Subjective Epistemologies: Inconsistent Artefacts in the Redesign of Medical Devices

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Abstract— In this paper we explore the potential of post-disciplinary practices to contribute to designing technologies that are in alignment with the fluidity of the female body and the non-fixity of objects. We describe a combination of methods for a deeper understanding of medical devices, and the challenges of prototyping bodily-centred technologies.

Keywords— Technology; body; design; health; care; women

I. INTRODUCTION

The nexus of technology and the body has long been at the interdisciplinary crossing between the humanities and science. In this context, design offers an increasingly effective knowledge of the body that contributes to its integration with technological apparatuses. This paper focuses on the notion of interdisciplinarity to conceptualise an ongoing project (Pelvics) that revisits medical devices designed to help care for the female pelvic floor. The example of a device that, to be functioning, needs to be mapped onto the body is the opportunity for re-framing discourses of body and technology in their proneness to change. On this ground, we draw on Knorr-Cetina’s concept of epistemic object to explore the permanently incomplete nature of designed artefacts [1], and Akrich’s notion of script [2] to stress how culture and subjectivity are embedded in technology, and how this is making scientific devices more similar to artistic artefacts.

A call towards interdisciplinarity has recently been reinvigorated by the experiential and user-centred turn in human-computer interaction. Research such as [3] places an emphasis on methods that contemplate empathy, and [4] on health and technology. While there is a growing body of work that suggests good practices in terms of how to work across disciplinary fields [5][6], the research we describe in this paper provides an instance of how working in a post-disciplinary environment might be [7]. A number of artistic projects, often adopting the approaches of speculative design, already address different issues related to health, illness and medical practice [8][9][10][11]. In this paper, we introduce Pelvics and explore a combination of different methods (participatory design, critical theory, ethnography, speculation) to achieve a set of artefacts that might simultaneously behave as objects for reflection, influence existing practices, prelude to a new prototype, raise awareness and motivate new practices of care; to critique traditional quantitative approaches to medical practice and to articulate a specific approach to empiricism and the adoption of scientific methodologies in the arts and humanities. We contribute to the discourses on digital art and health technologies and highlight the subjectivity of experience as pertinent to make ‘empirical beliefs’.

II. PELVICS

Pelvics is part of an ongoing research that looks at practices of care in the body and the future of medical devices. It advances [12], an embodied exploration for self-awareness that looks at technology and body literacy as a means to promote a preventative health practice: female pelvic fitness. Pelvics is an inquiry into the construct of esteem, touch, and diagnosis. It looks at medical devices as epistemic objects, and draws on speculative design as a method to further explore current care practices. Finally, we identify opportunities for design that can affect positive change in female intimate care and advocate the re-scripting of existing medical devices.

A. Body Knowledge, Technology, and Contemporary Health Care

Historically the human body has been perceived and represented in many different ways. A significant transformation took place in the late eighteenth and early nineteenth centuries following the emergence of modern science [13]. Medical models appeared showing evidence that made sense of sexual differences between the female and male anatomy and physiology. Further on, as cultural values and constructions of the body evolve, the body becomes the ally of sexual difference [14] and plays a role in social, cultural, and psychical life. The body is our primary interface to the world. “The body - what we eat, how we dress, the daily rituals through which we attend to the body - is a medium of culture [15]”. Conceptualizations of the body as “a physical body acting and experiencing in a specific sociocultural context; it is body-in-situation [16]” are advanced by feminist theory and this ‘lived body’ encompasses concepts of embodiment, which promotes “an understanding of the ways in which particular kinds of bodies are produced through experience [15]”.

Embodying, therefore, positions the body as a site of production of both the social and the self. In addition, and for much of the history of western philosophy, the body has been conceptualized as a possible source of disruption to be controlled [17]. The loss of a limb or a breast, for example, can affect “not simply corporeal integrity, but also the sense of who we are [18]”. Technology developments applied to care of the body have certainly provided for prevention of illness and surveillance to manipulate self-identity [19]. However, we look at the design of medical devices currently in use for caring of women’s bodies, which tend to neglect or attend to the fluidity of the body. We give the example of the speculum, and how its design is “lacking in innovation and concern for the patient [20]”. The speculum is a medical device used to perform the pelvic exam: its “purpose is to retract the vaginal walls to allow a clinician to visually examine the cervix and obtain culture specimens for tests, such as the Pap smear [20]”. It is the controversial invention of a male doctor [20] and dates back to the nineteenth Century. Since then, it has seen little design improvements. It simply gets the “job done” and has not been affected, so far, by contemporary reflection on gender, subjectivity, wellbeing. As noted in [22], there is “a blind spot as to how gender differences affect what people care about, what motivates them in everyday lives and the way they desire to live with technology.”

B. Objects of Ethnography and Speculative Design

To explore the inadequacies of existing medical devices for pelvic care, we delivered a design workshop in which we wanted to “hack” common biomedical technologies and explore the materiality of technology in use. This was intended as a collaborative speculation and the aim was to explore possible, fictional objects as alternative to the present ones. It was an exploratory study to help us identify requirements and preferences in order to redesign and re-script those existing medical devices.

The workshop took place in an artist’s studio and there were four female participants aged 29-38 years old. The artefacts available for observation were varied: different specula (vaginal, Sims) and pelvic floor exercisers (intra-vaginal probes), a reusable sanitary pad (figure 1). The presence of these artefacts stimulated a discussion around a variety of issues, such as:

- ergonomics and materials:
  “... useful to better understand how it’s used, what is that design doing? Can’t imagine, understand what it’s really doing.”
  “designed to be ergonomic for the people using it rather than the people receiving it”

- the sensitivity of the topic and sense of normalcy:
  “get ourselves to feel comfortable with even talking about our private parts and looking at them so we could know if something is not normal for us, to then talk to a doctor or...”

- the origin of the devices:
  “word play speculum and speculative”
  the use of the devices:
  “adds level of embarrassment”
  “dirty as woman”

The participants were invited to re-think these contemporary technologies in ways that would improve the woman’s experience of both receiving or giving care to this intimate part of the body. As noted in [23], speculative design is not only aimed at innovating and suggesting directions towards technological futures but can also provide a system for analysing, critiquing and re-thinking contemporary technology. We apply this design method to instigate debate rather than to create a final product to bring to the market. The design solutions for proposals dealing with sensitive subjects are complex and contradictory [23], and all the same, Pelvics is situated within the area of research and design of such troublesome topics. Some proposals coming out of this workshop were: a gene-based diagnosis to detect levels of collagen and health of connective tissue; a gym for women in which there is a specific space and ‘equipment’ available for pelvic fitness; a parallel between the use of the speculum to that of a fairy tale (figure 2); to market medicalised devices and products as a lifestyle rather than a remedy. Based on the resulting proposals and oral testimonies throughout the workshop, we created a series of narrative embroideries. This hand needlework is a form of visual storytelling and narration (figure 2). It is also an accessible, tangible medium that we used to preserve and communicate sketches, thoughts, and written notes, and we envision to be using them as prompts for interviews at a later stage.

Fig. 1. Medical devices for pelvic health care. Betagrams: Exhibition, Newcastle, UK, 2014
C. Epistemic Object and the Medical Artefact
Recent debates in the fields of Research Through Design, practice-based research and the Digital Humanities [24][25][26], have pointed at the co-existence of different kinds of knowledge, challenging the traditional scientific approach to research and introducing alternative logics of dissemination and validation. Variously defined as tacit, experiential, non-conceptual, non-propositional, in action, situated, and even ineffable, these new notions of knowledge are contributing to the introduction of not only new research methodologies but also alternative epistemological conditions. Pelvics can be understood precisely within this context and signals how the hierarchies between different definitions of knowledge, rigor, validity and truth are becoming dubious. Its methodology places an emphasis on experience, subjectivity, aesthetics and empathy and brings the creative languages of artistic and design practice within the field of medical science. As noted by Young in [16], “The lived body is particular in its morphology, material similarities, and differences from other bodies”. Similarly, Shildrick’s notion of the body as fabrication and inconsistent artefact is suggestive of a productive parallelism between the fluidity of the body and the non-fixity of designed objects [18]. The process of redesign implies that artefacts, even when established in practices of use and after a long-lasting presence in the marketplace, cannot achieve a stable condition. In a way all designed artefacts can be as potential prototypes for redefined versions of themselves. The case of medical devices however is made complex by their embeddedness within determined scientific system, guidelines and rules. These devices relate to the body as much as they relate to fixed parameters and measurements. In this context it is instructive to explore Karin Knorr-Cetina approach to the objects of scientific research (epistemic objects), that contribute to a broader strand of literature questioning the absolute and objective nature of scientific knowledge [27][28][29]. Epistemic objects are intended as inherently incomplete and constantly unfolding because of their relationship with the evolving nature of research, and their capacity to generate questions and develop new problems and responses. Similarly, tools for the care of the pelvic floor muscle are objects in flux, whose evolution depends not only on their mapping onto the body, but on developing paradigms and values that links definitions of disease to a set of conditions. Whereas traditional approaches rest on a quantified and measurable correspondence between disease and body performance, Pelvics suggests more subjective and variable attitudes to assessment and care. These devices are therefore part of a trajectory of becoming that responds to a shift in the notion itself of knowledge and its processes of production.
In parallel to a redefinition of knowledge, the design process of any technological device is also subject to changing value and cultural systems. Literature on STS has thoroughly addressed the reciprocity between the technical and the social [30][31], but Akrich notions of script and reinscription are particularly relevant to describe the process in which both designers and users attribute values to the device, shaping the device itself. While script is intended to what users are asked (from the designer) to imagine about a specific device, reinscription consists in a feedback movement that introduces conflicting visions on the object, not initially foreseen by the designer. The dynamic between inscription and reinscription can be adopted as a framework to understand how participants and designer, in Pelvics, co-operate on a modification of devices and values.

III. “BUYING INTO A LIFESTYLE”: RE-SCRIPTING TECHNOLOGIES
Technology has a profound mediating effect on the way we relate, obtain knowledge, and contribute to society [32]. The design knowledge of the body turn to self-awareness and self-care consequentially creates opportunity for change in approaches that were once inaccessible or institutionally bound technologies. As we incorporate self-diagnostic devices and medicating technologies, new frontiers need to be re-scripted. With the dissolution of boundaries between the body and technology - implantable, genetic, biologically enhanced, or contraceptive – the intersection of materiality and care become apparent. The space created by a possible medical condition, body knowledge, and the design of a technological artifact becomes personal and marks a shift in understandings across digital and physical health, material science, and design.
There is a richness of terminology to address ways of working across disciplines. Beyond multi-, inter-, trans-, and cross-disciplinarity, we found the notion of post-disciplinarity more attractive because it considers the division in disciplines as a contingent, historical phenomenon. While interpreted by some as a complete rejection of disciplinary separation [6], we prefer to embrace [7] approach based on a constant renegotiation of disciplinary boundaries. The post-disciplinary dimension of Pelvics relates both to the problem addressed
Pelvis epitomizes the responsive relationship between objects and knowledge and, on the basis of their reciprocity, advocates the notions of unsettledness and inconsistency to approach even the most accustomed practices of use. Artefacts are shaped by culture and have an impact on life in its social, cultural, economical, and political contexts. This research considers the future of medical devices and offers new possibilities to redesign and re-script them at the intersection of technology and the body. We applied varied methods to explore self-awareness and to craft self-understandings of such intimate care practices and products. Through this, we inquired how bodily technologies could benefit from research and development that is in accordance with both users and designers; evaluated how current designs and design speculations are or could be in tandem with the fluidity of the body and the non-fixity of objects. Avenues for future research could explore ways for technological artefacts to contend for post-disciplinary approaches to design. Nonetheless, combining a multitude of practices – artistic, scientific, technological – allows for the exploration of adequacies of bodily materials in anticipation of alternative futures. However, the challenge of post-disciplinary work remains on assessing the quality of the artefact, as methods of evaluation resist to traverse disciplines.

REFERENCES