

Digital Public Participation through the Eyes of Neuropolitics Methods: Neural Stimulation in Network Narratives

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Abstract: This article explores the intersection of neuropolitics and digital platforms to understand their impact on public engagement. By leveraging psychophysiological indicators and neuroimaging techniques, the study examines individuals' unconscious responses during digital engagement. A hybrid neuropolitical tool, combining eye-tracking and facial electromyography, measures visual attention and emotional responses. Through an experiment involving participants from Scotland's Climate Assembly, the research reveals biases and preferences in digital narratives and platforms, emphasizing the need for inclusive engagement processes. The findings contribute to enhancing digital public engagement platform and promote a more democratic decision-making process.

Keywords: Neuropolitics; Digital Platforms; Public Engagement; Unconscious Influences; Psychophysiological Indicators; Neuroimaging, Eye-Tracking; Facial Electromyography; Biases; Decision-Making; Inclusive Participation

1. Introduction--one puzzle in this domain

Neuropolitics, as a new and interdisciplinary domain, pushes us to transform traditional ideas that our brains perform in an innate manner (Schreiber, 2017). The main notion of neuropolitics is that our political behaviors are obviously affected by unconscious and personal emotions, which might become a cornerstone of manipulation of political behavior by politicians or other stakeholders (PÉREZ-ZAFRILLA et al., 2017).

Nowadays, political parties and government stakeholders start to apply information and communication technologies (ICT) to digital public participation, aiming to improve diversity, transparency and democracy in the administration (Vicente et al., 2014). For example, the City of Melbourne People's Panel organized in 2014 generated 11 recommendations for the Council's 10-year financial plan.

Nevertheless, reaching this ideal public participation is not streamlined as it may seem, and which often accompanied by tensions and paradoxes due to various elements, particularly in digital technology, such as various types of dialogues on digital platforms with different practical implications (Anon et al., 2022).

Therefore, I will focus on a research puzzle from the intersection of the two aspects in this article, that is, how to use neuropolitics as a key approach to understanding the impact of digital platforms, technologies, or narratives on digital public engagement, and attempt to find ways to intervene the process, then predict the future trends

2. How Neuropolitics will add value to this puzzle?

Considering previous research methods, in the early twentieth century, studies of political issues and decision-making processes typically emphasized observable actions and self-reported attitudes, such as voting or stance, rather than potential influences caused by the brain and neurons (Schreiber, 2017), which might lead to neglect of understanding emotional factors hidden inside minds. Meanwhile, some traditional theories also have limitations. For instance, both Behavioural Economics and Post-Structuralism attempted to keep emotion and cognition separate, which resulted in the lack of general theories and a neglect of the similarity of the structure of the human brain (Verweij et al., 2015). In addition, modern society is increasingly dependent on the application of algorithms and artificial intelligence in the field of life, biology and personal behaviour analysis (Beer, 2017). However, diverse

examples such as Microsoft's Tay chatbot, have demonstrated that algorithms may become problematic, raising issues of misjudgment, bias, accountability and transparency (Micheli et al., 2018), as they can only analyse user behavioural footprints according to a pre-programmed process, but cannot understand human nature and the neural networks in the brain.

The most difficult part of this puzzle is how to measure and analyse people's unconscious reactions and emotions in the face of different digital technologies, narratives and platforms in the process of digital public engagement. Neuropolitics may be able to offer a refreshing dimension to this problem. Many psychophysiological indicators and neuropolitical experiments have been proven to be capable of measuring the unconscious physiological responses of the human body, such as Electrodermal Activity (EDA) (Settle et al., 2020) and Functional Magnetic Resonance Imaging (fMRI), which studies the role of the brain in decision-making (Glimcher et al., 2013). Therefore, neuropolitical methods could be used to overcome this challenge.

3. The hybrid neuropolitical tool--Eye-tracking and Facial Electromyography(EMG)

3.1 Eye-tracking

Eye-tracking is a methodology that is useful for researchers to analyze visual attention, relying on an approach called corneal reflection to detect while locating the focus of vision as the eye moves. Eye-tracking is so powerful that we can highly understand an individual's eye movements based on three attributions of it, which respectively named location, duration and movement (Romano et al., 2014). In this article, we prefer to use one visualization called the 'heat map', which can highlight what draws the attention of participants in digital engagement when they take part in an online survey, poll, deliberation or other forms of online narratives, and what their sights are most concerned about.



Figure 1: <https://www.objectiveexperience.com/eye-tracking-ux-research/>

3.2 Facial Electromyography (EMG)

Facial Electromyography (EMG) is a scientific, quantitative and non-invasive method for measuring facial muscle activity triggered by positive or negative emotional responses by placing electrodes on certain muscles (Anon, 2019). For example, we can identify a negative emotion status by a furrowed brow regarding the activation of the corrugator supercilii, and EMG can also be used to capture the degree to which the participant is stimulated (Settle et al., 2020).

(3) The Hybrid approach

Eye tracking can only indicate what attracts the subject's attention, but not whether it is a positive or negative appeal (Romano et al., 2014), however, Facial Electromyography compensates for this shortcoming. Therefore, we will combine the two measurements to design our experiment taking into account their merits and demerits.

4. Experiment Design-- “What attracts you?”

4.1 Participants

Scotland's Climate Assembly, comprising 106 randomly elected individuals representing the wider public, includes 12 members participating in a neuropolitical experiment. Their inclusion is justified by their diverse perspectives, experience in digital participation, unbiased selection, ethical considerations, and the assembly's credibility. This selection enhances understanding of digital public engagement dynamics and informs future policies. However, limitations include potential lack of representativeness, varying digital literacy, differing willingness to engage, and overlooking other demographic factors. Caution is advised in interpreting results, and alternative sampling strategies should be considered. Additionally, participants' past climate discussion experiences may bias their decision-making styles.

4.2 Procedure

First, all participants will be assigned the same types of digital equipment and rooms, such as laptops or phones, also with an eye tracker and electrodes on facial muscles at the same time. Second, a defined content relevant to public management decisions in Scotland, such as seeking proposals for the development of tourism in the Highlands or voting for candidates for Scottish public organizations, will be presented to participants in four to six different manners, including unretouched or lyrical text, posters with relevant images and rich colors, poll or proposal pages with music, personal dialogues, websites with metaphorical slogans, etc.

Finally, we will collect and catalogue simultaneous feedback on the subjects' visual attention and emotional changes during the experiment, to analyze how different digital engagement methods or various designs of digital technologies and platforms evoke favourable or unfavourable attitudes in varying degrees, even though the effect may be subtle. Thus, we may initially determine what factors other than the main content affect the digital public engagement process and influence the brain's decision making judgement, for example causing a participant to vote for a candidate with a brightly coloured poster without thinking or to ignore a purely textual presentation.

4.3 Other information

The experimental content we provide for these participants should be as neutral and non-offensive as possible for some strongly trenchant topics may lead to highly biased results. Therefore, it is necessary to get a preview of recent hot topics in Scotland and the specific backgrounds or characteristics of the participants. We can request participant profiles from the assembly organizer or provide subjects with a list of various topics to exclude some of them.

5. Outcomes

The experiments reveal biases and preferences in individuals when encountering digital narratives, platforms, or tools. This impacts digital public engagement, as impatience with text-only narratives can lead to independent thinking and herd mentality, potentially failing to meet citizens' needs. Biases and preferences for social media platforms affect understanding and engagement. Some prefer Twitter for brevity and real-time updates, while others prefer Instagram's visual focus. Information sources also influence judgement, as some trust news outlets based on credibility or narrative consistency. These biases shape interpretation and trust in information.

These findings create opportunities to enhance digital public engagement platforms and technologies. Interventions can be developed based on experiment results to promote inclusive decision-making, reducing the influence of digital and narrative factors. Improvement requires addressing individual preferences and biases through user-friendly features and diverse information sources. This includes visual elements, clean formats, balanced access to perspectives, and fostering critical thinking to minimize echo chambers.

Its impact extends beyond personal preferences and biases, highlighting the importance of designing a digital public engagement platform that transcends the limitations imposed by media and narrative choices. Ultimately, this pursuit strives to promote a more democratic and inclusive decision-making process that takes into account the diverse needs and perspectives of citizens.

6. Ethical considerations

6.1 For participants

Protect the privacy of the subject, and ensure that personal information will not be used for other purposes without notification to the subject.

- . Subjects should volunteer to participate in the experiment without force.
- . Subjects have the right to know when the experiment starts and be recorded.

6.2 For the wider academy

- . Ensure that this experiment does not infringe on the interests of other studies or use non-copyrighted sources.
- . Use transparent, systematic and replicable research methods.

7. Limitations

There might be some deviations in neuropolitics experiments due to laboratory stress and the interaction of indicators (Settle et al., 2020).

- . Since the subjects are human, different samples or wider experiments may produce results that do not exactly match.
- . Research in this field is also guided by the possibilities and limitations of physiological measurements.

8. Benefits

Firstly, this experiment helps to advance the use of algorithms and digital technologies in public engagement, offering new ways of thinking about how they are used, regulated and limited. By understanding individual preferences for different forms of digital narrative, we can adapt narratives to reduce the occurrence of artificially induced public behaviour. This helps to improve the fairness and transparency of digital public engagement.

Secondly, this experiment provides a deeper understanding of the complexity of digital engagement. By examining individuals' biases and preferences in the digital environment, we can gain a more comprehensive understanding of people's behaviour and decision-making patterns during digital public participation. This helps to reveal the impact of digital tools on individuals' levels of engagement and expression of opinions, providing valuable insights for the design and improvement of digital public engagement platforms.

In addition, the experiment has the potential benefit of inclusive participation. By understanding individual preferences for different digital narrative forms, platform features and tool characteristics, we can identify inequalities that exist and take steps to promote more inclusive participation accordingly. Optimising the design and functionality of digital public engagement platforms ensures that they can accommodate a diversity of perspectives and voices, leading to broader public participation.

Finally, this experiment also has important implications for the fields of neuropolitics and digital public engagement. It offers new research directions to further explore the impact of digital environments on the brain's decision-making processes. By combining knowledge from neuroscience and cognitive psychology, we can optimise digital public engagement practices and enhance the cognitive and emotional experience of participants.

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