Human Factors and Ergonomics in Diversity, Inclusion and Social Justice Research

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Abstract
The Human Factors and Ergonomics Society Diversity Committee is entering its second year and continuing to explore ways to increase the diversity of the society. Following last year’s panel on “Challenges and Opportunities for Involvement,” we, and others, recognized that human factors and ergonomics (HFE) professionals are equipped and able to advance diversity, inclusion and social justice issues. This panel will bring together researchers to discuss experiences addressing these issues to highlight existing work, spark excitement about conducting new work and share advice. This panel will discuss and share lessons learned in a range of projects, including an HFE approach to studying diversity in academia and applications of user-centered design to address the intersection of technology and bias. Macroergonomics contributes important tools and approaches; the need for collaboration with other disciplines and intersectional thinking will be considered. Finally, venues for scholarship in this area of work will be highlighted.

Disciplines
Human Factors Psychology | Other Operations Research, Systems Engineering and Industrial Engineering

Comments
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INTRODUCTION
The Human Factors and Ergonomics Society (HFES) Diversity Committee is now entering its second year, previously existing as a task force over a number of years (Chiou, Wooldridge, et al., 2017). The committee initially focused on diversity within HFES as an organization. Our purpose is:

“to support diversity and inclusion efforts within the society. This involves recognizing and celebrating the variety of characteristics that make individuals unique. The Committee seeks to facilitate this by continuing and initiating programming or policies as part of the society’s ongoing efforts to foster a culture and atmosphere of mutual respect, to retain, attract, and promote outstanding, diverse human factors professionals. As part of a larger, diverse global society, HFES must also become a diverse professional association to truly develop innovative and enduring solutions to global problems.” (Chiou, Wooldridge, et al., 2017, p. 498)

To this end, we organized a panel last year on the history of the Diversity Committee, importance of diversity and approaches to enhancing diversity. Many practical conclusions to address diversity in HFES emerged from the panel, e.g., foster a culture of inclusion, engage in outreach and education, learn from student chapters, et cetera (Chiou, Roscoe & Wooldridge, 2017). One conclusion of this panel and subsequent discussion was that we, as human factors and ergonomics (HFE) professionals, possess the skillset to examine systemic issues in light of complexity and human capabilities and limitations. In fact, several speakers during the 2017 annual meeting, such as the keynote by Ronald Davis and Presidential Address by Dr. Nancy Cooke, highlighted that issues of public safety, public health and justice fundamentally involve human systems. As such, we argue that HFE principles, methods, expertise and research could directly advance diversity, inclusion and social justice.

Therefore, in this panel, we bring together human factors researchers from a variety of backgrounds, experiences and research traditions to discuss their experience conducting HFE research that considers diversity, inclusion and social justice issues as the focus of investigation as well as in research design. Panelists will highlight existing work in the area and engage the audience to generate interest and share advice for applying HFE expertise to these issues including exploring venues for dissemination.

Expanding Human Factors Contributions to Social Justice Research Through Collaboration
Rupa Valdez, Ph.D., University of Virginia, USA

Engaging with research seeking to advance diversity, inclusion, and social justice issues requires interacting with phenomenon that may be conceptualized as macro-level factors such as culture, economics, and policy. Although a macroergonomic perspective specifically acknowledges the need to understand and address such factors, most human factors and ergonomics programs do not provide comprehensive training in these areas. In his paper titled
“Culture, politics and ergonomics,” Neville Moray (2000) argues for the need to incorporate social science perspectives within human factors approaches. One approach to accomplishing this is to cross train human factors professionals in social science approaches. However, a complementary approach that allows for an in-depth integration of human factors and social science perspectives is establishing deep collaboration with researchers of other disciplines.

Over the past four years, we have established a partnership that merges human factors and global development approaches to conducting participatory action research on topics of importance in the field of global health. Our projects have spanned topics traditionally within the domain of human factors (e.g., occupational health), newly within the domain of human factors (e.g., self-management of chronic conditions), and rarely within the domain of human factors (e.g., youth violence and social mobility). These projects have occurred in traditionally marginalized communities such as a small rural town in Appalachia, a township outside Cape Town, rural villages in Gujarat, India, and a public housing community in Virginia. Each of these projects ties academic perspectives with community perspectives, and each involves multiple community collaborators whose voices drive the research priorities.

A human factors perspective has been instrumental in analyzing each of these research priorities from a systems perspective. Overarching frameworks such as work system models have been useful in analyzing and communicating the ways in which multiple factors shape current realities and highlighting opportunities for interventions. More specific tools such as task analyses have allowed for systematic evaluation of an app that was co-designed with youth in West Virginia. However, these human factors tools and approaches are not used in isolation. Instead, a deep collaboration with researchers from a social science discipline and community partners allows these human factors tools and approaches to be used within a broader social justice framework.

Understanding Sociotechnical Systems Requires a More Complex and Intersectional View of Diversity

Enid Montague, Ph.D., DePaul University, USA

Intersectionality is a theoretical position originated from feminist theory that posits that aspects of cultural identity should be considered as interwoven and not separate. These aspects of identity can include class, ethnicity, race, sexual orientation, disability and gender identity. Individuals may prioritize one aspect of their identity over another in different circumstances or over time, but the intersectional identity still exists. By failing to understand the intersecting identities we may lose perspective on the larger challenges individuals face or miss opportunities to identify groups of marginalized people that have shared experiences because of their intersecting culture identities.

Intersectional thinking is important as we move toward diversifying the human factors workforce, but it is also essential to understanding sociotechnical systems. When we move to better understand intersectional cultural identity we will likely uncover system barriers and opportunities that marginalized groups face and we will perhaps be able to develop better more inclusive designs that are sustainable.

Gender in the Workplace: A Human Factors Psychology Perspective

Mattie N. Milner, Embry-Riddle Aeronautical University, USA

As more female students than ever pursue graduate degrees, particularly in STEM fields, it is important to understand female students’ career and workplace perceptions. Many Human Factors PhD programs across the United States have a higher female to male ratio; however, many Human Factors professors are male. This gender discrepancy indicates that while females are obtaining PhD degrees, most of them are choosing to work in non-academic fields. Current research efforts in this area are attempting to address female Human Factors PhD students’ intended career plans and their perceptions of working in academia. The current study aims to investigate female PhD students’ thoughts and concerns regarding a career in academia and their career current plans. Female graduate students were recruited via email and the majority participated in a private, in-person interview with one of the researchers. Other participants were interviewed via phone or skype interview. Interviews were then transcribed by researchers and analyzed using NVivo, a qualitative data analysis software. Current results indicate that women feel there is gender discrepancy in industry, government, and academia and have concerns regarding gender discrimination. Fortunately, many women do not believe that gender discrimination will halt their career path; however, they are expecting it to hinder their success. In general, women feel that academia may still have elements of “good old boys club” meaning that there are groups of men in high authority positions who will exclude women from “joining” or cause women to miss out on opportunities. To ensure generalizability, and reach as many female graduate students as possible, interviews are still being collected and the data will continue to be analyzed. Completed results will be analyzed using thematic analysis and NVivo. This is an ongoing problem that impacts many different areas of the workplace; therefore, it is important to understand women’s perception of gender discrimination before researchers attempt to understand women’s behavior, and eventually how we can improve women’s future careers.

Research in User Centered Design to Address the Interaction of Technology and Bias

Michael Dorneich, Ph.D., Iowa State University, USA

Human Factors is well placed to bring its user-centered design lens to studying the interaction of technology and bias. Furthermore, through explicit design, technology can be used to give voice to, study, and address issues of diversity and inclusion. The user-centered design is an interactive process with three stages: requirements, design, and evaluation. Four projects are reviewed to highlight the utility of human factors research in each of these areas. In requirements development,
often the first issue is to gather reliable data. This if often difficult with marginalized populations because of issues such as access, time, language, economic resources, and trust. As part of a project to support city stakeholders making decisions, we have developed and applied a set of “best practices” when engaging marginalized populations to collect data, attitudes, and opinions (Stonewall et al., 2017). In a second project, we developed requirements for the application of Game-Based Learning (GBL) to the design of games with the goal of increasing female middle-school student’s interest in STEM. An evaluation demonstrated an increase in computer science interest by female students playing a game developed under these requirements when compared with their previous attitudes (Bonner & Dorneich, 2016). In the area of design, we have done work on how to be intentional in the gender perception of the design of websites (Stonewall & Dorneich, 2016). In a series of studies, design elements and their impact on perceptions of a website’s gender, professionalism, and user experience were studied. In a follow-up study, the perceived gender of the websites was shown to affect assessment of websites’ professionalism, workload, usability, likability and visual appeal (Stonewall, 2016). In the area of evaluation, we have been studying the effect of bias in student peer assessment in team-centric classroom strategies such as Team-Based Learning. Peer assessments monitor team performance and ensure accountability. However, the fairness of peer assessments may be impacted by student biases. We are currently reviewing the literature and developed an initial description of the issues involved to identify the extent to which bias has been observed to affect peer assessment scores (Stonewall et al., 2018). It is through efforts to address bias in education, design, and evaluation that human factors research can contribute to a fairer, more diverse, inclusive education and work environment.

Venues for Human Factors and Ergonomics Scholarship on Diversity, Inclusion and Social Justice
Rod Roscoe, Ph.D., Arizona State University, USA

The fundamental goals of human factors and ergonomics (HFE) research and practice include making the world safer, more efficient, more accessible, and more effective for human beings. This work acknowledges human needs, goals, capabilities, and limitations, and strives to ensure that these factors are addressed within the context of an overarching system. We argue that this mission of HFE can be aligned with efforts to include diverse people and ideas, and to transform or overturn systems of inequity that hinder inclusion (whether purposefully or inadvertently). For example, the HFE literature and related fields are rich with examples of scholarship on designing for and within special populations, complex settings, and cultures (e.g., Hall, Meyer & Rose, 2012; Kaplan, 2004; Kroemer, 2005; Vanderheiden & Jordan, 2012). When good (re)designs result in improved access and opportunities for diverse people, the goals of inclusion and social justice may be advanced.

As a way to acknowledge and encourage the social justice applications of HFE research and practice, it is necessary to have venues that bring such scholarship to the forefront. To the extent that outlets for publication address these issues as a featured theme, we can perhaps elevate “promoting social justice” to the level of worthwhile goals such as “increasing safety,” “improving accessibility,” and “optimizing performance.” Thus, we seek to offer platforms for HFE scholars working in this space to highlight their achievements, and to educate other scholars about unrealized applications and benefits of their own work.

Themed conference sessions (such as this panel) are one such venue! Other targets include special issues in relevant journals, interactive workshops and symposia (whether independent or affiliated with a conference), and edited volumes. A long-term goal may be to establish a new journal focusing on the above topics. A multipronged approach, sustained over time by committed scholars, will likely have a positive impact for the field as a whole.

REFERENCES