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Micro-Politics, Semiotic Power and Infrastructural Inversion: Theoretical Lenses for Geopolitical HCI

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Abstract. An argument is presented for the use of the concepts of Micro-Politics and Semiotic Power by Bijker, and Infrastructural Inversion by Bowker to understand the geopolitical dynamics of career-building, knowledge and value creation in the field of human computer interaction (HCI). This is illustrated with brief references to examples of HCI academic and professional practice and dissemination in local and global contexts. It is shown how local and global micro-politically dominant groups in the HCI field can construct scripts that define quality, impact and relevance. These scripts in turn have a direct effect in career-building and what is considered valid and useful knowledge and practice. The political leverage of these scripts is therefore embedded in artefacts used for different types of transactions in the HCI field. Infrastructural inversion is finally presented as a possible framework to deconstruct and make visible these scripts and the different types of historical and political tensions inscribed in them at disciplinary, local, national, regional and global level.

Keywords: Geopolitical HCI, technological frames, infrastructural inversion, HCI research, HCI practice

1   Introduction

The geographical diffusion of human computer interaction (HCI) as a field of knowledge and practice is underpinned by political and post-colonial discourses that pervade local indigenous and global knowledge networks shaping what is considered useful and relevant research and practice [1, 2]. Post-colonial analyses of HCI diffusion are fundamentally framed as set of intercultural and potentially uneven power relations encountered in design situations [1]. However, these analyses miss local and indigenous HCI concepts and methods [2] that are often invisible to professional and academic spaces of knowledge exchange [3]. The potential contribution of explicitly local or indigenous perspectives, approaches, and experiences with HCI tends to remain unknown, e.g. [4], and, it is argued, subject to political forces that make them remain largely invisible.

There are attempts to understand HCI maturity and diversity levels through origins, frequencies and levels of participation in conferences such as CHI or CSCW, e.g. [5];

through organizational adoption, e.g. [6, 7] or through regional institutionalizing efforts, e.g. [8]. The problem with these attempts and the discourses surrounding them is that HCI's maturity and diversity is placed on a scale underpinned by western models of value, quality and participation reinforcing geopolitical configurations of exclusion and inclusion, which regulate human and knowledge mobility in the field. Thus, limiting the potential to integrate other views, forms of being, living, understanding and succeeding in the world and in the HCI field itself.

An argument is presented for the use of the concepts of Micro-Politics and Semiotic Power by Bijker [9], and Infrastructural Inversion by Bowker [10] and Simonsen et al. to understand the geopolitical dynamics of career-building, knowledge and value creation in the field of HCI. These concepts enable political analyses of this field at local, national, regional and global level.

2   Background

2.1   Power and Politics in Information Technology Disciplines:

The significance of power and politics have been studied in disciplines such as information systems and requirements engineering [11, 12]. Power considered as a complex concept and its role depends on the perspective of the research [13]. In the social context, it is considered as characteristic of an individual within a relationship or interaction of two or more people [12]. Power enables individual to have influence on the others' behaviour [14]; or convincing others to act accordingly [15]. In the social interactions, politics is considered as the directing of the individuals' power into actions and acting according to it [16]. In a social group power can be practiced in accordance with the structure of relationship amongst individuals and the politics is perceived within the decision-making actions and processes within individuals [11].

Within literature examining design and implementation of information systems the focus on political issues concentrated more on the organizational change, managerial practices, and political tactics to resist change [17, 18]. In software engineering some research has been carried out to investigate power and politics in different areas such as requirements engineering [11, 19], and software eco-systems [20, 21]. In a study by Bano, Zowghi, & Ramini, [16] the political aspects of the relationship between user involvement and system success has been studied . Their findings highlight the significance of politics used to exert power and impact in the decision-making processes. The manipulation of communication channels for political purposes caused users' dissatisfaction and negatively influenced the project outcome.

Rowlands and Kautz [22] study the relationship of different forms of obtrusive and unobtrusive power [23] in systems development methods. Obtrusive power is a hierarchy-based or economic-based form of power. Whereas unobtrusive power is the ability to give meaning to events and actions, and to have an impact on the perceptions of other individuals. Their results highlighted the obtrusive power of clients due to the controlled critical resources and funding through approval and sign-off on documentation process. Developers were subject to the unobtrusive power embedded in the software development method in the form of habitual work practices and discipline.

All in all, the brief review of previous research in this area exposes a number of political tensions and power relations that tend to be asymmetric, dynamic and symbolically inscribed in artefacts used to develop and implement knowledge in these fields. The next two sections introduce theoretical frameworks and concepts that can be used to make sense and study this type of tensions.

2.2 Technological Frames, Micro-politics of Power and Semiotic Power:

The concept of technological frame (TF) was developed by Bijker [9] to make sense of the social shaping of technology and the technological shaping of society. Bijker's TF places an important focus on the political processes influencing socio-technical change. This concept was first developed by Bijker in trying to understand the socio-technical processes that guided the interactions of groups of scientists and technologists in the invention and development of bakelite and the fluorescent lamp. A TF is constituted by knowledge, assumptions, expectations, practices, workarounds and other tools shared in a community that influence how meanings are attached to technology and how it evolves within that community. HCI in this case is a technological field around which TF revolve associated with different types of community therefore leading to different frames shaping the socio-technical change and evolution of this field.

TF have already been used in previous research to understand the political processes involved in the definition and diffusion of technology and IS design practices within different types of communities, organisations and cultures [15, 24, 25]. According to Bijker [9] the exercise of power in TF occurs through two political processes take place: one referred to the 'micro-politics' of creation, transformation and negotiation of meanings attributed to technology, in which powerful groups tend to impose their own perspectives [e.g. 26, 27]; and other referred to as 'semiotic power', in which meanings, once fixed in diverse elements of a TF by dominant stakeholders (e.g. artefacts, accepted practices, norms, etc.) in turn constrain and structure the actions and transactions of the communities associated with the technology in question [e.g. 28, 29]. The idea of semiotic power is derived from semiotic approaches in the Sociology of Technology, which study processes of user and producer configuration [30–32]. This coincides with the concept of unobtrusive power already discussed in the previous section [22].

The use of TF to analyse power structures and dynamics is not uncommon with IS research [24, 33, 34]. The study of the discipline of Requirements Engineering has also been subject to analysis of power dynamics shaping the TF of relevant actors and their decision making in the process of systems design [11]. And more recent research highlights the importance of the political forces of TF in defining the HCI profession and job roles [35] where it is recognized that the involvement of powerful or influential stakeholders and the influence of organisational and intra-organisational cultures and politics can influence the interpretative processes and affect the framing and reframing process, and this in turn may influence the formation of a dominant frame, both in terms of content and direction [24, 36].

2.3 Infrastructural Inversion

The notion of information infrastructure [37] can cover the HCI discipline as a sociotechnical assembly of relations between humans and the realities they create including the technologies that enable and support these practices. The concept is fundamentally grounded on a situated and relational view that infrastructure happens in practice and when connected to some concrete activity. The emphasis on context as the maim medium through which infrastructures exist allow the identification of gaps and issues at different levels of learning using Bateson's categories [38]: (1st level) know-how, (2nd level) social/organisational, and (3rd level) political/paradigmatic. It is at this last political level that an infrastructural analysis enables the understanding of the geopolitical tensions underpinning career-building, knowledge, and value creation in relation to the lower clearer levels of overt communication and transactions in the field of HCI.

Simonsen et al. [39] propose infrastructural inversion as defined by Bowker [10] to analyse infrastructures by turning invisible relations into visible entities. This is achieved according through conceptual-analytic, empirical-ethnographic, and generative-designerly strategies. A typical "way into" the inversion is through the identification of breakdowns in the infrastructure [37, 40, 41], which is an empirical-ethnographic route. In a co-design project aimed at the implementation of electronic whiteboards in a hospital pre-surgery ward Simonsen et al. [39] demonstrate how invisible relations can be identified thorough initially conceptual-analytical strategies moving onto a designerly ones with the help of local participants in co-design workshops. The identification of these relations in turn facilitated the implementation of whiteboards to achieve the desired effect of optimum management of fasting times.

3 Towards a Geopolitical Analysis of HCI

It is argued that the above theoretical lenses can enable an analysis of geopolitical tensions in the field of HCI.

For instance, a TF analysis of political dynamics driving HCI communities can identify how powerful groups frame actions and artefacts defining scientific rigour or professional value and utility. Typical tensions that could be analysed through this approach include practice (e.g., UXPA) versus research (e.g, SIGCHI, IFIP) globally; the local HCI versus the BigTech HCI; or the emergence of national and regional HCI communities as geopolitical entities in HCI research. A semiotic power analysis of tensions could deconstruct the scripts embedded in transactions in the field. These deconstructions can focus, for instance, on the semantics of HCI, e.g., user-centric versus people-centric; or on the technical program of HCI conferences reflecting geopolitical controversies and imbalances.

An infrastructural analysis of HCI will necessary highlight second and third level issues, using Bateson's categories, to identify and map invisible relations in social and organisational arrangements and configurations with their own political models and worldviews. Good candidates for infrastructural inversion in HCI can be the tension between the emancipatory and military motivations originating this field, or conflicting forms of participation in design in liberal, deliberative or Marxist democracies.

Infrastructural inversions help us visualise local and indigenous HCI concepts and methods [2] that are often invisible to professional and academic spaces of knowledge exchange [3]. The potential contribution of explicitly local or indigenous perspectives, approaches, and experiences with HCI tends to remain unknown, e.g. [4]. The literature reviewed so far reports on case studies where user involvement and developer-client relations are shaped by invisible power relations embedded in artefacts and transactions scripted in design and development methods and how situations of breakdown or empirical [e,g, 18, 19].

It is relevant to note that of much of the knowledge production and mobilisation in HCI have taken place within developed countries. Political, Economic, Socio-cultural, Technological, Environmental, Legal, Managerial and Organisational analysis methods and concepts are needed for contextualising towards effective and meaningful HCI knowledge production in developing regions [42].

4   Conclusion: Theoretical Lenses for a Geopolitical HCI Research Agenda

This paper introduced three well-known concepts in the discipline of science and technology studies that enable a geopolitical analysis of HCI: TF [9] and Infrastructural Inversion [39]. The concepts have been briefly introduced and described illustrating how they can be used to research, identify and articulate typical geopolitical dimensions and contradictions present in the field of HCI. The scope of such research should span the political and historical forces, agendas and scripts underpinning professional and academic practice in HCI.

It is hoped these concepts can be used as analytical tools to help develop a research agenda for geopolitical HCI. Such an agenda should have as its main objective to offer a frame of reference for practitioners and researchers to mobilise knowledge [43] to reflect, plan and assess their own geopolitical position and assess the type of tensions embedded between theory, practice and the ideologies and worldviews underpinning them.

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