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" [16]. 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 [13, 14, 3, 8].

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*) [4, 10, 15, 2]. Yet more work looks at the general framing of tasks, chaining and arranging them to maximally exploit the attention and stress threshold of workers [1]. 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 [9].

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 [12].

Piecework's perspective. The beginnings of systematized 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* astronomical phenomena [6]. Airy's tasks were unique at the time for several reasons:

1. Each task was quickly verifiable by a qualified (human) computer;
2. tasks were discrete — that is, independent from one another; and
3. knowledge of the full scope of the project — indeed, knowledge of anything more than the problem set at hand — was unnecessary.

What's changed. [al2: todo]

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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 [7].

[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 [4]. Cosley et al. attempts to address this by directing workers to tasks through "intelligent task routing" [5]. 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 [3, 11]