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Introduction
Caring for Equitable Relations in Interdisciplinary Collaborations

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Abstract

Collaborative research between scholars of science and technology studies (STS) and scholars of science, technology, engineering, and math (STEM) is a growing trend. The papers assembled in this Special Section offer both embodied and empirical knowledge on how ethnographers negotiate our roles in integrative research when constrained by what our technoscientific collaborators value, what funders demand, what our home institutions expect, what we want to learn from the worlds we study, and the social transformations we envision in science and society. We grapple with how we as ethnographers can best balance caring for the communities we study, the ones we serve, and the ones we identify with. We take care that knowledge making is political. Race, gender, class, and ability status of scholars intersect with the organizational, institutional, and cultural contexts in which we practice science to shape and be shaped by entrenched power relations. Through a feminist politics of care, this collection transforms tensions in interdisciplinary collaborations into resources that enlarge our understandings of what these collaborations are like for STS ethnographers, make visible certain labors within them and, crucially, enrich our vision for what we want these collaborations to be.

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> When I ask who cares about what we do in science studies, I mean not only who is concerned with the dangers of our work, but who can see its full implications and recognize its potential value.
> —George Levine, "What Is Science Studies for and Who Cares?"

Collaborative research between scholars of science and technology studies (STS) and scholars of science, technology, engineering, and math (STEM) is a growing trend. There are many important reasons for doing this kind of research: because entrenched sociotechnical problems need many kinds of expertise to address them(National Science Foundation, n.d.); because STS and STEM researchers alike want to reform technoscience; because interdisciplinary research is an influential site for power relations in knowledge production, making it a valuable case study for feminist STS researchers; because it's fun and challenging; because funders incentivize it; because the problem of partial knowledges can lead to inadequate or inequitable products (see Parvin and Pollock 2020). However, few researchers have formal training in interdisciplinarity or team science, so we are all figuring things out as we go. We rarely publish these tinkered-together methodologies of interdisciplinarity, perhaps because they feel too ad hoc, we are embarrassed to share how they've failed (because of course, sometimes they do, and learning how these failures happen would be very useful for other interdisciplinary teams), and we don't want to critique our collaborators for fear of social or professional consequences. Still, we all construct frameworks of how to work together across epistemic and disciplinary boundaries, as well as across barriers from power differentials based on expertise, identity, and disciplinary status. These frameworks are both practical and theoretical, even if they are not explicit to our collaborators or sometimes even to ourselves.

This Special Section strives to excavate various ad hoc yet common approaches to collaborations between social scientists, life scientists, and technoscientists, and theorize about them based on feminist thought, particularly through the lens of care. We aim to bring these methodological insights to other STS scholars in the hope of building solidarity and community around this challenging and crucial work. We also hope STEM scholars can learn about interdisciplinary collaborations with ethnographers from this collection of essays. All researchers swap fieldwork stories; here we bring those stories out of the realm of informal chats, advice, commiseration, and complaint. Instead, we transform them into intellectual resources that enlarge our understandings of what interdisciplinary collaborations are like for STS ethnographers and, crucially, enrich our vision for what we want these collaborations to be.

Ethnography and Care in Feminist STS Research

Taking up and scaling up care in feminist STS, particularly in interdisciplinary efforts toward institutional change, requires confronting questions of race, gender, sexuality, and coloniality as historical, inductive analytics essential to understanding the multiple dimensions and far-reaching impacts of science and technology (Subramaniam et al. 2017). Feminist STS scholars frame emotions and embodiment as ways to think about care in domains beyond gender-coded sites such as nursing and childcare (Martin, Myers, and Viseu 2015; Patrick 2023). We also acknowledge and speak back to the colonial roots of Western science, whose traditional forms of data collection, classification, and representation too often serve an imperialist approach to knowledge and research (Smith 2021). In this collection, we are ethnographers who study emotions and embodied experiences in interdisciplinary collaborations and theorize about care by documenting the ignored, silenced, and neglected experiences of marginalized team members. María Puig de la Bellacasa probes the "meanings of care for knowledge politics in STS," a politics she argues is predicated on "oppositional standpoints" (2011, 85). Oppositional consciousness is foundational to feminist standpoint theory, a body of scholarship interrogating the politics of knowledge production and the specific situatedness of "competent" knowers within science (Dotson 2011, 2014; Fricker 2007; Settles, Buchanan, and Dotson 2018; Settles et al. 2020). A decolonizing approach to theorizing with care means that opposition is collective and actively resistant to systems of subjugation (Hobart and Kneese 2020; Sandoval 2000). Our contribution to this feminist, decolonial research tradition is to mobilize ethnography to illuminate and eliminate structural disadvantages in science and technology, especially those that pose barriers to interdisciplinary collaborations across social, technical, and life sciences. We aim to catalyze frameworks of shared understanding and collectively work toward egalitarianism in the production of knowledge.

We are especially inspired by feminist scholarship that has created foundational approaches to relations of technoscience and care. For example, the germinal 2011 paper by Puig de la Bellacasa, "Matters of Care in Technoscience: Assembling Neglected Things," contributed to an understanding of care both as a conceptual concern (what do we care about?) and a methodological one (why do we care?). Additionally, a 2015 special issue of *Social Studies of Science,* edited by Aryn Martin, Natasha Myers, and Ana Viseu and titled "The Politics of Care in Technoscience," extended Puig de la Bellacasa's work through theorizing care as a mode of attention, which, via structures of power, can direct attention to some relations and obfuscate others. Eight years after the publication of this important special issue, we are curious to learn how other STS scholars are taking up and practicing care to combat enduring injustices and what affective troubles are emerging (see Duclos and Criado 2020; Jerak-Zuiderent 2015; Lindén and Lydahl 2021). We are specifically interested in STS ethnographers' perspectives. Thus, in concert with other feminist STS ethnographers, we aspire to use the politics of

care to transform the unfair and "unhappy affects" of interdisciplinary collaborations (Smolka, Fisher, and Hausstein 2021, 2) into epistemological resources (Harding 1992) that generate scholarship beneficial to coalition building that asks with whom and for what purpose (Davis and Craven 2016)?

This Special Section draws from feminist thought to bring situated knowledges to the forefront by examining experiences and emotions that emerge within collaborative projects as sites for theorizing intersectionality, reflexivity, and positionality, which are key methodological approaches of feminist ethnographic research. We propose that care is a foundational concept for thinking about interdisciplinary collaborations. Further, care as a mode of attention (Martin, Myers, and Viseu 2015) within these research projects advances new knowledge about how the intersecting dimensions of power produce relationships, careers, scholars, and research design, as well as human society and the more-than-human worlds.

In addition to feminist STS theories on care, this Special Section features ethnographers' feminist interpretations of scientific practices and knowledge production. Ethnography is shaped by Black feminist thought (Chapman 2010; Collins 2000; Davis and Craven 2016; Fraser 1998; Hurston 1998). Social science research from Black feminist perspectives takes up new questions, valorizes lived experiences, and practices an ethics of caring centered on empathy, individual creativity, and emotional intelligence (Collins 2000). Therefore, ethnography guided by these principles is creatively attentive to distinctions between researcher and researched, scientist and subject. This method takes care to make sure that women of color and others who have been historically disenfranchised from official sites of scientific knowledge production have the opportunity to have an active presence in texts by and about them. Indigenous STS scholar Kim TallBear (2014) proposes that we "stand with" research participants by acting to transform our research participants into our collaborators, colleagues, and sources of deep mutual learning and positive social change. She finds that caring about shared concerns and about each other opens researchers up to rich and unexpected research directions and social outcomes through collaboration across social hierarchies and disciplinary identities. For example, TallBear (2014) enacts caring collaborations as a way to reform science by helping scientists change how they think. Many of this Special Section's authors hold this activist motivation too, viewing our collaborations as a "call to intervention" in technoscience, in scientist and Indigenous STS scholar Max Liboiron's (2016) words. Thus, informed by feminist, Black, and Indigenous thought, interventionist STS scholars strive to improve both scientific practice and our knowledge of power relations by working *with* technoscientists, university leaders, funding agencies, and others to align scientific knowledge-making infrastructures with values of equity and social justice. Hence the crucial social and epistemic need for practices of care when

navigating intersecting norms, values, and labor across differences of race, gender, class, ability, and career stage within interdisciplinary collaborations.

In this issue, the reader will learn more about the political and practical challenges of this type of care work. Using feminist ethnography, with its commitment to addressing relations of power within the research process, to conduct social studies of science adds greater complexity to the questions of quality and significance, voice and representation in our work. For example, when our "subjects" are scientists and we gain access to field sites through collaborations funded by technocratic foundations such as the United States' National Science Foundation and National Institutes of Health, historical asymmetries of resources and regard between the physical and social sciences can erupt and erode collegiality between collaborators and challenge the rigor and quality of our science. Too often, social scientists are integrated into funded collaborations in a "consultative manner" (Boudart and Borra 2023) and qualitative methods are adopted but shorn from critical methodological and epistemological traditions foundational to social science fields (Lewis 2022; Viseu 2015).

This subordination of social theory and its experts is dangerous. First, it limits what topics and evidence we as ethnographers can engage with, critique, and even access, particularly when combined with other forms of marginality from our identities and career stages. Second, the preferential treatment of quantitative, positivistic science and the denigration of qualitative science is part of a larger neoliberal project to defund and discredit critical scholarship and reallocate scientific resources to historically enfranchised members of US society (Carrigan and Bardini 2021). Coleen Carrigan and Michelle Bardini (2021) coined the term *epistemic prejudice* to refer to this phenomenon as it unfolds in sites of scientific and technical knowledge production. Epistemic prejudice is a subset of "epistemic injustice," a broader form of social violence that thwarts epistemic practices of the marginalized and normalizes this violence (Fricker 2007). The papers in this collection document this well-known but understudied problem in the contexts of interdisciplinary collaborations (Boudart and Borra 2023). For example, we found that epistemic prejudice stymies transformational changes, silences voices of highly marginalized members of technoscience through the violence of generalizability, and leaves exploitative dynamics in both the production of technoscience and its applications untroubled. It also makes it harder to negotiate the production of integrative knowledge and to reach consensus on what new discoveries we care to share with the world. This prejudice can thus lead to conflict and censure, making it harder to critique and transform gendered, racialized, and heteronormative practices, values, and behaviors in a team's culture and in scientific practices and institutions more generally. Third, ethnography's distinctive feature is participant observation (Barker 2012). Spending time and hanging out with our participants often deepens camaraderie, and friendships can develop. This rapport, however, can make it more difficult to

recognize or challenge epistemic prejudice in our interdisciplinary collaborations, because we care to not hurt feelings and thus jeopardize personal and professional ties. Fourth, engaged ethnographers can be cast in the gendered role of caretaker on projects, there to "observe not disturb" and provide ethically coded services and products, certainly not to lead research practices and meaningfully contribute to new knowledge (Viseu 2015, 642). We worry that the knowledge we *can* produce when shunted into hospitality roles rather than leadership in collaborations is therefore less complete, less rich, and less useful to liberatory projects. Additionally, the power relations animating these role allocations are ones of domination. Like other forms of harassment, they cause harm to both social sciences faculty and our students.[1]

Finally, epistemic prejudice in science against those of us with expertise in studying social forces weakens the scientific community's ability to fortify itself against far-right activism targeting secondary and post-secondary education (for examples of such activism, see Fucci and Catalano 2019; Giroux 2013; Krigel 2020; Riley 2018; Saul 2023). This vertical stratification in the academy leaves critical scholars on the frontlines of these coordinated attacks on academic freedom with little support and thwarts the ability of the research community to mount and fortify a collective response. Therefore, one significant assumption we want to destabilize in this Special Section is the gendered idea that care in STS research is motivated only by a sense of duty or "warm feelings of love, affection, or nurture. Care is just as often propelled by anxiety, injury, injustice, indignation, or frustration" (Martin, Myers, and Viseu 2015, 630). In these ways, care is a form of protest.

This Special Section is our attempt to confront the challenge of doing research across epistemic borders with hard-won evidence from feminist ethnographers creating both embodied and empirical knowledge on negotiating our roles in integrative research. Like many who challenge dominant norms, practicing care in STS knowledge creation can also make one vulnerable to retaliatory punishments, such as constraining career advancement by withholding resources or being uncivil (Viseu 2015). But we also risk being disregarded as an unreliable source of knowledge due to epistemic prejudice. Pejoratives, like "fluffy" and "soft," are designed to discredit our capacities as scholars and the kinds of scholarship we do and why (Martin, Myers, and Viseu 2015). For the collaborative turn in STS to blossom fully, we must resist this hierarchy between social and technical knowledge and publicly debate how social scientists should navigate precarious status on interdisciplinary collaborative teams (Reardon 2022; Reardon et al. 2015). Are we supporters or critics, collaborators or consultants, "adversarial outsiders or co-opted insiders" (Smolka, Fisher, and Hausstein 2021, 1)? The papers in this Special Section address these questions empirically, based on the authors' experiences as social scientists in interdisciplinary STEM projects. Together, we analyze our own methodologies of collaborative knowledge

production across disciplines in order to ask how research teams might care for each other and their shared work in ways that forefront equity, empathy, and celebration of diverse kinds of knowledge.

Positionality

This Special Section grew out of an open panel at the 2021 Society for the Social Studies of Science (4S) conference. Into this STS professional network, we cast a wide net for other ethnographers who also have experience in interdisciplinary collaborations with technoscientists and faced their share of challenges within them. Organizing that panel was inspired by our own experiences with interdisciplinary collaborations in which we did not feel cared for or our expertise appreciated. For example, scientists and engineers sometimes invite us to collaborate with them on projects by doing project evaluation, education, and/or public outreach, but do not see us as researchers. Instead, we are assumed to be operational support in service of our technoscientific peers in the integrative field sites of STS. In another example, technoscientists pushed qualitative social researchers off funded projects that the latter made possible because the technoscientists felt they had gotten what they needed from us and didn't understand how our expertise could possibly shape the technical application of our qualitatively generated data. By taking up feminist ethnography, the contributors to this Special Section protest these conditions and turn them into intellectual resources mobilized for transformational change in STS and, more broadly, in interdisciplinary collaborations. Accordingly, this Special Section contributes to a politics of care that catalyzes feminist STS scholars' vision of interdisciplinary collaboration, thanks to methodological foci on undervalued and invisible labor, situated knowledges, power dynamics, and the dual nature of care—which we understand as both a value (e.g., things we care about) and an action (e.g., things we care for or take care of).

A practice of care within interdisciplinary collaborations depends upon a recognition of the politics of labor. STS scholars have recognized the importance of different kinds of labor to the success of scientific practice, such as managing people and equipment, as "articulation work" or even "lab care-taking" (Fujimura 1996; Knorr Cetina 1999). But this work is underrecognized in assessments of research careers, especially its affective and emotional aspects, such as its typical absence in assessments for hiring, promotion, and tenure (Davies and Horst 2016; Smolka, Fisher, and Hausstein 2021; Viseu 2015). One example of a research methodology that assumes but does not support or reward social scientists' "affective labor" is what T.Y. Branch and G.M. Duché (2022) call collaborative sociotechnical integration (CSTI) research. CSTI projects follow protocols of intervention in STEM research to promote scientists' self-awareness. In CSTI projects, social scientists guide scientists to think through how their social and professional values influence their research practices, such as their biases about race and gender, their assumptions about more junior researchers' productivity

and abilities, and their own access to resources and privilege. This delicate methodology requires social scientists to control their own emotions and responses to be active and non-judgmental listeners. Branch and Duché call for these social scientists to take good care of themselves, to prevent their burnout from exploitative affective labor and to "heighten the potential of these interventions" (2022, 13). Preventing harm to social scientists providing emotional labor to their technoscientific peers—and holding social scientists alone responsible for their own well-being—is a weak form of care indeed. Ethically, it is unacceptable to ask social scientists to expose themselves to potential harm from affective labor, especially in technocratic domains that discredit their expertise. If scientists deserve care as they navigate a CSTI study, then so do social scientists. After all, emotion-sharing between scientists and social scientists (rather than unidirectional emotional expression from scientists alone) enriches the relationship within the collaboration, and improves the rigor and breadth of the research practices—and thus, the resulting knowledge (Carrigan et al. 2023).

This is just one example of how an attention to care when analyzing interdisciplinary collaborations can address power asymmetries in collaborations between social science and STEM researchers, while offering possibilities for improving science and its workforce culture. The following papers investigate their authors' experiences as members of interdisciplinary teams through a feminist lens of care. Like other STS scholars, our experiences as embedded ethnographers are part of our data sets and give us unique insights (Hackett and Rhoten 2011; Lyle 2017; Viseu 2015). Our positionality affects with whom we can talk, how we are received in the field, and how and where we can share our findings. So, in this way, the politics of care in knowledge production will always be shifting and changing based on place, practitioners, and the particular dimensions of structures of power (e.g., race, gender, economics, and institutional affiliations) that we all navigate to create knowledge (Cook and Trundle 2020).

The few other publications in which social scientists reflect on their own methodologies for collaboration with STEM scholars are insightful and offer some practical guidelines for other social scientists (e.g., Balmer et al. 2018; Boenig-Liptsin, Tanweer, and Edmundson 2022; Carrigan et al. 2023; Forsythe 2001; Lyle 2017; Rabinow and Bennett 2012; Smolka, Fisher, and Hausstein 2021; Viseu 2015). In general, they warn that teams set STEM as the standard for productivity levels, research questions, methods, and ways of working, such that STEM scholars may ignore, override, or even denigrate social scientists and their research practices. These STS authors share stories of emotional labor they have undertaken to appease their collaborators, such as swallowing critiques to avoid conflict, and the emotional toll of feeling misunderstood, superfluous, or unwelcome. They recommend the importance of having at least some intellectual input into project design, holding equal funding and status (e.g., a co-investigator title) as STEM collaborators, and choosing to work with people who value social

science contributions and truly want to produce socially beneficial project outcomes. They point out common biases that shape team interactions, including the prioritization of STEM; assumptions about researchers' race, gender, and age; and risks of doing interdisciplinary collaborative research without job security, such as for students, scholars in precarious temporary positions, and faculty on the tenure track. These are wise observations and recommendations that resonate strongly with this issue's authors. We strive to build on these contributions by sharing our own experiences and interpretations to demonstrate what ethnographers bring to the table of interdisciplinary knowledge projects.

Together, the papers demonstrate that feminist ethnography is especially critical to STS research that cares about equity and justice in scientific practices, relations, and impacts. Each paper asks how researchers enact care in decisions about research questions, methods, data, and conclusions as well as in everyday interactions with each other as collaborators. Ashley Lewis takes up auto-ethnography to interrogate power dynamics in a funded interdisciplinary collaboration to develop models that envision different ways of building sustainable urban environments. In her essay, "STS Researchers as Technology: Multiple Positionalities as Interpretations of Participant Expectations and Agendas," she positions herself and the team's interdisciplinary practices as "technologies" to analyze the purposes of the project and the roles her multiple identities played in relationships with her colleagues, who viewed her either as a spy, the interdisciplinary catalyst, or a caretaker. This self-reflexive approach that forefronts emotions makes visible the taxing work of ethnographers collaborating with technoscientists, the hierarchy of power relations on teams, and the costs to STS ethnographers when what we do and contribute to interdisciplinary research is misunderstood or maligned.

Coleen Carrigan offers feminist principles on taking care when documenting the neglected experiences of highly underrepresented actors in technoscience using ethnography designed according to intersectionality theory. "Sheltering: Care Tactics for Ethnography Attentive to Intersectionality and Underrepresentation in Technoscience" introduces a data sharing practice called *Sheltering*, inspired, in part, by the feminist standpoint methodology of "strong objectivity" and the computer science technique of "black boxing." Troubling multiple structures of power reproducing inequality in science involves risk and Carrigan describes three care tactics— reflexivity, refusal, and performance—which she has used to "shelter" or protect participants from interpersonal and institutional harm in several feminist ethnographic projects in the US. She concludes that ethnographers, by enacting solidarity in the struggle to end epistemic and social injustice in US knowledge production, can help transform who gets to produce science and reimagine other ways of knowing.

Jennifer Croissant, in her essay "Late to the Party: Articulating Time and Care in Interdisciplinary Projects," examines multiple registers of time on an interdisciplinary project designed to learn more about scale issues in the life sciences and create a new pedagogical curriculum for the emerging field of ecosystem genomics. She shows how conceptions of time function as a subtle but important indicator of researchers' disciplinary values. Specifically, she documents how the project's operational practices, such as scheduling, role allocations, communication, and outputs, reproduce and codify the subordinate status of social science researchers in collaborations. Like Lewis, she employs self-reflexivity to evince the costs of such hierarchies of power. Further, she argues that interdisciplinarity is instrumentalized, thereby constraining opportunities to integrate epistemological approaches that could generate solutions to society's "grand challenges" that interdisciplinarity is supposed to solve.

All researchers create ad hoc collaborative practices, as demonstrated by all these papers. What happens, then, when a funder advocates that research teams enact a particular collaborative strategy? Caitlin Wylie and Luis Felipe R. Murillo are social scientists on an interdisciplinary research team funded by a National Science Foundation program that promotes "knowledge co-production" as a framework for collaborative Arctic research across disciplines and with Arctic residents and Indigenous communities. To situate their role on this team, Wylie and Murillo investigate how other research teams define and apply co-production in publications through a systematic literature review. Their paper, "Care-fully? The Question of 'Knowledge Co-Production' in Arctic Science," argues that Arctic researchers do not agree on what co-production means in theory or practice, nor are they asking what it *should* mean. Most problematic of all, and perhaps as a result of this lack of engagement with the framework, few teams are co-producing knowledge. Wylie and Murillo propose that adopting a feminist care-centered approach would help inform co-productive strategies that empower marginalized knowledges and knowledge producers across disciplines and beyond academia.

Much like Lewis's essay asks us to consider who cares for the social scientist in interdisciplinary collaborations, Anne-chie Wang asks who cares for the caregivers performing end-of-life home care in Taiwan. Based on her ethnographic research with medical staff and families of hospice patients, Wang argues in her essay "Attuning to the Erratic End of Life: Family Carers' Practices in Hospice Home Care" that choices surrounding end-of-life care in Taiwan are not merely based on autonomous personal choices but on meticulous care practices shaped by gender, technology, kinship norms, cultural beliefs, biomedicine, economics, and the neoliberal state. The politics of care animates her feminist critique of how biomedicine and neoliberalism combine to construct the home as a place of care to externalize death care to kin at the cost of physical, emotional, and financial strain on family members.

Conclusion

The papers collected here inspire ideal visions for how we as ethnographers can best balance caring for the communities we study, the ones we serve, and the ones we identify with. To enact this vision, and to situate mutual learning and interpersonal support as cornerstones of integrative knowledge production, we must take care that knowledge making is political. Race, gender, class, and ability status of scholars intersect with the organizational, institutional, and cultural context in which we practice science to shape and be shaped by entrenched power relations.

If we pay attention to these relations and their complex mutualities, we can begin to raise questions about how to translate knowledge across epistemic and social barriers, how to align values and priorities across disciplinary cultures and unequal power statuses, and how social scientists can best balance engagement in STEM with critique and advocacy. Furthermore, what labor becomes visible when attending ethnographically to politics of care in interdisciplinary collaborations? What equitable relations become possible? For example, how is work distributed in integrative research, and what roles do researchers' discipline, gender, race, ethnicity, and sexuality play both in its allocation and recognition? What can the STS community do collectively to make interdisciplinary collaboration a matter of care? How might we enact care for each other, for our collaborators, and for our shared knowledge making? These papers provide insights into these important questions for social scientists as well as for our STEM collaborators.

We approached our editing responsibilities with care, such as by hosting an open and inclusive call for papers, making time for discussion during our 4S conference session, organizing a workshop at which authors commented on each other's drafts to help us all improve them before submission to *Catalyst*, and striving to be supportive and constructive editors as authors revised their papers in response to peer reviews. In our experience, this has been a warm, rewarding process of collective knowledge production for which we are grateful to our Special Section authors and the *Catalyst* editors. We wish this approach would be the norm for academic publishing and knowledge sharing more generally.

We hope publishing these papers is one way of sharing experiential knowledge, informing each other's collaborative practices, and reducing epistemic prejudice. For example, we ask STS journals to publish more papers co-authored with scientists—and science journals to publish more papers co-authored with STS scholars—as a way to legitimize collaboration across our disciplines to produce integrated knowledge. We call for mentoring, networking, and the expansion of knowledge-sharing practices for feminist collaborative methodologies. We envision an ever-growing community of practice around the important work of making all researchers feel cared for. Ideally, we would collectively propose

standards for caring collaboration that funders would adopt into their calls for and evaluations of proposals. Official guidance would help normalize caring relations as a foundational component of ethical and responsible research practices in interdisciplinary collaborations.

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Note

[1] To learn more about how the preferential treatment of technoscience in the academy, a phenomenon that some students call "majorism," hurts undergraduate students, please see Carrigan and Bardini 2021.

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