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How the Electric Toothbrush, Search Engine, Smartphone, Social Media and Artificial Intelligence Decision-Making Processes Amplify the Exercise of Power at State and Global Levels: A Media Ecology Analysis

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Aller au sommaire du numéro

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Résumé de l'article

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Abstract: Scholars disagree over whether the employment of artificial intelligence technologies entails an inevitable exercise of power over people or whether such technologies can be configured in such a way as to allow a plurality of possible ways to engage in governance. This article uses the media ecology approach to analysis to demonstrate that the concern that artificial intelligence technologies that appear to be mundane are in fact involved in the exercise of power over people is valid. It contributes to the existing literature by showing that numerous applications of artificial intelligence that people use on an everyday basis interact to amplify one another's effects. These technologies are the electric toothbrush, internet search engine, smartphone, social media and the use of artificial intelligence as part of the decision-making process. These effects occur at the levels of the individual, city, state and inter-state. These effects are cascading and interconnected rather than occurring on distinct planes. The exercise of power over the individual by the state and the corporations becomes difficult to disentangle. Therefore, states need to cooperate regarding governing artificial intelligence and technology companies if they are to meaningfully protect people from harmful effects.

Keywords: media ecology, governance, artificial intelligence, artificial intelligence decision-making processes, smartphone, social media, internet search engine, electric toothbrush

I. Introduction

The European Parliament said that it adopted a "landmark" law when it endorsed the Artificial Intelligence Act in March 2024 (European Parliament 2024). The European Parliament then went on to state that this legislation establishes "Europe as a leader in the field" (Ibid.). The

use of the theoretical framework of media ecology makes it possible to identify why the European Parliament is making statements overpromising what the legislation that it adopted can achieve. This is the case because the employment of media ecology analysis makes it possible to unveil the impact of the use of artificial intelligence (hereinafter AI) on society. Media ecologist Marshall McLuhan put forward that every technology has a transformative impact on the individual and society (McLuhan, Fiore and Agel 1996, 25). The knowledge about the societal impact of AI (Eyert, Irgmaier and Ulbricht 2018, 48) can provide insights into why countries should not mimic the Artificial Intelligence Act when formulating policies and laws on AI.

The present article will use the media ecology approach to analysis to demonstrate that the Artificial Intelligence Act does not address an important issue. Scholars disagree over whether the employment of different applications of AI involves an exercise of power over people by default (Liu 2018, 199; Sherman 2023, 1220). The present discussion will confirm that the use of several AI applications involves an exercise of power over individuals by default. Even an AI-based technology that appears to be far removed from exercising power over people, such as an electric toothbrush, creates an environment that is conducive to the exercise of power over the user without the user's knowledge. The article will show that when individuals use an electric toothbrush, smartphone, internet search engine, social media and AI decision-making processes, these technologies amplify one another's effects. Alongside an intensification of the exercise of power, there is a situation where the exercise of power over people by governments and corporations becomes difficult to disentangle. The exercise of power through AI technologies at the levels of the individual, city, state and inter-state is intertwined. The exercise of power by private and public actors becomes interlinked to such an extent that it is no longer meaningful to separate the locus of control as being related to either actor. Neither is it meaningful to talk about particular levels at which public authorities and private corporations exercise power. The article will put forward that the cumulative use of numerous AI-based technologies creates reverberating effects linking each individual to the global plane. It is not just that the use of AI involves the oppression of some over others (Mohamed, Png and Isaac 2020, 666). These technologies change the environment in a manner where the harmful effects arising from the use of AI on individuals, the city, the state and the inter-state levels

become fused and interwoven. One can no longer speak of effects as being confined to a particular individual, group, state, site, space, or time. Since these findings are new, the present article creates new knowledge.

Moreover, the article contributes to existing scholarship by suggesting that states need to understand in a different manner the effects that numerous AI technologies bring about. The advent of AI means that one should understand the impact of this technology in terms of cascading and interwoven effects. AI produces effects on the individual, the city, the state and the global community in a manner that cannot be neatly separated. Such effects cannot be grasped by focusing on particular levels where such impacts occur. Policymakers need to view the individual, the city, the state and the global community as interdependent and as comprising one whole. The upshot of this fact is that in formulating policies and laws on AI, states should consider how to safeguard the well-being of the individual, the city, the state and the global community. The legal instruments need to mitigate harmful effects arising from the interaction between diverse AI-based technologies.

The findings point to the fact that states need to cooperate to govern AI through international treaties if they are to have a meaningful impact on curbing the harmful effects of AI. The treaties and domestic legislation should address the fact that certain AI-based technologies create impacts that link together individuals and communities globally. Unfortunately, the Artificial Intelligence Act does not address directly the issue of organisations exercising power over people through technology. Neither does it engage with the issues of global interconnectedness and international cooperation. These aspects make this legal instrument poorly suited to address a key concern. This article will be of interest to the media ecology, policy-making and legal communities.

The context for this article is that while states are adopting new legislation governing AI (European Parliament 2024), scholars disagree over the social impact of this technology (Liu 2018, 199; Sherman 2023, 1220). Lawmakers can address the negative impacts of AI better if they understand the effects arising from the use of this technology. As a result, it is crucial to analyse what effects the use of AI creates in society (Eyert, Irgmaier and Ulbricht 2018, 48). Thus, resolving the scholarly disagreement over the role of AI in exercising power over people (Liu 2018, 199; Sherman 2023, 1220) is important.

Here is how the debate about the relationship between AI and the exercise of power (Liu 2018, 199) has been evolving. Shoshanna Zuboff put forward that “surveillance capitalism is the puppet master that imposes its will through the medium of the ubiquitous digital apparatus” (Zuboff 2018, 176). She called this apparatus the “Big Other” (Ibid.). Zuboff explained that,

> “I now name the apparatus Big Other: it is the sensate, computational, connected puppet that renders, monitors, computes, and modifies human behavior. Big Other combines these functions of knowing and doing to achieve a pervasive and unprecedented means of behavioral modification. Surveillance capitalism’s economic logic is directed through Big Other’s vast capabilities to produce instrumentarian power, replacing the engineering of souls with the engineering of behavior” (Ibid., 176).

Her definition of this apparatus is very expansive. Initially, she talks of the digital apparatus as comprising diverse digital technologies, such as digital personal assistants (Ibid., 176-177). At a later stage, she says that in “Microsoft’s instrumentarian society” the “Big Other” directs machine and human action through multiple technologies, such as those controlling when car engines can be switched on (Ibid., 191). She describes humans and machines as being united in a cloud (Ibid.). The “Big Other” ensures that individuals perform in accordance with “policy” (Ibid.). Technology controls how people relate to each other and technical artifacts (Ibid.). It achieves this by storing peoples’ schedules and documents in the cloud as well as by displaying information about peoples’ productivity as a graph (Ibid.). This automatic imposition and control over behaviour are detached from “social processes associated with private or public governance” (Ibid.). People remain unaware that they are being controlled through technology (Ibid., 192).

Zuboff appears to associate companies developing the technology with the “Big Other.” She talks of surveillance capitalists as having an “appetite for totality” (Ibid., 189). The surveillance capitalists portray technology as something that will magically solve society’s problems (Ibid.). She regards surveillance capitalism as having a vision of a society where machine learning becomes a “collective mind” (Ibid., 190-191). Machine learning is a subfield of study within

artificial intelligence (Brown 2021). Zuboff regards all machines as learning from one another and as operating jointly in a network to achieve the same outcomes (Zuboff 2018, 190-191). Unfortunately, Zuboff does not provide a detailed analysis to justify why her assertion applies to all digital technologies in general or to AI-based applications in particular. Neither does she analyse in depth how either different digital technologies or AI-based applications interact with one another.

In a similar vein to Zuboff, Hin-Yan Liu posits that the employment of AI entails the exercise of political power over human beings (Liu 2018, 199). He uses the Chinese Social Credit System to illustrate this argument (Ibid., 202). The Chinese Social Credit System involves the government collecting data on the behaviour of individuals and awarding them a positive or a negative score (Yang 2022). The government uses video surveillance to monitor individuals' behaviour in real-time (Canales and Mok 2022). AI uses this data about behaviour to calculate the social credit score for each person (Suter 2020, 43). Additionally, there is scholarship examining the role of the internet search engine, social media and the employment of the AI decision-making processes in the exercise of power over people (Zuboff 2018, 176; Citron and Richards 2018, 1356; Johns and Fourcade 2020, 808-809; Liu 2018, 199; de Laat 2019, 319).

Stephanie Sherman has a different perspective on digital technologies. Sherman questions whether the use of sensors and infrastructures in the city to collect and share information through a network of technologies involves a "disciplinary architecture" (Sherman 2023, 1209). Examples of technologies embedded in the city infrastructure include "cameras, sensors, facial recognition systems, mobiles and wearables" (Ibid.). Such technologies include the use of AI to predict how the situation will evolve, to produce a decision and to respond to a situation (Ibid.). Instead, Sherman thinks that the concept of a Polyopticon can be used to understand the distribution and interaction of AI alongside the technologies involved in collecting information in a city (Ibid., 1210). A Polyopticon is a "multi-perspectival and trans-perspectival network of sensing, knowing and sharing" (Ibid.). Different technologies can operate in a network to achieve particular goals, such as privacy (Ibid., 2019). It is possible to have a Polyopticon without domination and homogenisation (Ibid. 1220). Sherman observes that states and companies "provide the technology" (Ibid., 1214). They standardise the protocols which enable technologies to exchange information and to interact (Ibid., 1214). As a result, Sherman concludes that the design of technology shapes who owns the data, how technology is

embedded in a network of technologies and how people govern technology (Ibid.).

Therefore, unlike Zuboff (Zuboff 2018, 191), Sherman does not see technology as being beyond private and public governance (Sherman 2023, 1214). This is the case even though multiple technologies can operate together due to being integrated into the city infrastructure (Ibid., 1209). For Sherman, the design of technology and the political ideology underpinning its design shape what political changes the operation of technology brings about (Ibid., 1210). Given the divergent opinions between Zuboff, Liu and Sherman, it is necessary to critically reflect on the validity of Zuboff's and Liu's claims.

Such inquiry is particularly needed and timely. Digital technologies in general and AI technologies in particular are diverse. This aspect makes it necessary to scrutinise whether it is possible to make overarching assertions that apply to several different AI-based technologies. Furthermore, it is necessary to evaluate the validity of Zuboff's assertion because AI-based technologies are becoming an integral part of people's lives in several countries. For example, AI can be found in some electric toothbrushes (Oral-B 2024a). Some vacuum cleaners operate on AI software (Samsung 2023). AI can generate images and art from a description in natural language (OpenAI 2024). It can generate text, such as an article (Fontanella-Khan 2020). AI is present in smartphones (Wired Brand Lab 2024) and social media (Darbinyan 2023). Search engines rely on AI to determine what content to display in response to a search term (Heidt 2023). England's National Health Service uses AI to assess whether the image of tissue indicates the presence of cancerous cells (NHS England 2024). Likewise, AI can be found in chatbots that offer customer service support (Viliavin 2023).

Additionally, it is timely to evaluate what effects manifest themselves at state and global levels due to numerous AI-driven technologies interacting with one another. Florian Eyert, Florian Irgmaier and Lena Ulbricht explain that the deployment of AI will create profound changes at the societal level (Eyert, Irgmaier and Ulbricht 2018, 48). Liu believes that there is a need to examine what "structural" and "systemic" effects in society arise due to the cumulative use of a particular technology, such as self-driving cars (Liu 2018, 200). Unfortunately, Liu does not provide an in-depth analysis justifying his claim that the use of a particular type of AI

technology produces “structural” effects in society (Ibid.). Neither does he consider what effects arise due to different AI applications interacting with one another.

The article uses the technologies of the electric toothbrush, internet search engine, the smartphone, social media and the AI decision-making process as a case study. The article includes the electric toothbrush as part of the case study because at first glimpse this technology appears not to be connected in any way to the other technologies which form the basis of a case study. The article will demonstrate that contrary to the first impression the use of the electric toothbrush creates similar effects in the environment to the other technologies which are part of the case study.

The article uses the internet search engine, smartphone, social media and the AI decision-making process as a case study because these technologies are related to one another. Both the internet and social media allow people to share and to communicate information. The smartphone provides access to social media applications. Another aspect connecting the internet search engine, the smartphone, social media and the AI decision-making process is that the output from one of these technologies can feed into another technology. Danielle Keats Citron and Frank Pasquale explain that an individual’s online activities (Peck 2013), the rankings they receive online (Ritchel 2014) and the information individuals share on their apps (Marwick 2014) can be used as inputs into the AI decision-making process (Citron and Frank Pasquale 2014, 2-4). The AI decision-making process can use this information to predict a person’s behaviour and to produce a decision about that person (Ibid.). Data is important for the functioning of the AI decision-making process because this technology requires data of sufficient volume and variety in order to achieve the desired level of accuracy of prediction (Johns and Fourcade 2020, 808). Since peoples’ online activities (Peck 2013), the rankings they receive online (Ritchel 2014) and the information individuals share on their apps (Marwick 2014) can be used as inputs into an AI decision-making process (Citron and Frank Pasquale 2014, 2-4), these three technologies are interrelated. Due to space limitations, it is beyond the scope of this article to consider all types of interactions that can take place between AI applications that serve as a case study. Rather, the purpose of this article is to begin to map such interactions and to trace such interactions to particular effects.

Section 2 will explain why the present analysis is informative not only for media ecologists but

also for the policy-making and legal communities. It argues that the Artificial Intelligence Act does not address adequately the impact that the employment of numerous AI applications produces. The Artificial Intelligence Act does not account for the fact that different AI applications can amplify one another's effects through interacting with one another. Thus, the Artificial Intelligence Act has a gap when it comes to addressing the impact of AI. Furthermore, this section explains why the present discussion is valuable for the United Nations. Section 3 will define AI. It will explain what role AI has in technologies that serve as a case study. Section 4 will argue that the technologies which serve as a case study involve an exercise of power over people by default (Zuboff 2018, 176; Citron and Richards 2018, 1356; Johns and Fourcade 2020, 808-809; Liu 2018, 199; de Laat 2019, 319). Section 5 will demonstrate that the operation of the electric toothbrush, the smartphone, the internet search engine, social media and the AI decision-making process amplify one another's effects. An example of such an effect is the intensification of the exercise of power over people. This section will scrutinise how such effects come to permeate the levels of the individual, city, state and inter-state. Section 6 will use the findings to provide recommendations to the policymakers about how to approach governing AI.

II. Why This Discussion is Valuable to the Legal, Policy Making and Media Ecology Communities

The knowledge of what effects occur in the environment due to multiple different AI applications interacting with one another is of value to the legal, policy and media ecology communities. The legislatures need to understand what impacts the deployment of AI technologies produces to formulate laws. By way of illustration, the experts advising the Council of Europe on how to regulate AI in accordance with European values expressed the view that data protection necessitates consideration of both human rights and broader societal issues (Mantelero 2019, 3-4; Mantelero 2018, 755). After the publishing of this report, countries that are members of the European Union created the Artificial Intelligence Act in order to ensure that the use of AI technology complies with the fundamental rights and numerous social values (Council and European Parliament 2024, Art. 1). Despite the awareness among numerous states in Europe that legislation needs to address broader

societal issues arising from the deployment of AI (Mantelero 2019, 3-4; Mantelero 2018, 755), the Artificial Intelligence Act engages with this issue partially. A possible reason for this gap is that there may be insufficient awareness among the policy-making community about the specific ways in which multiple AI technologies can amplify one another's effects through interacting with one another.

To see why this is the case, consider the following provisions of the Artificial Intelligence Act. The Artificial Intelligence Act states that it adopts a risk-based approach to governing AI (Council and European Parliament 2024, paras. 26-27). This means that the legal rules in this legislation are tailored to the degree of risk that the deployment of AI poses including to the enjoyment of human rights (Ibid., par. 26). Article 6 of the Artificial Intelligence Act designates certain applications of AI as posing high-risk (Ibid., Art. 6). Section 3 specifies the duties of providers of AI, deployers of AI and other parties (Ibid., s. 3). Chapter 3 elaborates what measures the duty bearers need to take in light of the high-risk character of such systems (Ibid., ch. 3). The Artificial Intelligence Act acknowledges the need to consider the societal impact of AI when evaluating the impact of deploying AI. It draws a connection between intervening to regulate AI and safeguarding the societal values of democracy and the rule of law (Ibid., par. 28). It states that systems need to be developed so as to benefit all human beings (Ibid., par. 27). It is necessary to monitor the long-term impacts of AI "on the individual, society and democracy" (Ibid.).

However, it is suggested that the Artificial Intelligence Act does not comprehensively engage with the issue that AI creates effects manifesting themselves at the societal level in practice (Eyert, Irgmaier and Ulbricht 2018, 48). By way of example, Article 15(4) requires that high-risk AI systems be resilient to the consequences arising due to AI interacting with people and other systems (Council and European Parliament 2024, Art. 15(4)). This provision has a limited scope. It only covers "faults or inconsistencies that may occur within the system or the environment in which the system operates due to the AI interacting with other systems" (Ibid.; Ibid., par. 75). As a result, this provision does not contemplate multiple AI applications operating without error and giving rise to distinct harmful effects due to interacting with one another.

Article 27(1) requires those deploying AI to carry out a human rights impact assessment before

using the system (Ibid., Art. 27(1)). While the Artificial Intelligence Act requires deployers to carry out a human rights impact assessment (Ibid.), it does not draw a link between the impacts that AI may have on an individual with the effects that may manifest themselves due to multiple different AI applications interacting. The Artificial Intelligence Act merely comments that the provider needs to identify risks and adverse impacts "arising from the interaction between the AI system and the environment within which it operates" (Ibid., par. 65). This commentary addresses only risks arising from the operation of a particular AI system. Since the legislation refers to an AI application (Ibid.) and since it defines an environment as the context in which the AI system operates (bid., par. 12), it leaves unaddressed the issue of multiple AI applications producing effects through interacting with one another. As a result, the Artificial Intelligence Act does not consider the need to regulate effects that arise from multiple different AI applications interacting with one another. When Zuboff talks of different digital technologies constituting a "digital apparatus" (Zuboff 2018, 176), she implies that these technologies are interconnected and operate in an interrelated manner. It is therefore important to scrutinise whether numerous AI technologies operate in a manner to amplify each other's effects. A related issue is that the Artificial Intelligence Act does not consider whether a particular application posing a low or a moderate degree of risk may come to pose a much higher degree of risk due to multiple AI applications interacting with one another.

It is put forward that the following example illustrates another oversight in the Artificial Intelligence Act relating to the failure to account for the societal impacts of AI (Eyert, Irgmaier and Ulbricht 2018, 48). Article 5(1)(a) of the Artificial Intelligence Act prohibits putting into use an AI system that exploits any of the vulnerabilities of a person or a specific group of persons to "materially distort" their behaviour in a manner that is likely to cause that person "significant harm" (Artificial Intelligence Act 2024, Art. 5(1)(a)). Since Article 5(1)(b) of the Artificial Intelligence Act focuses on the use of a particular AI product to exploit the vulnerabilities of a particular person or group due to having personal characteristics, such as age (Ibid., Art. 5(1)(b)), the legal provision fails to consider what type of effects different AI applications create due to interacting. Had the Artificial Intelligence Act comprehensively addressed this issue, it would have explicitly acknowledged the fact that different AI applications could bring about particular effects through interacting with one another which can then impact individuals and

groups.

A potential counterargument is that in setting to protect equality and human dignity (Council and European Parliament 2024, par. 28), the Artificial Intelligence Act seeks to prevent harmful impacts from arising at a societal level. The response to this counterargument is that Article 9(2)(b) merely requires the estimation of risks that may emerge (Ibid., Art. 9(2)(b)). It imposes an obligation to implement risk mitigation measures (Ibid., Art. 9(2)(d)) to ensure that the overall risk posed by the employment of AI is acceptable (Ibid., Art. 9(5)). It is suggested that had the Artificial Intelligence Act engaged with the issue of AI producing effects beyond the level of the individual (Eyert, Irgmaier and Ulbricht 2018, 48), it would have explicitly required an assessment of harmful impacts which may emerge due to AI transforming the "fabric of the social world" (Birhane 2019, 2). Moreover, the Artificial Intelligence Act would have arguably had a blank prohibition on using AI in certain contexts due to the effects that these applications produce at the societal level (Eyert, Irgmaier and Ulbricht 2018, 48). Virginia Eubanks for instance found that the use of AI as part of the decision-making process can deepen inequality (Eubanks 2018, 204). It is maintained that the legislation that takes the impacts of AI at the societal level seriously (Eyert, Irgmaier and Ulbricht 2018, 48) would have prohibited all uses of AI which are likely to entrench inequality (Eubanks 2018, 204).

Similarly to the experts advising the Council of Europe (Mantelero 2019, 3-4; Mantelero 2018, 755), the United Nations High Commissioner for Human Rights Michelle Bachelet acknowledged implicitly the role of the impact of AI at the societal level (Eyert, Irgmaier and Ulbricht 2018, 48) in a report. She explained that the opaqueness behind AI decision-making processes makes it difficult to evaluate the effects of such systems "on human rights and society" (HRC 2021, par. 20). Bachelet implicitly recognised the importance of considering the impact of AI on individuals and society when she made a connection between the collection of data about individuals by corporations, the sale of data by brokers (Ibid., par. 13) and the potential use of such data by companies to create a model of the external world within the AI system (Ibid., par. 15). She said that "data environment, algorithms and models underlying the development and operation of AI systems" are factors which impact on the ability of the public to understand the human rights consequences of using these systems (Ibid., par. 20). Such AI systems are embedded in an ecosystem of personal data collection and exchange processes (Ibid., par. 57).

By viewing AI as operating in an ecosystem (Ibid.) and as producing impacts that may be difficult to understand (Ibid., par. 20), Bachelet implicitly acknowledged that AI can produce changes in the ecosystem which subsequently trigger ripple effects throughout society. Her report suggests that states need to consider how AI produces effects at the societal level (Eyert, Irgmaier and Ulbricht 2018, 48) when determining how to govern this technology. Bachelet's approach to the analysis of AI as part of an ecosystem comprising multiple technologies (HRC 2021, par. 57) has parallels with media ecology. Media ecology treats communication media, language and technology as comprising an ecology (Logan 2007, 16). The ecology in which these technologies operate evolves as these technologies interact with one another (Ibid.).

Bachelet's report demonstrates that it is timely and important to understand the effects that occur when numerous AI technologies interact from the vantage point of treating different AI technologies as being part of the same ecology. More recently, the General Assembly adopted a resolution on the 11th of March 2024 (General Assembly, 2024). In this resolution the General Assembly acknowledged the need to map and analyse the potential impacts of AI including developing appropriate safeguards for the use of this technology (Ibid., par. 8). It is suggested that the media ecology analysis can help inform the work of the policymakers and the United Nations by shedding light on the significance of the interactions between multiple AI technologies.

III. What is AI and What is Its Role in Technologies Serving as a Case Study?

There is disagreement over how to define AI (Jones 2023). Numerous definitions exist (hÉigeartaigh et al. 2018, 5180). To illustrate, Annex III of the Canadian Directive on Automated Decision-Making defines AI as "information technology that performs tasks that would ordinarily require biological brainpower to accomplish, such as making sense of spoken language, learning behaviours or solving problems" (Directive on Automated Decision-Making 2019). There is a degree of similarity between this definition and how the Singaporean Infocomm Media Development Authority defines AI. The Singaporean Infocomm Media

Development Authority defines AI as “the study and use of intelligent machine learning to mimic human action and thought” (Infocomm Media Development Authority 2024).

There is a crucial difference between how the Canadian Directive on Automated Decision-Making and the Singaporean Infocomm Media Development Authority define AI. Singapore’s definition better distinguishes between the machine and the human capabilities in comparison to the Canadian Directive on Automated Decision-Making. It describes AI as “mimicking human action” (Ibid.) rather than as functioning in the same manner as a human being. The Canadian Directive on Automated Decision-Making on the other hand arguably conflates human and machine capabilities by describing the tasks which AI can perform as requiring “biological brainpower” (Directive on Automated Decision-Making 2019).

This conflation is problematic because AI operates in a very different way to a human being. AI applies statistical techniques to information (Agarwal 2020) to perform a variety of tasks ranging from making recommendations to making predictions and generating decisions (Organisation for Economic Co-operation and Development 2019, 1). As a result, unlike a human being, AI lacks the capacity to understand the context behind the data it processes (Birhane 2021, 132-133; Krupiy 2020, 7). This is why Ig Snellen observes that intelligence is a metaphor when applied to technical systems (Snellen 1993, 55). Human beings engage in thinking when constructing the technical system rather than the technical system itself (Ibid).

The United States has a much more detailed definition of AI than Canada and Singapore. Section 3 of the draft National Artificial Intelligence Initiative Act of 2020 defines AI as “a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations or decisions influencing real or virtual environments” (National Artificial Intelligence Initiative Act of 2020, s. 3). It clarifies that AI uses “machine and human-based inputs to—(A) perceive real and virtual environments; (B) abstract such perceptions into models through analysis in an automated manner; and (C) use model inference to formulate options for information or action” (Ibid.). The advantage of this definition over those in the Canadian Directive on Automated Decision-Making and the Infocomm Media Development Authority is that it provides greater transparency about how AI operates. In addition to sending a clear message that AI is not alike to a human being, it provides an overview of what AI does.

AI is a field that is still developing. For example, researchers at Stanford University coined the term foundational model in 2021 (Bommasani and Liang 2021). They define foundation models as “models trained on broad data” that users can adapt “to a wide range of downstream tasks” (Ibid.). This means that the same model representing features of the external environment can be reused and applied for a different task (Ibid.). Additionally, foundational models allow one to combine multiple AI systems from different domains to operate together (Ibid.). Foundational models differ from the earlier “narrow AI” models because developers built “narrow AI” to perform a single task (Jones 2023). On the other hand, foundational models can be used to perform a variety of diverse tasks (Ibid.).

Narrow AI underpins social media platforms (Darbinyan 2023), the internet search engine (Heidt 2023), the smartphone (Wired Brand Lab 2024), the AI decision-making process (Noonan 2022; Harlan and Schnuck 2021) and the electric toothbrush (Oral-B 2024a). The present discussion covers those social media platforms that enable the user to interact with the posted content, communicate their opinions about the content and recommend the content to another person. For example, the LinkedIn platform allows users to post content, to like content, to insert comments in relation to posted content and to repost the content to disseminate it widely (LinkedIn 2024). When discussing AI decision-making processes, this article refers to systems that determine people’s access to resources and life opportunities. Examples include applying for study (Lamb 2023), a bank loan (Noonan 2022), employment (Harlan and Schnuck 2021) and government benefits (Brown, Richardson, Shetty and Crawford 2020).

IV. Artificial Intelligence and Power: a Shared Characteristic of the Employment of the Electric Toothbrush, Social Media, Smartphone, Internet Search Engine and AI Decision-making Process

Hin-Yan Liu and Paul de Laat regard AI decision-making processes as being involved in exercising power over people (Liu 2018, 199; de Laat 2019, 319). Marion Fourcade and Fleur Johns believe that social media applications entail the exercise of power over people as well (Johns and Fourcade 2020, 808-809). They maintain that developers design social media so

that the users interact with the system in a manner that optimises a particular value (Ibid., 815). One of such values is the generation of as much data about oneself as possible (Ibid.). Individuals derive a benefit from acting in accordance with the logic underpinning social media platforms (Ibid., 815). The more data one generates about oneself, the more homogenous the associations between the data that AI generates in its model become (Ibid., 817). As a result, it becomes more likely that AI will display the content to users with which they are interested in engaging (Ibid.). Thus, the architecture of social media involves an exercise of power over the users (Ibid., 808) by rewarding them for acting consistently with the logic of such systems (Ibid., 817). Fourcade and Johns based these conclusions on the analysis of numerous social media platforms. Such social media include Twitter (Ibid., 816), Facebook (Ibid., 817) and TikTok (Ibid., 818).

Similarly, internet search engines entail a degree of an exercise of power over the users (Citron and Richards 2018, 1372). An example is the Google search engine. Danielle Keats Citron and Neil Richards express the view that private companies are “powerful gatekeepers to digital expression” (Ibid., 1356). They determine what content is displayed as a matter of priority and what content is not displayed (Ibid.). Search engines rely on an algorithm to display content that most closely fits the keywords that the individual uses when looking for information on the internet (BBC 2021). The location of the user, the user’s prior search history and how often others visited a particular website determine in what order the search engine lists the websites with the search results (Roth 2021). Due to using AI for its operation (Ibid.; BBC 2021), the internet search engine strengthens the power of the dominant groups to act as influencers. Since how many people visit a website determines whether it is one of the first search results that a user sees (Roth 2021), the information that the majority regards as relevant, valuable and interesting gains greater circulation. Meanwhile, minority or alternative perspectives gain less attention.

The approach to displaying information by the internet search engine is similar to how social media algorithms operate. While social media rewards individuals for aligning themselves with the influencers (Johns and Fourcade 2020, 819), the search engine immerses individuals into the content visited by the majority (Roth 2021). One could at this point interject that individuals can locate the type of content that interests them. Therefore, they can counter group-based effects triggered by the operation of the internet search engine. Although the user can

influence the search results that the search engine displays by making deliberate choices, how AI operates limits the impact of such choices. The logic of optimisation underpinning AI (Badar, Umre and Junghare 2014, 39) results in the amplification of the perspective of the dominant group or the influencer.

The first reason why this is the case stems from the fact that corporations including those that provide search engines have “phenomenal power” to shape domestic and international politics (Babic, Heemskerk and Fichtner 2018). Dominant groups in the corporation can influence what content gets displayed and how through making programming choices (Citron and Richards 2018, 1356). The second reason why this is the case stems from the fact that larger service providers can provide more tailored content. Corporations with more resources have greater access to data (Sahbaz 2019, 61). The more data a user shares with the search engine, for instance by allowing it to save the search history, the more refined the search results are (McAuley 2022). It follows that having greater access to data allows a company to create internet search engines that provide more refined results. This aspect makes the service attractive. Users who lack awareness about the impact of sharing their data may choose to get more refined search results because they perceive the search engine to be more effective. Consequently, well-resourced companies are in a better position to get users to use their search engines, particularly when the users are unaware of the impact that sharing data has on them. Thus, there is a real possibility of the company having a very big role in determining how an algorithm displays the content on the internet and ranks such content due to such content having a closer fit to the user’s interests.

It is suggested that users can amplify the effect of the dominant groups’ ability to shape what content gets displayed through making programming choices (Citron and Richards 2018, 1356). They can do this by their choice of search queries. Fourcade and Johns write that recommendation algorithms minimise social media encounters with identities that individuals perceive to be different (Fourcade and Johns 2020, 818). The same can be the case for people using search engines such as Google. Safiya Noble’s scholarship provides support for this argument. Noble found that Google’s algorithms display search results that privilege whiteness, discriminate against people of colour and particularly affect racialised women

(Noble 2018).

Richard Lewis calls for a recognition that the relationship between people and algorithms is co-constituted (Lewis 2021). Technology and the underlying algorithm both enable and constrain individuals (Ibid.). The co-constituting character of the relationship (Ibid.) does not change the fact that while individuals make choices, the technology structures the array of choices open to the users when they are using that technology. Since some individuals can be influenced by cultural and fashion trends (Gomaa 2021), and since not all individuals have the resources for popularising their content (Fourcade and Johns 2020, 815-816), there is a potential that the search history of individuals who follow influencers or who look at mainstream content can influence what content gets displayed to a particular user.

The following two examples illustrate how beliefs can remain the same but manifest themselves in new configurations in technology over time. In the 1950s film “how to marry a millionaire” Marilyn Monroe plays a female character who has myopia but who does not wear glasses when going on a date (Negulesco 1953). She remarks that, “Men aren’t attentive to girls who wear glasses” (Ibid). This example illustrates how the technology of the cinema and television can reveal and perpetuate the attribution of a negative attitude toward individuals wearing glasses. In 2021 an investigation by Elisa Harlan and Oliver Schnuck demonstrated that AI software designed to select applicants for employment assigned lower scores to the applicants who wore glasses on desirable personality traits (Harlan and Schnuck 2021). This example shows that an AI decision-making process can embody an assumption that wearing glasses is negative (Ibid.) and can entrench this assumption by generating decisions. These two examples illustrate how the perception of wearing glasses as being undesirable can travel through time and space. After appearing in a film produced in 1953 (Negulesco 1953), the belief that wearing glasses is disadvantageous reappears in the 21st century in the guise of AI-based decisions (Harlan and Schnuck 2021). Since individuals use smartphones to access internet search engines and social media, the smartphone facilitates the ability of the exercise of power over the users.

Scholars have not examined whether the use of an electric toothbrush involves an exercise of power over the user. The theoretical framework of media ecology will now be used to show that the operation of an electric toothbrush can create an environment that facilitates the exercise of power over an individual. Marshall McLuhan argued that in order to study media,

one had to study both the media and the cultural environment in which the media operate (McLuhan 1969). McLuhan defined a medium as an extension of a person that amplified an organ, a function, or a sense (Ibid.). The electric toothbrush extends the reach of the hands. It amplifies the function of giving massage (Buchanan and Astill 2024) by enabling circular motions at greater speed. The electric toothbrush is therefore a medium. McLuhan saw media as triggering changes in the human user and the environment (Ibid.). McLuhan's scholarship points to the fact that one needs to study the electric toothbrush by reference to its user and its environment to understand the effects that the employment of this technology brings about.

McLuhan developed the following approach to enable the analyst to make visible the changes in the environment that technology creates (Matie, McLuhan and Toye 1987, 415). He believed that one can only understand the object of study in the context of the environment in which it operates (ibid., 194). This environment remains beyond peoples' awareness (McLuhan 1969). There is a need for an analyst to reveal the changes taking place in the environment (McLuhan and Carson 2003, 30-33). Robert Logan views digital media as an environment in which users are embedded (Logan 2020, 10). This is the case because digital media need user-generated data to function (Ibid.). Moreover, he views the users as being the environment in which the digital media are embedded whenever the users transform the digital media (Ibid.). This occurs through the users inputting their data into the system (Ibid.). Consequently, Logan perceives the user and the digital medium as being both the object of study and the environment (Ibid.).

The electric toothbrush user is the environment in which the toothbrush operates whenever the toothbrush displays messages to the user. Depending on the model of the toothbrush, such messages could differ. The message could be a timer helping the user monitor for how long the user brushed the teeth (Buchanan and Astill 2024). It could be a visual cue, such as a smiley face indicating when the user spent an adequate time brushing the teeth according to the developer's recommendations (Oral-B 2024b). There is a sad face icon when the user does not spend a sufficiently long time brushing the teeth (Ibid.). Some electric toothbrushes enable the user to use the mobile phone to see a visual representation of the progress associated with brushing the teeth (Buchanan and Astill 2024). The user who is brushing the teeth correctly can observe the different teeth zones going from blue to white on the

smartphone's display (Ibid.).

The user is the environment because the operation of the electric toothbrush triggers changes in the user. Such changes include thoughts relating to whether the user spent enough time brushing the teeth. Other changes include changes in the body arising from the sensory experience stemming from using the toothbrush. The electric toothbrush arguably constitutes an environment whenever it records how much time the user spends brushing the teeth and displays a message relating to the length of time the user spent brushing the teeth (Ibid.; Buchanan and Astill 2024). This is the case because changes occur in the toothbrush due to the user employing the electric toothbrush to brush teeth. The electric toothbrush measures how long the user brushed their teeth and displays the evaluation of the user's behaviour using formats, such as a smiley face icon (Oral-B 2024b).

McLuhan's phrase "the medium is the message" (Matie, McLuhan and Toye 1987, 448) helps one to evaluate what changes the employment of the electric toothbrush creates in the user when the user serves as an environment for the electric toothbrush. When coining this phrase, McLuhan wanted to convey that the medium's message encompasses all the effects that the medium produces in the environment (Ibid.). The medium transforms the ratio of the senses of the person (McLuhan 1969). He elaborated that, "The extension of any one sense alters the way we think and act-the way we perceive the world" (Matie, McLuhan and Toye 1987, 478). As a result, the medium influences how the person interprets the message (McLuhan 2013, 14). Additionally, the medium or technology transmits the content of the message (Logan 2011, 7). The audience is both the content and the co-author of the message because the individuals give meaning to the message in the course of interpreting it (Matie, McLuhan and Toye 1987, 443).

Just as McLuhan described, the use of the electric toothbrush activates tactile, aural and visual experiences. The user is immersed in a sound experience triggered by the toothbrush's motor operating. The user is arguably immersed in the tactile experience of feeling the weight of the electric toothbrush and experiencing gum massage (Buchanan and Astill 2024). Additionally, if the user sees a visual display, such as a smiley or a sad face (Oral-B 2024b), then this visual experience can trigger an emotional connection to the communication. The result is an environment characterised by the user undergoing a multisensorial experience. With some

electric toothbrush models, the user will additionally experience a personal connection with the electric toothbrush due to the smiley face mimicking human interaction.

It is maintained that the multiple sensory experiences that the use of the electric toothbrush triggers result in the electric toothbrush producing psychic effects on the user (McLuhan 1969). McLuhan thought that individuals remain unaware of the effects on their psyche that technology produces (Ibid.). The immersion in the sensory experience can result in individuals being more susceptible to internalising the messages the electric toothbrush conveys without individuals cognitively registering how this sensory experience is influencing their decision-making. It is suggested that this is particularly the case where the electric toothbrush uses emoticons corresponding to facial expressions (Oral-B 2024b).

Partial support for this position can be found in the research on how the use of emoticons influences how individuals interpret written communication (Walther and d'Addario 2001, 332). Neuroscientists posit that individuals use both emotions and reason when reaching decisions (Damasio 1994, p. 166; Allman and Woodward 2007, p. 189). Joseph Walther and Kyle d'Addario found that a research participant who saw an emoticon frown next to a positive statement felt less positive about the topic (Walther and d'Addario 2001, 341). The user nevertheless attributed a positive connotation to the writer who composed the message (Ibid.). Overall, the users attributed the same interpretations to the messages irrespective of whether they were accompanied by an emoticon or not (Ibid., 324). This research points to the fact that emoticons can influence how individuals feel (Ibid., 341-342).

The research of Walther and d'Addario concluded that the insertion of emoticons did not change how individuals attributed meaning to written text (Ibid.) on the digital screen (Ibid., 332). This finding does not apply to the display of the emoticon on the electric toothbrush. McLuhan wrote that technology produces effects by affecting the senses of persons and "patterns of perception" rather than at the level of opinions (McLuhan 2013, 18). The users are less likely to be engaged in a deliberative process of analysis of how the emoticon is influencing their reasoning process when using the electric toothbrush. The user is likely to rely on the emotional reaction to a greater extent than on the logical thinking process when

interpreting the message on the electric toothbrush. This stems from the fact that the user is undergoing a multisensory experience when using the electric toothbrush. Such greater reliance on the emotional reaction can result in the user being more likely to be influenced by the score displayed in the form of an emoticon when deciding how long to brush the teeth the next time.

The electric toothbrush entails a subtle form of exercise of power by creating a sensory experience that makes it more likely that the user will process the information through the channel of the emotional response. This conclusion flowing from the application of McLuhan's scholarship is in line with experimental research. There is research demonstrating that triggering certain emotional responses can facilitate persuasion (Rocklage, Rucker and Nordgren 2018, 749). The use of sensors to convey information about whether the user brushed the teeth for a sufficient length of time (Buchanan and Astill 2024) produces similar effects but to a lesser degree than the display of an emoticon. The feedback in the form of the timer influences the user's decision-making environment by providing the user with aural or visual cues. Such cues influence the user's decision-making regarding how long to brush the teeth. The display of the cues habituates the user to rely on an output a device generates as a basis for making decisions. Since the user uses the electric toothbrush regularly and is immersed in a multisensory experience, the user can come to mould one's brushing habits to the prescriptions generated by the electric toothbrush without giving much thought to the fact that the user is habituating oneself to obeying technology. Thus, it is not only the use of a smartphone (Zuboff 2018, 176), social media (Johns and Fourcade 2020, 808-809), the internet search engine (Citron and Richards 2018, 1356) and the AI decision-making process which entail exercising power (Liu 2018, 199; de Laat 2019, 319). Mundane technologies, such as the electric toothbrush, involve the exercise of power as well. Given this state of affairs, it is necessary to scrutinise what consequences flow from the employment of these multiple technologies.

V. Studying the Interacting Effects of Five Artificial Intelligence Technologies

This section will show that the technologies of the internet search engine, smartphone, social media, AI decision-making process and electric toothbrush interplay to amplify one another's effects. McLuhan wrote that the changes in the pattern of human affairs which a medium

creates is the message of the medium (McLuhan 2013, 13). Technology changes how individuals relate to themselves and others (Ibid.). Media reshape human lives (Ibid., 41). Every technology triggers “new configurations” in a situation (Ibid., 122). Media interact with one another through people’s senses (Ibid., 78) in a “biochemical” manner (Ibid., 131). The media bring about a new equilibrium as a result of interacting (Ibid.). For example, the advent of electric technology resulted in people becoming more socially involved with the group (Ibid., 37). McLuhan’s scholarship points to the fact that the employment of the internet search engine, social media, smartphone, AI decision-making process and electric toothbrush establishes a new equilibrium. It will now be shown that these technologies operate in an integrated manner because there is an intertwining between the logic embedded in these applications. This new equilibrium involves these technologies magnifying each other’s effects associated with the exercise of power.

To see why McLuhan’s assertion that the interaction between the media brings about a new equilibrium (Ibid., 131) consider how the use of social media and the employment of AI decision-making processes reinforce one another’s effects. Both technologies amplify one another’s effect associated with the exercise of power. This is the case because they encourage adherence to a socially constructed ideal. To see why this is the case, consider the role of social media in encouraging users to match a socially constructed ideal. Johns and Fourcade explain that social media provides the means through which users can make themselves visible (Johns and Fourcade 2020, 815). For instance, users can mimic the trendsetters or follow online guidance on how to “maximise” their “personal brand” (Ibid.). Mira Rawady and Robert Logan explain that companies sponsor influencers on social media platforms to promote their brand (Logan and Rawady 2021, ch. 13 p. 7). Influencers have a real impact. Instagram is an app that allows individuals to share photos and videos (Ibid., ch. 8 p. 1). Users can engage with one another through likes, comments and posts (Ibid.). Users of Instagram collect information on how others present themselves to create their own ideal identity (Ibid., ch. 8 p. 2). This “includes physical, emotional and mental ideals related to beauty standards, financial success, intelligence, and an endless array of other features that intertwine to form one’s sense of self” (Ibid.). Individuals emulate influencers such as celebrities to get more likes (Ibid., ch. 8 pp. 3-5). Therefore, social media encourages

adherence to a socially constructed ideal.

Drawing on the work of Mireille Hildebrandt, it is suggested that the use of AI as part of the decision-making process is conducive to individuals attempting to adhere to a socially constructed ideal (de Laat 2019, 319; Hildebrandt 2017, 7). This stems from the fact that optimisation is a logic that underlies the operation of AI decision-making processes (Badar, Umre and Junghare 2014, 39). Optimisation involves the use of criteria for the decision-making process which enable the designer to attain the desired goal to the greatest extent possible while satisfying the constraints (Koopialipoor and Noorbakhsh 2020). In practice, this decision-making process involves selecting individuals with the highest score on an attribute for access to an opportunity (Barocas and Selbst 2016, 679). According to Hildebrandt, the employment of the AI decision-making process incentivises individuals to adhere to the parameters of desirable behaviour as defined by an AI decision-making process to increase their chances of getting a positive outcome (Hildebrandt 2017, 7).

Social media and the use of the AI decision-making process can amplify each other's effects of encouraging individuals to adhere to a socially constructed ideal. The data gathered through the use of social media can become the basis for a decision by an AI decision-making process (Marwick 2014; Ritchel 2014). The technologies of social media and the AI decision-making process operate together to incentivise individuals to act in a manner that maximises their chances of being scored highly and of adhering to the logic of social media software. Since individuals derive a benefit from acting in accordance with the logics underpinning the social media platforms (Johns and Fourcade 2020, 815) and since social media data can become part of the AI decision-making process (Marwick 2014; Ritchel 2014), individuals have an incentive to act in accordance with the logics of both technologies to increase the likelihood of being scored highly by an AI decision-making process. These two technologies can amplify one another's effects by fostering an environment in which individuals feel encouraged to adhere to a socially constructed ideal. Here it is immaterial whether the government or the private organisation is operating AI services. Feminist scholarship has long challenged the artificiality of the public-private divide (Man Ling Lee 2007, 163-164). The outcome is arguably the same irrespective of whether one is adjusting one's social media engagement and personal behaviour to avoid being falsely flagged by an AI system detecting benefit fraud (Woollacott 2023) or to get a job at a private company (Parker 2023).

The operation of AI underpinning the search engine has the potential to strengthen the effects produced by social media use and by the employment of the AI decision-making process. Influencers (Logan and Rawady 2021, ch. 8 pp. 3-5) and cultural trends (Gomaa 2021) will influence how search engines rank websites due to how AI operates. The search engine displays to individuals the content visited by the majority (Roth 2021). If the majority of users search for contact lenses when they look for a way to correct myopia for instance, then the user is more likely to see information about contact lenses rather than glasses being displayed on the list of top results. While this itself may not be a decisive factor in someone's purchasing choices, the search engine displays the results in a manner that encourages the user to read information reflecting group interests. The search engine is a regulatory tool because it meets the definition of a nudge. A nudge is a regulatory tool that uses knowledge of psychology to design a decision-making environment in a way that promotes the making of particular choices (Teichman and Zamir 2020, 1266). The fact that both social media platforms (Johns and Fourcade 2020, 808-809) and the employment of AI decision-making processes encourage individuals to adhere to a social construct (de Laat 2019, 319; Hildebrandt 2017, 7) accentuates this effect of a nudge. There is a potential that individuals will access the content online which enables them to adhere closer to the logic of the social media and the AI decision-making processes. In turn, their activity can influence what content the search engine displays to other users and in what order of priority (Roth 2021). Consequently, the internet search engine is a technology that can amplify the impact of social media and the deployment of the AI decision-making process.

Since the smartphone allows users to access social media and to search for web content at any time, it facilitates the ability of the users to have greater contact with these technologies. As a result of allowing permanent connection, the smartphone amplifies the effects arising from the use of social media and the internet search engine. Given that the social media, internet search engine and AI decision-making process amplify one another's effects, the smartphone creates an environment where the possibility for such interactions between technologies occurring is maximised. Thus, the smartphone amplifies the effects arising from the other three technologies.

The electric toothbrush can accentuate these effects arising from the interaction of the smartphone, internet search engine, social media and AI decision-making process. The electric toothbrush creates an environment where users become habituated to using technology to obtain feedback on their conduct and to inform their decision-making. The fact that this technology is a mundane item that the users do not see as having much effect on their decision-making heightens this impact. The social media, the electric toothbrush and the AI-decision-making process together create an environment where technology encourages the users to use the feedback generated by technology to inform their conduct. Meanwhile, the smartphone and the internet search engine provide impetus for the conduct of a group to influence the array of choices open to a person.

The effect of the technologies of social media, smartphone, electric toothbrush, internet search engine and the AI decision-making process amplifying one another's effects is even more pronounced when the city infrastructure incorporates digital technologies. The concept of a smart city involves embedding digital technologies into the city infrastructure to collect data and to enable the municipality to make decisions about service delivery using this data (Gomstyn and Jonker 2023). To date, Singapore is a country that received the highest score on using digital technology to create a smart city (Smart Nation Singapore 2024). A smart city involves the use of sensory devices to collect information about the external environment to reach decisions about governance using automated processes (Ahada et al. 2020, 1). For example, Copenhagen already installed AI to detect when there is passenger demand for more trains in the metro and to dispatch more trains (Wired and Hitachi 2019). People use a smartphone to be able to use the public transport system and to plan their journeys (Ibid.). The sensors in the smartphone enable the user to pay the correct travel fare by generating information about the location of the user, where the user boarded the train and where the user left the train (Ibid.).

Such automated processes rely on dynamic rules and regulations that take into account the continuous input of data (Ahada et al. 2020, 1). Smart city infrastructure can be used to support many types of functions including tracking water quality (Organisation for Economic Co-operation and Development 2019, 7), delivering social services (Ibid., 8), predicting who will commit a crime and delivering personalised education (McKinsey Global Institute 2018, 3).

Because smart cities rely on digital tools to collect data, they generate a “wealth of data” (Organisation for Economic Co-operation and Development 2019, 19). What is more, since smart cities rely on automated decision-making based on continuous data input (Ahada et al. 2020, 1), they entail an expansion of the use of AI decision-making processes.

The smart city is an ecology where the technologies of the internet, social media, smartphones and AI decision-making processes are embedded. By integrating these technologies, the smart city creates a city infrastructure (SmartCity 2017). The smart city magnifies the effects of the internet search engine, social media, AI decision-making process and the smartphone at the population level by integrating the operation of these technologies. It intertwines the use of these technologies closer. One of the reasons for this closer intertwining stems from the fact that the smart city infrastructure conditions access to services on the use of technologies, such as the internet and the smartphone (McKinsey Global Institute 2018). By way of illustration, imagine that a city uses an AI decision-making process to schedule buses and trains (Niestadt and others 2019, 2). It monitors how many smartphones are in the area (Mazur 2020) and how many individuals use an app at home to check the schedule (Dredge 2016) to determine how frequently the vehicles appear at the station (Mazur 2020). The system monitors social media to determine how many individuals will travel to a particular area due to taking part in a demonstration or attending a football game for instance. Here, the smartphone, the social media and the AI decision-making process become integrated to deliver the service of dispatching regular public transportation. The internet search engine can come to be integrated into this process as well because monitoring the internet search activity for a particular event and tracking the use of Google Maps can be a source of information regarding how many individuals may want to attend a particular event.

The context of the smart city illustrates why it is significant that these technologies amplify one another’s effects in the course of interacting with one another. For example, because the smartphone (Zuboff 2018, 176), the internet search engine (Citron and Richards 2018, 1356), social media (Johns and Fourcade 2020, 808-809) and the AI decision-making process are involved in exercising power over people (Liu 2018, 199; de Laat 2019, 319), their integration into the city infrastructure has the potential to amplify the exercise of power over individuals.

The locus of the exercise of power can be hard to detect. Because an individual could be using the smartphone to access public transport (Mazur 2020; Wired and Hitachi 2019) and to use social media while travelling in public transport, the exercise of power by the government and private companies through technology becomes intertwined.

Individuals could be subjected to a plurality of different governance mechanisms (Sherman 2023, 2220). Public and private actors operate these governance mechanisms concurrently even when they do not coordinate their efforts. It is the use of multiple AI-based technologies that facilitates the concentration of power in the hands of the government and corporations. However, such power is diffuse, difficult to detect and hard to trace. This is the case because one cannot separate the effects that the operation of each AI application produces. How the state designs, embeds and regulates AI-driven technologies will influence who exercises power over individuals and how. Ideology shapes the design of technology and hence the impact of technology (Ibid., 1210).

Sherman notes that states can use smart cities as a way to observe and control human subjects (Ibid., 1214). The network comprising of a “web of hardware and software, architectures and devices, machinic and synthetic sensing agents, cameras and sensors within buildings and infrastructures, mobile vehicles on the ground and in the sky” can nudge individuals to engage in particular behaviour (Ibid., 1215). However, Sherman thinks that governments can use these integrated technologies as a political project to organise society and governance in different ways (Ibid., 1219). The media ecology analysis points to the fact that Sherman is overly optimistic. Since the employment of the internet search engine (Citron and Richards 2018, 1356), the AI decision-making process (Liu 2018, 199; de Laat 2019, 319), social media (Johns and Fourcade 2020, 808-809) and smartphone amplify one another’s effects associated with the exercise of power, the process of fusing these technologies in the smart city creates an enabling environment for exercising power over technology users. Given that the use of other mundane technologies, such as the electric toothbrush can habituate people to using technology as a feedback mechanism for evaluating and planning their behaviour, the fusing of digital technologies in the city infrastructure is conducive to creating digital subjects. The term digital subject refers to an individual who is habituated to using technology to inform the decision-making process. It refers to the state of affairs of individuals being accustomed to being governed by technology to the point that they stop noticing this

aspect.

The effects stemming from fusing digital technologies in a smart city (Gomstyn and Jonker 2023; Ahada and others 2020, 1) and from individuals using AI-based applications which are the subject of the present case study can transcend the national level to encompass the global level. From a media ecology perspective, it is relevant that individuals located across the world can access the internet network (Daigle 2015, 3-4). They can use the same social media services (Ortiz-Ospina 2019), such as LinkedIn. McLuhan's observation that media interact with one another through people's senses (McLuhan 2013, 78) and bring about a new equilibrium (Ibid., 131) points to the fact that there are no boundaries to the effects of a particular technology. The more individuals across the globe use a particular technology, the greater the effect that a technology can create.

Ussal Sahbaz comments that AI technology has a "centralising and monopolising" character from the standpoint of its effect on international affairs (Sahbaz 2019, 58). This stems from the fact that one needs access to a lot of data to develop AI (Ibid., 61). Companies based in the United States have been collecting data and building AI during the past ten years (Ibid., 62). Accumulating data creates a vicious cycle that enables more innovation (Ibid., 63). For this reason, companies and countries that produce and have access to big data will set the rules (Ibid., 61). This can result in medium-sized countries losing their power on the international arena, in inequality and in "data colonialism" (Ibid., 58). Sahbaz notes that mid-sized countries do not have a successful record to date in regulating big companies such as Google effectively (Ibid., 65). Limiting the powers of the corporations is one of the ways in which states can retain their power (Ibid., 68). He notes that even the European Union has been ineffective in reigning in the power of the corporations (Ibid., 66). Because these companies have large profit margins, they are not significantly affected by the imposition of fines for breaching the law (Ibid., 66).

The "centralising" effects which Sahbaz describes from the standpoint of inter-state relations (Ibid., 58) have parallels with the impact which the technologies that are the subject of the present inquiry have on individuals globally. Since individuals across the globe use services,

such as the Google search engine, it is possible for Google to determine how individuals across the globe access information. Social media allows connectivity beyond state boundaries and so does the internet. Social media and digital technologies can influence the perception of individuals worldwide by shaping their information environments (Howard and Bradshaw 2019; Pew Research Centre et al. 2022). While Western states spread their values globally through film (Maisuwong 2012, 1-2), technology companies can propagate values through technology design.

There is evidence that McLuhan was correct when he asserted that the form of the medium produces “psychic and social changes” (McLuhan 2013, 127). This is so even though individuals do not trace such effects to the form of the medium. Companies owning social media and internet search engine platforms have a growing ability to shape the attitudes and conduct of individuals on the global level (Tieman 2008). Yizhi Wang, Yuwan Dai, Hao Li and Lili Songin in their study found that social media communications can change the attitude that users have towards a particular social group easily (Wang, Dai, Hao and Song 2021, 6). Philip Howard warns that, “The manipulation of public opinion over social media remains a critical threat to democracy, as computational propaganda becomes a pervasive part of everyday life” (Howard and Bradshaw 2019). Digital technology is collapsing traditional hierarchies and categories. Such distinctions include the difference between the local and the global levels (Riles 1995, 48). Since technology companies can propagate the same expectations for behaviour globally through selling technologies, such as electric toothbrushes and AI decision-making tools, it is suggested that the invisible web through which companies exercise their power (Liu 2018, 199; de Laat 2019, 319) can come to permeate individuals and organisations globally.

McLuhan’s observation that people are unaware of the psychic and social effects of new technology much like “a fish of the water it swims in” (McLuhan 1969) continues to capture how people experience the effects of AI-based technologies that serve as a case study today. Not all members of the public are aware of the full scale of the effects of social media communication for instance. After surveying individuals in nineteen countries, the Pew Research Centre found that 84% of participants thought that the internet and social media made it easier to manipulate people by spreading misinformation (Pew Research Centre et al. 2022). It is noteworthy that such participants concentrated on the impact of misinformation

(Ibid.) rather than on the capacity of digital platforms to change public opinion (Wang, Dai, Hao and Song 2021, 6). Therefore, the lack of awareness that social media creates an environment where companies embed power relations (Johns and Fourcade 2020, 808-809) due to the form of the medium does not mean that such social changes are not taking place.

Mariana Valverde observes that the effects occurring at different levels can be interwoven (Valverde 2009, 143). Here such levels are the individual, city, state and global community. The technologies that serve as a case study can interact and produce new forms or configurations of effects. Thus, it is inaccurate to conceive of the effects as being located on a set of different levels that can be neatly depicted using a hierarchical representation. As Annalise Riles observes, ideology determines whether one treats something as being global or local (Riles 1995, 48). Her scholarship points to the artificiality of distinguishing between the city and the global levels (Ibid.). This scholarship reinforces the findings made so far. McLuhan's scholarship points to the fact that one should not look at the effects of the internet search engine, social media, smartphone, AI decision-making process and the electric toothbrush on the individual, the city, the state and the global separately as if these effects occur on different planes. Rather, one should view the effects stemming from the interaction between technologies that serve as a case study as transcending particular levels. A set of emergent effects are intertwined and occur at multiple levels simultaneously. One cannot understand such effects by looking at a single level alone. Rather, one needs to understand what changes occur in the global community as a whole due to several AI-based applications interacting with one another.

The work of Hin-Yan Liu and Matthijs Maas provides further support for this argument. The two scholars created a typology for mapping various policy approaches that exist regarding the regulation of AI technology (Liu and Maas 2021, 8). Liu and Maas conclude that the terminology of levels for different policy domains relating to AI and the distinction between the levels should not be treated as having a hierarchical ordering in relation to one another (Ibid., 13). The four approaches to thinking about policy domains pertaining to AI are complementary (Ibid.). Their work highlights how one can miss important dimensions of the unfolding events and propose inadequate solutions as a result of seeking to order a complex reality into a

hierarchical schema using categories.

Similarly, the scholarship on global governance recognises the complexity of social reality. Kanishka Jayasuriya highlights that it is descriptively inaccurate to distinguish between state governance and inter-state governance (Jayasuriya 1999, 425-426). The boundaries between international, national and local as well as between public and private are blurry (Ibid., 443-444). In practice, the exercise of sovereignty is “parcelled and diffused across a range of governmental and non-governmental authorities” (Ibid., 444). While Jayasuriya made the observations by reference to a different context, his writings are equally relevant to the present discussion. It is necessary to move beyond the use of categories and levels to capture the complex ways in which the AI-based technologies that serve as a case study interact and produce effects. The effects of the technologies that serve as a case study should be understood against the background of complex and interdependent sets of relations. These interrelationships need to be taken into account when analysing how these technologies interact and produce effects.

A caveat to the present discussion is that the societal effects stemming from the interplay of the AI applications that serve as a case study are necessarily uneven. This is because the frequency with which individuals use a particular technology determines the degree of transformation that any technology can create. Valverde points out that communities within a state have unequal access to technologies, such as the internet (Valverde 2020, 33:30-33:40). The individuals who make less reliance on a particular AI technology, such as the internet search engine, will experience a lesser transformative impact in their lives associated with the use of this technology.

VI. Conclusion: Recommendations to States

The employment of the media ecology analysis made it possible to generate a number of new insights. First, the social media (Johns and Fourcade 2020, 808-809), internet search engine (Citron and Richards 2018, 1356), AI decision-making process (Liu 2018, 199; de Laat 2019, 319), electric toothbrush and smartphone create an environment which is conducive to governments and corporations exercising power over individuals. The concurrent operation of these technologies amplifies such exercise of power. The smart city creates an environment

where the interplay between the technologies that serve as a case study can create greater effects. The effects stemming from the interplay of technologies that serve as a case study permeate and transcend the levels of the individual, city, state and inter-state. The effects are interwoven and cannot be understood by reference to a particular level or plane. Rather, one needs to look at how the effects permeate and link the levels of the individual, city, state and inter-state. These findings challenge Sherman's assertion that a smart city can involve non-hierarchical modalities of governance (Sherman 2023, 1220). It refutes her assumption that one can understand the impact of an AI technology or a smart city by looking only at the city level.

The present discussion points to the fact that states cannot adequately regulate AI by legislating at a domestic level. What is needed are international treaties that include all states. Equally, it is important to involve individuals and municipalities from around the globe to take part in these discussions. Miha Marčenko points out that a city can play a role in global governance (Marčenko 2021, 220-221). Thus, cities can actively shape policy-making in regard to AI. It is imperative that not only cities (Ibid.) but also individuals and communities have input into the governance of AI at the global level. Moreover, it is crucial for states to cooperate if they are to mitigate the harmful impacts arising from the employment of AI technologies in a meaningful way. States use the United Nations as a forum where to discuss how to coordinate their efforts to govern AI (United Nations News 2021). Given that AI is changing the relationship between states and companies (Sahbaz 2019, 65), it is unclear whether states will take a proactive role in protecting people from risks arising from the use of AI technologies. Of relevance is that in the past there have been cases where states were complicit in the human rights abuses which the multinational corporations perpetrated in the host country (Davies 2022). It is imperative for all states to focus on cooperation in order to curb government and corporate power if they are to protect people in a meaningful way from improper exercise of power. States need to create international mechanisms for enforcing treaty obligations. States should provide mechanisms to enable individuals to obtain remedies for their failure to comply with international treaties and for failing to regulate public authorities and corporations. It is put forward that states should adopt laws that place limitations on state and non-state entities exercising power over individuals through AI (Liu 2018, 199; Zuboff

2018, 176; Citron and Richards 2018, 1356; Johns and Fourcade 2020, 808-809; de Laat 2019, 319). Such interventions should go beyond governing the design of technology and how the technology is embedded in the existing institutions. The interventions should account for the complex manner in which AI technologies produce effects as a result of interacting with one another.

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