Labor Outcomes and Ethics of Agricultural Automation

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In Ursula K. Le Guin's acclaimed science fiction novel *The Dispossessed,* she tells of a famous physicist, Sheveck, and his research to uncover a unified mathematical theory with the potential to unlock space and time for humanity. Though purely a theoretician himself, Sheveck knows what his work could mean to his world and the many worlds beyond: the invention of the ansible, a classic science fiction technology capable of faster-than-light communication across the universe. His hope is that this invention will help to unify the disparate civilizations across his solar system, but as he grows older and world powers reveal their impatience for his research's completion, his hope turns to dread that such a powerful device will be wielded to the same end that power often is: domination of the powerless.

It is in a similarly complicated context that agricultural automation research- my own field- takes place in. It is of course the engineer's duty to serve the interest of the public, and yet the public has so many, often conflicting, interests. The development of new labor-saving agricultural technologies contains the potential to be a great boon, bane, or both at once depending on how they are used and whose eyes you are seeing the world through. When we engineers seek to intervene in work that takes place on farms through the invention of technology, it should be recognized that there are two primary, distinct groups into whose work and lives we intervene. Growers' and farm management's interest in agricultural automation is much the same as capital owners of any industry: acceleration of farm processes and reduction of labor costs can lead to higher farm profits. Yet there is another, more populous group of people who work on farms who also have interests at stake. Farmworkers often lack social access to the spaces where research and engineering is done, and it is for this reason that engineers must make special effort to understand the interests and social context of farmworkers so that the whole public may be served.

From transplanting, crop and pest scouting, pruning, harvest, and general crop management, a significant amount of hand labor is required on farms across the US. Long hours of physical labor underneath the summer sun pose a daily risk and result in heat induced deaths at twenty times the rate of

the average worker, and the overall farmworker morbidity rate stands at seven times the national average (Tonozzi & Layne, 2016). A survey of 198 Florida farmworkers found that nearly half of the surveyed had experienced symptoms indicating at least moderate heat stress within the previous week alone, while a North Carolina survey reported 27% of farmworkers had recently experienced three or more symptoms of heat stress during August and September (Kearney et al., 2016; Mutic et al., 2018). Physical labor also results in significantly higher than average rates of injury and musculoskeletal pain- the latter affecting as much as 40% of all farmworkers- and even these numbers are likely greatly underestimated due to social factors surrounding farm labor (Arcury et al., 2012; Leigh et al., 2004; May & Arcury, 2020). Pesticide exposure is also ubiquitous- repeated exposure to a wide array of agrochemicals is common, and urinary metabolites of even neurotoxic agrochemicals were found in high percentages of samples analyzed (Arcury et al., 2009, 2010). Although the long term outcomes of frequent exposure to pesticides are poorly understood and poorly researched, largely due to factors related to the marginalized status of the farmworker community in the United States, existing research shows evidence of decreased neurobehavioral performance and damage to workers' own DNA resulting from this exposure (McCauley et al., 2006).

Though it is possible and essential to improve the safety and working conditions of farmworkers, these aforementioned stresses are largely endemic to farm labor as it exists today. Without the automation of all farm processes, human beings will be required to endure hard labor in extreme and dangerous environments to keep pantries full. As the research demonstrates, this profession requires the sacrifice of one's body in exchange for compensation that is not and perhaps cannot be considered adequate. If any kind of labor is worthy of being automated, it is exactly this type which is both necessary for our society and which also inflicts real harm to the bodies of those who engage in it. The development of technology to replace this labor therefore has the potential to free humanity to safer and higher pursuits.

However, to stop here would be to ignore the crucial social and historical context of farm work. Farmworkers themselves have made many attempts to overcome barriers to improve their poor working

conditions and poverty wages, the most significant of which having occurred throughout the mid to late 20th century. As it happened, these movements were profoundly impacted by the advent of agricultural technologies. Farmworkers fought to achieve these better conditions though labor and community organizing, but were stymied by the Bracero Program, which used foreign contract labor with legal prohibitions on organizing to replace domestic workers especially as they pushed toward collective bargaining (Martin, 2003). Because this program was both effectively and explicitly intentioned to suppress wages for farm work, we can examine the role of agricultural automation in relation to the Bracero program and its abolition in 1964 in the tomato industry.

As late as 1962, braceros made up 85% of all tomato harvesters in California, and mechanized harvest was nearly nonexistent despite the fact that the University of California had developed a mechanical tomato harvester by 1951 (Friedland & Barton, 1975; Valdés, 1994). When the AFL-CIO launched an aggressive political attack on the Bracero program beginning in the late 1950s, the tomato industry began to fear rising wages for farm labor (Valdés, 1994). California farmworkers at the time were significantly more organized than in other parts of the country, with strong presence from the AFL-CIO and other organizations which became known as the United Farm Workers. Consequently, while other tomato producing regions continued to use hand labor well after the end of the Bracero program, the California industry quickly turned to automation. Over the period from 1959 to 1964, industry contributions to university research on mechanical tomato harvesters increased 756% over the previous 5-year period. In the five years following the end of the Bracero program, mechanical harvest of processing tomatoes in California rose from 3% to 99.5% (Valdés, 1994).

This dramatic shift to mechanization following efforts made by organized labor is not an isolated one: in Ohio, mechanical tomato harvesting remained as low as 29% in 1978, but rose sharply to 55% in a single year following a major farmworker strike in 1978 (Terry, 1983). As the National Farm Labor Union was striking against wage cuts in 1949, cotton farm owners put too fine a point on the labor-crushing function of labor-saving machinery by parading mechanical harvesters through farmworker

districts throughout California, declaring that “unless they accept the wage cuts the farmers will use their machines to pick the 1949 crop (Valdés, 1994).”

Whatever liberatory potential exists latent in automation and indeed all innovations, historically it has been the social context into which they are created which has ultimately been determinative of the effects they have had on the world. It is in fact because of farmworkers’ marginalized status that the outcomes of agricultural automation can be so ambiguous. Because farm work is so undesirable, it has nearly always been done by marginalized peoples to whom little other work has been available, and because little other work has been available, it has been difficult for workers to gain the bargaining power necessary to better their working conditions. Farmworkers are seemingly caught between a rock and a hard place, unable to fully make good on the social benefits of automation while suffering the worst of its drawbacks.

If it is the public we serve, then the ethical researcher must seek to understand the whole of the public, including the racial, gender, and class antagonisms existing therein. As for Sheveck, by the time his research is nearly complete, he realizes he has allowed the goals and bounds of his research be guided by the elite segment of society which has exclusive access to him, and that in doing so he has ensured that his work will be employed not to fulfill its revolutionary potential but to fortify existing hierarchies of wealth and power which his benefactors crown. In response, he commits to two acts: first, to seek out and build relationships with the marginalized so that they might teach him about their struggles and desires from perspectives that were previously hidden from him; and second, to truly serve the public good by reorienting his research toward the liberation of the marginalized and to the personal participation in the creation of a social context in which such liberation becomes possible.

Bibliography

Arcury, T. A., Grzywacz, J. G., Isom, S., Whalley, L. E., Vallejos, Q. M., Chen, H., Galván, L., Barr, D. B., & Quandt, S. A. (2009). Seasonal Variation in the Measurement of Urinary Pesticide Metabolites among Latino Farmworkers in Eastern North Carolina. *International Journal of Occupational and Environmental Health*, *15*(4), 339–350. https://doi.org/10.1179/oeh.2009.15.4.339

Arcury, T. A., Grzywacz, J. G., Talton, J. W., Chen, H., Vallejos, Q. M., Galván, L., Barr, D. B., & Quandt, S. A. (2010). Repeated pesticide exposure among North Carolina migrant and seasonal farmworkers. *American Journal of Industrial Medicine*, *53*(8), 802–813. https://doi.org/10.1002/ajim.20856

Arcury, T. A., O'Hara, H., Grzywacz, J. G., Isom, S., Chen, H., & Quandt, S. A. (2012). Work Safety Climate, Musculoskeletal Discomfort, Working While Injured, and Depression Among Migrant Farmworkers in North Carolina. *American Journal of Public Health*, *102*(S2), S272–S278. https://doi.org/10.2105/AJPH.2011.300597

Friedland, W. H., & Barton, A. (1975). *Destalking the Wily Tomato: A Case Study in Social Consequences in California Agricultural Research. Research Monograph No. 15*. https://eric.ed.gov/?id=ED116844

Kearney, G. D., Hu, H., Xu, X., Hall, M. B., & Balanay, J. A. G. (2016). Estimating the Prevalence of Heat-Related Symptoms and Sun Safety–Related Behavior among Latino Farmworkers in Eastern North Carolina. *Journal of Agromedicine*, *21*(1), 15–23. https://doi.org/10.1080/1059924X.2015.1106377

Leigh, J. P., Marcin, J. P., & Miller, T. R. (2004). An Estimate of the U.S. Government's Undercount of Nonfatal Occupational Injuries. *Journal of Occupational and Environmental Medicine*, *46*(1), 10–18. https://doi.org/10.1097/01.jom.0000105909.66435.53

Martin, P. L. (2003). *Promise Unfulfilled: Unions, Immigration, and the Farm Workers*. Cornell University Press. https://www.jstor.org/stable/10.7591/j.ctv3s8q54

May, J. J., & Arcury, T. A. (2020). Occupational Injury and Illness in Farmworkers in the Eastern United States. In T. A. Arcury & S. A. Quandt (Eds.), *Latinx Farmworkers in the Eastern United States: Health, Safety, and Justice* (pp. 41–81). Springer International Publishing. https://doi.org/10.1007/978-3-030-36643-8_3

McCauley, Linda A., Anger W. Kent, Keifer Matthew, Langley Rick, Robson Mark G., & Rohlman Diane. (2006). Studying Health Outcomes in Farmworker Populations Exposed to Pesticides. *Environmental Health Perspectives*, *114*(6), 953–960. https://doi.org/10.1289/ehp.8526

Mutic, A. D., Mix, J. M., Elon, L., Mutic, N. J., Economos, J., Flocks, J., Tovar-Aguilar, A. J., & McCauley, L. A. (2018). Classification of Heat-Related Illness Symptoms Among Florida Farmworkers. *Journal of Nursing Scholarship*, *50*(1), 74–82. https://doi.org/10.1111/jnu.12355

Terry, J. L. (1983). The Political Economy of Migrant Farm Labor. Immigration, Mechanization and Unionization in the Midwest. *Insurgent Sociologist*, *11*(4), 63–75. https://doi.org/10.1177/089692058301100407

Tonozzi, T. R., & Layne, L. A. (2016). Hired crop worker injuries on farms in the United States: A comparison of two survey periods from the National Agricultural Workers Survey. *American Journal of Industrial Medicine*, *59*(5), 408–423. https://doi.org/10.1002/ajim.22578

Valdés, D. N. (1994). Machine Politics in California Agriculture, 1945-1990s. *Pacific Historical Review*, *63*(2), 203–224. https://doi.org/10.2307/3640866