allodial titles and the annexation of Hawai'i as a sovereign state. NASA's website tells stories of astronaut's appreciation of Hawaiian culture, such as Neil Armstrong and his ukelele, "Aloha" shirts worn by crew, and the transport of 'Ōīwi instruments into space[32]. Despite efforts to seemingly give thanks to Hawai'i by way of recognition of Hawaiian participation in space exploration through land usage, no Kanaka Maoli representative body, land protectors, or scholars were consulted or involved in NASA's decisions to use sacred lands. Thus, these actions are performative, a way of repackaging Hawaiian culture in a digestible way to manufacture narratives of propinquity despite NASA's overt mission to use land and natural resources without regard for the long term implications or true care for Kanaka Maoli or aloha 'āina. This creates what Salazar calls a "fictive kinship"[33] borrowing recognizable pieces of Indigenous culture as an effort to assimilate scientific conquest into Hawaiian nationalism without important action that would back claims of collaboration. The same can be said for the statements released by TMT investors following protests and blockades by Kanaka Maoli land protectors to stop the Thirty Meter Telescope from being built. For example, Professor Vivek Goel Vice-President of Research and Innovation, and Strategic Initiatives at the University of Toronto released a statement about TMT in relation to the Dunlap's Institute's position on astronomical conquest without regard for Indigenous life in which he says:

> We have been involved with the development of the TMT for many years. Our position has been that a project of this nature must be developed where it is welcomed and with the engagement and support of the local community. I understand that the TMT project is committed to being good stewards on the mountain and inclusive of the Hawaiian community…We know through our own Canadian experience that a commitment to Truth and Reconciliation impels us to consult and engage with Indigenous communities and to work collaboratively towards change. We must work to uphold those principles as we engage with Indigenous communities beyond our borders as well as within them[34].

His claim of good stewardship comes without any active backing – as the building atop a sacred Mauna is an act of desecration no matter what sustainability practices are enacted. ACURA backs TMT as the Canadian government has already invested 200 million dollars into the project before consulting Indigenous communities in Hawai'i or Canada surrounding Indigenous practices of land tenure or scientific discovery. This statement by a professor at the Dunlap Institute is indicative of the views of euro-colonist understandings of value of both land and people, as the unyielding commitment to science is used as justification for colonization as projects such as the Apollo missions, and now TMT would not be possible without the ceded lands. Furthermore, real truth and reconciliation would not be waiting for a representative body to approve of TMT, but to

32 Uri, 2018

33 Casumbal-Salazar, 2017, 8

34 This quotation is available on the Dunlap Institute of Astronomy and Astrophysics website and was published in July of 2019. For clarity, the beginning of the quotation where professor Goel discusses his position as a board member on the Association of Canadian Universities for Research in Astronomy (ACURA) was removed.

listen to land defenders in their calls to action and divest from projects such as TMT and active efforts to decommission and restore public lands as sacred spaces for Kanaka Maoli. Until that happens, any kind of action or statement surrounding scientific conquest utilizing the stolen land of Indigenous Hawaiians is an ongoing act of war and a mode of persistent colonization wearing a beautiful disguise as western humanity grasping at the heavens for meaning without considering the planet they were given.

Conclusion

To conclude, the history of land distribution practices in Hawai'i before and after the illegal overthrow and subsequent annexation by the American government has paved the way for the utilization of sacred Hawaiian lands for colonial space exploration while exemplifying a false kinship with Kanaka Maoli people that clearly exemplifies the legacy of quiet exploitation by haole settlers. The Mahele era and shift into the privatization of proprietary interests permanently altered land tenure systems that impacted ʻŌiwi ways of life while benefiting foreign settlers and businessmen despite the ali'i acting in the best interest of the Hawaiian people. Furthermore, the illegal overthrow and annexation by settlers of foreign genealogy characterized ali'i as tyrannical and exploitative of their people in order to sell the coup d'etat as an order of protection, despite their motives of self-serving capitalist ideologies. This unfortunate benefit of dispossession by foreign settlers continues to reverberate through Hawaiian society today through land claim disputes as colonial attitudes do not understand the concept of aloha ʻāina and Indigenous relationality to land. Thus, despite performative gestures and statements of solidarity by organizations like NASA, TMT, and ACURA/Dunlap Institute, historic and ongoing exploitation of ceded lands perpetuates cycles of violence and erasure through imperialism and colonization of both terrestrial territories and space. Finally, efforts to cloak scientific conquest as a means to justify colonial dispossession is not in line with land defender's actions nor claims of truth and reconciliation from both the American and Canadian governments with financial investment into space travel. Neocolonial impulses driving the astrological industry must be stopped through recognition and proper action by bureaucratic systems and political organizations to return Indigenous lands and sovereignty by ceasing environmental degradation in Hawai'i and beyond.

References

Casumbal-Salazar, Iokepa. “A Fictive Kinship: Making ‘Modernity,’ ‘Ancient Hawaiians,’ and the Telescopes on Mauna Kea.” Native American and Indigenous Studies 4, no. 2 (2017): 1–30. https://doi.org/10.1353/nai.2017.a703400.

Jewett, Chas, and Mark Garavan. “Water Is Life – an Indigenous Perspective from a Standing Rock Water Protector.” Community Development Journal 54, no. 1 (December 20, 2018): 42–58. https://doi.org/10.1093/cdj/bsy062.

Kauanui, J. Kēhaulani. “For Get” Hawaiian Entitlement: Configurations of Land, “Blood”, and Americanization in the Hawaiian Homes Commission Act of 1921, 1999. https://www.jstor.org/stable/466700.

Koeppe, Tina. “Women in History - Queen Liliuokalani.” Journal of Women in Educational Leadership. 58. , 2007. https://doi.org/http://digitalcommons.unl.edu/jwel/58. Launius,

Roger D. “‘We Will Learn More about the Earth by Leaving It than by Remaining on It.’ NASA and the Forming of an Earth Science Discipline in the 1960s.” Innovation in Science and Organizational Renewal, 2016, 211–42. https://doi.org/10.1057/978-1-137-59420-4_8.

Lâm, Maivân Clech. “The Kuleana Act Revisited: The Survival of Traditional Hawaiian Commoner Rights in Land.” UW Law Digital Commons, 1989. https://digitalcommons.law.uw.edu/wlr/vol64/iss2/3/.

Maile, David Uahikeaikalei‘ohu. “On Being Late: Cruising Mauna Kea and Unsettling Technoscientific Conquest in Hawai‘i.” American Indian Culture and Research Journal 45, no. 1 (January 1, 2021): 95–122. https://doi.org/10.17953/aicrj.45.1.maile.

Maile, Uahikea. “LAND AND PROPERTY IN THE HAWAIIAN KINGDOM.” Lecture, February 1, 2024.

National Archives and Records Administration. Accessed April 25, 2024. https://www.archives.gov/milestone-documents/joint-resolution-for-annexing-the-hawaiia n-islands.

Osorio, Jonathan Kamakawiwo‘ole. Dismembering Lahui. University of Hawaii Press, 2002.

TallBear, Kim. “Close Encounters of the Colonial Kind.” American Indian Culture and Research Journal 45, no. 1 (January 1, 2021): 157–67. https://doi.org/10.17953/aicrj.45.1.tallbear.

Uri, John. “Hawaii’s Role in NASA’s Space Exploration Programs.” NASA, September 28, 2023. https://www.nasa.gov/history/hawaiis-role-in-nasas-space-exploration-programs/.

Van Dyke, Jon M. Who Owns the Crown Lands of Hawaii? Honolulu: University of Hawaii Press, 2008.

Werth, Karsten. “A Surrogate for War—The U.S. Space Program in the 1960s.” Amerikastudien / American Studies 49, no. No. 4 (2004): 563–87. https://www.jstor.org/stable/41158096.

♣ 7

Surveilling the Margins: *Privacy Laws and Racialized Governance at Canadian Borders*

By Tisya Raina

Introduction

In an era defined by increasing globalization and digital interconnectedness, the governance of personal data has emerged as a critical issue in balancing individual rights with state authority. Canada's privacy framework — anchored by the Privacy Act, and the Personal Information Protection and Electronic Documents Act (PIPEDA) — seeks to protect individuals' personal information while enabling its usage by public security offices. This law outlines the parameters for data collection, use, and disclosure, striving to harmonize privacy rights with public interests such as national security. The growing scope of data collection at Canada's borders highlights the role of biopolitical control — where the state governs populations by monitoring, categorizing, and regulating individuals through data collection and surveillance. This paper examines how Canada's privacy laws — particularly the exception for national security interests — enable and legitimize surveillance practices within government structures. Rather than safeguarding privacy, these laws leverage national security exemptions to justify extensive data collection, disproportionately impacting marginalized communities and enhancing the state's capacity to monitor and control under the pretext of security. By normalizing invasive surveillance, Canada's privacy laws contribute to systemic inequities while framing these measures as essential to the public interest.

To contextualize this dynamic, this paper will explore Michel Foucault's concept of biopolitics, which refers to the mechanisms through which the state governs populations by monitoring, categorizing, and regulating individuals' lives (Scher, 2020). Biopolitics includes processes of normalization, where security practices regulate those identified as not 'normal' who are then disciplined to conform (Finn et al., 2020). This framework connects directly to how national security is invoked to justify invasive border security measures. By framing biopolitical control as a key factor, this analysis underscores how privacy laws facilitate such governance under the guise of national security. This paper begins by examining the Privacy Act, emphasizing provisions that allow for extensive data collection and disclosure under national security exemptions. It then investigates how these legal frameworks contribute to the normalization of surveillance, framing it as an integral aspect of state governance. Finally, it highlights the disproportionate impacts on racialized and vulnerable populations, particularly at Canada's borders.

The Legal Framework for Privacy in Canada

Canada's privacy and surveillance landscape is shaped by the PIPEDA. While these laws are intended to protect personal information, they enable broad government and private-sector discretion to collect, use, and disclose personal data — especially when it relates to national security and law enforcement. These provisions create conditions where surveillance becomes routine, often undermining individual privacy rights. PIPEDA is important to the broader discussion of Canadian privacy laws and

biopolitical control because it governs the collection, use, and disclosure of personal data by private sector entities, including those involved in border security, like airlines and technology companies. As these private organizations share data with government agencies such as the Canadian Border Services Agency (CBSA), PIPEDA intersects with the Privacy Act in shaping how personal data is handled. However, PIPEDA is not the focus of this paper, as the analysis is concentrated on how the Privacy Act, particularly its national security exemptions, facilitates state surveillance and control, particularly at borders. PIPEDA governs private sector practices, which lies outside the scope of this paper's focus on government-driven data collection and surveillance mechanisms.

Overview of the Privacy Act

The Privacy Act governs how federal government institutions collect, use, and disclose personal information. Canadian privacy laws — particularly the Privacy Act — reinforce biopolitical control by legitimizing the collection and use of personal data at borders. Although the act is designed to protect individual privacy, its provisions — especially the broad national security exemptions — enable the routine and invasive collection of personal data, undermining individual privacy rights and enhancing the state's capacity to monitor and control marginalized communities. Section 4 of the Privacy Act stipulates that "no personal information shall be collected by a government institution unless it relates directly to an operating program or activity of the institution[.]" (Privacy Act, 1985). While this may seem like a limitation, the scope of this provision is broad enough to justify the collection of personal data for national security and border-related activities, such as those carried out by the CBSA. Under the guise of national security, the CBSA collects sensitive personal details like names, birthdates, travel histories, and biometric data through programs like the "Advanced Passenger Information and the Entry/Exit Initiative". These programs monitor travel patterns and create databases that can be shared across government institutions under Section 8(2), which allows for the disclosure of personal information without consent for various purposes, including to law enforcement and national security agencies (Privacy Act, 1985).

Section 8(2) explicitly enables the government to disclose personal data without consent in several scenarios, such as "for any purpose in accordance with any Act of Parliament or any regulation made thereunder that authorizes its disclosure" (Privacy Act, 1985). This clause permits the routine sharing of data for national security purposes, reinforcing a surveillance infrastructure that operates with minimal oversight. Additionally, Section 8(2)(c) allows disclosure for the purpose of "enforcing any law of Canada or a province or carrying out a lawful investigation," which can further justify the collection and use of personal data under security pretexts. These provisions create a framework in which personal information is treated as a resource to be accessed and used by the state, often without meaningful consent or transparency. The idea of the 'public interest' in Section 8(2)(m), which allows for disclosure if "the public interest in disclosure clearly outweighs any invasion of privacy," further compounds the problem, as the term 'public interest' is left open to broad interpretation, often to the benefit of government agencies (Privacy Act, 1985).

Far from safeguarding privacy, these provisions contribute to a framework that systematically enhances the state's capacity to monitor and control individuals, particularly marginalized communities. Section 22 of the Privacy Act exemplifies this trend by permitting the withholding of information if its disclosure "could reasonably be expected to be injurious to the conduct of international affairs, the defense of Canada, or the detection, prevention or suppression of subversive or hostile activities[.]" (Privacy

Act, 1985). This clause provides a sweeping justification for the state to limit transparency and oversight, particularly in the context of national security and law enforcement. The broad use of national security as a rationale for withholding personal data means that the government is able to operate with little accountability, often at the expense of the very privacy the Act purports to protect.

These exemptions disproportionately affect vulnerable populations, including immigrants, racial minorities, and other marginalized groups, who are more likely to face heightened surveillance, particularly at border crossings. These communities often experience increased scrutiny and are more likely to be subject to the routine collection and sharing of personal data, creating a cycle of surveillance that is difficult to challenge. With little ability to contest the collection or use of their personal information, these individuals find themselves increasingly controlled and monitored by the state. In this way, the Privacy Act and its national security exemptions don't merely provide privacy protection, they create a system that legitimizes the expansion of state surveillance and biopolitical control, reinforcing inequities under the guise of security.

Biopolitical Control and the Normalization of Surveillance

Biopolitical control refers to the mechanisms through which the state governs populations by monitoring, categorizing, and regulating individuals through data collection and surveillance (Scher, 2020). Defined by Micheal Foucault, rather than exercising power through overt military or political force, biopolitical control operates through subtle and pervasive means of managing individuals' lives and behavior; often under the guise of security or public interest. The state's role in this form of control is to render governance invisible and accepted, thus normalizing mechanisms of surveillance that would otherwise be viewed as intrusive (Scher, 2020). Within Canada's privacy framework, borders emerge as a focal point for this type of control. Privacy rights are particularly vulnerable there, as individuals are subjected to invasive monitoring practices that are justified by national security concerns. At these border points, the state has the ability to track people's movements and behaviors through biometric data, travel patterns, and personal history, reinforcing the normalization of surveillance as part of everyday governance (Bircan & Korkmaz, 2021). As individuals pass through borders, they often do so with the implicit understanding that their personal data will be collected and shared, without explicit consent or transparency as this data collection is presented as mandatory in carceral spaces, such as airports and other border crossings (Hiller, 2010; Gidaris, 2020). The erosion of privacy in these spaces is not a random occurrence, it is embedded within a broader strategy of biopolitical management, where data collection is justified in the name of national security.

A critical component of biopolitical control is the normalization of surveillance practices, which occurs when data collection becomes routine, and the state's actions are legitimized by legal exceptions. In Canada, the Privacy Act plays a key role in facilitating this normalization, providing broad exemptions for data collection and disclosure when national security is at stake. For example, the Privacy Act employs vague and open-ended terms such as "reasonable," "appropriate," and "public interest" to justify the collection and sharing of personal data without clear boundaries (Privacy Act, 1985). These terms leave significant room for interpretation, enabling the government to exercise a wide discretion in determining what data can be collected and for what purposes. For example, Section 4 of the Privacy Act permits government institutions to collect personal information as long as it "relates directly to an operating program or activity of the institution[.]" (Privacy Act, 1985). This broad stipulation is especially relevant

at the borders, where government institutions like the Canadian Border Services Agency routinely collect sensitive personal data in the name of national security, immigration, and public safety. The Privacy Act does not place sufficient limitations on the scope of this data collection, allowing surveillance practices to become a normalized part of governance rather than an exceptional or temporary measure.

The Privacy Act's provisions — particularly those in Section 8(2) — further institutionalize this normalization by permitting the disclosure of personal data without consent for purposes such as law enforcement and national security (Privacy Act, 1985). The CBSA's use of automated risk assessment systems, like the Passenger Name Record analysis, exemplifies how surveillance is entrenched in the operation of national borders (Lyon & Wood, 2020). These systems flag individuals for further scrutiny based on opaque criteria, disproportionately affecting racialized and marginalized groups, reinforcing a system of biopolitical control where surveillance is routine and unchallenged (Gidaris, 2020). In this context, personal data is not just collected for isolated purposes; it becomes part of a larger system where individuals' movements and behaviors are continuously monitored, categorized, and regulated. Over time the public becomes accustomed to the idea that their data will be collected, stored, and shared, often without their explicit consent, further diminishing resistance to surveillance. As a result, privacy is no longer seen as an inviolable right but as a flexible concept that can be compromised in the name of security, contributing to a climate where state power and control over individuals are normalized.

Impact on Marginalized Communities

The CBSA's 2020 data offers a stark illustration of the systemic racial profiling that occurs at Canada's borders, amplifying the disparities in treatment between racialized and non-racialized individuals. One quarter of front-line employees surveyed at Canada's border agency reported witnessing a colleague discriminate against a traveler in the past two years, with 71 percent attributing the discrimination to race and over 75 percent citing national or ethnic origin (Bronskill, 2022). The CBSA report underscores a disturbing pattern: racialized individuals—especially those of African and Middle Eastern descent — are disproportionately subjected to enhanced scrutiny, including more frequent stops, questioning, and invasive security checks (Bronskill, 2022). In fact, the data shows that racialized travelers are far more likely to be selected for secondary inspection, where they are asked more detailed questions, subjected to body searches, or even have their belongings scrutinized in ways that non-racialized individuals are not (Bronskill, 2022). This practice reflects not only an inherent bias in security protocols but also a legal framework that permits such disparities under the justification of national security .

This form of racial profiling is not incidental but rather facilitated by the policies and legal exemptions that are embedded in the Privacy Act. This regulation — particularly with its broad national security exemptions — enables border security agencies to collect, share, and use personal data with minimal oversight, often without the individual's explicit consent. The racial disparities highlighted in the CBSA data are thus further exacerbated by the lack of transparency and accountability in how personal information is used and shared within the context of border security. Under the guise of national security concerns, border security agencies are granted wide-ranging discretion to engage in practices that, in many instances, disproportionately affect racialized and marginalized individuals.

One of the most troubling aspects of this racial profiling is the way it becomes self-reinforcing. The increased scrutiny of racialized individuals at the border leads to the collection of more data about them, often stored in databases that can be accessed by other government agencies (Lyon & Wood, 2020). This information is then used to justify future monitoring and increased surveillance. In this way, individuals who are already targeted because of their race or immigration status become further entrenched in the surveillance state, making it even more difficult to challenge the ongoing scrutiny or escape the cycle of discrimination. As these individuals are continuously profiled and recorded in databases, their privacy rights are systematically undermined, and their ability to fully participate in society is restricted. This vicious cycle of surveillance is a direct result of the legal exemptions that allow for routine data collection at the border, which disproportionately targets marginalized communities.

Moreover, the psychological and social toll on racialized individuals subjected to such profiling is profound. The constant reminder that their movements are being monitored and that they are viewed with suspicion by the state can lead to feelings of alienation, distrust, and even fear. Many racialized travelers report avoiding certain travel routes or avoiding travel plans altogether to minimize the likelihood of being targeted for enhanced screening (Hiller, 2010). This is especially troubling for those who are already marginalized, such as refugees and asylum seekers, who may already feel vulnerable due to their immigration status. The impact is not merely procedural but deeply personal, as individuals internalize the sense that they are being treated as potential threats because of their race or background. This creates an atmosphere where privacy is not just violated in a technical sense but is fundamentally disrupted in a way that undermines individuals' sense of security and belonging within the country (Lyon & Wood, 2020).

Racial and gender biases in technology further highlight the intersection of surveillance, discrimination, and exclusion, where technologies designed to monitor and control disproportionately impact marginalized communities. These technologies and data-driven practices—such as those used at borders—are often embedded with racial and gender biases that further marginalize these groups (Browne, 2015). Studies have shown that there are higher rates of error in facial recognition systems, particularly for women and people of color, which exacerbates their unequal treatment in security processes. These biases not only affect racialized individuals but also compound the challenges faced by women, who may already experience heightened vulnerability due to gendered discrimination (Browne, 2015). This reflects how legal frameworks like the Privacy Act enable surveillance practices that perpetuate systemic inequalities. Where the most vulnerable are surveilled, controlled, and excluded. In the context of border security, such racial and gender biases can be exacerbated by unchecked technological monitoring that targets these individuals, contributing to their continuous profiling, higher rates of misidentification, and exclusion from societal participation.

The Privacy Act is intended to protect privacy, yet reinforces the very practices that perpetuate racial discrimination. The national security exemptions and the broad powers granted to border security agencies enable practices like racial profiling to persist unchecked, leading to the routine invasion of privacy for racialized individuals. The systemic bias within these security practices is further entrenched by the legal framework, which fails to offer adequate protections against racial discrimination or to ensure meaningful oversight. As a result, marginalized communities bear the brunt of a surveillance infrastructure that disproportionately targets them, all under the pretext of national security. This creates a deeply unequal and unjust system where the

privacy rights of these individuals are not only routinely violated but also systematically disregarded (Bronskill, 2022).

Conclusion

The Privacy Act provides broad exemptions for national security purposes, enabling the routine collection and disclosure of personal data without the individual's consent. This framework, while framed as a tool for protecting national security, disproportionately targets marginalized communities, subjecting them to heightened biopolitical surveillance and eroding their privacy rights. Through these legal provisions, the state gains an unchecked ability to monitor, categorize, and control populations under the justification of security, thus normalizing surveillance as an essential and acceptable aspect of governance.

As we consider the implications of these legal structures, it is clear that there is an urgent need for a rebalancing of national security measures with robust privacy protections. The privacy rights of vulnerable populations — such as racial minorities, refugees, and asylum seekers — must be safeguarded against over-surveillance and systemic discrimination. Strengthening privacy laws to ensure more precise definitions, clearer limits on data collection, and stronger oversight mechanisms could help mitigate the negative impact of these legal provisions. Ultimately, protecting individual privacy is not only about limiting state power but also about ensuring that marginalized communities are not further disenfranchised by a system of unchecked surveillance. In doing so Canada could uphold its commitment to privacy as a fundamental right, while maintaining the necessary security measures to protect the public.

Works Cited

Bircan, T., & Korkmaz, E. E. (2021). Big data for whose sake? Governing migration through artificial intelligence. Humanities and Social Sciences Communications, 8(1), 1–5. https://doi.org/10.1057/s41599-021-00910-x

Bronskill, J. (2022, August 16). One in four border officers witnessed discrimination by colleagues: Internal report. CTVNews. https://www.ctvnews.ca/politics/one-in-four-border-officers-witnessed-discriminati on-by-colleagues-internal-report-1.6028724

Browne, S. (2015). Dark Matters: On the Surveillance of Blackness. Duke University Press.

Finn, M., et al. (2020). Surveillance and Society: Normalizing the Exceptional. Routledge.

Gidaris, C. (2020). The Carceral Airport: Managing Race as Risk through Biometric Systems and Technologies. 30, 76–91. https://doi.org/10.1386/public_00007_7

Hiller, H. H. (2010). Airports as borderlands: American preclearance and transitional spaces in Canada. Journal of Borderlands Studies, 25(3–4), 19–30. https://doi.org/10.1080/08865655.2010.9695769

Legislative Services Branch. (2024a, June 20). Consolidated federal laws of Canada, Personal Information Protection and Electronic Documents Act. https://laws-lois.justice.gc.ca/eng/acts/P-8.6/index.html

Legislative Services Branch. (2024b, June 20). Consolidated Federal Laws of Canada, Privacy Act. https://laws-lois.justice.gc.ca/eng/ACTS/P-21/index.html

Lyon, D., & Wood, D. M. (2020). Big Data Surveillance and Security Intelligence: The Canadian Case. UBC Press.

Scher, B. (2020). Biopower, Disciplinary Power and Surveillance: An Ethnographic Analysis of the Lived Experience of People Who Use Drugs in Vancouver's Downtown Eastside. Contemporary Drug Problems, 47(4), 286–301. https://doi.org/10.1177/0091450920955247

♣ 8

The Disproportionate Impact of COVID-19 on Racialized and Marginalized Communities

By Alexis Argyropoulos

Introduction

According to a Health Canada survey during the pandemic, 27.9% of Black visible-minority respondents self-reported poor mental health compared to 22.9% of white respondents.1 Due to lockdown restrictions during the COVID-19 pandemic an increase in domestic abuse was documented, many women were left at home with their perpetrators and no longer had a form of "escape" such as going into work everyday.2 Evidently, in the United States of America there was a 21% - 35% increase of domestic violence reports from the onset of the pandemic, disproportionately impacting marginalized communities, specifically black populations.3–5 According to literature, the COVID-19 pandemic disproportionately impacted certain populations specifically, racialized and marginalized populations. Racialized populations are defined as people who do not identify as white in ethnicity or race.6 Marginalized communities experience discrimination or exclusion based on race, socioeconomic status and ethnicity.7 Root causes of this impact stem from systemic oppression and racism evident in structures and policies that reinforce inequalities in opportunities, power and resources, all of which contribute worse COVID-19 outcomes.8–10 Several factors contribute to this disproportionate impact experienced by marginalized and racialized communities and will be explored throughout this report.

Background

A pandemic is a global outbreak of an infectious disease across geographic regions, causing major economic, social and political disruptions.11 The Black Death (The Plague) is the deadliest pandemic in history, which arrived in Europe in 1347. Within 50 years, the Plague wiped out 150 million people, claiming at least 60% of lives in Europe. 12–14 Most recently, Coronavirus disease (COVID-19) caused by the SARS-CoV-2 virus declared a pandemic on March 11, 2020. The COVID-19 pandemic was a global crisis, killing over 6 million people globally,15 with a case-fatality rate between 0.25-3.0%, which is the lowest compared to other historic pandemics.16,17 However, the effects of the virus go far beyond health outcomes, having severe economic and social implications. Economic disruption is common during pandemics due to labour shortages as a result of illness and a rise in mortality rates. Other factors contributing to economic slowdown during a pandemic are transportation closures, workplace closures, and travel restrictions.18 Not to mention, pandemics place an economic burden on healthcare systems, with the Ontario Government having invested $935 million into the hospital sector within the first year of the 2020 COVID-19 pandemic.19 Pandemics cause a shift in typical social structures through social distancing and other risk mitigation strategies such as school closures and park closures in an effort to slow viral transmissions.20 These restrictions result in limited face-to-face interaction with individuals living outside one's household. Consequently, feelings of loneliness, frustration, and depression

have become increasingly prevalent in society, especially among individuals who live alone.21,22

Evidence

Research reveals compelling evidence suggesting factors that contribute to the disproportionate burden of COVID-19 outcomes experienced by marginalized and racialized communities.23 Racialized populations experience a high proportion of underlying comorbidities (i.e. Hypertension, Cardiovascular disease and Type 2 diabetes) which increase an individual's risk of severe COVID-19 outcomes (i.e. hospitalization or death).24,25In Canada, Black communities experienced higher prevalence, incidence and mortality rates of COVID-19 compared to other racialized groups.24,26 Diabetes prevalence in Ontario was highest among Black individuals (8.5%) compared to all other visible minority groups.27 Notable differences in hypertension rates among adults aged 40-59 between ethnic groups is prominent, highlighted by 49.8% prevalence among Black populations compared to 13.7% among East Asian populations,28 suggesting a relationship between comorbidities and negative COVID-19 outcomes. Individuals living in rural areas experience challenges accessing healthcare. These challenges are exacerbated for racialized communities who are already facing existing inequalities when seeking healthcare (i.e. stereotypes rooted in racism).29 According to the Centres for Disease Control and Prevention (CDC), across 29 states COVID-19 cases were higher in rural areas compared to urban areas, 30 drawing a link between access to healthcare and negative health outcomes. This is consistent with increased comorbidity prevalence in rural areas in the United States, namely diabetes, a risk factor for disadvantaged COVID-19 outcomes.31 The issue of comorbidities predisposing individuals to other conditions (i.e. COVID-19) has not been addressed.

Literature suggests a link between housing conditions and COVID-19 contraction and transmission. Higher COVID-19 incidence rates have been reported amongst individuals with unfavourable living conditions (i.e. crowded conditions) and precarious employment (i.e. part time employment).32,33 Anti-Black racism creates barriers to owning a home, leading to a higher proportion of overcrowded and multi generational homes. These living conditions amplify challenges associated with social distancing and increases individuals risk of viral contraction and transmission.34In addition, racialized individuals living in urban environments are more likely to live in crowded households and work essential jobs (i.e grocery store cashier) further impeding their ability to social distance.34 Neighbourhoods in which individuals and families reside also plays a role in transmission. Ontarians residing in neighbourhoods with the highest proportion of visible minorities were three times more likely to contract COVID-19 compared to individuals residing in less diverse communities. Notably, in neighbourhoods with the greatest diversity, there were 10 positive cases per 100 persons, compared to 3.2 positive cases per 100 persons in least diverse areas.35 Comparing this data to the United States of America, similar data exists with people of colour contracting the virus 3 times higher compared to white individuals.36 A positive association between population density in urban areas and COVID-19 transmission exists.37 Crowded living conditions and transportation services relied on by many urban residents are major factors for disease transmission.38 This was particularly evident by elevated mortality rates of Black individuals living in New York City.37 Although evidence is present suggesting a correlation between housing conditions and COVID-19 outcomes among racialized populations, it has thus far not been addressed.

Individuals working essential/public-facing jobs experience adverse COVID-19

outcomes partly because of their inability to transition to remote work. Racialized individuals are more likely to be employed in low-wage jobs with limited benefits such as paid sick leave. Consequently, individuals would often go into work regardless of displaying COVID-19 symptoms because they cannot afford to lose income.33,39 The adverse outcomes experienced by individuals working in public-facing jobs have not been addressed. The majority of evidence illustrating how marginalized and racialized individuals and communities have been heavily impacted by the 2020 pandemic, are rooted in the Social Determinants of Health Framework.

Theoretical and Methodological Perspectives

When addressing the disproportionate impact experienced by racialized and marginalized communities during the COVID-19 pandemic, it is important to address the Social Determinants of Health Framework. The Social Determinants of Health are the conditions in which people are born, grow, work, live and age and how these factors shape individuals lives and health outcomes. Globally at all income levels, health and illness follow a social gradient: individuals with lower socioeconomic status experience worse health outcomes.40 The disproportionate impacts on racialized communities are a reflection of existing health inequities driven by social and economic factors such as income, education, employment and living conditions.41 To conceptualize this framework in the context of COVID-19 outcomes among racialized populations specific determinants merit consideration such as: education, employment, food insecurity and housing and physical and built environments.

In the world today, few jobs require only a highschool diploma. Individuals with lower levels of education likely experience increased stress levels as a result of access to fewer resources to cope with daily struggles (i.e. daycare services and safe transportation to work), emphasizing how a lack of education can lead to limited resources.42Individuals working in lower-wage/precarious employment settings face job insecurity. This is amplified by the lack of benefits associated with these jobs, such as paid sick leave and healthcare benefits. In turn, this can limit an individual's ability to take time off when needed and creates hesitancy when seeking healthcare services due to the additional out-of-pocket costs required.43 Racialized individuals face barriers to equal employment opportunities which are rooted in systemic racism (i.e. biases in hiring stages), contributing to job insecurity, unemployment and precarious employment.44 Racial discrimination in workplaces is prevalent, highlighted by 48% of Black Canadians having reported experiencing discrimination in their workplace.45

Food insecurity and housing insecurity are interconnected social determinants of health. According to the literature, there is a negative correlation between an individual spending at least 30% of their income on housing and poorer health outcomes such as hypertension, which increases an individual's risk of adverse COVID-19 outcomes (i.e. hospitalization and death).46–48 Unfortunately, racialized communities face extreme housing insecurity, with 20% - 40% more susceptible than the Canadian average. 49 The physical and built environments in which an individual resides have implications on their health and wellbeing, hence, the importance of mentioning this determinant with regards to health outcomes.50 Having access to green spaces promotes physical activity, safe sidewalks promote walking and being within walking distance to healthy food options encourages healthy eating.51 In fact, individuals are more likely to engage in meaningful health activities such as exercise, when they have access to resources that encourage these behaviours.52 Environmental disturbances such as toxic waste disposal sites, are often found in racialized communities and lower income areas, putting

these individuals at a greater risk of developing cardiovascular and respiratory illnesses compared to other populations.50,53 In the United States between 2006-2010, 47% of Black individuals lived in poor neighbourhoods which is classified by 20% of the population's income being below or equal to the federal poverty guidelines.54 Bearing in mind the importance of the Social Determinants of Health Framework and the ways it contributes to health outcomes, it is important to be taken into consideration when deeming strategies as successful or unsuccessful.

Strategies

When examining the impact of COVID-19 on racialized and marginalized populations, it is crucial to evaluate what strategies have been successful and which have been unsuccessful at targeting this disproportionate impact. Community-based outreach targeted at racialized communities have been an effective way to disseminate information about the pandemic and available resources.55 For instance, in the United Kingdom and the United States of America, community organizations led by and for Black and other racialized groups who were severely affected by the pandemic, are providing mental health support.56 However, few outreach programs were tailored to meet the needs of these vulnerable populations. Mistrust in health systems is a common concern amongst Black populations, specifically regarding vaccine hesitancy.57In instances where community-based outreach initiatives were tailored to meet the cultural needs of populations (i.e. language preferences) there was a higher success of outreach efforts.58In turn, this increased understanding heavily decreases the barrier of mistrust these populations are facing when navigating the healthcare system. This contributes to better health outcomes for impacted populations down the line.

Mobile testing clinics were another successful strategy to encourage marginalized populations to get tested if they were experiencing symptoms and help decrease barriers (i.e. geographical location) that were hindering their ability to get tested. Toronto Public Health data revealed higher incidence and mortality rates among racialized and lower socioeconomic status populations, predominantly Black populations. To address this disparity, Toronto Public Health implemented mobile testing sites to increase accessibility of services and decrease inequities experienced by racialized individuals when accessing healthcare such as transportation to medical appointments.59 Although this did not decrease the impact on marginalized populations immediately, it allowed certain communities to access testing within close proximity thereby fostering more inclusive healthcare access.60

Failure to address existing health inequities exacerbated COVID-19 outcomes for marginalized and racialized populations.61 Structural racism is embedded in policies. Disparities in Health Insurance coverage exist with individuals working part-time/precarious jobs being excluded.62 A high prevalence of individuals working these jobs are people of colour (i.e. Black), wherein their access to healthcare is diminished, contributing to worse COVID-19 outcomes.61 Gender inequalities were present pre-pandemic with women often being placed in caregiving roles. During the pandemic, women were facing increased challenges due to additional caregiving responsibilities as a result of school closures and lockdown regulations.63 This is highlighted by women reporting higher rates of Anxiety and Depressive Disorder, particularly among women with children under the age of 18.64 These challenges are especially prominent among racialized women as they are more likely to be excluded from paid employment compared to other populations.65 Additionally, lack of data on racialized and marginalized populations at the onset of the COVID-19 pandemic was an unsuccessful strategy in

mitigating disease outcomes. This made it difficult for policy makers to make adjustments to existing policies and hindered the creation of interventions to meet the needs of these vulnerable populations. Therefore, the need to address the existing inequities remains the main priority.66

The Way Forward

In order to overcome the challenges creating the disparities experienced by marginalized and racialized individuals and communities, change is needed at the systemic and political level. Specifically, reforming policies to address systemic racism that is perpetuating health inequities amongst racialized populations. For example, making healthcare universally accessible by building hospitals and medical centres within close proximity to communities of lower socioeconomic status and racialized populations. Additionally, addressing the lack of benefits (i.e. health insurance) associated with part time/precarious employment would improve individual health outcomes. For instance, providing alternative insurance plans for individuals in these roles can decrease the financial stress associated with seeking healthcare without benefits due to the out of pocket costs. Investments in policy reformation is a step in the right direction to decreasing systemic racism and in turn improving health outcomes for these disproportionately impacted populations.67

Data collection on marginalized and racialized populations was minimal prior to and during the pandemic. Gaps still remain in the literature that need to be addressed to create necessary systemic change. Governments and medical researchers/organizations must focus and invest in data collection amongst these vulnerable populations. Publicly disseminating this data on racialized communities would assist policy makers and Public Health Officials in making decisions specifically targeted at addressing the needs of this population.68 For example, if data was collected respecting housing status of marginalized and racialized communities and reveals that a large proportion of these populations are living in crowded/multigenerational homes, a targeted approach must be administered. To provide an example, using government funding to open temporary, safe housing conditions for individuals whose current living conditions prevent them from social distancing. This would decrease risk of viral contracting and transmission. These suggestions would assist in ensuring that future pandemic responses are equitable and targeted to meet the needs of the most vulnerable populations and in turn decreasing the burden experienced by these populations.

In summary, the challenges experienced by racialized and marginalized individuals and communities are not a direct reflection of the virus itself. Rather, the COVID-19 pandemic unveiled existing inequities experienced by these individuals, which are rooted in systemic racism and oppression. In light of this, the inequities (i.e. education, housing and employment) must be addressed with an emphasis on data capturing the lived experiences of impacted populations. Focusing on the Social Determinants of Health Framework, especially when creating policies, would contribute in further identifying the underlying causal factors experienced by marginalized and racialized communities which are worsening their health outcomes. Addressing the underlying Social Determinants of Health is necessary to create equitable health interventions and policies in the future.

References

1. Mental Health Commission of Canada. SHINING A LIGHT ON MENTAL HEALTH IN BLACK COMMUNITIES [Internet]. Available from: https://www.mentalhealthcommission.ca/wp-content/uploads/drupal/2021-02/covid_19_tip_sheet%20_health_in_black_communities_eng.pdf

2. Alex R Piquero, Wesley G Jennings, Erin Jemison, Catherine Kaukinen, Felicia Marie Knaul. Domestic violence during the COVID-19 pandemic - Evidence from a systematic review and meta-analysis. PubMed Cent [Internet]. 2021 Mar; Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC9582712/

3. Kim Usher, Navjot Bhullar, Joanne Durkin, Naomi Gyamfi, Debra Jackson. Family violence and COVID-19: Increased vulnerability and reduced options for support. Wiley [Internet]. 2020 May; Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC7264607/

4. Julia P. Schleimer, Shani A. Buggs, Christopher D. McCort, Veronica A. Pear, Alaina De Biasi, Elizabeth Tomsich, et al. Neighborhood Racial and Economic Segregation and Disparities in Violence During the COVID-19 Pandemic. Am J Public Health [Internet]. 2021 Dec 22; Available from: https://ajph.aphapublications.org/doi/full/10.2105/AJPH.2021.306540

5. Emiko Petrosky, Janet M. Blair, Carter J. Betz, Katherine A. Fowler, Shane P.D. Jack, Bridget H. Lyons. Racial and Ethnic Differences in Homicides of Adult Women and the Role of Intimate Partner Violence — United States, 2003–2014 [Internet]. Morbidity and Mortality Weekly Report (MMWR). 2017. Available from: https://www.cdc.gov/mmwr/volumes/66/wr/mm6628a1.htm

6. Equity and inclusion glossary of terms [Internet]. The University of British Columbia. Available from: https://equity.ubc.ca/resources/equity-inclusion-glossary-of-terms/#:~:text=Racialized%20people,Employment%20Equity%20Act%20(1995).

7. Planning for a Diverse and Equitable Future- Diversity and Marginalized Communities [Internet]. American College of Trust and Estate Counsel. Available from: https://www.actec.org/planning-for-a-diverse-and-equitable-future/marginalized-communities/#:~:text=What%20is%20a%20marginalized%20community,status%2C%20disability%2C%20or%20religion.

8. Ruqaiijah Yearby, Brietta Clark, José F. Figueroa. Structural Racism In Historical And Modern US Health Care Policy. 2022 Feb; Available from: https://www.healthaffairs.org/doi/10.1377/hlthaff.2021.01466#:~:text=Structural%20racism%20operates%20through%20laws,access%20to%20high%2Dquality%20care.&text=One%20of%20the%20most%20visible%20examples%20of%20this%20is%20health%20insurance%20inequities.

9. Yin Paradies, Jehonathan Ben, Nida Denson, Amanuel Elias, Naomi Priest, Alex Pieterse, et al. Racism as a Determinant of Health: A Systematic Review and Meta-Analysis. PLOS ONE [Internet]. 2015 Sep 23; Available from: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0138511

10. Timothy W Farrell, William W Hung, Kathleen T Unroe, Teneille R Brow, Christian D Furman, Jane Jih, et al. Exploring the intersection of structural racism and ageism in healthcare. PubMed Cent [Internet]. 2022 Nov; Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC9886231/#R20

11. Nita Madhav. Disease Control Priorities: Improving Health and Reducing Poverty. Chapter 17 [Internet]. Vol. 3rd edition. 2017. Available from: https://www.ncbi.nlm.

nih.gov/books/NBK525302/

12. Damir Huremović. Brief History of Pandemics (Pandemics Throughout History). PubMed Cent [Internet]. 2019 May; Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC7123574/#Sec1

13. Sharon N DeWitte. Mortality Risk and Survival in the Aftermath of the Medieval Black Death. PLOS ONE [Internet]. 2014 May 7; Available from: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0096513

14. M Martini, V Gazzaniga, NL Bragazzi, I Barberis. The Spanish Influenza Pandemic: a lesson from history 100 years after 1918. J Prev Med Hyg [Internet]. 2019 Mar 29; Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC6477554/

15. Marco Cascella, Michael Rajnik, Abdul Aleem, Scott C. Dulebohn, Raffaela Di Napoli. Features, Evaluation, and Treatment of Coronavirus (COVID-19). StatsPearls [Internet]. 2024 Jan; Available from: https://www.ncbi.nlm.nih.gov/books/NBK554776/#:~:text=Coronavirus%20disease%202019%20(COVID%2D19,SARS%2DCoV%2D2).

16. Grace E. Patterson, K. Marie McIntyre, Helen E. Clough, Jonathan Rushton. Societal Impacts of Pandemics: Comparing COVID-19 With History to Focus Our Response. Front Public Health [Internet]. 2021 Apr 11; Available from: https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2021.630449/full

17. David T. Dennis, J. Erin Staples. Bacterial Infections of Humans- Chapter Plague [Internet]. 2009. 597–611 p. Available from: https://link.springer.com/chapter/10.1007/978-0-387-09843-2_28#citeas

18. Yunfeng Shang, Haiwei Li, Ren Zhang. Effects of Pandemic Outbreak on Economies: Evidence From Business History Context. Front Public Health [Internet]. 2021 Mar 11; Available from: https://www.frontiersin.org/journals/public-health/articles/10.3389/fpubh.2021.632043/full

19. Ontario Ministry of Health. Published plans and annual reports 2021-2022: Ministry of Health [Internet]. 2021. Available from: https://www.ontario.ca/page/published-plans-and-annual-reports-2021-2022-ministry-health#:~:text=Through%20Ontario%27s%20Action%20Plan%3A%20Responding,and%20500%20critical%20care%20beds

20. Pouya Hosseinzadeh, Mordali Zareipour, Esfandyar Baljani, Monireh Rezaee Moradali. Social Consequences of the COVID-19 Pandemic. A Systematic Review. PubMed Cent [Internet]. 2022 Mar 30; Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC9052715/

21. Richard Tindle, Ahmed A. Moustafa. Chapter 5 - Psychological distress, social support, and psychological flexibility during COVID-19. Sci Direct [Internet]. Available from: https://www-sciencedirect-com.myaccess.library.utoronto.ca/science/article/pii/B978012824289600012X

22. Emma E. McGinty, Rachel Presskreischer, Hahrie Han. Psychological Distress and Loneliness Reported by US Adults in 2018 and April 2020. 2020 Jun 3; Available from: https://jamanetwork.com/journals/jama/fullarticle/2766941

23. Thomas M. Selden, Terceira A. Berdahl. COVID-19 And Racial/Ethnic Disparities In Health Risk, Employment, And Household Composition. Available from: https://q.utoronto.ca/courses/365217/files/32915080?module_item_id=5987898

24. Janet Kemei, Mia Tulli, Adedoyin Olanlesi-Aliu, Modupe Tunde-Byass, Bukola

Salami. Impact of the COVID-19 Pandemic on Black Communities in Canada. Int J Environ Res Public Health [Internet]. Available from:

https://pmc.ncbi.nlm.nih.gov/articles/PMC9862348/#B2-ijerph-20-01580 25. Olivia Bowden, Patrick Cain. Black neighbourhoods in Toronto are hit hardest by COVID-19 — and it's 'anchored in racism': experts. Available from:

https://globalnews.ca/news/7015522/black-neighbourhoods-toronto-coronavirus-racism/ 26. Lily Rubin-Miller, Christopher Alban, Samantha Artiga, Sean Sullivan. COVID-19 Racial Disparities in Testing, Infection, Hospitalization, and Death: Analysis of Epic Patient Data. 2020 Sep; Available from:

https://madison365.com/wp-content/uploads/2020/09/KFF-Epic-Analysis_COVID19-an d-racial-disparities.pdf

27. Baiju R. Shah. Diabetes in Visible Minority Populations in Ontario. 2013 Oct; Available from:

https://www.longwoods.com/content/23660/healthcare-quarterly/diabetes-in-visible-min ority-populations-in-ontario

28. Frans HH Leenen, Jean Dumais, Natalie H McInnis, Penelope Turton, Lori Stratychuk, Kathleen Nemeth, et al. Results of the Ontario Survey on the Prevalence and Control of Hypertension. CMAJ [Internet]. 2008 May; Available from:

https://pmc.ncbi.nlm.nih.gov/articles/PMC2374854/#:~:text=A%20significant%20 differ ence%20between%20ethnic,13.7%25)%20(Table%202).

29. Cara V. James, Ramal Moonesinghe, Shondelle M. Wilson-Frederick, Jeffrey E. Hall, Ana Penman-Aguilar, Karen Bouye. Racial/Ethnic Health Disparities Among Rural Adults — United States, 2012–2015 [Internet]. 2017. Available from:

https://www.cdc.gov/mmwr/volumes/66/ss/ss6623a1.htm

30. Lawrence D. Reid, Marc Roemer. HCUP Statistical Briefs: Changes in Hospitalizations and In-Hospital Deaths for Patients From Rural Areas in the Initial Period of the COVID-19 Pandemic (April–December 2020), 29 States. 2022 Apr 15; Available from: https://www.ncbi.nlm.nih.gov/books/NBK580688/

31. Steven S Coughlin, Catherine Clary, J Aaron Johnson, Adam Berman, Vahe Heboyan, Teal Benevides, et al. Continuing Challenges in Rural Health in the United States. 2022 Feb; Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC7043306/

32. Khansa Ahmad, Sebhat Erqou, Nishant Shah, Umair Nazir, Alan R. Morrison, Gaurav Choudhary, et al. Association of poor housing conditions with COVID-19 incidence and mortality across US counties. PLOS ONE [Internet]. 2020 Nov 2; Available from: https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0241327

33. Emily Thompson, Rojiemiahd Edjoc, Nicole Atchessi, Megan Striha, Imran Gabrani-Juma, Thomas Dawson. COVID-19: A case for the collection of race data in Canada and abroad. 2021 Aug; Available from:

https://www.canada.ca/content/dam/phac-aspc/documents/services/reports-publications/

canada-communicable-disease-report-ccdr/monthly-issue/2021-47/issue-7-8-july-august -2021/ccdrv47i78a02-eng.pdf

34. Monica Webb Hooper, Anna María Nápoles, Eliseo J Pérez-Stable. COVID-19 and Racial/Ethnic Disparities. JAMA [Internet]. 2020 Jun 23; Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC9310097/

35. Chung H, Fung K, Ferreira-Legere LE, Chen B, Ishiguro L, Kalappa G, et al. COVID-19 Laboratory Testing in Ontario: Patterns of Testing and Characteristics of Individuals Tested, as of April 30, 2020. 2020 May.

36. Rogelio Saenz, Corey Sparks. The Inequities of Job Loss and Recovery Amid the COVID-19 Pandemic. Univ N H [Internet]. 2020 Aug 11; Available from: https://carsey.unh.edu/publication/inequities-job-loss-recovery-amid-covid-19-pandemic

37. Whanhee Lee, Honghyok Kim, Hayon Michelle Choi, Seulkee Heo, Kelvin C Fong, Jooyeon Yang, et al. Urban environments and COVID-19 in three Eastern states of the United States. PubMed Cent [Internet]. Available from:

https://pmc.ncbi.nlm.nih.gov/articles/PMC7952127/

38. David Rubin, Jing Huang, Brian T. Fisher. Association of Social Distancing, Population Density, and Temperature With the Instantaneous Reproduction Number of SARS-CoV-2 in Counties Across the United States. JAMA [Internet]. Available from: https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2768570

39. Public Health Agency of Canada. Social determinants and inequities in health for Black Canadians: A Snapshot [Internet]. Available from:

https://www.canada.ca/content/dam/phac-aspc/documents/services/health-promotion/po pulation-health/what-determines-health/social-determinants-inequities-black-canadians snapshot/health-inequities-black-canadians.pdf

40. WHO. Social determinants of health [Internet]. Available from:

https://www.who.int/health-topics/social-determinants-of-health#tab=tab_1 41. Public Health Agency of Canada. CPHO Sunday Edition: The Impact of COVID-19 on Racialized Communities [Internet]. 2021. Available from:

https://www.canada.ca/en/public-health/news/2021/02/cpho-sunday-edition-the-impact of-covid-19-on-racialized-communities.html

42. Paula Braveman. The Social Determinants of Health and Health Disparities - Chapter 3 Education Shapes Health and Health Disparities in Many Ways [Internet]. 2023. 67–92 p. Available from:

https://academic-oup-com.myaccess.library.utoronto.ca/book/45566/chapter/394730835

43. Shanting Zheng, Tangli Ding, Hao Chen, Yunhong Wu, Wenjing Cai. Precarious Job Makes Me Withdraw? The Role of Job Insecurity and Negative Affect. 2021 Dec 9; Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC8701801/

44. National Fund for Workforce Solutions. Racial Bias in Hiring Practices Widens the Black-White Wealth Disparity [Internet]. 2022. Available from:

https://nationalfund.org/racial-bias-in-hiring-practices-widens-the-black-white-wealth-di sparity/

45. Statistics Canada. Half of racialized people have experienced discrimination or unfair treatment in the past five years [Internet]. Available from:

https://www150.statcan.gc.ca/n1/daily-quotidien/240516/dq240516b-eng.htm#:~:text=F or%20instance%2C%20nearly%20half%20of,%2Dracialized%20people%20(41%25).

46. Craig Evan Pollack, Beth Ann Griffin, Julia Lynch. Housing Affordability and Health Among Homeowners and Renters. Available from:

https://www.sciencedirect.com/science/article/abs/pii/S0749379710004551?casa_token =TqmpYL-SXDoAAAAA:rCOC-_JLEZxMv1siyy9XO5dp9hCTwINW1Iu3Cc3gnXRGvVArVACf671FglYVNNu_9PGeUsqW

47. Leigh Ann Leung, Catherine Lau. Effect of mortgage indebtedness on health of U.S. homeowners. 2014 May 13;pages 239-264.

48. Paula Braveman. The Social Determinants of Health and Health Disparities Chapter 8 - Housing, Health, and Health Disparities. Available from:

https://academic-oup-com.myaccess.library.utoronto.ca/book/45566/chapter/3947319749. Homeless Hub. Available from:

https://homelesshub.ca/collection/population-groups/racialized-communities/

50. Paula Braveman. The Social Determinants of Health and Health Disparities-Chapter 7 Healthy and Unhealthy Places: Neighborhoods, Health, and Health Disparities. Available from:

https://academic-oup-com.myaccess.library.utoronto.ca/book/45566/chapter/394731728

51. Ana V. Diez Roux, Christina Mair. Neighborhoods and health. N Y Acad Sci [Internet]. 2010 Feb 18; Available from:

https://nyaspubs.onlinelibrary.wiley.com/doi/full/10.1111/j.1749-6632.2009.05333.x

52. Gavin R McCormack, Alan Shiell. In search of causality: a systematic review of the relationship between the built environment and physical activity among adults. Int J Behav Nutr Phys Act [Internet]. 2011 Nov 13; Available from:

https://link.springer.com/article/10.1186/1479-5868-8-125

53. Jean D. Brender, Juliana A. Maantay, Jayajit Chakraborty. Residential Proximity to Environmental Hazards and Adverse Health Outcomes. Am J Public Health [Internet]. 2011 Nov 28; Available from:

https://ajph.aphapublications.org/doi/full/10.2105/AJPH.2011.300183

54. Alemayehu Bishaw. Areas With Concentrated Poverty: 2006–2010- American Community Survey Beliefs [Internet]. 2011. Available from:

https://oklahoma.gov/content/dam/ok/en/odmhsas/documents/a0003/areas-with-concent rated-poverty.pdf

55. Marla B Hall, Nancy L Winterbauer, Courtney Klinger, Mary Tucker-McLaughlin, Ann Rafferty, Gwendolyn Greene, et al. The Creation of a Program of Engagement and Outreach for COVID-19 Among African Americans Through Community-Academic Partnerships. J Community Health [Internet]. 2021 May; Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC8165952/#CR23

56. Carmen Moreno, Til Wykes, Silvana Galderisi, Merete Nordentoft, Nicolas

Crossley, Nev Jones, et al. How mental health care should change as a consequence of the COVID-19 pandemic. Sci Direct [Internet]. 2020 Jul 16; Available from: https://www.sciencedirect.com/science/article/pii/S2215036620303072

57. Jude Mary Cénat, Pari-Gole Noorishad, Schwab Mulopo Bakombo, Olivia Onesi, Aya Mesbahi, Wina Paul Darius, et al. A Systematic Review on Vaccine Hesitancy in Black Communities in Canada: Critical Issues and Research Failures. PubMed Cent [Internet]. 2022 Nov 15; Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC9695687/

58. Jee Young Joo, Megan F Liu. Culturally tailored interventions for ethnic minorities: A scoping review. Nurs Open [Internet]. 2020 Dec 9; Available from:

https://pmc.ncbi.nlm.nih.gov/articles/PMC8363345/

59. Anna Greenberg, Dr. Kwame McKenzie, Angela Robertson. A Black Health Plan for Ontario A Call to Action to Reduce Disparities and Advance Equity in Ontario. Available from:

https://www.ontariohealth.ca/sites/ontariohealth/files/2023-06/BlackHealthPlan.pdf
60. Kandace Ryckman, Alexandra Piatkowski, Hannah Carriere. What influences members of marginalized communities to access testing for COVID-19? [Internet]. Health Commons Solutions Lab. Available from:

https://www.healthcommons.ca/articles/communities-access-testing-covid

61. Patrick Nana-Sinkam, Jennifer Kraschnewski, Ralph Sacco, Jennifer Chavez, Mona Fouad, Tamas Gal, et al. Health disparities and equity in the era of COVID-19. J Clin

Transl Sci [Internet]. 2021 Mar 16; Available from:

https://pmc.ncbi.nlm.nih.gov/articles/PMC8167251/

62. Zinzi D. Bailey, Justin M. Feldman, Mary T. Bassett. How Structural Racism Works — Racist Policies as a Root Cause of U.S. Racial Health Inequities. N Engl J Med [Internet]. 2020 Dec 16; Available from:

https://www.nejm.org/doi/full/10.1056/NEJMms2025396

63. Vasilena Stefanova, Lynn Farrell, Ioana Latu. Gender and the pandemic: Associations between caregiving, working from home, personal and career outcomes for women and men. PubMed Cent [Internet]. 2021 Dec 30; Available from:

https://pmc.ncbi.nlm.nih.gov/articles/PMC8717695/

64. Nirmita Panchal, Rabah Kamal, Cynthia Cox, Rachel Garfield, Priya Chidambaram. Mental Health and Substance Use Considerations Among Children During the COVID-19 Pandemic. 2021 May 26; Available from:

https://www.kff.org/report-section/mental-health-and-substance-use-considerations-amo ng-children-during-the-covid-19-pandemic-issue-brief/

65. Racialized Women & COVID-19 Challenges in Canada [Internet]. Available from: https://www.criaw-icref.ca/wp-content/uploads/2021/04/Racialized-Women-_-COVID-1 9-Challenges-in-Canada.pdf

66. Kwame McKenzie. Race and ethnicity data collection during COVID-19 in Canada: if you are not counted you cannot count on the pandemic response. 2020 Nov 12; Available from:

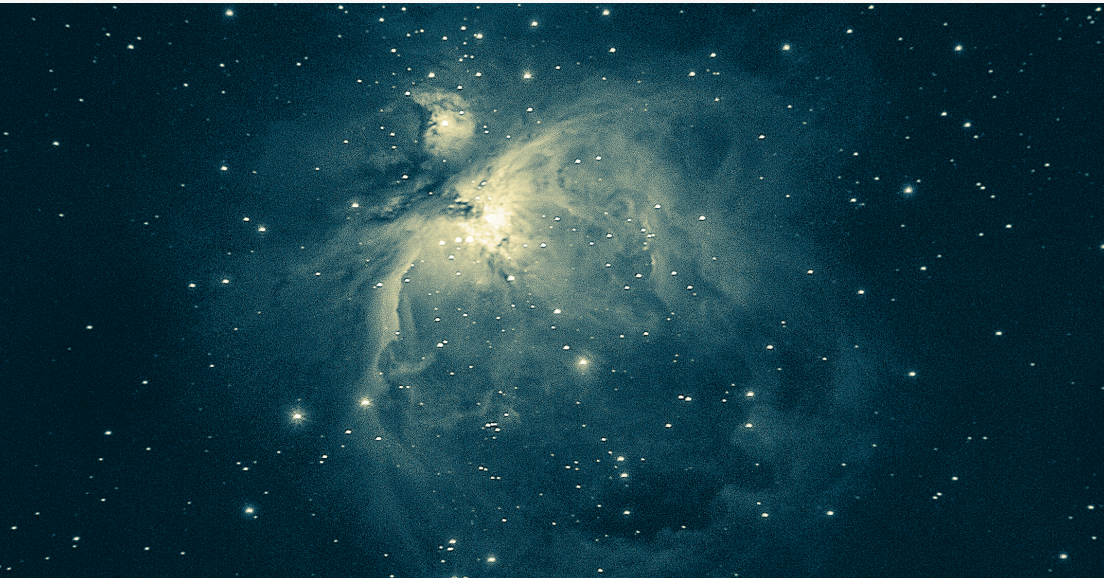
https://rsc-src.ca/en/race-and-ethnicity-data-collection-during-covid-19-in-canada-if-you -are-not-counted-you-cannot-count

67. Mahzarin R. Banaji, Susan T. Fiske, Douglas S. Massey. Systemic racism: individuals and interactions, institutions and society. 2021 Dec 20; Available from: https://cognitiveresearchjournal.springeropen.com/articles/10.1186/s41235-021-00349-3

68. Kil Huh, Amber Ivey, Dan Kitson. Using Data To Improve Policy Decisions Insights To Help Governments Address Complex Problems. 2018 Aug 14; Available from: https://www.pewtrusts.org/en/about/news-room/opinion/2018/08/13/using-data-to-improve-policy-decisionsv

Sciences

♣



♣ 1

Decoding Digital Desires: *The Role of Active Inference Framework in Understanding Online Pornography Consumption*

By Marina Papachristos

Historically, it has been understood that the visual cortex operated solely through bottom-up processes, where neural receptors passively translate sensory input as a direct representation of the world. However, new research proposes that predictions by the brain have more power over how the world is seen than previously thought. How exciting to think that two people experiencing the same event could perceive it so differently based on their cognitive expectations of the event! But there is a grimmer side to this conversation; if the mind influences how the world is perceived, it must also influence how people engage with it. In the digital age, one's deepest desires are at their fingertips, and with a brain that is driven by reward, the consumption of idealized and novel content like pornography can keep users uncontrollably engaged. This is not a cry against sex work, but a cry against the system and how to reign control over the algorithms.

Active Inference Framework

Neurocognitive research suggests that top-down processes are intimately involved with the visual cortex, where predictions formed by previous experiences influence not only how an individual understands but translates this perception of the world (Egner et al., 2010). Thus, the interplay of existing beliefs with sensory experiences builds a synthesized personal model of the world called "generative models" (White et al., 2023). Here, the Active Inference Framework (AIF) helps bridge the gap; a Bayesian statistical model used to explain how the brain encodes prior information and the downstream neurocognitive processes, predictions, and behavioural outcomes when updated. Through AIF, the brain is proposed to function as a "prediction engine", constantly generating predictions about what sensory inputs it will encounter for the system's (the individual's) generative model. It generates predictions for both immediate task-specific information/actions as well as long-term information/actions (White et al., 2023)

In this generative model, when agents interact with their surroundings, experiences that align or misalign with the model can occur. This is the basis of "prediction errors": the system tries to minimize the errors that can occur, such that in an ideal system, the model's predictions are a one-to-one fit of sensory experiences, actions, and interactions in the world. The task of error minimization is a constant battle between generative models and the world.

It is important to note that AIF is an extension of and works in tandem with a foundational framework known as Predictive Processing Framework (PPF). In this tandem, PPF is the portion focused on how our brain's predictions about sensory information shape our mental perceptions of the world. Thus, PPF focuses on minimizing the error between what is perceived and what is expected through refining internal neuronal models: When expectations are not met, prior beliefs are updated, refining predictions both immediately and for the future (Clark, 2023). While PPF focuses

on internal models to reduce error, AIF focuses on behavioural actions in minimizing prediction errors. Through AIF, the generative model not only updates its predictions but can take actions within the system's world to reduce prediction errors from occurring again (White et al., 2023).

Precision weighting is an important flexible aspect of AIF, where the brain assesses the reliability of sensory information compared to its initial predictions. Thus, not all prediction errors have the same weight. Higher Precision Weighting occurs when the brain is more confident in its initial predictions; errors between predictions and reality are more highly weighted, in turn having a large motivation to update predictions/adjust behaviours accordingly. In contrast, Lower Precision Weighting occurs when the brain is less confident in initial predictions; error is less reliable/significant, resulting in a weaker impact on updating predictions/behaviours. At its core, the brain is modulating the significance that prediction errors have on the system based on the context of these errors. Thus, the weight of precision in these errors is central to which behaviours are selected in AIF to reduce future prediction errors.

Through the AIF framework, the valence of a prediction error on the system also comes down to the rate at which the error is minimized. Actions by the system are understood by the dynamics between speed and expectation. Negative Valence occurs when error reduction is slower or worse than expected ("punishing"), whereas Positive Valence occurs when error reduction is faster or better than expected ("rewarding"). These positive and negative feelings from the rate of successful and meaningful error reduction influence how strongly certain behaviours are pursued. This in turn shapes our interactions with the environment and how models and the real-world match or conflict.

Much of this discussion is encapsulated by the human need for manageable levels of uncertainty. The balance between predictability and uncertainty shapes agents' behaviours (the importance of flexibility in the feedback loop).

Internet pornography consumption can be analyzed through the Active Inference Framework, which emphasizes learning via predictions errors in the development of behavioural patterns. These patterns of pornography consumption may become resistant to change, potentially narrowing an individual's capacity to engage in diverse experiences beyond digital environments. However, this inflexible perspective can also be critiqued, such that through mindfulness practices informed by a comprehensive sexual education framework, individuals have the opportunity to develop self-regulation strategies that promote adaptability and generative models that better predict offline relational and sexual dynamics.

Understanding Online Pornography Consumption Through AIF

When looking at digital environments such as social media platforms, AIF helps explain that the overwhelming amount of highly rewarding content exposed to users provides idealized versions of reality to prediction engines, creating large amounts of high precision prediction errors. This "hijacks" the prediction engine by updating it with warped realities that do not match real-world dynamics offline (White et al., 2023). In "Your Brain on Porn", Wilson (2014) offers the foundation to understanding these same dynamics for porn consumption. Internet pornography features content that is uniquely and constantly novel; the emotions and sensations stimulated by novelty fire high levels of dopamine, which is a key component to reinforcing behaviours. Through a framework of addiction and neuroplasticity, Wilson's analysis suggests that ease, variety, and novelty of online

pornography overstimulates the prediction engine in such a way that creates patterns of not just reinforcement but desensitization. The overuse of pornography leads the brain to see high novelty content in an addictive loop that must be fed, which can disregard and override natural sexual satisfaction. This desensitization can lead the user to tend towards extreme content that may even conflict with personal values, solely because the individual is seeking out and anticipating novelty for reward (Wilson, 2014).

To translate pornography addictions to generative model terminology, the sensory stimulus of pornography is the new information combined with pre-existing beliefs about arousal and satisfaction (model predictions). Digital pornographic environments (which share the same design as social media platforms) can subconsciously shape the predictive tendencies of generative models, leading users to find certain content over others as predictably rewarding and satisfying, particularly the type of content that is novel (White et al., 2023). Thus, repeated exposure to digital pornography leads users to consistently expect a certain threshold of arousal. Suppose the generative model is distorted by unrealistic portrayals of pornography at entrenched high levels of consumption. In that case, individuals may start to see a breakdown in their generative model and the behaviours they engage with to resolve prediction errors. What started as watching soft pornography for pleasure can quickly escalate into degrading pornography to fulfill the needs of novelty for reward.

"Your Brain on Porn" highlights how pornography consumers who develop inflexible consumption tendencies escalate both the amount and type of content consumed. Through AIF, it can be understood that the increasing consumption is driven by an inability to match initial prediction models with current experiences. With predictions entrenched in the novelty of pornography producing high arousal, immense and extreme content would be the sole-signal of greater than expected error reduction rates to the system. Thus, when the content at hand is no longer producing the expected arousal rates, prediction errors accumulate since resolution is delayed (White et al., 2023).

Additionally, the unpredictability and constant novelty of digital environments prime the generative model to assign high precision to the sensation of novelty itself, thus becoming a highly reliable indicator of reward/satisfaction (White et al., 2023). When heightened precision weighting is assigned to novelty so that it becomes a highly reliable indicator of reward/satisfaction, predictive models are updated with the information that novelty is essential for satisfaction. This helps explain why pornographic users with inflexible consumption habits feel negative valence when content doesn't meet arousal expectations; without novelty, there is a lack of positive valence from faster than expected error reduction. Behavioural updates in the AIF thus begin to focus on seeking new or increasingly stimulating content to match the primed predictions and thus reduce error at a that desired faster-than-expected rate.

Safer Consumption

At the heart of it all, the generative model is always seeking a grip on reality by balancing predictability with the manageability of uncertainty, in tandem with positive valence reduction rates for homeostatic maintenance of the system (Wilkinson et al., 2019). Pornography latches onto this need, where the over-stimulation of algorithmic websites traps users in feedback loops, leading to it becoming increasingly harder to satisfy a sense of manageable uncertainty in the niche of pornography.

Given the susceptibility of AIF to high-precision stimuli, digital environments can

manipulate these mechanisms through “Adversarial Inferences”, a situation where the brain’s normal predictions and processing of information are influenced by external forces. The algorithms of digital environments play a large role in predicting what the user wants next to effectively exploit the users’ error reduction feedback loops, in turn limiting an individual’s predictive autonomy (Bruineberg, 2023). How instead can AIF be used to aid in disengaging rather than falling victim to adversarial inferences? If lowered precision weighting can be assigned to the novelty of pornography, the reward is thus seen as less reliable and important, which could potentially lead to disengagement from pornographic consumption. This does not mean that sex must be demonized, but rather, rewards should be engaged with differently.

Sexual Education Frameworks

These arguments fall greatly in line with how “Your Brain on Porn” notes that despite the dangers of pornography consumption in developing entrenched behavioural patterns, awareness and moderation are central to the persistence of pornography in the digital age. Turn to Action Canada’s resource for sexual education (Zook et al., 2017); a key component to pornography literacy is understanding that its presentations of bodies, sexual interaction, and relationships may be unrealistic, especially when considering that pornography’s existence stems from needs for sexual gratification. While large amounts of consumption can lead to skewed realities, it is still a form of media that allows many (especially young) people to safely explore their sexuality, comforts, and desires on their own before engaging offline with sexual partners.

Sex Work is Here to Stay, so Learn from Sex Workers on How to Engage with It

Beyond sexual education frameworks, there is a plethora of research across disciplines that highlights the vital (but perhaps not always positive) roles that sex, sex work, and pornography play in society. Pre-existing sexuality studies have suggested that BDSM (Bondage and Discipline, Dominance and Submission, Sadism and Masochism) practitioners achieve altered states of consciousness involving mindfulness when engaging with the activity and that BDSM practitioners tend to have higher levels of dispositional mindfulness compared to the average person (Dunkley et al., 2020). While mindfulness is the non-judgmental awareness and acceptance of the present moment, dispositional mindfulness is the tendency to be consistently mindful of the present moment in day-to-day living. These skills offer a greater hold over real-world dynamics, such that increased mindfulness is linked to positive physical, psychological, and sexual outcomes such as relational and sexual satisfaction. These traits of BDSM practitioners are something users can learn from; the more mindful one is of what they engage with, the more rewarding the experiences can be.

Alternatively, take sociology theories of Erotic Capital (Hakim, 2010); the social power one can accrue through means of sexual attractiveness, sexual competence, beauty, and many other attributes is not only a valid form of capital, but (in a heteronormative framework) one that can provide power to women over men. Despite the capital sex workers can gain, they still suffer largely from stigmatization. Research has shown decreased psychological well-being across the population, with internalized stigma accounting for 39.3% of the variance seen in feelings of loneliness, and 12.6% of the variance seen in mental well-being (Hart et al., 2022). This doesn’t mean sex work should be eradicated, but being aware of the power dynamics underlaying the industry can help users keep hold of the real-world dynamics involved.

Mindfulness Over Reward

If AIF can explain the development of inflexibly extreme pornography consumption habits, and mindfulness can explain many of the benefits sexuality offers, then these concepts in tandem can offer a concrete understanding of how to consume pornography without tending towards inflexible consumption behaviours.

Consider Wilkinson et al. (2019); if emotions guide and inform behaviours made in AIF, practicing awareness during the consumption of pornography could offer a more mindful engagement without allowing precision weighting and valence to drive all future (potentially extreme) behaviours of consumption. If consumers anchor their beliefs in the boundaries they set for consumption, this can operationalize an intentional approach to lowering precision weighting and in turn reduce the likelihood of inflexible extremes in pornography consumption (White et al., 2023). Blain & Rutledge (2020) extend this idea; if one's level of well-being depends on the ability to engage in adaptive learning over immediate rewards, a model of well-being could underscore how to approach reworking inflexible AIF. The inflexible consumption habits of pornography users stem from not forming adaptive habits and instead updating their predictive models to be solely reward driven in the niche of pornography. Combining AIF with Blain & Rutledge (2020) offers a perspective which suggests that redirecting the need for reward from pornography to a broadened set of rewarding and explorative experiences could cause a breakdown in the consumption cycle. If agents turn to other mechanisms for reward, adaptive learning that benefits well-being mechanisms may become fostered enough in other long-term experiences to overwrite pre-existing drives for immediate rewards in the niche of pornography. If mindfulness and emotional tracking are also being practiced before, during, and after pornography consumption, it is possible to see the most effective impact on encouraging flexible and adaptive consumption habits.

Ultimately, at the very core of pornography consumption is the importance of mindfulness to keep the generative model in check with offline real-world dynamics, focusing on long-term global rewards rather than immediate niche-specific rewards. Mindfulness' active regulation, through attention control and non-action, can be understood via AIF: prediction errors update the user's world model, reinforcing stable and flexible dynamics and preventing habitual actions without introspection (Lutz et al., 2019). By slowing down engagement for introspection and focusing prediction errors on keeping consumption aligned with broader goals (i.e., self-awareness, emotional regulation, boundaries of content, etc.), this helps break the impulsive reward loop by being aware of cues leading up to consumption. The greater hold a consumer can have with offline real-life dynamics, the easier it is to engage with content in a mindful manner.

Conclusion

In conclusion, the AIF works as a prediction engine with its main goal being the minimization of prediction errors through model or behavioural updates. Prediction engines are systems that rely on the weighting, valence, and resolution rates of these errors. Pornography constantly hijacks the AIF's need for increasingly rewarding experiences which can lead agents to fall vulnerable to pornography's inflexible consumption loops due to the generative model being built on learning and constantly seeking out new experiences. However, instead of broadening one's experiences for system learning, users tend towards a narrowed set of experiences within pornography.

So, what are the next steps? Instead of allowing pornography to hijack the seeking of immediate rewards that is built into the generative model of AIF, users can work to engage with pornography in ways that are mindful of their beliefs, boundaries, and goals for consumption. Awareness of the present moment helps manage impulsivity by consciously lowering precision weighting, and helps consumers maintain a hold on offline real-world dynamics to prevent maladaptive consumption. Tangible ways of nipping this at the bud would be incorporating and teaching mindfulness practices in the education system, as this can help teach regulation at a young age and set up the future generations to mindfully engage with all aspects of life. Even breaching more media literacy discussions about specifically digital-age pornography in sexual education courses is another important route to strengthening the public's generative models to be more aware of the risks of pornographic algorithms. Further research is always needed to solidify more proven practices in reducing the susceptibility generative models have to digital pornography, but these conclusions are an urgent call to immediate action in public awareness. If these practices and considerations are adopted for pornography consumption, it would be expected to see safer sexual media engagement and, in turn, improved sexual health across users.

References

Blain, B., & Rutledge, R. B. (2020). Momentary subjective well-being depends on learning and not reward. eLife, 9. https://doi.org/10.7554/eLife.57977

Bruineberg, J. (2023). Adversarial inference: predictive minds in the attention economy. Neuroscience of Consciousness, 2023(1), niad019–niad019. https://doi.org/10.1093/nc/niad019

Clark, A. (2023). The experience machine: how our minds predict and shape reality (First edition.). Pantheon Books.

Dunkley, C. R., Barringer, A., Dang, S., & Brotto, L. A. (2020). Dispositional mindfulness among BDSM practitioners: A preliminary investigation. The Canadian Journal of Human Sexuality, 29(3), 314–322. https://doi.org/10.3138/cjhs.2020-0013

Egner, T., Monti, J. M., & Summerfield, C. (2010). Expectation and surprise determine neural population responses in the ventral visual stream. The Journal of Neuroscience, 30(49), 16601–16608. https://doi.org/10.1523/jneurosci.2770-10.2010

Hakim, C. (2010). Erotic Capital. European Sociological Review, 26(5), 499–518. https://doi.org/10.1093/esr/jcq014

Hart, G., Allen, A., Aubyn, B.S. et al. Exploring the Relationships Between Internalised Stigma, Loneliness, and Mental Well-Being Among Sex Workers. Sexuality & Culture, 27, 191–210 (2023). https://doi.org/10.1007/s12119-022-10009-3

Lutz, A., Mattout, J., & Pagnoni, G. (2019). The epistemic and pragmatic value of non-action: a predictive coding perspective on meditation. Current Opinion in Psychology, 28, 166–171. https://doi.org/10.1016/j.copsyc.2018.12.019

Wilkinson, S., Deane, G., Nave, K., & Clark, A. (2019). Getting Warmer: Predictive Processing and the Nature of Emotion. In The Value of Emotions for Knowledge (pp. 101–119). Springer International Publishing. https://doi.org/10.1007/978-3-030-15667-1_5

Wilson, G. (2014). Your brain on porn: Internet pornography and the emerging science of addiction. Commonwealth Publishing.

White, B., Clark, A., & Miller, M. (2024). Digital Being: social media and the predictive mind. Neuroscience of Consciousness, 2024(1), niae008–niae008. https://doi.org/10.1093/nc/niae008

Zook, M., Chan, K. B. K., Chabot, F., & Neron, B. (Eds.). (2017). Beyond the basics: A resource for educators on sexuality and sexual health (3rd ed.). Action Canada for Sexual Health and Rights. https://www.actioncanadashr.org/resources/beyond-basics

♣ 2

Assessing the Sustainability of the Urban Forest on St. Joseph Street, Toronto: Taxonomic Diversity, Size Distribution, and Canopy Cover

By Thalia He

Abstract

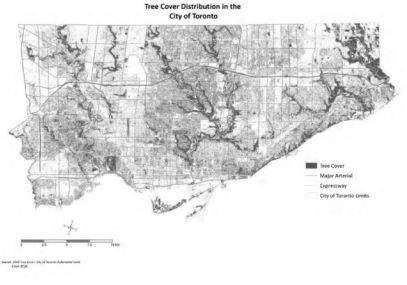
Urban forests provide ecological, social, and economic benefits but are often undervalued in urban planning. This study assesses the current state and sustainability of the urban forest along St. Joseph Street in Toronto. It examines three key aspects: tree taxonomic diversity, size distribution, and canopy cover. Through field surveys, species identification, and i-Tree Eco Canopy software analysis, results indicate low taxonomic diversity with dominant genera such as Acer and Gleditsia surpassing recommended diversity thresholds, increasing susceptibility to pests and diseases. The tree size distribution is fair and skewed, with an overrepresentation of smaller trees and a lack of large, mature trees, indicating an imbalanced ecosystem structure. Canopy cover was measured at 27.5%, which is significantly lower than Toronto's target of 40%. To enhance the ecological resilience and sustainability of urban forests, this study recommends increasing native species plantings, improving pest and pathogen monitoring, as well as raising public awareness of the importance of urban forestry. These strategies are essential for aligning urban forestry practices with Toronto's Strategic Forest Management Plan and promoting long-term ecological stability and community well-being.

Introduction

Urban forests, consisting of trees, shrubs, and other vegetation within city landscapes, encompass streetscapes as well as public and private green spaces (Nowak et al. 1970). Despite their significant contributions to urban ecosystems, urban forests are often underappreciated in urban planning, leading to a lack of adequate preservation measures. Urban forests provide an array of ecological, social, and economic benefits, such as improving air quality, enhancing biodiversity, mitigating the urban heat island effect, and offering recreational spaces for communities (Stigsdotter et al. 2017). Additionally, recent studies have highlighted the positive effects of urban forests on mental health, including benefits like forest therapy, psychological restoration, and reductions in anxiety and depression (Stigsdotter et al. 2017; Chun et al. 2023). Given their wide-ranging importance, urban forests are crucial for improving quality of life and sustainability.

To assess the health and sustainability of an urban forest, three key criteria are often analyzed: taxonomic diversity, size distribution, and canopy cover. Taxonomic diversity reflects the variety of tree species present, which is essential for maintaining biodiversity and ecosystem resilience. In Toronto, 50% of the urban forest is composed of native species, while 26% are invasive, with Norway maple (Acer platanoides) being the most prevalent species (Craig et al. 2018). Size diversity is defined as the distribution of trees across various size classes from seedlings to mature specimens, which is vital for ecosystem functioning and habitat complexity. A 2008 survey found that mid-to-large-sized trees (≥30.6 cm diameter at breast height) made up only 25% of the total tree population in Toronto, while small trees (<15.2 cm) accounted for 47% (Craig et al. 2018). Forest cover refers to the percentage of land area occupied by trees and is a crucial indicator of a city's ecological health, biodiversity, and carbon sequestration capacity. According to the 2018 Tree Canopy Study, Toronto's tree canopy covered 28.4% of the city, characterized by denser distribution along the main river systems and lower coverage in densely populated residential areas (Craig et al. 2018).

Figure 1: Tree cover distribution in Toronto (Craig et al. 2018)



This study focuses on the current state and sustainability of the urban forest along St. Joseph Street in Toronto. By analyzing its taxonomic diversity, size distribution, and forest cover, this research aims to assess the alignment of the St. Joseph Street urban forest with the objectives outlined in Toronto's 2013 Strategic Forest Management Plan. Understanding the specific characteristics of this area will offer crucial insights into improving urban forestry practices and promoting ecological sustainability in similar urban settings.

Methods

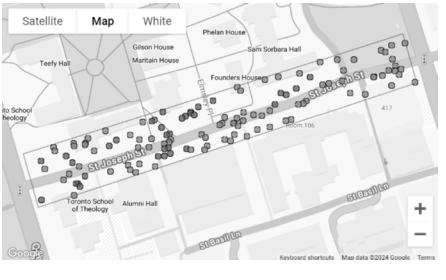
Field surveys, visual inspection, dichotomous keys, and plant identification apps were used to catalog 61 street trees located on public property along St. Joseph Street. Trees with a diameter at breast height (dbh) of less than 7 cm, as well as those located on private property, were excluded from the analysis. The survey area extended from Bay Street to Queen's Park Crescent East, including both sides of the street. Trees were recorded in sequence by block, direction, and side of the street. Each tree species was classified by genus and family, and the percentage of trees belonging to each genus and family was calculated to assess taxonomic diversity. This was evaluated against the '5-10-20' rule, a guideline used in urban forestry to promote biodiversity and reduce vulnerability to pests and diseases. The rule recommends that no more than 5% of a population should consist of a single species, 10% of a single genus, and 20% of a single family to enhance ecological resilience and prevent monoculture-related risks.

The diameter at breast height (dbh) of each tree was measured using a ruler, with tree size classified into three categories: small (0-15.2 cm), medium (15.2-30.6 cm), and large (≥30.6 cm). These categories align with standards outlined in Toronto's 2013 Strategic Forest Management Plan (City of Toronto 2013).

The i-Tree Eco Canopy software was utilized to assess forest cover. A total area of 107,861.86 ft², covering St. Joseph Street and its adjacent vegetation and buildings, was delineated for the study (Figure 2). The area was delineated using U.S. boundary data for analysis. The software's tree/non-tree mode was employed to randomly select 120 points within the study area. Points intersecting tree canopies were marked in green, while points on non-tree surfaces were marked in gray (Figure 3). The percentages of each land cover type were then recorded for analysis.

Figure 2: The boundary of the study area of St Joseph St

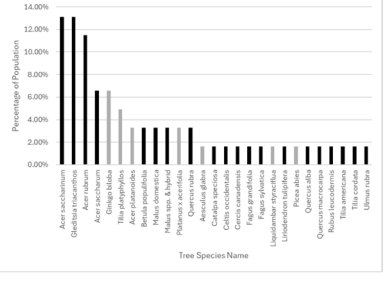
Figure 3: The tree/non-tree point in the i-Tree Canopy within the study area

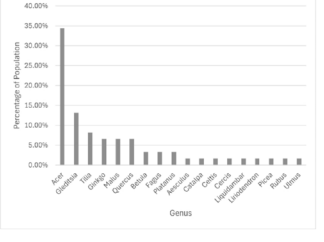


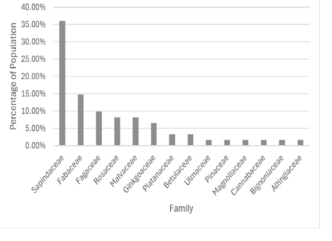
Results

The taxonomic diversity of St. Joseph Street's urban forest does not adhere to the "5-10-20" rule. Five species—Acer saccharinum (silver maple), Gleditsia triacanthos (honey locust), Acer rubrum (red maple), Acer saccharum (sugar maple), and Ginkgo biloba—exceeded the 5% species threshold (Figure 4). The genera Acer and Gleditsia surpassed the 10% genus limit (Figure 5), while the Sapindaceae family exceeded the 20% family threshold (Figure 6). These findings indicate low taxonomic diversity along St. Joseph Street.

Figure 4: Percentage of native (black) and non-native (grey) tree species in the study area. It shows that 22.95% of the trees are exotic or invasive species, a relatively low figure compared to citywide averages.







In this area, 22.95% of the trees were exotic or invasive species. This number is relatively small compared to the 2018 Canopy Study because this neighborhood does not have as many Norway maples as other neighborhoods. Additionally, St Joseph St is a smaller neighborhood relative to Toronto, with a smaller study area, and therefore not representative of Toronto. On a positive note, four dominant species—Acer saccharinum, Acer rubrum, Acer saccharum, and Gleditsia triacanthos—are native to Ontario, which offers ecological benefits. However, the unevenness in diversity and non-native species of the urban forest in this neighborhood and Toronto remain problematic.

The survey of 61 trees along St. Joseph Street revealed that 14 trees (22.95%) were classified as large (dbh > 30.6 cm), 20 trees (32.79%) as medium (15.2–30.6 cm dbh), and 27 trees (44.26%) as small (dbh < 15.2 cm). The proportion of trees in each size class was calculated, revealing that the St. Joseph Street neighborhood does not meet ideal size distribution targets, with approximately 50% of the trees classified as large. This size distribution is fair and skewed toward smaller trees, indicating an imbalance that may compromise long-term ecosystem health.

efforts to meet its canopy cover target and improve its forest structure.

Urban forests play a vital role in urban ecosystems, providing numerous ecosystem services that include supporting biodiversity, regulating climate, and offering cultural and recreational benefits (Stigsdotter et al. 2017). These services are most effectively delivered by native species, which are better suited to local ecosystems than non-native taxa. A study of urban forests in Mexico by Barrico et al. (2018) showed that public gardens dominated by exotic taxa do not offer the same biodiversity or ecosystem services as native remnant forests. Given that a substantial portion of Toronto's urban forest comprises non-native species, there is a critical need to shift toward planting more native species, as recommended by the city's Strategic Forest Management Plan (City of Toronto 2013).

The connection between urban tree covers and below-ground biodiversity, such as bacterial and fungal communities, further underscores the need to prioritize native species. For example, the presence of native trees is linked to richer bacterial and fungal communities below ground, which are essential for soil health and plant growth (Barrico et al. 2018). Therefore, urban planners should prioritize an ecological approach that favors native species, ensuring the well-being of both the environment and residents in the long term.

The lack of taxonomic evenness in Toronto's urban forests, including the study area, makes these ecosystems particularly susceptible to pests and pathogens. The overabundance of certain genera, particularly Acer (maples), makes the urban forest more vulnerable to species-specific pests like the Asian longhorn beetle, which poses a significant threat to maple trees (Vetch 2014). The high concentration of maples in the St. Joseph Street area magnifies this risk, highlighting the urgent need for diversification.

Implementing pest susceptibility matrices can help identify species that are at higher risk of infestation, thereby informing proactive management strategies (Vetch 2014). While Toronto has taken steps to diversify its tree population, more intensive monitoring and data collection are needed to reduce overall pest and disease vulnerability. By fostering a more even distribution of species, the city can build a more resilient urban forest that is better equipped to withstand future ecological challenges.

Achieving sustainability in urban forestry requires a long-term, collaborative effort involving government agencies, the forestry sector, and the public. Despite the city's goals, there is often a disconnect between urban forestry objectives and residents' planting behaviors. While residents may express support for native species, they are often hesitant to plant them due to concerns about cost or perceived risks (Almas 2017).

To bridge this gap, cities should expand public education and outreach initiatives that highlight the long-term ecological and economic benefits of planting native species. Increasing the availability of native species in local nurseries would also facilitate this transition, making it easier for both municipalities and residents to contribute to a more resilient and sustainable urban forest. Encouraging residents to align their planting decisions with the city's sustainable development goals will play a pivotal role in building a healthier urban ecosystem.

References

Almas AD. 2017. Native Trees, Urban Forest Management Planning, and Residents: Knowledge, Attitudes, and Actions. ProQuest Dissertations & Theses, Ann Arbor.

Chun H, Cho I, Choi YY, Park S, Kim G, Cho S. 2023. Effects of a forest therapy program on physical health, mental health, and health behaviors. Forests.14(11):2236. doi:10.3390/f14112236

Craig A, Barker J, Burkhardt R, Kuttner B, Rudy A, Restivo D, Fair J, Galloway S, Willemse M, Duinker P. 2018. 2018 Tree Canopy Study. City of Toronto. Available from: https://www.toronto.ca/legdocs/mmis/2020/ie/bgrd/backgroundfile-141364.pdf

Escobedo F, Livesley SJ, Morgenroth J. 2017. Urban and Periurban Forest Diversity and Ecosystem Service. MDPI AG - Multidisciplinary Digital Publishing Institute.

Monteiro MV, Handley P, Doick KJ. 2020. An insight to the current state and sustainability of urban forests across Great Britain based on i-Tree Eco surveys. Forestry (London). 93(1): 107–123.

Nowak DJ, Hoehn REI, Bodine AR, Greenfield EJ, Ellis A, Endreny TA, Yang Y, Zhou T, Henry R. 1970. Assessing urban forest effects and values: Toronto's Urban Forest. US Forest Service Research and Development. Available from: https://www.fs.usda.gov/research/treesearch/43543

Stigsdotter UK, Corazon SS, Sidenius U, Refshauge AD, Grahn P. 2017. Forest design for mental health promotion—using perceived sensory dimensions to elicit restorative responses. Landscape and Urban Planning. 160:1–15. doi:10.1016/j.landurbplan.2016.11.012

Sustaining & Expanding the Urban Forest: Toronto's Strategic Forest Management Plan. 2013. Toronto, Ontario. City of Toronto, Parks, Forestry, and Recreation, Urban Forestry.

Vecht JV. 2014. If a Tree Falls in the Urban Forest: Current and Future Pest Vulnerability in Toronto's Urban Forest. ProQuest Dissertations & Theses, Ann Arbor.

♣ 3

Children's Innate Helping Behaviour Follows Social Contexts

By Elvia Ip

Abstract

Young children have the capacity to indulge in helping behaviours, even with a limited understanding of the social world. In particular, as their understanding of their social environment grows, children's helping behaviours become increasingly nuanced. Children have an innate predisposition to be social agents prior to developing full social understanding, serving as a foundation for future social interactions that require prosocial behaviour. As children's cognitive abilities develop, their understanding of motives, costs, and benefits deepens. This change enables children to participate in altruistic helping. However, given that social environments vary across different societies, the benefits of helping at a cost to oneself also vary. Thus, children's helping behaviour is also adaptive and reflects the environment they grow up in. Ultimately, humans are social creatures who benefit from cooperation, and young children reflect this by naturally exhibiting adaptive behaviours that adopt nuance with age.

Children's Innate Helping Behaviour Follows Social Contexts

One of the longest-standing debates in psychology centers around the concepts of nature versus nurture. This concept extends into our explorations on the nature of helping behaviour: is it innate or something we learn to exhibit? Humans evolved to be social beings and thus create social environments that influence our individual actions. In fact, our social nature reflects unusually high levels of prosocial behaviour compared to others in the animal kingdom. The general trend of human development reflects these prosocial tendencies (Grueneisen and Warneken, 2022). In particular, the understanding of helpful versus hindering individuals emerges early in life, where infants exhibit helpful behaviour within the first year of life (Grueneisen and Warneken, 2022; Hamlin et al., 2007). As the cognitive abilities of young children improve, children develop more nuance in when and how they help others, such as by considering the personal costs and benefits of helping another (Grueneisen and Warneken, 2022; Sommerville et al., 2018). However, although general trends exist in helping behaviour, we see behavioural differences across different social contexts and environments. Thus, young children's helping behaviour is neither solely innate nor learned; it reflects the social nature of humans. Young children naturally exhibit adaptive helping behaviour that becomes more nuanced with age and societal exposure, and children ultimately only do so after consideration for personal costs and social benefits.

Exploring Children's Helping Behaviours

The nature of helping behaviour is difficult to define due to the complicated social aspects that influence whether humans choose to act in a helpful manner. Specifically, prosocial behaviour — voluntary behaviour with the intent to benefit another — may be exhibited due to numerous different motives that are goal-directed and drive us to take

action (Eisenberg et al., 2016). For instance, a person may be driven by internalized values or norms from their culture, or by empathetic concern or sympathy. In the case of prosocial behaviour, motives act on top of our ability to recognize when individuals are in need or in distress and cause us to come to those individuals' aid. Given our individual differences and different social backgrounds, it can be difficult to pinpoint one's motives when we observe prosocial behaviour. For example, an individual may see the daughter of a wealthy CEO and choose to help her. The person may be helping out of sympathy and concern or could be helping with selfish intent with the expectation of a reward. Depending on the motive, the nature of the person's prosocial behaviour may be considered altruistic or selfish. Thus, many nuances appear when attempting to define what constitutes the nature of helping.

Distinguishing the nature of helping becomes even more complicated when examining young children's helping behaviour, especially during infancy. While we may be able to understand the motivations behind an adult's helping from contextual clues such as their culture or social background to make inferences, infants lack the same understanding of social contexts or reasoning abilities and do not share the same level of motives (Eisenberg et al., 2016; Van de Vondervoort & Hamlin, 2017). Moreover, young children do not exhibit the same communicative abilities, limiting our ability to understand children's reasoning behind their decisions and actions. Given these limitations, it is more effective to explore the nature of helping behaviour at younger ages by observing infants' raw behaviours and their understanding of prosocial agents. Specifically, as children age, we can combine observations of how children choose to help with a more concrete exploration of their motivations to better understand the nature of their helping behaviour.

Early Understanding and Displays of Helping Behaviour

The early emergence of helping behaviour understanding in infancy suggests that understanding prosocial concepts holds importance in social development. By 6 months, infants are capable of social evaluation on the basis of others' behaviours (Hamlin et al., 2007). Using social evaluation, preverbal infants understand when an individual is helpful or hindering another. This ability to distinguish when people are being helpful versus unhelpful plays an evolutionarily adaptive role as helpful agents would more likely assist in survival. Thus, infants innately consider this information when evaluating the appeal of an individual, preferring helpful figures over neutral and hindering individuals. Infants also show aversion towards unhelpful agents, preferring neutral individuals over hindering ones, showing recognition of not only positive agents but also potentially harmful agents. This preference for helpful agents and aversion towards hinderers allows infants to actively seek out individuals who are more likely to assist them over someone who may not or even cause harm.

Being drawn towards helpers suggests an innate predisposition for a social preference for prosocial agents and a foundation for future understanding and development of helping behaviour. For instance, children's understanding of helping and hindering becomes more robust with age and applicable to other social situations, allowing us to begin to explore children's motivations. By the age of 3, children use knowledge of helpers and hinderers to inform their moral judgments (Van de Vondervoort & Hamlin, 2017). However, it is not until 4 years of age that children explicitly rate helpers more favourably and allocate punishment with correct social reasoning to hinderers under the same scenario. Although unable to refer to the relevant social considerations to explain why, without additional prompting, 3-year-olds consistently allocate punishment to hinderers. This behaviour suggests that by this age, children not only show an

aversion to hinderers but also view others' social behaviour through a moral lens (Van de Vondervoort & Hamlin, 2017). This difference between 3- and 4-year-olds highlights an age-related cognitive gap in the ability to bridge complex scenarios involving prosocial agents and moral beliefs about helpers and hinderers. Thus, while an understanding of helping behaviour emerges at a young age, children require a certain level of cognitive development over time to properly express this understanding.

Notably, not only do children's understanding of helping and hindering begin early on in development, but their helping behaviour also emerges at an early age. Within the first year of life, children act prosocially through primarily sympathy-driven motivations (Grueneisen and Warneken, 2022). For instance, around 14 to 18 months, children begin helping each other to achieve practical goals and assist adults requiring instrumental needs (Corbit et al., 2020; Grueneisen and Warneken, 2022; Svetlova et al., 2010). In a study by Sommerville et al. (2018), 18-month-olds were found to be more likely to help when they needed less physical effort, suggesting the emergence of cost-understanding alongside helping behaviour since less cost is attached to using less effortful activities.

Despite this evident predisposition for being helpful agents, age-related improvement to socio-cognitive development and other cognitive domains influence children's understanding of helping behaviour, which allows for more complex types of helping, including altruistic — or costly — helping. Understanding of ownership also begins to emerge by the age of 2, which influences young children's tendency to help at a cost (Brownell et al., 2013). Ownership-understanding enables the concept of altruistic helping given that one cannot give at a cost without understanding what constitutes costly behaviour (Corbit et al., 2020). Particularly, younger children are more likely to engage in self-focused and hypothesis-testing behaviour compared to older children who share more frequently (Brownell et al., 2013). Furthermore, ownership understanding is correlated positively with sharing and negatively with non-sharing behaviour, suggesting that ownership understanding fosters social understanding and costly helping (Brownell et al., 2013). As ownership understanding improves with age, their sharing behaviour correlates directly to their understanding of ownership.

Children's Motivations for Exhibiting Helping Behaviours

Although greater social understanding allows for greater helping behaviour, it is unclear what the motives behind altruistic helping may be at younger ages. For instance, despite the emergence of ownership understanding, children consistently struggle with altruistic helping, even at 30 months old (Svetlova et al., 2010). A reason why children struggle to help beyond pure cognitive limitations may be motivation-based. Understanding the principles behind motives enables children to follow certain motives and decide to act prosocially. Another milestone in cognitive development that children eventually reach is the ability to reason counterfactually: the ability to reason about what could have happened in the past. Children's ability to engage in counterfactual thinking guides social evaluation (Wong et al. 2023). By understanding how to reason about the past, children can utilize motives based on social evaluations, which in turn, could influence children's decision to act prosocially. In a study by Wong et al. (2023), counterfactual reasoning was found to be tied to moral judgments. Specifically, 4- to 8-year-olds were introduced to a positive moral character and asked to engage in counterfactual thinking. It was found that children who generate selfish counterfactuals are more likely to positively evaluate an agent who engages in positive moral actions. An age-related effect was also discovered where regardless of the type of counterfactuals children tended to generate, the character was more likely to be evaluated positively, showing that counterfactual

reasoning plays a role in the development of moral evaluations but no longer remains as important as children age. However, due to internalized values, older children may be more motivated to help an individual they have rated more positively. Although motivations become much clearer around the ages where counterfactual reasoning emerges, motivations may also develop at a younger age, with helping behaviour and understanding becoming more nuanced and considerate of personal needs. As children continue

to age, the nature of children's prosocial actions also begins to change. By 30 months, despite struggling with altruistic helping, children have a greater ability to infer the needs of others without explicit communication, suggesting that earlier prosocial behaviour is driven by communicative learning (Svetlova et al., 2010). Moreover, prosociality becomes more varied and selective with age due to motivations and cognitive abilities becoming more complex (Grueneisen and Warneken, 2022). Specifically, this increase in the ability to infer other's needs also allows children to begin using prosocial acts in self-serving manners. Acting prosocially serves a social purpose, as prosocial agents are seen as more favourable. By the age of 5, children reflect this phenomenon and act more generously when being watched (Engelmann et al., 2012). Moreover, children become gradually more capable of strategically using prosocial acts for ulterior goals for both self-serving and mutually beneficial interactions (Grueneisen and Warneken, 2022). Thus, despite children ultimately continuing to exhibit prosocial behaviour and becoming more advanced at identifying prosocial agents, children begin to help with ulterior motives that benefit them, suggesting that they begin weighing the costs and benefits of helping.

Although children tend to follow general trends in their development and understanding of helping behaviour, children also develop nuances when they are willing to help due to more specific social contexts. Prosocial tendencies are influenced by mechanisms that make these tendencies more selective to avoid free riders and adhere to social expectations (Grueneisen & Warneken, 2022). While toddlers are willing to share with free riders, preschoolers are more likely to exhibit prosocial behaviour towards those who intentionally benefitted them in the past or have shown kindness to others. Moreover, by 18 months, infants are shown to have intrinsic motivations when considering whether to help, which drives their evaluation of whether or not to help based on cost. For instance, infants are more likely to incur a cost to help those who share a preference, suggesting an early predisposition for selective prosociality (Sommerville et al., 2018). Motivations for social relatedness may drive this behaviour due to a desire for effective ties with helpful agents.

Cultural Differences in Children's Helping Behaviour

On a broader scale, the nuances in when children are willing to help are also affected by cultural contexts. Despite some universal patterns for helping behaviour, such as the general onset of understanding of prosocial agents, variations occur across different cultures. In a study by Corbit et al. (2020), toddlers between the ages of 16 and 36 months' costly helping tendencies were explored across three societies: India, Peru, and Canada. Across all three societies, the level of non-costly helping was found to increase with age. However, different developmental patterns of costly helping were also found. Specifically, costly helping was only found to increase with age in the Canadian sample. In contrast, the sample in Peru remained relatively stable, and the sample in India saw decreases with age. Evidently, while helping behaviours exist relatively universally, societal factors influence the extent to which children are willing to help altruistically.

Corbit et al.'s (2020) results show that the extent of helping behaviour is influenced by environmental contexts and reflects the nature of said environments. For example, the amount of resources one can access may influence the cost of giving up an object you own. If you do not have a lot of resources, it would be considered much more costly to give up the same item as someone who owns a lot of resources, and thus you would be less likely to give up resources. Such is shown by the Indian sample which was reported to have lower experience with ownership and also exhibited a decreased likelihood to participate in costly helping. However, these results also highlights some factors that seemingly stay stable across cultures. For example, consistent with the findings of Sommerville et al.'s (2018) study where infants tended to consistently help when the cost was low, Corbit's study also found a stable level of non-costly helping across different ages, suggesting that some helping behaviour developments stay stable across cultural contexts. Thus, these cross-cultural findings are shown to be tied to relative costs across societies.

Conclusion

Evidently, young children have the capacity to engage in helpful behaviours. Even at preverbal ages, children display strong foundations for future prosocial behaviour through their preferences for helpful individuals (Hamlin et al., 2007). Moreover, as young children gain the cognitive capacity to understand the social world better, they utilize their ability to engage in cognitively more difficult and costly forms of helping, showing that children can become altruistic helpers as they develop an understanding of cost and benefit. In particular, the early emergence of non-costly helping and preference over costly helping that remains stable across societies suggest that young children indeed have the predisposition to exhibit helping behaviour. However, it is equally important to address that social and environmental contexts influence this base predisposition of helpfulness. Although their motivations cannot be fully understood at younger ages, they are driven by social factors, given how prosociality becomes more varied with age based on social knowledge (Grueneisen & Warneken, 2022). Additionally, children do indulge in altruistic behaviours regardless of environmental contexts, although the extent varies with consideration of costliness (Corbit et al., 2020). Given that social environments vary across different societies, the benefits of helping at a cost also vary. Thus, children's helping behaviour is also adaptive and reflects the environment they grow up in. While a child in one society may seem to be willing to incur little cost, we must consider that that cost is relative. Ultimately, humans are social creatures who benefit from cooperation, and our tendencies to be prosocial agents display themselves through countless motives with varying contexts. Young children reflect this nature, and thus, we should not underestimate the complexities behind why children choose to be helpful.

References

Brownell, C. A., Iesue, S. S., Nichols, S. R., & Svetlova, M. (2013). Mine or Yours? Development of Sharing in Toddlers in Relation to Ownership Understanding. Child Development, 84(3), 906–920. https://doi.org/10.1111/cdev.12009

Corbit, J., Callaghan, T., & Svetlova, M. (2020). Toddlers' costly helping in three societies. Journal of Experimental Child Psychology, 195, 104841. https://doi.org/10.1016/j.jecp.2020.104841

Eisenberg, N., VanSchyndel, S. K., & Spinrad, T. L. (2016). Prosocial Motivation: Inferences From an Opaque Body of Work. Child Development, 87(6), 1668–1678. https://doi.org/10.1111/cdev.12638

Engelmann, J. M., Herrmann, E., & Tomasello, M. (2012). Five-Year Olds, but Not Chimpanzees, Attempt to Manage Their Reputations. PLOS ONE, 7(10), e48433. https://doi.org/10.1371/journal.pone.0048433

Grueneisen, S., & Warneken, F. (2022). The development of prosocial behavior—From sympathy to strategy. Current Opinion in Psychology, 43, 323–328. https://doi.org/10.1016/j.copsyc.2021.08.005

Hamlin, J. K., Wynn, K., & Bloom, P. (2007). Social evaluation by preverbal infants. Nature, 450(7169), 557–559. https://doi.org/10.1038/nature06288

Sommerville, J. A., Enright, E. A., Horton, R. O., Lucca, K., Sitch, M. J., & Kirchner-Adelhart, S. (2018). Infants' prosocial behavior is governed by cost-benefit analyses. Cognition, 177, 12–20. https://doi.org/10.1016/j.cognition.2018.03.021

Svetlova, M., Nichols, S. R., & Brownell, C. A. (2010). Toddlers' Prosocial Behavior: From Instrumental to Empathic to Altruistic Helping. Child Development, 81(6), 1814–1827. https://doi.org/10.1111/j.1467-8624.2010.01512.x

Van De Vondervoort, J. W., & Hamlin, J. K. (2017). Preschoolers' social and moral judgments of third-party helpers and hinderers align with infants' social evaluations. Journal of Experimental Child Psychology, 164, 136–151. https://doi.org/10.1016/j.jecp.2017.07.004

Wong, A., Cordes, S., Harris, P. L., & Chernyak, N. (2023). Being nice by choice: The effect of counterfactual reasoning on children's social evaluations. Developmental Science, 26(6), e13394. https://doi.org/10.1111/desc.13394

♣ 4

From "Ha-ha" to "Aha!": *Humor as a Procedural Facilitator of Insight*

By Sky Wang

Abstract

While current literature suggests a positive relationship between humour and insightful problem-solving, there is a current research gap between the collected data and proposed explanations. Addressing such issues, this essay highlights the cognitive processes involved in both humour comprehension and insightful problem-solving, emphasizing their shared structural similarities and the potential for transfer-appropriate processing. Through a comprehensive review of empirical studies and theoretical considerations, the essay ultimately argues for the cruciality of procedural transferability in the attainment of insight. However, critical evaluation of the argument raises questions about the specificity of this relationship, the multi-component nature of humour processing, and the generalizability of findings across different types of insight problems. Despite these critiques, the essay underscores the importance of bridging empirical research with theoretical development to advance our understanding of the mechanisms underlying insight and its facilitation. Additionally, it suggests future directions for interdisciplinary collaboration and the formulation of comprehensive theoretical frameworks to enhance the investigations into insightful problem-solving.

Introduction

As insight refers to the complex and dynamically self-organizing attentional skill generally used in problem-solving (Danek et al., 2020), ongoing literature in cognitive science has been found to address potential factors that enhance the facilitation of insight (Salvi et al., 2015). To construct a solid foundation regarding the investigation into insightful problem solving, the conceptual processes underlying it must be first addressed.

Research characterizes an impasse as the main obstruction in the attainment of insight during novel problem-solving (Weisberg, 2018). Specifically, this occurs when false initial encoding of the problem by the problem-solver leads to a fixation on inaccurate problem representation, decreasing their chances of reaching the solution. This irrelevant fixation of the problem is dependent on cognitive factors such as individuals' recollection of past experiences, which leads to their deviation from crucial operators to the solution. To further clarify the cognitive processes underlying fixation, research emphasizes the role of attentional processes in directing cognitive resources toward relevant information while filtering out extraneous stimuli (Salvi et al., 2015). Impasses, therefore, can be understood as a consequence of attentional biases towards certain problem representations, leading individuals to overlook alternative perspectives or solutions (Hildebrand and Smith, 2014).

In order to overcome such impasses, spontaneous reconstruction must occur to perceive a new understanding of the problem (George and Wiley, 2018). However, due

to the biased attentional processes mentioned previously, such functional reorganization is difficult to achieve in the absence of analogical transferring of relevant past knowledge. Whilst surface similarity between the problem and experience aids individuals in accessing potential analogies, structural similarity is crucial for facilitating transfer (Webb et al., 2023). Through transfer appropriate processing of the analogy, problem-solvers may move from the state of impasse to the solution (Fedor et al., 2015).

To emphasize the role of transferability in the attainment of insight, recent investigations demonstrated how the pre-presentation of humour may act as an analogy that procedurally transfers to the process of insight problem-solving and increases the possibility of finding a novel solution (Patrick and Amed, 2014; Wu and Chen, 2019). This can be explained through the structural similarities underlying the cognitive processes of humour and insight problem-solving (Amir et al., 2015; Tian et al., 2017). Specifically, as reconstruction of a fixation is required for insight, humour processing involves individuals in the initial state of cognitive incongruence to eventual resolution (Korovkin and Nikiforova, 2015; Wu and Chen, 2019). Moreover, insight problem-solving and humour comprehension show similar activations in semantic-related regions of the cortex in fMRI scans, demonstrating a neurological basis in the similarities of the two cognitive mechanisms (Tian et al., 2017).

Despite the establishment of this positive relationship between humour and insight through empirical evidence, the research results emphasized the observable behavioural outcomes, such as increased accuracy rates of solution-finding, all failing to address the specifics that allow humour to possibly predict successful insight problem-solving. In essence, there exists an imbalance between the abundance of empirical data and the lack of deriving of theoretical explanations to explain how humour elicits insight. In order to address such gap in existing research, this essay will first offer operationalized definitions of both processes, and then through evaluative research argue for how procedural transferability exists across humour and insight, ultimately highlighting the cruciality of transfer appropriate processing during insight problem-solving.

Humour Processing: The Two-Component Model of Humour

Prior to examining the role of humour processing in insight facilitation, it is imperative to first establish a clear understanding of humour itself. A proposed model of humour processing, the two-component model of humour, distinguishes its cognitive mechanisms in terms of cognitive and affective components (Gibson, 2019). The cognitive component involves individuals' extent to interpret and comprehend humorous content; the affective component involves the positive emotions that individuals experience proceeding exposure to humorous content, often characterized as reflexive and uncontrollable (Gibson, 2019).

Despite attempts at clarifying a distinction between humour comprehension and appreciation when investigating humour processing, the absolute isolation of one component from the other proves challenging. This may be due to how the two components demonstrate a bidirectional relationship: comprehension allows for appreciation, and appreciation implies comprehension. However, to avoid equivocation issues, this essay will primarily focus on the cognitive component of humour comprehension, and how it exhibits procedural transferability into insight.

Argument: Facilitative Effects of Humour on Insight

Cued insight problem solving was mentioned previously and characterized by several stages: encountering an impasse, provision of an analogical cue to reconstruct the impasse, procedural transfer of cued knowledge to construct accurate problem representation, and eventually, successful solution generation. Therefore, these corresponding stages will be addressed to argue for the facilitative effects of humour processing on insight. First, the similar cognitive mechanisms behind humour comprehension and insight shall be provided to clarify potential procedural transferability; then, empirical evidence of how pre-exposure to humorous content facilitates insightful problem-solving shall be presented to reinforce the role of humour as a procedural cue; ultimately, highlighting the significance of insightful transfer as a key component to efficient insight problem-solving.

Humour Comprehension: Incongruity Detection and Resolution

Literature postulates that the nature of humour comprehension is a sequence of incongruity detection and incongruity resolution (Gibson, 2019). Incongruity theory proposes that for humour to occur, individuals first experience incoherency by a piece of information between what is given and their expectations, often derived from contradiction, absurdity, or irony (Gibson, 2019). When such discrepancy is detected, individuals will attempt to approach the unexpected information with a new perspective to resolve cognitive incongruence (Gibson, 2019). This process mirrors the cognitive demands of insight problem-solving, wherein individuals must recognize and reconcile inconsistencies within problem representations to reach a solution. As the restructuring of a gestalt is coexistent in both humor incongruity resolution as well as experience of insightful problem-solving, this underlies procedural parallelisms between humour comprehension and insight facilitation, emphasizing their shared structural similarities of cognitive flexibility. However, as structural similarities between one cognitive process – humour comprehension – and insight are a necessary condition for transfer-appropriate processing, whether it alone serves as a sufficient component that will effectively predict insightful transfer still requires empirical evidential support, which will be further evaluated.

Humor Comprehension as a Procedural Cue

Building upon the notion of spontaneous reconstruction inherent in humour comprehension, it will be further established how the pre-experience of such reconstruction serves as a sufficient and effective procedural cue through various research, predicting individuals for success in insight problem-solving.

Regarding the effects of exposure to humour comprehension on insight, research done by Korovkin and Nikiforova (2015) aimed to explore facilitation efforts of humour processing on problem-solving (Korovkin and Nikiforova, 2015). Through humor-priming tasks involving humorous questions that required comprehension, the researchers measured the mean solution time individuals took to solve insight problems (Korovkin and Nikiforova, 2015). Increased performance in solving visual insight problems occurred for participants who were pre-exposed to humorous questions compared to the control group, suggesting a positive influence of humor comprehension task on insight, reflecting the potential of humor processing as a procedural cue for insightful transfer (Korovkin and Nikiforova, 2015).

In addition to previous research, the study of Korovkin et al. (2024) attempted to operationalize humor comprehension through logical mechanisms and schema switching to increase the internal validity of results (Korovkin et al., 2024). Specifically, with the aim to determine how logical processes in the cognitive component of humour affect the speed at which insight problems are solved, the researchers presented participants with contextual humour tasks prior to a matchstick problem (Korovkin et al., 2024). A matchstick problem is a given equation that is false, but through manipulating the lines in the equation, it can be set right; moreover, the matchstick equation had two solutions in which one involved constraint relaxation of the operation symbol whilst the other was related to chunk decomposition of the numbers themselves. Results showed that pre-presentation of humorous videos related to the breaking of functional fixedness prompted increased performance in generating constraint relaxation solutions whilst exposure to humorous stimuli related to perceptual overlapping of objects drove chump decomposition solutions (Korovkin et al., 2024). Therefore, these results added to the specificity of how structural similarities between the humorous stimuli and insight problems promote procedural transferability from the prior to the latter, reinforcing how humour processing may act as an analogical cue for insightful problem-solving.

As procedural transferability between humour comprehension and insight fundamentally relies on their overlapping structural similarities, it ought to be questioned how the order of presentation matters for one to elicit improved performance of another. Specifically, the pre-presentation of humorous stimulus following the insight problem can only be explained if humour comprehension tasks exhibit comparable lower difficulty for it to demonstrate facilitative efforts on insight problem-solving. To reinforce such an assumption, research suggests that the cognitive processes involved in humour comprehension may require less cognitive load compared to insight problem-solving (Ferstl et al., 2017). Leveraging this notion, it can be argued that it is cognitively easier for individuals to perform perceptual reconstruction to resolve incongruence in humour; this pre-experience of spontaneous reconstruction can then be procedurally transferred to solve insight problems.

In conclusion, demonstrating structural similarities between humour comprehension and insightful problem solving serves as a foundational condition to establish a transferable relationship between the two processes; the additional assessment of their relative cognitive load then explains the order of presentation of the two. Overall, this attempts to fill the proposed gap between empirical findings and theorized explanation of current literature, moreover, highlighting the crucial role that transfer-appropriate processing plays in insight.

Counterargument: Questioning the Facilitative Role of Humor in Insight

This section aims to critically evaluate the arguments presented in the previous sections regarding the facilitative role of humour processing in insight problem-solving. Specifically, it will address potential limitations and alternative interpretations of the evidence, offering a nuanced perspective on the relationship between humour comprehension and insight.

Failed Consideration of the Multi-component Nature of Humor Processing

One potential limitation of the previous argument is the failure to adequately consider the multi-component nature of humor processing. By focusing on cognitive aspects of humour comprehension, it disregards the affective component and emotional

responses. Studies showed that while humour comprehension promotes insight, humour appreciation does not (Zhou et al., 2021). This can be explained as that humour appreciation, lacking the cognitive processes necessary for overcoming fixation and spontaneous reconstruction, may fail to promote procedural transfer and, consequently, insight.

Despite being evidence of how research fails to address humour processing as a whole, this limitation can be negated as it conversely reinforces the main thesis of how procedural transferability is crucial to insight problem solving, since only components that share structural similarity with insight demonstrate facilitative effects.

The Presence of Essentialism Bias

Further criticism pertains to the collective investigation of insight problem-solving, which can be seen as indicative of essentialism bias. Essentialism bias refers to the tendency to view categories or concepts as having an inherent, immutable nature, leading to oversimplified or reductionist understandings. In the context of insight problem-solving, the essentialism bias may manifest in the assumption that all insight problems share identical underlying mechanisms or characteristics. This treatment of insight problems as homogeneous entities overlooks their diverse nature, which can vary significantly in terms of complexity, structure, and cognitive demands. Research demonstrated variations in the effects of humour on different types of insight problems, such as verbal insight problems versus visual insight problems (Gibson, 2019). While humour exhibited positive effects on spatial rotation problems, no significant relationship was found between humour and verbal insight problems (Gibson, 2019). This discrepancy suggests that the facilitative effects of humour on insight may be contingent upon the nature of the problem being solved. Furthermore, although Korovkin and Nikiforova (2015) demonstrated positive effects of humour comprehension on visual insight problems, they also concluded the absence of a facilitation effect in textual insight problem-solving (Korovkin and Nikiforova, 2015).

Although proposed evidence raises questions about the generalizability of the argument, rather than limitations, they may serve as factors that potentially narrow the scope between the current overly broad relationship established between humour processing and insight. It advances current research, specifying how only humour comprehension in humour processing can facilitate spatial-visual insight problem-solving.

Conclusion

In conclusion, this essay argues for how procedural transferability exists across humour and insight, ultimately, highlighting the cruciality of transfer-appropriate processing of effective cues that promote successful insight problem-solving. While much attention has been devoted to exploring the empirical relationship between humour and insight, it is crucial to shift focus toward the gap between such research. Specifically, the abundance of empirical data on humour's effects on insight has not been accompanied by commensurate theoretical development. This disparity reveals the shortcomings of research related to the intersection between cognitive psychology and cognitive science, wherein there is a tendency to stop at analytical data without formalizing and mechanizing theoretical frameworks. As a result, this imbalance between the amount of empirical data and theory-building may result in the triviality of findings. Therefore, it is imperative for researchers to formalize theoretical explanations and mechanize

applicational models, thereby advancing our understanding of the mechanisms underlying insight and its facilitation. By embracing the natural imperative of cognitive science— to analyze, formalize, and mechanize— the elegance of investigations related to the complexities inherent in cognitive processes such as insight can be established, ultimately contributing to the development of comprehensive theoretical frameworks in the field.

References

Amir, O., & Biederman, I. (2016). The Neural Correlates of Humor Creativity. Frontiers in Human Neuroscience, 10. https://doi.org/10.3389/fnhum.2016.00597

Amir, O., Biederman, I., Wang, Z., & Xu, X. (2015). Ha Ha! Versus Aha! A Direct Comparison of Humor to Nonhumorous Insight for Determining the Neural Correlates of Mirth. Cerebral Cortex, 25(5), 1405–1413. https://doi.org/10.1093/cercor/bht343

Canestrari, C., Branchini, E., Bianchi, I., Savardi, U., & Burro, R. (2018). Pleasures of the Mind: What Makes Jokes and Insight Problems Enjoyable. Frontiers in Psychology, 8. https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2017.02297

Danek, A. H., Wiley, J., & Öllinger, M. (2016). Solving Classical Insight Problems Without Aha! Experience: 9 Dot, 8 Coin, and Matchstick Arithmetic Problems. The Journal of Problem Solving, 9(1). https://doi.org/10.7771/1932-6246.1183

Danek, A. H., Williams, J., & Wiley, J. (2020). Closing the gap: Connecting sudden representational change to the subjective Aha! experience in insightful problem solving. Psychological Research, 84(1), 111–119. https://doi.org/10.1007/s00426-018-0977-8

Fedor, A., Szathmáry, E., & Öllinger, M. (2015). Problem solving stages in the five square problem. Frontiers in Psychology, 6. https://doi.org/10.3389/fpsyg.2015.01050

Ferstl, E. C., Israel, L., & Putzar, L. (2017). Humor Facilitates Text Comprehension: Evidence from Eye Movements. Discourse Processes, 54(4), 259–284. https://doi.org/10.1080/0163853X.2015.1131583

George, T., & Wiley, J. (2018). Breaking past the surface: Remote analogical transfer as creative insight. In Insight. Routledge.

Gibson, J. M. (2019). An Introduction to the Psychology of Humor. https://doi.org/10.4324/9780429000959

Hildebrand, K. D., & Smith, S. D. (2014). Attentional biases toward humor: Separate effects of incongruity detection and resolution. Motivation and Emotion, 38(2), 287–296. https://doi.org/10.1007/s11031-013-9374-1

Huang, F., Tang, S., Sun, P., & Luo, J. (2018). Neural correlates of novelty and appropriateness processing in externally induced constraint relaxation. NeuroImage, 172, 381–389. https://doi.org/10.1016/j.neuroimage.2018.01.070

Korovkin, S., & Nikiforova, O. (2015). Humor as a Facilitator of Insight Problem Solving.

Korovkin, S. Y., Morozova, E. N., & Nikiforova, O. S. (2024). Funny? Think About It! Selective effect of cognitive mechanisms of humour on insight problems. Cognition and Emotion, 0(0), 1–21. https://doi.org/10.1080/02699931.2024.2316861

Macchi, L., & Bagassi, M. (2020). Bounded rationality and problem solving: The interpretative function of thought. In Routledge Handbook of Bounded Rationality. Routledge.

References

Martin, R. A., & Ford, T. (2018). The Psychology of Humor: An Integrative Approach. Academic Press.

Patrick, J., & Ahmed, A. (2014). Facilitating representation change in insight problems through training. Journal of Experimental Psychology: Learning, Memory, and Cognition, 40(2), 532–543. https://doi.org/10.1037/a0034304

Raskin, V. (2017). Humor theory: What is and what is not. In Humor theory: What is and what is not (pp. 11–22). De Gruyter Mouton. https://doi.org/10.1515/9781501507106-001

Salvi, C., Bricolo, E., Franconeri, S. L., Kounios, J., & Beeman, M. (2015). Sudden insight is associated with shutting out visual inputs. Psychonomic Bulletin & Review, 22(6), 1814–1819. https://doi.org/10.3758/s13423-015-0845-0

Tian, F., Hou, Y., Zhu, W., Dietrich, A., Zhang, Q., Yang, W., Chen, Q., Sun, J., Jiang, Q., & Cao, G. (2017). Getting the Joke: Insight during Humor Comprehension - Evidence from an fMRI Study. Frontiers in Psychology, 8, 1835. https://doi.org/10.3389/fpsyg.2017.01835

Webb, T., Holyoak, K. J., & Lu, H. (2023). Emergent analogical reasoning in large language models. Nature Human Behaviour, 7(9), 1526–1541. https://doi.org/10.1038/s41562-023-01659-w

Weisberg, R. W. (2018). Toward an integrated theory of insight in problem solving. In Insight and Creativity in Problem Solving. Routledge.

Wu, C.-L., & Chen, H.-C. (2019). The Influence of Creativity on Incongruity-Resolution and Nonsense Humor Comprehension. Creativity Research Journal, 31(1), 110–118. https://doi.org/10.1080/10400419.2019.1577675

Zhou, Z., Wu, J., Luo, H., Guo, Y., Tu, M., Yu, Q., & Zhang, L. (2021). The effect of humor on insight problem-solving. Personality and Individual Differences, 183, 111105. https://doi.org/10.1016/j.paid.2021.111105

♣ 5

Literature Review: *Artificial Intelligence in Dentistry*

By Jyot Patel

Introduction

Artificial Intelligence (A) has revolutionized modern medicine since its inception at the 1956 conference on technology by John McCarthy.1 From the creation of DXplain in 1984, a software capable of providing a differential diagnosis from a list of symptoms to its ability to detect cancerous polyps during a routine endoscopy by gastroenterologists, AI has changed the way physicians approach treatments and patient care.1,2 As its efficiency and reliability evolved, it expanded its influence beyond medicine. Professionals of other fields recognized its potential and began integrating it into their personal workflows. From law and finance to engineering and education, AI-backed tools started to enter mass production. This review will specifically focus on how AI has impacted dentistry, examining its role as a diagnostic tool, its use in education, and the ethical considerations surrounding its application.

Mechanisms underlying artificial intelligence

The mechanisms at the core of AI technology aim to replicate the neuronal networks central to the human brain.1 Just as humans receive sensory input, process it in the central nervous system, and respond through the movement of speech, AI uses artificial neural networks to replicate these functions.3 These networks consist of three layers: an input layer that acquires data through user-derived information (text prompt, images, videos etc.), hidden layers where complex algorithms process and convert the data acquired previously into machine-readable formats; and an output layer that generates predictions or results based on the processed data.1,3

However, unlike humans, who refine their thinking heuristics over years of experience, AI relies on iterative training with large datasets specific to a particular topic. This process involves humans, who guide the learning process through labelling and validation, referred to as machine learning.4 This is where experienced dentists would work alongside the engineers to train the AI to develop rigorous and evidence-based frameworks for solving clinical problems. Progressively, because of incremental improvements to the algorithms from one generation of the code to the next, the AI becomes more efficient and accurate at completing tasks. This “learning” allows the AI to make decisions, predict outcomes, and recognize patterns it wasn’t explicitly programmed to understand.4 The novelty of this implementation is that the AI can pick up on trends that the experts who designed the program itself may not have identified, decreasing human decision-making bias.5 For instance, a novel software by the name, Enlitic, is designed to be used simultaneously with manual radiograph analysis and is proven to increase the accuracy of radiology report analysis by 50-70%.6

AI's diagnostic and predictive ability

One of the first fields to integrate AI into workflows was radiology, as it could provide radiograph readers with highlighted prompts while bringing attention to patient anomalies on scans.7 Dental science followed suit by integrating similar technology to combat missed enamel-only proximal caries on bitewing radiographic images seen in clinics, and a study was carried out to determine if AI-assisted software was able to increase the correct identification of these caries by dentists. In a study comparing diagnostic accuracy, dentists in the experimental group used the AssistDent software, which provided on-screen prompts to identify potential carious lesions, while the control group analyzed the same radiographs without assistance.8 Dentists in the experimental group detected 75.8% caries compared to 44.8% positive detection by dentists in the control group, demonstrating a 71% increase in sensitivity.8 This improvement in diagnostic accuracy in detecting enamel-only proximal caries demonstrated that AI has the potential to enable a higher degree of care in dental-based scenarios, ultimately benefiting the patient. Additionally, by improving early detection, AI not only enhances diagnostic accuracy but also reduces treatment costs by allowing for less invasive interventions and preventing complications that arise from undiagnosed or late-stage caries progression.9

Beyond routine diagnostics, AI has also shown promise in patient management and treatment monitoring, as evidenced by its application in a study done on periodontitis care.10 Periodontitis is a dental disease caused by plaque accumulation due to poor oral hygiene and, over time, can lead to alveolar bone damage and teeth falling out.11 A recent study assessed the impact of an AI model-based monitoring tool, Dental Monitoring (DM), on patients with periodontitis to assess how AI can support both professional care and patient adherence to oral health routines from a remote perspective.10 DM utilizes a patient's smartphone to scan their mouth and upload it to a central server to analyze various metrics. By quantifying technical data like gingival inflammation, supragingival plaque area, etc., the program can determine the effectiveness of a patient's brushing habits and medication adherence.10 Participants were patients between 35 and 65 years of age and diagnosed with stages III and IV periodontitis using the 2017 classifications. One group of patients performed an independent assessment weekly using DM (AI intervention); the second group received DM along with personalized oral health counseling from dentists (AIHC group) who viewed the scanned images; and the control group received no intervention of AI or health care team follow-up. The total plaque and inflammation of patients in both the AI and AIHC groups were significantly reduced after three months. This improvement was notably greater than in the control group10. Specifically, AI-based monitoring led to enhanced patient adherence to oral hygiene practices, and its analysis provided crucial information to dentists.10 This use case is beneficial as dentists have another avenue to provide a high level of care via follow-up to remote populations, like those living in rural towns.

The ability to predict outcomes following treatment is powerful, as it can help in determining the individualized risk level of a patient undergoing dental interventions. Using retrospective data as a training set, AI is capable of predicting future outcomes comparable to regression models that are currently in use. A study published in The Angle Orthodontist evaluated an AI model's effectiveness in predicting soft tissue and alveolar bone changes following orthodontic treatment against conventional statistical predictive models like the Multivariate Multiple Linear Regression (MMLR) model.12 Orthodontic treatments induce changes in a patient's soft tissue and alveolar bone through the continuous application of force on the teeth. This force stimulates bone remodelling via

osteoblasts (cells that play a role in building new bone tissue) and osteoclasts (cells that play a role in degrading existing bone tissue) to change alveolar bone structure to accommodate the new positions of the teeth.12 Thus, predicting where the changes will occur is crucial for dentists to determine the next steps of a patient's treatment plan. Although initial results looked promising based on the 887 adult patients enrolled in the study, MMLR demonstrated superior accuracy in predicting all the alveolar bone and skeletal landmarks, proving AI to not be up to standard.12 However, the authors pointed out that for 5 out of the 22 soft tissue landmarks, specifically on the face below the chin to the terminal point of the neck, AI excelled and outshone the MMLR framework.12 Although AI is inferior to the current methodology overall, testing its capability through trials like the one above will uncover hyper-specific niches in which it excels and proves to be the better option.

Utilization in tool-assisted learning

Healthcare institutions are placing more emphasis on developing adequate resources for patient education, as the spread of misinformation through the internet could jeopardize a patient's decision about care. Especially with the widespread use of large language models like ChatGPT, patients may use them to acquire information that may or may not be accurate.13 To test the current aptitude of web-based AI chatbots on the topic of dentistry, a study looked into the accuracy and completeness of the answers provided by generative AI.13 Using an expert panel of 5 orthodontists to blindly review answers to 100 prepared common questions regarding orthodontic care, the study scrutinized the responses using the Accuracy of Information (AOI) index to assess that the AI-generated information aligned with established knowledge in the field. A high score on the AOI index reflects that the response generated by the AI model is of high quality when considering how correct, precise, and reliable it is. The experts agreed that the median level of completeness and accuracy was high (interquartile range of 7-9 on a scale of 10) and almost identical between the two chatbots. The authors mentioned that, despite the promise shown by the AI models in providing patient education, their performance is nuanced as they are trained on pre-existing literature and information that may not be accredited by governing bodies or up-to-date.14 There is still a need, however, to explore patient expectations and satisfaction with these AI-generated responses, as understanding user feedback can further inform the development of these technologies.

The integration of AI in education not only benefits patients but also extends its impact on students. For decades, professors have attempted to create various techniques to transfer information and teach technical skills to dental students, but with the presence of AI, they have come across a novel game-based method. AiDental software was created to teach removable partial denture (RPD) design to dental students, utilizing gamification elements like a real-time scoring system to grade students' RPD designs.15 A study was conducted where mock practical test scores of dental students using AiDental were compared against a control group that did not have access to the software. The results indicated that more students achieved a B-grade or higher in their mock practical when using AiDental (86.1%) compared to those relying on traditional practice (64.8%), indicating a correlative effect of the use of the software.15 The feedback received through the gaming component was critical in enhancing the student's understanding and application of complex design principles in a low-stakes setting before the examination.15 This approach made learning more interactive while aligning with the emerging trends in education that emphasize the importance of innovative teaching methods to improve student outcomes. A follow-up to this particular scope of AI would

be to determine if it can objectively evaluate the students as an invigilator, as this would eliminate inherent individualized bias present in human examiners.

Ethics Involved in AI Use

As dental practitioners increasingly rely on AI in patient care and education, ethical discussions surrounding data privacy, consent, and biases have gained prominence. Federal governing bodies, like the CDC, are concerned about the protection of patient data, particularly in populations with limited English speakers in the US, as this is where AI is being implemented the most.16 They are emphasizing developing consent forms with refined language and rolling out procedures that should take place when companies recruit or purchase patient information for their database to train their AI algorithms.16 There is an emphasis on protecting the personal data that belongs to the patient, especially radiographs, treatment plans, and treatment outcome information, that can be acquired by companies retrospectively.

Additionally, the population demographic that the AI systems are trained on could be biased and not applicable to the general public. As mentioned earlier in this review, the AI algorithms learn from existing datasets, and any inherent biases (concentrated data from a particular age group, gender, geographic location, etc.) may become amplified after iterative machine learning takes place.3 If this were the case, the AI system would fail to generalize to the diverse patient population and would only be accurate for the demographic that is majorly concentrated in the dataset.16, 17 Thus, it is imperative that developers work with trained professionals like dentists to critically evaluate the training datasets to ensure they are varied and representative samples of the population they aim to serve. For instance, dentists can assist in identifying rare but clinically relevant conditions that may not be well-represented in standard datasets that are skewed to a single demographic. This stresses the importance of external validation or open-sourcing of the training data used by AI development firms to minimize potential inaccuracies in the training regimen.

Future directions

As AI continues to evolve, it will be essential to address both technical and ethical challenges. With current emphasis being placed on diagnostic care of patients visiting the clinic, these prediction models are also well poised to be used for preventative care, as experts would be able to deter bad outcomes before the onset of disease. There are promising advances underway regarding the advanced image analysis of radiographs to determine structures and patterns that are evident of early-stage cancer formation and microscopic abnormalities that could lead to complications in the future for a patient.18

However, future research should also focus on improving the generalizability of AI models to diverse populations and ensuring that AI systems align with ethical standards. This can be addressed by enacting several policies regarding the holistic nature of curating a representative database and creating a legislature that aims to protect consumer privacy. Policymakers should also consider regulations to ensure transparency in AI decision-making, allowing patients to have the ultimate say in its utilization in their health care plan.

References

1. Ossowska, A., Kusiak, A., & Świetlik, D. (2022). Artificial intelligence in dentistry—Narrative review. International Journal of Environmental Research and Public Health, 19(6), 3449. https://doi.org/10.3390/ijerph19063449

2. Samarasena, J., Yang, D., & Berzin, T. M. (2023). Aga clinical practice update on the role of artificial intelligence in colon polyp diagnosis and management: Commentary. Gastroenterology, 165(6), 1568–1573. https://doi.org/10.1053/j.gastro.2023.07.010

3. Korteling, J. E. (Hans)., van de Boer-Visschedijk, G. C., Blankendaal, R. A. M., Boonekamp, R. C., & Eikelboom, A. R. (2021). Human- versus artificial intelligence. Frontiers in Artificial Intelligence, 4, 622364. https://doi.org/10.3389/frai.2021.622364

4. Arsiwala-Scheppach, L. T., Chaurasia, A., Müller, A., Krois, J., & Schwendicke, F. (2023). Machine learning in dentistry: A scoping review. Journal of Clinical Medicine, 12(3), 937. https://doi.org/10.3390/jcm12030937

5. Chubb, J., Cowling, P., & Reed, D. (2022). Speeding up to keep up: Exploring the use of AI in the research process. Ai & Society, 37(4), 1439–1457. https://doi.org/10.1007/s00146-021-01259-0

6. Lee, L. I. T., Kanthasamy, S., Ayyalaraju, R. S., & Ganatra, R. (2019). The current state of artificial intelligence in medical imaging and nuclear medicine. BJR|Open, 1(1), 20190037. https://doi.org/10.1259/bjro.20190037

7. Farič, N., Hinder, S., Williams, R., Ramaesh, R., Bernabeu, M. O., Van Beek, E., & Cresswell, K. (2023). Early experiences of integrating an artificial intelligence-based diagnostic decision support system into radiology settings: A qualitative study. Journal of the American Medical Informatics Association, 31(1), 24–34. https://doi.org/10.1093/jamia/ocad191

8. Devlin, H., Williams, T., Graham, J., & Ashley, M. (2021). The ADEPT study: A comparative study of dentists' ability to detect enamel-only proximal caries in bitewing radiographs with and without the use of AssistDent artificial intelligence software. British Dental Journal, 231(8), 481–485. https://doi.org/10.1038/s41415-021-3526-6

9. Schwendicke, F., Rossi, J. G., Göstemeyer, G., Elhennawy, K., Cantu, A. G., Gaudin, R., Chaurasia, A., Gehrung, S., & Krois, J. (2021). Cost-effectiveness of artificial intelligence for proximal caries detection. Journal of Dental Research, 100(4), 369–376. https://doi.org/10.1177/0022034520972335

10. Shen, K.-L., Huang, C.-L., Lin, Y.-C., Du, J.-K., Chen, F.-L., Kabasawa, Y., Chen, C.-C., & Huang, H.-L. (2022). Effects of artificial intelligence-assisted dental monitoring intervention in patients with periodontitis: A randomized controlled trial. Journal of Clinical Periodontology, 49(10), 988–998. https://doi.org/10.1111/jcpe.13675

11. Könönen, E., Gursoy, M., & Gursoy, U. K. (2019). Periodontitis: A multifaceted disease of tooth-supporting tissues. Journal of Clinical Medicine, 8(8), 1135. https://doi.org/10.3390/jcm8081135

12. Cho, S. J., Moon, J.-H., Ko, D.-Y., Lee, J.-M., Park, J.-A., Donatelli, R. E., & Lee, S.-J. (2024). Orthodontic treatment outcome predictive performance differences between artifivcial intelligence and conventional methods. The Angle Orthodontist, 94(5), 557–565. https://doi.org/10.2319/111823-767.1

References

13. Park, H. J. (2024). The rise of generative artificial intelligence and the threat of fake news and disinformation online: Perspectives from sexual medicine. Investigative and Clinical Urology, 65(3), 199–201. https://doi.org/10.4111/icu.20240015

14. Daraqel, B., Wafaie, K., Mohammed, H., Cao, L., Mheissen, S., Liu, Y., & Zheng, L. (2024). The performance of artificial intelligence models in generating responses to general orthodontic questions: ChatGPT vs Google Bard. American Journal of Orthodontics and Dentofacial Orthopedics: Official Publication of the American Association of Orthodontists, Its Constituent Societies, and the American Board of Orthodontics, 165(6), 652–662. https://doi.org/10.1016/j.ajodo.2024.01.012

15. Mahrous, A., Botsko, D. L., Elgreatly, A., Tsujimoto, A., Qian, F., & Schneider, G. B. (2023). The use of artificial intelligence and game-based learning in removable partial denture design: A comparative study. Journal of Dental Education, 87(8), 1188–1199. https://doi.org/10.1002/jdd.13225

16. Dankwa-Mullan, I. (2024). Health equity and ethical considerations in using artificial intelligence in public health and medicine. Preventing Chronic Disease, 21. https://doi.org/10.5888/pcd21.240245

17. Mörch, C. M., Atsu, S., Cai, W., Li, X., Madathil, S. A., Liu, X., Mai, V., Tamimi, F., Dilhac, M. A., & Ducret, M. (2021). Artificial intelligence and ethics in dentistry: A scoping review. Journal of Dental Research, 100(13), 1452–1460. https://doi.org/10.1177/00220345211013808

18. Dhingra, K. (2023). Artificial intelligence in dentistry: Current state and future directions. The Bulletin of the Royal College of Surgeons of England, 105(8), 380–383. https://doi.org/10.1308/rcsbull.2023.132

♣ 6

Modeling Fright: *An ACT-R Interpretation of Fear, from Conditioning to Somatic Markers*

By Sebin Im

Introduction

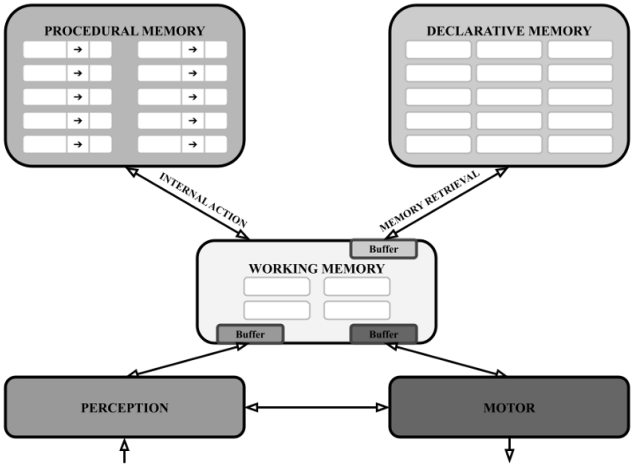
Emotion retains a unique role in human cognition as it facilitates efficient adaptation to changing environments, moderation and encouragement of societal behaviour, amplification of memory retrieval rates and, most importantly, prevention of potential threats to kindreds' well-being (LeDoux 2011). Emotion-encapsulated behaviours were found to expedite the aforementioned processes with qualitatively better performances compared to certain cognitive channels like appetence, libido, or reflex (Nyklíček, Vingerhoets, and Denollet 2010). As Fox (2009) argued, most contemporary theories of emotion recognize that certain primary emotions—such as anger, joy, and fear—appear even in the earliest days of life exhibited via facial expressions, hence attesting to emotion being biologically determined (Ekman 1992; Simić et al. 2021). Emotion has been found to have especially close links to attentional (Vuilleumier 2005) and motivational (Seli et al. 2015) modules, heightened activations of which have been proven to enhance learning and memory (Phelps 2004; Shen, Wang, and Shen 2009). This high appraisal of emotion in cognition is corroborated by Pekrun (1992) renowned paper on learning, where it was affirmed that emotionally salient memories tend to have improved clarity and longevity.

In cognitive science, the primary objective is satisfying the naturalistic imperative (Vervaeke 1997); that is, to analyze, formalize, and mechanize cognition whilst avoiding to invoke the realist doctrines of metaphysical naturalism. Supplementing this imperative, a facet that has garnered insights from computer science is to develop computational models capable of demonstrating segments of human cognition by reducing mental processes into a product from a rule-governed, goal-oriented infrastructure. Then, with emotion seemingly being an embedded constituent of human cognition, could we formulate a cognitive model that manifests emotion or, better yet, encompasses an emotional module?

Model Description and Rationale

Demand for Embedding Emotions to Cognitive Architectures

Cognitive architectures are computational models that simulate human cognition by constructing a symbolic, connectionist, or hybrid system of modules to describe various mental phenomena (Lieto 2021). They are frequently employed in the field of AI and computational cognitive science, specifically as a framework to simulate human intelligence concerning problem-solving, analysis, decision-making, memory, and more. Notable architectures include SOAR by John E. Laird, Newell, and Rosenbloom (1987), AlphaGo by Google Deepmind et al. (2016), and ACT-R by Anderson (1993), which will be incorporated in this study. The rationale behind this choice will be explored later on.



ACT-R's infrastructure of modules

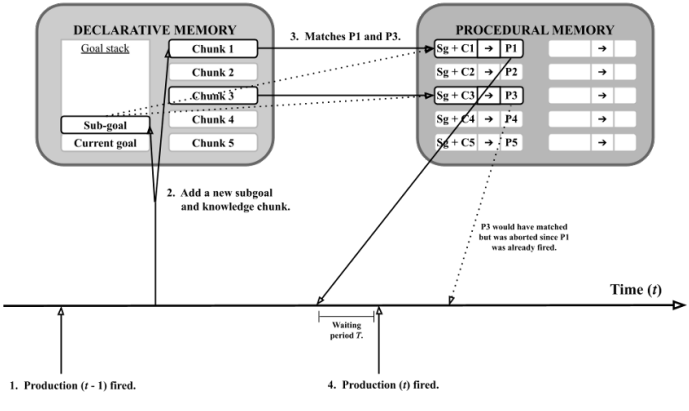
The ACT-R cognitive architecture, in essence, was created with a primary goal to model human behaviour, with an entailing goal of creating cognitive agents; this is different from other functionalist accounts of cognitive models such as SOAR, where the emphasis lies on developing complex cognitive agents, with an entailing goal of modelling human cognition (J. E. Laird 2021, 2022; Ritter, Tehranchi, and Oury 2018). ACT-R is an excellent choice because it is a hybrid cognitive architecture, meaning it retains the precision of symbolic systems (e.g. natural language processing) while also enjoying the superior intelligence of subsymbolic systems (e.g. recurrent neural network). An elementary visualization of ACT-R's infrastructure is shown in Figure 1. The idea to implement such a program has been in discussion not only for ACT-R but also other architectures, including CLARION, SPAUN, and the Common Model of Cognition (Kajić et al. 2019; John E. Laird, Lebiere, and Rosenbloom 2017; Sun, Wilson, and Lynch 2015; West and Young 2017). We will focus specifically on one of the primary emotions, fear.

This specific choice is not arbitrary; the earliest studies of emotions used fear as their primary example in the representation of emotions, where they described fear as the activation of neural circuits necessary for survival, triggering a fight-or-flight response to real or potential dangers of the status quo (Simić et al. 2021). This paper will investigate the various components of a Pavlovian fear conditioning process, discuss a potential sequence thereof in ACT-R, and the consequential plausibility of the somatic marker hypothesis (Jameson, Hinson, and Whitney 2004). It is important to note that the paper will have certain a priori assumptions, which include a predisposition toward elementary fear responses (i.e. fight-or-flight, freezing), the agent not (yet) conditioned to any intense audio stimuli, and the ubiquitous desire for painlessness (Mobbs et al. 2015). It is also worth noting that this description of modelling fear conditioning is by no means universally applicable to all types of emotions or accounts for individual differences. Instead, the primary goal of this paper is to investigate if fear-instigated cognitive processes could be modeled through this specific cognitive architecture, and how well it can be reflected in simulating human behaviour in coordination with the principal goal of the ACT-R cognitive model.

Fundamental Mechanisms and Sequence of ACT-R

ACT-R cognitive architecture comprises various modules, with the focus of this paper on the two memory modules: declarative and procedural. The declarative memory modules will retain explicit information called chunks, such as the fact that 2+2=4 or that “Sven is my name”. These chunks can already be within the declarative memory, or added as novel chunks as a consequence of a production being fired. In ACT-R, chunks are graphical structures, with a maternal node connected to children nodes (with a recursive capacity) which contain the representable “knowledge”, but this network-like form was omitted for brevity. In addition, the declarative memory module houses the goal stack, which is a FIFO (First-In-First-Out) container of goals employed to help reduce them into simpler and/or easier processes. Goals are also chunks, but will be separated in the visualizations for brevity. Goals and sub-goals are pushed into the stack by a production rule, akin to chunks. Procedural memory, on the other hand, will contain productions and only them. Productions are essentially If-Then statements that, once matched via information (i.e. chunks, goals) from the declarative memory, will “fire”. An example of a production would be the statement “If I am hungry, I will eat”. This would incite the agent’s food-seeking behaviour, by sending a motor instruction or, in a reductionist route, creating more sub-goals and chunks to send to the declarative memory to start the sequence. Simply put, declarative knowledge is knowing what, and procedural knowledge is knowing how.

A comprehensive description of the architecture and its internal processes will be omitted for simplicity’s sake, but a coarse decision flowchart in ACT-R is displayed in Figure 2. It starts with the firing of a production p_(t-1). This engages the addition of a sub-goal and knowledge chunk, which motivates the selection of a production that matches the premise of said production. This newly chosen production p_t is then fired, and buffers are updated for another cycle (Ritter, Tehranchi, and Oury 2018; Whitehill 2013). A precept worth mentioning is that in ACT-R, this cycle takes approximately □100 ms, a measure of time per cycle that has been regularly postulated for other cognitive architectures (John E. Laird, Lebiere, and Rosenbloom 2017; Newell 1991). Lastly, the metric for the unit of cost in the ACT-R model is the variable for time, t.



Flowchart of how an ACT-R agent decides which production to select

We omit certain aspects from the official production selection algorithm for simplicity, such as the latency period T or any productions that were indeed matched but aborted. The pseudocode for this production selection algorithm is shown in Algorithm 1, which is also often used for building prototype ACT-R models and their derivatives.

agent action Y, declarative memory D, procedural memory P,
current goal g, sub-goal g_i, goal stack G, chunks c_i, productions p_i $t \geq 0$; $g \in G$; $p_{t-1} \in Y$
function production_sequence $G.push(g_1)$ $D.push(c_i), \forall c_i \in p_{t-1}$ $j \leftarrow 1$ $p_t \leftarrow p$
$Y.push(p_t)$ $G.pop(g_1)$ $j \leftarrow j + 1$ $t \leftarrow t + \varepsilon, \exists \varepsilon > 0$ $Y.pop(p_{t-1})$ $p_t \leftarrow p_{t-1}$ **end function**

ACT-R's unique way of knowledge representation and the various changes occurring in the model will be used to describe the phenomenon of fear conditioning and how it affects future behaviours (i.e. strengthening of activations, changes in behaviours). A potential set of production rules in an ACT-R cognitive model will be laid out after the following clarification on the Pavlovian fear conditioning process. A sequence of how these productions may 'fire' as the predicates are 'matched' with chunks and/or goals pertaining to our model will also be explored.

Pavlovian Fear Conditioning

Pavlov's Dog is a renowned experiment in conditioning, which showed the psychological phenomenon of associative learning and its impact on behaviour. To summarize, the experiment showed that dogs can be conditioned to salivate upon hearing the bell even with the absence of food, as the dog has associated the sound of the bell with the thought (or potential, a useful interchange in the context of fear) of food through repeated cases of conditioning. This case can be generalized to all cognitive agents, which describes our ability for associative learning and, ergo, efficient memory consolidation; we coin this phenomenon the Classical or Pavlovian Conditioning, in honour of the inceptive psychologist, Ivan Pavlov (Kim and Jung 2006).

The Pavlovian Fear Conditioning can be more generally defined as a learning process where an agent associates an otherwise non-endangering stimulus with an actual threat such that a potential of the danger is phenomenally experienced as fear by the agent. Note that there are innate fears that we are seemingly born with, most notably loud noises and heights (Fox 2009), and we will not argue about these heavily contested items in the nature versus nurture debate. Most fears that we have by the time we reach maturity are argued to be learned and conditioned via various possible aspects, including the environment, education, generational effects, and introspection (Larue et al. 2018; Mobbs et al. 2015). These fears will be the main focus of this potential trace of fear conditioning in ACT-R, and we will be able to sprout new conversations regarding embedding emotions in this cognitive architecture by discussing flaws, improvements, novel ideas, and more.

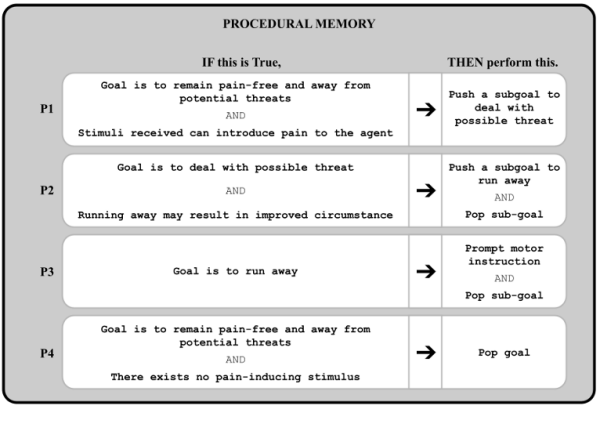
Here, we encounter a fundamental question regarding the very nature of emotions; how could we quantify something so vague as fear? Indeed, emotions such as fear seem unable to be simply defined by a chunk (respective to graph-structured knowledge representation used in ACT-R) or manipulations thereof. However, we can attempt to model fear by studying human behaviours that are imposed by fear, and how such behaviours emerge through processes between modules as explained by the ACT-R architecture. This approach is consistent with the primary goal of ACT-R, which is to model human behaviour. Thus, we will try to model what a human-like agent goes

through in an emotion-learning sequence. The agent is defined to be human-like instead of human because, in real life, such a conditioning process happens very early in human maturity, from infancy to early adolescence (Donadon, Martin-Santos, and Osório 2018).

Model Design and Results

The Scenario and Assumptions

We will now present a hypothetical scenario of a fear conditioning procedure and see if ACT-R's components can explain the anticipated (more specifically, rational) behaviour of the agent. Let us consider a case where an agent is unaware of the existence or functionalities of a pistol. There are a few assumptions worth noting, the first of which is that the agent is not fearful of loud noises, such as the 'bang' sound emitted by a pistol firing. Another important assumption is that although the agent has no a priori encounters with this specific stimulus of fear, the agent already retains the necessary set of productions which helps appropriately process the imminent danger and knows how to mitigate the threat (e.g. fight or flight). This "knowledge" can be represented in declarative memory (memorized to efficiently account for such an encounter) and procedural memory (corresponding to other production rules stored within); a sample list of productions for this scenario is shown in Figure 3. The last assumption, albeit obvious, is that the agent can be shot by the pistol multiple times without cognitive impairment or disarray, and wishes to stay away from potential threats.

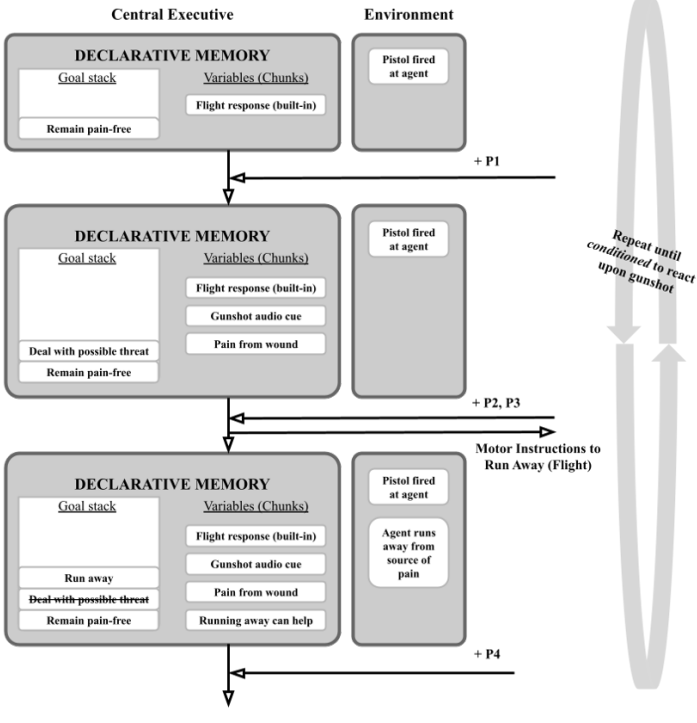


Sample production rules in procedural memory

Emotion of Fear and Its Orientation of Human Behaviour in ACT-R

The agent is shot by a pistol. A loud audio cue from the gunshot is experienced by the agent, accompanied by the perception of extreme pain. These two perceptions are registered into the declarative memory as chunks by the perception/sensory module; the mechanics behind this information conversion will be omitted as the details are out of scope concerning our topic of interest. Initially, there is no production for running away from the gunshot noise, but rather the pain that comes after the gunshot. Production P1

is fired due to the new chunks added, and the sub-goal to deal with the pain is added to the goal stack. The agent thus desires to avoid such confrontations in the future, because such a state goes against the agent's desire to remain dormant and away from threats to its well-being. P2 is then fired thanks to our built-in flight response, which assumes that running away oftentimes improves the situation. P3 is finally fired as the previous production pushed an instruction to the motor module to flight. This cycle of hearing the loud audio cue, experiencing pain, and running away is repeated until the agent associates the auditory cue with pain and wants to avoid the loud sound from the gunshot that accompanies the painful experience. Concerning our model, associating the sound with pain occurs when the production P1 is altered to also accept a loud audio chunk as its latter premise. Practically speaking, our production P1 is incrementally updated to not only accept a gunshot sound, but also take priority over the pain itself such that any loud sounds would fire the production for flight. This repetition is what we define as conditioning. The information flow of this event is roughly laid out in Figure 4, using the productions from Figure 3 as needed (e.g. push sub-goals, send instructions to the motor module).



Potential information flow of an agent being shot by a pistol in ACT-R

After repeated instances of the stimulus, the agent will associate the audio stimulus with pain and optimize production P1 to also accept audio instead of relying on waiting solely for the perception of physical pain. Now, we will discuss the ongoing

changes to the equation governing activation strength, affecting how likely chunks are selected, matched with productions, and fired. The activation strength of a particular chunk is defined by the equation A as a function of time t, A(t), such that:

$$A(t) = B(t) + \sum_j w_j s_{ij}, \exists w_j \in [0,1], \exists s_{ij} \in \mathbb{R}$$

where function B(t) is the base activation of the knowledge chunk at time t, and the summation is the associative strength of the chunk dependent on its related chunks. Each w_j reflects weights of s_ij, which represent the strengths of the current knowledge chunk to its related chunks. Concerning our model, a chunk with the information for "Pain" would have a high s_ij value to a chunk for "Gunshot", and these strengths are adjusted by updating w_j. Thus, the activation strength is governed by a neural network of chunks, which is updated by adjusting the weights; this is partly the reason why ACT-R is considered a hybrid cognitive architecture, which encompasses a connectionist form of knowledge representation in it (Whitehill 2013). The function B(t) is defined by the equation:

$$B(t) = \ln \sum_k t_k^{-d} + C$$

where k is the number of times repeated, d is the decay rate and a random variable C. If we look closely, the equation is, albeit decaying, a summation that increases in quantity through repeated exposure, which can be achieved via successful matches to a production rule or through practice (learning events).

In the context of the agent, after getting shot numerous times, the activation strength must increase along with the base activation. This means three things: 1) When ACT-R can choose between chunks, the chunk with the highest activation strength will be chosen; 2) The retrieval time of the selected chunk will be dramatically shortened; and, 3) The higher likelihood that the activation is above a retrieval threshold (Whitehill 2013). Combining these three principles, it can be ascertained that the chunk that holds the information about "flight" will be chosen much faster through repetition, and this effect will sum to the point where even if the agent has not taken physical harm from the projectile, the auditory stimulus with the high activation will be enough for said chunk to be chosen quickly and assuredly. Then, this chunk will match the necessary production (i.e. P1) and fire, and the procedure to the motor module, receiving instructions to run away, will commence.

Therefore, after numerous cycles, whenever the agent recognizes a loud sound, the agent will responsively realize that a potential of threat is imminent and will run away to avoid further confrontation, as enforced by the assumption that the agent desires to remain pain-free. Through this simulation study of an agent being shot (and the associative learning between a conditioned stimulus of a loud sound and a conditioned response of flight), the possibility of describing fear conditioning in ACT-R is demonstrated. It is important to note that this procedure has been dramatically simplified, where certain components in ACT-R, such as latency, selection fail-safes, log odds, and recalls, were omitted for brevity and the scope of this model.

Introduced by the renowned neuroscientist Antonio Damasio, the somatic marker hypothesis postulates that human decision-making is strongly affected by somatic markers; that is, feelings in the body associated with emotions (e.g. tearfulness with sadness, rapid heartbeat with anxiety). The hypothesis further states that somatic markers can influence decision-making via afferent feedback to the brain (Jameson, Hinson, and Whitney 2004); for example, the aforementioned agent hearing the loud auditory cue will incite fear, which in turn will motivate the agent to initiate the flight response. Thus, the brain can anticipate expected bodily changes, which allows us to respond faster to external stimuli without waiting for an event to actually occur. Damasio (1994) stated that emotions "have been connected, by learning, to predicted future outcomes of certain scenarios". Overall, the hypothesis that relates to this paper expresses the crucial role of our emotions in our ability to make swift, rational decisions in situations of profound complexity or uncertainty. Does our procedural model of fear provide rigid support for this claim?

Through our trace of fear conditioning in a cognitive architecture, we were able to showcase a hypothetical outline of our decision-making being heavily influenced by fear. This display of emotion-driven decision-making has been both theorized and modeled in other computational models other than ACT-R (Fum, Stocco, and Zalla 2005). Then, is it appropriate to suggest that, likewise, all emotions influence much of our decision-making? In our model, the emotion of fear was attached to the outcome of fear conditioning, with no phenomenal basis. In other words, what we colloquially define as fear, an intimate emotion that we can feel when we watch a horror movie or walk through a haunted house, is fundamentally not comparable to the results of a cognitive model. The difference lies in the problem of objectivity vs subjectivity, a major dispute prevalent in cognitive science and the philosophy of mind (Cussins 1992).

In our model, we could add further instructional processes toward both the motor and perception modules into P2, the production rule that dictates what to do post-trauma. However, adding more chunks to the production would only slow down the matching process, as the activation strength for the chunk would be inversely affected due to having to iterate through more productions to match and fire. It would be inefficient to add more things to do (e.g. freeze, sweat, etc.) when the chunk for flight, a built-in danger escape tool, is oftentimes the best choice. Therefore, it is implausible for the somatic marker hypothesis to be valid in our ACT-R model because it simply would take longer and, ergo, be less efficient to add human reactions from a fearful experience, like freezing or sweating, than not having them at all. Looking at the viewpoint of optimality for our ACT-R model, emotions cannot be the main source to govern our decision-making.

Analytically, the problem arises due to the radicality of the hypothesis' claim, which is that the majority of our decision-making is guided by somatic markers. Indeed, most people are more willing to perform tasks that are emotionally pleasing and vice versa. It is invalid, however, to appropriate this phenomenon over all kinds of tasks, whether long-term planning or moral considerations (Colombetti 2008). Also, the strength with which emotions such as fear influence decision-making varies across contexts and cultures (Poppa and Bechara 2017). In general, it seems that the hypothesis is oversimplifying decision-making such that emotions have the greatest influence over it. Concerning the ACT-R trace of fear conditioning performed beforehand, we cannot expect to account for every possibility through experimental or simulation analysis alone.

Conclusion

Our trace of fear conditioning in ACT-R showed promising results, accurately reflecting what would happen if the agent were a human. It has been shown that fear-inducing events, even when the encounter lacks any real negative experience for the agent, could encourage reactionary behaviours such as running away. Changes in behaviour were fundamentally defined by changes in the production rules, the chunks, and the activation strengths of said chunks, the combination of which we defined as the experience of fear. This model could be strengthened by adding numerous productions to interact with the perception module to demonstrate accurate phenomenal experiences that come with fear, such as freezing, sweating, and widening of pupils (LeDoux 2011). As aforementioned, it was assumed that simply appending these into the memory modules would result in delayed reactions, which would be inefficient concerning the heightened cost (time). However, unforeseen processes may arise within the model, which could accurately describe how and why humans experience these phenomena. Overall, this model motivates further research in attempting to model human behaviour and, furthermore, cognition.

Limitations

Despite its ineptitude in taking phenomenal emotions into account, the ACT-R cognitive model is a strong tool that can describe many psychological phenomena and human behaviours (J. E. Laird 2021). However, just because it is functionally apt in describing the consequences of the human mind, it does not necessarily mean it defines the processes behind them well. Emotion is only one of the many mental states that remain unaccounted for, still leaving behind crucial topics such as intention/motivation, qualia, consciousness, and more (Pekrun 1992). Great strides in neural networks and transformers have shown developments of human-like cognitive agents, like ChatGPT's Figure 1 (OpenAI 2024), but its efficiency in power consumption and response time pales in comparison to humans. Thus, it seems opportune to state that the role of cognitive science is to provide a cognitively and psycho-physiologically precise account of the human mind in order to assist in creating our very own artificial general intelligence (AGI).

References

Anderson, John Robert. 1993. Rules of the mind. http://ci.nii.ac.jp/ncid/BA21045984.

Colombetti, Giovanna. 2008. "The Somatic Marker Hypotheses, and What the Iowa Gambling Task Does and Does not Show." The British Journal for the Philosophy of Science 59 (1): 51–71. https://doi.org/10.1093/bjps/axm045.

Cussins, Adrian. 1992. "Content, Embodiment and Objectivity: The Theory of Cognitive Trails." Mind 101 (404): 651–88. https://doi.org/10.1093/mind/101.404.651.

Damasio, Antonio R. 1994. Descartes' error: emotion, reason, and the human brain. http://ci.nii.ac.jp/ncid/BA81390277.

Donadon, Mariana Fortunata, Rocio Martin-Santos, and Flávia L. Osório. 2018. "Baby Faces: Development and psychometric study of a stimuli set based on babies' emotions." Journal of Neuroscience Methods 311 (October): 178–85. https://doi.org/10.1016/j.jneumeth.2018.10.021.

Ekman, Paul. 1992. "An argument for basic emotions." Cognition & Emotion 6 (3-4): 169–200. https://doi.org/10.1080/02699939208411068.

Fox, Elaine. 2009. "Emotion science: cognitive and neuroscientific approaches to understanding human emotions." Choice Reviews Online 46 (10): 46–5903. https://doi.org/10.5860/choice.46-5903.

Fum, Danilo, Andrea Stocco, and Tiziana Zalla. 2005. "Revising the role of somatic markers in the gambling Task: A Computational account for Neuropsychological Impairments." Proceedings of the Annual Meeting of the Cognitive Science Society 27 (27). http://csjarchive.cogsci.rpi.edu/Proceedings/2005/docs/p2074.pdf.

Google Deepmind, David, Silver, Aja Huang, Chris J. Maddison, Arthur Guez, Laurent Sifre, George Van Den Driessche, Julian Schrittwieser, et al. 2016. "Mastering the game of Go with deep neural networks and tree search." Nature 529 (7587): 484–89. https://doi.org/10.1038/nature16961.

Jameson, Tina L., John M. Hinson, and Paul Whitney. 2004. "Components of working memory and somatic markers in decision making." Psychonomic Bulletin & Review 11 (3): 515–20. https://doi.org/10.3758/bf03196604.

Kajić, Ivana, Tobias Schröder, Terrence C. Stewart, and Paul Thagard. 2019. "The semantic pointer theory of emotion: Integrating physiology, appraisal, and construction." Cognitive Systems Research 58 (May): 35–53. https://doi.org/10.1016/j.cogsys.2019.04.007.

Kim, J. J., and M. W. Jung. 2006. "Neural circuits and mechanisms involved in Pavlovian fear conditioning: A critical review." Neuroscience & Biobehavioral Reviews 30 (2): 188–202. https://doi.org/10.1016/j.neubiorev.2005.06.005.

Laird, J. E. 2021. "An analysis and comparison of ACT-R and Soar by John Laird." https://www.youtube.com/watch?v=s-MA1iieMus.

———. 2022. "An analysis and comparison of ACT-R and SOAR." arXiv. https://doi.org/10.48550/arxiv.2201.09305.

References

Laird, John E., Christian Lebiere, and Paul S. Rosenbloom. 2017. "A standard model of the mind: toward a common computational framework across artificial intelligence, cognitive science, neuroscience, and robotics." AI Magazine 38 (4): 13–26. https://doi.org/10.1609/aimag.v38i4.2744.

Laird, John E., Allen Newell, and Paul S. Rosenbloom. 1987. "SOAR: An architecture for general intelligence." Artificial Intelligence 33 (1): 1–64. https://doi.org/10.1016/0004-3702(87)90050-6.

Larue, Othalia, Robert West, Paul S. Rosenbloom, Christopher L. Dancy, Alexei V. Samsonovich, Dean Petters, and Ion Juvina. 2018. "Emotion in the common model of cognition." Procedia Computer Science 145 (January): 740–46. https://doi.org/10.1016/j.procs.2018.11.045.

LeDoux, J. E. 2011. "Evolution of Human Emotion: A view through fear." Progress in Brain Research 195: 431–42. https://doi.org/10.1016/B978-0-444-53860-4.00021-0.

Lieto, Antonio. 2021. Cognitive design for artificial minds. https://doi.org/10.4324/9781315460536.

Mobbs, Dean, Cindy C. Hagan, Tim Dalgleish, Brian Silston, and Charlotte Prévost. 2015. "The ecology of human fear: survival optimization and the nervous system." Frontiers in Neuroscience 9 (March). https://doi.org/10.3389/fnins.2015.00055.

Newell, Allen. 1991. "Unified theories of cognition." Choice Reviews Online 28 (09): 28–5376. https://doi.org/10.5860/choice.28-5376.

Nyklíček, Ivan, A. J. J. M Vingerhoets, and Johan Denollet. 2010. Emotion regulation: conceptual and clinical issues. http://ci.nii.ac.jp/ncid/BA87044097.

OpenAI. 2024. "OpenAI's NEW "AGI Robot" - Figure 1." https://www.youtube.com/watch?v=GiKvPJSOUm.

Pekrun, Reinhard. 1992. "The impact of Emotions on learning and Achievement: Towards a Theory of Cognitive/Motivational Mediators." Applied Psychology 41 (4): 359–76. https://doi.org/10.1111/j.1464-0597.1992.tb00712.x.

Phelps, E. A. 2004. "Human emotion and memory: interactions of the amygdala and hippocampal complex." Current Opinion in Neurobiology 14 (2): 198–202. https://doi.org/10.1016/j.conb.2004.03.015.

Poppa, Tasha, and Antoine Bechara. 2017. "The somatic marker hypothesis: revisiting the role of the 'body-loop' in decision-making." Current Opinion in Behavioral Sciences 19 (November): 61–66. https://doi.org/10.1016/j.cobeha.2017.10.007.

Ritter, F. E., F. Tehranchi, and J. D. Oury. 2018. "ACT-R: A cognitive architecture for modeling cognition." WIREs Cognitive Science 10 (3). https://doi.org/10.1002/wcs.1488.

Seli, Paul, Jeffrey D. Wammes, Evan F. Risko, and Daniel Smilek. 2015. "On the relation between motivation and retention in educational contexts: The role of intentional and unintentional mind wandering." Psychonomic Bulletin & Review 23 (4): 1280–87. https://doi.org/10.3758/s13423-015-0979-0.

References

Shen, Liping, Minjuan Wang, and Ruimin Shen. 2009. "Affective e-Learning: Using "Emotional" data to improve learning in pervasive learning environment." Educational Technology & Society 12 (2): 176–89. http://www.anitacrawley.net/Resources/Articles/ShenWangShen.pdf.

Simić, G., M. Tkalčić, V. Vukić, D. Mulc, E. Španić, M. Šagud, F. E. Olucha-Bordonau, M. Vukšić, and P. R. Hof. 2021. "Understanding Emotions: Origins and roles of the amygdala." Biomolecules 11 (6): 823. https://doi.org/10.3390/biom11060823.

Sun, Ron, Nick Wilson, and Michael Lynch. 2015. "Emotion: A Unified Mechanistic Interpretation from a Cognitive Architecture." Cognitive Computation 8 (1): 1–14. https://doi.org/10.1007/s12559-015-9374-4.

Vervaeke, John Alexander. 1997. "The naturalistic imperative in cognitive science." https://tspace.library.utoronto.ca/handle/1807/10696.

Vuilleumier, P. 2005. "How brains beware: neural mechanisms of emotional attention." Trends in Cognitive Sciences 9 (12): 585–94. 10.1016/j.tics.2005.10.011.

West, Robert L., and Jeremy T. Young. 2017. "Proposal to add emotion to the standard model." National Conference on Artificial Intelligence, January, 487–92. https://orcid.org/0000-0003-1011-5795.

Whitehill, J. 2013. "Understanding ACT-R - an outsider's perspective." arXiv. https://doi.org/10.48550/arxiv.1306.0125.

♣ 7

Morphological Analysis of RME Neurons in C. elegans Dauers

By Yuna Lee

Introduction

Organisms are susceptible to environmental stress during development, which can induce phenotypic changes in the nervous system. Under harsh environmental conditions such as increased population density, high temperatures, and limited food, C. elegans diverges from its normal developmental program of maturing through the L1-L4 larval stages and enters an alternative, stress-resistant larval state specialised for survival, known as dauers (Fig.1, Cassada & Russell, 1975). Although the dauer stage is called a diapause and maintains some juvenile characteristics, it has been found that the nervous system continues to develop. This indicates that the dauer stage results from an alternative developmental pathway rather than a complete halt of development. Environmental conditions can trigger intrinsic genetic mechanisms that underlie cellular responses for coping with stress. The dauer stage is recognizable by distinct morphological adaptations such as a thick ridged cuticle for protection and locomotion, a smaller body size, and changes in metabolism (Wolkow & Hall, 2011). These attributes are reversible and can only form at a specific point in the worm's life cycle, at the second larval moult, further indicating a distinct dauer developmental program (Wolkow & Hall, 2011).

To gain insight into the inherent complexity of the human nervous system, small model organisms such as the nematode C. elegans can be studied as it is well characterised due to the ease of maintenance, experimental manipulation, short generation cycles, and capacity to study certain traits in detail. Its optical transparency and stereotypic nervous system also makes it ideal for such a purpose. With many biological features in common with humans, such as the development of nerves and the development of the organism, studies using C. elegans as a model can broaden our understanding of brain activity, complex neurological diseases, and aging (Rodriguez et al., 2013).

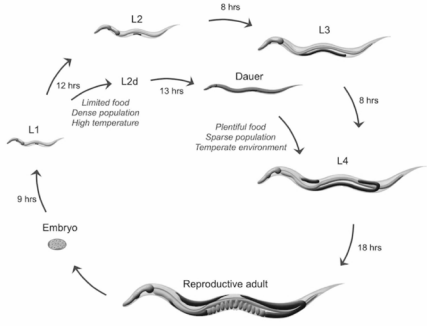


Figure 1. C. elegans life cycle with dauer variant. C. elegans larval development proceeds through 4 primary stages, L1 through L4. If L1 experiences harsh living conditions such as starvation, crowding, or elevated temperatures, the worm may proceed to an alternative pathway, L2d, followed by a stage known as dauer larvae. The dauer stage is reversible. If a favourable environment returns, the worm proceeds to L4 and eventually into a reproductive adult. (Adapted from WormAtlas Hermaphrodite IntroFIG 6.)

In order to adjust to harsh environments, dauers display distinct morphological and behavioural changes that aid survival, such as nictation, rapid escape response, and being motionless to enhance dispersal and long-term survival (Le Roith & Adamo, 2004). By entering a non-feeding and non-reproductive stage, dauers typically survive 4 to 8 times longer than the normal 2- to 3-week lifespan of C. elegans (Lee et al., 2011). As the environment fluctuates, the nervous system modifies certain circuits in response to internal and external cues. By comparing neural pathways between normal C. elegans nervous system and new dauer connectomes, the impacts of environmental stress can be investigated in further detail. Thus, analysing morphological and volume differences in individual neural structures across non-dauer worm stages and the dauer variant would reveal neurons most affected by developmental and environmental stress, providing insights into neuronal dynamics, signal transduction, and neuronal function (Karp, 2018). The goal of my project is to identify and study neurons that show morphological changes in C. elegans entering the dauer stage by analysing volumetric differences and recognising the potential implications in entering alternative developmental pathways.

Methods

1. Electron Microscopy Volumetric Data Analysis

Prior to this experiment, non-dauer and dauer C. elegans were imaged using serial-sectioning electron microscopy at the Zhen lab (Witvliet et al., 2021). Neural circuits with synaptic resolution were used to reconstruct the entire brain of C. elegans throughout development, particularly its circumpharyngeal nerve ring, which refers to a bundle of approximately 100 axons encircling the outside of the pharynx, and the ventral ganglion (Riddle et al., 1997). The neurons were annotated by segmenting and painting the cross-sectional stack images, based on the worm's cell body positions and stereotypic morphologies, creating a 3-dimensional model of each neuron. In general, neuron morphology is established during embryonic development and remains fairly consistent through normal development. The maturation of the nervous system in larval development primarily involves changes in connectivity rather than morphology (Witvliet et al., 2021). A total of 8 whole nerve ring projections were used for the comparative analysis of developmental stages, with 1 dauer variant and 7 non-dauer stages consisting of 4 L1, 1 L2, 1 L3, and 1 adult stage.

Figure 2. 3-dimensional projection of the dauer nerve ring. From David Witvliet's paper, the brains of 8 isogenic hermaphrodites at different developmental stages were reconstructed, resulting in a volumetric model of the C. elegans brain, coloured by cell type (Witvliet et al., 2021).

Through this preceding study, it has been found that the size of the brain grows uniformly, and its overall geometry is maintained without substantial changes in the shape or relative position of neurites. These 3-dimensional volumes of all developmental stages were segmented on VAST (Volume Annotation and Segmentation Tool), which is a utility application for manual annotation of large electron microscopy stacks. The volumetric data of each neuron from the 8 datasets were extracted to determine which neurons had the most significant volumetric changes in dauers versus non-dauers directly from VAST. This data was then used for comparative computational analysis using Python.

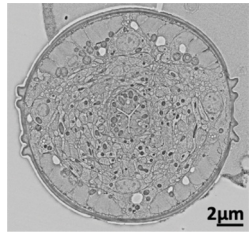


Figure 3: Cross-sectional electron microscopy stack image of the nerve ring. Every neuron, glia, and muscle was annotated to generate a connectome of the non-dauer brain. The same neurons were unambiguously identified in all datasets based on their soma position, neurite trajectory, and stereotypic morphological traits (Witvliet et al., 2021).

i) The volume of each neuron was normalised as a percent composition relative to the size of its respective larval brain to account for varying overall sizes of the worms. The following equation was used for the calculation. This was done for every neuron in every dataset.

$$percent\ composition\ = \frac{volume\ of\ neuron}{total\ neural\ volume\ of\ the\ worm}\ \times 100\%$$

(ex. Dataset 1, non-dauer L1 larval stage, RMED)

$$percent\ composition\ of\ RMED\ = \frac{volume\ of\ RMED\ in\ L1}{total\ neural\ volume\ of\ the\ worm} \times 100\%$$

$$percent\ composition\ of\ RMED\ = \frac{3896820960\ nm}{128619517800\ nm} \times 100\%$$

$$percent\ composition\ of\ RMED\ = 0.03029727545\ \times 100\%$$

$$percent\ composition\ of\ RMED\ = 3.03\%$$

ii) The 8 datasets of all non-dauer stages and the dauer stage were merged. This way, the changes in volume for each neuron across its developmental stages from L1 to adult with comparison to the dauer variant could be visualised and compared.

```
volume_df = pd.DataFrame (index = cells)

for dataset in file_assc.values():

  df = datasets[dataset].melt(

      id_vars = "Object Name",

      value_vars = "Object Volume",

      value_name = dataset

      ).drop("variable",axis=1).set_index("Object Name")

  volume_df = pd.concat([volume_df,df], axis = 1)

volume_df.to_csv('fullvolume.csv')
```

iii) The mean volume of each neuron in L2 and L3 was found (in nanometers). The mean volume (of L2 and L3) and the dauer volume were individually ranked greatest to least.

```
nd_means = volume_df[['Dataset 5', 'Dataset 6']].mean(axis = 1)

nd_rank = nd_means.rank()

d_rank = volume_df['Dauer'].rank()
```

The non-dauers stages that are most comparable in size and developmental step to the dauer stage are L2 and L3 larval stages (Fig. 1). Thus, the neuron volumes from L2 and L3 stages were primarily used as a representative of non-dauers when compared against the dauer volume. The mean volumes of L2 and L3 datasets were calculated for each neuron, which was then computed and visualised side-by-side with the neuron's dauer volumes. The neurons were then ranked based on their size relative to the rest of the neurons in non-dauer volumes and the dauer volume, greatest to least.

iv) For each neuron, the difference between the non-dauer (mean of L2 and L3) rank and the dauer rank was calculated. The non-dauer rank value was subtracted from

the dauer rank value, with a difference close to 0 indicating minimal volumetric changes between the stages. Furthermore, the rank differences were ordered from greatest to least to determine the neurons with the most significant volumetric differences between non-dauer and dauer stages at the top of the table.

```
rank_diff = d_rank - nd_rank

rank_diff = rank_diff.sort_values(ascending=False)
```

v) The final table was transferred to a csv file for observation.

```
output_file = "d_nd_rank_diffs.csv"

rank_diff.to_csv(output_file)
```

2. Confocal Microscopy Preparation

Analysis of the in silico experiment suggested RME as a neuron of interest given its significant volumetric difference between the dauer and non-dauer stages. Confocal imaging enables high resolution imaging of multiple layers of tissue and optical sectioning for reconstructing imaged worms (Elliott, 2019). Studying the RME neuron under the confocal microscope allows for validation of the conclusions from the electron microscopy volumetric data by analysing a larger sample than the limited electron-microscopy datasets.

In preparation for visualising the configuration of RME neurons in live worms under the microscope, C. elegans strain (CZ13799) with the genotype uIs76 [unc-25p::GFP + lin-15(+)] II were maintained. This particular strain consists of a GFP (Green Fluorescent Protein) reporter gene, which expresses green fluorescence in GABAergic motor neurons, including 6 DD neurons and 4 RME head neurons (RMEV, RMER, RMEL, and RMED) (Cinar et al., 2005). With this strain, RME neurons can be visualised under the confocal microscope. 2 sets of the strains were monitored under different conditions. 1 set was kept in a healthy environment at a temperature of 20 degrees Celsius and fed every 3 days for the imaging of non-dauer worms. The other set was maintained at the same temperature but starved and left uncared in plates beyond 7 days to create food scarcity and crowded conditions to induce dauers. Typically, it takes more than a week for dauers to form, so the non-dauer worms were consistently monitored for 13 days.

3. In vivo visualisation

After 13 days of culturing the worms, 10 non-dauer worms were picked that resembled L2 and L3 stages by size, while 10 dauer worms were picked from the starved plate. In two separate trials, the set of dauer and non-dauer worms were paralysed in 5% sodium azide to keep them immobile but still alive. Under the confocal microscope, GFP-expressing RME neurons were then characterised and imaged.

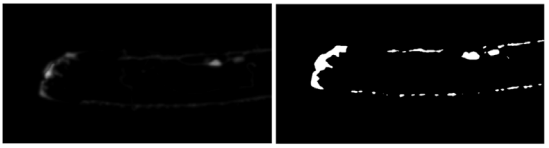


Figure 4. The confocal image of a dauer worm (left) was converted to a binary format (right) using Fiji to generate optimal representations of the GFP expressing RME neurons.

To create maximum projections of the GFP signals, the images were then binarised using Fiji (Fig. 4). Here, the 3-dimensional configuration of RME neurons was studied to determine whether the volumetric changes between non-dauer and dauer were from the difference in neuron configuration or change in size.

Results

In silico analysis of the stereotypic neurons provided knowledge on neural structures with the most significant changes in volumetric size between non-dauer stages and the dauer. The ranked selection of neurons with the greatest volumetric differences indicates that neurons RMEV, RMED, RMER, and RMEL are smaller in the dauer variant than the non-dauer L2 and L3 larval stages (Fig. 5). RMEV, RMED, RMER, and RMEL are subset classifications of the RME neuron based on their orientation: ventral, dorsal, right, and left, respectively. These are C. elegans neurons that express the neurotransmitter GABA and control head muscle movements (Cinar et al., 2005). The consistency of RME neural classes within the list suggests that it affects the behaviours of C. elegans entering the dauer stage. The reduced volume of RME in the dauer stage may indicate restrained activity of RME functionalities (Fig. 5).

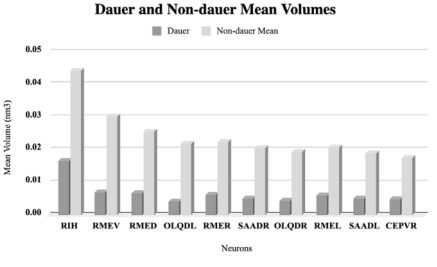


Figure 5. Mean neuronal volumes in dauer and non-dauer C. elegans. Non-dauer neurons exhibit consistently larger volumes, with the RIH neuron showing the most significant difference, suggesting structural or functional adaptations between life stages.

Aforementioned, RME is a motor neuron that releases GABA to relax flexed muscles and is used for head bending. RMED and RMEV specifically have been studied to control dorsal and ventral nerve cords and receive mechanosensory neurons (Cinar et al., 2005). The volume decrease of RME neurons aligns with the expected behaviours of dauers, as dormant activity of the organism is common to conserve energy for survival.

In vivo study of RME dauers and non-dauers under the confocal microscope supports preceding computational analysis by confirming its morphological changes. Upon investigating the neural configuration of the confocal images, it was discovered that the RME neurons as a whole decreased in volume from their non-dauer size by about 50% as a dauer variant. This was determined using Fiji's measuring tool to scale the confocal images of dauer and non-dauer worms, which had a ratio of 2.9 to 7.1, respectively. This scaling was the length measurement of the worm's nerve ring from the anterior to the posterior plane. The reduction in volume suggests that C. elegans that enter the dauer stage under harsh environmental conditions has a decrease in neuronal activity of RME, a type of motor neuron involved in innervating head muscles to control foraging, which suggests a decrease in behavioural activity correlated to the morphology of neurons (Cinar et al., 2005).

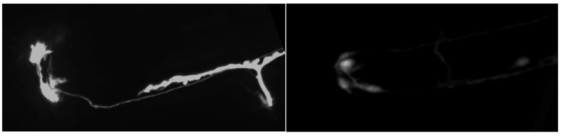


Figure 6. Images from the confocal microscope comparing non-dauer RME neuron is shown in left and dauer RME neuron is shown in right, displaying a morphological decrease in structural and GFP prominence.

Comparative confocal images displaying the morphology of RME neurons in non-dauer and dauer worms show a decrease in GFP-stain brightness when entering the dauer stage (Fig. 6). The reporter used for the in vivo experiment expresses GFP under the unc-25 promoter. This indicates that its expression is proportional to the expression of the unc-25 transcript since this is an exogenous-line. Thus, given that the expression of GFP is weaker in dauers, there would also be a lower expression of unc-25 in dauers as well. It is unclear whether this coincides with a decrease in neural activity of RME.

Discussion and Limitations

Computational analysis identified neurons with significant volume changes between non-dauer larval stages and the dauer stage, with more prominent volumetric differences in cell sizes in some neurons than others. Some of the neurons with the greatest changes aside from the selected RME include OLQ, known to be a motor neuron, and SAA, which is involved in the regulation of foraging movements (Fig. 5), both distinct behavioural traits of dauers (WormAtlast et al.). Dramatic changes in neuron morphology, such as volume or size, may reflect adaptations in an organism's neural circuits that underlie specific behaviours or functions. These can be further explored through behavioural studies such as neuron ablation, using genetically encoded photosensitizers such as miniSOG to ablate cells in C. elegans and determine neural functions (Xu & Chisholm, 2016). Stimulation using optogenetic channels can also be used to determine whether these neurons are indeed necessary for dauer-specific attributes (Shipley et al., 2014).

The size reduction of RME neurons in its dauer stage indicates functional advantages, such as efficient intracellular transport, conserving energy, and decreasing metabolic demands (Ewald et al., 2017). Thus, the reduction in RME volume of the dauer in comparison to non-dauer larval stages serves as crucial evidence for understanding the behaviour and cognition pathways involved in neurodevelopmental processes.

Following the volumetric analysis of RME neurons in C. elegans dauers in silico, electron microscopy data conclusions were validated using confocal in vivo imaging by looking at a larger number of worms. Confocal images can also be used in future studies to examine the effects of certain mutations on dauer-specific neuron morphology changes. With this tool, cell-specific knockdowns of dauer-entry pathway proteins, such as DAF-16, can be explored to determine whether dauer traits such as cell size will be affected.

RME is not the only neuron morphologically affected in the dauer stage (Fig. 1). That is to say, several other neurons undergo changes during this alternative developmental pathway, which proposes a broader perspective of volumetric changes that occur between non-dauer and dauers. Future studies can focus on neurons such as RIH, OLQ, or SAA to answer the following questions: are there neurons that are collectively affected, neurons consequently affected, or a group of neurons that are mostly affected? Given that this study validated the morphological changes in RME, functional experiments on the neuron would enable the discovery of certain gene functions and involvement in cellular or physiological pathways. This research was focused on looking at neurons with the greatest volumetric change with dauers having a smaller size. However, it is important to note that there are neurons that increase in volumes upon entering the dauer stage, which can suggest a significance in behavioural generation.

Additionally, the rationale behind studying the RME neuron other than its consistent prevalence in the volumetric comparative data was that it had an effective GFP-expressing strain with unc-25p::GFP not expressed in several nearby cells, so visualising the morphology of RME was unchallenging. If other neurons with large morphological changes aforementioned also had strains with effective GFP markers, it would be a promising extension to this experiment to further investigate the implications of volumetric differences between non-dauer and dauer stages.

The decrease in GFP-expressed structural integrity of the dauer neuron in comparison to a non-dauer shown in Figure 6 indicates that there may be a lower expression of unc-25 in dauers. Transcriptional reporters for unc-25 encode a glutamic acid decarboxylase (GAD), which is an enzyme necessary for GABA biosynthesis (Jin et al., 1999). A past study suggested that reducing GABA signalling by mutating its receptors may increase lifespan, a trait common in dauers (Jin et al., 1999). Therefore, a lower production of GABA in dauers, coincidentally with an increase in the dauer's lifespan, may also be a possible hypothesis to explore from these results. Studying the role of GABA signalling has the potential to broaden our understanding of neuronal function regulation in the mammalian nervous system (Yuan et al., 2019).

Overall, this study suggests that under stressful environmental conditions, C. elegans neural circuits adapt to meet the metabolic demands of the dauer stage for specialised functional roles. The size differences of the RME neuron suggest abnormalities or disruptions in developmental processes under harsh conditions, which in broader application, can explain potential pathways that lead to neurodevelopmental disorders or cognitive deficits.

Acknowledgements

A warm thanks to Dr. Mei Zhen, William Li, Alanna Love, Mona Wang, and the rest of the Zhen Lab for their unwavering support and guidance!

References

Cassada, R. C., & Russell, R. L. (1975). The dauerlarva, a post-embryonic developmental variant of the nematode caenorhabditis elegans. Developmental Biology, 46(2), 326–342. https://doi.org/10.1016/0012-1606(75)90109-8

Cinar, H., Keles, S., & Jin, Y. (2005). Expression profiling of GABAergic motor neurons in Caenorhabditis elegans. Current Biology, 15(4), 340–346. https://doi.org/10.1016/j.cub.2005.02.025

Elliott, A. D. (2019). Confocal Microscopy: Principles and modern practices. Current Protocols in Cytometry, 92(1). https://doi.org/10.1002/cpcy.68

Ewald, C. Y., Castillo-Quan, J. I., & Blackwell, T. K. (2017). Untangling longevity, Dauer, and Healthspan in caenorhabditis elegans insulin/IGF-1-signalling. Gerontology, 64(1), 96–104. https://doi.org/10.1159/000480504

Jin, Y., Jorgensen, E., Hartwieg, E., & Horvitz, H. R. (1999). The caenorhabditis elegans gene unc-25 encodes glutamic acid decarboxylase and is required for synaptic transmission but not synaptic development. The Journal of Neuroscience, 19(2), 539–548. https://doi.org/10.1523/jneurosci.19-02-00539.1999

Karp, X. (2018). Working with dauer larvae. WormBook, 1–19. https://doi.org/10.1895/wormbook.1.180.1

Le Roith, D., & Adamo, M. L. (2004). Insulin-like growth factors. Encyclopedia of Endocrine Diseases, 32–35. https://doi.org/10.1016/b0-12-475570-4/01451-7

Lee, J., Kim, K.-Y., Joo, H.-J., Kim, H., Jeong, P.-Y., & Paik, Y.-K. (2011). Methods for evaluating the Caenorhabditis elegans dauer state: Standard dauer-formation assay using synthetic Daumones and proteomic analysis of O-Glcnac modifications. Methods in Cell Biology, 445–460. https://doi.org/10.1016/b978-0-12-544172-8.00016-5

Preusser, F., Neuschulz, A., Junker, J. P., Rajewsky, N., & Preibisch, S. (2022). Long-term imaging reveals behavioral plasticity during C. elegans dauer exit. BMC Biology, 20(1). https://doi.org/10.1186/s12915-022-01471-4

Riddle, D., Meyer, B., & Blumenthal, T. (1997). C. elegans II. 2nd edition. Cold Spring Harbor Laboratory Press.

Rodriguez, M., Snoek, L. B., De Bono, M., & Kammenga, J. E. (2013). Worms under stress: C. elegans stress response and its relevance to complex human disease and aging. Trends in Genetics, 29(6), 367–374. https://doi.org/10.1016/j.tig.2013.01.010

Shipley, F. B., Clark, C. M., Alkema, M. J., & Leifer, A. M. (2014). Simultaneous optogenetic manipulation and calcium imaging in freely moving C. elegans. Frontiers in Neural Circuits, 8. https://doi.org/10.3389/fncir.2014.00028

Witvliet, D., Mulcahy, B., Mitchell, J. K., Meirovitch, Y., Berger, D. R., Wu, Y., Liu, Y., Koh, W. X., Parvathala, R., Holmyard, D., Schalek, R. L., Shavit, N., Chisholm, A. D., Lichtman, J. W., Samuel, A. D., & Zhen, M. (2021). Connectomes across development reveal principles of brain maturation. Nature, 596(7871), 257–261. https://doi.org/10.1038/s41586-021-03778-8

References

Wolkow, C., & Hall, D. H. (2011). Wormatlas Dauer Handbook - The Dauer Cuticle. WormAtlas. https://doi.org/10.3908/wormatlas.3.1

Wolkow, C., & Hall, D. H. (2015). Wormatlas Dauer Handbook - Introduction to the dauer larva - genetics of dauer arrest. WormAtlas. https://doi.org/10.3908/wormatlas.3.11

WormAtlas, Altun, Z.F., Herndon, L.A., Wolkow, C.A., Crocker, C., Lints, R. and Hall, D.H. (ed.s) 2002-2024. http://www.wormatlas.org

X. Huang, H.J. Cheng, M. Tessier-Lavigne, Y. Jin MAX-1, a novel PH/MyTH4/FERM domain cytoplasmic protein implicated in netrin-mediated axon repulsion Neuron, 34 (2002), pp. 563-576 https://cgc.umn.edu/strain/CZ13799

Xu, S., & Chisholm, A. D. (2016). Highly efficient optogenetic cell ablation in C. elegans using membrane-targeted minisog. Scientific Reports, 6(1). https://doi.org/10.1038/srep21271

Yim, H., Choe, D. T., Bae, J. A., Choi, M., Kang, H.-M., Nguyen, K. C., Ahn, S., Bahn, S., Yang, H., Hall, D. H., Kim, J. S., & Lee, J. (2024). Comparative connectomics of Dauer reveals developmental plasticity. Nature Communications, 15(1). https://doi.org/10.1038/s41467-024-45943-3

Yuan, F., Zhou, J., Xu, L., Jia, W., Chun, L., Xu, X. Z. S., & Liu, J. (2019). GABA receptors differentially regulate life span and health span in C. elegans through distinct downstream mechanisms. American Journal of Physiology-Cell Physiology, 317(5). https://doi.org/10.1152/ajpcell.00072.2019

Arbor Journal of Undergraduate Research

Humanities, Social Sciences, and Sciences at UofT.

No. 6

The Arbor Journal of Undergraduate Research is the premier undergraduate journal for the Arts & Sciences, seeking to publish, highlight, and celebrate the best of undergraduate Arts & Science research at the University of Toronto. Arbor offers the unique opportunity for undergraduate students to gain experience in copyediting, peer-editing, publication and partaking in the role of the editorial board.

Following its inception by the Arts and Science Students' Union (ASSU), Arbor has set out to promote the work of undergraduate students at one of the most distinguished research universities in the world. The University of Toronto is a premier venue for conversations about cross-disciplinary research and Arbor hopes to showcase the research talent of the university's undergraduate students through an annual issue featuring the best from the humanities, social sciences, life sciences, and physical sciences.