

# MYBIAS: A WEB-BASED TOOL TO OVERCOME COMMUNICATION ISSUES AND FOSTER CREATIVITY IN HETEROGENEOUS DESIGN TEAMS.

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## ABSTRACT

The authors, who are researchers and teachers in the field of Design and Engineering, have developed an area of study that deals with the role of biases in heterogeneous teams' dynamics. In particular they designed, prototyped and tested a web-based exploratory tool called *Mybias*, aimed at building mutual understanding in heterogeneous teams by making designers more aware of their personal biases when facing a new design issue. *Mybias* is designed to be used at the very beginning of the design process, the exploratory research. Yet during the first year of development the authors realised that it is worth investigating the effect of the tool on the whole design process. Thus, we decided to experiment with the tool in a real design process by letting 79 students use it during their design studio course, in the context of a Design and Engineering Master Course. The students received the design brief from the teachers and the partner company, later they used the tool to explore the brief and finally they freely used the tool's output (a set of cards) during the creative phase that was supported by the teachers through a brainstorming session.

Feedback on the use of the tools was gathered by a questionnaire. Authors did direct observation during the brainstorming session and qualitative unstructured interviews to a few students at the end of the studio. In the paper the authors discuss the output of this experimentation. It seems that *Mybias*, a tool designed to support mutual understating among heterogeneous team members, might also support and improve the idea generation and foster creativity by consequently being useful for innovation purposes.

*Keywords: Biases, HCD tool, exploratory tools, generative tools*

## 1 INTRODUCTION

During the last year we conducted a research that led us to a deeper understanding about some issues related to design teamwork dynamics. Being educators in an interdisciplinary course of Design & Engineering within an international academic environment, we observed that diversity among students' backgrounds affects the design team's collaboration. We first defined heterogeneous teams those who are characterised by a wide variety of different viewpoints resulting from each member's background, culture and sometimes first-hand experiences (e.g. interdisciplinary and demographically diverse teams).

The diversity is crucial because it is a positive and a negative aspect at the same time, in order to efficiently solve the design issue at hand. Designer's subjective experience is a fundamental element during the discovery research [1] and it ensures a high divergence which widens the range of solutions. At the same time the lack of shared mental models causes misunderstandings among team members and it could lead the team to struggle more during several steps of the design process [2].

This lack of mutual understanding is often determined by the presence of individual pre-conceptual ideas about the design issue or about the possible ways to solve it. These pre-conceptual ideas, or biases, could be much related to the individuals' background and, if not well addressed, they remain implicit. However, there is a lack of tools for designers aimed at sharing designer's tacit knowledge [3].

Addressing the conference theme “*Diversity or Conformity?*” we do advocate that many diverse perspectives on the project enhance the design and engineering education. However, differences amongst team members must be properly acknowledged, without necessarily leading to conformity. Moreover, if “*Design is making sense of things (to others)*” [4], it is essential for design students to gain an understanding on how this sense – or meaning – is created by *the others*. According to this definition, we do support the idea that one of the most outstanding skills that distinguish a good designer is the *understanding of understanding*, which means that designers should be able to understand the way others understand [4]. A design studio should be the environment for students to learn that any design project and, in general terms, all the artefacts not only exist in their physical dimension, but they also assume meaning according to the sociocultural dimension embedding them [5]. The meaning of a product is hence not self-evident, but it is constructed by each person understanding. Since the understanding takes place in the individual dimension [4], designers should also know that their interpretation will always be a result of their personal understanding. The meaning-creation process, which is the design central activity, continuously moves between *the self* and *the other* [6].

Human-Centred Design (HCD) methods can be defined as methods to support designers while conducting research on stakeholders and while creating meaningful solutions for them [7].

It is possible to categorise HCD tools according to the phase of the design process in which they are used, and dividing them between exploratory, generative and evaluative tools [8].

The exploratory research is the first phase of the design process and it is aimed at shaping the team’s culture about the design issue at hand. This phase is followed by the generative one which is aimed at generating novel insights to solve the issue at hand, by ideating meaningful solutions. During the evaluative phase the generated ideas are tested.

According to literature review and to the collective imagination, *the others* or *the stakeholders* are mostly intended as end-users when it comes to discuss HCD methods. Our research led us to the awareness that the first stakeholder that a design student should learn to understand is the one that follows her during the all design process: the team members. Teams have become the organisational strategy of choice to confront with complex and difficult tasks [9] and design practice is not excluded from this tendency as well. Several authors are yet discussing how to manage design collaborations in interdisciplinary teams [10], while some others are underlining the importance of cross-cultural collaborations in designer’s education [11][12].

We hence designed an exploratory tool, *Mybias*, to support self-reflection on students’ understanding and foster mutual understanding among team members. Mutual understanding and shared knowledge among team members are indeed highlighted as powerful elements to overcome communication issues and to enhance the positive effects of different biases [13].

## 2 MYBIAS: AN EXPLORATORY TOOL

*Mybias* is a web-based activity for design heterogeneous teams aimed at representing members biases about a decided topic within a standard format representation, called *bias card* (see *Figure 1*).

The tool has been designed to be used at the beginning of the design process, as a prelude to the exploratory research.

### 2.1 Process

Before starting the main activity, the team selects minimum one *topic* according to the design brief at hand. The topics should be intended as relevant concepts or products related to the brief. *Mybias* activity is divided into an individual part and a collective one. In the first phase each participant is asked to reflect individually about her preconception about the topic and to represent it by choosing three pictures and a short text description of 140 characters maximum. Both the pictures selection and the text writing are constrained in quantity but not in quality. Indeed, participants should firstly find on the internet the three most representative pictures of their preconceptual idea about the topic at hand and, secondarily, describe this idea using their words in English. The personal outcome is displayed in the form of a card and it constitutes the bias card. At the end of the individual phase each team member will have one bias card for each decided topic.

When all the team members have concluded this first part, the collective phase begins. Each participant makes a storytelling to introduce her representation to the others. Since the storytelling is the crucial steps to build mutual understanding, participants are asked to include all the personal

experiences also, that guided them through the bias card construction. The rest of the team should listen carefully and ask questions to the storyteller in order to comprehend her viewpoint and where it comes from (e.g. cultural biases, previous experiences, and different backgrounds).



Figure 1. Example of a bias card made by a participant of the preliminary workshop test.

## 2.2 Tool implementation

Since the core of meaning-making process relies on words, images and gestures [14], we designed *Mybias* to ensure the presence of all these communication modes. Images and words are indeed selected to create the *bias cards*, while language and gestures are used during the storytelling and the group discussion. The result of the activity is partially material and partially immaterial; indeed, the team has a set of bias cards that can become part of the research material, but also a deeper understanding of the other team members.

As we already mentioned, the tool was designed to support the exploratory research of the design process. Indeed, *Mybias* is aimed at constituting an HCD exploratory tool for team members to reflect on their selves and to build the team as well. In the context of our design studio, it was supposed to be also a good educational tool to stimulate self-reflection on the presence of biases. Some preliminary brief workshop tests showed good results according to these aims. Nevertheless, they also raised some concerns about possible negative implication on the generative phase, because in some cases the shared knowledge appeared to act as a limitation for the further exploration. We therefore decided to insert the use of the tool in the wider context of a three months design studio course to analyse *Mybias* effects on a long-term scenario.

## 3 THE TEST

*Mybias* was tested on 79 students within two different classes of the design studio of a Master of Science course in Design and Engineering that is characterised by the presence of students coming from mixed backgrounds (mostly design and mechanical engineering) and different nationalities. The students were divided into 21 teams of three to four people and each group was asked to design an innovative product from concept to manufacturing. The specific design brief of the Studio was “*to design an innovative anti-theft mechanical device*”. The objective of the entire design studio was to design an innovative anti-theft mechanical device. In order to achieve this aim, we provided them with theoretical lectures about the different levers (form, mode of use and technology) that a designer can use to foresee innovation. Moreover, during each lecture they were taught that creativity is the basis of innovation. There is no innovation without creative ideas since, innovation is the capability or act of conceiving something original or unusual [15].

This is the reason why this year, we set an in-class activity during the creative phase. After the delivery of the design brief and the use of *Mybias* tool they performed a brainstorming session.

During this four hour activity they were asked to take on a lateral thinking approach, by focusing on the requirements set in brief and using the *bias cards*.

Right after the introduction of the design brief, *Mybias* was presented during a short lecture. Then each team used it autonomously off-class during the following week. To assess the tool, the students delivered a brief team report about the use of the tool, the storytelling and the relevant insights emerged during the team discussion. The week after, the teams bring their *bias cards* to class and they

were asked to perform a team brainstorming, during which they were free to use – or not use – the *bias cards* as they liked. In the end the students were asked to fill in a questionnaire individually.

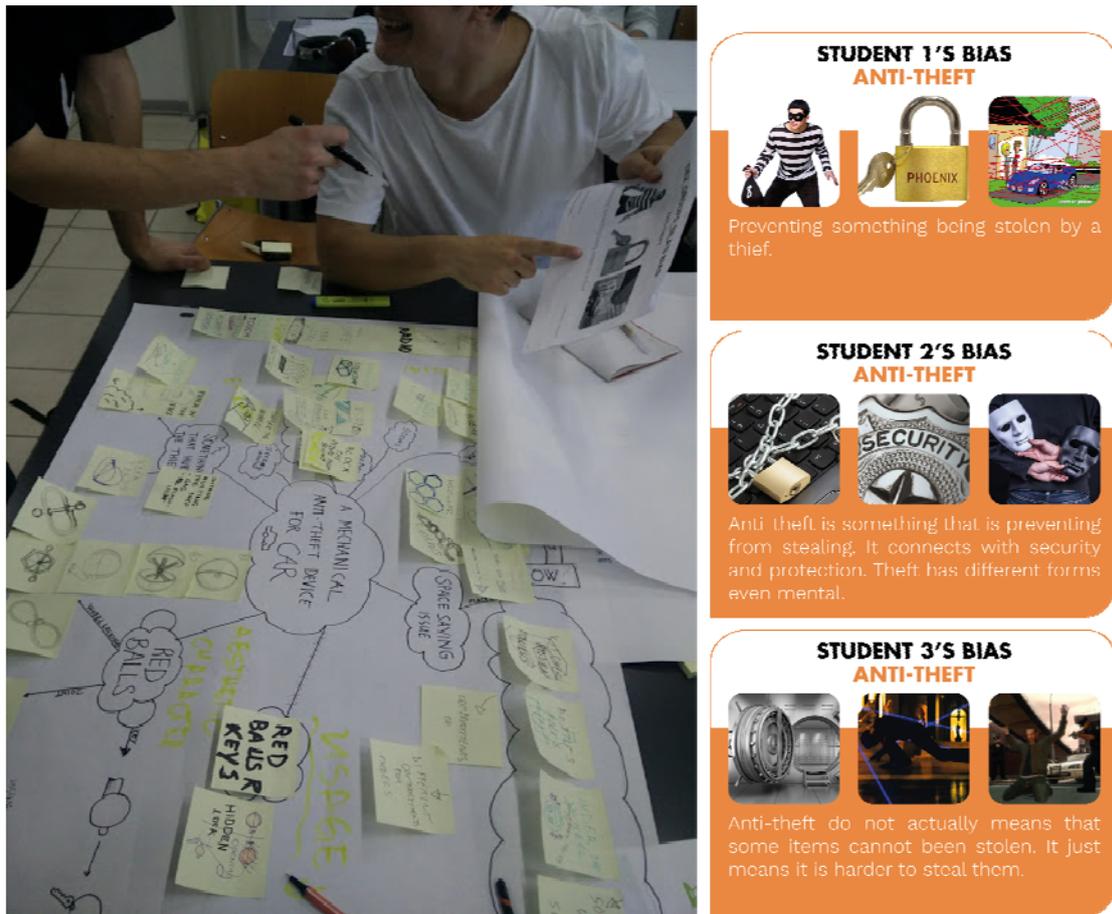


Figure 2. On the right, some students during the brainstorming activity. On the left three examples of bias cards made by students about the topic “anti-theft”

#### 4 RESULTS

The results confirmed that *Mybias* was effective to build mutual understanding among team members. Indeed, the team reports and the final questionnaires showed that *Mybias* was a useful activity to acknowledge different and similar team members’ perceptions regarding the brief<sup>1</sup>.

According to our concerns about the possible negative implications on the generative phase, we surprisingly registered the opposite sensation. Indeed, referring to the final questionnaire, the students had to indicate which phase of the design process could have been more improved by the use of *Mybias*. From Table 1, it is clear that the majority of the students perceived *Mybias* as a useful tool to improve the creative process (29.8%) and the idea generation (26.3%). Since both the creative process and the idea generation are traditionally grounded in the generative phase, the perception of the majority was that the actual benefits of the use of *Mybias* resided in this phase more than in the exploratory one. We hence asked ourselves: should we categorise *Mybias* as a generative tool?

Table 1. Percentages of answers to the multiple-choice question “*Mybias* activity can help the heterogeneous team to improve”

Research/ Analysis	Counter-brief definition	Creative process	Idea generation	Decision-making	Technical development	Others
15,8%	21,1%	29,8 %	26,3 %	3,5%	0%	3,5%

To better acknowledge this unexpected result and to evaluate the tool experience in the studio context, we set interviews with some students at the end of the course (we will address them as A, B, C).

<sup>1</sup> These results are yet to be discussed in another paper by the authors that are currently in press.

We therefore interviewed three students of different teams through an unstructured interview aimed at inquiry on the role of *Mybias* in the generative phase. Being part of different groups, the three students were selected to be a representative sample for different design paths within the same studio course.

#### 4.1 Interviews short reports

The first interviewee, student A, said that the tool could be very useful for students coming from a design background to stimulate creativity. Indeed, A perceived that who had already experienced the design process can start to explore possible ideas and analogies whilst using the tool. A said that the team did not actively use the *bias cards* to generate ideas, but the tool was effective for the team members to understand each other during the idea generation. A stated that in his opinion, a team of design practitioners could also use the *bias cards* as a support for idea generation and brainstorming. For A, *Mybias* gives the opportunity for everybody to express ideas even when there are team members that have difficulties in expressing their selves. Finally, A said that using the cards can also be used to revive the brainstorming when there are no interesting ideas.

The second student, B, stated that during the brainstorming they also did not check the *bias cards* because, thanks to *Mybias*, they already knew each other pre-conceptual ideas and previous experiences. This mutual understanding was built during the storytelling and it was contributing to connect with all the other team members; for B, this understanding was important in the moment of idea generation. Therefore, B suggested that *Mybias* should be used before the brainstorming and it should not be mixed with it. B also stated that the tool was effective for the team to analyse the initial brief and led to the counter-brief definition. Finally, B claimed that the tool was not a limitation to creativity.

The third and last interviewee, C, claimed that she found a relationship between *Mybias* and a brainstorming activity. Indeed, the storytelling and the discussion with the team were an opportunity for everybody to widen the horizon on the project. *Mybias* was interesting for C because it can push the designer to a deeper understanding of the issue and this is a stimulus to move closer to a meaningful solution. Within her team, the tool was useful to improve the starting phase of the exploration. C stated that *Mybias* was a sort of preparation for the brainstorming because they all arrived to it much more prepared on the issue at hand. In C's team, *Mybias* was also a crucial activity for the definition of their counter-brief and of the concept, even though they did not use the *bias cards* during the brainstorming.

## 5 DISCUSSIONS

From the interviews emerged those they all indicated *Mybias* as an effective activity for idea generation, even though none of their teams used the *bias cards* actively during the brainstorming activity. All the interviewees claimed that self-exploration and bias sharing could be seen not only as an alignment activity, but also as a preparation for the generative phase of the design process. These results are also confirming that *Mybias* was not perceived as a limitation to creativity, which was our main concern before the test. On the contrary, all the interviewees stated that the constructed shared knowledge and the consequential improved mutual understanding were powerful elements to enhance the brainstorming session. According to the team experience told by the interviewee C, we also claim that *Mybias* could be crucial in pushing the team to explore certain research paths that lead to the concept definition. The *bias cards* did not act as a limit to divergent thinking, whereas they stimulated the team to diverge and to enlarge their horizon on the problem framing and hence on the problem solving as well.

Since the brainstorming was actively tutored by us, we would now integrate our observation to the output of the interviews. We also observed that in an implicit way, they did use the *bias cards*, because we heard them discuss and exchange ideas coming from the topic of the cards.

The proactive discussion and the cards contents helped them opening their mind and generate multiple ideas and creative ones at the same time. In the case of the interviewee C's team, our observation confirmed what was stated during the interview. Indeed, while tutoring the team's brainstorming, we saw one team member that, by remembering the cards, came up with a very innovative idea. Later on, the team decided to develop this concept and their design path brought them to design an innovative anti-theft system for bikes that is now under evaluation by the partner company who is interested in acquiring the concept. Nevertheless, we reckon that not all teams used the cards in the same way, thus,

we think to develop and investigate a strategy to integrate *Mybias* in creative phases of the design processes.

## 6 CONCLUSIONS

Positioning *Mybias* according to the categories proposed by Hanington [8], we still define it as an exploration HCD tool aimed at understanding collaborators. However, the test results and the interviews showed that *Mybias*, in its simplicity, was perceived as an effective tool to improve heterogeneous team dynamics during the generative phase. The constructed mutual understanding helped students to collaborate, but it was specifically highlighted as a determining factor in the moment in which they had to come up with novel ideas. Indeed, thanks to the activity, they were more able to comprehend others' ideas because they already shared their pre-conceptual views on the issue. Therefore, as it is, *Mybias* cannot be categorised as a generative tool but it should be acknowledged as an *exploratory tool* which can support the creative process in heterogeneous teams by helping students understand each other better. Based on the success of *Mybias* in the studio, we envision applying it again in the future studio-based courses by proposing the tool to a wider audience of students of the Design and Engineering course to gain a deeper understanding of the influence of the tool on the generative phase. Moreover, our future research will investigate how to propose *Mybias* to design practitioners, but also to other professionals coming from different fields of expertise (e.g. management and economics).

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