

Video Games in Job Interviews: Using Algorithms to Minimize Discrimination and Unconscious Bias

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Introduction

On a summer day in 2002, Billy Beane sat in a roomful of baseball scouts trying to create a list of high school and college athletes his team hoped to draft seven days later.¹ Beane, in his fifth year as general manager of the Oakland Athletics, a Major League Baseball team, grew tired of the players his scouts suggested, most of whom never reached the major leagues.² He decided that comments from his scouts about players, such as “[t]here might be some . . . family issues here . . . I heard the dad had spent some time in prison”³ or “[t]his kid wears a large pair of underwear . . . [a] body like that can be low energy”⁴ . . . [i]t’s not natural,”⁵ were not the qualities scouts should consider when selecting a player to draft.⁶ Beane wanted to analyze the players’ statistics.⁷ He wanted to know which players hit the ball, drew the most walks, and struck out hitters most often.⁸ Beane hired Paul DePodesta, a Harvard graduate, to analyze statistics using algorithms to calculate who performed best on the field.⁹ Using algorithms focused on performance to make operational decisions throughout the 2002 season, Beane replaced the best players Oakland lost in free

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1. MICHAEL LEWIS, *MONEYBALL* 14–15 (2004).

2. *Id.* at 15–18.

3. *Id.* at 24.

4. *Id.* at 34.

5. *Id.* at 36.

6. *Id.* at 15–18.

7. *Id.* at 18–19.

8. *Id.* at 18, 36–37.

9. *Id.* at 17–19.

agency with unknown or overlooked players and made the playoffs with one of the league's lowest payrolls.¹⁰

Beane's bold and unprecedented use of algorithms to evaluate baseball players set an example for objectively identifying the best talent within a large pool while saving money.¹¹ Employers have achieved similar success using algorithms to select employees.¹² For many years, companies used computerized résumé-tracking systems based on algorithms to scan résumés for key words or phrases important for the job.¹³ Some companies use algorithms in more sophisticated ways. Some have applicants take quizzes or play games to assess qualities, including cognitive abilities, work ethic, problem-solving skills, and motivation, that cannot be seen from a résumé.¹⁴ These employers can winnow from thousands of applicants those most likely to perform the best and stay the longest.¹⁵

Although analyzing game or quiz performance with algorithms seems like an objective means to evaluate applicants, some say the practice¹⁶ may lead to disparate treatment¹⁷ and disparate im-

10. *Id.* at 119–37, 270; Don Peck, *They're Watching You at Work*, ATLANTIC (Dec. 2013), <http://www.theatlantic.com/magazine/archive/2013/12/theyre-watching-you-at-work/354681/>.

11. LEWIS, *supra* note 1, at 21–42, 270.

12. Tim Adams, *Job Hunting Is a Matter of Big Data, Not How You Perform at an Interview*, GUARDIAN (May 10, 2014, 4:00 PM), <https://www.theguardian.com/technology/2014/may/10/job-hunting-big-data-interview-algorithms-employees>; Jennifer Alsever, *Is Software Better at Managing People Than You Are?*, FORTUNE (Mar. 21, 2016), <http://fortune.com/2016/03/21/software-algorithms-hiring/>; Taylor Casti, *Video Games Could One Day Replace Job Interviews*, HUFFINGTON POST (Jan. 23, 2014), http://www.huffingtonpost.com/2014/01/23/video-games-job-interviews-applications-startups_n_4647245.html; Rob Davies, *Everything to Play for as Employers Turn to Video Games in Recruitment Drive*, GUARDIAN (Nov. 28, 2015, 11:00 PM), <https://www.theguardian.com/money/2015/nov/28/psychometric-tests-games-recruitment-interview>; Steve Lohr, *Big Data, Trying to Build Better Workers*, N.Y. TIMES (Apr. 20, 2013), http://www.nytimes.com/2013/04/21/technology/big-data-trying-to-build-better-workers.html?_r=0; Melanie Pinola, *How Can I Make Sure My Resume Gets Past Resume Robots and into a Human's Hands?*, LIFEHACKER (Dec. 9, 2011, 10:00 AM), <http://lifehacker.com/5866630/how-can-i-make-sure-my-resume-gets-past-resume-robots-and-into-a-humans-hand>; Catherine Rampell, *Your Next Job Application Could Involve a Video Game*, N.Y. TIMES (Jan. 22, 2014), <http://www.nytimes.com/2014/01/26/magazine/your-next-job-application-could-involve-a-video-game.html>; Pamela Skillings, *How to Get the Applicant Tracking System to Pick Your Resume*, BIG INTERVIEW (Mar. 1, 2015), <https://biginterview.com/blog/2015/03/applicant-tracking-system.html>; Lauren Weber, *Your Résumé vs. Oblivion*, WALL ST. J. (Jan. 24, 2012), <http://www.wsj.com/articles/SB10001424052970204624204577178941034941330>.

13. Pinola, *supra* note 12; Skillings, *supra* note 12; Weber, *supra* note 12.

14. Casti, *supra* note 12; Rampell, *supra* note 12.

15. Peck, *supra* note 10.

16. Solon Barocas & Andrew D. Selbst, *Big Data's Disparate Impact*, 104 CAL. L. REV. 671, 691 (2016); Allan G. King & Marko J. Mrkonich, *"Big Data" and the Risk of Employment Discrimination*, 68 OKLA. L. REV. 555, 563–64 (2016); Pauline T. Kim, *Data-Driven Discrimination at Work*, 58 WM. & MARY L. REV. 857 (2017).

17. *Int'l Bhd. of Teamsters v. United States*, 431 U.S. 324, 335, n.15 (1977) (disparate treatment occurs when an employer intentionally treats members of a protected class less favorably than others).

pact¹⁸ discrimination violating Title VII of the Civil Rights Act of 1964¹⁹ and the Age Discrimination in Employment Act (ADEA).²⁰ Critics express concern that algorithms, often derived from information about current employees, will discriminate against underrepresented groups if existing employees do not proportionately represent the applicant pool.²¹ For example, use of a video game to screen applicants may disadvantage older applicants if they do not perform as well as millennials.²² Further, algorithms may not prevent unconscious bias from affecting employers' hiring practices.²³

However, carefully designed and periodically evaluated algorithms can avoid disparate treatment and disparate impact discrimination and avoid unconscious bias.²⁴ This Article argues that despite the fear that algorithms will cause employment discrimination, a

18. *Id.* at 336, n.15 (disparate impact occurs when a facially neutral employment practice in fact discriminates against one group).

19. 42 U.S.C. § 2000e-2 (2012) (prohibits employment discrimination on the basis of “race, color, religion, sex, or national origin”).

20. 29 U.S.C. §§ 623–634 (2012) (prohibits employment discrimination on the basis of age against persons over the age of forty).

21. Alsever, *supra* note 12; Kevin McGowan, *Big Bad Data May Be Triggering Discrimination*, BLOOMBERG BNA (Aug. 15, 2016), <https://bol.bna.com/big-bad-data-may-be-triggering-discrimination/>; Dustin Volz, *Silicon Valley Thinks It Has the Answer to Its Diversity Problem*, ATLANTIC (Sept. 26, 2014), <http://www.theatlantic.com/politics/archive/2014/09/silicon-valley-thinks-it-has-the-answer-to-its-diversity-problem/431334/>. Volz cites White House, *Big Data: Seizing Opportunities, Preserving Values* (May 2014), https://www.whitehouse.gov/sites/default/files/docs/big_data_privacy_report_may_1_2014.pdf; *see also* White House, *Big Data: Seizing Opportunities and Preserving Values: Interim Progress Report* (Feb. 2015), https://www.whitehouse.gov/sites/default/files/docs/20150204_Big_Data_Seizing_Opportunities_Preserving_Val_ues_Memo.pdf; White House, *Big Data: A Report on Algorithmic Systems, Opportunity, and Civil Rights* (May 2016), https://web.archive.org/web/20161219083427/https://www.whitehouse.gov/sites/default/files/microsites/ostp/2016_0504_data_discrimination.pdf.

22. Casti, *supra* note 12; Rampell, *supra* note 12; Anastasia Anashkina, *Will Video Games Replace Job Interviews?*, CNNMONEY, <http://money.cnn.com/video/pf/2014/01/09/pf-job-search-video-game-tests.cnnmoney/> (last visited Oct. 3, 2016); *see also* Jessica K. Sink & Richard Bales, *Born in the Bandwidth: “Digital Native” As Pretext for Age Discrimination in Hiring*, 31 ABA J. LAB. & EMP. L. 521, 523 (2016) (arguing that the phrase “digital native” in a job listing is an illegal age-based qualifier).

23. McGowan, *supra* note 21; Shana Lebowitz, *3 Unconscious Biases That Affect Whether You Get Hired*, BUS. INSIDER (July 17, 2015, 11:47 AM), <http://www.businessinsider.com/unconscious-biases-in-hiring-decisions-2015-7>. Unconscious bias tends to occur in the job hiring process during applicant interviews. *Id.* Employers and employer representatives, such as supervisors and human resources professionals, tend to like people similar to themselves. *Id.* If employers see their own qualities reflected in the applicant, they gravitate toward that person. *Id.* Even though employers try to avoid characterizing classes or classifications of candidates, they may unconsciously assume certain groups perform better than others, such as believing men perform better than women on mathematical tasks. *Id.* Unconscious bias may affect employers' perception of job candidates' competence. *Id.*

24. *Could Video Games Be the Next Job Interview?*, ALL TECH CONSIDERED (Dec. 1, 2013, 8:13 AM), <http://www.npr.org/sections/alltechconsidered/2013/12/01/246999632/playing-the-game-to-get-the-job> (showing video games provide information of a person's skills and potential); Pinola, *supra* note 12 (showing résumé trackers use objective criteria to identify candidates).

study of video game use in the hiring process shows that it provides better and fairer ways to evaluate applicants without discrimination.

Part I describes how algorithms have been utilized in hiring and provides details about two video games, “Wasabi Waiter” and “Firefly Freedom,” used to evaluate applicants. Part II examines the debate over whether algorithms, and particularly their use in video games, cause hiring discrimination. Finally, Part III discusses how the use of “Wasabi Waiter” and “Firefly Freedom” can achieve greater success than human evaluations in both avoiding disparate impact and disparate treatment claims and reducing unconscious bias in employee selection.

I. Background

Workers today, especially millennials, no longer envision spending an entire career at one company.²⁵ Although the average number of applicants per job has remained low, some companies receive large quantities of applications for certain openings.²⁶ Many of these companies have looked to algorithm-based résumé-tracking systems to help sort and evaluate applicants.²⁷ Widely used résumé-tracking systems, however, have limitations that have led some companies to use algorithm-based video games to identify whether applicants possess desired qualifications.²⁸

A. *Job Market Changes Have Led to Large Numbers of Job Applicants*

Millennials (born between 1980 and 1996) move more freely between jobs than any other generation.²⁹ A 2016 Gallup poll showed that twenty-one percent of millennials had changed jobs within the last year, three times more than non-millennials.³⁰ Sixty percent of millennials were open to a different job opportunity, compared to forty-five percent of non-millennials.³¹ On average, millennials switch jobs every two years for a number of reasons, including better job opportunities, low workplace engagement, and the absence of a compelling reason to stay in a current position.³²

25. Amy Adkins, *Millennials: The Job-Hopping Generation*, GALLUP (May 12, 2016), <http://www.gallup.com/businessjournal/191459/millennials-job-hopping-generation.aspx>.

26. Lianna Brinded, *Goldman Sachs Was Flooded by 250,000 Job Applications from Millennials*, BUS. INSIDER (June 6, 2016, 3:07 AM), <http://www.businessinsider.com/goldman-sachs-careers-total-job-applications-for-2016-2016-6>.

27. Casti, *supra* note 12; Pinola, *supra* note 12.

28. Casti, *supra* note 12.

29. Adkins, *supra* note 25.

30. *Id.*

31. *Id.*

32. *Id.*; Hattie Bernstein, *Millennials Face Always Changing Job Market*, BOS. GLOBE (Sept. 26, 2015), <https://www.bostonglobe.com/business/2015/09/25/millennials-must-contend-with-labor-market-that-more-mobile-and-competitive/v1heSmdXIqiPhQu6s1HfIO/story.html>.

Before the Internet was in widespread use, those seeking employment were limited to information from published newspaper and magazine notices and referrals from family and friends.³³ Now, the Internet facilitates casual and efficient nationwide job searches.³⁴ For example, the popular job search website, LinkedIn, has 400 million users and includes a job search tool connecting job seekers with posted employer vacancies.³⁵ LinkedIn's "apply now" button can transmit job seekers' profiles directly to potential employers.³⁶

Job search engines have significantly increased the number of job applicants.³⁷ On average, 118 people apply for a single job posting.³⁸ Some companies are overwhelmed by the number of applicants.³⁹ In 2011, Starbucks received 7.6 million job applications for 65,000 corporate and retail job openings, and one million people applied for 2,000 positions at Proctor & Gamble.⁴⁰ Goldman Sachs received 250,000 job applications from millennials for 2016 summer positions.⁴¹ Companies facing the tall task of screening so many applicants have used algorithm-based tools to identify efficiently the far smaller number of candidates appropriate for a manager's review.⁴²

B. Algorithms Incorporated into the Job Hiring Process

Originally, algorithm-based tools were very basic.⁴³ Résumé-tracking systems could scan résumés for pre-selected key words and phrases to identify résumés to be reviewed by human eyes.⁴⁴ However, these systems improved over time.⁴⁵ They now do more than identify

33. *The Internet Is Taking Over the Job Search Process*, RECRUIT HOLDINGS (Dec. 16, 2015), http://www.recruit-rgf.com/news_data/release/2015/1216_7736.html.

34. *See id.*

35. Kimi Puntillo, *Technology Is Changing the Job Market*, COLUM. BUS. (June 27, 2016), <https://www8.gsb.columbia.edu/articles/columbia-business/technology-changing-job-market-%E2%80%94-how-can-you-navigate-it> (demonstrating other job search websites, including Indeed, which aggregates postings from job boards, news sites, and employers. SimplyHired allows searching LinkedIn or Facebook connections to a job; and JobMo consolidates job postings from sites such as Indeed and SimplyHired to identify additional openings).

36. Weber, *supra* note 12.

37. *Id.*; Brinded, *supra* note 26; Jacquelyn Smith, *7 Things You Probably Didn't Know About Your Job Search*, FORBES (Apr. 17, 2013, 12:19 PM), <http://www.forbes.com/sites/jacquelynsmith/2013/04/17/7-things-you-probably-didnt-know-about-your-job-search/#7888bcaa64e6>.

38. Smith, *supra* note 37.

39. Weber, *supra* note 12.

40. *Id.*

41. Brinded, *supra* note 26. Other Wall Street members receive large numbers of applications. *Id.* The Bank of America's Merrill Lynch investment banking division offered jobs to only 3% of applicants, and Citigroup's investment banking division offered jobs to only 2.7% of applicants. *Id.* Morgan Stanley receives about 8,000 applications annually for about 100 positions. *Id.*

42. Weber, *supra* note 12.

43. Skillings, *supra* note 12.

44. *Id.*

45. *Id.*

key words and phrases.⁴⁶ Contemporary tracking systems have four steps.⁴⁷ First, the system removes all résumé styling and separates the text into recognized words and phrases.⁴⁸ Second, it sorts these words and phrases into specific categories, such as education, contact information, skills, and work experience.⁴⁹ Third, it matches the employers' desired keywords against the résumé's words and phrases.⁵⁰ Fourth, it scores the résumé on a relevancy scale representing the applicant's value to the employer.⁵¹ Résumés of candidates with sufficiently high scores are then reviewed by a human.⁵² The ability of résumé-tracking systems to sort quickly through thousands of applications has led to its wide adoption by both large and small companies nationwide, including over 90% of Fortune 500 companies.⁵³

Résumé-tracking systems have weaknesses, however. On average, a résumé-tracking system decreases applicants' chances of obtaining a job interview by 75% if they fail to include key words or phrases, regardless of their qualifications.⁵⁴ Thus, highly qualified applicants who omit selected key words or phrases may be eliminated.⁵⁵ Also, résumé-tracking systems consider only some elements of a candidate's qualifications. They might, for example, include education, work experience, contact information, and skills.⁵⁶ They do not assess cognitive abilities, work ethic, problem-solving skills, or motivation.⁵⁷ Because experts believe these additional factors best predict workplace success, newer tools use algorithms to analyze these qualities.⁵⁸ These tools often take the form of online quizzes or games that can make detailed personality assessments that can efficiently identify the most promising candidates.⁵⁹

46. *Id.*

47. *Id.*

48. *Id.*

49. *Id.*

50. *Id.*

51. Pinola, *supra* note 12.

52. Skillings, *supra* note 12.

53. Weber, *supra* note 12.

54. Meridith Levinson, *5 Insider Secrets for Beating Applicant Tracking Systems*, CIO (Mar. 1, 2012, 7:00 AM PT), <http://www.cio.com/article/2398753/careers-staffing/5-insider-secrets-for-beating-applicant-tracking-systems.html>.

55. Weber, *supra* note 12.

56. Levinson, *supra* note 54.

57. *Id.*

58. Casti, *supra* note 12; *see also* Alsever, *supra* note 12 (eBay designed algorithms using information on tenure, compensation, promotions, and feedback scores from managers to predict which workers would likely quit; General Electric correlates human resources data and worker profiles with successful executives' career paths to identify candidates for key promotions).

59. Rampell, *supra* note 12.

C. Video Game Algorithms

In March 2016, eight percent of U.S. companies used predictive analytics involving algorithms.⁶⁰ Many of these companies use video games to obtain and analyze data from a large number of applicants to find candidates having the company's desired abilities and personality traits.⁶¹ The data to be analyzed are tailored to the particular job and assess such qualities as "how creative, cautious, adept at multitasking or easily distracted, among other attributes, potential job applicants are."⁶² "Wasabi Waiter," developed by Knack,⁶³ and "Firefly Freedom," used by Deloitte,⁶⁴ are examples of such games.

"Wasabi Waiter" places the applicant in the role of a server at a sushi restaurant who must decide which dishes to recommend to customers.⁶⁵ The game's designer, Guy Halfteck, explains:

The player has to engage in multiple micro-decisions, think about prioritizing, about [the] sequence of taking actions, about persisting when the game becomes more challenging The game collects all the data points about the entirety of the behavior during the game Then we analyze that data to extract insight into the intellectual and personal makeup of that person.⁶⁶

"Firefly Freedom" takes place in a forest world where applicants must catch fireflies to provide light for a family during the winter.⁶⁷ The applicant fires pieces of fruit at a jar to release fireflies trapped inside.⁶⁸ However, one of the ten pieces of fruit will smash the jar, letting all fireflies escape, reducing the applicant's score to zero.⁶⁹ The game tests whether applicants will quit while ahead or risk losing everything to get more fireflies.⁷⁰ Statistics compiled from this game analyze applicants' risk appetite, mental agility, and persistence.⁷¹

II. The Debate over Whether Algorithms Discriminate

Algorithms' growing use in hiring raises the question of whether they result in discrimination.⁷² Some contend algorithms invite discrimination because their creators rely, in building their formulas, on

60. Alsever, *supra* note 12.

61. Casti, *supra* note 12.

62. Rampell, *supra* note 12.

63. Adams, *supra* note 12.

64. Davies, *supra* note 12.

65. Rampell, *supra* note 12.

66. *Could Video Games Be the Next Job Interview?*, *supra* note 24 (quotations in original) (this game has been used by companies, including Shell and the NYU Langone Medical Center).

67. Davies, *supra* note 12.

68. *Id.*

69. *Id.*

70. *Id.*

71. *Id.*

72. See *infra* Section II.

past hiring decisions that may have been discriminatory.⁷³ Video game algorithms, in particular, may cause age discrimination if younger applicants' experience playing video games disadvantages older candidates.⁷⁴ However, the gap between age groups' performance on video games is not as wide as some might assume.⁷⁵ Legal scholars have suggested that disparate treatment and disparate impact law is ineffective in responding to algorithms.⁷⁶ However, proponents explain that cost-effective algorithms can be designed to avoid discrimination.⁷⁷

A. *The Argument That Algorithms Discriminate*

Both legal scholars and the media are concerned that using algorithms in hiring causes discrimination.⁷⁸ Much of this concern arises from a 2014 White House report warning that algorithms could allow companies to discriminate against certain groups, including minorities and low-income persons.⁷⁹ Such discrimination can be built into algorithms under the guise of statistical assessment.⁸⁰ Algorithm creators rely on employers' past hiring data to build predictive formulas to match their best workers' traits with job applicants' data.⁸¹ If a company has not historically hired people from a particular racial or ethnic group, its algorithm will systematically exclude such people from consideration.⁸² For example, Silicon Valley has long been criticized for its white-male-dominated workplaces.⁸³ Algorithms based on such existing workforce demographics may not advance employee diversity.⁸⁴

Video games such as "Wasabi Waiter" and "Firefly Freedom" generate fear that older applicants will be systematically excluded.⁸⁵ While many millennials are accustomed to playing video games and may not mind playing one in the initial job hiring process, older persons less familiar with video games might struggle.⁸⁶ Video games

73. *See infra* Section II(A).

74. *See infra* Section II(A).

75. *See infra* Section II(B).

76. *See infra* Section II(A).

77. *See infra* Section II(B).

78. *See infra* Section II(A).

79. Volz, *supra* note 21 (citing *Big Data: Seizing Opportunities, Preserving Values*, *supra* note 21).

80. Bourree Lam, *For More Workplace Diversity, Should Algorithms Make Hiring Decisions?*, ATLANTIC (June 22, 2015), <http://www.theatlantic.com/business/archive/2015/06/algorithm-hiring-diversity-HR/396374/>.

81. Alsever, *supra* note 12; McGowan, *supra* note 21.

82. Volz, *supra* note 21.

83. Stacy Jones & Jaelyn Trop, *See How the Big Tech Companies Compare on Employee Diversity*, FORTUNE (July 30, 2015, 8:07 AM), <http://fortune.com/2015/07/30/tech-companies-diveristy/>.

84. Saul Hansell, *Google Answer to Filling Jobs Is an Algorithm*, N.Y. TIMES (Jan. 3, 2007), http://www.nytimes.com/2007/01/03/technology/03google.html?_r=1.

85. Rampell, *supra* note 12.

86. *Id.*

test characteristics such as response time, attention to detail, levels of emotion, and responsiveness.⁸⁷ Millennials may perform better than older applicants at these games and may score higher on the desired characteristics.⁸⁸

Rejected candidates may seek to challenge use of algorithm-based games as discriminatory.⁸⁹ However, legal scholars realize that it would be hard for plaintiffs to prove disparate treatment or impact claims under Title VII's existing framework.⁹⁰ Algorithms analyze vast amounts of information, making it unlikely that an employer would intentionally alter each calculation to treat a protected class disparately.⁹¹ Disparate impact claims are also unlikely to prevail.⁹² Successful plaintiffs would have to identify the exact algorithm that discriminated against a specific group—a difficult task because of the complexity of algorithmic design.⁹³ Even if plaintiffs sought to prove the algorithm as a whole resulted in discrimination, they would need to engage in costly discovery to learn how applicants in the targeted group were denied employment by the algorithm.⁹⁴

Some legal scholars have sought alternatives to address algorithm-caused discrimination.⁹⁵ For example, in her article, *Data-Driven Discrimination at Work*, Pauline T. Kim, a law professor at Washington University in St. Louis, argues that the rigid framework of Title VII should be broadened to disallow what she calls “classification bias.”⁹⁶ Kim defines “classification bias” as “the use of classification schemes that have the effect of exacerbating inequality or disadvantage along lines of race, sex or other protected characteristics.”⁹⁷ Instead of requiring plaintiffs to identify the biased algorithm causing discrimination, Kim would require employers to prove that data created by their algorithms are accurate and do not discriminate against any group.⁹⁸

87. Anashkina, *supra* note 22.

88. *Id.*; Casti, *supra* note 12.

89. See generally Barocas & Selbst, *supra* note 16; Kim, *supra* note 16; King & Mrkonich, *supra* note 16.

90. Barocas & Selbst, *supra* note 16, at 694–712; King & Mrkonich, *supra* note 16, at 563–76.

91. Barocas & Selbst, *supra* note 16, at 694–701; King & Mrkonich, *supra* note 16, at 563.

92. Barocas & Selbst, *supra* note 16, at 701–12; King & Mrkonich, *supra* note 16, at 563–76.

93. King & Mrkonich, *supra* note 16, at 565–66.

94. *Id.* at 567–68.

95. See, e.g., Kim, *supra* note 16.

96. *Id.* at 1.

97. *Id.* at 34.

98. *Id.* at 64.

B. The Argument That Algorithms Do Not Discriminate

Algorithms' proponents contend that algorithms can be effective, non-discriminatory job performance predictors.⁹⁹ Algorithm-based video games allow companies to lower the costs of initial hiring process stages, which can run as high as \$3,000 for each new employee.¹⁰⁰ They also enable employers to identify quickly the most qualified applicants among large numbers of candidates.¹⁰¹ While applicants often have equal or similar résumé content, algorithm-based tests allow employers to see which have qualifications not revealed by paper documents.¹⁰²

Algorithm supporters challenge the White House's conclusion that algorithms will likely discriminate.¹⁰³ Algorithm creators are aware that their formulas risk unintentional discrimination, so they seek to eliminate potentially discriminatory factors. For example, Evolv, a San Francisco start-up company that creates hiring algorithms, omits the distance between applicants' homes and the employer's location, even though data show that workers with longer commutes are more likely to quit.¹⁰⁴ Evolv knows that because racial and ethnic communities are often geographically segregated, considering residence location risks discrimination.¹⁰⁵ Monitoring results can identify disparities and periodic updates can eliminate potential unfairness toward any group.¹⁰⁶

Video game proponents similarly argue that games are superior to résumés for assessing job-relevant qualities and skills.¹⁰⁷ As Knack's founder, Guy Halfteck, explains: "Traditional scores only look at written test abilities. They do not begin to measure the factors likely to have most bearing on your success: social skills or personality traits—how you deal with stress, how you collaborate with people, how much you listen"¹⁰⁸ Halfteck assures skeptics that games do not discriminate based on age because people of all ages play mobile games like "Wasabi Waiter" well.¹⁰⁹

99. See *infra* Section II(B).

100. Casti, *supra* note 12.

101. See Peck, *supra* note 10.

102. *Id.*

103. Volz, *supra* note 21.

104. *Id.*

105. *Id.*

106. William Terdoslavich, *Building a Better Algorithm*, DICE (Aug. 29, 2016), <http://insights.dice.com/2016/08/29/building-better-hiring-algorithm/> (algorithms should undergo periodic updates, ranging from once every eighteen months to every four years, to maintain validity).

107. Adams, *supra* note 12.

108. *Id.*

109. *Id.*

III. Analysis

Critics of algorithm-based hiring correctly identify algorithms' potential for hiring discrimination.¹¹⁰ If algorithms intentionally disadvantage certain types of applicants or eliminate a group from consideration they would constitute illegal disparate treatment.¹¹¹ Algorithms can also unintentionally cause disparate impact discrimination.¹¹² As with any type of employment hiring practice, discrimination may occur if proper precautions are not taken. However, algorithms should not be presumptively viewed in such negative light. Used properly, algorithms can evaluate job applicants more fairly than face-to-face employer-applicant interviews. Specifically, video games such as "Wasabi Waiter" and "Firefly Freedom" assess applicants in the initial hiring process in a less discriminatory way.

A. *How "Wasabi Waiter" and "Firefly Freedom" Evaluate Applicants*

While not applied specifically to hiring, an experiment in which people were asked to play "Wasabi Waiter" identified the best employee ideas without discriminating.¹¹³ Hans Haringa, an executive in Royal Dutch Shell's GameChanger unit, was interested in whether "Wasabi Waiter" could help identify people who would offer potentially disruptive business ideas, that is, those with outside-the-box workplace creativity.¹¹⁴ The unit "solicit[s] ideas promiscuously from inside and outside the company, and then play[s] the role of venture capitalists, vetting each idea, meeting with its proponents, dispensing modest seed funding to a few promising candidates, and monitoring their progress."¹¹⁵ The unit's process generally succeeds in finding these sources of creativity, but the process takes more than two years and less than ten percent of ideas warrant the unit's further research and development.¹¹⁶ With Knack's help, Haringa conducted an experiment to see if the same results could be reached more quickly.¹¹⁷

Using a database of all the ideas GameChanger had received over several years, Haringa asked 1,400 idea contributors to play two of Knack's video games, one of which was "Wasabi Waiter."¹¹⁸ Haringa in-

110. *See supra* Section II(A).

111. *See* Barocas & Selbst, *supra* note 16, at 694–701; King & Mrkonich, *supra* note 16, at 563 (discussing disparate treatment claims involving algorithms).

112. *See* Barocas & Selbst, *supra* note 16, at 701–12; King & Mrkonich, *supra* note 16, at 563–76 (discussing disparate impact claims involving algorithms).

113. Peck, *supra* note 10.

114. *Id.*

115. *Id.*

116. *Id.*

117. *Id.*

118. *Id.*

formed Knack how well three-fourths of these idea generators had done in identifying business ideas, and Knack used the gameplay data of these contributors to create gameplay profiles comparing strong and weak idea contributors.¹¹⁹ Knack analyzed the remaining idea contributors to predict which had done best at identifying disruptive business ideas.¹²⁰ Without knowing any identifying information about contributors, including class or classification characteristics, Knack correctly identified the top ten percent of successful idea generators.¹²¹ This identification was based only on personal factors such as “‘mind wandering’ (or the tendency to follow interesting, unexpected offshoots of the main task at hand, to see where they lead), social intelligence, ‘goal-orientation fluency,’ implicit learning, task-switching ability, and conscientiousness.”¹²²

Deloitte, an accounting firm that provides “audit, consulting, financial advisory, risk management, tax, and related services” to clients uses “Firefly Freedom” for non-discriminatory evaluation of interns.¹²³ It uses “Firefly Freedom” to select people with a variety of backgrounds that have high potential for success.¹²⁴ Rob Davies, author of the article, *Everything to Play for as Employers Turn to Video Games in Recruitment Drive*, played Deloitte’s video game, and his experience shows how employers can avoid discrimination.¹²⁵ In addition to catching fireflies, the game also had simpler tests to measure how quickly players tapped the screen and whether they remembered a color sequence.¹²⁶ The game’s designer, Arctic Shores, analyzed and reported to Davies the data from his twenty-eight minutes of gameplay.¹²⁷ The results showed Davies “‘tend[ed] to be fairly motivated by tangible rewards’ . . . ‘[was] as quick at learning new things as most people’ and . . . ‘may not display either the truly breakthrough thinking required for step-change, nor the extreme due diligence required in high-stakes situations.’”¹²⁸ Davies’ experience playing “Firefly Freedom” demonstrates how Deloitte looks only at personal performance qualities when evaluating interns rather than focusing on an applicant’s personal characteristics that can lead to discrimination.¹²⁹

119. *Id.*

120. *Id.*

121. *Id.*

122. *Id.*

123. Davies, *supra* note 12; *About Deloitte*, DELOITTE, <https://www2.deloitte.com/us/en/pages/about-deloitte/articles/about-deloitte.html> (last visited Feb. 1, 2017).

124. Davies, *supra* note 12.

125. *Id.*

126. *Id.*

127. *Id.*

128. *Id.*

129. *Id.*

These examples show that “Firefly Freedom” and “Wasabi Waiter” can identify applicants with desired qualities in a manner traditional hiring processes cannot duplicate. If used in smart, safe, and effective ways, video games can reduce discrimination in hiring.

B. Video Games Can Avoid Disparate Treatment and Disparate Impact Discrimination

Some critics argue that plaintiffs cannot effectively litigate hiring discrimination caused by algorithms under current law.¹³⁰ Despite these claims, discriminatory algorithms can be effectively identified using disparate treatment and disparate impact frameworks.¹³¹ A properly prepared attorney can conduct necessary discovery and find appropriate expert witnesses to prove if algorithm-based discrimination exists. Attorneys can also examine both the employer’s algorithm itself and the data it generates when sorting applications to determine if discrimination occurred. Neither of these glimpses into discovering hiring discrimination is available when humans sort through résumés.¹³² Any hiring practice, including algorithms, can be discriminatory because of intentional, reckless, or negligent human behavior. However, if employers use algorithms intelligently, they can evaluate job applicants using video games in a manner that reduces disparate treatment and disparate impact discrimination.

It will be difficult to establish a *prima facie* case of disparate treatment against an employer using video games in hiring.¹³³ Such employers have considered neither class nor classification of applicants when analyzing candidate results.¹³⁴ When employers collect game-

130. *See supra* Section II(A).

131. For an in-depth explanation of disparate impact and disparate treatment frameworks, see *EMPLOYMENT DISCRIMINATION LAW*, ch. 2–3 (Lindemann et al., eds., 5th ed. 2015).

132. For example, when job applicants play games like “Wasabi Waiter” and “Firefly Freedom,” the company must send the gathered data to the game creator for analysis, and the creator returns the results to the company. Davies, *supra* note 12; Peck, *supra* note 10. A lawyer trying to determine whether discrimination was present in this process can conduct discovery by requiring that the creator provide the measurable data it obtained from applicants who played the game as well as the algorithms used to analyze the data. An expert (another video game developer) can examine the data and algorithms to determine if discrimination, whether intentional or unintentional, is present. If these actions show the algorithm has a disparate impact, it is easier to identify the specific hiring criterion causing the impact than it is when hiring is done by different humans, using different hiring criteria, within the company.

133. For a review of disparate treatment framework, see *EMPLOYMENT DISCRIMINATION LAW*, *supra* note 131, at ch. 2–3.

134. *See* Davies, *supra* note 12; Peck, *supra* note 10. When Davies played “Firefly Freedom,” he was not asked about any personal characteristics such as race, religion, gender, ethnicity, color, or age. Davies, *supra* note 12. An employer can ensure that no one has an unfair advantage due to technology by having all applicants go to the same location and play the video game on the same device. *See, e.g., id.* An independent party can administer the video game so the employer cannot observe any characteristics of applicants during the process.

play data from applicants, they send it to video game developers for analysis.¹³⁵ Without considering any class or classification (because no such information was acquired from game players), the developer analyzes all data produced by its algorithms and identifies the most qualified candidates.¹³⁶ Employers that rely on these assessments do not consider applicants' class or classification under Title VII or the ADEA because the algorithm did not collect such information. Rather, the process identifies applicants with characteristics related to job success, such as emotional intelligence, cognitive skills, working memory, and propensity for risk-taking, and the employer can select a small group from the large pool of initial applicants for the next hiring process stage.¹³⁷ The employer can even have the developer select the smaller group of applicants based on these characteristics without the employer being aware of any applicant's class or classification.¹³⁸ If employers use algorithm-based video games to evaluate job applicants without knowledge of protected classes, disparate treatment claims are far less likely to arise than if a human evaluates job applicants with ready access to information (such as physical address or first name) that may indicate race, sex, or another protected characteristic.

Disparate impact claims, however, are still possible.¹³⁹ Although algorithms analyze players' video game statistics in "Wasabi Waiter" and "Firefly Freedom" neutrally, algorithms could unintentionally discriminate against a protected class or classification¹⁴⁰ in the absence of preventive actions to avoid inclusion of discriminatory factors.¹⁴¹

Game developers have a company's best performers play a game to design algorithms to identify applicants sharing the same workplace characteristics of successful employees.¹⁴² If a company does not have a history of hiring a certain category of persons, particularly those from protected classes, algorithms using past hiring data may systematically exclude this group from consideration.¹⁴³ However, when video game developers have the best workers play video games, they do not consider the player's identity.¹⁴⁴ The developers simply

135. Davies, *supra* note 12.

136. *Id.*

137. Lohr, *supra* note 12; Peck, *supra* note 10.

138. Peck, *supra* note 10. This process would be similar to the résumé tracking systems that the majority of the Fortune 500 companies use to analyze the résumés of the thousands of applicants to pick a smaller group for employer evaluation. *See supra* Section I.

139. *See* Barocas & Selbst, *supra* note 16, at 701–12; King & Mrkonich, *supra* note 16, at 563–76 (discussing disparate impact claims involving algorithms).

140. *Id.*; *Int'l Bhd. of Teamsters v. United States*, 431 U.S. 324, 335 n.15 (1977) ("Proof of discriminatory motive . . . is not required under a disparate-impact theory.").

141. *See infra* Section III(C).

142. Peck, *supra* note 10.

143. Volz, *supra* note 21.

144. Peck, *supra* note 10.

have the employee play the game to identify personal characteristics of successful workplace performers, such as emotional intelligence, cognitive skills, working memory, and propensity for risk-taking.¹⁴⁵ Developers focus on workplace characteristics of successful employees, not group identities of applicants.¹⁴⁶ Although results are preliminary, research suggests it is unlikely a protected group will perform worse than other applicants in all relevant categories of workplace production.¹⁴⁷

Research on one protected class tends to disprove one of the most common arguments that video games will cause discrimination: video game algorithms will cause age discrimination because older people who may not regularly play video games will perform worse than millennials.¹⁴⁸ The argument assumes that the traits video games test, including response time and attention to detail, will decrease with age.¹⁴⁹ However, a study conducted in 2014 undermines this expectation.¹⁵⁰

Researchers at Simon Fraser University in Canada used video games to study the age at which motor performance begins to decline.¹⁵¹ Persons aged sixteen to forty-four played a video game called “StarCraft 2,” and researchers analyzed their gameplay using several different statistical analyses.¹⁵² “StarCraft 2” is more complex than, but similar to, “Wasabi Waiter” and “Firefly Freedom.” Its object is to defeat the opponent’s army while managing the player’s civilization and military growth.¹⁵³ The game is played in real time, so players must make split-second decisions and conduct small actions to defeat the enemy.¹⁵⁴ Researchers found that cognitive function, such as reaction time, begins to decline at age twenty-four.¹⁵⁵ However, even though older players had slower reaction times, their gameplay did not suffer.¹⁵⁶ Older players compensated for slower reaction times by using simpler and more streamlined strategies.¹⁵⁷ Basically, as reac-

145. *Id.*; Lohr, *supra* note 12.

146. Peck, *supra* note 10.

147. *But see* Anashkina, *supra* note 22 (certain groups may be disadvantaged if employers include video games in the hiring process).

148. Rampell, *supra* note 12.

149. Anashkina, *supra* note 22; Casti, *supra* note 12.

150. Joseph J. Thompson, Mark R. Blair, & Andrew J. Henrey, *Over the Hill at 24: Persistent Age-Related Cognitive-Motor Decline in Reaction Times in an Ecologically Valid Video Game Task Begins in Early Adulthood*, 9 PLOS ONE 4: e94215 (Apr. 2014), available at <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0094215>.

151. Teresa Tanoos, *Brain Function Peaks at 24, But It’s Not All Downhill*, EMAX-HEALTH (Apr. 19, 2014, 5:01 PM), <http://www.emaxhealth.com/11400/brain-function-peaks-24-its-not-all-downhill>.

152. Thompson et al., *supra* note 150.

153. *Id.*; Tanoos, *supra* note 151.

154. Tanoos, *supra* note 151; Thompson et al., *supra* note 150.

155. Tanoos, *supra* note 151; Thompson et al., *supra* note 150.

156. Tanoos, *supra* note 151; Thompson et al., *supra* note 150.

157. Tanoos, *supra* note 151; Thompson et al., *supra* note 150.

tion times decreased, ability to utilize a better strategy increased.¹⁵⁸ Age discrimination claims based on video game applicant screening are not likely to be successful because even though reaction time decreases with age, the ability to plan and employ an effective strategy increases.¹⁵⁹

Companies that intelligently create and administer video games in initial hiring stages can accomplish several purposes. Video games allow employers to select efficiently a small group from a large number of candidates to interview and can decrease disparate treatment and disparate impact discrimination. Video games can also reduce unconscious bias in evaluation of job candidates.

C. *Video Games Can Reduce Unconscious Bias*

Unconscious bias plays a role in human evaluation of job candidates.¹⁶⁰ For example, “[m]anagers often gravitate to people most like themselves, make gender-based assumptions about skills or salaries, or reject candidates who have non-white names”¹⁶¹ Having applicants playing video games like “Wasabi Waiter” and “Firefly Freedom” during the initial hiring process allows employers to choose the best candidates without considering anyone’s class or classification.¹⁶² Selected candidates continue to the next stage of the hiring process without unconscious bias of human decision-makers influencing selection.¹⁶³ Although unconscious bias could arise during later interviews, video games using algorithms can at least eliminate unconscious bias in the first stage.

Of course, unconscious bias could infect algorithm design.¹⁶⁴ Algorithms can reproduce biases inherent in their creators because creators determine which factors the algorithms will weigh.¹⁶⁵ Addition-

158. Tanoos, *supra* note 151; Thompson et al., *supra* note 150.

159. *Id.* Simon Fraser University’s study is consistent with psychology research showing how aging affects brain function. Research shows that the brain’s ability to empathize, define, ideate, prototype, and test improves with age. Amanda Enayati, *The Aging Brain: Why Getting Older Just Might Be Awesome*, CNN (June 19, 2012, 11:11 AM), <http://www.cnn.com/2012/06/19/health/enayati-aging-brain-innovation/>. Older people have a greater capacity for empathy because they learn it over time. *Id.* Empathy is important in the workplace because it facilitates finding patterns and seeing the big picture when designing and solving problems. *Id.* While younger people may react quicker and have better short-term memory, they do not have as diverse life experiences and often offer only linear problem solving approaches. *Id.* Older people rely on diverse life experiences affording a broader range of problem-solving ideas. *Id.*

160. See *supra* text accompanying note 23 for a discussion of unconscious bias.

161. Leigh Alexander, *Is an Algorithm Any Less Racist than a Human?*, GUARDIAN (Aug. 3, 2016, 2:00 PM), <https://www.theguardian.com/technology/2016/aug/03/algorithm-racist-human-employers-work>.

162. See Davies, *supra* note 12; Peck, *supra* note 10.

163. See Peck, *supra* note 10.

164. See Alexander, *supra* note 161.

165. *Id.*

ally, if unconscious bias influences identification of job-related characteristics, candidate selection will also be biased.¹⁶⁶

While unconscious bias may influence both human hiring decisions and algorithms,¹⁶⁷ precautions can eliminate unconscious bias more effectively from algorithms than from human brains. Algorithms designed by collecting multiple people with different backgrounds, perspectives, and biases can identify and eliminate unconscious bias that could be present if designers worked individually.¹⁶⁸ Computer scientists at the University of Utah, University of Arizona, and Haverford College demonstrated this process.¹⁶⁹ University of Utah Professor Suresh Venkatasubramanian led these computer scientists in a project to create a method to avoid unconscious bias in algorithms.¹⁷⁰ The group designed two algorithms to work in tandem.¹⁷¹ The first algorithm incorporates the Title VII disparate impact framework¹⁷² to test whether an algorithm is discriminatory.¹⁷³ If proven discriminatory, the second algorithm changes the data set to remove discriminatory effects.¹⁷⁴ Developers can add this method to the existing precautions of “Wasabi Waiter” and “Firefly Freedom” to limit the discriminatory effects of their algorithms.¹⁷⁵ Running these video games algorithms through the algorithms the computer scientists created could eliminate unconscious bias at a much higher rate than humans trying to eliminate it from their behavior during hiring. Although algorithms could cause discrimination, video games such as “Wasabi Waiter” and “Firefly Freedom,” with additional reviews for possible algorithm bias, are more effective at avoiding discrimination at pre-interview stages of the hiring process than human review of applicants and résumés.¹⁷⁶

166. Richard Sharp, *Machine Learning Needs Bias Training to Overcome Stereotypes*, ENTREPRENEUR (Aug. 12, 2016), <https://www.entrepreneur.com/article/279927>.

167. See Lauren J. Young, *Computer Scientists Find Bias in Algorithms*, IEEE SPECTRUM (Aug. 21, 2015), <http://spectrum.ieee.org/tech-talk/computing/software/computer-scientists-find-bias-in-algorithms>.

168. See Alexander, *supra* note 161 (“[A]ny algorithm can—and often does—simply reproduce the biases inherent in its creator, in the data it’s using, or in society at large.”)

169. Young, *supra* note 167.

170. *Id.*

171. *Id.*

172. *Id.* For a review of disparate impact framework, see EMPLOYMENT DISCRIMINATION LAW, *supra* note 131, at ch. 2–3.

173. Young, *supra* note 167.

174. *Id.*

175. See *supra* Section III(A).

176. A company requiring job applicants to play a video game at the beginning of the hiring process must reasonably accommodate those unable to play the video game because of a qualifying disability protected by the Americans with Disabilities Act (ADA). CHARLES A. SULLIVAN & MICHAEL J. ZIMMER, CASES AND MATERIALS ON EMPLOYMENT DISCRIMINATION 487–88 (8th ed. 2012). For example, if a blind person can perform the essential functions of a job, the employer must provide a means of evaluation other than having the person play a video game. *Id.* The employer could conduct an initial in-person

Conclusion

To find the best job candidates out of thousands of applicants, some companies require applicants to play video games that use algorithms to determine who could best perform the job.¹⁷⁷ Some assert that the use of algorithms in hiring can cause both disparate treatment and disparate impact discrimination under Title VII and the ADEA and can reflect their creators' unconscious bias.¹⁷⁸ Certainly, any practice not carefully designed, applied, and evaluated can cause workplace discrimination.¹⁷⁹ However, having applicants play video games such as "Wasabi Waiter" and "Firefly Freedom" in initial hiring stages can facilitate nondiscriminatory evaluation of all candidates.¹⁸⁰ If employers take proper precautions, algorithms can more effectively avoid unconscious bias than human assessment.¹⁸¹ Video games using algorithms to identify applicants with characteristics that predict exceptional workplace performance can be a cost-effective alternative to avoid the discriminatory potential of human evaluation.

interview or have a proctor read test questions and alternative answers to the candidate. The employer must provide reasonable accommodations to ensure that all candidates, regardless of disability, will have equal employment opportunity. *Id.*

177. Casti, *supra* note 12; Rampell, *supra* note 12.

178. *See supra* Section II(A).

179. *See supra* Section III(A)–(C).

180. *See supra* Section III(A)–(C).

181. *See supra* Section III(C).