Ethnographic Activity, Artifactual Agency, and "Progress" in Robotics

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PREFACE

This submission consists of two parts. Section 1 reproduces an extended abstract of an in-progress, collaboratively authored paper on the notion of "progress" in robotics. The paper draws from my and my students' ongoing ethnographic participatory observation, artifactual analysis, and grounded theory, characterizing the imperative of progress, the onus of activity, and the spaces wherein these are satisfied in robotics research. Section 2 is a positionality statement describing my experience adapting to the pace of robotics research over three years (and counting) of participatory observation of robotics research practice. I analogize this experience to that of jerk, the third derivative of position. I describe how the research question that motivated the paper was informed by these experiences and those of my coauthors. Each provides partial answers to one of the workshop's key questions: why is ethnography still not a thing in HRI?

Presuming our description of the nature of progress in robotics is apt, transferrable, and applicable, the question of ethnography in HRI could be restated: why can't (or how could) ethnographers attain the state of having made progress in robotics?

1 AN EXTENDED ABSTRACT

Spaces of Progress in Robotics: A Topology of Human Activity and Artifactual Agency

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"Progress" in the field of robotics is complex: alternatively an imperative to be active, a heuristic that can guide activity, and a possible result of activity. In robotics practice we study, progress is most acutely experienced as the onus of to remain active. To make, achieve, or realize progress, technosciences of the not-yet-possible like robotics must align activities and artifacts towards a progress that is inherently imagined. It's not clear how these determinations are made, or how the resulting disparate, small-scale, progress-oriented activities result in the large-scale character and impact of robotics upon social life.

This paper traces progress-oriented activities in a robotics research program from the spaces within which they are accomplished into those in which they are made into artifacts of progress. Drawing from a richly heterogeneous dataset of ethnographic fieldnotes, Github repositories, Slack posts, and research papers, we map the formation of and relationships between diverse spaces of progress wherein activities and artifacts are made to matter. The resulting topology intimately describes the complex spatiotemporal configurations of progress within a specific robotics research program. We trace the artifacts of progress from this research program into the two spaces of progress that are most important to the roboticists in our site, the robotics research literature and the "real world". The questions we ask in this paper are thus: What is progress in robotics? How does it shape activities and artifacts in "the real world"?

We seek an answer that incorporates human and nonhuman activities, digital and physical spaces, and the material-discursive traces of progress-oriented activity evident in the multiform agents involved in *making progress*, such as robotics code, researcher identity, and the scientific literature. We sensitize our inquiry to the agencies and relations arising within distinct spaces of robotic activity, including Github, arXiv, Slack, physical laboratory space, simulation, and the computers that partially compose research robots. A recurrent pattern in our data is the presentation of an activity or artifact accomplished in one space into another, such as a video of a robot grasping an object included in a Slack post. We utilize the philosophy of agential realism to trace how human and nonhuman activity within spaces results in articulated artifacts. An articulated artifact, such as a robot trained in simulation able to accomplish a task in the laboratory, has gained agency, but can also confer agency. If the robot's activity within the laboratory is articulated to Slack, a website, or as a multimedia appendix to a conference paper submission, the researcher(s) thereby gain the property of *having made progress*. Guided by a conception of relational space drawn from critical geography, we term these presentational actions as articulations of artifacts, which move across spatial boundaries and thus tie spaces of progress into relation. An articulation is a novel instantiation of an artifact (i.e. a video of a robot is not a robot) that expands rather than duplicates or re-present the artifact. Tracing these articulations reveals a complex topology within which activity can be oriented towards "making progress."

Spaces of progress in robotics place an onus of activity upon those who enter them. Locally realized progress must be articulated into other spaces, such as Slack, for a researcher (or research project) to acquire the property of being active. The update is a kind of articulation, typically articulated within Slack or weekly lab meetings, that accounts to this onus. Paradoxically, an update that merely accounts for past activity confers inactivity upon the updater. We thus find that skill in robotics research involves the successful articulation of progress across multiple spaces and at multiple temporal scales. The most skillful and successful researchers have made, are making, and will be making progress. Through this lens, we elucidate how spatial formations emerge from the relations between agents, activities, and artifacts of research within the temporal path 'towards' progress, forming a spatiotemporal model of progress in robotics.

Finally, we consider the accomplishment of sustained progress over years or decades. In our topological framework, sustained progress is visible in the form of manifold artifacts, which are sustained by their repeated articulation across spaces of progress and,

most importantly, into the research literature and the "real world". Examples in our data include software projects or lineages of robots that form the foundation of multiple research publications, dissertations, or even conference workshops. The roboticists in our site often portray manifold artifacts produced by other programs ('the MIT cheetah', 'CMU's Roboceptionist', etc.) as central to those programs' durable leadership within the field. Despite their importance, manifold artifacts' spatiotemporal extent is nonetheless finite and vulnerable to decay through inaction. This indicates that the onus of progress-oriented activity visible within the laboratory is active at the broadest extent of the field, albeit at delayed timescales. We consider whether this relatively scale-free phenomenon might be present within adjacent areas of technoscience or even academic fields unrelated to robotics

This paper contributes a novel approach towards a pervasive and portentous phenomenon as observed within a specific technoscientific field. The complex topology of activity, artifacts, and agency we trace is likely highly idiosyncratic to our site, but the potentially scale-free dynamics we find are likely visible in other spaces. By providing a unified account of progress as an organizing vector of activity by human and nonhuman agents and within digital and physical spaces, our approach is likely to be fruitfully applied to investigate related phenomena in a variety of adjacent sites.

2 POSITIONALITY STATEMENT

Jerk Upon Entering the Stream of Progress in Robotics
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Qualitative research projects are often triggered by, or perhaps retrospectively traced to, specific experiences researchers can identify experiencing within the site of interest. My initial experience of collaborating with roboticists was the experience of *jerk*. This term metaphorically invokes the physics concept, defined as change in acceleration (defined as change in velocity, defined as change in position. Jerk is thus the third derivative of position).

Acceleration, a change in speed, was already a characteristic of my transition from doctoral student to tenure track junior faculty member. I already found myself doing more, more quickly: a compounding increase of speed. But the change in acceleration I perceived amongst my robotics colleagues and their students I can only describe as jerk: a sudden increase of acceleration.

The term 'stream of progress' indicates my sense of wading into and being swept along by something present long before my entrance and resulting efforts to 'keep up'. As my collaborations developed, especially over the pandemic-marred spring of 2021, my new robotics colleagues presented opportunities and ideas in a way that inexorably swept me into the streams of progress surrounding them. As I subsequently brought other socially and critically oriented collaborators into the partnership, I've seen an echo of my own experience in theirs. Our deepening collaboration is now bringing a sociotechnical perspective to bear upon community-robot encounters. My social scientifically oriented colleagues and I increasingly find ourselves participating in and enacting the stream of progress with our collaborative work. I've become sensitized to some characteristic features of stream-entry as my social scientifically-oriented colleagues and I have introduced our doctoral students to the site and robotics students cycle in and out of our collaborative orbit.

Having regained my bearings in this new flow, I began to explore the notions of progress operative within and around my roboticist colleagues' work. As a non-tenured, tenure-track faculty member, I have an emic experience of the onus of activity and the imperative of progress pervasive in academia, particularly at research universities. Nonetheless, I found myself better able to access and analyze my own professional experiences outside my field site in relation to the idiosyncrasies (idiosynchronies?) of robotics. TheBy the spring of 2022, I was co-lead of a recently awarded $725,000 internal grant from my university and co-PI of a $3,600,000 NSF grant proposal under review (which would be awarded that September) with my new collaborators. This was the context in which I began asking [with coauthor Le] "what is progress in robotics?"

Our initial categorical codes surfaced Slack as a critical space where progress was reported (and lack of progress accounted for). Adjacent spaces of Github, the laboratory, the literature, and 'the real world' quickly surfaced. We reformulated our questions to "what are *spaces* of progress in robotics?" and "how do spaces of progress shape in/visibilities across and between them, roboticists' actions within them, and the artifacts that ultimately emerge from them?" These questions have guided us to trace human actions and nonhuman agencies that animate our field site and, increasingly, our own research.

CONCLUSION

So, why is ethnography not a thing in HRI? The indirect answer suggested by the foregoing is that it's not clear how to intelligibly articulate the activities of ethnography into the spaces of progress in robotics. Legibility across disciplines is a perineal challenge; perhaps this sheds light on its manifestation at this particular disciplinary interface. Stated as a challenge: ethnographic study for or of HRI must find ways to achieve the durable property of *making progress* available to successful robotics researchers. The mechanisms of attaining progress as a property and the nature of progress in the field are separate constructs. With any luck, skill in the former will enable ethnographers to participate more fulling in the ongoing negotiation of what progress *should* consist of in the field.

Adjacent to notions of pace and progress is that of time as a resource. Becoming a robotics researcher takes a lot of time and effort, needless to say, but ethnographic practice takes still more. Judging from my CV, I've become more of a roboticist than an ethnographer of robotics practice during my fieldwork ("gone native?"). My HRI publications with collaborators are deeply informing the many in-progress single- and co-authored drafts that draw on ethnographic methods and the thick, heterogeneous data they produce. These papers have gestated as drafts for far longer than my robotics work. Whatever resource time may be, I am so far more efficient at converting it into research output collaborating with my roboticist colleagues than studying the practices, rituals, and ethnos of robotics through them.

As these reflections likely make clear, I have ultimately become implicated in my study of progress in robotics. Even as I seek to understand my roboticist collaborators' notions of progress, I am tempted to experiment with or even emulate with their strategies for

achieving it. I conclude by suggesting open questions highlighting these complexities (wherein I can be synecdoche for or substituted with other ethnographic researchers in HRI):

(1) Can I attain the level of productivity needed to (for instance) make tenure *without* making progress like a roboticist?
(2) If I make progress like a roboticist, will I lose my ability to make transdisciplinary interventions in robotics?
(3) If I could do ethnography at the speed of robotics, would I still be doing ethnography?

I'm grateful for the opportunity to discuss these and related issues amongst the like-minded community of researchers the workshop is assembling and look forward to engaging with the other contributions.

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The extended abstract in Section 1 was written collaboratively with Claire Fitch. Fitch and Elizabeth Le are coauthors of the paper it describes.