

P / REFERENCES OF DESIGN

DESIGN STRATEGIES FOR THE COMMUNICATION OF MEDICINE AND HEALTH PROMOTION IN SCIENCE MUSEUMS.

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ABSTRACT | The doctoral research presented in this paper explores the relationship between design and scientific communication in medicine and health museums. In particular, the thesis aims to define methods, principles, and scenarios useful for the design of scientific exhibits that display visitor information by redefining the human body metaphors. The challenges of contemporary society include the need to facilitate access to the latest results of medical research for an ever-wider public to contrast the growing phenomenon of disinformation about these topics. Medical sciences are exhibited in science museums concerning medicine, health, and hygiene and science centres using different exhibition strategies. Generally, designers and curators work simultaneously to design exhibitions and exhibits, but in this context, there emerges a lack of involvement of designer profiles in the visitor experience design and also a loss of appropriation of these issues by the discipline. It was necessary to complement the design literature review – that is particularly limited – with the analysis of the wider literature in the sectors of museography, museology, scientific communication, and public health. The review was supported by visits to European museums that revealed a panorama where visitor involvement by exploring their data increases engagement. In this way, users feel more involved even but sometimes this is at the expense of awareness. A mapping of usable data was returned. It brings out problematic design aspects and new design scenarios for health datafication. To reconsider these themes considering scientific and technological development is both necessary and urgent because design has an increasingly important function to interpreting and transferring scientific knowledge to society by creating engaging, inclusive, and exciting experiences. In this regard, the doctoral thesis intends to provide the groundwork for reflecting on science exhibits and exhibitions that incorporate visitor data inside the design discipline to stimulate reconsideration of the relationship between designers and science and technology museums reciprocally and innovatively. This is considered necessary to get the design back on body and interaction issues in these contexts.

1. Scientific Background and Purpose

The doctoral thesis presented in this contribution investigates the relationship between design, scientific communication, and the museum to understand the contribution of design in health science museums. Specifically, it examines the exhibition of the human body and medical sciences in science and technology museums (UNESCO/STC/Q/853, 1984) based on an analysis of the contemporary exhibition scenario. The need to promote knowledge of these themes to an ever-widening public in a manner appropriate to the contemporary techno-scientific scene is recognised as a founding mission of these institutions that responds to an emerging need in contemporary society. In fact, in a 2021 report on the economic and social impacts of health systems, the World Health Organisation reported that a population consciously educated on health-related issues has access to considerable social and economic benefits (WHO, 2021). Recently, however, the COVID-19 pandemic has highlighted a problem of public misinformation about medical prevention because people are frequently unable to distinguish between credible sources and fake news (Sala & Scaglioni 2020). Therefore, the function played by museums that illustrates scientific methods and progress by narrating and exploring knowledge and offering a dynamic perspective to the dissemination and production of knowledge is becoming increasingly important. However, the surveys on the number of visitors to Italian museums (ISTAT, 2020; 2022) show how museum institutions still address only a small part of society even though they act as an engine for the construction of cultural identity. Science museums must, therefore, reach out to the public distant from scientific culture by translating and making medical-scientific phenomena and principles more accessible. This change involves several disciplines associated with museological and museographic management and design. These include the designer as a strategic actor in designing the cultural experience inside and outside the museum using exhibitions, visitor paths, installations, and interactive exhibits. Currently, medical sciences and the human body are displayed in their everyday functions using virtual and augmented reality, 3D animations, and interactive and hands-on models by linking medical-scientific knowledge to social and cultural sources of care and support, with focus on the stories of people and the ethical-behavioural sphere of individuals.

In the last few decades, the development of advanced medical imaging techniques and processes, nanotechnologies, biosensors, and telematic and digital communication technologies have made possible a very advanced level of acquisition, transmission, and representation of the human body. Body digitalisation also profoundly changes the relationship of individuals with their bodies because it transforms the way we perceive, manage, and communicate health through new models, technologies, and metaphors. In the history of medical museology, technoscientific innovations in medicine have often driven the development of new ways of displaying the body (Canadelli, 2011).

In connection with the foregoing and the multiple intentions of science museums, the importance of interpreting medical sciences to inform audiences about health promotion is evident (Batterham et al. 2016; Christensen et al. 2014). However, even today, many people are critical about learning in modern science centres and science museums and often classify them as exclusively playful contexts. Concerning the correct design of interactive exhibits, several contributions have informed the discussion in science museology since the 1980s (Merzagora & Rodari, 2007). These papers cannot be found in the research in design but in the other disciplines involved in museums. This suggests that museums while using design science in different ways, do not directly and consciously involve the figure of the designer. Moreover, the inappropriate and sometimes missing status of these disciplines in the statutes and regulations of museums and museum associations show that they are not institutionally recognised (Celi et al., 2013). The relationship between design and museums should be even more evident in science museums, which, by their specific identity, are responsible for connecting scientific-technological advances with society in which design plays a strategic role. Design and science are related in many ways. They are two mutually intersecting and co-evolving units, and design is often used to interpret and communicate concepts effectively to science (Langella, 2019). There is, therefore, an urgent need to investigate the contemporary museum context to understand which practices we are moving towards. The research topic, therefore, is located at the intersection between fields of investigation that in recent decades have been attracting increasing interest from various international scientific communities, such as health promotion, digital

technologies for modelling and representing the body, digital health, exhibit design, interaction design and design for the communication of science. The doctoral research was developed starting from a series of theoretical-methodological and applicative questions: in contemporary society, what are the most effective semantic, metaphorical, and linguistic codes for representing the human body? How does the use of electronic and digital technologies influence the exhibition of the human body and medicine? How can design contribute to the dissemination of medical science and health promotion in science museums? What are the relationships between design and other disciplines in science museums, and what role does it play? What is the role of design in designing experiences involving scientific phenomena and principles related to health and medicine? How can scientific phenomena and principles relating to health and medicine be translated and made more understandable and accessible?

2. Design Strategies for Health Promotion and Medical Sciences: Showing Visitor's Data

The doctoral research explores, therefore, the present scenario of museums covering the topics of the body, public health, and medical progress using a multitude of practices and representations of the human body. The aim is to reduce the distances between scientific and design areas by converging them in the design of interactive exhibits. To achieve this, it is necessary to start with the establishment of scientific literature that is currently severely lacking in the design area. The lack of contributions in design made it necessary to define broader selection criteria than the design domain by including articles from other areas such as public health, health education, museology and scientific museology, history of medicine and history of science, communication of science and science education, information and communication technologies, medicine, social sciences, psychology of perception and learning, media studies and design. The literature review shows that in museums aimed at the general audience, such as health exhibitions, technologies are currently used to make visitors aware to engage and discover themselves. There is a trend towards the use of devices that gather data from the visitor's body to induce them to think about their body and its functions in everyday life contexts to influence correct lifestyles and good behaviour (Garneau & Hostetler, 2010; Canadelli, 2011; Saab et al., 2013; Rivera-Gutierrez et al. 2014; Sandholdt & Achiam, 2018; Bønnelycke, Sandholdt & Jespersen, 2018; Lykke, Skov & Jantzen, 2021). Evaluation studies show its opportunities and limitations, especially about learning in informal settings and health promotion. Contextualising the visitor's data and information in a personal everyday or pathological life scenario promotes learning and reflection. The design essays highlight the interdisciplinary nature of these issues and the close relationship between design and science. Their limited number, combined with their geographical concentration, shows that design has not yet appropriated adequately, in theoretical terms, the design of scientific exhibitions and exhibits on the body, medicine, and health. This does not allow for an appropriate assessment of the involvement of designers in practice.

For this reason, the analysis of the state of the art is complemented by the investigation of exhibitions and museums on site. Therefore, a mapping of the exhibition strategies and technologies used, the approaches used to exhibit, and the relationships museum institutions establish with the scientific community is proposed. This study was carried out by identifying the main European science centres and science museums. From these, eight museum facilities were selected in Europe in the geographical areas that have historically played a primary role in medicine and medical museology – Italy, the United Kingdom, the Netherlands, and Germany. In this way, more traditional institutions dealing with the body and medicine were intercepted in the same areas.

The analysis focused on exhibition practices that display personal data and information related to the visitor's body, identity, and health that are captured in real-time with digital or analogue techniques. Visitors, therefore, can observe, monitor, measure, and listen to themselves through the exhibits to acquire new knowledge and reflect on sensitive issues such as health. From being more or less passive users of communication, depending on the context, bodies become subjects of representation themselves. Sometimes, the information is collected for scientific purposes, contributing to the progress of research and experimenting with novel practices of health datafication (Ruckenstein & Dow Schu, 2017).

In this regard, case study analysis and confrontation provided the starting point for the doctoral research and set the stage for a critical reading of the transition as to how the exhibited body is the visitor's body and opens up reflection on not only technological but also cultural and ethical issues. The systematisation of these aspects supported the definition of strategic directions for the design of exhibits displaying the body of visitors for the dissemination of medical science and health promotion in museums in three categories: methods and tools, design principles, and possible scenarios. The result is a detailed mapping of the exhibition possibilities in terms of data and detectable information, opening up reflection on ethical issues regarding the management and use of data within the museum. It revealed a few critical aspects concerning scientificity, the relationship to the visitor's path, and the way of interaction. It highlighted a strong standardisation of exhibits, which has been intercepted in the literature as a tradition in these contexts. New exhibition opportunities have also emerged from exhibits and exhibitions designed in collaboration with companies and research centres that open the way to new project scenarios in which the exhibit is conceived as a tool for research, diagnosis, meeting with society and the scientific community, and creating new experiences. In the panorama of scientific museology, the actors involved converge in affirming that for the construction of the Museum of the Third Millennium, it is necessary to reach new audiences and be more inclusive not only in terms of physical and social accessibility but also to create an open and collaborative multidisciplinary community. Bron, Leroy, and Merzagora (2018) describe a vision in which science museums can and should take on the role of knowledge production devices, as well as communication or public engagement devices, through initiatives useful for specific aspects of academic, industrial, or citizen-driven research. In this sense, the possible scenarios identified involve exhibits that go "outside the museum" to involve people; exhibits that collect data from visitors contributing to research - providing a large and heterogeneous sample; exhibits that involve visitors in a citizen science perspective; exhibits that incorporate medical diagnostic tools - as user interfaces to explore notions and concepts or as actual diagnostic tools; exhibits that promote prevention and health promotion actions in collaboration with medical departments; exhibits that collect data to create new content in a generative way; exhibits that use personal or museum wearable devices to simplify data creation and management. According to the proposed scenarios, it is considered essential to consider exhibition design strategically to make the place of the visiting and learning experience, in its configurational aspects and interactive components, a tool not only for communication but also for investigation.

In this view, design has an interpretative role and is responsible for translating scientific information and curatorial vision to audiences, providing technical and communication skills to engage visitors in the exhibit and exhibition experience. The relationships between design, medical sciences, and scientific museology also reveal new scenarios and opportunities in terms of new occupations in which it can be difficult to distinguish the boundaries of intervention and expertise to which we have been used. To make design consciously and widely appropriate to this area and to increase professional possibilities in both qualitative and quantitative terms, design schools need to approach this challenge proactively by offering students appropriate and ad hoc training courses that enable them to effectively integrate scientific understanding and interpretation into their projects.

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