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Master's Thesis
Academic Year 2019

Reducing Unconscious Gender Bias through
Workshop with Co-Speculative Design



Keio University
Graduate School of Media Design

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A Master's Thesis
submitted to Keio University Graduate School of Media Design
in partial fulfillment of the requirements for the degree of
Master of Media Design

Hazuki Miyoshi

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Abstract of Master's Thesis of Academic Year 2019

Reducing Unconscious Gender Bias through Workshop with Co-Speculative Design

Category: Science / Design

Summary

This research began with a natural skepticism. “Why are there few women in science? ”. As I advanced my research, certain problems emerged. It is Unconscious Gender Bias. With Unconscious Gender Bias, people have an invisible boundary in everyday life, living without any doubt about the definition they have taken for granted. In the beginning, it was the Tokyo Medical University entrance exam scandal that was a big trigger. An evaluation system that emphasizes steps rather than motives, and Unconscious Gender Bias that underlies the problem. It was received a lot of criticism about this scandal, but I felt that it was very complicated problem that could not solved only by criticizing and changing the system. This thesis focuses on Unconscious Gender Bias. The purpose is reducing your own Unconscious Gender Bias by thought-provoking question, then having a multi-faceted perspective on events that are commonplace in everyday life.

The approach is to hold a workshop using Co-Speculative Design. The point is that the program has a mechanism that advances the discussion from the general theory without reminiscent of the Unconscious Gender Bias and finally reveals the Unconscious Gender Bias. Then, Speculative Design, which raises a question and discusses it, reconsiders the present problem while assuming a possible future, and I feel that it is also effective to shake fixed concepts. I called it Co-Speculative Design because I placed emphasis on discussing. In the workshop, the purpose was not for the facilitator to lead but for the participants to voluntarily discuss and raise new issues or discover them.

As a conclusion, it can be said that if starting from a general theory without reminiscent of Unconscious Gender Bias, Unconscious Gender Bias tends to decrease. It was discovered that the use of analogy, the high quality of the artwork as

speculative design, and the psychological safety of the place are necessary to make the process more emergent. In addition, noticing Unconscious Gender Bias was not necessarily a positive effect, but some participants were shocked or anxious about themselves. From these results, how can we accept the ideas of individuals and become a world of diversity? I want you to read it from that point of view.

Keywords:

Gender, Unconscious, Bias, Speculative Design, Co-Speculative Design, Workshop

Keio University Graduate School of Media Design

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Chapter 1

Introduction

1.1. Background

Why is the gender ratio in sciences biased? While I was studying Design Engineering at the Yamanaka Laboratory, I felt that the percentage of women was small. And I myself have been choosing the humanities field unconsciously. In addition, also the trigger of my research is The Tokyo Medical University entrance exam scandal. The recent scandal involving Tokyo Medical University's practice of restricting the number of incoming students, primarily female, by systematically lowering their entrance exam scores has once again shone a spotlight on the issue of gender discrimination in Japan. The bulk of the media coverage to date has centered on the manner in which the female applicants to the university have been treated unfairly and how societal perceptions of women's roles in the workplace may be in need of significant revision. What is the factor? What is the root? In the future, more technology may be going to develop in many field, it can replace job instead of human. I think we need to think about future as well. From this very simple question, my research has began.

1.2. Motivation

My concept of my research is "I want to support the design by those whose motivation has been hampered by environmental and external factor". Furthermore, I want to find out why the unconscious stereotypes that exist in the world are born. In myself, I have lived without doubt in the tacit understanding that "women should be" and "men should be". It is a big motivation to ask what the nature of things is. This is because new viewpoints are added to what has been considered natural until now, and various interpretations are created by changing

the viewpoint. At present, SDGs and others advocate “Gender equality,” but what is it to say equality? Each interpretation should be different, and I believe that the first step is to notice the potential understanding of people.

1.3. Research Purpose

My goal in this thesis is “Create a new Workshop program that reduces Unconscious Gender Bias”. I have two purposes in the research. First, Workshop held using Co-Speculative Design. Second, Start discussions from general theory, not Unconscious Gender Bias as a concept of Workshop.

1. Workshop held using Co-Speculative Design

The position of Speculative Design and Co-Speculative Design in this workshop is as follows.

- Speculative design

I made of “Future Scientist” movie and the workshop concept is “Thinking about the Personnel assessment system for the future”.

- Co-Speculative Design

The new issues discovered or redefined through discussions and dialogues among participants beyond the concept of the workshop.

2. Start discussions from general theory, not Unconscious Gender Bias as a concept of Workshop

- Personnel assessment system

First, I explain about the Issues for evaluation methods that emphasize steps rather than motivation such as Entrance exam (i.g. The Tokyo Medical University entrance exam scandal). Then, I ask a question of what is the most appropriate and diverse evaluation to bring out the potential of the individual? In this workshop, the goal is to consider how to evaluate the future

- Different factor X

It is assumed that there is another factor lurking, not telling the participants that workshop will reduce Unconscious Gender Bias. However, in the second half of work in the workshop, I have a mechanism that exposes Unconscious Gender Bias such as Gender swap. As a result, which is a hypothesis as a paper, appears as differentiation factor X is Unconscious Gender Bias! This is some sort of mathematical induction method.

1.4. Structure of the thesis

- Chapter 1 Introduction

Introduce the background of the research, some explain of the previous study about Gender stereotype and what is positioning of my thesis statement, the motivation of the research and its purpose.

- Chapter 2 Literature review

Present the literature review and related work about Gender stereotype, Implicit Association, Speculative design and Co-Speculative design.

- Chapter 3 Concept & Methods

Explain the related concept of the design theory and workshop, including the method to realize the purpose and the basic knowledge of workshop and program design.

- Chapter 4 Worksop part 1

Explain how to conducted of my workshop and detail structure such as timeline, worksheet and preparation. Furthermore, I will discuss about Improvements and corrections of program design.

- Chapter 5 Worksop part 2

Explain how to conducted of my workshop and detail structure such as timeline, worksheet and preparation. Furthermore, I will discuss about Improvements and corrections of program design.

- Chapter 6 Workshop part 3

Explain how to conducted of my workshop and detail structure such as timeline, worksheet and preparation. Furthermore, I will discuss about Improvements and corrections of program design.

- Chapter 7 Implementation & Evaluation

Summary the result of Implicit Association Test form the participants whether reducing Unconscious Gender Bias or not. In addition, analysis of dialogue between participants how to become Co-Speculative Design.

- Chapter 8 Discussion

Discuss the result of the evaluation and try to come up with more improving plan. In addition, I will explain what is my future work about how can be implemented into our daily living/social.

Chapter 2

Literature review

It has been reported that women and girls are influenced by negative stereotypes in experimental settings as well as in the real world.

2.1. “Women can not do math”

According to the previous research, the number of women in the field of STEM (Science, Technology, Engineering and Mathematics) is extremely small compare to Humanities(65.4%). On the other hand, the percentage of women in the field of science is only 14.1% among researchers who belong to research institutes such as universities or graduate schools [1].

| | 人文 科学 | 社会 科学 | 理学 | 工学 | 農学 | 保健 | 商船 | 家政 | 教育 | 芸術 | その他 | 合計人数 |
|---------------------|----------|----------|------|------|------|------|------|------|------|------|------|-----------|
| 男性の中での各専攻の割合 (%) | 8.9 | 38.0 | 4.1 | 23.2 | 3.0 | 8.9 | 0 | 0.5 | 5.5 | 1.4 | 6.6 | 1,425,672 |
| 女性の中での各専攻の割合 (%) | 21.0 | 25.2 | 1.9 | 4.7 | 3.0 | 16.8 | 0 | 5.7 | 9.9 | 4.3 | 7.6 | 1,141,442 |
| 各専攻における女性の占める割合 (%) | 65.4 | 34.7 | 27.0 | 14.0 | 44.5 | 60.2 | 11.8 | 90.5 | 59.0 | 70.6 | 47.9 | 2,567,114 |

(Source: “Women can’t do math” (2017), MEXT School Basic Survey 2016 (Ministry of education, 2016))

Figure 2.1 Percentage of undergraduate students at four-year university (by gender, by major)

According to this thesis, researchers have found that negative stereotypes can undermine the performance of women in math exams. More recently, implicit stereotypes have been found to affect women’s math preferences either equally or even more than explicit stereotypes. How can we counteract the effects of negative stereotypes? Interventions, such as informing women that their math

performances and career decisions are often unconsciously influenced by gender stereotypes, have been introduced based on accumulated knowledge of both gender and stereotypes.

Not only in Japan, but also in the United States¹, European countries, and organizations such as the Organization for Economic Co-operation and Development [2], women in the STEM field are listed as necessary issues for countermeasures. Often [3]. So why are there fewer women in the STEM field?

From the perspective of social psychology, students are discussing science disciplines and women centered on mathematics with the “stereotype” as a key word. Among science subjects, mathematics is regarded as an important factor related to the choice of department or occupation at a university [4]. Gender differences in attitudes have drawn the attention of psychologists [5]. These studies often take up the international mathematics and science education trends implemented by the OECD Program for International Student Assessment (PISA) and the International Association for Education Achievement Assessment (IEA). It is a survey (Trends in Mathematics and Science Study: TIMSS). As a result of PISA conducted in 65 countries and regions in 2012, 38 countries and regions have statistically significant higher grades in boys than girls in mathematics, while five in girls have higher grades. It was a country and a region. And although this gender difference is gradually shrinking, in the math self-concept, such as “I am not good at mathematics” and “I am doing good in mathematics”, in many countries boys shows a significantly higher score [2].

What are the factors that help girls lose interest and motivation in mathematics and detract from their career choices? Research on the socialization of children’s academic motivations argues that the influence of parents and teachers on socialization is significant [6]. Studies in the United States have repeatedly reported that the family’s cultural background and socioeconomic status have an impact on children’s academic performance, but in many cases, parent’s convictions, behavior and even resource mediation have been suggested [7]. For example, Simpkins, Price, and Garcia [8], for European and Latin American male and female high school students, recognize the support from the parents and the

1 <https://www.whitehouse.gov/administration/eop/ostp/women>

child’s own conception of the ability related to science and medicine that the child has and I examined the relation with the value to put in the subject. As a result, the two are related, and the more the parent’s support is recognized, the more the subject-related self-concept and the value become higher, but the support received from the parent was the most highly recognized among European high school students in the first place.

In addition, Bleeker and Jacobs [9], in a 12year longitudinal study conducted in the United States, predicted that mothers could succeed in math-related careers when they were in seventh grade We found that success is related to a sense of career-related skills in the math and science-related field for children aged 19-20. According to the analysis conducted by Jacobs and Eccles (1992) on the same subject, it is shown the mother’s stereotyped conviction influences the child’s ability recognition through the mother’s perceived child’s math ability.

Furthermore, Leaper, Farkas, and Brown [10], from a survey of 13 to18 year old female students in the United States, showed that motivation for mathematics and science came from parents, teachers, friends, and other people around them. It is related to support and encouragement related to science and mathematics, and reports that motivation is higher as we recognize that there is more support. In a study using the same target has been reported [10], frequent comments on gender related to mathematics and science often lead to lower values for such subjects and lower ability ratings.

There are also studies that examine how students recognize the expectations of teachers and parents for Japanese men and women in junior high school. Although it is a research that deals with science rather than mathematics, I asked the junior high school first and second graders whether I thought that “I expect that I can get good grades in science”, both grades Although there are few students who feel positive expectations from teachers for both men and women, it has been reported that girls do not feel more than boys [11]. Also, compared to female students who do not like science, “Mothers think science is important” and both parents say “I will be happy if I get to science / technical jobs” [11]. Also, according to Tsukawaki [12], among women’s college students who majored in the life sciences, among the school-going motives they had when they were high school students, academically-based motives for wanting to improve their specialized knowledge

regarded the working mother as a model. In addition, it was related to receiving instruction from the father and feeling strongly the expectation from the father. These are based on an examination of the thoughts and attitudes of parents and teachers that children have recognized, but according to Morinaga [11], in Japan, teachers and parents are also affecting the attitudes towards learning and subjects of children.

Behind such attitudes of parents and teachers, we connected gender with disciplines such as “Science is male, Humanities are women” and “Males are good at math, and women are poor at math” shared by society. It is thought that there is a stereotype. And one of the reasons why people have such stereotypes is the gender bias of students and researchers who are actually involved in the STEM field. It can be inferred that stereotypes connecting science and men have some influence on the interest and motivation of girls in mathematics. As described above, it may be transmitted to children through parent’s expectations and behavior, and children may learn by frequently looking at male students and male scientists who major in science. One of the reasons why stereotypes are created is to see that there are many men in the science field, or to receive information as information through the surrounding people. However, there is also a possibility that women themselves have strengthened stereotypes by using their own stereotypes [11].

2.2. “Change in Behavior” Workshop

According to research that breaks the practice of gender bias, Carnes [13] organized an interactive (including role-playing) workshop on the principle of “Change in behavior.” The workshop consists of three modules. The first module shows that the unconscious bias is a habit of mind, and the second module considers it as an unconscious bias when the teacher faces an unconscious bias at work, and which type of bias I was instructed to give them the insight to make a decision. The third was to transfer the behavioral strategies obtained from research aimed at overcoming gender bias into the following five items.

1. Excluding fixed concepts (For example, if you have the image that girls are weak in arithmetic, you admit that it is a gender bias, consciously challenge

it, and challenge the poor image “It is not so in fact” Replace with the correct information

2. Have a positive image contrary to the fixed concept (for example, before evaluating applicants for positions where it is a tradition for men to take office, draw a picture of a competent female leader specifically in his head). It may or may not be a woman who actually exists.)
3. Viewpoint acquisition (For example, it is a woman who is questionable because he is a woman, and it is not considered to be competent on the job, so it will be considered as a woman and considered in detail.)
4. Individualization (For example, when making a judgment on a single woman, make a judgment after acquiring the personal information of the person, and so make sure that it does not have an inaccurate belief due to an unconscious gender bias.)
5. Increase opportunities to interact with stereotyped cases (for example, meet women with a long work history or a senior career, listen to their thoughts and visions, and have a forum for discussion)

The usefulness of this workshop was tested with more than 2,000 teachers in the sciences, medicine and engineering departments at the University of Wisconsin-Madison. The subjects were 46 faculty members who were randomly selected, and 46 other faculty members were in charge. The subjects who had participated in the workshop for 3 months had improved or improved the following points in comparison with the teachers in the control department. Awareness of your own bias, your willingness to engage in gender equality activities, confidence in your ability to perform, and the number of reports that you have regularly participated in activities. In another survey, male and female teachers in the experimental department both reported improvements in the working environment. Specifically, there are voices such as improvement in comfort within the department, recognition of one’s own ability, and a preference for time with individuals and families over undergraduate activities [14]. Two or three years after the intervention, the female percentage of newly hired teachers in the department where the subject is

located was high. This intervention has been shown to have long-term effects on ideas and behaviors at the individual and undergraduate level.

More than 600 faculty members have received the “Implicit Accosiation Test (IAT)” on gender in leadership [15]. More than 70% of respondents in both men and women matched male names with words that image leadership, and matched female names with words that imaged serverers. Importantly, this IAT score was not affected by the workshop participation(Figure 2.2).

Although this study can not be used as it is when aiming at reduction of Unconscious Gender Bias from the result of IAT, it is worth enough reference about the aspect of the effect as Conscious Gender Bias.

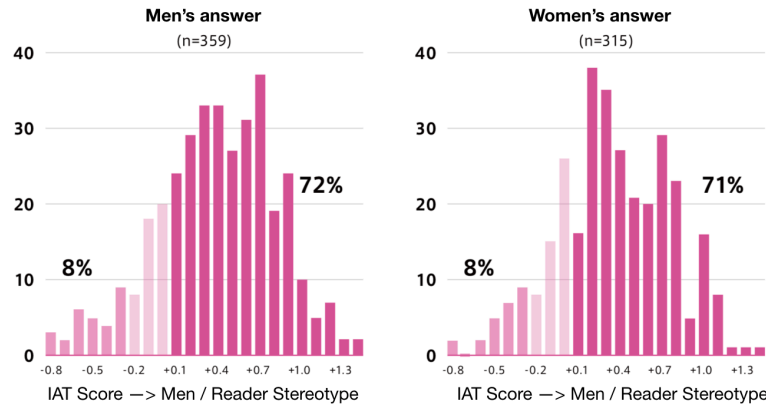


Figure 2.2 Gender and Leadership IAT Scores

2.3. Unconscious Gender Bias

“Unconscious Bias” is a universal thing that always appears in human society. Because it is derived from “the stereotypes brought about by the various links of society”, beginning with “man, woman.” Stereotype is the act of dividing human characteristics and behavior into social categories based on heuristics. This distribution action is repeatedly activated and strengthened by the experience and messages from the surroundings that are routinely exposed throughout life. The

content of these messages will vary depending on the country and culture, but the process of creating prejudice and stereotypes for a group of people may be the same everywhere. If there are people who share social characteristics and “social identity” (eg, gender, race, place of birth, religion, occupation), there is no doubt that stereotypes for that group appear. For example, one can cite common stereotypes for Germans, Frenchs, Japanese and Americans [16]. Prejudices rooted in stereotypes may be correct at the population level (eg, men are taller than women), but not necessarily at the individual level (ie, some women are taller than men)). The contents of such stereotypes are widely shared in any society regardless of members. It is recognized even among those who do not believe or admit “cultural stereotypes” [17].

The act of tying a group is further divided into two types of bias [17]. The most obvious type of bias is what is known as the explicit and explicit belief of an individual, or “obtrusive (visible) bias”. This type of bias can usually be investigated and measured. If you do this, you can conclude that in many countries such prejudice has diminished in the past 50 years. For example, many people in the past believed without a doubt that women could not be talented leaders, doctors, scholars, scientists and engineers. Women are still undervalued in these areas, but in all these areas there is ample evidence to show that women are quite capable [18]. “Explicit bias” is seen in laws and customs in favor of certain groups and exclusion of others. For example, before the Civil Rights Act came into force in 1964, African Americans had many fundamental rights restricted by the law. In addition, “Education Amendments of 1972, Education Amendment of 1972, Title IX”, many educational institutions accept a certain few women regardless of their abilities.

The second type of bias was first experimentally verified by Patricia Devine, who tested racism in the United States [17]. A potential bias of this type is that judgments on individuals belonging to a group are affected by preconceptions (Stereotypes) on the group without intention or awareness. If the subject of the evaluation is a member of a stereotyped group, the “Cognitive distortion” that occurs in the process of processing the information of the individual is inherently even among those who show a negative attitude towards the stereotype itself. I can see it. Stereotype-based stereotypes have the power to make even objective

data in making judgments powerless, whether it is true or not. For example, Monica and Biernat [19] found that men and women having similar heights are next to common indicators such as desks and door frames because of the general knowledge that men are taller than women. I found that even if I stood, I judged that the height of the woman was shorter [20]. Another example of “cognitive distortion” is the increase in the number of female members as a result of blind audio screening for orchestra members [21]. When the gender of the performer can be discerned visually, the judge has declared that the sound heard by men and women differs because the prejudice hears that women can not produce the same sound quality and volume as men. The final case was the work of Donald Rubin [22]. He showed undergraduate students the pictures of Asian teacher assistance (TA), and when they listened to the recorded standard American English, compared with the case where they showed the pictures of white and the same standard American English. I noticed that the students sounded like a break in English. As these examples show, preconceptions based on stereotypes cause “faults” in the process of recognizing objects. Therefore, these distortions also affect judgments, decisions and actions. In other words, even if they are conscious, they do not recognize stereotypes, are egalitarian, and understand the tide of acting according to meritocracy, but everyone can not escape from the effects of unconscious bias [23]. This paper focuses on how the unconscious bias interferes with the career formation of women in science and technology and medicine and prevents women from taking senior positions in any field. However, the unconscious bias is not limited to gender bias, but it is exerted on races, ethnic groups, nationalities, sexual orientation, body size, appearances, religions, and all groups in this society.

Even if the perception of gender is more complex than just men’s or women’s binary confrontational things, stereotypes about men and women are widely shared, and as cultural norms it penetrates deeply. Men’s traits and behaviors include strong, decisive, professional, strong, and logical, while women’s traits and behaviors include subordinate, quiet, caring, human relationships and nurture and nurture [23]. Features and actions that are strongly linked to the male image are called “agentic”, while those that are strongly linked to the female image are called “communal” [24]. Virginia Schein et al [25] found that, even though

there are some differences in such gender stereotypes, there are considerable differences between cultures. The 105 female students and 211 male students of the economics department at a university in Japan, on gender-based fixed role assignments and successful manager characteristics based on individual cases in China, the United Kingdom, Germany, and the United States, It was found to have a similar view [26]. She named this discovery as “the think manager-think male phenomena” in terms of a manager. In other words, the possible image of the leader is highly overlapped with the male gender stereotype. Furthermore, recent meta-analysis identified the role of the top leader as a typical male image [27]. People are exposed to such gender stereotypes as soon as they are born, and the information contained therein is repeatedly strengthened throughout their lives. These messages form the basis of unconscious gender bias. They will then influence the decisions of those who have the right to decide who to accept, who to mentor, hire and promote in the workplace. It also has implications for future scientists, engineers, entrepreneurs and leaders seeking to determine if a particular career path or job role is with them.

In 1968, Philip Goldberg [28] conducted the first randomized experiment. He made the students read an essay with exactly the same content, in which the author’s name was written in male name (John T. McKay) or female name (Joan T. McKay). Then, they changed the evaluation depending on whether the author of the essay was a male or female name, which indicated that an unconscious gender bias works in the evaluation. The experimental framework, later named Goldberg Design, is an intervention that reduces bias, also to show that there is a gender bias in the assessment of individual men and women and their assessment of their work. It was also used to test the effect. In our research group, we conducted a systematic review approach to examine all experiments that used GOLDBERG DESIGN to evaluate gender bias in employment [29]. Taken together, these studies show that evaluators are generally of the same grade regardless of gender, and female applicants are less capable and more likely to be employed than men with similar competencies. It was evaluated as low and it turned out that the salary is set low. This tendency was particularly noticeable in the case of top position and leader positions. Gender bias has been in existence for more than 30 years. As a recent study using Goldberg Design, when a professor of the Faculty of Science

chooses a laboratory manager, he or she not only chooses a male student over a female student at the same level but also becomes a mentor for male students. There is an example where it is desirable [30].

It should also be noted that gender bias works against so-called unmanly men. For example, tall men have more successful careers, higher incomes, and easier management positions than short men [31]. Sabine Sczesny [32] report that in Germany, the same male in a photo is considered more masculine than the male in the picture. In addition, baby-faced men suffer the same discrimination as women receive in the promotion of senior positions [33]. And egalitarian men, or men who behave “jointly,” are also more difficult to accept socially than men who act more masculine [34]. In addition, research shows that only male applicants with employment gap are at a disadvantage than women with unemployment [35]. Unless there is special information, it seems that the judgment of those who participated in this study followed the fixed role of gender. It was thought that women’s unemployed period would be due to childbirth and child rearing, but based on the stereotype that men get family income, they regarded men’s unemployed period as contrary to men’s role. In a similar story, in experimental and field work, as Ashleigh Shelby Rosette [36] found, male leaders are at a disadvantage when they seek help, but it is probably that men are confident. It is considered to be contrary to the male stereotype of having an independent mind.

It can be said that the insignificant amount of information will produce a complete picture of stereotypes, even if it is not required. Once stereotypes are activated, personal information sent later, as well as information about work content and results, will be processed through the filters of the stereotypes. Of course, the relationship with “conscious bias” towards women is still recognized, but the cognitive bias due to the activation of gender-related stereotypes remains unconscious. As Goldberg [37] discovered, bias in assessment can be triggered when gender is known by name or otherwise. For example, even when playing in the shade of a curtain in an orchestra’s blind audition, women have realized that they need to take off their shoes. This is because the sound of heel when crossing the stage will cause the judges to lose their gender. Mazarin Banaji [38] found that, once people first saw and heard the “words” that represent typical features found in men and women, it became a primer and became a typology of everyone.

It was reported that it would be fit. In order to clarify this effect, which is called “semantic priming effect”, Banaji et al. Ambitious behavior (i.g. never backs down), behavior meaning female stereotypes (i.g. cannot manage alone: can not be done alone), or sexual behavior (eg, reading a book) I read a phrase such as “Read a book” [38]. Then, Banaji et al. Had people who participated in the experiment read a short sentence describing a series of behaviors that men (Donald) or women (Donna) showed about seemingly unrelated tasks. Next, participants were asked to evaluate Donna and Donald using a variety of words. The words were mixed with aggressive and dependent. They are more “aggressive” when they mention the word “aggressive” as a primer, compared to when they touch a word unrelated to Gender’s stereotypes. I noticed that I appreciated it. The same was true for Donna. When “dependent” was presented as a primer, participants rated Donna as dependent.

As only women can be mothers, evaluation as to hiring to senior positions has shown that it is disadvantageous just because they are mothers, and has triggered gender bias. According to a report by Shelley Correll [39], participants in a survey experiment who responded to the word “members of the Parents Association” in their resumes had written nothing else about their children. It has been reported that mothers are clearly considered to be less suitable than applicants who do not mention being a parent, even though they are not, and they are ranked as involved in lower-level work. In addition, participants in the experiment did not recognize overtime work, kept high passing scores in the hiring test, paid lower, and were considered equivalent in ability, but they were not mothers for the possibility of promotion. Lower than in the case of the elderly. Women without children were recommended to employ approximately twice as often as women with children (mothers). In comparison, the fathers were clearly more positive, allowed more overtime days, and paid higher than they did not. Correll [39] sent submissions for mothers and non-mothers to actual jobs and looked at the results. As in the case of the survey, the number of women without children who passed the screening was twice as many as those with children. A report submitted by Hill [18] to the American Association of University Women says that single women are more likely to be hired in tenure-track positions and easier to promote than married mothers. In contrast, Madeline Heilman and Okimoto [40] have shown that in one

experimental study, being a mother works against women in many evaluations, but once in a position where women can exert their leadership. It was found that being a mother would work in favor. That is what I found in a survey based on Goldberg Design. I selected the same application form for men and women with exactly the same skills. If the application documents do not contain information on whether or not they have children, men and women with equal abilities were evaluated as having equal aptitude, but women were clearly better. It turned out that it is not rare. However, if there was information in the application that the manager had children, it would be preferable to be a superior and would like to be hired, without a decline in the aptitude rating [40].

2.4. Gender Stereotype

Gender stereotypes are what men and women are and what they should be, and not only do they develop the norms of behavior, but also (unconsciously) what they do. It also determines the boundaries between the two. The resulting gender commitments create subtle (sometimes striking) differences between men and women in career formation. We reviewed the written evaluations for medical school students and found that female students who consistently have higher ranks and skills, masculine professions (eg, plastic surgery), but slightly, it has been a glimpse that they are recommending lower-ranked, women-like professions (eg, family doctors) [41]. The establishment of similar social status is also seen in the fact that few women are promoted to professors as specialists [42].

I would like to rethink about the statement that “girls have less math skills than boys.” That’s because it is a puzzling thing at this time [43], which calls on women to move into mathematics and related fields [44]. This bias does not go away forever, as evidenced by how many studies are not. There is no difference between men and women in the degree of interest in math and childhood sciences, but there is a gap as it grows. According to a survey of the National Science Foundation [43] in 1966, boys were also expected to be more interested in mathematics than their female counterparts, and so were actually proven. In general, boys are said to be interested in the task of assembling something. The girls who grow up looking at the reaction around “Let’s be a good boy” to the boys in their early

years who play with LEGO and the Lincoln logo are not fit for what they are doing. Become aware of nature. According to Janet Hyde et al., Boys at high school start to score higher in math tests than girls [45]. Even if boys and girls are equally interested in mathematics as high school students [43], women are underestimated in mathematics related fields during college, and the difference appears. Nosek [46] examined university students' psychology-facing attitudes, attitudes, mathematics and gender stereotypes, and their relationship to gender. Women are naturally influenced by the social trend they see and hear in their growth process, and naturally feel weak at mathematics, and are bound by this stereotype and can not think of going to science and mathematics when they enter university or graduate school. Since the stereotype that women are not good at mathematics is so pervasive, according to the survey of Reuben [47], female candidates are finally given evidence that they can prove mathematical ability in the selection of a certain job. It could be chosen by defeating a male candidate.

An unconscious gender bias based on culture-based stereotypes not only affects the way others assess women and their performance, but also their own judgments and behaviors give. As pointed out earlier, fear of backlash is one way in which internalized gender stereotypes (fixed ideas for gender) influence women's behavior. Another way in which gender stereotypes can affect individual women is stereotype threat. This phenomenon has been described for the first time in experimental results called the modern monument of social psychology. In the experiment, several male and female graduate students of top American universities who recognized themselves as "good at math" received a test that included a difficult question selected from the math problems of the "Graduate School Advanced Assessment (GRE)". Half of them were informed in advance that "this test had a difference in score according to gender", and the other half was notified that "this test did not have a difference in score according to gender." Then, surprisingly, in the former case, the score of the female candidate was lower than the score of the male candidate, and in the latter case, there was no difference between the male and the female. If it is recognized that "one's own group is considered to have a lower ability than the other groups, and oneself is one of them", a person holds stereotype threat, and as a result, ability [48] [49].

An interesting experiment (1999) was conducted by Dr. Shih's [50] group to

manipulate stereotype threads. The subjects are female students of American and Canadian universities with Asian roots. They were subjects with two identities: Asian women who are both weak in mathematics and at the same time strong in mathematics. The team asked a couple of questions about gender awareness prior to the exam (for example, “Do you prefer co-studying?” And so on), then did a math test. Then, they scored worse than the control group, which had no questions asked. Their gender identity switch has been turned on. However, if the questions involved were related to their Asian identity(i.g. “Does parents or grandparents speak languages other than English?”) They scored better than the control group. When exposed to stereotype threat, stress such as anxiety, frustration, disappointment, sadness [51] or negative feeling is enhanced [52], and at the same time the strength and motivation of mentality Is reduced [53] and people can not perform well. Under such circumstances, people become sensitive to stress and anxiety, but the cause can not be determined, and they simply come to a conclusion that their inability is their cause [54]. As a result, women have their own path, particularly in mathematics and related fields. But fortunately, just saying a word about the presence of the stereotype threat protects women from negative effects and prevents them from achieving underperforming mathematics [54]. It is also effective to be verbally asserted to maintain identity.

For example, according to the aforementioned Davies et al. Study [55], women tend to be less reluctant to take leadership in group work than men. The stereotype thread has been internalized as a result of repeatedly looking at the appearance of the actresses who behave like a woman in the television commercial. However, at that time, if it is written that “both men and women who take leadership have no difference in ability between men and women”, women will be willing to take leadership [55].

2.5. Implicit Association Test

One of the most commonly used measures of unconscious bias over the past 20 years is the IAT developed by Anthony Greenwald [56]. The IAT subjects will group words or pictures that appear on the computer screen by tapping the keys on the keyboard. The subject is asked to perform this step as quickly as possible,

without any conscious recognition, and the time of the reaction is recorded. The combination of words and pictures (on the computer screen) was mixed with something that is not reminiscent of cultural stereotypes.

The word “implicit” is an expression used in cognitive psychology and social psychology in the sense that people can not consciously or intentionally use it. In other words, the latent attitude refers to the attitude that can not be perceived by oneself. The expression used in contrast to the potential is “explicit”, which means that it can be perceived or used intentionally. The overt attitude is the attitude we have in the subject, obtained by thinking about our thoughts when asked by questionnaires, etc., ie reflection, and social psychology in a classical sense Attitude at will all refer to this. The set of potential social cognition studies behind which the Implicit Association Test (IAT) was developed, the cognitive sciences framework for discrimination and bias that is difficult to measure by traditional questionnaire measures Approach [57]. People’s responses to questionnaires tend to distort in a direction that is generally regarded as socially desirable, especially when trying to measure individual differences between discrimination and prejudice. In the study of potential social cognition, in general, respondents do not know what their response means. Therefore, in the socially desirable direction, for example, to prevent discrimination and prejudice from appearing, It is difficult to change.

Unlike self-reporting methods that report their own emotions, attitudes, and convictions, such as questionnaires, it is clear that the respondent measures potential attitudes that will not distort the answer intentionally or unintentionally. It is said that there is an advantage. The reason is the accessibility effect [58]. The accessibility effect is a phenomenon in which the concept related to the word becomes easy to be used in another independent task after the experiment participant touches some words in advance, and in cognitive psychology, It is thought that it is due to the latent memory which is the search and use of the memory which is not conscious [59]. This is because touching the word causes the corresponding concept to be “activated” and the activation spreads to the related words, thereby increasing the ease of use, ie accessibility. is there. The IAT is a measurement method that captures the flow of such research, and was developed for the purpose of measuring potential attitudes as individual differences [56]. It

is assumed that there is an individual difference in the strength of the relationship between concepts in accessibility effects, and the point to try to measure the individual difference is the same as the method of previous Fazio [60], but IAT. There is a major difference in the procedure, that is, it is not necessary to use decontamination without priming.

The contents of the Gender-Science category include words such as the following image, and categorize the words with the keyboard.

次の課題では、単語や画像が呈示され、グループに分けることが求められます。この課題では、できるだけ誤答を少なくしながらも、できるだけ速く呈示された項目を分類することが求められます。反応が遅すぎるか、エラーが多すぎる場合には、結果を判定できなくなります。この課題を実施するには約5分かかります。以下に示してあるのは、カテゴリーラベルと、それらのカテゴリーに属する項目のリストです。

| カテゴリー | 項目 |
|-------|----------------------------|
| 女性 | 少女、女性、おばさん、娘、妻、女、母親、おばあさん |
| 男性 | 男、少年、父親、男性、おじいさん、夫、息子、おじさん |
| 人文学 | 哲学、人文学、芸術学、文芸、英語学、音楽、歴史学 |
| 科学 | 生物学、物理学、化学、数学、地質学、天文学、工学 |

注意事項

- 速く反応ができるようにするために、「e」と「i」のキーの上に予め人差し指を置いて下さい。
- 画面上部に示されている2つのラベルは、それぞれのキーがどちらの単語あるいは画像に対応しているのかを表しています。
- 各単語あるいは画像には、正しい分類があります。これらの分類の大部分は簡単なものです。
- あなたの反応が遅かった場合には、テストの結果を示すことができません。できるだけ速く反応するようにして下さい。
- 速く反応しようとするれば、ミスをしてしまうこともありますが、それは構いません。
- 最良の結果を得るために、モニターでの明るさ設定を最大にして下さい。また、注意散漫になるものを遠ざけて下さい。

Figure 2.3 IAT Gender-Science Words Category

• IAT procedure

The test contents are about 10 to 15 minutes, and only PC is supported. I received a test within one week before the workshop participation, and a second test within the week after the workshop participation as well. The participants were informed in advance and asked to save the results. In the measurement of latent attitude by IAT, the evaluation object and its corresponding concept are used in pairs. In studies of prejudice against races, the IAT has the feature that evaluation targets are always used in

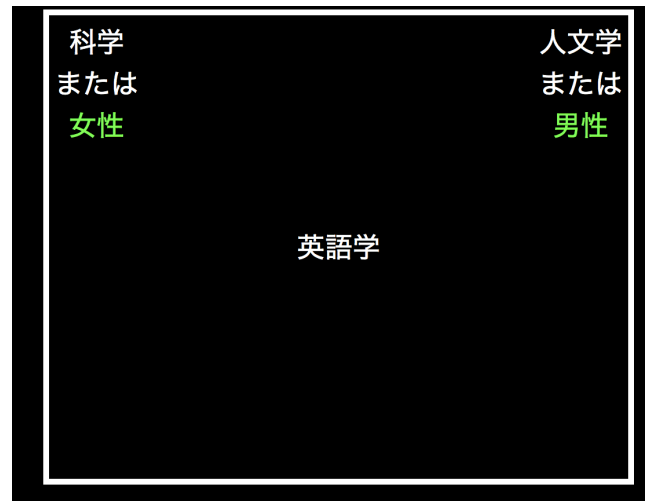


Figure 2.4 IAT Gender-Science Test Image

pairs, such as using “white” and “black”. Also, the concept of the pair is not always the opposite. Not necessarily. Nosek, Banaji, & Greenwald [46] use “old” and “young”, “male” and “female”, “self” and “others” as evaluation targets. Nosek et al. Have tried to use the Internet to prepare a website to experience IAT and collect data, some of which can be experienced at this time². This time the subject was given a test of “Gender-Science”. The potential attitudes of how connected (positive or negative) there is a connection between “humanities” and “sciences” that would be related to “males” and “females” It can measure.

2.6. Speculative design

As I was learning a lot of design methods, I felt that the design concept closest to my research was Speculative Design. This is because Speculative Design places emphasis on raising issues and discussions rather than solving problems, and I felt that there were a lot of works on social issues. For example, (IM) POSSIBLE

² <https://implicit.harvard.edu/implicit/japan>

BABY, CASE 01: ASAKO & MORIGA, which is one of Ai Hasegawa's works³, is performing installation on the premise that a lesbian couple can give birth to a child. I thought that the method of anticipating the reality that might occur in the not so distant future, and approaching the problems of the present in a way fits my research on the subject of the Gender problem.



Figure 2.5 (IM) POSSIBLE BABY, CASE 01: ASAKO & MORIGA

Speculative design is the process of addressing big societal issues with design processes and systems. Speculative design is a design method addressing big societal problems and looking towards the future—and creating products and services for those scenarios. BUT, like all things design, the concept is a little more complex than it sounds. The term was coined by Anthony Dunne, professor and head of the design interactions programme at the Royal College of Art, and

3 <https://aihasegawa.info/>



Figure 2.6 (IM) POSSIBLE BABY, CASE 01: ASAKO & MORIGA

Fiona Raby, professor of industrial design at the University of Applied Arts in Vienna. The two popularized the concept in their book, *Speculative Everything: Design, Dreaming, and Social Dreaming*.

Dunne said that “Speculative design thrives on imagination and aims to open up new perspectives on what are sometimes called wicked problems, to create spaces for discussion and debate about alternative ways of being, and to inspire and encourage people’s imaginations to flow freely. Design speculations can act as a catalyst for collectively redefining our relationship to reality [61].”

To illustrate this and help define and differentiate it from other design fields and in particular the traditional notion of design in the service of industry, Dunne and Raby have created the ‘A/B diagram’(Figure 2.7) by Dunne, A., Raby, F.(2013,vii preface) [61]:

| (a) | (b) |
|-----------------------------|-----------------------------|
| affirmative | critical |
| problem solving | problem finding |
| design as process | design as medium |
| provides answers | asks questions |
| in the service of industry | in the service of society |
| for how the world is | for how the world could be |
| science fiction | social fiction |
| futures | parallel worlds |
| fictional functions | functional fictions |
| change the world to suit us | change us to suit the world |
| narratives of production | narratives of consumption |
| anti-art | applied art |
| research for design | research through design |
| applications | implications |
| design for production | design for debate |
| fun | satire |
| concept design | conceptual design |
| consumer | citizen |
| user | person |
| training | education |
| makes us buy | makes us think |
| innovation | provocation |
| ergonomics | rhetoric |

Figure 2.7 A/B diagram

In Dunne and Raby’s diagram, consisting of two juxtaposed lists of adjectives and short descriptive terms, A stands for traditional concepts of design, whilst B represents Critical Design. Column A features words relating to our current capitalist society, ideas of production and function, industry, enterprise and consumerism. Design in this column is described as affirmative of the status quo.

Challenging this, the wording of column B is centred around critique and speculation, society, the world and ethics. However, the terms in list B were never intended as opposites to those in A but as an extension of the scope of traditional design by means of CD [61].

The A/B diagram is, however, often interpreted as one of opposites, for instance by Bardzell & Bardzell⁴. They criticise CD, represented by list B, as having strong value judgements attached to it and as being

“more vague and political than professionally useful” (p. 3299). They claim that, in Dunne and Raby’s description

“affirmative design is the common practice, and this practice is amoral and ultimately a dupe for capitalist ideology, while critical designers are described as moral agents who seek to change society for the better. Since affirmative design is a pejorative, and critical design is an honorific, the question of who gets to decide whether a design is affirmative or critical is key.”

Speculative Design is heavily influenced by Critical design and Transition Design.

Critical Design (CD) is “critical thought translated into materiality” [61]. It is a “medium to engage user audiences and provoke debate” [62] by combining scientific, cultural, ethical, social and technological aspects of reality and articulating them through the language of design. The intention is to enable reflection about our current world views, values, technological and scientific advances, societal and economic models by means of proposition, exaggeration, and presentation of alternative visions of reality [63] Numerous actors are engaged in this field, however the most prominent or rather most widely-published are the designers Dunne and Raby, quoted above, who coined the term and have used it since 1997 — Anthony Dunne as a PhD student, both designers in their design research and practice as well as through their tenure as tutors and professors in the Design Interaction Department of the Royal College of Art (RCA) until 2015.

Since 2013, Dunne and Raby (DnR) have employed the term Speculative Design (SD) to describe their practice, coinciding with the publication of their book ‘Speculative Everything — Design, Fiction, and Social Dreaming’ (2013). For the

⁴ <https://openlab.ncl.ac.uk/digitalcivics2014/files/2015/03/p3297-bardzell.pdf>

purpose of locating my pre-PhD practice, I will use DnR's Critical Design (CD) practice as a point of reference. I share DnR's aim to create a form of design practice that acts as a counterpoint to conventional design. DnR and I view the latter as mostly affirmative, problem-solving and giving form to technological innovation with too little questioning of its impact on society or critically investigating its possible negative effects. DnR state that One of the main aims of critical design is to expand design's potential beyond narrow commercial concerns — to decouple it from industry and explore how it can be put to other uses states Dunne in *Material Beliefs*, [64]

Transition Design (TD) is a holistic theory connecting trans-disciplinary knowledge from education, science, technology, futurology and philosophy with the aim of applying it in society through design. The term 'transition' acknowledges that we live in a time of rapid social, cultural and environmental change in which it becomes increasingly clear that the capitalist model of continual growth cannot be reconciled with our planetary boundaries and that our capitalist pattern of production and consumption has to transform radically in the 21st century. It also implies that this is an ongoing process, rather than a development towards a preconfigured future scenario.

TD's historical roots can be found with architect, inventor and systems scientist Buckminster Fuller and designer, educator and author Victor Papanek [65], who both advocated ecological awareness and grounded their theories and practice in ecological systems thinking in the 1960's and 70's. The philosophical basis for transition design is best described in Hans Jonas 'Imperative of Responsibility in a Technological Age' [66]: He describes the environmental impact of advanced technology and insists that the survival of humanity depends on an extended scope of ethics including non-human entities and future generations. "Act so that the effects of your action are compatible with the permanence of genuine human life" [67]. One expression of how people strive to address these concerns is the grassroots initiative "Transition Network", initiated by activist, designer and writer Rob Hopkins in Totnes in 2006 [68]. It has since developed into a network of 'Transition Towns' and other initiatives, to adapt to change — and decrease its oil dependency. Projects include local currencies, garden sharing initiatives or planting food crops in public parks. Transition stands for a holistic

reconception of lifestyles, communities and models of production and consumption towards a resilient society and ecology that considers the future consequences of its actions. The driving force of the movement is the participants' ethical awareness of the urgent need for transformative change. Since 2013, this process of transition has been translated into a design method and associated postgraduate and doctoral classes by Terry Irwin, Gideon Kossoff and Cameron Tonkinwise at Carnegie Mellon University. The framework consists of four interrelated areas of knowledge, action and reflection described using the terms "visions for transition", "theories of change", "posture and mindset" and "new ways of designing".

2.7. Co-Speculative Design

I refer from Lohmann, Julia [69]. She said that, "I discuss the learnings of my residency and formulate key aspects of a new co-speculative method of design." I came to understand that there would have to be a legal framework that reflects the collective nature of the co-speculative and practicebased activities of the DoS, as well as their outcomes. This should clarify how individual contributions can be credited, whilst governing the overall knowledge as a commons for material development, similar to a Creative Commons licensing system. The idea of the commons has been described by the economist Elinor Ostrom as a shared system for managing and protecting a resource generated by a group [70]. It is relevant to the DoS framework since this knowledge is created outside the commercial realm. Some individuals or groups might only contribute to the DoS because of the fact that the DoS is a social rather than a commercial enterprise. Therefore, the commons framework should also protect the infrastructure, activities, processes, knowledge and other outcomes from exploitation in a traditional commercial manner.

The shift from individual authorship to the facilitation and activation of collectives — from 'me' to 'we' — that is taking place in my model for practice-based co-speculation in workshop context raises the question how an infrastructure of people, processes, knowledge, things and visions should be attributed in terms of intellectual property, also how it can be protected from exploitation by parties beyond the CoP value base. As a solution, I am proposing a Creative Com-

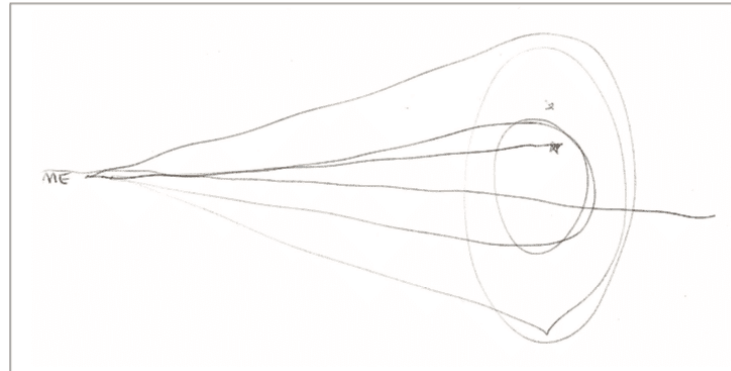


Figure 2.8 Sole speculation by myself

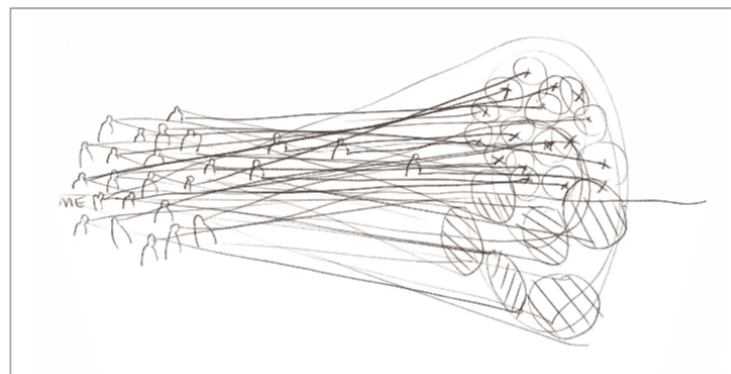


Figure 2.9 Co-speculating with others

mons for Co-speculation, in the case of my residency relating to practice-based co-speculative(Figure 2.8)(Figure 2.9).

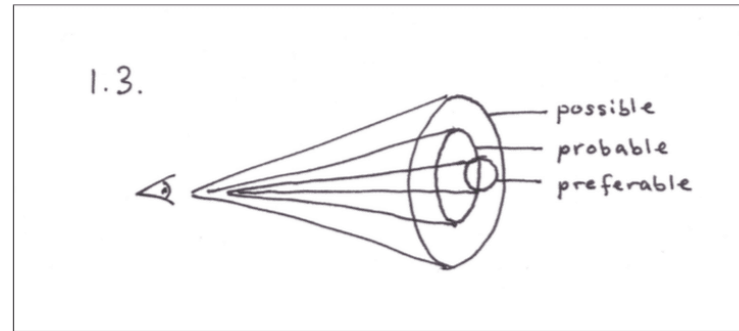


Figure 2.10 Individual research and practice-based speculation

This is illustrated by the ‘Cone of Futures(Figure 2.10)’ devised by Jo-seph Voros [71]. On the cone, a future extends from its starting point along a time line, showing the scope of possible and probable futures, as seen from a single perspective. From this perspective a value-based judgement about what a preferable future consists of is also possible, visualised as a cone that in my view can intersect any of the base cones representing probable, possible, improbable and impossible futures. This, however, is a value judgement that is rendered meaningless and solipsistic if it only mirrors an individual viewpoint. Engaging with the material help in a physical, multi-sensory way as well, in practice-based research, generates additional sensory feedback feeds for my inquiry, both as an observer and as a maker ⁵.

This is where the actual method for practice-based co-speculation takes shape(Figure 2.11). Any individual inquiry, however extensive, will always be shaped by the designer’s own experiences, knowledge and background and have blind spots, even when we design in conversation with ourselves [72]. By establishing a CoP, the designer’s role shifts from author to facilitator. Grouping individuals from different publics [73]around an inquiry enables Bohm dialogues [74]. Collective speculation complements the single vision of the initiating designer through a dense field of

⁵ http://www.pangaro.com/glanville/GlanvilleSECOND_ORDER_CYBERNETICS.pdf

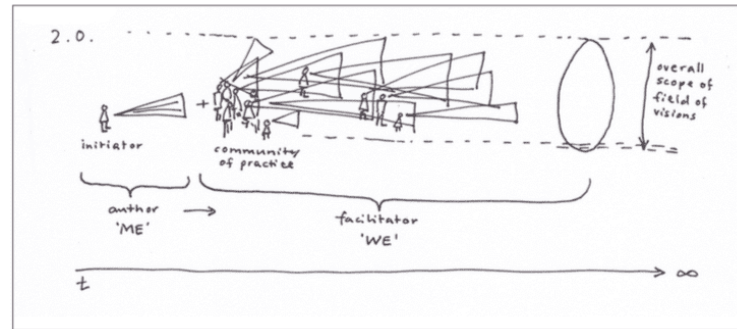


Figure 2.11 Field of Visions — Creating a community of practice

visions. The field has the potential to both sharpen the initial vision, as well as expanding it and changing its overall trajectory [69].

In this research, I would like to say conduct workshop with Co-Speculative Design because workshop is very vital in dialogue step. Furthermore, I would like to encourage thinking to participants through workshop with Co-Speculative Design because Gender issue need to think many people seriously.

Chapter 3

Concept & Methods

3.1. Concept

As indicated above, my research goal is “Create a NEW workshop program affect to reduce Unconscious Gender Bias”.

I have two purpose: first, conduct workshop with Co-Speculative Design. Second is as a workshop concept, start discussions from general theory, not Unconscious Gender Bias.

First, as the background of this purpose, Unconscious Gender Bias has been reduced, and it has been greatly improved, as it is the “Change Behavior” Workshop described in the literature review of Chapter 2, but it has been able to approach the reduction of Unconscious Gender Bias. It was not. So, this time I want to work on creating a workshop program design that has the effect of reducing the Unconscious Gender Bias.

The hypothesis of this paper is that “The method of *Change Behavior* Workshop described in the Literature review of Chapter 2 does not reduce Unconscious Gender Bias and WS that does not assume Unconscious Gender Bias contributes to Unconscious Gender Bias reduction”.

Also, as the concept of workshop, it is assumed that there is another factor (Different factor X) that is lurking, critically grasping the attitude that Unconscious Gender Bias is the cause. Then, I raise a question for the general theory called Personnel assessment system and advance discussion. Among them, in the second half of the workshop, Unconscious Gender Bias aims to put an embroidered device, and as a result notice Unconscious Gender Bias. Each will be explained below.

3.1.1 Personnel assessment system

As a concept of workshop, we raise a problem not to Unconscious Gender Bias but to Personnel assessment system.

First, the Tokyo Medical University entrance exam scandal is treated as an example of the problem. In the first place, as an evaluation method for entrance exams, the emphasis is placed on how to take good scores in the exam rather than the thought of “want to be a doctor”. Is a homogeneous evaluation method that emphasizes the means rather than the motives really correct? It starts from where. Today, the word “diversity” is a word that is flying around at the individual and company levels, but what does it mean to be “diversity” in the first place? What does gender equality mean to have equality? It is said that the purpose is to promote thinking by asking questions from the bottom. Then, the goal of this workshop is “think about a diverse evaluation system with the right person and the right person that can show the potential of the individual”. It is important not only to think about the current situation, but to think about the future that can occur due to the development of Artificial Intelligence(AI). It is said that one of the causes of the Tokyo Medical University entrance exam scandal was that it was caused by a prejudice such as women’s lack of physical strength and quitting after getting married. But what if Artificial intelligence changes society by changing times? Is there a possibility that Artificial intelligence can also fill in differences in physical strength? These questions will be cast to advance workshop.

Before the explanation of workshop, homogeneous evaluation is carried out in the first place, and it is said that the strong country is a major cause as a background of the division of science and culture. I will explain it as a supplement.

It can be said that Japanese science education since the Meiji period has been conducted based on humanities and sciences. This can be attributed to the fact that Japan’s education policy has been matched to the political and economic requirements of Fukoku kyohei and a nation of industrial nations at that time. Fukoku kyohei ¹ is a policy that promotes the development of the national economy and promotes the strengthening of military power. It is said that Japanese education has been influenced by Germany and France since the Meiji era. These

1 https://en.wikipedia.org/wiki/Fukoku_ky%C5%8Dhei

two countries have started to build up military forces, established science and engineering departments at universities, and have focused on military research. The Meiji government set the military powers and industrial nations as national goals. In order to achieve this goal, they adopted the education system of the above two countries. Now that the number of occupations that can not be divided into humanities and sciences is increasing, it is more likely that the university will set up a liberal arts department in accordance with this. Of course, it is necessary to have a good idea of how to do it. Furthermore, homogenization is considered to be influenced by the military background.

3.1.2 Different factor X

As Indicated Above, We will not convey to participants that workshop will reduce Unconscious Gender Bias, but assume that there are other factors that are hidden. However, in the second half of work in workshop, I will prepare a mechanism that workshop is exposed. As a result, workshop, which is a hypothesis as a paper, appears as differentiation factor X. We analyze the results of workshop by some sort of mathematical induction method.

3.2. Workshop

In recent years, methods of learning and creation called “workshops” have been practiced in various fields and are attracting attention. Its areas are diverse, including art, community development, schools and businesses. In some areas, it is expected to be a “magic wand” that solves today’s complex problems, and it is rapidly expanding. At first glance, it looks like an epidemic that has suddenly appeared in the last few years, but the workshop has a history of practice of more than 100 years. The history will be described in detail in Chapter 1, but it is clear that the workshop has developed as a rival culture to overcome the existing methods of each domain. In particular, there is a background that has been attracting attention as a way to regain democracy, as a counter culture to the modern system in which things go on in the upper reaches and lower minds. It has been respected that there is a process of discovery and meaning creation for the participants, where they are engaged. In other words, the workshop emphasizes

the process of learning and creation by collaboration among participants. The definition of the workshop is widely quoted in Nakano [75], he said that “It is not a style of unilateral knowledge transfer such as lectures, the style in which participants can join and experience themselves, and collaborations among participants can create learning and creation”.

Anzai(2017) stated as follows:

If the place follows the genealogy of practice in each area of the workshop, in the practice, the weight for *learning* and *creation* is different, and some practices are mainly aimed at learning, while some practices are mainly intended for creation Exists.

In addition, there are various facts of learning. What can be said in common is that “the process of generating meaning through interactive and face-to-face communication between participants” is emphasized as an opportunity to drive learning and creation.

This point is similar to Co-Speculative Design in my thesis. Details on this will be described later.

“Workshop” originally means “studio” and is a term that represents a workshop for creating things, but now it is spreading its practice called “workshop” as a metaphor. Workshops are often used for a variety of purposes. There are various viewpoints to classify workshops, not limited to practical purpose. In the overview of the previous research, the classification by “region” described above is general, and some are classified by “scale” of practice. For example, Hori and Kato [76] focus on workshops for individual learning, focus on solving organizational issues, or deal with broader social consensus building across more than one organisation. They are classified into (1) human system, (2) organizational system, and (3) social system according to their existence. This can be said to be classification by purpose, but it can be said that classification is by size of the purpose being focused.

Anzai said that in order to realize the state where the purpose of “learning” and “creation” are compatible, the background about the following practice was taken.

3.2.1 Type of practice of the workshop

Anzai [77] said that the workshop, that main purpose is learning, is (1) a type of practice that gives participants the opportunity to reflect on the implicit assumptions they already have and (2) higher-level thinking and abilities of the participants. There is a type of practice to foster.

- Practice to reflect implicit assumptions

Reflection is to look at your own thoughts and experiences. People live their daily lives and form various perspectives of values and things. The “natural” premise, which is usually not noticed during long hours, may be a factor in everyday problems. “Practice to reflect implicit assumptions” is the practice to reconsider critically, noticing the existence of a view of values and things that have become commonplace without such knowledge. The adult pedagogist Jack Mezirow noticed the premise he had overlooked, and called the process of thinking to reconsider consciously “critical reflection of assumptions”. “Assumptions” are things behind beliefs and viewed as self-evident. Mezirow named the process of transforming the view of things by “critical reflection of assumption” as “transformative learning”, and (1) the dilemma causing confusion, (2) fear, anger, guilt or shame. Emotional self-examination, (3) critical assessment of assumption, (4) perception that one’s dissatisfaction and the process of transformation are shared with others, and (5) new roles and relationships Exploring alternative options for (6) making an action plan, (7) acquiring knowledge and skills to carry out one’s own plan, (8) provisional trials of new roles and relationships, (9 A) Organizing ability and confidence in new roles and relationships, and (10) Reintegrating new perspectives into your life, in 10 stages [78].

“Critical reflection of assumptions” prescribed by Mezirow can not be performed in isolated condition, and it is essential to interact and share with others who have a view of something different from theirs (Toeha-Enforcement 2004). Mejiro also emphasized the process of cooperative dialogue with others for critical reflection [79]. Based on the above, I will outline the features of the workshop that have been conducted to reflect on the implicit assumptions.

Based on the above, as the position of the workshop in this paper, while aiming for long-term change, let socially suppressed parties notice the current state of “invisible boundaries”, and be aware of change awareness. It is practice of the workshop of “the social change” domain which promotes action while enlightening. The important point of the workshop in this area is that the participants express each other’s premises and values towards other participants, listen to each other’s opinions, and create new meaning dialogue and communication. Process is required in “Practice to realize implicit assumptions”.

- Practice for fostering higher abilities and thinking

Practices for fostering higher-level skills and thinking include practices aimed at learning involving higher-level thinking such as acquiring a view of something, and fostering higher-level skills such as creativity, problem solving skills, and communication skills. Practice aimed at Practice of “art creation” area with the purpose of fostering practical communication with the purpose of understanding art and practice with the main purpose of creation, etc., and workshops developed in in-service education and “school” .

For example, a workshop in the field of in-service education will bring together teachers and other educators. To discuss the state of education and problems faced in the field, and to study their solutions. And practice to learn the basics of problem solving necessary for field teachers.

When in-service training workshops were beginning to be widely accepted as the “most democratic research method”, Daisho [80] was called “concrete”, “autonomy” and “cooperability” as the principle of in-service training workshops. I mentioned three principles. The “principle of concreteness” refers to the difficult problems in reality where teachers are confronted in daily education, and the problems that solving such problems will bring educational activities in the field one step further into reality. Point out the importance of In the principle of autonomy, it is said that all planning and management of the workshop should be carried out in line with the expression of the voluntary intentions of the participants in general. “The principle of cooperativity” means that in the workshop, people who have trouble with each

other help each other to solve common problems, and it is said that there is a genuineness, and individual activities promote research as a group. It is supposed that the cooperative relationship that each person's research will be completed through the research results of the group will be the foundation. It is speculated that the teacher's intention was to acquire the skills and attitudes necessary for problem solving in the field by solving the problem in the field on the basis of group discussions voluntarily and democratically. right.

This point was also introduced at the beginning of a concrete issue raised by Scandal and deepened through cooperative dialogue among the participants.

- Practice with the main purpose of creation

One area is the town development workshop. Rather than leaving the decision of urban development measures to the administration, it is a practice for each resident to bring their own ideas, think about urban planning through discussions and exercises, and form an agreement.

In the hands of Laurence Halpin and others who are urban planning experts, we used "Talking Part Process Workshop" as a method of consensus building among the residents, using the method of the workshop used in the theater field.

The practice focused on the process of community participation and creative activities in a group, and was established as a method of community development for citizen participation. Halpurin intended to disclose the process of consensus building and creation and actively involve the population in the process [81] in order to aim for the active participation of the population.

Workshops in the area of community development, "The members share their experiences, opinions, and information under horizontal relationships, and in the process of accumulating work with physical movements, And it is defined as *How to create a group toward the goal* [82]". One of the characteristics of the practice whose main purpose is creation is to actively involve others with different perspectives, and to generate ideas through collaboration among diverse members. This time, the participants worked to create a situation where people with diverse backgrounds as possible

(finance, advertising, IT, fashion designers, high school students, graduate students and more) enjoy the collaboration.

3.2.2 Workshop background theory

Following the theoretical lineage of the workshop, one of the first ideas of the workshop is John Dewey's idea of "experience learning". In addition, I think that Fritz Perls's Gestalt Therapy is important in the process of introducing a new viewpoint from a state that I can not understand for one thing.

- Dewey's experience learning

Dewey pointed out that while emphasizing experience, there may be experiences that impede learning, and above all, emphasis was placed on "quality of experience". According to Dewey, the quality of experience is determined by two principles: the principle of interaction and the principle of continuity.

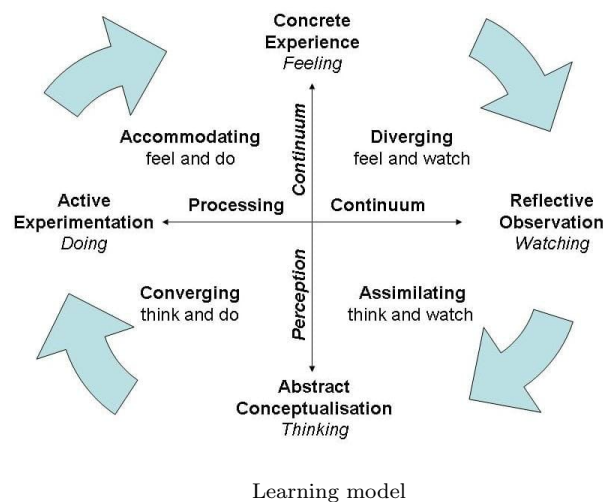


Figure 3.1 Dewey's learning model

Takada (1996) gives an overview of the workshops in all areas and points out that the origin of all workshops is derived from the pedagogy of John Dewey [83] (1859-1952). Dewey is an American educational philosopher who is known for writings such as *School and Society* (1899), *Civilization*

and Education (1916), and Experience and Education (1938). Preaching the importance of experience in education, the idea is widely known by the word “Learning by Doing”. Dewey pointed out that while emphasizing experience, there may be experiences that impede learning, and above all, emphasis was placed on “quality of experience”. According to Dewey, the quality of experience is determined by two principles: the principle of interaction and the principle of continuity. The “principle of interaction” is the idea that experience does not occur inside an individual, but arises as a result of interaction between the individual and the environment. Dewey stated in “Experience and Education” (1938) that “experience does not occur in a vacuum. The source of experiences is outside the individual”, and “human experiences are social. Yes, it is fulfilled in the communication and communication with others”. In other words, in Dewey’s theory of empirical learning, “experience” is considered to be social in nature and to be caused by “communication with others”. Dewey’s experiential learning process, in which learning takes place through reflection and introspection from such concrete experiences, is David A. Corb, who is the first person who promoted experiential learning research focusing on the adult learning area. It is summarized by Kolb [84].

According to Kolb, Dewey’s experiential learning refers to observation of a specific situation based on the learner’s desire (Impulse), and searches for knowledge (knowledge) obtained in a similar situation in the past. By making a judgment that combines observation and knowledge in a dialectic manner, it is a process that inevitably leads to ideas about conclusions and is transformed into higher-level, targeted activities [84]. In other words, experiential learning can be said to be a chain of processes to create new knowledge from the analogy of observation of the concrete situation in front and past experience. While Colub is based on Dewey’s idea, it is integrated with other theory groups, and the model of experience learning is summarized in the following four-stage circular model.

In this model, the process of empirical learning is (1) from concrete experience to consideration and observation (2) from consideration and observation to abstraction / generalization (3) from abstraction / generalization

to hypotheses setting (4) hypothesis It is organized into four stages, from setting to concrete experience, and the abstract law is derived from concrete experience, and the learning process that is used in the next concrete scene is formulated.

Although Colub’s model is referenced in various situations in adult learning, it also gives suggestions for how to practice the workshop. Brooks-Harris & Stock-Ward (1999) summarized the basic activity flow of the workshop in the following 6 stages, based on Korb’s experience-learning cycle(Figure 3.2).

| | |
|-----------|---|
| 1. 導入と概説 | ワークショップの概要について説明し、参加者の自己紹介とともに、参加者がなじむための活動を行う。 |
| 2. 経験の内省 | ワークショップのテーマにもとづき、日常生活の中で経験したことを参加者間で話し合い、多様な事例を共有する。 |
| 3. 同化と概念化 | 経験を相対化するための新しい情報を提示し、話し合うことによって知識化するとともに、その知識を使って過去の経験を概念化する。 |
| 4. 実験と実践 | 実験的な状況を設定し、問題解決的な実践をおこなう。グループで協力しながら解を形にする制作活動になる。 |
| 5. 応用の計画 | ワークショップの実践について振り返り、話し合いの中で気がついたことを可視化して反芻する。また、今後学んだことを応用できる状況はないか考え共有する。 |
| 6. まとめ | ワークショップ全体について振り返り、ワークショップに関する評価を行う。 |

Figure 3.2 Workshop Composition

This is a basic structure common to many workshops, but many of the workshops practiced in the modern age have been set to “create new ideas and forms in a group” at the “experiment and practice” stage. There are many cases [85]. Working in groups makes sense from both a creative and a learning perspective, and it is important to communicate with others with different values, and to create ideas while overcoming conflicts. . While respecting Dewey’s ideas of experiential learning, Yamauchi calls the process

in which learning takes place through creative activities by these groups as 'creative experiential learning'.

Under Dewey's experience learning and the idea of creative experience learning developed from that, the activity of creating new ideas while the learners communicate with each other is an opportunity to trigger learning, and the quality of the next communication. It will be positioned as an important tool for raising

- Fritz Perls's Gestalt Therapy

In this workshop, I focus on Fritz Perls's Gestalt Therapy [86]. He was born in Germany and well-known psychiatrist and psychotherapist. Expressing gestalt in Japanese is said to mean "shape", "totality", "completion", "cohesion", but this therapy has three main characteristics. First, gestalt therapy is said to be group psychotherapy using "(now-here) = phenomenological place". In this therapy, we do not ask what we did in the past, why it is, "now, here", "how", "how", "what", "what are you talking". It aims to be aware of it, to experience it, to aim at whole body spiritual awareness and awakening from there, and to regain the freedom of being oneself there. As a method, it is often performed as a group workshop.

A famous example of gestalt is Rubin's vase. When you look at this image, some people may look like "beards" and others may look like "faces". If you change the focus a little, the person who was looking like a wolf will see it on the face and vice versa. Although this image contains two elements, "eyebrow" and "face", there is an interesting phenomenon that once one is focused, the other will not float.

In this way, the gestalt that is firmly perceived in our consciousness is called the "figure". On the other hand, Gestalt, which disappears when the image is focused, is called "the ground". According to the sociologist Keisuke Maki [87], he has introduced the process of cultural anthropologist Carlos Castaneda in his biographical "sounds of air flow". Among them is a description of gestalt. It is considered extremely difficult for people to see either "figure" or "ground".

In gestalt therapy, in this way, humans perceive various elements of the

world and put them together. In other words, I think that I am alive while composing “Gestalt”. People are considered to be able to act and to be changed by gestalts because they form gestalts. In this way, healthy people can freely change their point of view and can manipulate the “figure” and “ground” of the gestalt. It is possible to reverse in a timely manner. Sometimes we can focus on the figures and sometimes on the ground(Figure 3.3).

However, if you have a mental illness, you can not change your position by sticking to the gestalt you have once configured. Originally, in order for human beings to grow and live happily, it is necessary to change themselves flexibly in response to environmental changes, but those who have tasks make gestalt, break it, break it Can not make.

In other words, gestalt therapy can be said to be a 'stimulant' for those who can not make gestalt and the creation of new gestalt.

Visualizing the negative things that the group faces and directly addressing those issues are considered effective for corporate organizational development. In addition to that, I think that a workshop incorporating gestalt therapy is effective for changing awareness on social issues.

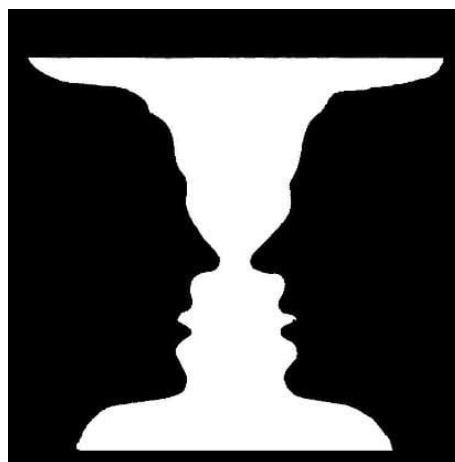


Figure 3.3 Rubin's vase in Gestalt Therapy

3.2.3 Workshop program design

Anzai [77] says that the quality of learning and creation in a workshop is influenced by the act of “workshop design”. Although the definition and view regarding the workshop design differ depending on the practitioner and the researcher, the elements targeted for the design are “theme (concept)” “program” “facilitator (facilitation)” “participant (group)” “space” There are some common keywords such as “artificial objects” (eg Yamauchi et al. 2013; Mogi et al. 2011; Hori-Kato 2008). If you look at these and organize the terms, the “theme (concept)” describes what kind of content of the workshop will be conducted, the content of activities and the content of learning. A “program” is a workshop schedule, and is a plan that describes in advance what activities will proceed with what kind of procedures and time allocation. The “facilitator” is the presiding officer who promotes the program of the workshop, and also supports the activities of the participants. The way in which the facilitator in the workshop works with participants is called “facilitation”. Participants are, literally, people who attend workshops. As the workshop is often used in group activities, the composition and number of groups may also be pointed out as design targets [88]. “Space” refers to the selection and layout of furniture at the workshop site, and “artificial objects” refers to tools and materials used in the workshop activities.

Although these factors can not be ignored in any workshop design, in particular, the three points of “program”, “facilitator (facilitation)” and “participant (group)” that directly affect the process of activity are important. Are often pointed out. In addition, Anzai [77] describes the basic structure of the workshop in four stages: 1 introduction, 2 activities to know, 3 activities to create, 4 summary. “1. Introduction” consists of explanations from the facilitator, self-introduction between participants, and activities called ice breaks. Ice break is an activity to relieve participants’ tensions and build relationships among them. The “2 activities to know” is an activity to acquire knowledge related to the theme. There are often short lectures, reference to materials, and time for participants to share knowledge and experiences with each other. Workshops are often regarded as “not a lecture” and “not a place for knowledge transfer”, but it is also important to have time to experience new knowledge in order to enrich active experiences. In “3 Creating Activities”, participants work together to create works in line with

the main production issues. This is the process that is expected to have the most emergent collaboration in the workshop. In “4 Summary”, the created works are presented to each other, and learning is made conscious by reflecting on their experiences.

In this way, the workshop program is composed of a series of activities. The main thing is the “production activities” where the participants work in cooperation. The time to understand the purpose of the workshop before that, the time for the participants to know each other’s experiences and knowledge, and the theme The content of “knowledge acquisition activities”, which is the preparation for production activities, is also important, such as the time to acquire new knowledge. In the activity of designing such workshop programs, it is considered important to organize activities as organic connections and flowing programs [75]. In particular, it has been pointed out that it is important to set meaningful production tasks for the participants and to organize the process for that [89].

The program contents of the three workshops in this research will be described in the following chapters, focusing on the above viewpoints.

Chapter 4

Workshop part 1

4.1. Purpose of this workshop

First, the date of the first workshop is as follows. 2019.05.26 14:00-17:00 in Keio University Graduate School of Media Design Floor 3 at S02

Consistently, the goal of the workshop is to create a new evaluation system. The workshop consists of 4 steps in total, with 4 hours in total. First of all, I made a question about the present evaluation system, and not only that, in the rapidly changing times of the times, assuming the future, participants will consider what an evaluation system that can bring out the potential of each individual I will tell you about it in the introduction.

In addition, in Step 3 of the gender swap, which is the most important point in this workshop, I used Doraemon characters¹ this time, and I was asked to create a persona from the three categories of “scientist, professor, secretary”.

By using Doraemon’s character, it was intended to make the work more familiar and playful.

So why did you choose that character and chose that profession? The purpose was to make various Unconscious Gender Bias in the process of creating a persona. After Step 3, I set up a session and deepened the dialogue and why the persona was created as mentioned above.

| | | |
|-------------|--------------|---|
| 14:00-14:20 | Introduction | Explain about this workshop and today's Goal |
| 14:20-14:50 | Ice breaker | 4 mass self-introduction |
| 14:50-15:50 | Work1 | Create Persona and New personnel assessment system |
| 15:50-16:40 | Work2 | Gender swap |
| 16:40-17:00 | Reflection | About my Research and Unconscious Gender Bias |

Timeline of workshop

4.2. Project description

4.2.1 Timeline

1. Introduction

Welcome and brief introduction of the facilitator

2. Today's purpose

The purpose of today is to create a future ability assessment and evaluation system with a scientist who works there as a protagonist, imagining the future where Artificial intelligence has developed.

3. About Speculative Design

First of all the explanation of Speculative Design. Introduce the case of Ai Hasegawa.

4. Personnel assessment system problem

Including the history of education such as Fukoku Kyohei ², I presented the

¹ <http://www.marumegane.com/blog/2005/03/12/>


² https://en.wikipedia.org/wiki/Fukoku_ky%C5%8Dhei

reasons for different humanities and sciences and problems in the present age. For example, exams emphasize means rather than motivation. If you want to be a doctor, it is more important to take good measures in past tests and take good evaluations than to feel that you want to help the poor. I suggest that I feel uncomfortable about it.

5. Ice break

4 mass self-introduction with a paper illustrated in Figure 5.2:

- Name
- What is your passion?
- Express the current mood with emoticons
- Image of a scientist

| | |
|---|--------------------------|
| 仕事/活動 | 私の情熱 (私が一番情熱を持てるものは?) |
|  | 科学者ってどんなイメージ? |

呼んでほしい名前

4 mass self-introduction in A4 paper

6. Making Persona

Of the five Doraemon characters, They will assign them to the "Scientist, Professor, Secretary" category and have them make a persona.

7. Create New Personnel assessment system

What is the evaluation that utilizes the characteristics of each persona?

8. Presentation

They announce from persona that we made each to evaluation system.

9. Gender Swap

Ask them to discuss the following issues. If the gender of the created persona (Doraemon character) is swapped, how will that persona's character, tendency, and role in work change?

10. Session

Why is that for the team that was talking on the assumption that "secretary = woman"? I heard that the team with many women did not get along well and I dug up the remarks such as.

11. Reflection

Finally, I will explain my research and explain that the real aim of this workshop was Unconscious Gender Bias.

12. Checkout

Have each person write their own words and comments on the worksheet.
Have one person say one word.

4.2.2 Preparation

- Logistic

Materials:

Plocky, A4 paper, post-it, worksheets, masking tape, sweets and drinks

Venue layout:

Create islands of the number of groups (5 people × 1 groups)

Record:

Deliverable photos, landscape photos, completed worksheets, recordings

Point:

Not only "Sit free" but also "With people who haven't talked much".

- Worksheets

The workshop uses several kind of worksheets shown in Figure 4.1, Figure 4.2, Figure 4.3, Figure 4.4, and Figure 4.5.

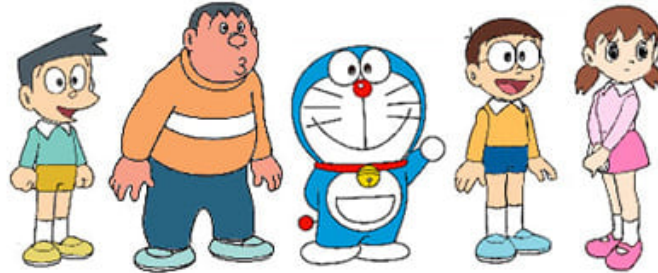


Figure 4.1 Using Doraemon characters to make persona

| | |
|------------------------------|-------|
| NAME & GENDER / 名前 & 性別 | _____ |
| AGE & LOCATION / 年齢 & 出身地 | _____ |
| CHARACTERISTIC / 性格 | _____ |
| ACADEMIC BACKGROUND / 学歴 | _____ |
| WORK/ 主な仕事内容 | _____ |

Figure 4.2 Worksheet 1 for Persona

WHERE /
居住地

FAMILY /
家族構成

HOBBY/
趣味・特技

STRENGTH/
強み

WEAKNESS/
弱み

Figure 4.3 Worksheet 2 for Persona

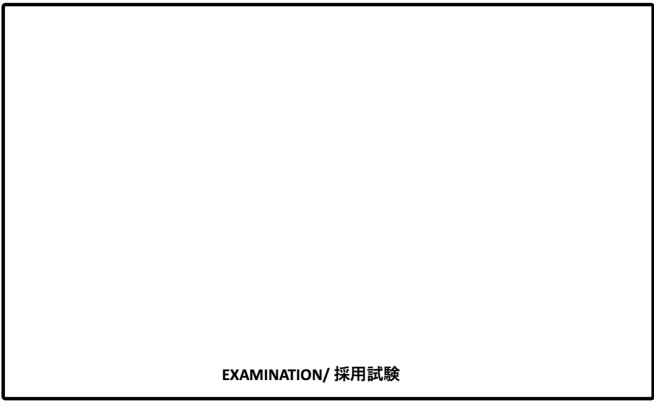
ROLES / 役割・役職

このペルソナは、どんな役割を担っていますか？

以下の観点から考えてみましょう

- ・ポジションに関わらず、何を達成することがこの人の責任ですか？
- ・プロジェクトを進行する際に、決定権はありますか？それとも影響を与える？または評価をする人？
- ・どのくらいの権限を持っていますか？リードする？サポートする？

Figure 4.4 Worksheet 3 for Roles



EXAMINATION/ 採用試験

科学者スペシャルチームが結成されました。では、この人材を採用するにあたってどんなスキルを評価すればいいでしょうか？
以下の観点から考えてみましょう
・数学メインではなくチームを引っ張っていくメンバーがいた場合、そのようなリーダーシップがあるかどうかのような試験で判断すればいい？
・スキルベースなのか、好奇心や精神力の強さなどの心理的ファクター要因なのか、評価の仕方は同じではないはず？
・定性的評価？定量的評価？

Figure 4.5 Worksheet 4 for Examination

4.2.3 State of the day

This time, the workshop was attended by three men and I went to the table as well.

The first time seemed to be just fine with this number, and the work progressed with good communication with everyone. However, for those who are unfamiliar with design, questions about Speculative Design's explanation were not clear, and there were many questions about the setting to assume the future.

However, in the work to create the persona, it was so exciting that I felt that the creativity was fully realized when I thought about the future image of the familiar character.

4.2.4 Output from participants

Some of the worksheets created by the participants are as follows:

| | |
|--|--------------------|
| NAME & AGE & LOCATION / 名前 & 年齢 & 出身地 | のびた x 31 x 産日代 |
| TITLE / 肩書 | フラン大学医療系学部 助教(子?) |
| CHARACTERISTIC / 性格 | 優しいけどちょっとバカな青年 |
| SIZE & TYPE / 学歴 | フラン大学 |
| WORK / 主な仕事内容 | 産後のマタニティヘルスと100%研究 |

Figure 4.6 Output of worksheet from participants 1

4.2.5 Result of Implicit Association Test

The participants’ IAT results are as follows. It can be said that the change before and after participation in the workshop tends to decrease.

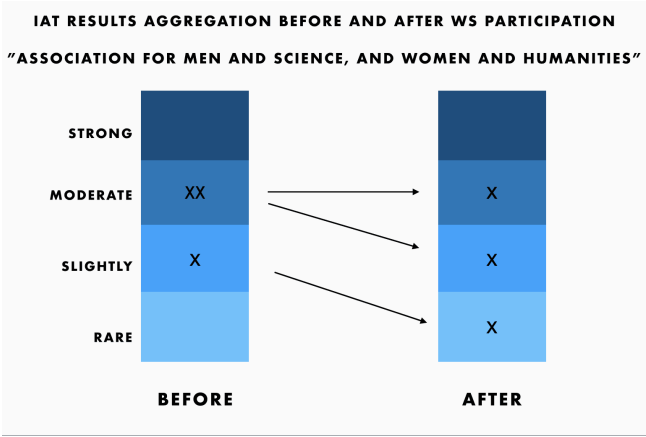


Figure 4.10 IAT results aggregation before and after Workshop participation "Association for Men and Science, and Women and Liberal arts"

4.2.6 Participant's feedback in Reflection

Especially remarkable in this workshop was the word “secretary = beautiful woman”. In addition, the secretary’s work was discussed as “simple work, such as schedule management”. “I want to have a beautiful secretary manage my schedule”, the participant said. There were also remarks that participant would stay scientists always stay in the laboratory and never get married.

When I ask for participants about the concept of “secretary = beauty”, they said it is the influence of the media.

4.3. Evaluation of this workshop

As Unconscious Gender Bias was able to find it well, I felt the session had a good dialogue. However, when creating a persona, if you use a Doraemon character, you could not pull out his bias because he was pulled by an existing character. The participants who chose Doraemon appeared to be somewhat puzzled in digging in, as Doraemon also had a robot character. Since it is important how persona creation can be thought by oneself, it was a failure to have you select Doraemon.

Also, as no one chose Shizuka-chan (the only female character), the work went on, so I decided to make sure that the balance between men and women was equal next time.

Chapter 5

Workshop part 2

5.1. Purpose of this workshop

First, the date of the second workshop is as follows. 2019.06.8 14:00-17:00 in Keio University Graduate School of Media Design Floor 3 at S02

As with the first workshop, the goal of the workshop is to create a new evaluation system. The workshop consists of 4 steps in total, with 4 hours in total. First of all, I made a question about the present evaluation system, and not only that, in the rapidly changing times of the times, assuming the future, participants will consider what an evaluation system that can bring out the potential of each individual I will tell you about it in the introduction.

This time, I did not use the characters of Doraemon, but I decided to make a persona from scratch.

Because it takes time to create a persona, the time spent on each work is by no means sufficient, but we put emphasis on making the persona carefully so that the person's Bias is exposed as much as possible.

After that, gender swap was conducted in the same way, and it was considered how the persona's role and characteristics changed. Furthermore, I used a card tool when doing gender swap. This is because the facilitator did not induce the swap, but it used the card in the sense that it would be less biased if the card was read and the thought was changed by oneself. This card consists of three questions: not only gender, but the relationship between the two in reverse, and LGBT.

5.2. Project description

5.2.1 Timeline

Table of contents

| ACTUAL TIME | LINE DURATION | TITLE | TIME GUIDE | NOTE |
|-------------|---------------|----------------------|------------|---------------------------------|
| 14:00 | 00:03 | Introduction | 3 | Who am I / Contents |
| 14:03 | 00:02 | 今日の目的 | 2 | これから必要になる能力と現状の問題に気づいて思考を促すのが目的 |
| 14:05 | 00:05 | Speculative Designとは | 5 | AI Hasegawa |
| 14:10 | 00:02 | 現代の教育問題 | 2 | 動機と手段 / 脇田先生事例 |
| 14:12 | 00:15 | 4マス自己紹介 | 2/3 2'5 | アイスブレイク |
| 14:22 | 00:03 | MOVIE | 3 | 未来の科学者 |
| 14:25 | 00:15 | そもそも科学って？ | 5 | 具体的に何を遂行していてどんな人が担うの？ |
| 14:30 | 00:20 | ベルソナ作り | 10 10 | スペシャル科学者チーム構成（個人ワーク）/Share |
| 15:00 | 00:20 | 役割と採用試験 | 10 10 | 役割と採用/まとめる |
| 15:20 | 00:10 | Presentation | 3/3/3 | 発表 |
| 15:30 | 00:10 | 休憩 | 10 | - |
| 15:40 | 00:45 | カードツール | 15/15/15 | 発想の転換（役割メイン） |
| 16:25 | 00:15 | Session | 5+5*3 | Share/対話型FB |
| 16:35 | 00:05 | Research | 5 | About my research |
| 16:50 | 00:10 | Reflection | 5 5 | 感想や気づきを書いて一人一言共有 |
| 17:00 | 00:00 | Checkout | 0 | - |

Figure 5.1 timeline

1. Introduction

Welcome and brief introduction of the facilitator

2. Today's purpose

The purpose of today is to create a future ability assessment and evaluation system with a scientist who works there as a protagonist, imagining the future where Artificial intelligence has developed.

3. About Speculative Design

First of all the explanation of Speculative Design. Introduce the case of Ai Hasegawa.

4. Personnel assessment system problem

Including the history of education (Fukoku Kyohei), I presented the reasons for different humanities and sciences and problems in the present age. For example, exams emphasize means rather than motivation. If you want to be a doctor, it is more important to take good measures in past tests and take good evaluations than to feel that you want to help the poor. I suggest that I feel uncomfortable about it.

5. Ice break

4 mass self-introduction with a paper illustrated in Figure 5.2:

- Name
- What is your passion?
- Express the current mood with emoticons
- Image of a scientist


| | |
|---|--------------------------|
| 仕事/活動 | 私の情熱 (私が一番情熱を持てるものは?) |
| 呼んでほしい名前 | |
|  | 科学者ってどんなイメージ? |

Figure 5.2 4 mass self-introduction in A4 paper

6. Making Persona

Formed a team of four or five special scientists gathered to make a new urban design on Mars. Have each one create a persona.

7. Create New Personnel assessment system

After clarifying the role within the team, ask them to consider what kind of recruitment evaluation would be used without such mismatches.

8. Presentation

Announce the results of 3 teams.

9. Using card tool

Use Gender's cards in the worksheet to switch roles. So I ask questions from the session about the changes that have been highlighted, and share them with other teams.

10. Session

In the session, I deepened the dialogue mainly by Why did the characteristics of the persona change or not because of the gender swap?

11. Reflection

Finally, I will explain my research and explain that the real aim of this workshop was Unconscious Gender Bias.

12. Checkout

Have each person write their own words and comments on the worksheet. Have one person say one word.

5.2.2 Preparation

- Logistic

Materials:

Plocky, A4 paper, post-it, worksheets, masking tape, sweets and drinks

Venue layout:

Create islands of the number of groups (5 people \times 3 groups)

Record:

Deliverable photos, landscape photos, completed worksheets, recordings

Point:

Not only "Sit free" but also "With people who haven't talked much".

- Worksheets

The workshop uses several kind of worksheets shown in Figure 5.3, Figure 5.4, Figure 5.5, Figure 5.6, Figure 5.7, Figure 5.8, and Figure 5.9.

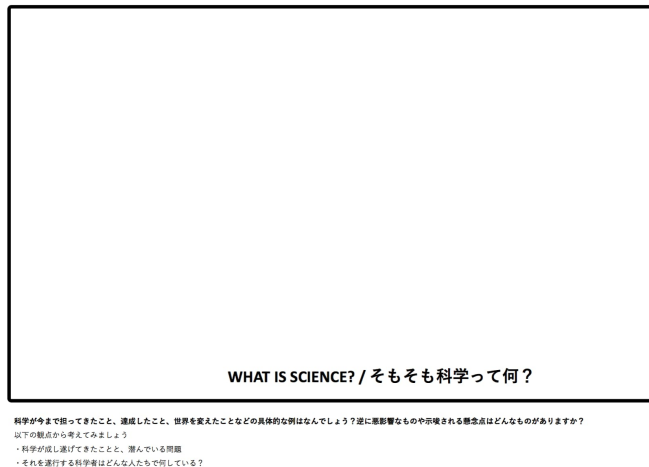


Figure 5.3 Worksheet 1 for Icebreak

| | |
|------------------------------|-------|
| NAME & GENDER / 名前 & 性別 | _____ |
| AGE & LOCATION / 年齢 & 出身地 | _____ |
| CHARACTERISTIC / 性格 | _____ |
| ACADEMIC BACKGROUND / 学歴 | _____ |
| WORK/ 主な仕事内容 | _____ |

Figure 5.4 Worksheet 2 for Persona

| | |
|------------------|-------|
| WHERE / 居住地 | _____ |
| FAMILY / 家族構成 | _____ |
| HOBBY/ 趣味・特技 | _____ |
| STRENGTH/ 強み | _____ |
| WEAKNESS/ 弱み | _____ |

Figure 5.5 Worksheet 3 for Persona

PERSONA NAME:

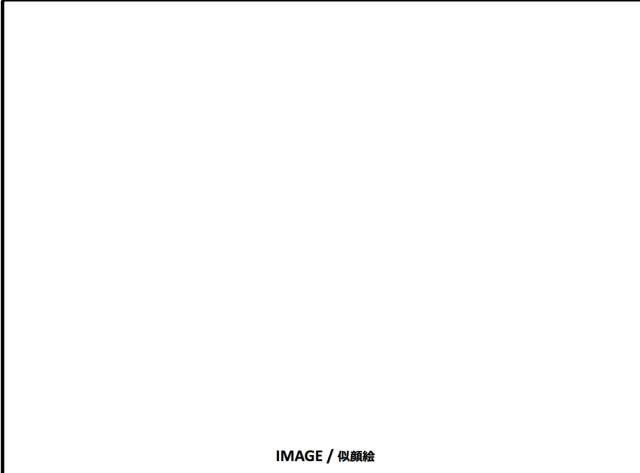


IMAGE / 似顔絵

Figure 5.6 Worksheet 4 for Persona



ROLES / 役割・役職

このペルソナは、どんな役割を担っていますか？
以下の観点から考えてみましょう

- ・ポジションに関わらず、何を達成することがこの人の責任ですか？
- ・プロジェクトを進行する際に、決定権はありますか？それとも影響を与える？または評価をする人？
- ・どのくらいの権限を持っていますか？リードする？サポートする？

Figure 5.7 Worksheet 5 for Roles

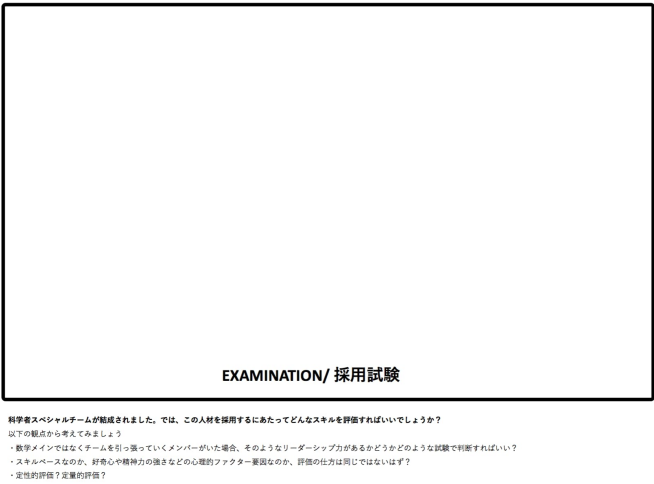


Figure 5.8 Worksheet 6 for Examination

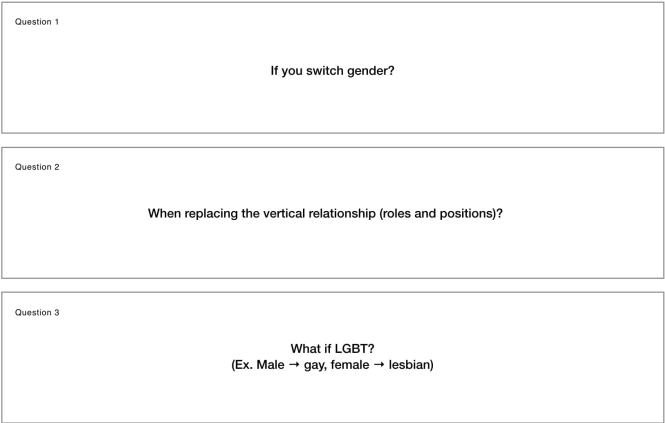


Figure 5.9 Card tool for Gender Unconscious Bias

5.2.3 State of the day

There were 15 participants, and the gender ratio was well dispersed. It was an atmosphere that was relatively tense until the ice break, with everyone relatively meeting for the first time.

Although the creation of the persona was exciting, the amount of work was large, and the time spent on each was short, so I felt that the participants' motivation was being dropped from the second half.

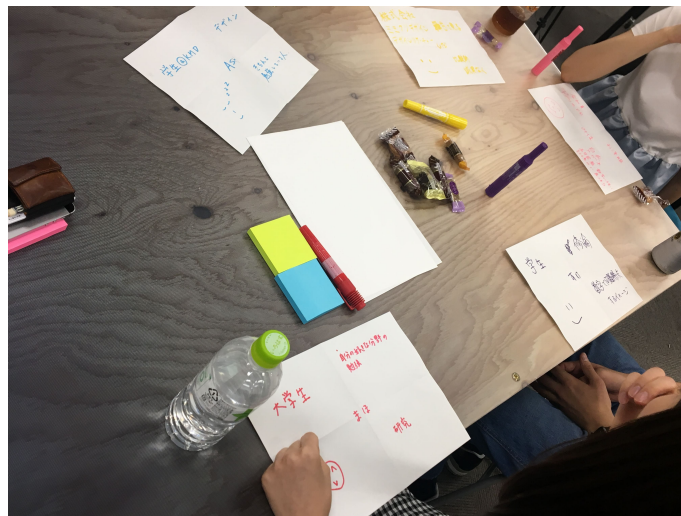


Figure 5.10 Workshop scenery



Figure 5.11 Workshop scenery

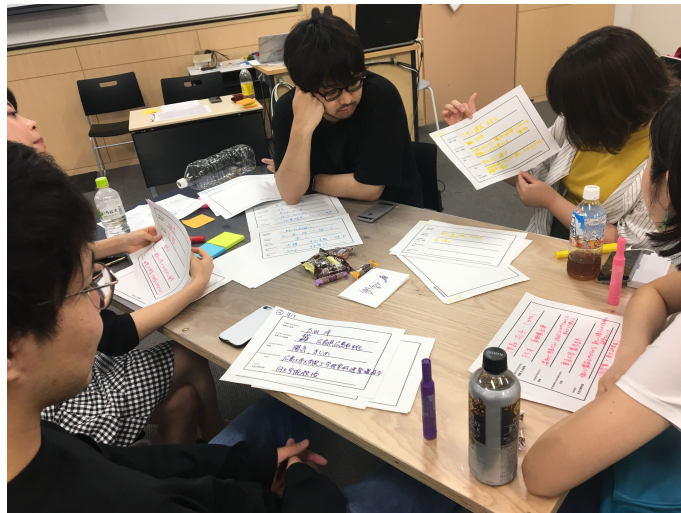


Figure 5.12 Workshop scenery

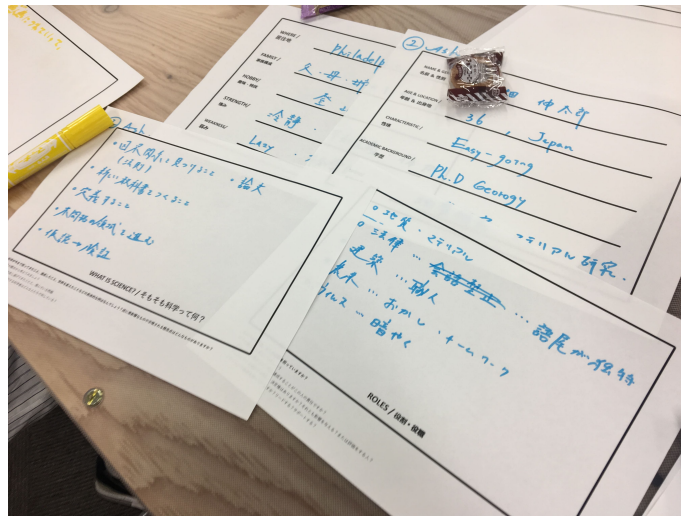


Figure 5.13 Workshop scenery

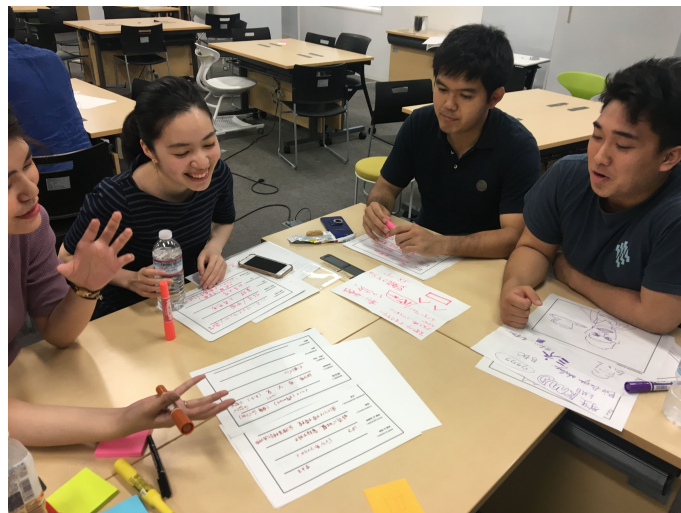


Figure 5.14 Workshop scenery



Figure 5.15 Workshop scenery



Figure 5.16 Workshop scenery

5.2.4 Result of Implicit Association Test

The participants’ IAT results are as follows. As for changes before and after the workshop, it can be said that the Unconscious Gender Bias of more than half of the participants tends to decrease.

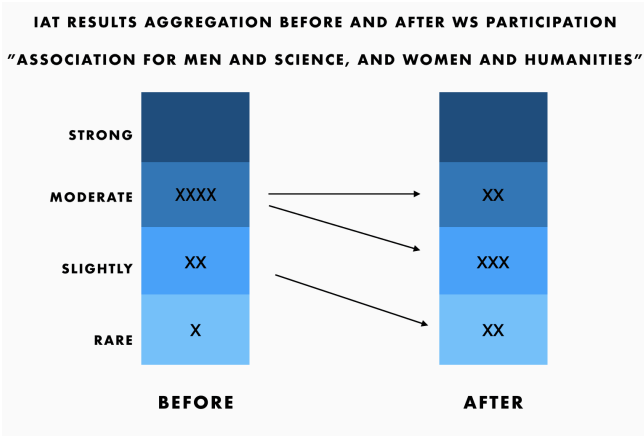


Figure 5.17 IAT results aggregation before and after Workshop participation
"Association for Men and Science, and Women and Liberal arts"

5.2.5 Participant's feedback in reflection

The big finding I got from this workshop was that the participants questioned the definition of the word "gender equality" and that noticing Unconscious Gender Bias has not only positive but also negative effects.

The participants' comments are as follows;

- "I noticed my own UGB and felt anxious about future behavior"
- "What should I do to empower men?"
- I thought that gender equality would be progressing as in the SDGs, but I began to think about what the definition of equality would be in the first place.
- "I realized that I was convinced that it was natural."
- "I was prepared to talk about gender. If I had more psychological safety in workshop, I could speak with real intentions."
- "I think Japan's gender discrimination has not progressed yet"
- "Scientists had an image with many men, but there is no sense of discomfort even if women are scientists"
- "I want to evaluate mentality in uninhabited island life watching!"
- "I want to do something DASH village but I think it will cost you a lot"
- "I think that Indian persona will not be assigned to PJ in the first place by religion's culture if it is a woman"
- "I think the color and identity of the organization will change if the top changes."
- "What kind of team has a gentle graduate student under strong leader woman?"
- "If the fluffy man is at the top, I will rule to wipe away the complex with power."

- "If you have two female leaders, you will probably get giggles. But if you have two male leaders, I think the hierarchy will be clear and successful."

5.3. Evaluation of this workshop

The point of improvement was that it took too much effort to create the persona from scratch, so I considered simplifying the creation of the persona. In addition, in the gender swap in this workshop, not only gender but also questions on the relationship between the organization and LGBT were put in, so the burden was too large. Since this paper focuses on gender only, I decided to use only gender swap next time.

Chapter 6

Workshop part 3

6.1. Purpose of this workshop

First, the date of the last workshop is as follows. 2019.07.19 15:00-18:00 in Tokyo Gakugei University International Secondary School N Building Floor 2.

The flow of the workshop is the same as the first and second times, but the point that we devised is persona making and gender swap. Persona creation prepared the occupation, gender ratio and face photograph in advance, put some restrictions and reduced the burden of persona creation.

Also, in terms of gender swaps, the slides were labeled “persona gender swaps” and presented in an easy-to-understand manner. In addition, participants were asked to discuss how the persona’s characteristics, their roles in the team, and how they changed as a gender swap point of view.

6.2. Project description

6.2.1 Timeline

1. Introduction

Welcome and brief introduction of the facilitator

2. Today’s purpose

The purpose of today is to create a future ability assessment and evaluation system with a scientist who works there as a protagonist, imagining the future where Artificial intelligence has developed.

3. Personnel assessment system problem

First, using the Tokyo Medical University news as an example, we will raise

| Start | End | Session (en) | Session (ja) | Description | Length | Steps |
|-------|-------|-----------------------|--------------|---|--------|--|
| 15:15 | 15:18 | INTRODUCTION (LEARN) | イントロ - 知る | | 3 | ようこそ ファシリテーターの簡単な自己紹介 |
| 15:18 | 15:23 | | | | 5 | このWSの目的とポテンシャルが生かされていない評価システム（教育、年功序列） |
| 15:23 | 15:33 | | | | 10 | AIによって変わりゆく未来の説明と「未来の科学者」Movie |
| 15:33 | 15:38 | ICE BREAKER (LEARN) | アイスブレイク - 知る | 4マス自己紹介 | 5 | ワーク説明 |
| 15:38 | 15:42 | | | | 4 | 回答（個人作業） |
| 15:42 | 15:52 | | | | 10 | ・テーブル共有：8min（ひとり2分×4人） ・バツファ：2min |
| 15:52 | 15:57 | SESSION 1 - CREATE 1 | 創造 | ペルソナを作り、チームにおける役割を決める | 5 | ・ワーク説明 |
| 15:57 | 16:17 | | | | 20 | ・チーム作業でペルソナ作り（どのペルソナを作るかチーム内で役割分担）：10min ・ペルソナのルール作り：10min |
| 16:17 | 16:27 | SESSION 2 - CERATE 2 | 創造 | その人材のポテンシャルが発揮できるような評価方法は？ 壁に張り出し（垂れ流し） プレゼン（ペルソナの特性、役割、評価方法まで） | 10 | 1) 評価システム ・全体を静ませる（1min） ・次のワーク説明（1min） 評価方法をチームでプレスト ・チームで書きおろす（5min） |
| 16:27 | 16:32 | | | | 5 | 壁に張り出し：チームナンバーを記載（評価方法（左）＝役割、その下にペルソナ） |
| 16:32 | 16:42 | | | | 10 | ・チーム内に評価方法シェア（7min） ・プレゼン準備：1つ以上チーム内でいいと思った評価方法を決める(3min) |
| 16:42 | 16:52 | SESSION 3 - FOLLOW-UP | 探求 | ジェンダーが入れ替わったら、そのペルソナはどのように変化する？ （役割、個人的な志向etc） ギャラリーワーク（ポストイットに書く） ギャラリートーク（一つ一つのペルソナを見ていく） | 10 | 3) 全体発表 ・休憩と次のワークの説明（1min） 「こうであるべき、よりも適材適所が実現することを考えられると、本当の多様性が実現するかもしれませんね」→休憩 |
| 16:52 | 16:57 | | | | 5 | 1) ペルソナのジェンダー逆転 ・全体を静ませる（1min） ・次のワーク説明（1min） |
| 16:57 | 17:07 | | | | 10 | 2) ギャラリーワーク（個人ワーク） ・ポストイットにてどうなるかメモを書いて張り出す ・できるだけ多くのペルソナに対してコメントを書く ・役割の変化を重視しつつ、キャラクターの変化も書き出す（評価は無視） |
| 17:07 | 17:22 | REFLECTION | 振り返り | 研究目的：GUBに気づくこと ・二重メタ認知（評価、GUB） ・未来を考えて、自分のポテンシャルや可能性を広げる為にも、GUBによって思考が停止されていることに気づき、見えない境界を破ることでチャレンジして言ってほしいというのメッセージ ・感想記入 | 15 | 3) 全体発表 ・ワークの説明(1min) ・一つ一つのペルソナをみてコメントしていく(10min) ・セッション（4分） |
| 17:22 | 17:32 | | | | 10 | テーブル内で振り返り 1) 全体を静ませる（1min） 2) 研究目的（19min） |
| 17:32 | 17:40 | BAFFA | | | 8 | 3) 質疑応答（5min） 4) 個人で振り返り：リフレクションシートに感想記入（3min） |
| 17:40 | 17:45 | | | | 5 | |

Figure 6.1 Timeline of Workshop

the issue of the Personnel assessment system problem. Tokyo Medical University's news has been widely reported overseas, but in Japan it is news that has quickly disappeared from the media. As raising a problem, if we are able to substitute mathematics to some extent by Artificial intelligence, how would you rate the entrance exam from now on? What happens if Artificial intelligence is solved the problem that women are not fit for doctors because they are short on physical strength?

4. Ice break

4 mass self-introduction with a paper illustrated in Figure 6.2:

- Name
- What is your passion?
- Express the current mood with emoticons
- Image of a scientist

| | |
|---------------|--------------------------|
| 仕事/活動 | 私の情熱 (私が一番情熱を持てるものは?) |
| 科学者ってどんなイメージ? | |

呼んでほしい名前

Figure 6.2 4 mass self-introduction in A4 paper

5. Making Persona

Collected to design the first city on Mars, There are 5 scientists special teams. What kind of people?

- Engineer making jet
- Space engineering research (atmosphere)
- Space engineering research (sunlight)
- Space engineering research (planet)
- pilot



Figure 6.3 Persona Images

6. Create New Personnel assessment system

What is the evaluation that utilizes the characteristics of each persona?

7. Presentation

They announce from persona that we made each to evaluation system.

8. Gender Swap

Ask them to discuss the following issues. If the gender of the created persona (Doraemon character) is swapped, how will that persona's character, tendency, and role in work change?

9. Session

In the session, I deepened the dialogue mainly by Why did the characteristics of the persona change or not because of the gender swap?

10. Reflection

Finally, I will explain my research and explain that the real aim of this workshop was Unconscious Gender Bias.

11. Checkout

Have each person write their own words and comments on the worksheet.
Have one person say one word.

6.2.2 Preparation

- Logistic

Materials:

Plocky, A4 paper, post-it, worksheets, masking tape, sweets and drinks

Venue layout:

Create islands of the number of groups (5 people \times 2 groups)

Record:

Deliverable photos, landscape photos, completed worksheets, recordings

Point:

Not only “Sit free” but also “With people who haven’t talked much”.

- Worksheets

The workshop uses several kind of worksheets shown in Figure 6.4, Figure 6.5, Figure 6.6, and Figure 6.7.

| | |
|--|--|
| NAME & AGE & LOCATION / 名前 & 年齢 & 出身地 | |
| JOB TITLE & WORK / 肩書 & 仕事内容 | |
| CHARACTERISTIC / 性格 | |
| FAMILY / 家族構成 | |
| HOBBY / 趣味 & 特技は？ | |

Figure 6.4 Worksheet 1 for Persona

| | |
|------------------|--|
| WHERE / 居住地 | |
| FAMILY / 家族構成 | |
| HOBBY/ 趣味・特技 | |
| STRENGTH/ 強み | |
| WEAKNESS/ 弱み | |

Figure 6.5 Worksheet 2 for Persona



Figure 6.6 Worksheet 3 for Roles

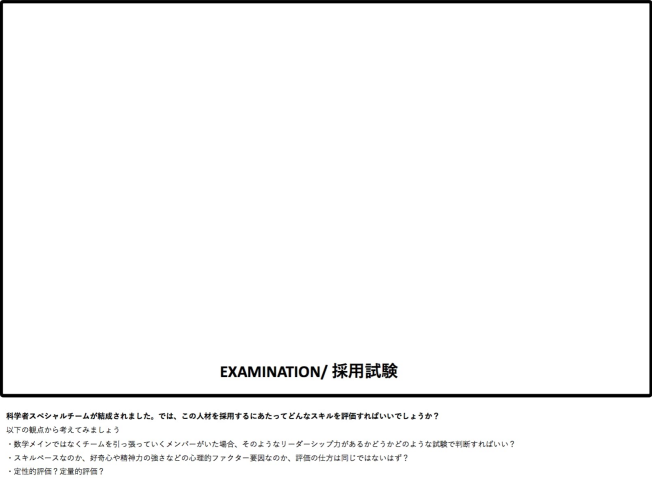


Figure 6.7 Worksheet 4 for Examination

6.2.3 State of the day

The last workshop was not to tell the friends of the graduate school, but the first high school students who met for the first time were the participants. The high school students came to participate because they were interested in the gender issue, but the day of the workshop came without knowing the contents of the workshop. It may be the third time, and I may have been able to do my facilitation smoothly, but more than I imagined, the participants had the impression that they were enjoying the workshop.



Figure 6.8 Workshop scene



Figure 6.9 Workshop scene



Figure 6.10 Workshop scene



Figure 6.11 Workshop scene



Figure 6.12 Workshop scene



Figure 6.13 Workshop scene



Figure 6.14 Workshop scene

6.2.4 Output from participants

Some of the worksheets created by the participants are as follows:

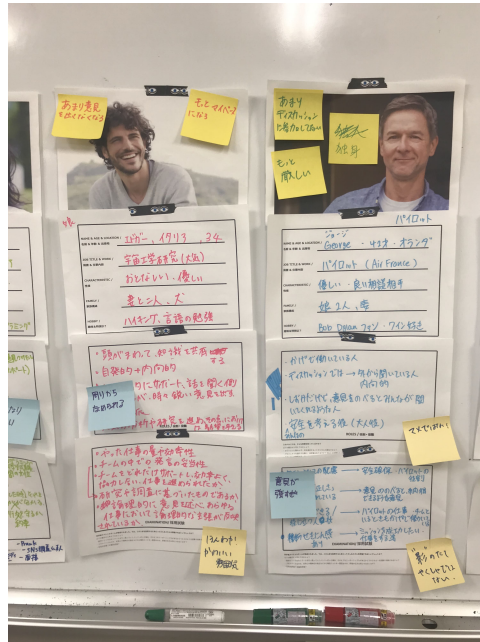


Figure 6.15 Output of worksheet from participants 1

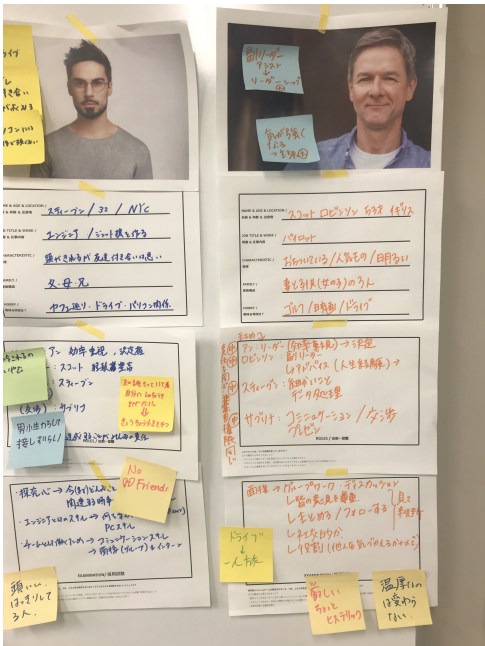


Figure 6.16 Output of worksheet from participant 2

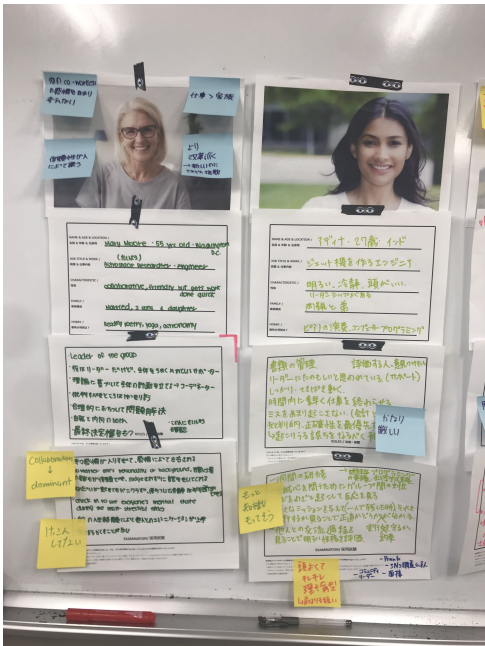


Figure 6.17 Output of worksheet from participant 3

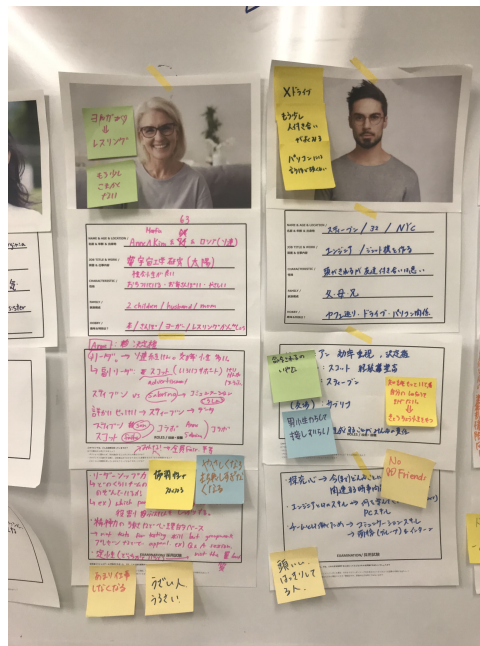


Figure 6.18 Output of worksheet from participant 4

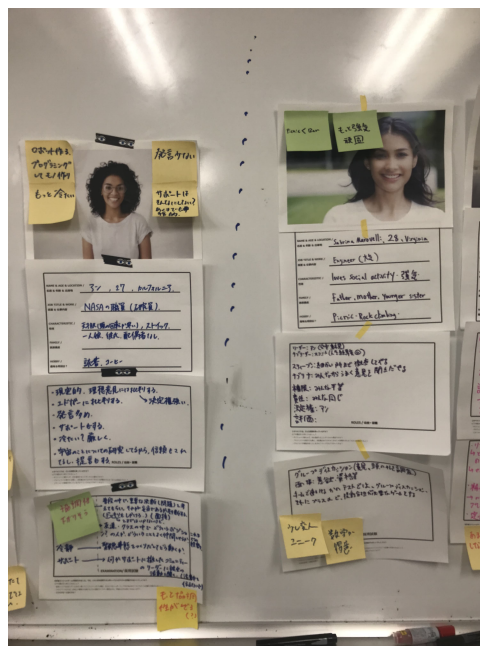


Figure 6.19 Output of worksheet from participant 5

6.2.5 Result of Implicit Association Test

The participants’ IAT results are as follows. It can be said that the change before and after participation in the workshop tends to decrease.

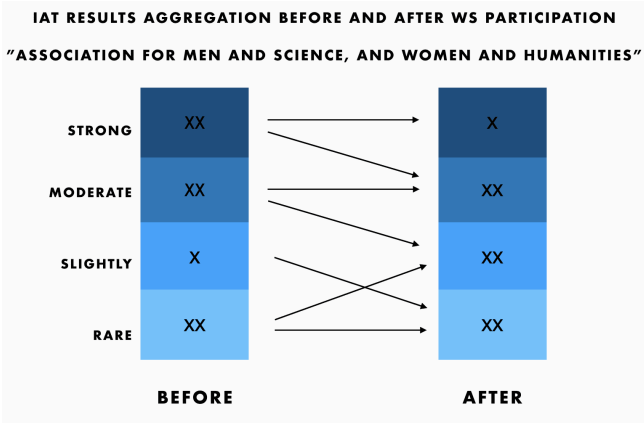


Figure 6.20 IAT results aggregation before and after Workshop participation
"Association for Men and Science, and Women and Liberal arts"

6.2.6 Participant's feedback in Reflection

One of the things we have told through all the workshops is that “bias is not evil.” On the other hand, participants seem to think that bias is something to wipe out. I told the previous research that the bias that I had once did not disappear for a lifetime, but told that I could notice my own bias and encourage thinking. As a result, the participants have renewed their mindset.

6.3. Evaluation of this workshop

I feel that I went smoothly as a whole, and I could make the most balanced program as a workshop program. However, IAT's results show that only one participant has increased.

Chapter 7

Implementation & Evaluation

7.1. Implementation

There are two main implementations of evaluation. Firstly, I analyzes IAT test results of participants. As shown in Figure 7.1, as a whole flow, first get an IAT within one week until joining the workshop. Then, within one week after participating in the workshop, participants will receive same cartagory IAT again.

Since IAT randomly displays words and measures their reflexes, participants will not influence of learning even take IAT twice. Therefore, I can compare the results from the viewpoint.

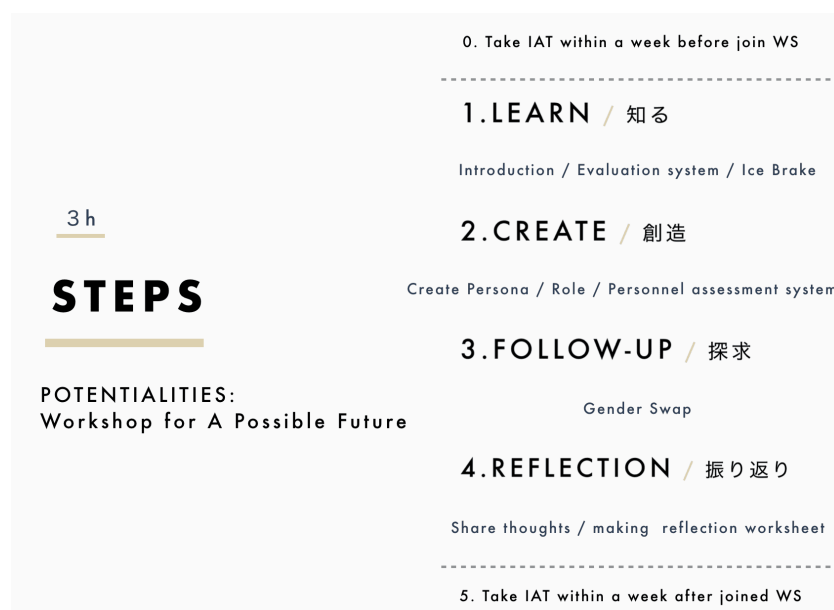


Figure 7.1 Overall of workshop and Implementation

The second is the effectiveness of Co-Speculative Design. Here I mainly analyze the participant's dialogue.

7.1.1 Implicit Association Test of summary

As Implicit Association Test of summary, it can be said that it tends to decrease.

By repeating the workshop, I thought that the growth of my facilitation power and improvement of the program design would result in synergy in reducing the Unconscious Gender Bias of the participants.

However, such a result was not produced, but rather the participant who increased Unconscious Gender Bias appeared only at the third workshop (Your date suggest a little or no automatic association for Male with Female and Liberal arts to a slight automatic association).

From this result, there is no guarantee that a workshop can be held to reduce Unconscious Gender Bias if repeated, and various factors are considered to be affecting. For example, space design, team configuration, psychological security collateral, etc. can be mentioned.

Furthermore, even if Unconscious Gender Bias is decreasing as a result of IAT, it is a result regarding "Association for Men and Science, and Women and Liberal arts", so from the viewpoint of how much impact can be given to society, I still need to continue to consider.

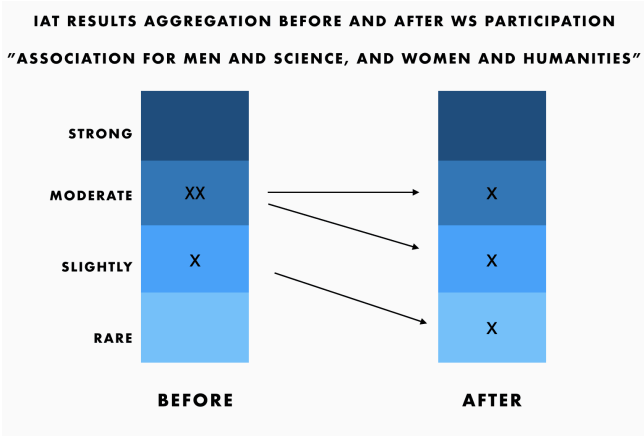


Figure 7.2 IAT results aggregation before and after Workshop Part.1 participation
“Association for Men and Science, and Women and Liberal arts”

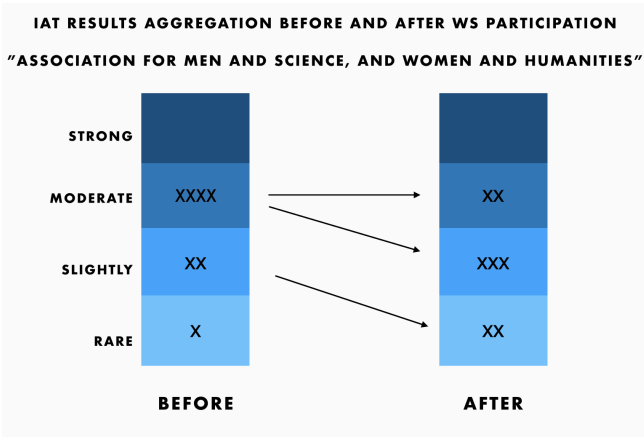


Figure 7.3 IAT results aggregation before and after Workshop Part.2 participation
“Association for Men and Science, and Women and Liberal arts”

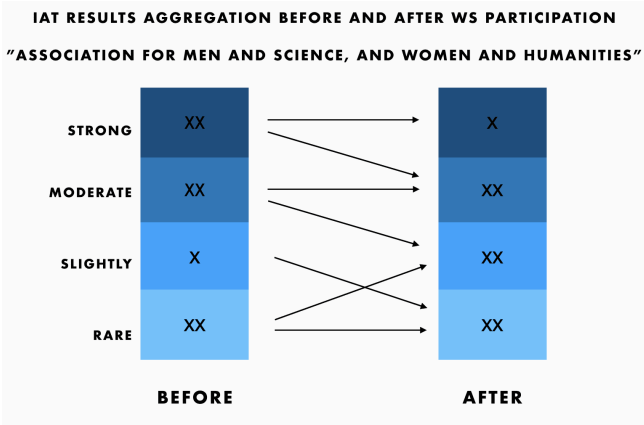


Figure 7.4 IAT results aggregation before and after Workshop Part.3 participation
“Association for Men and Science, and Women and Liberal arts”

7.1.2 Effectiveness of Co-Speculative Design

In describing the effectiveness of co-speculative design, assumptions and evaluation methods are shown below.

1. Process of emergent / collaborative design process

Assess the part of the workshop concept where new issues beyond the issue raised are discovered or redefined through discussions and dialogue among participants.

2. Evaluation method: Change process of behavior by observation and dialogue

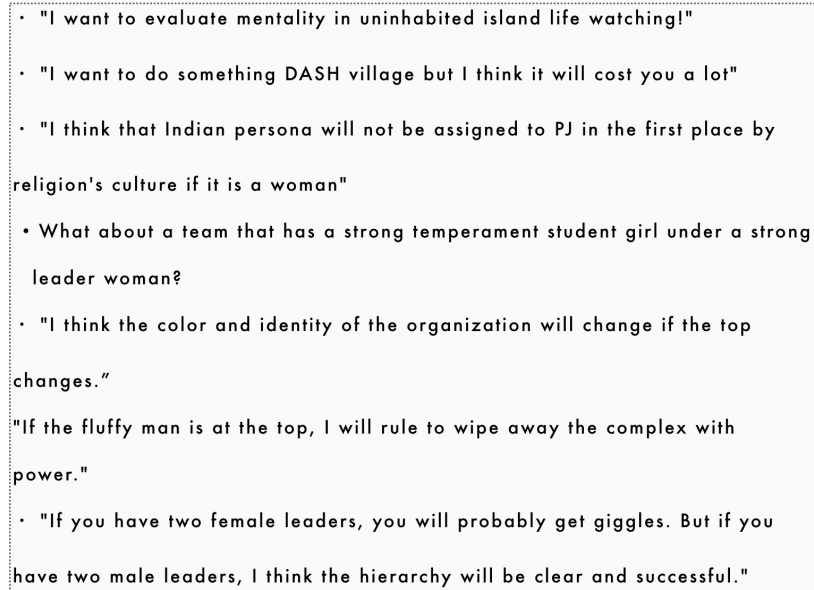
- Record and observe the behavior of the user during the workshop one by one.
- When certain actions or unintended behavior occur, Check on the way or immediately after why you took such an action.
- Through dialogue with the post user Dig deeper into the point of shock and why.
- Follow up as needed.

3. On dialogue

Discussions in dialogues are divided into three categories, and the cues that new questions are raised through dialogues between participants are recorded.

Discussion in Dialogue - Proposal:

The proposal in the new evaluation system was influenced by the media, such as Island life watching and create a DASH village, but that analogy affect easy-to-understand for other participants of same group, so the dialogue among the participants was exciting. There was also a statement such as “Is there any restriction by religion?”. Furthermore, The card tool about the relationship between the top and bottom, how was the team in persona creation seen from the outside, then one participant said that there was a statement that the top is the identity of



• "I want to evaluate mentality in uninhabited island life watching!"

• "I want to do something DASH village but I think it will cost you a lot"

• "I think that Indian persona will not be assigned to PJ in the first place by religion's culture if it is a woman"

• What about a team that has a strong temperament student girl under a strong leader woman?

• "I think the color and identity of the organization will change if the top changes."

"If the fluffy man is at the top, I will rule to wipe away the complex with power."

• "If you have two female leaders, you will probably get giggles. But if you have two male leaders, I think the hierarchy will be clear and successful."

Figure 7.5 Discussion in Dialogue - Proposal

the organization. Therefore, discussions were in progress from the new point of view.

Discussion in Dialogue - Association:

- "Scientist feels like staying in the laboratory" "You are not familiar from the beginning"
- "Scientists don't understand the woman's feelings!"
- "I feel like I have no change in my role after becoming LGBT." "I think so too." "Me too."
- "Feminist was a violent image."
- "The secretary is not a beauty," "Tension goes up."
- "Secretary work is just schedule management / monotonous work"
- "It is definitely the influence of media (animations and movies) that a secretary is a woman."
- "The effect of changing the relationship between graduate girls and veteran men depends on the contents of PJ"
- "Women's research is soft theme, men's research seems strict"
- "A negative character that allows men in the law department to understand the feelings of the support type positive character"
- The pilot is a man's occupation, and IQ seems to be very high, so it looks like a bad deal with people.

Figure 7.6 Discussion in Dialogue - Association

There was a seniority-long succession of elders who had a long experience should be a leader. I felt that there was a strong association of gender by occupation, such as the pilot being a man and the secretary being a woman. In addition, there was a statement that the influence of the media was strong, and some participants raised the issue of the media. As in Japan, critics often occur in advertising, I realized that there is a deep problem with representation.

Discussion in Dialogue - Interpretation:

- "I noticed my own UGB and felt anxious about future behavior"
- "What should I do to empower men?"
- I thought that gender equality would be progressing as in the SDGs, but I began to think about what the definition of equality would be in the first place.
 - "I realized that I was convinced that it was natural."
 - "I was prepared to talk about gender. If I had more psychological safety in WS, I could speak with real intentions."
 - "I think Japan's gender discrimination has not progressed yet"
 - "Scientists had an image with many men, but there is no sense of discomfort even if women are scientists"

Figure 7.7 Discussion in Dialogue - Interpretation

In the interpretation, positive comments were seen, such as being able to notice fixed concepts for the participants by noticing the Unconscious Gender Bias, and having triggered questions about what they thought was commonplace. Furthermore, in my position, the word “gender equalit?” is often used in the world like SDGs, but what is it equivalent to? For whom is it equal? There was also a sense of problem with these fundamental definitions. One participant made exactly the same statement, she was saying, “Equality means that if the number of CEOs is equal on gender equality they will be happy?”. I feel very important the point and happy to hear that kind of comment in my workshop.

However, not all were positive effects by noticing Unconscious Gender Bias, and some participants were stunned by their bias. As politicians and others were criticized for making discriminatory statements, they seemed shocked that they had similar biases. Furthermore, there was

a comment that “I did not know what to do from now on because I noticed.” The goal of the workshop was that it was a major advance, just to notice it, but like HeForShe of UN, from men can say that “it’s probably a fixed concept”, the situation is surely I believe it will change. That kind of words I told to participants.

Chapter 8

Discussion

8.1. Discussion

To summarize the results, it can be said that the hypothesis that the Unconscious Gender Bias will decrease is the tendency for workshops that start from general theory without a brief Unconscious Gender Bias.

To summarize the results, it can be said that the hypothesis that the Unconscious Gender Bias will decrease is the tendency for workshops that start from general theory without a brief Unconscious Gender Bias. In addition, from the analysis of Co-Speculative Design, it was found that the use of analogy in the discussions among participants resulted in more emergence. Furthermore, I think that the mechanism that Unconscious Gender Bias is exposed by doing gender swaps was relatively effective, because of considering it in the subjectivity by the persona making. On the other hand, the point of improvement was the need for psychological safety of the remarks in the workshop. Details will be described below.

I conducted workshop in this research, it was the point in the workshop to start with general theory and to put in a device that exposes the Unconscious Gender Bias in the second half of the work. As a workshop, I feel that it was a high-level effort to do double meta-cognition in 3 hours. First of all, I raise a question about Personnel assessment system, and devise a new system assuming the future. I feel that this was a complex topic for high school students, graduate students and members of the workforce as well. Then, by gender swap, is one participant the purpose of this workshop? And it showed a state of confusion. Basically, I think it was a theme to talk about the whole day (eight hours) evaluation system so that I could work on the day after day gender swap. However, it was safe to keep it within 3 hours to proceed with the research and to gather more participants.

The positioning of Speculative Design in this workshop was the concept of “thinking about the evaluation system of the future” and “Future Scientist” movie. However, the content of the movie as Speculative Design has not been such an effect that would surprise people so much. Furthermore, it was only a director who was a real scientist who had no spotlight, but I just saying “Future Scientist”. In terms of overturning fixed concepts, I think it’s a success from the story of female scientists collaborating with designers to create innovation. I felt keenly that when it comes to manufacturing as Speculative Design, I need to improve it.

In addition, as the effectiveness of co-speculative design, I felt that the psychological safety of the place was important in order for new questions and redefinitions (definition of words such as Gender equality, impression on feminist, media and religion) to be made among the participants. I realized that it was the role of the facilitator to build a good balance even if the participants were too close to each other or at the first meeting. In other words, I feel that space design, BGM, visualization of deliverables each teams, the moment when you work in a team and work standing instead of sitting, and other skills that capture the attention and atmosphere of the participants are very important.

What worked in this workshop was that I could start thinking from general theory and think for themselves by creating a persona. I think that the flow of noticing themselves Unconscious Gender Bias at the last device could have shaken the participant’s fixed concept. However, it was a big discovery that not necessarily becoming positive by noticing Unconscious Gender Bias.

8.2. Future Work

As the next step, I would like to approach this workshop to various generations (elementary school students, junior high school students, high school students, university students, about 50 years old, etc.) in order to implement society. I would like to devise and practice effective program design by age. Specifically, the purpose is to hold a study group at a company to which I belong and to spread awareness. And I want to be actively involved in UB related projects.

I also want to create a card tool (Such as analogy cards that create more emergence) that will be a new trick.

Everyone has Unconscious Gender Bias, but it is not evil. I believe that discarding such negative emotions and encouraging thinking will lead to the realization of a better society and individual happiness. I will continue to think about better workshop program design, and believe that I can make new discoveries by repeating the workshop steadily.

It is my hope that if someone are not fooled by the invisible boundaries of the world and they can broaden themselves potential and try to challenge others.

References

- [1] 内閣府男女共同参画局. 男女共同参画白書 平成 28 年版, 2016.
- [2] OECD. The abc of gender equality in education: Aptitude, behaviour, confidence, 2015.
- [3] Mario Piacentini and Chiara Monticone. Equations and inequalities: Making mathematics accessible to all. pisa. *OECD Publishing*, 2016.
- [4] Steven D Brown and Robert W Lent. *Career development and counseling: Putting theory and research to work*. John Wiley & Sons, 2004.
- [5] Nicole M Else-Quest, Janet Shibley Hyde, and Marcia C Linn. Cross-national patterns of gender differences in mathematics: a meta-analysis. *Psychological bulletin*, 136(1):103, 2010.
- [6] Richard M Lerner. Developmental science, developmental systems, and contemporary theories of human development. *Handbook of child psychology*, 1, 2007.
- [7] Aprile D Benner, Sandra Graham, and Rashmita S Mistry. Discerning direct and mediated effects of ecological structures and processes on adolescents' educational outcomes. *Developmental Psychology*, 44(3):840, 2008.
- [8] Sandra D Simpkins, Chara D Price, and Krystal Garcia. Parental support and high school students' motivation in biology, chemistry, and physics: Understanding differences among latino and caucasian boys and girls. *Journal of Research in Science Teaching*, 52(10):1386–1407, 2015.
- [9] Martha M Bleeker and Janis E Jacobs. Achievement in math and science: Do mothers' beliefs matter 12 years later? *Journal of Educational Psychology*, 96(1):97, 2004.

- [10] Christia Spears Brown and Campbell Leaper. Latina and european american girls ' experiences with academic sexism and their self-concepts in mathematics and science during adolescence. *Sex roles*, 63(11-12):860–870, 2010.
- [11] 森永康子. 「女性は数学が苦手」. 心理学評論, 60(1):49–61, 2017.
- [12] 塚脇涼太, 森永康子, 坪田雄二, 柘植道子, and 平川真. 理系大学生の進学動機とその規定因. 広島大学心理学研究, 12:1–14, 2012.
- [13] M. Carnes and C.N.B Merz. Women are less likely than men to be full professors in cardiology: Why does this happen and how can we fix it? *Circulation* 135, 6:518–20, 2017.
- [14] Molly Carnes, Patricia G Devine, Linda Baier Manwell, Angela Byars-Winston, Eve Fine, Cecilia E Ford, Patrick Forscher, Carol Isaac, Anna Kaatz, Wairimu Magua, et al. Effect of an intervention to break the gender bias habit for faculty at one institution: a cluster randomized, controlled trial. *Academic medicine: journal of the Association of American Medical Colleges*, 90(2):221, 2015.
- [15] Nilanjana Dasgupta and Shaki Asgari. Seeing is believing: Exposure to counterstereotypic women leaders and its effect on the malleability of automatic gender stereotyping. *Journal of experimental social psychology*, 40(5):642–658, 2004.
- [16] Steven J Spencer, Claude M Steele, and Diane M Quinn. Stereotype threat and women's math performance. *Journal of experimental social psychology*, 35(1):4–28, 1999.
- [17] Patricia G Devine. Stereotypes and prejudice: Their automatic and controlled components. *Journal of personality and social psychology*, 56(1):5, 1989.
- [18] Catherine Hill, Christianne Corbett, and Andresse St Rose. *Why so few? Women in science, technology, engineering, and mathematics*. ERIC, 2010.
- [19] Christian Crandall and Monica Biernat. The ideology of anti-fat attitudes 1. *Journal of Applied Social Psychology*, 20(3):227–243, 1990.

- [20] Monica Biernat. Stereotypes and shifting standards: Forming, communicating, and translating person impressions. In *Advances in experimental social psychology*, volume 45, pages 1–59. Elsevier, 2012.
- [21] Claudia Goldin and Cecilia Rouse. The impact of ‘blind’ auditions on female musicians. *American Economic Review*, 90:715–41, 2000.
- [22] Andrew Gelman, Donald B Rubin, et al. Inference from iterative simulation using multiple sequences. *Statistical science*, 7(4):457–472, 1992.
- [23] Mahzarin R Banaji and Anthony G Greenwald. *Blindspot: Hidden biases of good people*. Bantam, 2016.
- [24] Diana Burgess and Eugene Borgida. Who women are, who women should be: Descriptive and prescriptive gender stereotyping in sex discrimination. *Psychology, public policy, and law*, 5(3):665, 1999.
- [25] Virginia E Schein, Ruediger Mueller, Terri Lituchy, and Jiang Liu. Think manager—think male: A global phenomenon? *Journal of organizational behavior*, 17(1):33–41, 1996.
- [26] Virginia E Schein and Ruediger Mueller. Sex role stereotyping and requisite management characteristics: A cross cultural look. *Journal of Organizational Behavior*, 13(5):439–447, 1992.
- [27] Anne M Koenig, Alice H Eagly, Abigail A Mitchell, and Tiina Ristikari. Are leader stereotypes masculine? a meta-analysis of three research paradigms. *Psychological bulletin*, 137(4):616, 2011.
- [28] Philip Goldberg. Are women prejudiced against women? *Society*, 5(5):28–30, 1968.
- [29] Carol Isaac, Barbara Lee, and Molly Carnes. Interventions that affect gender bias in hiring: A systematic review. *Academic medicine: journal of the Association of American Medical Colleges*, 84(10):1440, 2009.
- [30] Corinne A Moss-Racusin, John F Dovidio, Victoria L Brescoll, Mark J Graham, and Jo Handelsman. Science faculty ’ s subtle gender biases favor male

- students. *Proceedings of the National Academy of Sciences*, 109(41):16474–16479, 2012.
- [31] Timothy A Judge and Daniel M Cable. The effect of physical height on workplace success and income: preliminary test of a theoretical model. *Journal of Applied Psychology*, 89(3):428, 2004.
- [32] Sabine Sczesny, Sandra Spreemann, and Dagmar Stahlberg. Masculine=competent? physical appearance and sex as sources of gender-stereotypic attributions. *Swiss Journal of Psychology*, 65(1):15–23, 2006.
- [33] Leslie A Zebrowitz, Daniel R Tenenbaum, and Lori H Goldstein. The impact of job applicants’ facial maturity, gender, and academic achievement on hiring recommendations. *Journal of Applied Social Psychology*, 21(7):525–548, 1991.
- [34] Corinne A Moss-Racusin, Julie E Phelan, and Laurie A Rudman. When men break the gender rules: Status incongruity and backlash against modest men. *Psychology of Men & Masculinity*, 11(2):140, 2010.
- [35] Filiz Tabak, Sammy Showail, Judi McLean Parks, Janean S Kleist, et al. The name game: Employability evaluations of prototypical applicants with stereotypical feminine and masculine first names. *Sex Roles*, 52(1-2):63–82, 2005.
- [36] Ashleigh Shelby Rosette, Jennifer S Mueller, and R David Lebel. Are male leaders penalized for seeking help? the influence of gender and asking behaviors on competence perceptions. *The Leadership Quarterly*, 26(5):749–762, 2015.
- [37] Alice H Eagly and Linda L Carli. The female leadership advantage: An evaluation of the evidence. *The leadership quarterly*, 14(6):807–834, 2003.
- [38] Mahzarin R Banaji, Curtis Hardin, and Alexander J Rothman. Implicit stereotyping in person judgment. *Journal of personality and Social Psychology*, 65(2):272, 1993.

- [39] Shelley J Correll, Stephen Benard, and In Paik. Getting a job: Is there a motherhood penalty? *American journal of sociology*, 112(5):1297–1338, 2007.
- [40] Madeline E Heilman and Tyler G Okimoto. Motherhood: a potential source of bias in employment decisions. *Journal of Applied Psychology*, 93(1):189, 2008.
- [41] Carol Isaac, Jocelyn Chertoff, Barbara Lee, and Molly Carnes. Do students’ and authors’ genders affect evaluations? a linguistic analysis of medical student performance evaluations. *Academic Medicine*, 86(1):59, 2011.
- [42] Daniel M Blumenthal, Andrew R Olenski, Robert W Yeh, Doreen De-Faria Yeh, Amy Sarma, Ada C Stefanescu Schmidt, Malissa J Wood, and Anupam B Jena. Sex differences in faculty rank among academic cardiologists in the united states. *Circulation*, 135(6):506–517, 2017.
- [43] National science foundation. “back to school: Five myths about girls and science”. news release 07-108, (accessed june 1, 2019), August 27, 2007. https://www.nsf.gov/news/news_summ.jsp?cntn_id=109939.
- [44] Diane F Halpern, Camilla P Benbow, David C Geary, Ruben C Gur, Janet Shibley Hyde, and Morton Ann Gernsbacher. Sex, math and scientific achievement: Why do men dominate the fields of science, engineering and mathematics? *Scientific American Mind*, 18(6):44, 2007.
- [45] Janet S Hyde, Elizabeth Fennema, and Susan J Lamon. Gender differences in mathematics performance: A meta-analysis. *Psychological bulletin*, 107(2):139, 1990.
- [46] Brian A Nosek, Mahzarin R Banaji, and Anthony G Greenwald. Harvesting implicit group attitudes and beliefs from a demonstration web site. *Group Dynamics: Theory, Research, and Practice*, 6(1):101, 2002.
- [47] Ernesto Reuben, Paola Sapienza, and Luigi Zingales. How stereotypes impair women’s careers in science. *Proceedings of the National Academy of Sciences*, 111(12):4403–4408, 2014.

- [48] Claude M Steele and Joshua Aronson. Stereotype threat and the intellectual test performance of african americans. *Journal of personality and social psychology*, 69(5):797, 1995.
- [49] Michael J Yedidia and Janet Bickel. Why aren't there more women leaders in academic medicine? the views of clinical department chairs. *Academic Medicine*, 76(5):453–465, 2001.
- [50] Daniel L Lastinger. The effect of background music on the perception of personality and demographics. *Journal of music therapy*, 48(2):208–225, 2011.
- [51] Phyllis L Carr, Arlene S Ash, Robert H Friedman, Laura Szalacha, Rosalind C Barnett, Anita Palepu, and Mark M Moskowitz. Faculty perceptions of gender discrimination and sexual harassment in academic medicine. *Annals of internal medicine*, 132(11):889–896, 2000.
- [52] Christine Logel, Gregory M Walton, Steven J Spencer, Emma C Iserman, William von Hippel, and Amy E Bell. Interacting with sexist men triggers social identity threat among female engineers. *Journal of personality and social psychology*, 96(6):1089, 2009.
- [53] Purdie-Vaughns M.V. Adams G., Garcia D.M. and Steele C. The detrimental effects of a suggestion of sexism in an instruction situation. *Experimental Social Psychology* 42, pages 602–15, 2006.
- [54] Peter Glick, Sadie Larsen, Cathryn Johnson, and Heather Branstiter. Evaluations of sexy women in low-and high-status jobs. *Psychology of women quarterly*, 29(4):389–395, 2005.
- [55] Paul G Davies, Steven J Spencer, and Claude M Steele. Clearing the air: identity safety moderates the effects of stereotype threat on women's leadership aspirations. *Journal of personality and social psychology*, 88(2):276, 2005.
- [56] Anthony G Greenwald, Debbie E McGhee, and Jordan LK Schwartz. Measuring individual differences in implicit cognition: the implicit association test. *Journal of personality and social psychology*, 74(6):1464, 1998.

- [57] Frederick L Oswald, Gregory Mitchell, Hart Blanton, James Jaccard, and Philip E Tetlock. Predicting ethnic and racial discrimination: A meta-analysis of iat criterion studies. *Journal of personality and social psychology*, 105(2):171, 2013.
- [58] Russell H Fazio, David M Sanbonmatsu, Martha C Powell, and Frank R Kardes. On the automatic activation of attitudes. *Journal of personality and social psychology*, 50(2):229, 1986.
- [59] 池上知子. 社会的適応システムとしての潜在記憶. *心理学評論*, 42(2):243–256, 1999.
- [60] Russell H Fazio, Joni R Jackson, Bridget C Dunton, and Carol J Williams. Variability in automatic activation as an unobtrusive measure of racial attitudes: A bona fide pipeline? *Journal of personality and social psychology*, 69(6):1013, 1995.
- [61] Anthony Dunne and Fiona Raby. *Speculative everything: design, fiction, and social dreaming*. MIT press, 2013.
- [62] Matt Malpass. *Critical design in context: History, theory, and practices*. Bloomsbury Publishing, 2017.
- [63] Matt Malpass. *Critical design in context: History, theory, and practices*. Bloomsbury Publishing, 2017.
- [64] Pennington S. Beaver J., Kerridge T. Interview with anthony dunne, material beliefs. *Group Dynamics: Theory, Research, and Practice*, pages 63–65, 2009.
- [65] Stuart Walker. *Sustainable by design: Explorations in theory and practice*. Routledge, 2012.
- [66] Hans Jonas. Toward a philosophy of technology. *Hastings Center Report*, pages 34–43, 1979.
- [67] Jean McNiff. *Action research: Principles and practice*. Routledge, 2013.
- [68] Rob Hopkins et al. *The transition handbook*. Green books Totnes, 2008.

- [69] Julia C. V=Lohmann. The department of seaweed, co-speculative design in a museum residency. *foresight*, 0(0):172, 2017.
- [70] Elinor Ostrom. *Governing the commons: The evolution of institutions for collective action*. Cambridge university press, 1990.
- [71] Joseph Voros. Reframing environmental scanning: an integral approach. *foresight*, 3(6):533–551, 2001.
- [72] R. Glanville. *Second-Order Cybernetics*. In Parra-Luna F. (Ed.) *Systems Science and Cybernetics, Encyclopedia of Life Support Systems, developed under the Auspices of the UNESCO*. EoLSS Publishers, Oxford, 2003.
- [73] John Dewey and Melvin L Rogers. *The public and its problems: An essay in political inquiry*. Penn State Press, 2012.
- [74] D. Bohm. *On Dialogue*. London, New York: Routledge., 2013.
- [75] 中野民夫. ワークショップー新しい学びと創造の場一. 岩波新書, 2001.
- [76] 堀公俊 and 加藤彰. ワークショップ・デザイン: 知をつむぐ対話の場づくり. 日本経済新聞出版社, 2008.
- [77] 安斎勇樹, 森玲奈, and 山内祐平. 創発的コラボレーションを促すワークショップデザイン (教育実践研究論文). 日本教育工学会論文誌, 35(2):135–145, 2011.
- [78] Jack Mezirow and Victoria Marsick. Education for perspective transformation. women’s re-entry programs in community colleges. 1978.
- [79] Jack Mezirow et al. Learning to think like an adult. *Learning as transformation: Critical perspectives on a theory in progress*, pages 3–33, 2000.
- [80] 大照完. ワークショップの覚え書. 教育新潮, 1(5):2–8, 1950.
- [81] 森玲奈. 日本におけるワークショップの展開とその特質に関する歴史的考察. 教育方法学研究, 39:49–58, 2014.
- [82] 木下勇. ワークショップによる住民参加のむらづくり まちづくり. 快適環境社会の形成, pages 419–438, 1994.

- [83] John Dewey. John dewey. *The Middle Works, 1899–1924*, 2014.
- [84] David A Kolb, Richard E Boyatzis, Charalampos Mainemelis, et al. Experiential learning theory: Previous research and new directions. *Perspectives on thinking, learning, and cognitive styles*, 1(8):227–247, 2001.
- [85] 山内祐平, 森玲奈, and 安斎勇樹. ワークショップデザイン論: 創ることで学ぶ. Keiō Gijuku Daigaku Shuppankai, 2013.
- [86] Fritz Perls, Goodman Hefferline, and Paul Goodman. Gestalt therapy. *New York*, 1951.
- [87] 中原 淳 and 中村 和彦. 組織開発の探究 理論に学び、実践に活かす. ダイアモンド社, 2018.
- [88] 西村佳哲. かかわり方のまなび方. 筑摩書房, 2011.
- [89] 佐藤信夫, 佐々木健一, and 松尾大. レトリック事典. 大修館書店, 2006.