Slicing work smaller — or "putting the 'micro' in microwork"

Crowdwork's perspective. **The crowdsourcing research into work decomposition has largely focused on minimizing the additional context necessary to do tasks, and making it easier to do tasks with less time.** This first thread is perhaps best described by Verroios and Bernstein as making crowd workers "... able to act with global understanding when each contributor only has access to local views" [19]. With the exception of a few cases (specifically, Kinnaird, Dabbish, and Kiesler's work which finds that greater work context fosters more reliably high–quality work), the micro task paradigm has emerged as the overwhelming favorite [16, 17, 4, 9].

As the additional context necessary to complete a task diminishes, the marginal cost of finding and *doing* tasks has increasingly become the focus of research. Chilton et al. illustrate the challenges on AMT, and some work has gone into ameliorating the problems specific to this work site (*ReLauncher*), while other work designs tasks around gap time (*Twitch Crowdsourcing* & *Wait–Learning*) [5, 11, 18, 3]. Yet more work looks at the general framing of tasks, chaining and arranging them to maximally exploit the attention and stress threshold of workers [2]. Rather than attempt to minimize the error rates in micro–tasks, as Kinnaird, Dabbish, and Kiesler suggested, we as a community have leaned *into* the peril of low–context work, "embracing error" in crowdsourcing [10].

Not all of the work toward optimizing crowd work–flows has gone toward minimizing the creative input of crowd workers; a thriving body of literature adopts practices such as pipelining to allow experts to participate in crowd work [15].

Piecework's perspective. **The research community relating to piecework and labor has been wrestling with the decomposition of work for centuries.** The beginnings of systematic task decomposition stretch back as far as the 17th century, when Airy employed young boys at the Greenwich Observatory who "possessed the basic skills of mathematics, including 'Arithmetic, the use of Logarithms, and Elementary Algebra' " to compute, by hand, astronomical phenomena [7]. These workers became the first *computers*.

The work Airy solicited was interesting for several reasons. First, work output was quickly verifiable; Airy could assign variably skilled workers to compute values, and have other workers check their work. [al2: I could point out that the opportunity to check work and repeat the task is a little like find–fix–verify, but is that jumping the gun?] Second, tasks were discrete — that is, independent from one another. Finally, knowledge of the full scope of the project — indeed, knowledge of anything more than the problem set at hand — was unnecessary.

The insight of breaking tasks down into smaller components didn't find its audience until the early 20th century, with the rise of Fordism and scientific management (or Taylorism). From scientific management, we found that we could measure work at unprecedented resolution and precision. As Brown points out, piecework most greatly benefits the instrumented measurement of workers, but certainly in Ford and Taylor's time — and certainly in Airy's time — highly instrumented, automatic measurement of workers was all but impossible. As a result, the distillation of work into smaller chunks ultimately reached a limit of usefulness.

[al2: Marx in here? Alienated from the context of the work? Critiques about piecework marginalizing workers? Labor. Railway Employees Dept and Board wrote about this as well (albeit they were advocating from workers' perspectives, but who isn't?)]

What's changed. 1) Computers make it possible to switch from one task to another unlike any arbitrary manufacturing factory possibly could; 2) we've sliced works to such small sizes that the marginal costs — things like task–finding, cognitive load switching, etc... — have become relatively large; 3) instrumentation has become so advanced that the curve of diminishing value on measuring and tracking workers has shifted significantly (but not been obliterated); [al2: some companies have suggested self–tracking through programs that give workers fitbits and whatnot — I could make the argument that this is just an illustration of that, but it's not really about work *per se* unless you think about it as the general management of workers. Thoughts?]

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PARAGRAPH GRAVEYARD

The finding here is that crowdwork can be more carefully micro–managed than piecework could be, and that this is a double–edged sword: we can effectively give feedback to workers on everything they do, but this is emboldening us to try to over–manage workers just as piecework tried to do.

My goal for this section is to make two points:

1. show how this is related to the assembly line and scientific management, and how piecework literature tried to measure everything, but found it untenable given the extra equipment that was necessary (but generally which didn't exist) to track every movement and action that workers took.
2. show how this work was enabled by the "verifiability" of work output(?)

As a result, the prevalent mindset of designing work for crowd workers — one which treats micro task workers as "modular, protocol–defined computational services" — has inexorably alienated workers from the greater context of their work [8].

[al2: i don't like this section *here*, but i like it in general. what do?] **One of the emergent properties of micro–tasks has been the relative cost of *finding* worthwhile tasks.** The research community has documented and to some extent attempted to intervene in the discovery of worthwhile tasks [5]. Cosley et al. attempts to address this by directing workers to tasks through "intelligent task routing" [6]. Much of this work and the work at the periphery of this space, then, has focused on minimizing the amount of time that people need to spend doing anything other than the work for which they are paid.

What we take away from this and the previous set of work is that the value of adopting crowdsourcing for any particular task seems to be mediated by two questions: 1) How long does it take to train workers to do the work in question? and 2) How long does it take for the worker to do the work? Minimizing these criteria has become the overarching motivation of the crowdsourcing work design community [4, 14]