Project Title: Visualizing the space of debate

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Host institution: Télécom Paris
Advisors: Michael Baker and Samuel Huron

Context, Challenges and Originality

Deliberation is an essential element in any collaborative environment and democratic processes. For collaborations to be successful, it is a major challenge to ensure that different ideas and perspectives are well communicated and understood in order to lead to constructive outcomes. *Constructive argumentation/deliberation* practices support participants to become more informed about a topic and the diverse views of the topic.

While a range of online debate platforms (Frappier et al., 2024) and in-person protocols (Schwarz & Baker, 2017) exist, large scale platforms are not necessarily developed with inputs from argumentation research. Many cognitive and metacognitive dimensions internal to the participants that impact the quality of the debates are also often not accounted for. For example, what participants' cultural backgrounds and value systems are and how they might be evoked; Over the course of the dialogues and interactions, how participants' affects and emotions fluctuate (Baker et al., 2013) and how their understanding of the topics or related concepts modify (Baker, 2015). A crucial question is then how a technology might externalize these dimensions along with capturing the evolution of cognitive and metacognitive changes in the debate process in order to support participants to better reflect and communicate.

At the same time, information visualization (infovis) is a field of research that studies how the *visual representation* of abstract data can enhance human understanding (Card, 2009). However, platforms such as those used for civic deliberation (Frappier et al., 2024), that provide visualizations (e.g. El-Assady et. al, 2016; South et al., 2020), tend to use them for presenting data as *output* (Bressa et al., 2024). There is therefore an opportunity to use infovis to design with participants *new input models in visualization* that represent the evolution of debates that leads to more constructive deliberations.

Scientific Objectives, Approach and Anticipated Results

This project aims to improve online debate platforms in citizenship debates at large scale. Research will be conducted with topics related to sustainable development, similar to those previously debated by governmental organizations such as CNDP or civic organizations such as ZigZagZoom. Participants of the research will be drawn from the adult populations around Institut Polytechnique de Paris and partner organizations of its research labs.

In this project, three innovative approaches are used to achieve its scientific objectives. *First*, the project combines argumentation and infovis research to achieve its scientific objective of exploring what participants' representation models for the evolution of deliberations are. *Second*, rather than the traditional use of visualization as an output system for existing data (Bressa et al., 2024), the project will use infovis research to support the scientific objective of designing an input visual representation system using participatory design. This visual representation system will serve as a medium for participants to externalize and interact with their own internal processes of cognitive and metacognitive changes and be used for re-designing an online debate platform. *The third innovative* approach is to re-design and evaluate an online debate platform guided by argumentation research, which is often not the case in existing citizen debate platforms (Frappier et al. 2024). To evaluate the quality of the new technology platform, research in cognitive science will be employed

to assess whether it leads to constructive reflections and communications as participants engage in dialogues (Schwarz & Baker, 2017). These approaches will lead to the final scientific objective of prototyping and scaling up visualization deliberation at scale.

Positioning: PC4: CONGRATS

This project is situated within the framework of the "PC4 : CONGRATS - Collaboration à grande échelle" axe of the PEPR eNSEMBLE. Supporting the work package "WP 4.4-Understanding socio-technical collaborative systems in action", the project's scientific objectives contribute to the development of large scale online debates through visualization. It aims to better understand the representation models in visualization that would support constructive argumentation with input visualization. We are approaching this problem with a participatory design approach, aiming to design a representation system and input visualization with debate participants which have not been done by the literature. The aim of the project is to support the design of visualization for deliberation at scale. The final goal of this project is therefore to improve the design of online debate platforms (Frappier et al. 2024) by creating novel design approaches that support constructive debate. The research targets large scale citizenship debates such as those held by the CNDP and complement the "Task 4.4.2 cases of platforms for public debate and deliberation" within WP4.4 of PC4.

Project Organization, Duration, Milestones

Milestones correspond to the end of each work package.

Work packages

WP1. Systematic review. Conduct a review of existing deliberations related visualization models.

WP2. Research design. Design research protocols and deliberation protocols including running pilots. The deliberation protocol will reflect practical deliberation scenarios in the society while drawing from argumentation design research (Andriessen & Schwarz, 2009) for constructive deliberations.

WP3. Data collection and analyses. Deploy research holding deliberations and collecting observation data, manual sketches from participants and conducting interviews. Data collected will include:

1. Video, audio, and text capture of the entire deliberation process
2. Interviews with participants in groups and individuals
3. Participants' manual sketches of their experiences

Analyze participants' experiences along with their visualization sketches.

WP4. Re-design and evaluation. Drawing from findings in WP3 and working with design expertise, reimagine a deliberation protocol, and the visual representation design using participatory design approach. Re-deploy research with redesigned protocols and analyze outcomes and disseminate findings.

WP5. Prototyping for scale. Prototyping technology for deliberation with visual representation and experimentations for large scale deployments. Documentation and proposals for scaling up deliberation

	2025				2026												2027							
Work packages	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8
WP1 Systematic review																								
WP2 Research design																								
WP3 Data collection & analyses																								
WP4 Re-design and evaluation																								
WP5 Prototyping for scale																								

Feasibility

Given the institutional support of Télécom Paris, advisors and a project partner (see below under partnership), there are sufficient resources to carry out the tasks described. The milestones of the work packages are realistic estimates.

Partnership

This interdisciplinary project will bring together expertise in argumentation, design, and visualization within Telecom Paris and CNRS.

Postdoc: Dr. Toi Sin Arvidsson (CNRS, Télécom Paris) is conducting pilot studies on argumentation among higher education students. Her training is in cognitive science and argumentation with a background in statistics and computer science.

Advisor: Dr. Michael Baker (CNRS) is an expert in argumentation and collaboration and will provide support on the design of deliberation practices and the design and implementation of an online debate platform.

Advisor: Dr. Samuel Huron (Télécom Paris, IPP) is an interaction and data design expert and will provide support on the study and design of visualization models, of an online debate platform.

Project partner: Dr. Nathalie Bressa (Télécom Paris, IPP) is an expert in situated visualization and deliberation and has a strong background in participatory design and will provide support for the design of an online debate platform.

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