

Todxs Cuentan en ECCO

Building a Mathematical Community

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*Aprendí que para uno encontrarse tiene que buscar en la raíz. ...
Aprendí que no soy sólo yo, y que somos muchos más.*

—Hugo Candelario González, Grupo Bahía

What is ECCO?

The Encuentro Colombiano de Combinatoria is a biannual gathering of students and researchers from Colombia, Latin America, California, and many other places. It is a two-week long summer school, featuring mini-courses by experts, collaborative problem workshops, research talks and posters, open problem sessions, a discussion panel, a hike, and visits to some of Colombia's legendary salsa clubs. It is also much more than a summer school, and we hope to capture a bit of its spirit in these pages.

ECCO is designed to give every participant opportunities to interact closely with people at all stages of the mathematical career. We do our best to build a very professional and very warm atmosphere. We are collaborators and we are also a community.

The Encuentro started as a small gathering for combinatorics students in Colombia and the San Francisco Bay Area. They had taken classes together, as part of the SFSU–Colombia Combinatorics Initiative described in [1], and it had become clear that they wanted to meet in person, build closer ties, and find ways to collaborate.

Since then, ECCO has broadened and gained a strong reputation. Students from many different countries now attend, and combinatorics experts also ask to participate. We communicate our goals clearly. This is not a regular conference; it is a school and an *encuentro*: a coming together. We ask experienced researchers to do problem sets with the students, to present research questions that they would like help with, to offer advice, and to join the dance floor at some point. They have been wonderfully helpful and inspiring mentors, they have recruited students, and—perhaps most meaningfully to us—several have mentioned

that their experiences at ECCO have influenced their work at their home institutions.

As one becomes more experienced organizing events, one becomes more conscious of their shortcomings. ECCO is certainly an imperfect event. After seventeen years, it is still an event under construction, and we hope it continues to be. But ECCO has been tremendously inspiring and energizing to us, and has taught us a lot about what it might mean to truly find community and belonging in a mathematical space. The goal of this article is to share a few of the lessons that we have learned from helping to build it.

Community Agreement, Part 1

When prospective participants are applying to ECCO, they encounter our Community Agreement. The first part reads:

A rewarding experience for all. *The Encuentro Colombiano de Combinatoria aims to offer a rewarding, challenging, supportive, and fun experience to every participant. We will build that rich experience together by devoting our strongest available effort to all ECCO activities. You will be challenged and supported. Please be prepared to take an active, critical, patient, and generous role in your own learning and that of the other participants.*

When we meet in person, we start ECCO by reminding everyone about this agreement. We ask people to get in pairs, read it out loud to each other, and spend a few minutes discussing it: What stands out to you about this agreement? What can it look like to put it in practice?

We're not gonna lie. While some participants jump right in, many look confused, and if we are reading their body language correctly, a few seem to think: *I can't believe you are asking me to do this; what am I, a kindergartener?* But we insist. Everyone participates.

To initiate a dialogue, we ask each group to underline a few words in the agreement that resonate with them, and share them with everyone. Some are excited that they will be challenged; some that they will be supported; some point out that the combination is crucial. We discuss how to be productively critical of each other's work and what generosity might mean in a mathematical setting. We talk about how sometimes we are very good at being patient with others, but not so good at being patient with ourselves.

We wrote this agreement to communicate, from day one, the kind of space we are trying to build collectively. Johan, one of the participants of Días de Combinatoria², shared with us an experience that became an unforeseen consequence of the agreement. He told us that reading it on the webpage of Días was the push he needed to apply, and to attend; for the first time, he felt he was welcome at an event like this.

²The Días summer school is one of the offsprings of ECCO.

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Community Agreement, Part 2

The second part of the community agreement reads:³

A welcoming experience for all. ECCO is committed to creating a professional and welcoming environment that benefits from the diversity of experiences of all its participants. We will not tolerate any form of discrimination or harassment. We aim to offer equal opportunity and treatment to every participant regardless of their mathematical experience, gender identity, nationality, race or ethnicity, religion, age, marital status, sexual orientation, disability, or any other factor.

Behavior or language that is welcome or acceptable to one person may be unwelcome or offensive to another. Consequently, we ask you to use extra care to ensure that your words and actions communicate respect for others. This is especially important for those in positions of authority or power, since individuals with less power have many reasons to fear expressing their objections regarding unwelcome behavior.

If a participant engages in discriminatory or harassing behavior, ECCO organizers may take any action they deem appropriate, from warning the offender to immediately expelling them from the event.

If you are being harassed, you feel uncomfortable with the way you are being treated, you notice that someone else is being harassed, or you have any other concerns, please contact Carolina Benedetti or Federico Ardila immediately. If you prefer not to speak in person, you may e-mail us (anonymously, if you wish) at the account _____@_____. _____ which only Federico and Carolina access.

Again, we make sure everyone actively engages with this text, reading it out loud in pairs and discussing it, awkward as they might find that. We are direct: social events are an essential part of ECCO, and we explicitly ask participants not to use them as excuses for romantic advances. We bring together more than 100 strangers from many different cultural and mathematical backgrounds for an intense shared experience; it is essential to have an agreement that clarifies expectations, and gives the organizers the power to react to potential incidents. We regularly revisit our protocol to respond to incident reports; we have found the Geek Feminism Wiki protocol⁴ to be a useful starting point.

³This part of the agreement was based on a code of conduct written by Ashe Dryden, a former programmer turned diversity advocate and consultant; see ashedryden.com.

⁴https://geekfeminism.fandom.com/wiki/Conference_anti-harassment/Responding_to_reports

We have co-created these community agreements with our students; our hope is to reach a collective understanding that is actually ours, that everyone is committed to as a whole. The critical feedback of participants has helped us strengthen our prevention and intervention protocols. We plan to add a short training on bystander intervention to the schedule of future ECCOs; this training helps participants recognize potentially harmful interactions and intervene to prevent them from escalating. We need to understand harassment and discrimination as community issues, and not individual issues, if we want to truly transform the harmful practices that our societies have normalized.

In the 'Any additional comments?' question on the exit survey of ECCO 2018, almost all participants who identified as women and/or LGBTQ+ praised the community agreement, and several said they would like to have one in all math events. Two participants wrote:

I thought the community agreement was an excellent idea. The openness allowed us ... to make a giant community out of everyone, which made the conference very special. I felt I could finally be myself after years of feeling caged in.

We made an agreement to acknowledge each other's differences and try our best to create a positive experience for everyone and it worked! We came together and did math without fear or judgment. It was so much fun! I think that the community agreement and the leadership of the organizers, TAs, and Colombians were driving forces behind making that possible. We all played a part by putting our hearts into creating the environment we were longing for. I left feeling fired up about bringing ECCO home with me. I would love it if all of my classes started off with a community agreement at the beginning of the semester.

A senior participant later told us: *I was very surprised at first, and looked at [the agreement] as an oddity. Then I remembered what it was like being a grad student at conferences and all the weird guys I had to avoid. So I figured, yeah, why not?* Another participant, who had been assaulted in a mathematical space before, told us that she simply does not attend conferences that do not have a plan to ensure her safety.

Mathematics has lost too many people—primarily women and people of color—to harassment and discrimination, and silence has never protected the victims. Perhaps by sharing with you how we are confronting these problems in our context, we may help you confront them in yours.

Breaking Power Structures

In any group of people there is a hidden power structure that influences who leads the discussion, who participates, whose voices are listened to, and whose ideas are seen as important.

Our activities are most successful—for teachers and for students—when we are able to disrupt those power structures as much as possible, when every participant feels that their presence is important and their thoughts are valuable. We try to do this constantly, in several ways; a particularly successful one occurs outside of the classroom.

On Saturday nights, ECCO moves to the dance floor of the best salsa club we can find. The truth is that many of our international experts look a bit intimidated when they first walk in. For most of them, this is not the kind of place they visit often, if ever. Few people at the *discoteca* look like them; they might feel like they don't really belong there.

Very soon, the students approach them and invite them to dance. They don't accept "I don't know how to dance" for an answer; they teach them, patiently, kindly, from the beginning, or just persuade them to dance as they will.

We won't pretend our guests become expert dancers overnight; that really does not matter. But they always seem really grateful to the students who make sure they are comfortable, who guide them through a few steps, and who probably help them find a bit of freedom inside their body. Some of us have known these professors for years and we get to see a smile that they have never shown us before.

We like to ask our course instructors to keep in mind the feeling of discomfort they might have had entering the *discoteca* and the feeling of growth and joy they hopefully had walking out. Many ECCO students—who have never met so many accomplished mathematicians, who may have never attended a math conference before—are probably feeling a similar discomfort when they walk into the classroom. We want them to have that sense of belonging, growth, and empowerment when they leave. Since the professor was vulnerable in front of the student, the student can more comfortably say "I don't understand, can you explain this to me?" when needed. Since the student showed generosity and patience on the dance floor, the professor naturally shows a similar generosity and patience in the classroom.



Figure 1. Lecturers and students on the dance floor.

We must return ourselves to a state of embodiment in order to deconstruct the way power has been traditionally orchestrated in the classroom.

—bell hooks [4]

The dance floor is one of the most democratic spaces of the tremendously unequal societies we live in. At ECCO it is a place of joy, and also a place of pedagogy, for professors and students alike.

Problem Workshops: Thinking Simply About Deep Things

Mathematically, ECCO aims for a low-floor, high-ceiling approach. We want the courses and activities to be designed so that everyone is able to engage with them at some level, and no one runs out of questions to explore. Every participant should find interesting things to learn. This is perhaps best exemplified in the way that problem workshops are structured.

Each mini-course meets four times, and each 60-minute class meeting is followed by a 90-minute problem workshop. People self-identify their level of expertise, and we split them into groups as heterogeneously as we can. A typical group will include a professor or postdoc, a graduate student in combinatorics, and two undergraduates with scarce combinatorial experience. Many participants speak very little English, and many speak very little Spanish, so everyone has something to learn and something to teach. We offer materials in Spanish or English and the unofficial language of mathematical discussions is Spanglish. People are welcome to use the language they wish. Interestingly, many choose to communicate in a foreign language for the first time since this is their opportunity to try it.

The first problems on each list ask people to carry out a small example, to ensure that everyone understands the key constructions or results in the class. The last few problems on the list can be very challenging and may take days or weeks to solve.

We ask each group to keep in mind our community agreement: how can they make the problem session rewarding, challenging, supportive, and fun for every participant? The result has always exceeded our expectations.

We realize this approach is unusual. Occasionally, it faces some resistance. A few of the more-experienced participants have asked: "Why don't you let the beginners work on the easy problems together, and we can focus on the hardest problems?" But this is how these experts have been operating for most of their career. Why not learn something new?

It is very rare for an undergraduate to collaborate with an expert of one field on questions about a different field and see: *Experts struggle too! How do they productively struggle?* These are very valuable lessons for the undergraduates. It is also very rare for an expert to collaborate with a relative newcomer to mathematics as equals. When they find a way

to do it, they inevitably deepen their understanding of the subject.

The last few minutes of the problem workshop are spent sharing solutions. We ask the people who are usually very comfortable speaking up to make space for others. We invite the least-experienced or the least-vocal participants to present their work—they are the ones who can grow the most from doing so, and with the right atmosphere and maybe a bit of extra encouragement, they are usually happy to speak.

Andrés Vindas-Meléndez, who was a master's student at the time, described his experience:

The exercises were mathematically meaningful, but what is noteworthy is that all group members played an active role in reaching a solution and understanding of the concepts. I observed that the more experienced mathematicians went directly to thinking about the abstraction of the problems, where the younger students emphasized a more concrete approach to exemplify the theory occurring in the problem. Of course both ways of thinking are valuable.

This reminds us of Gelfand's request when encountering a new mathematical topic:

Explain this to me in a simple example; the difficult example I will be able to do on my own.

—Israel M. Gelfand

Satisfying this request can be very challenging for beginners and experts alike, and it can also be surprisingly rewarding and enlightening. The celebrated Ross Mathematics Program extols the value of thinking deeply about simple things. We agree wholeheartedly and propose the counterpart as well: there is a tremendous amount to be learned from thinking simply about deep things.

Universal Design

Mathematicians from overrepresented groups in mathematics often ask "Why do you need these math conferences for minorities? Don't we all do the same mathematics?" To try to answer, allow us to digress for a moment.

Let us share an embarrassing confession: The first time we rode a public bus in North America, and someone in a wheelchair got on, we could not believe our eyes. Are all 50 of us really going to wait all this time for one person to get on? Did the city really spend all this money putting all this equipment on every bus for such a small percentage of the population? We both grew up riding the ramshackle buses of Bogotá, jumping in and out of them while they were still in motion, collecting frequent minor bruises along the way. We should have known better.

The term "universal design,"⁵ coined by architect Ron Mace, describes the concept of designing all products and built environments to be aesthetic and usable to the greatest extent possible by everyone, regardless of their age, ability, or status in life. What may be unintuitive about universal design is that, what may seem like designing for a small minority, ends up being a better design for the majority. In fact, once it becomes widely used, it is no longer seen as serving special needs.

We often forget that sidewalk ramps were installed in every US city thanks to the Americans with Disabilities Act of 1990, after decades of activism. They were originally designed for people who use wheelchairs to go on and off sidewalks easily. Today, everyone uses them: a kid on a tricycle, a parent with a stroller, a traveller with a suitcase, a skate boarder, or the two of us when we were dealing with injuries. Everyone benefits from them.

With this in mind, let us propose an analogy:

Mathematics education cannot truly improve until it adequately addresses the very students who the system has most failed. ... We need a central focus on students who are Latinx, Black, and Indigenous ..., developing practices and measures that feel humane to those specific communities as a means to guide the field.

—Rochelle Gutiérrez [3]

This does not come naturally, or without some opposition. Sexism, racism, classism, and centralism often lead to a small, homogeneous group of students being valued more than the rest, tacitly or explicitly. Academic elitism centers the voices and interests of the "top" students from the "top" schools, whatever "top" might mean. Furthermore, in Colombia, we always seem to put the needs of our foreign guests above our own.

At ECCO we are intentional and unapologetic about focusing on the needs and interests of the local students, the less-experienced students, and the students from regional universities that have less access to activities like this. It is our belief, and our experience, that when we find practices and structures that truly serve these students, we are doing much more than serve these students. We find practices and structures that benefit the wider mathematical community.

For example, we must confess that the organizing committee had not explicitly thought about the experience of the LGBTQ+ community at ECCO. But our struggles are connected, sometimes in ways that we do not foresee. Post-doc Aram Dermenjian wrote:

The single biggest reason I loved this conference was the diversity and inclusiveness. In recent years I felt like the only gay person doing mathematics. I've started to feel more and more lonely in my math community. All my friends are amazing, and they

⁵We would like to thank May-Li Khoe for teaching us about universal design and its wide applicability.

always try to make me feel welcome, but it's just not the same.

Having a community agreement allowed everyone to be open about themselves allowing queer people to be out.

It gave me the confidence to do something I had never done before. I invited my math friends at ECCO to a gay club. Sure, more than half of us weren't gay, and sure, the gay club wasn't that amazing, but just being out, in a gay club, with mathematicians ... was amazing. I felt I belonged.

Professor Viviane Pons wrote:

One question arose from the students: why do professors come and teach at ECCO? They saw clearly what was the gain for them, but the reason we would spend time and energy there was not clear to all of them. So let me tell you what I (and the scientific community as a whole) gain from that investment. I can help shape the academic world to something better and to something I like. Being part of ECCO is one step in this direction, because that is the kind of math community I want.

The Colombian Way

Worldwide, people have (accurate or inaccurate) ideas about the “French style,” “Hungarian style,” or “Japanese style” of doing mathematics. In a country that is relatively new to research in mathematics, perhaps we still have the opportunity to shape what “Colombian mathematics” might look and feel like.

Many would argue that mathematics does not distinguish a person's culture or nationality. Unfortunately, this widespread belief has led many of us to feel forced to leave our humanity at the door and struggle to fit in with the dominant mathematical cultures and practices. But our cultures are too rich to be dismissed when we enter mathematics and dismissing them is a loss to mathematics itself.

Research has shown that creating learning environments that value and incorporate students', families', and community members' cultural and linguistic strengths into instruction creates a



Figure 2. The future: Días 2017 alumni at ECCO 2018.

nexus to mathematics cognition. ... Culture and mathematics learning are intertwined in that they are both transformed through everyday lived experiences and are shaped by those experiences.

—Michael Orosco and Naheed Abdulrahim [5]

We are not interested in patriotism, but we are interested in culture and values. How might we use the cultural practices of Colombian communities to positively influence the cultural practices of Colombian mathematical communities—or at least the cultural practices of ECCO?

Colombians pride ourselves in being good hosts, and making every effort to help our guests feel welcome and comfortable. We are proud of our food, our music, our *rebusque*, and our stories. At ECCO, these all end up playing a central role.

Colombia has a unique salsa culture, where each *salsoteca* has a wall full of hard-to-find vinyl records from the 60s and 70s—mostly salsa, cumbia, and West African music—and this is what the DJ plays all night long. People of all ages dance with their family, their friends, their coworkers, and with any stranger who asks to dance with them. No one does those fancy turns and slick moves they teach in American salsa lessons. Everyone sings along as they dance. At ECCO, we organize a visit to the *salsoteca* with the deepest music collection we can find. César gives everyone (foreigners and bogotanos alike) dance lessons, the venue gives us maracas and cowbells to play along (and they take them away if our rhythm is not on point), and everyone dances together. And once the dancing starts, it does not stop. Imagine a conference where participants work hard during the day, dance during the night, and get up fresh and early next morning all over again, for two weeks. Well, dancing drains some energy out of us, but it also fuels us to return to the conference the next day and give it our all. In the final survey, undergraduate student Eliana said:

I think that dancing is an important part of ECCO and it changes the whole dynamic in a very positive way. In Colombia, mathematics is danced.

Colombians are used to working with a shortage of resources, and we have a strong culture of *rebusque*: this means that in the face of difficulty, there is always an ingenious solution to be found within our means. The first time we organized a summer course in geometric combinatorics for undergraduates, we were advised by foreigners that Colombian students would not have the preparation necessary to understand these topics, that we should teach a basic course in abstract algebra instead. But, for better or for worse, a lack of preparation has never stopped a Colombian from trying to accomplish something. We don't really believe in deficit mindsets. This culture of *rebusque* shapes our conviction that even without a lot of experience with mathematics, if you are hard-working and resourceful, you can take a class

about current research directions from the world experts in the field, learn from it, and contribute to it.

The final activity of ECCO is a panel discussion where we talk about personal issues that most of us struggle with at every stage of our careers, but we rarely or never talk about. Discussion ranges from everyday topics such as “What does a typical day in your life look like?” to more transcendental ones such as “What tools have worked for you to deal with stress, anxiety, or a sense of not belonging in academia?” We choose a broad range of panelists, from professors to undergrads, from all parts of Colombia and the world.

To be truthful, we are not big fans of math panels in general. Why does this one feel different to us? Perhaps it’s the strong sense of community and trust that has been built by the end of ECCO that leads to a very honest conversation that does not shy away from strong emotions. Perhaps it’s simply that people, and their stories, are really important to us. Daniel wrote:

(The panel) is one of the most relevant things at ECCO. Breaking with the idea of math as a selfish and lonely task should be a priority. Talking like human beings, with our emotions and conflicts, is fundamental. Unfortunately this is rarely done in academic events. Congratulations to the organizers for recognizing the need to humanize math and mathematicians. This was a cathartic experience.

This *encuentro* is an intense mental, physical, and emotional experience. We seem to have a tacit agreement to store lots of energy prior to ECCO and budget a few days of recovery afterwards. We start as a bunch of strangers and end, with tears of joy, promising to keep in touch, planning our next *encuentro*.



Figure 3. ECCO 2018 participants from six countries.

What Does ECCO Wish to Be?

For us, it is crucial to be mindful of **how** we engage with and produce high quality mathematics. Valuing and promoting respect and difference has been essential to the development of ECCO. We seek to create an environment where each participant is empowered to take the space that belongs to them and share their voice, ideas, experiences, and world views, inside and outside the classroom. More than a conference, ECCO has become a space where learning mathematics is as important as recognizing each other as mathematicians and as individuals. If we are aware of what makes us different mathematically and personally, we can take advantage of these differences to complement each other.

The difficult, but also essential part, is to value respect and difference positively; not as minor, inevitable nuisances, but as the elements that enrich life and encourage creation and thought.

—Estanislao Zuleta [6]

ECCO brings together a close-knit community of mathematicians who are spread out all over the world. This community has led to the founding of the Seminario Sabanero de Combinatoria⁶ in Bogotá, and it has strengthened our mathematical connections with ALTENUA⁷ in Colombia, and with CIMPA⁸ worldwide.

To achieve a more lasting effect, we also challenge ECCO participants to continue to mold their mathematical knowledge so that it can be used beyond the creation and understanding of science as a tool of positive societal and human impact. This has led to the construction of other mathematical communities that celebrate different ways of learning and help dehomogenize the concept of academia in Colombia. Examples include Días de Combinatoria⁹ and Círculos Matemáticos.¹⁰

ECCO wishes to help build a strong and dynamic research network that collaborates regionally and internationally and produces very interesting mathematical work. We also wish to help create a culture of sharing mathematical knowledge with the public and using this knowledge to have a positive impact in all sectors of society. Finally, we wish to be very mindful of how we do this work, putting our humanity, our values, and the diversity of our cultures

⁶SeSaCo is a weekly seminar that rotates locations among five universities in Bogotá.

⁷ALTENUA is a research group in algebra and number theory with a very strong presence in many regions of Colombia.

⁸CIMPA is a nonprofit organization founded in France that promotes research in mathematics in developing countries.

⁹Días is a summer school in basic combinatorics, geared towards undergraduates who haven’t had access to classes in this area. More than half of Días alumni, from 16 different universities in 9 different cities, went on to attend ECCO.

¹⁰Círculos is now a national program that helps high school students from public schools fall in love with mathematics in an inclusive, non-competitive setting.

at the center of everything that we do. These are the goals that guide our work. In our minds, they are inseparable.

ACKNOWLEDGMENTS. We would like to extend our warm gratitude to the ECCO family, who have become our mathematical home. They have allowed us to experience true community and belonging in a mathematical space.

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Credits

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