

# A MATHEMATICIAN RETHINKS GENDER

## *A Review of Eugenia Cheng's New Book*

Conversations about gender often result in heated debates on what differences there are and what we should or should not do to reach gender equality. Often all sides misunderstand each other, and any scientific evidence is interpreted to support one's previously held beliefs.

In her newest book, category theorist Eugenia Cheng seeks to bring order into this chaos. She begins by characterizing how some of the simplifying arguments in gender discussions misunderstand the statistics and then gives her take on the

lean-in controversy. To me, the more interesting part of the book is when she builds up her theory of ungendered thinking. She divides the reasons for the persistence of inequality into two categories:

Firstly: forms of explicit discrimination, also including unconscious biases and structural hurdles for women, such as the prevalence of men in positions of power.

Secondly: disadvantages due to traits correlated with gender. Anyone with these character traits is disadvantaged in our current society, but women are more often affected by this.

In four steps, Cheng argues for ungendered actions against these disadvantages:



## 1. New terminology

New terminology in Mathematics helps us understand concepts and work with them more easily. Multiplication is concatenated addition. Once we call it multiplication, however, it is much easier to go on to define exponentiation. The same is also true for gender discussions. Cheng gives “mansplaining” and “patriarchy” as examples of such terms. She defines two new terms herself:

### *Def. Ingressive:*

Focusing on oneself over society and community, emphasizing individualism and independence, more competitive and adversarial than collaborative.

### *Def. Congressive*

Focusing on society and community over self, interdependence and interconnectedness, collaborative and cooperative.

She argues that women are often more congressive but all people with congressive traits are hurt by current systems, regardless of their gender.

## 2. Mathematical education favours ingressive people

One popular measure of success for young mathematicians is placements at mathematical olympiads. Women both compete less and are less successful. Cheng argues that this is in part due to them liking the competitive style less. She thinks that more collaborative activities should be a central part of mathematics education on all levels.

She also wonders whether it still makes sense to give prizes to individual researchers. Through modern communication, science has become much more collaborative. Some papers have been co-authored by several thousands of people. Showing successful scientists as individual geniuses might discourage congressive people from pursuing research careers. Analysis of arXiv publications suggests that even between mathematical subfields, the belief that brilliance is required to be

successful correlates negatively with the presence of women in that field [2].



*The author, Eugenia Cheng.*

### 3. *Congressiveness is important for science*

The third layer of Cheng's argument is that science does not profit from ingressive behaviour, and we should therefore not reward it as much as we currently do and indeed rather discourage it. She backs this up with examples of competition leading to the use of unsound scientific practices and describes the more collaborative research community in category theory.

Competition might make sense in situations of scarcity, but scarcity doesn't have to exist in educational systems. This is especially evident in times when some professors have chosen to share their lecture series online for everyone to enjoy (e.g. Timothy Gower's Topics in Combinatorics [2]). Knowledge is multiplied when it is shared.

### 4. *How can we support congressive people?*

Cheng describes having learned ingressive behaviours to promote her career as a mathematician. After realizing and disliking this change, she transformed back to her congressive self. Later she began to dislike her work environment and started teaching mathematics to congressive art students while developing new ways of teaching mathematics.

We often experience the lecture style Cheng describes having been used to. It is very uncollaborative and uninteractive. Students seldom ask questions unless they are pointing out a mistake on the part of the professor. More sincere questions about unclear parts of the presentation would benefit the learning of all students in the class. Kind encouragement from professors sometimes helps but can hardly be enough to fix a cultural problem. A recent innovation seems to be particularly well-suited for supporting congressive students: our D-MATH fo-

rum. Here students can ask questions without having to speak up in class or even sending a personal email. The replies are shared with everyone, and we all benefit.

On the subject of speaking up, Cheng notes an important distinction: It is not only the correlation of character traits with being a minority but also the fact that the risks minorities face when speaking up are much greater, which leads to them often asking fewer questions at talks.

When the stereotype says that black people are less educated, one mistake will be seen as a confirmation of that bias, while a white person can laugh it off as a small deviation from their competent self. Even if we don't expect our current colleagues to be discriminatory, we have experienced situations like this before and internalized this fear. Higher risks for minorities might result in them seemingly taking fewer chances, for instance by not partaking

in competitions.

The constant pressure due to challenging exams is also not well suited for more progressive personalities. Less confident students constantly see the risk of not being able to continue their studies. Especially for members of minority groups, the pressure is high. This creates fear and insecurities, causing students to seek confirmation that they are better than others. We consciously or unconsciously put others down, for example, by stating that something is "trivial". Progressive students either give up or learn to be more

ingressive. No solution to this problem is immediately obvious, but we should ask ourselves how more progressive members of our community feel when we plan lectures ("How will questions be asked?", "How can we encourage students to work together?") and events ("Does everything have to be in the form of a tournament?", "How do introverts feel if they have to find mentors in a speed-dating format?"). This can lead to small adjustments, which, taken together, give progressive people more space to be themselves to the benefit of everyone.

### Final remarks

Although the book is much less explicitly mathematical than I had hoped, I was impressed by the clarity of Cheng's argumentation and enjoyed getting to know her perspective on the scientific community and gender issues within it. I would recommend it to anyone who wants to find out more about the arguments described in this article. The book also contains many inspiring examples, scientific references and recommendations for further reading. One possibility for helping progressive people in competitive academic environments might also be to form progressive subgroups. My personal experience with the Phimale commission has been very positive and I hope it can become a support network for

more and more people of all genders within our departments.

Our current projects include improving exchange between graduate and undergraduate students through discussion events, working with the department to improve support for people who have experienced sexual harassment and making menstrual products available at ETH. Keep an eye out for menstrual products at the ETH Store and throughout campus in 2021! More details will be published as they become available.

If you would like to become a part or stay up-to-date on our events, send us an email at **phimale-intern@vmp.ethz.ch**.

[0] Eugenia Cheng,  $x + y$ , *A Mathematician's Manifesto for Rethinking Gender*, 2020

[1] Abra Brisbin, Ursula Whitcher, *Women's Representation in Mathematics Subfields: Evidence from the arXiv*, 2015

[2] Timothy Gowers, *Topics in Combinatorics*