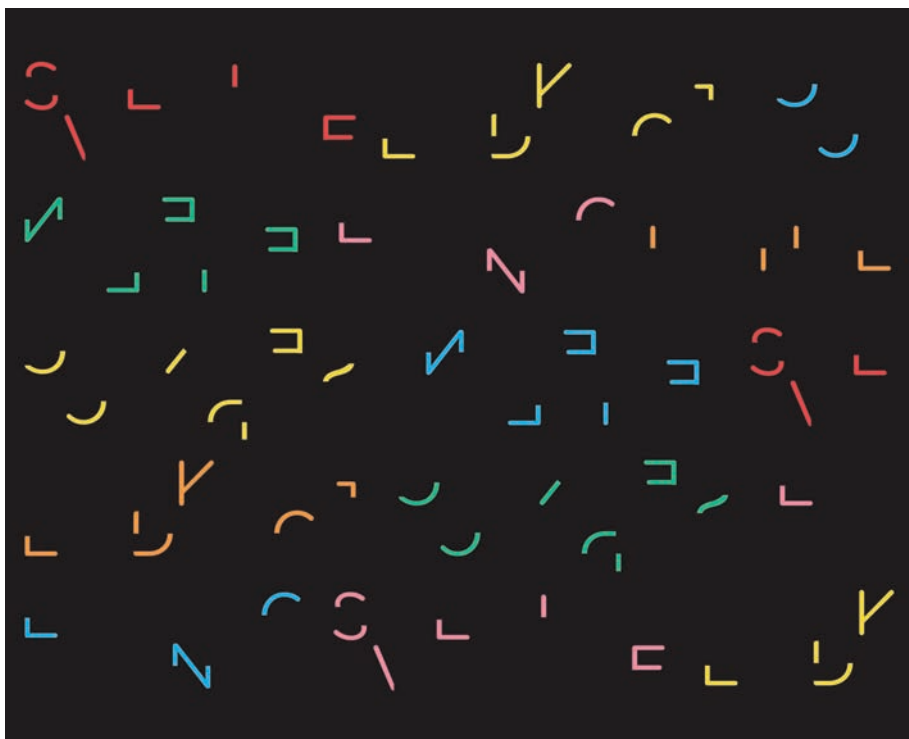# POLIMI DESIGN PHD_017

10 PhD thesis on Design as we do in POLIMI

edited by
**Alessandro Biamonti,
Luca Guerrini**

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Essays by:

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Sabrina Scuri, Han Han, Livia Tenuta,
Rosalam Che Me, Silvia Maria Gramegna,
Beril Imamogullari

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# Probing Design. The Outcomes of Doctoral Research at Politecnico di Milano, Year 2016

*Luca Guerrini and Alessandro Biamonti*

This e-book brings together the results of three-year research work carried out by eleven candidates of the PhD programme in Design of Politecnico di Milano. The variety of the topics covered in these theses represents a cross section of the manifold research activities that the programme encourages and supports. In common with all representations of on-going processes this book presents a specific picture of doctoral research in design, one embedded in theses completed in 2016.

Since its inception in 2009, the PhD Design programme has aimed to enquire into design's disciplinary foundations and explore its scope. Following on from a strong tradition of design research at Politecnico, dating back to 1990, this new programme rests on solid ground and has the potential to broaden the spectrum of analysis.

Young researchers, increasingly coming from all over the world, join an open-minded academic community which helps them carefully shape their research subjects and provides them with the tools they need to face the challenges involved in analysing them. Regardless of the topic explored, the Politecnico's doctoral design research constitutes a factor of change for the purposes of improved conditions in any field of analysis while also increasing its fields of application.

In this respect, the contribution to design knowledge made each year by doctoral theses not only follows an internationally recognised trajectory but also strengthens a disciplinary approach that Ezio Manzini defined as *design multiverso*: design as a complex system, both

comprehensive in its theory, culture and motivation and multifaceted and composite according to the perspective from which it is examined.

The design field is currently exploring a growing spectrum of topics with multiple intersections with defining new forms of dialogue emerging as a priority. In fact, Sara Bergamaschi's research "INTERM&DIA. Interaction as dialogue based on materiality" explores the field of interaction design from an industrial design perspective looking at interaction by means of the metaphor of dialogue. As all dialogue is based on language, Sara explores "the four dimensions of language" according to the interaction design classification. Her research is based on phenomenological studies which define codified languages and empirical languages. In her industrial design researcher capacity Sara Bergamaschi focused her enquiry on a wide range of 3D languages encompassing all those that we can perceive through our sensory apparatus. Exploring the new material opportunities offered to design, enriching the discipline – and profession – with new forms, shapes and ways of creating new meanings, this research establishes a dialogue between interactive products based on sensory stimuli.Via two design concepts ("Glass of Water" and "F.E.E.L") Sara demonstrates that sense can be designed, in accordance with goals, in order to convey information (codified languages) or emphasise emotions (empirical languages). If we want users to be conscious of information content, codified languages are preferable while if we want to underline the interaction with products experience, empirical language is better. As multimedia products are less and less a matter of simply imparting information and increasingly focus on other aspects of our everyday life-experiences such as knowledge and entertainment, Annamaria Andrea Vitali's research "Meet Me in Play. Creative processes and expressive techniques in playful multimedia" explores the design processes involved in the creation of interactive multimedia artefacts. She focuses on those in which design significantly contributes to engaging users in an interactive experience, especially in video games. Experimental and authorial video games are the fields of interaction design on which the research is focused as a way of finding answers to research questions by means of a theoretical overview process, a collection of case studies and video game prototyping. This research

investigates the complex relationship between authorial video games and meaningful user experience as a sense-making process involving the audience at different levels and via different expressive techniques.

Most of the work underlines the designer's role as interpreter of emerging phenomena demonstrating the way design approaches can be applied to different fields or topics to answer new questions related to the use of novel technologies. For instance, Ece Özdil's research "Reimagining Archives. An investigation into novel experiences of archives towards heritage knowledge production and dissemination" explores a possible shift in archive design towards the creation of a more engaging user experience with a specific emphasis on the creation of an open-ended and continuous structure for the dissemination and production of knowledge based on public, institutional and archive data exchange. Within the main framework of design for cultural heritage, this research is an interdisciplinary consideration on the role of digital technology as an enabling agent in archive-related information and knowledge especially as far as exhibitions are concerned. Ece's analysis defines four kind of archive models which she uses to develop a meta-design approach based design framework.

Design and cultural heritage is an extremely challenging adventure ranging from the institutional and museum contexts to everyday environmental experiences as well as from institutional and organised information to the minor and little-known details around us. Claudia Caramel's research "Fleeting Beauty. Improving the aesthetic experience of urban spaces by enhancing the little-known heritage" studies this latter theme in depth focusing on raising awareness of the role and importance of beauty by enhancing little-known architectural heritage. Here beauty is considered a fundamental individual right, a human need, improving the aesthetic experience, and consequently the quality, of everyday life. Claudia considers beauty both as a complex – over-used and neglected – concept as well as an urgent collective need especially in our present state of social fear and anxiety. In the light of the part design plays in enriching the aesthetic and ethical value of everyday experience, this research suggests considering solutions using tangible and intangible heritage (memories, stories, etc.) as a way of bringing beauty to our contemporary everyday experiences.

A sense of place and belonging, a perception of our urban environment, an awareness of the beauty around us as an open participatory process via virtual and real solutions: the purpose of these is to consider and appreciate "fleeting beauty" as a real and sustainable reaction to contemporary social crisis.

Beauty as a key-element in our lives, a key-topic to be narrated in a appropriate way with appropriate tools and platforms since an increase in possibilities in terms of communication platforms that designers have to manage is currently under way. In this scenario Simona Venditti's research "Social Media Fiction. A framework for designing narrativity on social media" is based on the ways in which digital technologies have reconfigured the production and dissemination of narrative contents as well as cultural forms and conventions related to the user, producer, author, designer and audience roles. In order to design content for social media in this context, it is important that designers grasp the new dynamics through which these specific media are evolving This research focuses on identifying the social media fiction characteristics which could support designers in communicating through the use of narrative on social media with two main goals: investigating and mapping current storytelling practices on social media and defining a methodological framework with which to support designers in creating fictional narratives on social media. On social media designers mainly produce micronarrative, an important strategy with which to engage with people and users, focusing attention and maintaining motivation for a specific goal. Simona's work demonstrates how micronarratives acquire meanings as designed objects if they respond to designers' prior strategic goals.

In any case, even in the context of multiplying possibilities, the web remains our main point of reference for communication, an infinite landscape to navigate through or rather a world to dive in to, in a total immersion experience. This is the experience that Sabrina Scuri's research "Web-based Immersivity: setting the field. A framework for understanding the experience of immersion in the web environment" analyses with a focus on what are called immersive languages. Assuming that technology itself is not necessarily a synonym of immersivity, *immersion* is considered in terms of cognitive and perceptual

absorption. From a phenomenological point of view, therefore, the term *"immersion"* is not simply technology related, even in its web context. Nowadays, users' expectations of immersive web navigation are smooth interaction with a range of media and enriched perceptions and cognitions. This is, of course, an extremely effective form of communication. The goal of this research was to deliver a first exploration and feeling of immersion in the web environment in an attempt to foster the phenomenon and define a framework for it made up of a set of both theoretical and practical tools for the design of immersive websites. Sabrina's work is based on an intensive literature review, an ad-hoc user test and an analysis of a set of case studies for the purposes of identifying the answer to the main research questions: "What are the features of an immersive website? And how do we design them?". These are strategic questions of the sort that designers are used to formulating but ones which are becoming more challenging to pose within our even more intercultural world context.

From a different point view, this is the challenge taken on by Han Han's research "Acculturation of Brand. Strategic design for European luxury fashion brands in China's consumer market" which starts from the goal of finding potential branding designs for a more durable brand development in intercultural contexts, a multidisciplinary framework for design research in which sociology, economy and anthropology play an important role. Han's work is based on two theories: acculturation and the pedagogy of multiliteracies. The four key-elements of acculturation strategies (assimilation, integration, separation and marginalisation) drive the brand-consumer relationship. The adaptation of the multiliteracies approach borrowed from language education could become a key-point in the co-making of meaning as well as in the process of value co-creation. This research adapts the two theories for the purposes of developing a holistic framework related to strategic branding design in the intercultural context. It is a vision which represents an alternative to globalisation, localization and glocalisation, considering both brand and consumer in a new role in current, more democratic, branding and consumption practices.

Fashion Design is an extremely wide field, in both research and practice terms, in which technology and economics combine with so-

cio-cultural aspects in an inevitably multidisciplinary dimension. In one corner of this field, Livia Tenuta's research "Future for Fashion. Functional accessories between innovation and fashion in the age of technology" explores the complex intersection point and potential synergies between the fields of fashion – especially accessories – and technology as related to wearability in particular. With an overview of the role of technological innovation in fashion in general, Livia focuses on the potential for shaping new accessory consumer experiences which take on innovative use mechanisms and meanings by means of technology. From a design point of view, her research explores the social effects and physical and intangible perceptions of technology in our society, considering the growing impact of technology on people's everyday lives. Livia looks at three general scenarios (hidden technology, ubiquitous computing and customised technology) and, after zooming in on the jewellery design field, proposes three contexts: extension of the past, the future re-elaborated and artificial environments. Her theoretical contributions relate to the identification of future directions in the fashion/technology relationship and an analysis of the results of thematic workshops with companies highlighting the limitations and joint working potential of the fashion-digital technologies relationship.

Another approach to the management of the relationship between design and technology is put forward by Rosalam Che Me's research "Assistive [Wayfinding] Design and Technology. The development of wearable haptic-feedback navigational assistance for the elderly with dementia" which explores, from the design point of view, the ability of a specific group of users – those suffering from cognitive decline – to find their way. The research considers the principles of inclusive design alongside those of universal design and design for all upholding the user-centred design philosophy using a design project as case study. The project takes the form of three main phases: a survey designed to examine how the proposed design concept would be perceived and taken on board by dementia experts and caregivers, a usability test aimed at evaluating the utility of the first prototype and a second usability test designed to check the wearability of a more sophisticated second version of the device. Each phase contained a strat-

egy of assessment based on considerations of functionality, comfort or wearability and usefulness. The research focused to some extent on evidence and information which has been lacking in previous studies but there is still room for future research in the design and technology field related to this multidisciplinary topic. It is a multi-disciplinary approach which is also to be found in Silvia Maria Gramegna's research "Therapeutic Habitat. Interior design as a tool to develop solutions to enhance the effectiveness of non-pharmacological therapies for Alzheimer's disease" which explores the role of the environment in the fragile ecosystems of dementia, specifically Alzheimer disease, sufferers. The term "environment" is used in its complete physical, social and cultural sense, its creation of a "sense of belonging" by individuals. This sense of belonging is undermined in these vulnerable users especially when they are uprooted from their homes to an alternative living environment (nursery home, hospital, etc.).

Silvia Maria's hypothesis focuses on defining the therapeutic habitat conceptual model as a fluid environmental device and tool system (both tangible and intangible) made up of a specific set of environmental interventions designed to avoid a loss of sense of belonging and diminishing independence and self-confidence in patients. The contributions made by this research are principally twofold. On the one hand, it provides a set of guidelines for interior designers; on other, it develops a day-night care centre concept for dementia named Alzheimer Point, as a new standard-bearer in dementia care.

A new point of reference is what design research aims to establish to apply design methods to complex problems and this is what Beril Imamogullari is attempting with her research "Design for Therapies in Dementia. ICT-enabled design practice for supporting non-pharmacological therapies in Alzheimer's disease" exploring the potential contribution of a new relationship between ICT, design and therapists in developing solutions for Alzheimer's disease with a specific focus on the potential of non-verbal communication (eye-contact, nodding, body posture, facial expressions, hand gestures, etc.) to head off the frustration deriving from loss of verbal communication ability. Non-verbal communication can also provide a great deal of information about interpersonal attitudes, behaviours and emotions.

Beril's research has three goals: assist Alzheimer's patients; create a smart tool to enhance communication between therapists, caregivers and patients; bridge the gap between design, ICT and Alzheimer therapies. This research was developed with the involvement of patients, therapists and caregivers in a participatory process analysing, designing and testing guidelines and prototypes with the main concept that "communicating emotions through technology" might provide an important support in the everyday life experiences of all those involved.

All these candidates have successfully completed theses which were periodically submitted for intermediate assessment, tested in seminars and workshops and discussed in conferences. Many of them carried out internships abroad to verify the hypotheses, methodologies and results of their research. Now, in accordance with usual practice, to successfully complete their study programmes, candidates will discuss their dissertations before a panel of experts.

In recent years, when doctoral dissertations on the PhD Design programme have been discussed, a PhD Design Festival has been organised to communicate doctoral research outcomes to the academic design community both locally and nationally. There have been seven editions of the Festival since 2012, the year it began. The event usually lasts five days with three different activities being scheduled every day: doctoral thesis discussions, public lectures and PhD evenings.

The theses are grouped by subject and discussed in open sessions. Thesis discussions consist of thesis content presentations delivered by candidates followed by discussions between the candidate and a panel of academics from Politecnico and other national and international universities. A specific topic is discussed every day in the open lectures given by internationally renowned professors and experts who usually also take part in the doctoral thesis discussion panel. PhD evenings are more informal meetings where guests and audience can interact with members of the design community. The programme usually includes art performances, parties and DJ sessions.

This formula has proven effective in promoting the PhD programme in the academic design community both nationally and internationally. Formal sessions have given rise to thoroughgoing discussion on the most topical disciplinary design issues while informal sessions have

offered the community a networking opportunity. With this e-book, the PhD Festival has, for the first time, given itself a new tool which it is hoped will enhance sharing and the dissemination of the knowledge generated by our PhD candidates.

# Product Design Challenges: Interaction as a Dialogue Based on Materiality

*Sara Bergamaschi*

## Product design: shift from form to interaction

Conventionally, design was born within the industrial revolution that manage to define it in relation to the mass production of goods. At the beginning of the industrial revolution, designers were commissioned to contribute on the aesthetics of industrial artefacts. In that period, design was also defined as art for industries and the designer was considered as an artist appointed to give shape to technology and to innovative products that has been developed by new industries. Against this idea of the design-artist, the slogan "Form Follows Function" was created. This movement was against ornament, decoration and natural form. It promoted the creation of a new aesthetics linked to the industrial world more than recreate shapes linked to artisanship. At the beginning of the XX century, the Bauhaus school promoted geometrical and abstract forms designed to answer to the new needs of people and industrialized society. In this period, design became not only a matter of giving shape to objects but it was focused on ways of use and ways of living. Moving design closer to the issue of how object are used, designers started to investigate how a given design invites potential users to interpret its form; design faced disciplines like semiotic and semantic. As soon as the discussion about design came close to the notion of users, it became relevant to investigate their reactions, their experiences and the way they create meanings from the form of the object (Redstrom, 2006). Following this evolution, objects can

be seen as a medium for designers to convey meaning and messages that have to be interpreted and understood by the users: «The designer communicates by means of the product sign. The industrial designer should make a sign as clear and unequivocal as possible, so that the target group understands the message» (Mono, 1997, p. 51).

This idea enrich the role of the designer. The designer is not just someone able to shape things, but who is able to shape the perception of the users. During this evolution, the design move more closed to users growing in to a discipline related to the correspondence between product and user (that is not only functional but for example can be linked to the status symbol of the users). Indeed, design trying to be more than a communication process (in which users decode messages that are conveyed through products), it start to refer to the user's experience. The large number of award-winning designs that have failed the test of use are the evidences that the design community's criteria for successful design differs radically from that of design users. «Design itself needs to be redefined in terms of peoples' experiences, instead of in terms of objects. This static geometrical criteria of the design of the industrial era must be abandoned in favor of a focus on the dynamic, multisensory experiences of design users» (Mitchell, 1993, p. xxiii).

To enrich the product's experience and the ability of artifacts to convey a large number of information, industrial design field faced the field of digital interfaces. After the evolution of computer, products that traditionally were mechanic were implemented with electronical systems, such as the telephone or the thermometer. The extreme of this evolution was the tendency to transfer the material qualities to the virtual world. Negroponte talked about the transition from atoms to bits exploring the tendency to dematerialize items that are typically physical losing the richness of multisensory experiences. For instance a black and white photo can be virtually represented with bits: colors are represented by a series of 0 and 1 (the binary code – Negroponte, 1995). He made also a step further, he envisioned the ability of computer to disappear and becoming invisible and integrated into simple object as clothes and even in food (Negroponte, 1995). Shortly after, Ishii introduced the notion of Tangible bits (he is considered the father of Tangible Interaction – TI). TI is based on the idea of making

bits physical and manipulable, that means that data can be connected with object and surfaces that become graspable and directly controlled by hands and gesture «The entire world could become an interface» (Shaer and Hornecker, 2010).

In recent years, thanks to new materials and the technological developments designers have new materiality capability to work on. This new materiality make products smart, dynamic and interactive. Recent studies talked about the fourth dimension of products: the time (Vallgårda, 2009). These products are able to behave and to respond to the situation (the users, the environment or others external or internal condition). Thus, «a domain which was once considered pure industrial design is faced with many interaction design challenges» (Djajadiningrat *et al.*, 2004). In this chapter, a novel research in the product design field is presented. The objective of this research is to explore new forms of interactions (following defined as dialogues) within the product and the user focused on the materiality of things.

## Interaction As A Dialogue

«An interaction is a transaction between two entities, typically an exchange of information» (Saffer, 2009). "Interaction" is also defined as «an occasion when two or more people or things communicate with or react to each other» by the Cambridge English Dictionary. These definitions suggest that the main aspect of an interaction is that both the involved subjects have to be reactive and responsive to each other. For this reason, it can be assumed that users and products should be related to each other in a circle of influences: the object with its (changing) material features (shape, weight, color, etc.) affects the user's behaviors and thoughts, and vice versa. The idea of a transaction between two entities in an interactive relationship and the idea of an exchange of information over time recalls the definition of "dialogue": «A conversation between two or more people» (Cambridge English Dictionary, 2016). To converse means to «talk between two or more people in which thoughts, feelings, and ideas are expressed, questions are asked and answered, or news and information is exchanged» (Cam-

bridge English Dictionary, 2016). In these definitions, it is possible to find several correspondences between an "interaction" and a "dialogue". Both require the involvement of two actors who are in contact for sharing something. Typically, they share bits of information, but it is also possible to enrich this relationship with emotional factors (like feelings) and personal points of view (like thoughts and ideas).

### *Dialogues and languages*

«Nowadays, design becomes a matter of using the right language to generate a dialogue about the functionality, intended use of the object and to generate thoughts and meanings in the user's mind» (Redström, 2006). Each dialogue – and, consequently, each interaction – is based on specific language. In the interaction design field, Moggridge (2007) categorized four languages according to their "dimensions":

- the 1-D language includes words and poetry. It is the language used in the dialogue boxes of computer systems;
- the 2-D languages refers to painting, typography, diagrams, and icons. This language is typically used in the artistic field. This language can make the message more clear and more engaging. Computer interfaces used the 2D language in the icons, that are simplified images that stand for a larger idea of things;
- the 3-D languages refers to physical and sculptural form. As presented in the next paragraphs, this language is typical of industrial design. This language of form and appearance is largely explored in the "product semantic". Designers use this language to make thing clear (if there is an handle, we are meant to grab it), but sometimes also to play with expectations that when they are avoided can raise surprise in the user;
- the 4-D languages include sound, film, and animation. Moggridge (2007) compares this language with films that have can put together all these factors to create a complex story that can be understood by every one.