

NeuroView

Mentoring to propagate racial inclusivity in neuroscience

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Mentoring the next generation of neuroscientists from historically excluded backgrounds brings several challenges. Successful mentor-mentee relationships are critical for addressing these challenges. Rodriguez-Romaguera and Quirk reflect on lessons learned from their cross-racial mentor-mentee relationship that could apply to many mentors.

Introduction

Increasing the racial diversity of neuroscience researchers is an admirable goal, but prior diversification efforts have fallen short. Neuroscientists from all racial groups need to become more effective at mentoring trainees from underrepresented and historically excluded backgrounds, who can become effective mentors themselves, and create racially inclusive environments. Important questions are: which mentoring practices are the most effective from the mentee's point of view, and which are worth passing on to the next generation? We address these questions from the joint perspective of a White mentor with 30 years of experience in Latin America and the Philippines and his former Latinx mentee who trained with him at the University of Puerto Rico and now runs a successful lab at a flagship school in the United States. We discuss the boundaries of mentor-mentee relationships, lab environments that value caring and inclusivity, and strategies to overcome impostor syndrome. Although effective scientific mentoring is not one size fits all, we discuss lessons learned that may apply to a growing number of mentors training people from historically excluded backgrounds.

Developing the mentee's scientific identity: A sense of belonging

Students who come from racially underrepresented groups have difficulty seeing themselves as capable of becoming scientists.¹ However, a mentor from any

racial background who believes in a student's potential can spark their journey to build their scientific identity. For example, early on, a mentor can take the (rough) ideas of a young mentee seriously at lab meetings, despite the additional time required to do so. Seeing the mentor allocate time for small group lessons or being accessible for answering questions is important for young trainees. I (Jose) remember having regular meetings in my mentor's office (Greg) to learn about mechanisms of Hebbian plasticity: "Wow, my mentor thinks I am worth his extra time and effort." More importantly, this initial learning allows a trainee to bring new questions to the table. A sense of belonging can also be developed through the mentor's professional network at scientific meetings. The trainee learns to identify with the mentor's style, rigor, and values. These activities allow trainees the space to test drive their newly formed scientific identity.

Sitting in Greg's office with other undergrads learning about NMDA receptors and long-term potentiation, I was excited to learn this mechanism, but more so, I remember seeing Greg get excited once he saw it click in us! This was the first time I saw a mentor getting excited at the process of discovery in his mentees. This opened the door for me to engage in (and enjoy) the discovery process, and I will never forget that moment. During this early training period, I started to understand the foundations of systems neuroscience and the mechanisms behind learning and memory. Then, as new trainees came into

the Quirk lab, I could teach them all about it! A sense of "intellectual entitlement" was born in me, and I recognized that this entitlement belonged to everyone, regardless of race, gender, or socioeconomic background. All trainees have the same right (and responsibility) to understand and contribute.

Oftentimes, trainees unfamiliar with a lab environment must first evaluate whether they belong in research. For example, I (Jose) did not perceive myself as a scientist prior to joining the Quirk lab because most scientists do not look like me. In fact, my own mentor did not look like me! However, having this person (Greg) who "looked" like a scientist tell me I could also "be a scientist" was a powerful motivator and started my journey to become a neuroscientist. I was also entering a research environment where people cared for each other, and I felt welcomed and appreciated. This environment helped me realize that I needed to do some personal work to discover the neuroscientist in me that was being suppressed by internalized racial notions.

When a sense of belonging is not sufficiently developed by the mentee, it can contribute to impostor syndrome—a feeling that you do not deserve to be where you are.² In its most extreme form, we believe that individuals may actually seek to confirm their impostor syndrome by unconsciously choosing to fail at their work. This can manifest as a long stretch of (inexplicably) failed experiments. In these instances, the mentor and mentee can work together to



understand why the mentee may be accepting their failure. As a graduate student, I (Jose) used to suffer from this type of impostor phenomenon until my mentor (Greg) asked me, “Do you prefer to fail, or would you rather succeed and leave your impostor identity behind?” While I was horrified that my mentor could think that I was failing on purpose, I realized that there were unconscious processes preventing me from succeeding in an environment where I thought I already belonged. In fact, impostor syndrome has re-emerged at each new step of my career (e.g., postdoc, faculty); however, awareness of these unconscious processes has allowed me to persevere.

Maximizing the mentor-mentee relationship: Possibilities and boundaries

One issue that frequently comes up with mentor-mentee relationships is the establishment of appropriate boundaries. For example, can your mentor also be your friend? Mentoring can lead to a friendship between mentor and mentee, especially if they are close in age or share common interests. However, there is a risk here. A mentor as a friend limits the mentor’s ability to address shortcomings because some students may try to co-opt the mentor-mentee relationship to gain a friend or to simply get their way while not realizing the inherent danger. My mentor (Greg) jolted me late one afternoon by saying, “I may be friendly, but I’m not your friend; I’m your mentor.” While inconvenient to hear, this can allow the mentee to relax knowing that the mentor will not lose sight of the mentee’s professional needs.

That being said, a mentor should care for the mentee both professionally and personally. Professionally, a mentor should set clear expectations for the trainee’s role in designing experiments, analyzing data, making figures, and writing papers.³ In addition, this can include exposing trainees to the responsibilities of a principal investigator; for example, asking the mentee to help review manuscripts for journals. It can even go farther by getting them to help write grants for the lab. This level of engagement can increase levels of commitment to the lab’s goals and provide training in grantsmanship. I (Jose)

remember sitting in my mentor’s office (Greg) co-writing a draft for a Silvio O. Conte Center grant, literally passing the keyboard back and forth to write individual sections. Thus, the trainee can begin to feel like a colleague rather than a student.

Personally, the mentor should also care about the mentee’s issues outside of the lab. Personal problems can tend to build up inside and prevent the mentee from working efficiently. The mentor needs to develop a sense of awareness to detect when a mentee may be distressed and be able to listen and suggest professional help through university resources if needed. In this way, the mentor can acknowledge the mentee as a whole person, letting them know the lab is a safe space. Following this conversation, the mentor can then shift back to talking about the science from a more comfortable perspective. Contrary to popular thinking, we believe personal issues and scientific issues can be successfully compartmentalized within the mentor-mentee relationship. Proper caring and boundaries are needed for the mentee to develop a sense of trust for the mentor that underpins the most effective mentor-mentee relationships.

The “temperature” of a mentor’s style

One often wonders, what kind of mentor should I be? A friend-mentor who shows caring or a tyrant-mentor that demands productivity? Based on our experiences, as well as those of others,⁴ we conclude that the mentor’s role is dynamic in nature and should be calibrated based on the mentee’s personality and stage of training. One could imagine the mentor’s “temperature” fluctuating from warm to cold to represent different mentoring styles (Figure 1). What temperature will produce the most effective mentoring for a given mentee at a given time? Some mentors focus on continuous productivity, but this is not sustainable. Others are more caring and will help their trainees think through issues they are trying to overcome (whether personal or professional). Both are necessary at some point, and the mentor should feel free to shift back and forth from productivity-mentor to caring-mentor depending on the current needs of the mentee. In this way, caring by the mentor leads to the productivity

of the trainee, along with mutual satisfaction and less stress.

Regarding the extreme temperatures of mentoring, one should avoid becoming a tyrant, because it produces a lot of unhappiness and has diminishing returns in terms of trust and productivity. In the same vein, one should avoid becoming a friend to the mentee (see above). However, in the real world, a mentor will occasionally need to dip into both these extremes, for example, because of a mentee’s severe underperformance (tyrant needed) or personal tragedy (friend needed). However, the time spent in these extreme zones should be brief.

Some mentors may find it easier to focus on productivity rather than caring. Obviously, this will reflect the mentor’s own psychology and personal experiences. However, caring for your mentee is not as difficult as it may seem. The first step is to realize that you have the responsibility to care for your mentees. Sometimes, all that is needed is to listen to your mentee and repeat what you hear with sympathy, connecting their ideas with a unifying thread, as you might do with your science. An objective viewpoint from a trusted mentor can help the mentee see how their hardship may affect their performance in the lab and interfere with achieving their goals and dreams. On the other hand, showing too much caring can often drain the mentor and disempower the mentee because it can lead to unnecessary dependence. Therefore, it is important for the mentor to show balance between caring and focusing on productivity.

Our general premise is that trainees who are more junior will need more caring than advanced trainees. While postdocs are more senior than graduate students, one should not assume that they are more scientifically mature. Additionally, trainees from underrepresented backgrounds may need more caring initially than non-underrepresented trainees because of the additional work needed to overcome racial stereotypes and build their scientific identity.⁵ Mentors need to be aware of this additional burden on underrepresented trainees.

Fostering a lab environment that promotes caring and collaboration

The mentor who has given careful thought to the optimal lab environment needs to

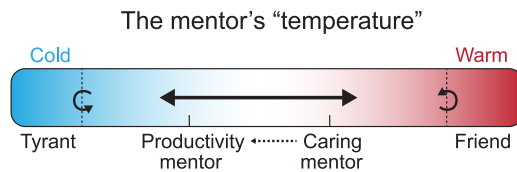


Figure 1. Representation of the dynamic range of a mentor's style in their interactions with their trainees

maintain that environment (to the best of their ability). As discussed above, this environment would optimally be a close-knit group participating in regular lab activities (lab meetings, journal clubs, and lab retreats' see Quirk⁶). It's important that trainees are fully aware of what each member is doing in the lab, helping each other, and collaborating. This may or may not lead to co-authored papers, as mutual caring should be the main driver of group interactions. Such an environment builds cohesiveness and a sense of pride that helps form a trainee's scientific identity.⁷ When conflicts arise, for example, with authorships or project ownership, they can be resolved for the good of the entire group. This can also apply to conflicts separate from work, such as differing world views, philosophies, or politics. If everyone wants to maintain a safe environment that fosters progress and growth, it becomes a self-regulating process. This environment can also be an enjoyable place to spend time in, even on the weekends!

Maintaining such an environment in the long run can be a challenge. Every lab has its ups and downs (and the occasional bad apples). When a mentee does not cooperate, the mentor needs to send a signal that "this is how we work as a group, and it is not negotiable." Most trainees will rise to the occasion, but if they don't, the mentor should realize that there is a poor match and consider removing them from the lab. This is a difficult but important job that only the mentor can do, and the rest of the lab may be counting on them to do it. There may also be specific dos and don'ts in the lab, and they can even be incorporated into a signed agreement with new trainees.

Transitioning from mentee to mentor: Finally flying solo

After building my (Jose's) scientific identity in graduate school, my next chal-

lenge was to use it for successful postdoctoral training. My postdoctoral mentor (Garret Stuber) ran a high-tech neuroscience research environment at a prestigious university. I immediately felt like I belonged and was able to hit the ground running. I had a new mentor at this stage of my training who focused on productivity and was more hands off than my grad school mentor. I was able to think independently and determine the research directions I wanted to take, even if they were outside of the existing paradigms. Toward the end of my postdoc, I had to go into battle on the job market, and surprise(!), impostor syndrome resurfaced. I remember calling my grad school mentor (Greg) before entering the job market to tell him that I may not be cut out for academia. Right away, he reminded me of my passion for discovery and, particularly, for mentoring and why I've been on this scientific journey. Interestingly, that same week, my postdoc mentor (Garret) reiterated that having a lab is not just about scientific discovery; it's also about mentoring, and he thought I excelled at this. Therefore, I realized that a faculty position would unite my passion for scientific discovery with my passion for mentoring.

When I finally launched the Rodriguez-Romaguera lab at the University of North Carolina, I soon realized that I could find other mentors suited for my next career stage as an independent investigator (e.g., faculty colleagues, department chairs, and center directors). For example, I teamed up with optical engineer Dr. Nico Pégard to co-mentor trainees and develop new tools for behavioral neuroscience. I also benefit from a close network of friends and colleagues from my previous training environments and specific programs for scientists from underrepresented groups (e.g., MBL-SPINES, SfN-NSP, and UW-BRAINS).

Therefore, I continue to find mentors across my scientific journey: "flying solo" does not mean flying alone.

Leading my own research group, I have been able to put into practice much of what I learned from my mentors while also defining my own style. I created policies and a code of conduct for lab members in order to clearly outline expectations. Unlike my mentors, I actively engage in discussions with university leadership to advocate for racial inclusivity from the perspective of a Latinx professor. I develop programs to enhance the experience of young scientists (including those from racially underrepresented backgrounds) at the undergraduate, postbac, graduate, postdoc, and early faculty levels. Trainees that I interact with come from diverse backgrounds (e.g., racial, gender, socioeconomic). Therefore, I am now achieving my dream of propagating inclusivity in neuroscience.

All that being said, have I ever fallen into the friend-mentor trap? Yes. Have I become a tyrant-mentor at times? Yes. Do I continue to struggle with impostor syndrome? Yes. Have I ever stopped caring for my trainees? No. Building a scientific career is filled with many challenges and pressures, but I must never forget my responsibility for my trainees' welfare.

Concluding remarks: One size does not fit all

In this NeuroView, my graduate mentor and I reflected on one cross-racial mentor-mentee relationship that worked. We highlight that mentors of any background can effectively train the next generation to propagate racial inclusivity in the field of neuroscience. We emphasize the importance of creating a caring and collaborative environment, balancing a mentor's emphasis on caring vs. productivity, and fostering a trainee's scientific identity. We would like to note that the present article is limited to the perspective of two male scientists (one Latinx, one White). Multiple combinations of mentor-mentee pairs can exist across gender, race, culture, sexual orientation, and neurodiversity. We hope this article helps others to reflect on best practices and continue the discussion of this important topic in public forums.^{3,8-10}

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DECLARATION OF INTERESTS

The authors declare no competing interests.

REFERENCES

- Hurtado, S., Cabrera, N.L., Lin, M.H., Arellano, L., and Espinosa, L.L. (2009). Diversifying Science: Underrepresented Student Experiences in Structured Research Programs. *Res. High. Educ.* 50, 189–214. <https://doi.org/10.1007/s11162-008-9114-7>.
- Chandra, S., Huebert, C.A., Crowley, E., and Das, A.M. (2019). Impostor Syndrome: Could It Be Holding You or Your Mentees Back? *Chest* 156, 26–32. <https://doi.org/10.1016/j.chest.2019.02.325>.
- Marshall, A.G., Vue, Z., Beasley, H.K., Neikirk, K., Stephens, D., Wanjalla, C.N., Damo, S.M., Trejo, J., Rodriguez-Aliaga, P., Headley, C.A., et al. (2023). Diversity, Equity and Inclusion in the Laboratory: Strategies to Enhance Inclusive Laboratory Culture. *Mol. Cell* 83, 3766–3772. <https://doi.org/10.1016/j.molcel.2023.09.011>.
- Lunsford, L.G. (2014). Mentors, tormentors, and no mentors: mentoring scientists. *Int. J. Mentor. Coach. Educ.* 3, 4–17. <https://doi.org/10.1108/IJMCE-02-2013-0007>.
- Hinton, A.O., Jr., Vue, Z., Termini, C.M., Taylor, B.L., Shuler, H.D., and McReynolds, M.R. (2020). Mentoring minority trainees: Minorities in academia face specific challenges that mentors should address to instill confidence. *EMBO Rep.* 21, e51269. <https://doi.org/10.15252/embr.202051269>.
- Quirk, G.J. (2019). Neuroscience Research and Mentoring in Puerto Rico: What Succeeds in This Environment? *J. Neurosci.* 39, 776–782. <https://doi.org/10.1523/JNEUROSCI.2352-18.2018>.
- Atkins, K., Dougan, B.M., Dromgold-Sermen, M.S., Potter, H., Sathy, V., and Panter, A.T. (2020). “Looking at Myself in the Future”: how mentoring shapes scientific identity for STEM students from underrepresented groups. *Int. J. STEM Educ.* 7, 42. <https://doi.org/10.1186/s40594-020-00242-3>.
- Barres, B.A. (2006). Does gender matter? *Nature* 442, 133–136. <https://doi.org/10.1038/442133a>.
- Tilghman, S., Alberts, B., Colón-Ramos, D., Dzirasa, K., Kimble, J., and Varmus, H. (2021). Concrete steps to diversify the scientific workforce. *Science* 372, 133–135. <https://doi.org/10.1126/science.abf9679>.
- Thorp, H.H. (2024). Science needs neurodiversity. *Science* 384, 365. <https://doi.org/10.1126/science.adq0060>.