EDITORIAL
Celebrating Diverse Voices in Neuroscience: Introducing Project DiViNe

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Institutions of higher education are meant to provide opportunities for the growth and development of their students. As student bodies have become more diverse it would seem to follow that institutional efforts to satisfy this obligation would likewise need to change. Despite increases in the numbers of historically underrepresented students entering higher education, the proportion of these students who graduate continues to lag behind that of students who are not historically underrepresented. As others have suggested, we believe the disparity between rates of matriculation and graduation parallels a disconnect between diversity and inclusion. Whereas the former is a relatively simple matter of access and demographic accounting, the latter concerns the lived experiences of students within our programs. Evidence suggests that the degree to which students feel valued within their programs can predict students' success, persistence, and graduation from these programs. Here, in an effort to promote greater inclusion, we propose a new pedagogical resource designed to share the personal stories and scientific contributions of neuroscientists from historically underrepresented or marginalized groups. After providing some context for why these interventions are so important, we describe the general expectations of these profiles and, in an accompanying article in this same issue, provide a number of examples. By incorporating these stories into our curricula we would hope to increase the sense of belonging of historically underrepresented or marginalized students and to increase awareness of disciplinary diversity among their peers. Ultimately, by challenging a colorblind approach to science in general and to neuroscience in particular, we hope to change our collective assumptions about who neuroscientists are and can be.

Key words: diversity, inclusion, multiculturalism, educational outcomes, STEM education, role models, visibility.

Social events of the last few years and the responses these events have engendered, have given issues of racial, sexual, gender, and other inequalities renewed prominence. Although college campuses have long served as the organizing locations of many social justice initiatives, many of our institutions continue to reflect the inequalities of the broader nation. Efforts to diversify college and university campuses in the United States have met with some success. Student diversity, reflected by the demographics of our student bodies, is relatively easy to quantify. In 1976, 83.4% of undergraduate students identified as White, compared to 10.2% and 3.8% who identified as Black and Hispanic, respectively (Snyder et al., 2016). By 2013, the percentage who identified as White had fallen to 58.4%, whereas the percentages of those identifying as Black and Hispanic had risen to 14.7% and 16.9% (Snyder et al., 2016). During this same period, overall enrollment in degree-granting institutions rose from 11.1 to 20.4 million, with just over 60% being full-time enrollments (Snyder et al., 2016). Although the overall college-aged population grew over this same period, the growth in enrollments actually exceeded that of the population as a whole, suggesting that a greater proportion of people are now choosing to enter higher education (Snyder et al., 2016). In the US in 1976, 27.6%, 22.5%, and 20.0% of Whites, Blacks, and Hispanics between the ages of 18 and 24 were enrolled in degree-granting programs, respectively. By 2013, enrollments had grown to 41.6%, 34.2%, and 33.8% for Whites, Blacks, and Hispanics in that same age range (Snyder et al., 2016; see also Martinez-Acosta and Favero, 2018). Together, these data suggest a considerable shift in the demographic landscape of US higher education with increased participation from those in historically underrepresented groups. Indeed, in 2012, and for the first time, a larger proportion of Hispanic (49%) than White (47%) high school graduates entered college directly. Projections from the National Center for Education Statistics (NCES) suggest that whereas White post-secondary enrollments will remain flat in absolute numbers between 2015 and 2026, growth of up to 20% for Black students and 26% for Hispanic students is possible (Hussar and Bailey, 2018).

As positive as these undergraduate diversity trends might be, a larger problem becomes evident when we look at program completion (e.g., Asai, 2020; Estrada et al., 2016; Martinez-Acosta and Favero, 2018). In a large longitudinal study of 1.6 million students first enrolling in 2011, for example, 6-year completion rates for White and Asian students (at the original institution) were 52.5% and 57%, respectively. In contrast, the average completion rates for Black and Hispanic students were much lower at 29.2% and 38.2% (Shapiro et al., 2017; see Figure 12). Not only were Black and Hispanic students less likely to graduate within 6 years, they were also more likely to leave higher education altogether (42.8% and 32.8%, respectively; Shapiro et al., 2017). For comparison, the percentages of White and Asian students who left after 6 years were 23.5%

and 16.5%. Overall, male completion rates tended to lag those of females in all groups by approximately 6 percentage points. However, when completion rates were disaggregated by gender, the graduation problem appears most dire for Black males, just 35% of whom have completed any degree program (either at the original or another institution) within 6 years of matriculation (Shapiro et al., 2017). Compare this to completion rates of approximately 62% of Asian/White males and 71% of Asian/White females using the same criteria. In conclusion, despite considerable gains in the post-secondary engagement of students from historically underrepresented groups, graduation numbers are not commensurate with matriculation numbers (Shapiro et al., 2017; Krogstad and Fry, 2014).

Similar disparities have been reported in STEM disciplines more specifically where students from historically underrepresented racial or ethnic groups completed degrees at approximately half the rate of White students (25.9% vs. 52.3%; reviewed in Asai, 2020; also see Ramos et al., 2017 for data concerning racial and ethnic diversity in graduates of neuroscience programs). A study by Flynn (2014) analyzed data from 2003-2009 using logistic regression to calculate risk ratios for switching away from STEM or for leaving school altogether. In this data set, Black and Latino undergraduates were 1.6 and 1.5 times more likely than their White peers to switch away from STEM, respectively, and Black students were almost twice as likely as White students to leave school altogether (Flynn, 2014; see also Estrada et al. 2016; Chen, 2013). Male students were no more likely than female students to switch from STEM to other programs but were twice as likely to leave school altogether (Flynn, 2014). Extending analyses beyond race/ethnicity in a similar data set, Hughes (2018) found that LGBTQ+ STEM students were 10% less likely to complete a 4-year STEM degree than their non-LGBTQ+ peers. Overall, these findings help characterize a selectively leaky pipeline whereby students from historically underrepresented groups (based on race, ethnicity, sexuality, or other discriminating features) are less likely to complete the post-secondary programs in which they enroll.

In order to understand the disparity between enrollment and graduation numbers, it might be useful to mark the distinction between diversity and inclusion. Tienda (2013) defined inclusion as "...organizational strategies and practices that promote meaningful social and academic interactions among persons and groups who differ in their experiences, their views, and their traits." This definition includes explicit and implicit aspects of institutional and disciplinary climate. Estrada and colleagues (2011) suggested that one reason for the lack of persistence in programs by historically underrepresented students was a belief that they did not belong. Using structural equation modeling, they observed that it was not necessarily a belief in one's ability to succeed (i.e., self-efficacy) that predicted persistence, but a more personal identification with the scientific system (Estrada et al., 2011). Indeed, the affective constructs of sense of belonging and scientific identity have emerged as key factors that increase persistence in STEM disciplines (Trujilo and Tanner, 2014; see Hurtado et al., 2007 for an exploration of similar factors in college adjustment more generally). For example, a longitudinal analysis of students in a short (5.5-day) pre-college STEM program demonstrated that sense of belonging and scientific identity were critical to their retention (Kuchynka et al., 2019). Studies like these demonstrate that a strong, affective connection to the discipline is positively related to student persistence. But what drives these connections? A study by Chang et al. (2014) demonstrated that retention of underrepresented students in STEM could be increased through engagement in research, participation in organizations related to their STEM major, or by studying closely with other students, in decreasing order of importance. Institutional selectivity, approximated by the combination of math and verbal SAT scores, was negatively related to STEM persistence in these groups as was the need to work full-time (Chang et al., 2014). On their face, the three factors that increased persistence (i.e., engagement with research, organizations, and peers) and at least one of the factors that decreased persistence (i.e., full-time employment) are related to or have an impact on the making of meaningful social and academic interactions (Tienda, 2013). However, at least for the activities that contribute positively, it is unclear whether engagement drives connection, or whether connection motivates students to engage in these activities.

Several action plans for systemic, institutional change concerning diversity and inclusion have been proposed (e.g., Estrada et al., 2016; Martinez-Acosta and Favero, 2018), and one obvious place to focus our efforts is on the classroom. Inclusive pedagogy generally has been shown to support the learning of diverse student groups and this type of teaching prioritizes classroom culture, reflective and responsive teaching, and equitable course design (Gannon, 2018; Johnson and Elliot, 2020; for strategies applied in the neuroscience classroom see Penner, 2018). Eddy and Hogan (2014), for example, demonstrated that increased structure in a general biology course increased course performance disproportionately for Black and first-generation students compared to White or non-first-generation students. Additional studies have shown that high-impact, high-structure, student-centered practices and inclusive pedagogy support the academic success of historically underrepresented students (Ballen et al., 2017; Freeman et al., 2014, Theobald et al., 2020) and, by extension, their persistence (but see Henning et al., 2019). We know that the needed institutional change will require more than just revisions of individual courses; it will demand changes to our conceptualization of our disciplines and practices concerning race, ethnicity, sex, gender identity and expression, and more. As one example, research by Aragón et al. (2016) demonstrated that faculty who endorsed multiculturalism (a position that celebrates differences) also engaged in more inclusive teaching practices than faculty who endorsed 'colorblindness' (a position that downplays differences). Although colorblindness is often well intentioned, its utopian foundation does not square with many peoples' lived experiences (e.g., Bonilla-Silva and Dietrich, 2011). Another piece of this story can be found in a study by Purdie-

Vaughns and colleagues (2008) that was conducted in a corporate setting. There a sample of Black, college-educated professionals were shown fictitious promotional materials for a consulting firm. The materials had two main manipulations: 1. High and low minority representation in group photographs; and 2. A statement of institutional philosophy that celebrated diversity or similarity (the latter of which was meant to model colorblindness). Participants reported the lowest levels of trust in the specific combination of low minority representation and a colorblind diversity philosophy. What is most interesting about this finding is that two elements were necessary: a low representation of marginalized groups and an expression of a colorblind philosophy (Purdie-Vaughns et al., 2008). The results of this study suggest that diversity philosophy (colorblind vs. multicultural) and visible demographics can contribute to feelings of exclusion for those in marginalized groups, and there is little reason to believe that this issue is unique to the business world. Indeed, the historical tendency for science educators to discuss the contributions of scientists in colorblind ways, however benevolent their intentions, might be doing all of our students a great disservice.

Thus far we have identified an inclusion problem in higher education as a whole, and in STEM fields in particular, and provided evidence that, despite increased interest in higher education from historically underrepresented groups, graduation rates have not kept pace with matriculation rates. Many of the arguments for why we ought to correct this leaky pipeline have been made in economic terms, suggesting that it would allow us to maintain our competitive advantage in the global marketplace (e.g., Allen-Ramdial and Campbell, 2014). Although this is likely true and no doubt important, there is also an ethical argument to be made. Institutions of higher education have an obligation to promote the growth and development of all of their students. Given the evidence we have shared that historically underrepresented or marginalized groups of students are less likely to persist in STEM disciplines like neuroscience or in higher education as a whole, do we not have an obligation to work harder to establish equity? In light of evidence that these graduation disparities are influenced by the broader cultures of our institutions, we believe that efforts to foster more inclusive educational cultures are needed (see also Purrity et al., 2017).

One way to work toward achieving this goal of an inclusive institutional culture is to reduce the gap between the diversity of students and the faculty who teach them (consistent with the factor of minority representation in the work by Purdie-Vaughns et al., 2008). Although we have focused on the racial and ethnic diversity of our students where 14.7% identified as Black and 16.9% as Hispanic in 2013 (Snyder et al., 2016), NCES data from the fall of 2017 indicate that just 8% and 5% of faculty identified as Black and Hispanic, respectively (NCES digest). The disparity is clear: those who are White make up 77% of faculty and just 58% of students; those who are Black or Hispanic make up 13% of faculty and 32% of students. (Sadly, recent reports suggest that this disparity has only been enhanced by the job losses that have occurred during the current pandemic; see Bauman, 2021). That the diversity of students and faculty is changing on different timelines is not unexpected given differences in the durations of college experiences and academic careers. Nevertheless, students deserve to see themselves reflected among their instructors. Although the adjustment of faculty demographics will be a longer process, it has already been shown to pay real dividends. Price (2010), for example, showed that the persistence gap between Black and White students could be reduced when Black STEM students had at least one Black STEM instructor, and Cotner et al. (2011) demonstrated that the female STEM instructors increase the scientific confidence of female students (also see Young et al., 2013). A quasi-experimental study by Stout et al. (2011) explored a stereotype inoculation model by exposing students to counter-stereotypical role models. In that study, when female students were provided with STEM-positive female role models their implicit attitudes about STEM were more positive, they identified more with STEM, and even exerted more effort on a math test. Stout et al. (2011) argued that female role models protected the student against readily available stereotypes and allowed them to imagine themselves in similar professional roles. Work by Schinske et al. (2016) also showed that the incorporation of counter-stereotypical examples of scientists in courses resulted in longitudinal shifts in science identity and course grades. Dasgupta (2011) describes role models as social vaccines and argues that we can promote student success by "diversifying the demographics" of our academic settings and, thereby, inoculate our students to historically prevalent stereotypes. Studies like these demonstrate that diversifying the classroom and curriculum can change attitudes, actions, and outcomes, and help to close the equity gap evident in STEM.

MISSION STATEMENT

Project DiViNe (Diverse Voices in Neuroscience) is a collaborative effort between the Faculty for Undergraduate Neuroscience (FUN) and the Journal of Undergraduate Neuroscience Education (JUNE) and is meant to facilitate the dissemination of materials that neuroscience educators can use to highlight the scientific contributions and personal stories of scientists from historically marginalized or underrepresented groups.

VISION STATEMENT

Our commitment to this project was reinforced by a recent statement from FUN that called for educators to reflect on our contributions to systems of oppression, to commit to supporting anti-racism work, and to work toward inclusive excellence and recognizing the humanity and potential of diverse people (https://www.funfaculty.org/content.asp?admin=Yandcontentid=187). We view this project as one step of the many required to create a more inclusive neuroscience community.

PROJECT DIVINE

We are introducing an open-source pedagogical tool that will allow instructors to incorporate the stories and contributions of diverse neuroscientists into their courses, providing meaningful human context to the research we share (cf., Chamany, Allen, and Tanner, 2008). The target of this intervention is not just our historically underrepresented students. By bringing awareness to the contributions of diverse neuroscientists, our hope is to change the way we all think about our discipline. This project joins a growing number of initiatives intended to bring awareness to the contributions of historically marginalized scientists. One example of such a resource is a list of inspiring Black scientists that in just one year's time has grown from an initial offering of 100 to now include more than 1,200 (http://crosstalk.cell.com/blog/an-addendum-to-1000-inspiring-black-scientists-in-america). Similar resources have also emerged to highlight the contributions of women in neuroscience (https://www.storiesofwin.org/), Hispanic/Latinx and Native American scientists (http://crosstalk.cell.com/blog/100-inspiring-hispanic-latinx-scientists-in-america; https://www.sacnas.org/sacnas-biography-project/), and LGBTQ+ scientists (https://500queerscientists.com/). Such lists are likely to be of tremendous value in raising awareness of the contributions of members of these and other groups, particularly for students hoping to identify possible mentors, for networking within the scientific community, and for identifying a more diverse range of scientific experts for use by those in the media. Our goal here is not to duplicate these efforts, although we share the spirit articulated by the SACNAS Biography Project (https://www.sacnas.org/sacnas-biography-project/) of making role models visible. Instead, our focus will be on highlighting the efforts of scientists from historically underrepresented or marginalized groups whose work is of relevance to the field of neuroscience in such a way that they and their work can be readily incorporated into our teaching.

As will be evident from the example profiles included in the companion paper to this editorial (Frenzel et al., 2022), profiled scientists can be historical or contemporary figures. We are looking for an opportunity to present a more inclusive view of the important work being done within our discipline, and exactly when these contributions have been made matters little. This initiative is aligned in general spirit with the *Amazing Papers in Neuroscience* media reviews also found in this journal (Harrington et al., 2015; Harrington et al., 2016), but diverges somewhat in its scope. Whereas the Amazing Papers reviews focus almost exclusively on scientific contributions, Project DiViNe will be more attentive to those who have made these contributions. Each resource should provide some biographical information about its author(s), links to relevant papers and other useful instructional resources, an indication of the important information contained within these resources, and guidance about where, when, and how the information could be used in the undergraduate neuroscience curriculum. Again, as with the Amazing Papers mechanism, the inclusion of resources like primary journal articles remains a priority, although supplementary materials of different types are welcomed. Just as we have deferred to our contributors when deciding which papers are of pedagogical value in their classes when contributing Amazing Papers reviews, we will defer here when identifying those scientists who might represent historically underrepresented or marginalized groups. We have no intention of acting as gatekeepers in this domain and would encourage a broad view of diversity.

FUN will maintain an online, searchable catalog of these resources on (or linked through) its website, making it easier for educators to incorporate the research and biographies of diverse neuroscientists into their teaching. The success of this initiative clearly depends upon the willingness of members of the neuroscience community to make contributions to this catalog. As we hope will be evident in the initial collection of profiles included in a companion paper in this issue (Frenzel et al., 2022), these profiles are an opportunity to acknowledge those who have made (or are still making) a difference in our discipline and in the lives of their students and collaborators. One goal here is to expand the range of this difference making. So long as profiles are of relevance to the teaching of neuroscience, we would welcome any contributions. We also hope that the online format available through the new FUN website will allow contributors to identify potential collaborators for profiles. This collaborative approach would strengthen contributions especially when contributors might include people from outside of the field of neuroscience. For those looking for even deeper involvement with the initiative there should be opportunities to help solicit, review, and edit these resources. We might also develop an online workspace where profiles might be incubated and offer periodic write-a-thons (perhaps linked to events like FUN's summer workshops) to bring contributions to fruition. As a shared initiative, we welcome comments and corrections on resources, nominations for additional resources to develop, and other feedback.

GETTING INVOLVED

The process for getting involved with the project and contributing to profiles is meant to be as open as possible while still maintaining its integrity. Those who are interested in getting involved should first visit the project's webpage on the FUN website: https://www.funfaculty.org/project_divine. This page will maintain the latest expectations for the project's implementation and will be updated as any of the processes are changed. Contact information for program coordinators will also be available on the project website. We fully expect that while the spirit of the initiative will remain largely intact, the details of its implementation are likely to evolve. We welcome your contributions to this process.

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