Session 3: Diversity Enhancing Intellectual Property

Summary of Proceeding by Mack Kautzman

Featured Speakers: *Assistant Professor Jordi Goodman and Visiting Professor Nina Srejovic*

Moderated by Professor Margaret Chon

Abstract: The field of intellectual property suffers from a lack of diversity. Women are underrepresented as credited inventors in the United States. Additionally, multi-gender inventor groups are underrepresented compared to all-male and, sometimes, even all-female groups. This representation has changed over time, with changes not always reflecting an increase in female representation. This is particularly true when studying gender-disparity as it exists in the field of computer programming and software patents. While women were well represented in computer programming at field's inception, this changed after World War II because men lobbied to push women out of the field. Women have since been erased from the history of computer programming and have not been recognized for their contributions to the field.

I. Introduction

More STEM-related opportunities are necessary to increase the representation of women and BIPOC individuals in STEM fields. It is also necessary to continue to foster creativity, diversity, and growth in the field once women and BIPOC members become more prevalent. This presentation analyzes how women have been historically excluded from innovation and how group dynamics in patent creation have changed over time regarding the inclusion of both men and women.

II. The patent equity project

a. Background

Traditionally, people have thought of inventors as singular individuals. Thomas Edison, for example, is celebrated as a prolific inventor. Though he was wildly successful in his innovations, Edison — like many celebrated inventors — did not work alone. The perception of the inventor as being a lone man, however, is misguided. The vast majority of inventions are created by a team. Today, the average team of inventors listed on a patent is comprised of over three people. This finding led Professor Jordi Goodman to study patent generation from a group equity perspective.

b. The Study

Professor Goodman wanted to determine whether the diversity present among individuals in certain STEM fields was represented in the teams receiving patents. Using data from

approximately three million patents granted from 2005 to 2022, Professor Goodman studied who comprised the teams behind the inventions. To determine whether the team members were men or women, Professor Goodman gender-matched names with WIPO's WGND 2.0 worldwide gender-name dictionary[1] from the Harvard University database. Using this data, Professor Goodman further divided the results by the size of the team behind the invention. Professor Goodman then applied group probability to the results. Using the actual percentages of men and women working in STEM fields,[2] she first determined the expected gender inclusion in different sized groups receiving patents.

Professor Goodman then performed an equity test, in which she compared the percent difference between the expected representation of groups with different gender compositions and their actual presence. Professor Goodman calculated "the difference between who was represented and who should have been represented." Professor Goodman described her results using a graph comprised of circles, each circle representing a team. Pink circles showed an overrepresented type of team, meaning that team-type appeared more often than expected; and green circles meant that team-type appeared less often than expected. The results were also represented by the percentage difference between the expected percentage of the type-team and the team-type's actual percentage. Additionally, Professor Goodman grouped the results by team sizes, which ranged from one to five people.

c. The Results

First, Professor Goodman found that, while back in 2005 men were overrepresented compared to women among inventor-teams, female-representation in inventor-teams has improved since then. There is now an overrepresentation[3] of women among large all-female teams. Further, there is a trend of increased representation of women among small all-female teams. Female representation among mixed gender groups, however, remains below expected values.

Second, Professor Goodman compared the expected gender-representation results to the actual gender-representation reflected on named patent recipients. Again, she found that the mixed groups showed the most inequity compared to the all-female or all-male groups.

Third, Professor Goodman looked specifically at academia to determine whether this inequity existed in the universities that generated patents. Again, she found that there is inequity in mixed groups of patent generators. This inequity is something that needs to be solved to create a diverse, well-rounded team of patent generators in the future.

---

[1] Professor Goodman acknowledged that this method is not perfect, as it does not take into consideration gender nonconforming individuals or those whose names may not match their correct gender identity according to the database. She further acknowledged that there are issues with this database and non-western names, as the database is built around western names.

[2] According to Professor Goodman, women are still vastly underrepresented in the STEM field, an issue that needs to be resolved. However, this study deals with the expected results by taking this underrepresentation into consideration.

[3] This is not overrepresentation in the sense that more groups than necessary exist, but overrepresentation in the sense that more of these groups than expected appeared over time.

III. Computer software patents and gendered views of computer programming

Professor Srejovic was interested in why there is an underrepresentation of women in STEM patents. To examine its roots, she focused on the story behind a specific part of the STEM field, namely, computer programming. She chose this field because it had gone from being women dominated to men dominated throughout its evolution and development. She found that women were vital to the initial development of computers in early- to mid-twentieth century America, but they were then excluded from the industry when it became more commercialized.

Women were vital to the creation of computer programming languages. When computers were invented, women were the first computer programmers. During the World War II, computers were developed to calculate ballistic missile trajectories. Women were the first to program these computers, as they had been the ones calculating these trajectories by hand prior to these computers being invented. Additionally, these computers resembled switch boards, which were also traditionally operated by women.

In the post-war years, however, computer programming began to be used commercially. Male computer programmers, seeking "legitimacy" in what was then a female-dominated field, established professional societies, created credentialing programs, and lobbied the government to fund academic departments, all of which excluded women from the field of computer programming. In fact, sexist computer advertisements during the 1960's visually depicted men replacing women in the workforce. These efforts changed the public's perception of computer programming from being a "feminine" field to being a "masculine" field. At the same time that computer programming became more masculine, it also was perceived as more innovative and more patentable.

During the late 1960's, an anti-trust case brought against IBM forced computer developers to separate the sale of computer hardware and computer software, which allowed computer software to become commercially valuable and therefore worth patenting. To this day, however, it is difficult to get patent protection on new software without the patent incorporating some piece of hardware along with the software. This has further excluded women from the world of patent creation because, likely due to the exclusionary methods mentioned earlier, women have not historically been associated with technology-related fields.

Women's actual activities do not determine how much they are recognized as innovators. Rather, the amount of recognition and value given to the work women do in technology fields is largely dependent on societal norms and outdated ideas about what women can do and what their societal roles are. Additionally, patent-allocation may not be the best way to measure innovation. According to Professor Srejovic, patents only recognize certain types of innovation. Finally, women working in technology-related fields may not be effectively recognized for their work. Lawsuits against Google and other technology companies indicate that women have been actively helping to develop new technologies but are often not given the title or the pay associated with their level of performance.