
Belonging

Arlie O. Petters

BHM Belonging. What a word. What a deep-seated human need. It touches all of us, invoking a strong sense of loyalty and commitment when we are showered by it and feelings of alienation and distrust when it is denied. Julio Frenk, president of the University of Miami, deconstructed this word beautifully [2]:

The components of “belonging” are suggestive: “Be”—as in being—signifies authenticity and freedom from the need to cover aspects of one’s identity. “Longing” reminds us of the profound human yearning to connect with others and be part of something that transcends us.

The times we live in have made this topic even more pressing. I shall discuss it within the context of under-represented minorities and women in the mathematical sciences, though many of the ideas apply more broadly to the human experience. My goal is not to take you on an academic tour of the extensive psychology and sociology research literature on belonging. Instead, I will share some personal reflections and anecdotes intended to provide useful insights into the experiences of marginalized individuals.

Otherring and Such Climatic Joy Killers

I remember being giddy with excitement to attend the welcoming reception for my entering class of math graduate students. I walked into the room and heads turned towards me. Feeling out of place, I walked over to two student-looking faces. One happened to be a fourth-year graduate math student and the other was a first-year like

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me. I introduced myself and, because I wanted a quick exit, I asked the more senior student how to get to the main math office. He told me that when I walked out the door, I should make a left, walk down the hallway, make another left, and it would be on my right. “Or, you could tie a rope to the ceiling and swing over to the other side,” he said with a mischievous grin. The first-year student turned red with embarrassment. It did not matter whether the senior student thought of me as a monkey in a tree, Tarzan, or something else; his decision to engage in an unnecessary framing that could provoke a negative stereotype was telling. I quickly responded, “I see that you’re going to be an a**hole,” and I walked out of the room. Here I was, looking forward to being part of a new community of mathematicians and then being made to feel unwelcome at the onset.

I went directly to my apartment and started packing. My mind was racing and I was angry: “To hell with them. They turned around looking at me because I am a person of color. I am leaving this place. To hell with these people.” As I started calming down, a counterintuitive thought occurred to me: “What if the others in the room weren’t like him? What if they turned around and looked at me because they don’t often see someone like me in an entering class and were curious to get to know me? ... If I leave, this guy will win. I refuse to let him win.” My psychological bounce back was that he had brought the fight to me, and I refused to cower in fear or run away in anger. I had briefly allowed him to hijack and taint my perspective. And, even worse, by allowing him to make me angry, I had given him power over me in that moment. Never again. The emotional-intelligence battle was on. Would I have had such a fight-back spirit in the academic sphere if from pre-kindergarten my sense of self had been chipped away, bit by bit, by individual and

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institutional racism? I doubt it. Fortunately, I was raised until the age of fifteen years in Belize by a loving and resilient grandmother who strengthened me internally, fortifying my identity and allowing me to maintain its structural integrity in the face of undermining forces.

I was not naïve about the epiphany that caused me to stay. My hypothesis that most people in the room were not like him needed to be tested. But I had enough internal energy and grit to hold on to it by blind faith in the short term. The energy sustained me through the long hours of hard work needed to perform very well on my homework sets. And the grit enabled me to bear the anxiety that maybe most people in the environment did not really care for my being there and did not think much of me intellectually. In my case, I was fortunate to discover with time that most of the people were not like that graduate student. I had a perceptive and supportive thesis advisor and a positive interaction with the majority of the other math and physics graduate students and faculty. That young man had acted as if he owned the place. To me, he had a warped sense of belonging and entitlement that made him feel confident enough to treat me in a demeaning way without consequences.

I wish I could tell you that my experience was an anomaly. Over the years I have mentored a host of underrepresented minority students and listened to their experiences. They range from regular racial micro-aggression, through “oppressive othering,” to more overt examples, like being the only one not invited to a bus outing organized by fellow math graduate students. A sense of belonging “involves one’s personal belief that one is an accepted member of an academic community whose presence and contributions are valued” [3, p. 701]. This is important not only for the mathematics community but also for education and our society at large. At the convocation for Duke’s entering 2017 undergraduate class, Stephen Nowicki emphasized to our students:

We only learn best from each other and teach each other well if we all feel like we belong. We can only achieve the excellence that lies in the potential of the different people and perspectives, the different aspirations and ideas we’ve brought together at Duke, if everyone feels equally that Duke belongs to them.

There’s another important thing to understand about what it means to belong, which is that “belonging” does not mean “conforming.” ... The excellence of this place emerges from the very different kinds of people who join our community. To diminish those differences through conformity would only diminish our excellence.

If we truly believe that diversity in all its dimensions is a key driver of excellence in our educational institutions

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and increases the probability of intellectual breakthroughs, then we cannot ignore the implicit biases directed toward underrepresented minorities and women. Actionable first steps a department can take as part of fostering a welcoming culture are to assign *thoughtfully chosen* mentors to incoming students and faculty; to advocate inclusion, acceptance, and understanding; and to promote effective ways to engage diversity. Imagine for a moment that you are a newcomer. Having someone in your department teach you the ropes and advise you from their own experiences is part of

an onboarding that tells you from the beginning that you matter. Usually it is through such a relationship that your trust in the environment grows. By trust, I mean that you can allow yourself to be intellectually vulnerable without fear that your admission of the need for help or clarity will be attached to your race, ethnicity, gender identity, or social-class history. For example, you can feel secure enough to admit that you have certain gaps in your math background and allow the mentor to assist you with filling them. And you can ask faculty and seminar speakers questions about mathematical issues that are unclear to you.



A diverse group of students exuding a sense of belonging.

Deficit Thinking: Can They Add Value?

Even when we accept diversity, it is still a problem when we approach it from a deficit-thinking perspective, that is, when we automatically expect lower achievement of students and even faculty from backgrounds that are not the norm. This brings me to an experience when I was inducted into Sigma Xi, the scientific research honor society. I felt so proud. Induction came with a really nice banquet. The guest speaker was the Queen of Carbon Science, Mildred Dresselhaus. At my table was an older Caucasian gentleman who seemed important through my student lens, at least as I inferred from his jacket and tie and the way he took control of our table. Going around the table, he started asking what research we were doing. I could not wait to tell him and the others about my work

in mathematical physics. He asked everyone at the table about their work, except me. He made me feel as if I did not deserve to be in the honor society. It felt as if he were a displeased gatekeeper whose “boundary maintenance” was upset by my being admitted into the society. I had the last laugh, though. After Mildred spoke, I went up to her to introduce myself. She was welcoming and the first thing she wanted to know was, “What are you working on?” Mildred valued me enough intellectually to want to hear about my research.

Belonging involves more than the experience of feeling connected, welcomed, and free to be oneself. As underscored by psychologist Isaac Prilleltensky, another key part of belonging is being given the opportunity to add value. Imagine again that you are a newcomer. Even though everyone in your department is nice to you, if they do not see you as being able to add research value, you will likely not feel a sense of belonging. A simple practical gesture to improve belonging for underrepresented minorities and women in your department would be to talk with them about the mathematical research issues they are currently tackling and perhaps invite them to give a talk.

No Organization Is Perfect, but Keep Improving

I am sure that Sigma Xi would have been disappointed if they had learned about my induction experience. On August 28, 2017, the society issued its “Statement on Diversity and Recent Events in Charlottesville, Virginia.” It pointed out that in May 1993 its leadership acknowledged that “the rich diversity of contemporary society was not reflected in the composition of the scientific and engineering communities, or in its own membership” and pledged “the Society to set aside barriers encountered by individuals from underrepresented groups who seek to become scientists and engineers, as well as to reach out to all members of our diverse society.”

It is admirable to see the leaders of Sigma Xi acknowledge publicly that diversity within their organization is an important issue to address and then to act accordingly. In fact, some practical interventions on how to address belonging more broadly in one’s department, institution, or organization are given in the intriguing paper [4]. And a very insightful analysis in the college context is in [1], including surveys that probe for belongingness and loneliness.

It Is about Humility, My Friend

There is a third aspect of belonging, which is important to unearth. It ties in with negative stereotypes about the value underrepresented minorities and women can contribute. To put it candidly, I am talking about views of math ability as innate versus acquirable through hard work, dedication, and practice. And I am not talking about the kind of nutty worldview of white supremacists that still echoes from the rally in Charlottesville, Virginia. I am talking about a subtler culture of how math ability is perceived.

In their revealing paper “Why do women opt out? Sense of belonging and women’s representation in mathematics” the authors state [3, p. 700]:

Sense of belonging to math—one’s feelings of membership and acceptance in the math domain—was established as a new and an important factor in the representation gap between males and females in math.... —the message that math ability is a fixed trait and the stereotype that women have less of this ability than men—worked together to erode women’s, but not men’s, sense of belonging in math. Their lowered sense of belonging, in turn, mediated women’s desire to pursue math in the future and their math grades. Interestingly, the message that math ability could be acquired protected women from negative stereotypes, allowing them to maintain a high sense of belonging in math and the intention to pursue math in the future.

A similar statement about the mathematics representation gap between underrepresented minorities and whites would not come as a surprise. They continued [3, p. 701]:

Females who, despite the stereotype, find themselves in math-related disciplines must now face the “culture of talent” pervading these fields, a culture that may also undermine their sense of belonging. The United States and perhaps Western societies in general often view math ability as a talent, something that one is either born with or not.... In fact, individuals may often console themselves about their mathematics short-comings by falling back on the expression, “I’m not a math person.” Perhaps nowhere is the belief in the fixed nature of math ability more entrenched than within the mathematics community itself, which relies on a ‘talent-driven approach to math.’ ... Research suggests that this mindset about the nature of intelligence as being a fixed trait (an “entity theory”) can undermine achievement in the face of difficulty....

I have personally observed situations and heard anecdotes that are consistent with the above mindset about mathematics. It is then not unexpected to see “deficit thinking” often communicated in the attitudes of some towards underrepresented minorities and women in the mathematical sciences. And it is no surprise to see some marginalized students with high academic achievement in mathematics pursue careers in other fields.

Emphasize that mathematics can be mastered through effort.



Students meeting for a tutorial with their instructor.

Every student has the capacity to succeed in mathematics. And, as with any challenging activity, we should purposefully emphasize that mathematics can be mastered through effort. Those who started delving into the subject from childhood, especially under the tutelage of a parent who is a mathematician, will naturally have an advantage in skill. But those who did not get such a head start can still fill their gaps and catch up on the fundamentals if they are deeply committed. Furthermore, the mathematical sciences have varied modes of reasoning, ranging from the algebraic to geometric, to analytic, to topological, to probabilistic, to statistical, to numerical, etc. This does not begin to touch on the interdisciplinary intuition employed in fields like mathematical physics, mathematical biology, mathematical finance, and so on. There is clearly room for a wide array of cognitive skills, and so some people will develop strengths in certain modes and intuitions over other ones. Equally important, we must also allow for the variations in learning styles that come with heterogeneity. Certain people will work best alone, others will excel with one or more co-authors, still others will flourish in large research collaborations. Such variety should be the spice of life in the mathematical sciences. Indeed, we must doggedly preserve this diversity and fight against any unhealthy mindset that promotes exclusion and a sense of superiority.

For many underrepresented minorities and women, the issue of belonging in mathematics has been a continued fundamental challenge. I believe that an integral part of keeping our field vibrant and relevant is for its participants to welcome everyone, knowing that anyone can get better at mathematics through an ample commitment of time and energy by teacher and student. Equally important, one should not only be welcoming at the door but also give people a chance to add value inside. Belonging is indeed a foundational human need, which when nurtured can bring out the best in all of us, enabling our community

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to maximize its excellence. In the end, mathematicians are the custodians of mathematics. The onus is on us.

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