Assisting Technology: Disability Expertise and Labor in
Artificial Intelligence (AI) Data Work in China

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ABSTRACT

In recent years, people with disabilities in China have been explicitly enrolled by government programs, corporations, and NGOs to classify and label training data for AI systems. This thesis offers an ethnographic account of one of these programs, combining insights from science and technology studies (STS), critical disability studies, and digital labor scholarship. Run by a disabled persons' organization (DPO), the examined program is staffed with predominantly blind, low vision, and physically impaired data workers, tasked to sort data for an AI-based internet of things (IoT) system. While existing scholarship on digital labor tend to focus on how technology empowers or exploits disabled people, this thesis asks how disabled people's labor in turn transforms technology. Centering the experience of disabled data workers and the inner workings of the sociotechnical processes with which they are bound up, I argue that people with disabilities working in AI data annotation effectively *assist* the technology, not just the other way around.

In this study, the DPO outperformed their non-disabled competitors and became the exclusive contractor of data annotation for a major AI company in China. I show that the obscure and iterative nature of classifying contextless intentions and unclear sound generated by the virtual assistant system necessitates a constant workforce of data annotators, who have rich tacit knowledge, good institutional memory, and a strong working relationship with the developers. Disabled workers in China, pushed out of a wide range of job opportunities due to structural ableism, supplied the initial stability for the AI company. In the meantime, through their disability-informed, non-normative knowledge of flourishing in uninhabitable worlds, or what anthropologist Cassandra Hartblay calls "disability expertise," disabled workers have reshaped the often-dehumanizing conditions of microwork in the AI data pipeline, pulling many workers to stay and produce higher quality data. An intervention of this article is not only to lay bare the use and abuse of disability as a resource in contemporary AI systems, but also to elevate crip technoscience by teasing out the disability expertise actually entailed in the production of AI.

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INTRODUCTION

> *"Microwork Helps Disabled People Fly Against the Light."[1]*

> *"AI Brings New Jobs for Disabled People's Employment."*

> *"Big Data Annotation Heralds New Disability Assistance Model."*

News headlines in China have lately proclaimed people with disabilities to be the beneficiaries of new kinds of job opportunities that label training data for use in artificial intelligence (AI) programs (e.g. Netease.com 2018). Chinese government agencies and technology companies, in the name of poverty reduction and disability assistance, have enthusiastically set up collaborations aimed at recruiting and training disabled people to conduct data annotation work. Such jobs, they claim, empower disabled people by increasing their income, by offering ways to overcome physical barriers to labor, by providing at least "ten years of work opportunities," and ultimately, by fulfilling these persons' "self-worth" by making them "useful" to society (JD.com 2018).

Scholars studying digital labor have demystified similar narratives, calling attention to how exploitation often shadows the empowering effects of digital work for people with disabilities. While it is true that digital platforms have provided technical affordances for people with certain disabilities, permitting them to bypass discrimination (Gray and Suri 2019), to work around physical inaccessibility (Dobransky and Hargittai 2006), to forge communities of resistance and self-governance (Lin and Yang 2020), to express agency and self-identity (Goggin et al. 2019), and to expand sources of income (Boellstorff 2019), it is also the case that new forms of algorithmic cruelty (Irani 2016; Gray and Suri 2019), digital inaccessibility (Zyskowski et al.

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[1] The phrase "fly against the light"(逆光飞翔) may be a reference to the Taiwanese film 《逆光飞翔》 (Touch of the Light), which tells the story of a blind musician overcoming hardships to pursue his dreams. All translations of Chinese language content in this paper are mine.

2015), trade-offs between flexibility and security (Qu 2020b), and exacerbated precarity (Lin, Zhang, and Yang 2019) abound in computer-based work available to people with disabilities. The paradoxical impact of digital technology on the livelihood of people with disabilities has been the source of a rich scholarship (see Yu et al. 2019).

Moving beyond the empowerment/exploitation dichotomy, this paper is concerned not just with how technoscience transforms disability but also with how certain aspects of disability may be generative of technoscientific enterprise. Centering the experience of disabled data workers and the inner workings of the sociotechnical processes with which they are bound up, I argue that people with disabilities working in AI data annotation effectively *assist* the technology, not just the other way around. Far from being passive recipients of empowerment or exploitation, organizations run by disabled persons proactively create "alternative regimes of value" (Friedner 2015a, 9) of disability through constant bargaining and negotiations with corporations. I draw attention to how technoscientific formations have benefited from the labor and expertise of disabled people — and in profound yet often invisible ways.

This study draws upon remote interviews, preliminary fieldwork, as well as my own five-year professional experience of working in nonprofits on disability inclusion programs in China. My interlocutors for this study are a team of data workers with visual or physical impairments who have been hired to sort, label, and categorize training data for a commercial voice-activated AI (VAI) internet of things (IoT) system (think of Amazon Alexa, a voice-interactive "virtual assistant" connected to the Internet). The workers are based in four major cities in China, recruited and managed by an activist organization that I will call ENABLE.[2] ENABLE is run by and for disabled

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[2] All companies, organizations, and individuals involved in this study are given pseudonyms, and personal identities rearranged to protect anonymity to the extent possible. Although public information exists about this organization, and the identity of some parties may be recognizable to those familiar with the issue, I strive to minimize representation that could bring reputational or economic risks to my interlocutors.

people and has a more rights-based agenda than state or corporate initiatives of the same kind. ENABLE's teams recently outperformed all their non-disabled competitors and became the exclusive data annotation service supplier for a leading AI company in China, which I will here call AITech.

In what follows, I first contextualize the work of disabled people annotating digital data for AI systems, situating this within a long history of the extraction of value from disability, an extraction that has been simultaneous with the dismissal of disabled people as legitimate agents of knowing and making. Next, I deliver empirical evidence that there are now coming into being new modes of resourcing and erasing disability in contemporary AI work, work that depends heavily not only on the processing of massive amounts of "raw" data but also on fine-grained annotations that require that each data point be associated with ever-more granular attribute tags (Tubaro, Casilli, and Coville 2020).

To train VAI systems, disabled data workers are tasked with determining the intentions of human users by labeling sound or audio-transcribed text data extracted from users' speech (in the cases I discuss here, all in Mandarin), classifying user requests (such as "turn on the AC"), categorizing topics in complex conversations, identifying key words, or rating audio qualities. In practice, the seemingly straightforward annotation process is highly ambiguous and subjective, in part due to the imposition of classificatory order onto the unruly human world (Bowker and Star 1999) and the complexity of adjudicating human intentions without accompanying social or linguistic context, and in part owing to the frequent iteration of complex annotation rules. High-quality data annotation enterprises thus prefer workers who have developed a trained judgement of uncodifiable and shifting rules and whose subjectivity has become, through close, long-term collaboration, aligned with the priorities of AI developers.

I argue that the iterative ambiguity of VAI data classification mobilizes a stable workforce of annotators, in this case, achieved not through calling upon hyper-flexible, spatially and temporally heterogeneous platform workers (Altenried 2020), but rather by capitalizing on immobility and disablement. Disabled workers in China, *pushed* out of a wide range of job opportunities due to structural ableism, supplied the initial stability for the AI company, a form of value extracted from the stigma of disability (Friedner 2014). In the meantime, through their disability-informed, non-normative knowledge of flourishing in uninhabitable worlds, or their "disability expertise" (Hartblay 2020), disabled workers have reshaped the often-dehumanizing conditions of "ghost work" (Gray and Suri 2019) in the AI data pipeline, *pulling* many workers to stay and produce higher quality data.

AI systems profit from a fusion of structural ableism and disability expertise, all the while repackaging labor as charity. But more is happening. Bringing together scholarship on digital labor, feminist STS, and critical disability studies, I call for greater recognition in discussions on technology and labor of the many uses of "disability" as an objectified resource and for new attention to previously undervalued forms of disability expertise.

DISABILITY AS RESOURCE

Examples of disability as epistemic resource abound in the history of technological development. Integrated circuits, "the force that drove the minicomputer" (Ceruzzi 2003, 178), found their first commercial application in hearing aids as early as 1900s, when other market opportunities were not immediately apparent (Mills 2011). Norbert Wiener, founder of cybernetics, told Helen Keller, one of his deafblind research subjects, that the assistive technology (the "hearing glove") his lab built for deaf people was "the first constructive application of cybernetics to human beings" (Kline

2009, 338). Early time-compression technologies for sound reproduction were popularized by blind aural speed-readers (Sterne and Mills 2020). The sound spectrograph, a precursor to speech recognition technologies (Li and Mills 2019), was initially proposed to improve deaf education (Mills 2010). At robotics and AI labs at MIT, analogies between disabled bodies and machines became a recurring tool to theorize disembodied AI (Richardson 2015).

Historian and media scholar Mara Mills, who uncovered many of these historical cases, coined the term "assistive pretext" to capture such patterns of using disability as a "resource" for technoscientific innovation (Mills 2010). Disability frequently serves as a metaphor, precursor, or advertisement for the research, production, and commercialization of technoscientific objects that are ultimately designed for purportedly more profitable markets of non-disabled users. Even in the cultural studies of science and technology, disability is often used as a literary device, a rhetorical operator that has been called the "narrative prosthesis" by disability scholars David Mitchell and Sharon Snyder (2001). As anthropologist Sarah Jain (1999) warns, the under-constructed but over-objectified ways in which disability and prosthetic tropes have been used for theorizations of human-technology relationships risk the "disavowal and simultaneous objectification of the disabled body" (33).

While the technoscientific extraction of value from objectified disabled body-minds proceeds apace, the actual knowledge and expertise of disabled people are often ignored. STS scholar Ashley Shew (2020b) laments that disabled people are too often enrolled as "marginal cases" and objects of "thought experiments" in philosophy of technology and our collective imagination about technological futures, while such imaginations persistently disregard disabled people as real experts about their own experiences. Disability HCI scholars call such dismissal of disabled people's status as knowers, and consequently the denial of their personhood, a form of

"epistemic violence" (Ymous et al. 2020). In the *Crip Technoscience Manifesto*, disability scholars Aimi Hamraie and Kelly Fritsch (2019) urge us to center disabled people as experts and designers in technoscience, and as agents who can harness technology for social and political change. Anthropologist Cassandra Hartblay argues for attention to "disability expertise," defined as forms of knowledge that "disabled people develop about unorthodox configurations of agency, cultural norms, and relationships between selves, bodyminds, and the designed world" (2020, S34).

The case examined in this paper may be partially understood through this long history of resourcing disabilities while erasing actual persons and their labor, drawing imagined inspiration without crediting embodied expertise. While much scholarship on "disability resourcing" has focused on disabled people as metaphors, research subjects, and users, I seek also to understand how people with disabilities are mobilized, hidden, and selectively publicized as laborers. More, however, I highlight the transformative potential for rethinking the relationship between technology and work, when disability expertise and crip technoscience are turned to in practice.

SUPPLYING STABILITY

When I managed disability employment programs as an NGO professional in China, my colleagues and I would often invoke worker loyalty and a low turnover rate as a talking point for the "business case" for employing people with disabilities, a practice fraught with neoliberal rhetoric about disabled people as productive additions to the diversity and inclusion of workplaces (see Friedner 2015a). Nevertheless, in my experience, corporations in China rarely actually acted on such a logic. Instead, their main interest in hiring disabled people was to fulfill a disability employment quota mandated by the government, as non-compliance could result in significant financial penalty (Liao 2020). Often, even such strong financial incentives could not persuade

employers to hire persons with disabilities; many would rather pay the fine, or rent a disability certificate as a token of compliance but keep actual people out of sight (Qu 2020a). Before embarking on this study, I assumed that the disability employment quota policy factored into all AI data annotation employment programs for people with disabilities, including ENABLE, an organization run by and for people with disabilities, which I knew through previous work. I approached ENABLE because their employment programs are more explicitly interested in disability rights than other more charity-based programs. My first visit to ENABLE's Shanghai office was in early 2020. I began formally interviewing the workers in the summer of that year, when they managed to further expand their largely in-person operation despite the constraints of the pandemic. While media coverage often praises disabled workers for being "more focused" than "normal people" for meticulous work like data annotation, I was interested in how the workers actually did their work and how they themselves perceived the value of their work.

ENABLE has been operating one of the most successful disability AI annotation programs, in collaboration with a "big tech" company in China, which I call AITech. Within two years since 2018, AITech's data annotation team is now entirely staffed by workers with visual or physical disabilities, managed by ENABLE off site. The taggers are paid by AITech but contract with ENABLE with a nondisclosure agreement. A precursor to platform-based crowdwork, this business process outsourcing (BPO) model was invented to cut cost, evade labor regulations, and impress stockholders (Gray and Suri 2019, 55). Surprisingly, however, as of the time of writing, AITech has not claimed any disability employment quota from the hiring of these workers. Neither, as is often the case, does AITech pay the disabled workers less than non-disabled workers doing the same work. The workers enjoy the benefits of full-time employment, a decent salary, and rent

subsidies. In the director Zhang Fan's words, "You can't keep playing the charity card or fighting price wars. Eventually, we win through quality."

I began asking my interlocutors what they thought contributed to the "quality" or advantages of their work. The answer that kept coming back was "stability." But why would stability matter in this context? Stability seems at odds with platform-based crowdwork, labor that is characterized as hyper-flexible. How is the work of these disabled data taggers different from the kind of data annotation that is done by interchangeable workers hidden by algorithms on platforms like Amazon Mechanical Turk (Irani 2016)? What kinds of data annotation may require more training and experience? In this section, I show how the inherent ambiguity and complexity of classifying user intents and rating sound qualities for VAI systems, enrolls a committed workforce of trained data taggers, who develop better understanding of the highly subjective rules set by the developers than unstable workers.

Reading Minds Without Context

The blind and low-vision taggers' official job title is "intent annotator." Their tasks include classifying intents of user queries, linking queries with web content, and sometimes determining the emotions present in a given snippet of speech. Every day, they listen and determine the intention of user queries to "smart" voice-activated and -recognizing digital assistants, and code them into thousands of specific "features" that trigger the correct machine response. Contemporary VAI systems like Alexa, built on "supervised" machine learning algorithms, require huge data sets of high-quality, annotated user requests (Tubaro, Casilli, and Coville 2020). Consider my interlocutor Yu's routine for example. Yu is a blind woman in her twenties and has some work experience in call centers. She now works on data related to "hardware control," one of the six

types of data pre-sorted to streamline work distribution. From a portal in ENABLE's office, Yu logins into the annotation system designed specifically by and for AITech and its data. She might be assigned "hardware control" related data, including user queries such as "turn on the AC." She would then link this query with the AC control feature in the tagging system. This annotated piece of data goes through a quality assurance process, and once approved, will be fed back into AITech's system for optimizing the VAI device's ability to recognize and respond to future users. The more accurately the data annotators understand and classify users' intentions, the more "intelligent" the device will appear.

It sounds straightforward. But not all queries are this clear-cut. Out of the six general types of queries, a surprisingly large number of users engage these devices in casual conversations, categorized as "chitchat." Under "chitchat," taggers need to determine what emotions are conveyed, whether the user is talking with a human or interacting with the device, making a command, or simply saying nonsensical words. Sometimes the name of a song could sound like a conversation and escape the ear of someone who's not attuned to the latest trends in pop culture.

The act of classification is intrinsically reductive (Bowker and Star 1999). User intent classification attempts to impose an artificial social order (Suchman 1993) onto the messy, complex inner and social world of human users so their needs can be made legible to the machine. Adding to the complication is the form of the content. Blind annotators, as it happens, *are not labeling sound clips*. Instead, the spoken user requests are transcribed into text, in this case Mandarin Chinese characters, and presented to the taggers as cut-up phrases. Annotators, without ever hearing the voice of the human, now need to judge from choppy texts the speaker's "true" intention. In a word, data taggers are part of the layers of mediation that render the technology and end users mutually legible and constructive to each other (Robbins et al. 2020). Far from an

impartial, objective, and rote act of simple "click work," data annotation is a "sense-making process" (Klein et al. 2007), in which human workers with heterogenous lived experience assign meaning to snapshots of decontextualized content, with prescribed labels.

The blind annotators use screen readers to convert text into speech, so they can listen to the content of the text transcribed from users' speech, as well as navigate the digital annotation system aurally. Through ENABLE's advocacy, AITech made their annotation system screen-reader compatible. When I visited ENABLE's office, many taggers did not even need a screen, and did their work solely by using shortcuts on keyboards. Lihua, a well-educated blind tagger who works at the "chitchat" group, often found herself frustrated by the ambiguity of her data:

> My group's work is actually quite difficult. It is like cropping a clip from a conversation like the one we are having, and then asking you to judge what on earth it is. Take this sentence for example, "you say you like me huh."

In Chinese, the written form of "you say you like me huh" (你说你喜欢我吗) can at least allow three interpretations: "Did you say that you like me?"; "Say that you like me!"; or "Do you think you like me?" Without knowing the intonation and punctuation from the original speech, it is difficult to judge the precise meaning. Lihua reiterated this a few times: "My group works on lots of ambiguous stuff. You have your opinion, and I have mine."

One may assume that tagging with a screen reader would be a disadvantage for blind annotators. But the confusion was not so much caused by sensory differences and tools, but the data's lack of social and linguistic context. Kai is a sighted tagger with physical impairments based in another city, who works on the same kinds of data as the blind taggers. Reading those texts with vision is just as complicated as listening to a screen reader converting those texts to speech. Kai explained to me the numerous confusing categories that "burn his brain" (烧脑):

Sometimes a phrase has multiple intentions. For example, a user says "play Youth" [少年]. "Youth" can be a song, a movie, a TV show, or a podcast. We then need to search in all the genres and tag the query to all these media formats. If a query needs further clarification, that goes into the category of "multiple rounds." So when the user says "play Peppa Pig," the device can respond: "I found multiple seasons of Peppa Pig, which one do you want me to play?" Another category is "recognition." If the query contains the name of a TV show, we need to first put it in "recognition" so the machine can recognize it, and then link it to other features.

Among the more challenging tasks that the taggers raised to me, the most extreme cases of unclassifiable data have to do with what is called "meaningless." "Meaningless" is a category of query defined by AITech's manual as order-less, ungrammatical, or illogical. Because the data that they receive are already trimmed, it is practically impossible to know for sure whether a broken sentence is mistakenly cut off by machine or simply spoken that way. One needs "high EQ" (emotional intelligence) to succeed in such work, as many taggers would say.

Applying "Dead Rules" to "A Living Thing"

The ambiguity of data annotation is not restricted to user intent classification. ENABLE's team in western China works on annotation of audible data, such as identifying the "wake word" for the VAI device (for example, "Alexa" or "Hey Google" are wake words for their respective devices), or rating the quality of sound. These sound clips were sent to the taggers for manual identification precisely because they were accented, unclear, or confusing. Staffed by predominantly sighted wheelchair users, this team also complained to me about how "subjective" the data can be. Wenbo is a man with a humorous and relaxed demeaner. Sitting in his wheelchair, he had a cup of green tea and a cigarette on the table while we video called. When I asked what guidelines they would follow for annotation, however, he suddenly got serious:

Speaking of this topic I really do want to say a few words – because this is not something that is very standardized. If a lighter costs fifty cents, it costs fifty cents. But for things like

sound, everyone's ears are different, and everyone's places [of origin] and accents are all different. Like, you speak Jiangsu dialect, and you may understand immediately [when you hear that] but I can't. Each person who does the job has their own standards. For example, the activation word was spoken very fast. I may find it OK and clear. But if the Quality Assurance [QA] person finds it unclear, then it's not ok.

The "subjectivity" of hearing is a recurring theme among taggers who listen to the original sound clips of user speech. Meihui has a college degree. For her, the hardest part of the job is to listen objectively and mechanically to something subjective and animate. In her words, "Audio [information] is meant to be a living thing [音频它本来就是一个活的东西]! Some people may hear this and other people hear that. … But the QA would apply dead rules to judge our work." Multiple taggers expressed frustration when they were in disagreement with the QA person on what particular speeches "objectively" sounded like. Even if all the taggers heard the same thing, the QA, who report directly to the client and are in higher position in the organizational hierarchy, may have a different opinion. QAs and the client have higher epistemic authority than annotators.

Power dynamics and organizational hierarchy, rather than the individual bias of the annotators, have a more profound impact on the outcome of data annotation, as HCI scholars who study computer vision data annotation argue (Miceli, Schuessler, and Yang 2020). In my study, all taggers are evaluated by a "success rate." The rate is determined by QAs, who spot check annotated data sets. If the set has a success rate lower than 98%, it will be sent back for the taggers to rework on the entire set. A few taggers experienced repeated reworking during the incubation period when their eligibility for a formal contract was being evaluated; but later improved their success rate by "figuring out what the QA wants." I asked all the taggers what they would do when they were uncertain about a data entry. Their strategies ranged from consulting the written rules, which rarely helps, to deliberating among fellow taggers. But after exhausting all the internal channels, their ultimate solution is always: "Ask the QA."

Quality of work, defined by a high "success rate," thus requires a good grasp of the needs and preferences of the client and QAs, which cannot easily be spelled out on paper. One tagger explicitly deemed good annotation as "getting the same results as the QA." The best way to gain such knowledge then is through long-term, close collaboration. The director of ENABLE, Zhang Fan, takes pride in the fact that their taggers have a better knowledge of what the AITech developers want, because they have been there longer, and are more familiar with earlier versions of the annotation rules, whereas the non-disabled QAs have a much higher turnover rate.

In addition, disabled data workers play an integral role in AITech's daily operation. Similar to the annotators in Miceli et al. (2020)'s case, to align the subjectivity of annotators, QAs, and the client, the disabled taggers attend weekly meetings with the developers. In those meetings, the taggers provide direct feedback on trends, problems, and recommendations to the data and annotation rules. Often, the developers end up adjusting the feature of the product based on common queries that the annotators observe. As Danni, a young blind woman who likes gaming, remarks, "we are the ones who understand the users most, because we have first-hand information about their needs." The close feedback loop ensures that developers know what's happening on the ground. By contrast, constant turnover in the annotation workforce would mean higher costs of retraining, transaction, and communication.

Data annotation tasks are not homogenous. While some tasks are performed by part-time, flexible crowdworkers managed by platform algorithms, more complex or proprietary tasks may require a full-time, trained workforce that is in frequent coordination with the developers (Lavee et al. 2019). The nature of data tasks shapes the kind of workers desired. In the case of AITech, the obscure nature of classifying contextless intentions and unclear sound makes the articulation of clear rules impractical. Human intentions resist classification, and the "quality" of sound defies

standards; but a fixed numerical rate that measures the quality of data annotation work must be set. On top of this, annotation rules update on a weekly basis. To mediate the tension between practice and iterating prescriptions, a constant workforce of data annotators who have rich tacit knowledge, good institutional memory, and a strong working relationship with the developers, is mobilized. The AI system depends on the data taggers' trained judgment to ensure the "objectivity" of annotated data (Daston and Galison 2007). The quality of the data is thereby closely tied to the stability of the annotation workforce. Here, stability is not achieved through platform-based labor that is always-on, spatially heterogenous, and temporally flexible (Altenried 2020), but by capitalizing upon disablement and immobility.

HUMANIZING GHOST WORK

Disabled data taggers at ENABLE provided an essential human resource to ensure the quality of data annotation for AITech's VAI systems that rely on tacit knowledge and coordinated subjectivity. The absence of better job opportunities due to systemic ableism and the medicalization of disability in China (Huang 2019; Kohrman 2005) explains what "pushed" many ENABLE workers out of mainstream job market.

But data annotation work is not automatically a superior option to other jobs. Scholarship on labor, heteromation, and crowdwork has revealed that AI systems are creating a "new global underclass" (Gray and Suri 2019) by systematically turning large numbers of people into contingent labor, fulfilling "essential but marginal roles" (Ekbia and Nardi 2017, 1). Work like data annotation is often managed by algorithms that computerize human workers (Irani 2015) into interchangeable bodies and elements in a system of fungible cognition (Irani 2012). Workers are typically underpaid, benefit-less, undercompensated, and atomized, with little means for collective

action (Vallas and Schor 2020). Additionally, the nature of the work is often mind-numbingly tedious or even harmful (Roberts 2019). The deskilling, control, and disciplining prevalent in such work has been described as "digital Taylorism" (Altenried 2020), suggesting the relentless optimizing for profit at the expense of human flourishing.

The public image of data annotation in China is just as dim. "However much intelligence you see at the front is however much human labor is behind the scenes." This is a staple phrase that Chinese media frequently cite when reporting on data annotation work for AI, not least because of the word play. In Mandarin, the word "artificial" in AI (人工智能) is *rengong*, which can mean both "man-made" and "manual labor" (Au 2021). These stories often expose the precarity of the job — low skill, low pay, employers' refusal to pay salaries, layers of middlemen, with unequivocal pessimism about the fleeting moment of the job that will soon be displaced by AI once it reaches the next level of "intelligence." Many call these jobs "AI Foxconn," a digital sweatshop.

What made data annotation an acceptable option for these taggers with disabilities? To be clear, public perceptions consider such work as devalued for "normal" people, but to somehow *lend* value to disabled people. Multiple ENABLE workers have previously conducted platform-based, home-bound annotation work, and suffered from the kinds of algorithmic and human cruelty often noted in the literature. In their narratives, however, the particular form of work at ENABLE represents something qualitatively different, something "pulling" them towards staying.

Let me say more about the collective labor and expertise that ENABLE and its workers invest in making the workplace more accessible and inclusive. I will focus on two specific practices that resist the rigid corporate regimes of space and time – first, collectively enabling access in response to shifting technical, social, and epistemic context; and second, organizing labor around

non-normative temporalities that take into account the divergent individual paces of the workers, namely the "crip time" that reworks "clock time" to accommodate unorthodox bodies and minds. By enacting novel ethics of care, access, and interdependence, disabled workers have reshaped the conditions of data annotation work, resulting in the improvement of their work performance as well as, many report, work experience. I argue that disability expertise (Hartblay 2020) and crip technoscience (Hamraie and Fritsch 2019) can offer crucial lessons for rehumanizing labor in AI, without objectifying the actual human.

Co-Creation of Access

ENABLE's operational model stands out from other disability AI data annotation programs — platform-based or non-disabled people led BPOs — in their deliberate collectivization of disabled labor. Not only does the organization provide a physical workspace, but they also offer a free dormitory for the workers. As an organization run by and for disabled people, ENABLE strives to put the access needs of the workers at the forefront of their operation. The organization's interests and their disabled constituencies of course do not always align. Indeed, ENABLE had to turn down many eager job candidates and select particular kinds of workers to keep the business viable. This inevitably produces exclusionary kinds of disability employment and disabled workers (Friedner 2015a). Internalized ableism also exists among disabled persons and disabled persons' organizations (DPOs) in China. I am interested, nevertheless, in spotlighting the efforts and practices that Chinese DPOs *do* make to further their disability-activist agenda, and improve the lived experience of a group of exceptional disabled people. These exceptional individuals can redistribute their gained advantages and reorient the collective visions of the community (Mauksch 2021). In the case of ENABLE, they devoted significant efforts in locating, partnering, and

mobilizing additional funding for accessible office space in multiple cities, as well as accessible living space. Accommodation, sometimes literally, is not an afterthought, but a precondition. ENABLE had to reject many clients because the organization could not compromise on accessibility.

The physical space of accessible offices and dormitories, to my interlocutors, constitutes significant social and community space. In our interviews, I was struck by how many of them — across workers with visual and physical impairments — related their current work to notions of "going out," "leaving home," and "experiencing the world." Free dormitory space in big cities and a fixed salary made it possible for many of them to experience life in different cities with "financial and psychological independence," as one put it to me. Many of them became friends through work and organized weekend trips together. Rongfei came from a small village in central China. Growing up, she never met anybody who used wheelchair like herself. The relentless staring at her wheelchair used to discourage her from going out; but now traveling with a dozen other people in wheelchairs together actually brings her a sense of pride. Meihui, who used to walk with crutches to appear less "crippled," also echoed how she was liberated by, rather than "confined to" her wheelchair, thanks to a community of wheelchair users who taught her how to roll. These physical spaces that are made accessible, allow ENABLE's workers a sense of "membership and mattering" (Lynch 2013).

Before the pandemic, I visited ENABLE's Shanghai office, a typical, white-collar office with about twenty individual cubicles and computers, located in a government subsidized start-up incubation compound. All of the data workers and staff are legally disabled. The office space is symbolic of a desired lifestyle. Some taggers have shared photos of their office on social media, or invited parents to visit the office, to show that they now live "a decent life." Although many of

them recognize that this is not strictly "inclusive employment" (a notion promulgated by the United Nations Convention on the Rights of Persons with Disabilities (CRPD)), in that they are not working alongside non-disabled colleagues, taggers feel more socially included by doing mundane things like commuting, eating lunch together, working nine to five, or even squabbling with discriminatory neighbors.

A couple of disabled women in particular, highlighted to me how they appreciated working "with a computer" and inhabiting an office that looks "white collar" to their family and friends. As anthropologist Carla Freeman points out, the physical workspace and particular appearance of informatics work can be integral to workers' experience of the job and even their identities (Freeman 2000). These embodied, physical "disability worlds" (Ginsburg and Rapp 2013) made the work much more meaningful for the taggers than just clicking alone on a computer at home earning the same income. Although online platforms can to a degree shield disabled people from inaccessible physical space and blatant discrimination, this study shows that to many disabled people in China, the yearning for community and mobility can still outweigh the convenience and flexibility of platform work.

Making digital space accessible, which is core to the blind and low-vision taggers' work performance, also requires complex expertise. To begin, it is a process that involves constant maintenance, updating, and negotiation with the client. According to ENABLE's director Zhang Fan, who himself is a man with low vision and uses magnifiers and screen readers, "It's a tricky negotiation. If you ask for too much, the client freaks out and finds you troublesome. But if you ask for too little, then the system is not usable. We could only make progress step by step."[3] It is a process of "frictioned negotiations of access and privilege" (Hamraie 2017, xiii). One advocacy

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[3] Tech companies in China have no legal obligation to make their consumer-facing products or employee-facing systems accessible.

success, in ENABLE's view, is that after working together over time and witnessing the productivity of blind people, AITech developers would now proactively ask them for accessibility suggestions before significant system updates.

Digital access also requires knowledge and attention to diverse, non-normative epistemologies. It cannot be simply fulfilled by "sensory translations" that "map visual to non-visual modalities in a one-to-one fashion" (Lundgard, Lee, and Satyanarayan 2019). Haoming, one of the blind in-house programmers at ENABLE, is responsible for developing shortcuts and add-ons for the blind taggers, so they can more efficiently navigate the annotation system, bypassing the linear "top-to-down, left-to-right" linear reading sequence that the screen readers typically follow. The same adjustment may not be necessary or useful for low-vision taggers. For instance, for Shujun, who can see shapes and colors, access needs are an appropriately sized monitor and a laptop stand that allows her to lean her face towards the screen. When she uses the screen reader, she often jumps to where she wants to click based on her memory of the shape of the text. As education researcher Lucia Hasty points out, visual learners process information from "whole to part," whereas non-visual learners may approach from "part to whole" (Hasty n.d.). Each of these categories of epistemology are again infinite spectrums.

Access is also profoundly relational at ENABLE. Sighted and non-sighted workers are paired to work on the same data set, so they can compare results and ensure a target success rate. Off work, low-vision workers will guide blind workers to subway stations. While travelling, those who use crutches and those with wheelchairs assist each other in particular tasks. The disabled workers were relying not on high-tech solutions, but rather on what anthropologist Arseli Dokumaci calls "microactivist affordances," namely everyday acts that disabled people enable for each other and that can become affordances for one another in the absence of a readily accessible

material environment (Dokumaci 2020). Staff members, all of whom have disabilities, work closely with new taggers to figure out the best reasonable accommodation for each individual. Shujun recalled that when she was new, Zhang Fan would stay after work every day and coach her about how to use the system efficiently.

> Because he's also a low-vision [person], Zhang Fan knows how I work. He taught me about shortcuts, speed, left-and-right hand coordination, and even which screen mode to choose so it does not hurt my eyes. He's really a peer, not just a leader. Colleagues here support each other with their own experience. You don't feel tired because you are not alone.

Through tireless co-creation of access, disabled workers at ENABLE expanded their social space, strengthened their community, and forged meaning for their work. Their practice shows that access is not only a technical and infrastructural *product*, but also an epistemological and relational *process* (Wu forthcoming). Interdependence is a key technology that they enact to "crip" their technoscientific practice (Mingus 2010). Their knowledge of managing and standardizing specific forms of access — what Aimi Hamraie calls "access-knowledge" (2017, 5) — and the taggers' collective labor, made the annotation work a more attractive option than what they would otherwise have access to, and made ENABLE a more human-centered space than mainstream crowdwork platforms. Demonstrating how people with diverse bodily and sensory experiences "create and dwell in inhabitable worlds" (Friedner and Cohen 2015), ENABLE workers' practices could offer a model for worker-owned and worker-governed "platforms" that platform labor scholars are advocating for (Vallas and Schor 2020).

Crip Time at Work

Another important practice that made ENABLE a stable resource for AITech, and a relatively satisfactory workplace to their workers, was their non-normative management of time.

Expectations of scheduling, pace, and futures are fraught with assumptions based on normatively abled bodies and minds. Contesting such assumptions may be accomplished by thinking and working through what disability scholars call "crip time." Design scholar Sara Hendren defines it as "a flexible shorthand in disability culture, used to indicate a range of uneasy relationships to the pace of contemporary industrialized life, with its relentless and clock-driven organization of hours and days" (2020, 166).

Crip time is often imagined to be incompatible with work. Words invoked to describe the presumed lack of productivity of disabled persons, often implicate time – inefficient, slow, late, chronic illness, cannot handle long hours. ENABLE's workers recall constant struggles against these temporal stereotypes. Disability scholars and activists, meanwhile, use the notion of crip time to urge a reimagination of human worth that is not bound by economic time (Hendren 2020; Kafer 2013; 2021). As Kafer puts it, "rather than bend disabled bodies and minds to meet the clock, crip time bends the clock to meet disabled bodies and minds" (2013, 27).

In ENABLE's case, the clock is bent to the extent possible within the bounds of a capitalist mode of production. Taggers often invoke "efficiency," not as a linear calculation of cost-effectiveness, but how time can be creatively maneuvered to meet the productive goals of specific bodies. They differentiate between "functional" and "efficient" accessibility, suggesting that it is not their bodies that are inefficient, but the way work is organized and conditioned. While a "functional" technology translates non-disabled people's needs into their disabled counterparts, an "efficient" process rearranges the system based on disabled people's needs unmediated by able-bodied imagination, and therefore provides, in blind tagger and programmer Jiabao's words, "a near-non-disabled experience."

Deploying numerous crip body-minds-centered temporal strategies, workers at ENABLE sought to reconcile the tension between crip time and work. Instead of segmenting linear, progressive schedules and maximizing unit time productivity, ENABLE created a separate timeline in parallel to, but also intercalated with, corporate time. They negotiated a contract with fixed salaries for the workers, doing so specifically to set performance indicators based on collective delivery on a weekly basis rather than by individual piecework. Unlike crowdworkers on platforms like AMT, who have to remain hypervigilant in order to compete with other workers for tasks, the disabled taggers as a whole would become a unit of production. The unit ended up delivering results that matched the time and performance requirements of the client.

Because labor time does not unfold evenly across the unit, individual crip time is respected. ENABLE divides workers into six general groups based on the type of the data with which they work, so taggers in the same group become familiar with their group's content over time. Some groups may need more time to complete their tasks because of larger volume or higher complexity of the data. Workers in other groups will help out after finishing their own batch.

Inevitably, the fluidity of crip time management can run into conflict with disciplining corporate time, especially with the prevalence of standardized corporate surveillance technologies. For instance, when one tagger needed a longer break to get around in wheelchair, the QA raised questions about why they were not detected as "active" in the system for over thirty minutes. Overall, however, through protecting the boundaries of collective crip time, most ENABLE workers with whom I spoke experience their work as reasonably paced.

To gain control over speed, the taggers also deploy non-normative listening strategies. Screen readers, for example, a way to make use of a time-compression technology that permits deviation from standard time, can afford taggers with "speeds that appeared fast to the normate,

while feeling timely to disabled people" (Sterne and Mills 2020). Many blind taggers admit, however, that dialing the speed of screen reader up too high can be challenging for annotation work when the data itself is already ambiguous and confusing. Some taggers developed a different strategy to intervene time without relying on speeding up the screen reader:

> In the beginning, we need to become familiarized with the dropdown menu. We listen to Line 1, Line 2, and Line 3, one by one. We figure out that what we are looking for is in Line 3. But when everything becomes familiar, we can directly cut in. We may only listen to a single word and move on. There is a sense of compatibility between the hand and the keyboard. We can feel that the correct label is in this line.

Rhythms of the work become increasingly aligned with the skilled ear. By shortcutting time, the taggers disrupt the imaginaries of linear, progressive time that deems their ways of knowing inefficient.

Crip temporalities also allow room for budgeting significant time buffers, planning for uncertainties, and refusing to adhere to oppressive timeframes. Disabled workers at ENABLE have always been prepared for a future where they may be deemed unproductive again by new regimes of speed. None of the taggers that I spoke with thought of this particular job as a long-term career. Contingencies are a built-in feature of crip temporality. As Katzman et al. (2020, 521) put it, "Crip time reflects the unpredictable, at times defiant, nature of human body-minds, and attends to the added layer of unpredictability that is a reality of many 'crip' lives." ENABLE's management is also aware that the next iteration of AITech's system may demand more vision in completing certain tasks, such as reading multiple rounds of conversations or labeling underlined content. I asked Zhang Fan what they would do if this happened. He clearly has thought through the answers:

> First, we will advocate for accessibility. If that's not possible, then we will negotiate, see if it is ok for us to slow down a little. Another option is to switch clients. … I've been looking out for other clients all the time.

Access and crip time are uncompromisable principles for ENABLE. To the disabled taggers, living with uncertainties and exclusions has been the norm. Every software update or human resource shift is a potential threat to continued access or collaboration. Because disability is always an afterthought for those without disabilities, disabled people are constantly thinking ahead. In many ways, crip time is similar to everyone's daily time planning but different in degree. It further reorients time towards individuals' body and mind and foregrounds these needs (Kafer 2013). Such reorientation in management practice makes AI data work at ENABLE more human-centered and resilient to change. For AITech, crip time management practice ensured the low turnover rate of disabled workers, and the quality of their work.

As the COVID-19 pandemic reshuffles scheduling, pace, and the literal experience of time, many disability scholars argue that we now are all living in crip time (Samuels and Freeman 2021) and we would have all benefited from earlier attending to crip temporalities (Shew 2020a). Out of sheer necessity, such "universalization of crip time" (Samuels and Freeman 2021) finally allows us to be "asynchronous," to take the time, and to be together in time in ways for which the disability community has long been advocating (Goggin and Ellis 2020). Disability scholar Alison Kafer suggests to "think less of what crip time is and more of what crip time does" (2021, 421). As ENABLE's case shows, working in crip temporalities allows different realities of bodyminds to be attended to, and time to unfold in non-standardized ways; it also empowers the negotiation with and refusal of compliance with capitalist regimes of time, where simply no human is fast enough.

Disabled workers at ENABLE deployed significant collective labor in making their work on AI data annotation more accommodating, and less debilitating. Their co-creation of access and the management of "crip time" are forms of disability expertise that centers disabled people as knowledge making agents, and derives from relational and interactional practices (Hartblay 2020).

ENABLE's relationship labor (Shestakofsky and Kelkar 2020), and the intellectual and material costs of the workers' disability expertise are covered by ENABLE's painstakingly mobilized government and philanthropic resources, provided free of charge to AITech. In the ENABLE director's words, "We took care of everything. [The client] never had to worry about anything."

DISCUSSION: STIGMA, IM/MOBILITY, IN/VISIBILITY

The value of disability in late capitalism is often intertwined with stigma, as anthropologist Michele Friedner has argued (2014; 2015a; 2015b) in her studies of the mobilization of deaf workers by NGOs and private sectors in urban India. The immobility of disabled people is often reinscribed as value in neoliberal workplaces in the name of stability (Friedner 2015b). Similarly, disabled people in China are not naturally stable but are rendered so. With limited structural job opportunities for persons with disabilities in China (Lin, Yang, and Zhang 2018), the annotation work at ENABLE to many taggers was a slightly better option than being a massage therapist - the most common livelihood option for people with visual impairments in China; doing digital piecework at home; or being excluded by non-disabled colleagues in mainstream workplaces. Some taggers resented massage so much that they "would do anything but massage." The workers with whom I spoke tend to use "stability" and "lack of options" interchangeably to account for their comparative advantage. To them, "stability" is essentially a euphemism for social and physical immobility. Workers at ENABLE recognize both the stigma that constrains their options, and the value that their immobility can bring to companies. ENABLE, as a DPO, is constantly balancing the advocacy gains of marketing their workers as productive labor for charismatic technologies like AI, and the risks of exposing their constituencies to the feel-good politics of neoliberal corporate social responsibility (Friedner 2015a; Irani 2019).

By contrast, tech discourse around disability in China frequently emphasizes individual in/abilities, while remaining silent on systemic inequalities. In an article that discusses AITech's achievements, a well-subscribed tech media cited its collaboration with ENABLE. People with visual impairments are described as "naturally gifted" to do user intent annotation, because they are "used to listening to information" and have "very strong meaning comprehension and linear logical abilities" which makes them "understand and reconstruct meaning better than normal people." Disability hereby is essentialized as a biological reality, rather than a relational category produced through the interactions of diverse body-minds, materials, and social context (Kafer 2013). In addition, the article notes, "with fewer visual interferences, their attention is more focused."[4] Although reframing a commonly assumed deficiency as an advantage may seem uplifting, the statement is both untrue and downplays the pains and liminality structurally imposed upon blind people. Through rhetoric like this, the main drive for the work of disabled taggers is located in individual talent and attentiveness, rather than interlocking systems of exclusion. Like the indigenous women who were portrayed as "natural" circuit assembly workers in 1960s United States (Nakamura 2014), disabled women and men in contemporary China become naturalized labor for AI companies. Similar discourses can be found among the AI research communities in the United States, where autistic data workers are often portrayed as technologically gifted but denied personhood (Keyes 2020). Some taggers themselves may resort to naturalizing narratives when making a case about their productivity; but almost all of them reject any attempts that pigeon-hole them to limited sets of opportunities. As Yang, a shy blind man remarks, "if all blind people start doing data tagging, then it is like massage all over again." They can perform stability for clients, but draw the line where they feel "stuck."

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[4] The source is not cited to protect anonymity. It is unclear whether this is paid content by AITech.

Unfortunately, naturalizing the stability of disabled workers has material consequences. Despite their high quality of work, ENABLE taggers have little prospect for upward mobility within AITech. ENABLE has been trying to negotiate with AITech to reclassify the disabled taggers as AITech employees, so AITech can enjoy tax benefits and ENABLE workers can get better contracts – a "win-win" proposal. But AITech has allegedly been hesitant about the "risks" of formally hiring disabled employees. Chunlin is an experienced blind annotator who aspires to move upward in the career ladder. Over the two years of work, however, she witnessed non-disabled annotators hired by AITech moving up to higher-level positions in less than a year.

> Chunlin: Regardless of whether you are a good tagger or a bad tagger, your opportunities are frustratingly limited.
> Me: Why?
> Chunlin: Many reasons. From my perspective, I can see that accessibility is an issue. Currently the client only made the annotation system accessible, but not the arbitrator's system.[5]
> Me: Why didn't they modify the arbitrator's system, in your view?
> Chunlin: My guess is that they never thought about making us arbitrators.

Indeed, if annotation is where disabled people "naturally" belong, then there is no need to plan for a future that involves them. The opposite of accessibility is therefore not inaccessibility, but restricted access (Ellcessor 2016), preserved for people who are deemed more mobile and worthy.

Although disabled workers at ENABLE provided a stable human resource that many other non-disabled suppliers cannot guarantee, their productivity was not immediately apparent to AI companies in the beginning. "How do blind people label texts?" Many potential clients shook their heads. Blind people in contemporary China, in particular, are commonly deemed unemployable outside the realm of massage (Dauncey 2020). In many ENABLE taggers' past BPO work

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[5] Arbitrator is a high-level position than annotator, responsible for arbitrating disputes between different labels annotated by different taggers on the same data.

experience, incidences of working perfectly effectively for a client until the client learnt that they have disabilities and terminated contracts, are not entirely rare.

ENABLE's collaboration with AITech is therefore fraught with negotiations of stigma and different regimes of value (Friedner 2015b). It began with only two blind annotators testing out the idea, optimizing the process, and modifying accessibility. After a year of comparing annotators from ENABLE and other non-disabled contractors, it became clear to AITech that ENABLE workers provided higher quality service. To ENABLE, this is a great proof for advocacy for the economic productivity of disabled persons, whose citizenship and even personhood is often tied to their contribution to capitalist production (Mitchell and Snyder 2010; Dauncey 2020). The sublime imaginaries of AI can bring funding to the desperately under-resourced NGOs in China and visibility to their activist agenda. The trade-off for visibility is to expose disabled persons to the risks of exploitative corporate narratives. As a veteran DPO, ENABLE was ready to publicize the collaboration, even though it could end up adding more moral value to the corporation than sociopolitical value to the disability community.

But there is another problem – the inclusion of disabled people does not necessarily translate into affective and moral values for companies (cf. Friedner 2015a). Initially, AITech was weighing the stigma costs and the PR gains from making visible its disabled workforce. According to ENABLE, AITech had concerns. What would happen, they worried, "if our users know that a bunch of disabled folks are behind our product … [T]hey may have doubts about the quality of the product." AITech's users are China's urban, middle-class, young professionals, who call upon virtual assistants to organize their own overworked, fast-paced lives. The presence of disabled workers threatens the image of the frictionless, efficient, and competent service worker who always obediently stays out of the sight. "Smart technologies" such as virtual assistants must

further conceal the feminized and racialized nature of such work so promises for the white-collar users' freedom from degraded labor can be enchanted (Atanasoski and Vora 2015).

ENABLE workers' disabilities would not only be a hypervisible reminder of the "gendered and racialized subordination of low-income workers, the unemployed, and the unemployable" by techno-capitalism (van Doorn 2017, 908); but also an inconvenient association with malfunctioning, clumsiness, and deficits of the machine. People with non-normative body-minds are always already presumed to be less capable. Therefore, when AITech finally decided to promote its collaboration with ENABLE in its corporate materials, they called it "a small employment experiment" because they "wanted to do something for diverse employment."[6] The concept of "labor," a form of economic resource, was conveniently replaced with "employment," in this case, a public good. The workers' expertise and ENABLE's "taking care of everything," is undone by the company's acts of kindness. The fact that many disabled annotators have college degrees and are overqualified for the work is left out. The value of disability is cashed in once again, this time in not just economic, but moral terms.

Repackaging labor as charity, AITech's narrative obscures the fact that ENABLE's work was more valuable than other suppliers, hence the exclusive contract. Instead of agents *providing* quality labor, disabled people are perpetually portrayed as beneficiaries being *given* the opportunity to work. Tech companies hereby fine-tune the visibility of disabled workers to mediate the charisma and danger of AI in public imagination. In my recent conversations with the taggers, many nodded to the charitable connotations of AITech's storytelling. Nevertheless, they perceive visibility as inherently positive, symbolizing endorsement to their work that could bring more job opportunities and social change in the long run.

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[6] Source not cited to protect anonymity.

CONCLUSION: DISABILITY EXPERTISE FOR EQUITABLE AI LABOR

I have sought here to explore how it is that people with disabilities in China are coming to play an integral role in the making of commercial AI in China. Disabled data annotators, I found, offered a stable and high-quality collective human resource that the making of virtual assistant systems came to rely on, so that the unruly human intentions and indistinct human speech delivered to these devices could be rendered legible to the machine in consistent ways. By enacting novel ethics of care, interdependence, and access, the disabled workers with whom I spoke turned out to be actively reshaping the conditions of "ghost work," making their service even more durable and excellent. Building on the notion of "assistive pretext" which emphasizes the technoscientific extraction of disability as an epistemic resource, I demonstrated how disability provides material and moral resources to technoscience through the labor and expertise of people with disabilities.

The labor of people with disabilities in technoscience is often examined through the lens of disability employment in digital economy. Debating the promises and perils of technology, digital labor scholars focus on how to make technology work better for people with disabilities. This paper complements such efforts by looking at the other end of the equation. I highlight the fact that the labor and expertise of disabled people, in the meantime, assists technologies in profound ways, albeit invisibly.

My approach is informed by many historians who have uncovered the hidden roles played by marginalized communities, including women (Abbate 2012; Hicks 2017), indigenous communities (Nakamura 2014), people of color (McIlwain 2020; Shetterly 2018), and people with disabilities (Mills 2008), in the sociotechnical systems that are foundational to the numerous technologies referred to today as AI. I seek here to show the same pattern recurring in real time

through the perspectives of the workers with disabilities themselves — before their contributions are written out of history again and displaced by voices of the more powerful.

Juxtaposing their competing narratives, I detail the dynamics between the AI company and people with disabilities, who strategically deploy the stigma and value of their labor in exchange for greater community experience, economic independence, and social acceptance. They leverage the charisma of AI to showcase the productivity of disabled people. It is a form of counter-eugenics activism (Garland-Thomson 2012) that is not without risks of co-optation into capitalist norms of "productivity" (Mitchell and Snyder 2010; Hartblay 2014). The process of disability resourcing, therefore, is one of constant bargaining.

An intervention of this paper is not only to lay bare the use and abuse of disability as a resource in contemporary AI, but also to elevate crip technoscience by teasing out the disability expertise actually entailed in the production of AI. In particular, I argue that data workers' crip resistance to corporate spatiality and temporality constitutes a new form of invisible labor that is crucial to rehumanizing the working conditions of crowdwork for AI, where human labor is a structural rather than temporary component (Tubaro, Casilli, and Coville 2020; Seaver 2018). This paper calls for greater incorporation of disability expertise in the debate about technology and labor. Centering the co-creation of enabling conditions rather than essentialized body-minds, disability expertise offers new insights for operationalizing more equitable labor practices in AI.

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