

*AI will substantively change the
skills needed in the workplace of
the future*

Amalia R. Miller

University of Virginia, NBER, IZA

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My answer: Yes, probably

- AI is already causing large changes in specific narrow areas and both *innovation* and *adoption* of AI are on track for continued growth

Use my time to address *how* AI might affect demand for different skills:

- Offer some structure on the question
- Discuss implications of the 2 papers

Start with a few notes about skills

1. Skills are not occupations, jobs or even tasks

- AI can affect skill mix even with stable employment, job titles, tasks

2. People acquire skills with ability and human capital investment

- Skills will be unevenly distributed if ability or investments are

3. Skills vary along vertical and horizontal dimensions (degree, kind)

- Often think of high v. low skill, proxy for education level, but also range of different types of general and specific skills

4. Skills are not well defined or measured, hard to study

Why think about skill demand?

- Thinking about disembodied skills feels weird
- Ignores so much about work, subjective experience of human workers that will be affected by AI
 - Time allocation, interpersonal interactions, autonomy, pay, job security, status, intrinsic joy, personal growth; also, boredom, frustration, conflict, stress, risk
- Yet focus on skills is a standard policy response to labor demand disruptions, focused on easing the transition path
 - Re-training is a popular tool to help workers with devalued skills, a way to provided targeted transfers, though its success can be questioned

Beyond transition, skill demand mix matters

- For distributional impacts of AI among workers
 - Skill-biased technological change increases wage inequality
 - Horizontal skill shifts also have distributional effects (if ability, preferences, opportunities are unequal)
- Because of large public sector role in skill development through provision, subsidy, regulation of schooling
 - Human capital investments take time, so current choices about content, funding levels and types of training should respond to predictions

How will AI change demand for skills?

- AI can substitute for skills that resemble it in form (routine, prediction) or function (used to perform AI-amenable tasks).
- Computer skills are complementary in the near term
 - Programming of AI, tech support, “feeding” and interpreting AI
 - Could happen within jobs/tasks or with new job mix
- But these skills seem ripe for substitution by AI
 - AI innovation can reduce (remove) the need for specialized human “programmers” and devalue the skills that created it
- In that case, the skills that will become more valuable are those used in tasks that have limited (require human in the loop) or no role for AI

Insights from current papers

Papers share a common focus on settings where AI is superior

But focus attention on opposite aspects of AI and skill interaction

- Deming is mostly about substitution
- Choi, Kim, Kim and Kang about complementarity

Deming: AI as substitute for humans

- Paper focuses on “decision making” as a job requirement, rising in frequency. What does that mean?
- In the broadest sense, all human tasks require “decision making” so need a more specific definition
 - Definition in the paper is operational, rather than conceptual, dictionary-based text analysis of job listings
 - Hard to interpret b/c listings are advertisements to attract applicants, not objective accounting, but correlated with management and non-routine cognitive
- Paper presents a model of human decision making that looks like
 - A typical economic model of rational choice with an objective function
 - Also boils down to a prediction problem.

Human decision making as bad AI

- In the model, humans get better at making predictions as they accumulate experience and are (passively) exposed to more data
- But the desk is stacked
- AI can do better than humans in decision making when decisions boil down to routine prediction problems with clear objectives and lots of clean, unbiased data available
- Paper describes the competition between man and machine:

The model provides some insights about how artificial intelligence could replace or alter job tasks previously performed by people. For example, humans have capacity constraints on the amount of data they can use to make predictions, which we could think of as a cap on sample size n .

Machine learning technologies do not face the same data processing constraints, and so all else equal they will make more accurate predictions.

However, humans may have an advantage when relevant data are not formally codified. If people observe important decision-making context (X_j) that is not collected as data, they may outperform machines even after accounting for capacity constraints. Since the magnitude of sample selection bias increases with data size, big data will still yield poor predictions if it is non-representative or missing important features (Meng et al. 2018).

Overall, the increasing availability of big data and the falling cost of prediction suggests that the value of work experience may decline relative to the ability to make good decisions by minimizing sample selection bias.

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Paper also hints at complementarities

- Think about “decision making” managerial occupations, lots of non-prediction parts
- Management jobs are partly about people, entail communicating, inspiring, mentoring, leading other humans who implement decisions
 - Maybe AI is best solo for decisions that can be implemented directly via computer or robot? If you want to manage people, you still want a human manager
- The keywords listed include: “problem-solving”, “diagnosing”, “judgment”, “strategize”, “planning”, “prioritizing”, “goals”
 - AI is not able to set goals, seems poorly suited to some of those
 - Maybe a human in the loop is needed for mission and vision

Choi et al.: AI as enhancer of humans

- This paper uses the example of the game GO to talk about how AI can improve human performance at some tasks
- This is not a production complementarity, because the AI is not used in “production” (game play)
- Instead, the paper is about using AI as a learning tool
- In this context, the AI is better than the humans, so people can get better at the task by practicing with the AI
 - Measure of move quality is from the AI, though, so are humans getting better or just moving more like AI would?
- Finds that younger players improved more, consistent with standard human capital models and their longer horizon

Implications for skills?

- Unless cost of AI is higher, unclear why people would still perform the task → seems like a classic setting for substitution
- But there is also something interesting and surprising here, which suggests limits to the substitution
- People still play GO, for fun and even professionally. This is true for chess too. Why? And why do they get paid to do it? Do people pay to watch robots compete?
- What does that suggest about the kinds of tasks and skills that won't be devalued?

Conclusions

- Expect AI diffusion to have differential impact on skills, but may not align along simple vertical dimension or even tech/soft
- Even within stark settings where AI has the advantage, both papers suggest modes of complementarity and human-machine cooperation