INTRODUCTION

The past decade has seen a flourishing of on–demand work where the statuses of workers have become so fleeting that these workers (known colloquially as "Turkers") have been described as "transient" [14, 24, 19]. The realization that tasks can be accomplished by directing and managing this crowd of workers has spurred the research and and industry communities to flock to sites of labor like Amazon's Mechanical Turk (AMT) to explore the limits of this distributed, seemingly ephemeral labor force. Researchers in particular have taken to the space in earnest, finding opportunities to enable new forms of work as well as using Turkers as representative populations of the public [1, 37, 28].

The many sites of work replicating and extending on the general style of labor popularized by AMT have predominantly involved work done on a computer or involving the human processing of data, leading many to call this "information work" [12, 33, 13, 27]. Howe defined "crowdsourcing" in 2008 as "taking a job traditionally performed by a designated agent (usually an employee) and outsourcing it to an undefined, generally large group of people in the form of an open call" [10].

In the years since, scholars have generated taxonomies for the work done by many distributed workers in an attempt to better categorize and reason about the many forms of work done on information work platforms such as AMT, oDesk, etc... [42, 6, 29]. We add that, under Howe's constraints, even *more* new forms of work fall squarely under the metaphorical umbrella we collectively call "crowdsourcing".

Indeed, this on–demand workforce has sparked interest across industries ranging livery (driving for hire, for example Uber), house–cleaning (Handy), and generalized services (TaskRabbit) [39, 9, 38]. Today, a rapidly growing transient workforce is forming, itself assembling piece–by–piece as industries and researchers find yet more unexpected ways to benefit from a latent pool of previously vetted workers [35].

Researchers have made efforts to understand the people that have gravitated toward crowdsourcing platforms since its emergence and popularization, but as the form of work has grown and changed, so too have the demographics of workers [31, 34]. Some of this research has been motivated by the realization of the sociality of gig work, and the frustration and disenfranchisement that these systems embody [12, 32]. Other work has focused on the outcomes of work, reflecting on the resistance workers express against digitally mediated labor markets [21].

The extant body of work has ostensibly sought to answer one underlying question: What does the future hold for work and those that do it? Researchers have offered their input on this open question along three major threads of scholarship:

1. What are the limits of crowdsourcing? Perhaps more tightly constrained, what can and cannot be done by crowd workers? [for example, see 30, 36, 15, 41, 40, 17, 25, 8];
2. What forms of work design, and worker management and arrangement, are viable? [for example, see 1, 4, 22, 18, 20, 3, 5, 26]; and
3. What will work and the place of work look like for the workers? [for example, see 12, 11, 32, 7, 2, 23]

Piecework as a lens to understand crowdsourcing

This large and growing body of research has conversed to varying degrees with labor scholarship, but has not offered a persuasive framing for holistically explaining the developments in worker processes that researchers have developer, or the phenomena in social environments we have observed; nor has any research, to our knowledge, gone as far as predict future developments.

We offer a framing for crowd work spanning the aforementioned industries collectively as a contemporary instantiation of "piecework". Piecework as a metaphor for the type of work at hand is not new. Indeed, Kittur et al. in 2013 referenced crowd work as "piecework" briefly as a loose analogy to the form of work emerging at the time [16].

But more than this, the framing of on–demand labor as piecework (re–instantiated) allows us to attempt to make sense of the broader research on this new form of work by evaluating this work through a much more refined lens. More concretely, by looking at task–based or "gig" work as an instantiation (or even a continuation) of piecework, and by looking for patterns of behavior that the corresponding literature predicts on this basis, we can 1) make sense of the phenomena so far as part of a much larger series of interrelated events; 2) bring into focus the ongoing work among workers, system–designers, and researchers in this space; and finally, 3) offer predictions of what social computing researchers, and workers themselves, should expect to see on the horizon of on–demand work.

We'll look at a broad range of cases under a number of major themes we propose as broadly describing the types of research being done in crowd work and more generally in what we argue is contemporary piecework. After validating this lens as a way of reasoning about on–demand labor, we'll attempt to use this perspective to suggest areas of research worth anticipating, and developments we should expect to see in the maturation of digitally mediated work. Finally, we will offer design implications based on this research...

[al2: **notes/what i want to get across...**

- on–demand labor has consumed an increasing proportion of the labor market in the past ten years [*Pew research on on–demand labor*]; the work has ranged from Turk work processes
- some of it has been about resisting Uber & other gig labor platforms [1, 21]; some researchers have tackled understanding this new instantiation of work, but come up short (*how*).
- (what binds this together)
- we offer a framing on this topic that situates the research so far on a timeline of the maturation of another form of work that emerged approximately 150 years ago — that is, piecework — which convincingly suggests that on–demand labor in the form of Turking, driving for Uber, etc... are in fact little more than piecework re–surging today.
- this paper will trace the body of research describing microwork — and later gig work — and place it in the context

of historical piecework and the industrial revolution as a whole.
- informed by this new lens, we'll then turn our attention to the future of this re–emergent form of work, and suggest ways that researchers and users of on–demand labor might influence the outcomes we predict in this paper.

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