

1 DISCUSSION

Street-level bureaucracies are not a perfect metaphor for the phenomena we described here. We didn't discuss in any capacity the fact that street-level bureaucrats sometimes diverge in unexpected ways from the prerogatives of their managers. This becomes the source of considerable tension in Lipsky's treatment of street-level bureaucracies, but in our discussion of the relationships between street-level algorithms and their stakeholders, we largely avoided the relationship between engineers and other system designers and the systems themselves. We'll let it suffice to say that while there is a disconnect between intent and outcome, the nature of that relationship is so different that it warrants much further discussion.

Nor are street-level bureaucrats paragons of justice and fair decision making. Street-level bureaucrats have historically been a source of immense prejudice and discrimination: Jim Crow in the United States, for instance, often took the form of laws very selectively enforced to harm people of color. Likewise, bureaucratic administration can become opaque and benefit only those in power with access to understand how the system works. All of this is to say that street-level bureaucracies are places of power — and power is often abused by those who have it. This is intensely documented in Whyte's ethnography of organized crime, and the abuses and corruption endemic to the police force [5].

Perhaps least certain of all the questions that emerge as a result of this discussion of street-level algorithms is that of the relationship between conflicting agents. What happens when street-level bureaucrats collide with street-level algorithms? The theory of street-level bureaucracies doesn't offer much to reconcile the tensions between bureaucrats and algorithms. Christin, Veale et al. have done substantive work to map out the landscape of challenges that may emerge and ways to mitigate those conflicts [1, 4]. This area in particular needs further study: the fault lines are here to stay, and we need to reflect on the shifting of discretion from the bureaucrat to the engineer [2]. A value-sensitive approach [6] would ensure that engineers consider whether and how their algorithms will be integrated into bureaucrats' decision-making, and how the algorithms may support or undermine bureaucrats' authority.

Algorithms and machine learning may yet introduce new methods that override the observations made here. We are assuming, as is the case currently, that algorithms require feedback or additional training to update their learned models. Likewise, we are assuming that algorithms will continue to make errors of confidence estimation, and will make mistakes by labeling marginal, novel cases with high confidence. Nothing about the emerging architectures of modern machine learning techniques challenges these assumptions, but should it happen, the situation might improve.

Despite these limitations, we suspect that the lens of street-level algorithms gives us a foothold on many questions in HCI and computing more broadly. We've discussed the ways that street-level bureaucracies can inform the ways we think about YouTube content moderation, judicial bias, and crowdwork, but we could take the same mechanism to task on a number of other cases:

- *Moderation of forum content:* For many of the same reasons that we see trouble with the application of algorithmic classification systems on YouTube, we should expect to see problems applying algorithmic systems to text-based forums.
- *Self-driving cars:* Cars will make algorithmic decisions all the way from Level 1, where the vehicle decides to break when we get too close to the oncoming vehicle, to Level 3, where it will need to decide when to hand control back to the driver, to Level 5, where the system might need to decide which route to take and thus how late we should be to our meeting. Self-driving cars are literal street-level algorithms.
- *Parental controls:* Algorithms that lock children out after a certain amount of screen time elapses will need to learn how to handle unforeseen situations when the device should remain functional, such as a threat or emergency.
- *AI in medicine:* When decisions are life-or-death, how does a patient or doctor handle an algorithm's potentially error-prone recommendations?

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