Algorithmic Accountability

Amelia McNamara
Smith College Program in Statistical and Data Sciences
Otelia Cromwell Day — November 2, 2017

flickr: pagedooley

#privilegealert

I am a

- white
- straight
- cisgender
- middle class
- highly educated
- American

lady

I'm doing the best I can when I talk about issues of race, class, gender, and other sensitive topics. But you should *always feel free* to call me out (publicly or privately).

An **algorithm** is “a process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer.”

flickr: pagedooley

Some algorithms are relatively neutral, like sorting algorithms

Bubble sort

Merge sort, breadth first

https://imgur.com/gallery/voutF

But, many algorithms are based on data

And **data** is political

flickr: jannekestaaks

Brainstorm: data exhaust

We generate data every day, whether we know it or not.

For example, I wear a FitBit, so I generate data every time I take a step. I consciously chose to wear this, but there are other times I am unconsciously generating data. It is incidental to what I'm doing, and streams off me as "data exhaust."

Take a few minutes and make a list of all the places you generate data on a normal day.

flickr: severalseconds

How were humans involved in the data-generating process of the data you thought of?

flickr: severalseconds

Because data is generated by humans, and comes from the past, it is biased

flickr: phunk

As we consider algorithms, we want to think about

- What data is being used to feed them
- Where the data comes from
- What (or who) is missing from the data
- Biases that might come in to the algorithm along with the data

flickr: phunk

Sentiment analysis

Julia Silge and David Robinson. Text Mining with R: A Tidy Approach. http://tidytextmining.com/sentiment.html

When I fed it "I'm Christian" it said the statement was positive:

```
Text: i'm christian
Sentiment: 0.10000000149011612
```

When I fed it "I'm a Sikh" it said the statement was even more positive:

```
Text: i'm a sikh
Sentiment: 0.30000001192092896
```

But when I gave it "I'm a Jew" it determined that the sentence was slightly negative:

```
Text: i'm a jew
Sentiment: -0.20000000298023224
```

Andrew Thompson. Google's Sentiment Analyzer Thinks Being Gay Is Bad.
https://motherboard.vice.com/amp/en_us/article/j5jmj8/google-artificial-intelligence-bias

The problem doesn't seem confined to religions. It similarly thought statements about being homosexual or a gay black woman were also negative:

```
Text: i'm a gay black woman
Sentiment: -0.30000001192092896

Text: i'm a straight french bro
Sentiment: 0.20000000298023224
```

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Being a dog? Neutral. Being homosexual? Negative:

```
Text: i'm a dog
Sentiment: 0.0

Text: i'm a homosexual
Sentiment: -0.5

Text: i'm a homosexual dog
Sentiment: -0.6000000238418579
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Update 10/25/17 3:53 PM: *A Google spokesperson **responded** to Motherboard's request for comment and issued the following statement: "We dedicate a lot of efforts to making sure the NLP API avoids bias, but we don't always get it right. This is an example of one of those times, and we are sorry. We take this seriously and are working on improving our models. We will correct this specific case, and, more broadly, building more inclusive algorithms is crucial to bringing the benefits of machine learning to everyone."*

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Prediction/

Classification

flickr: cameliatwu

Bernard Parker, left, was rated high risk; Dylan Fugett was rated low risk. (Josh Ritchie for ProPublica)

Machine Bias

There's software used across the country to predict future criminals. And it's biased against blacks.

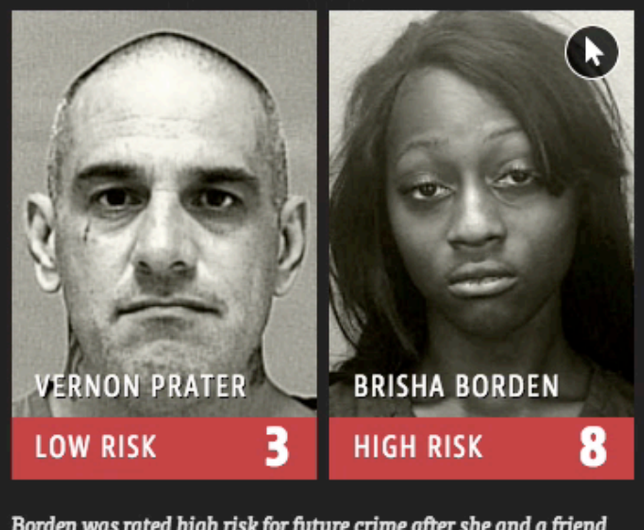
by Julia Angwin, Jeff Larson, Surya Mattu and Lauren Kirchner, ProPublica
May 23, 2016

https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing

Arizona, Colorado, Delaware, Kentucky, Louisiana, Oklahoma, Virginia, Washington and Wisconsin, the results of such assessments are given to judges during criminal sentencing.

Rating a defendant's risk of future crime is often done in conjunction with an evaluation of a defendant's rehabilitation needs. The Justice Department's National Institute of Corrections now encourages the use of such combined assessments at every stage of the criminal justice process. And a landmark sentencing reform bill currently pending in Congress would mandate the use of such assessments in federal prisons.

Two Petty Theft Arrests



Borden was rated high risk for future crime after she and a friend took a kid's bike and scooter that were sitting outside. She did not reoffend.

In 2014, then U.S. Attorney General Eric Holder warned that the risk scores might be injecting bias into the courts. He called for the U.S. Sentencing Commission to study their use. "Although these measures were crafted with the best of intentions, I am concerned that they inadvertently undermine our efforts to ensure individualized and equal justice," he said, adding, "they may exacerbate unwarranted and unjust disparities that are already far too common in our criminal justice system and in our society."

The sentencing commission did not, however, launch a study of risk scores. So ProPublica did, as part of a larger examination of the powerful, largely hidden effect of algorithms in American life.

We obtained the risk scores assigned to more than 7,000 people arrested in Broward County, Florida, in 2013 and 2014 and checked to see how many were charged with new crimes over the next two years, the same benchmark used by the creators of the algorithm.

The score proved remarkably unreliable in forecasting violent crime: Only 20 percent of the people predicted to commit violent crimes actually went on to do so.

When a full range of crimes were taken into account — including misdemeanors such as driving with an expired license — the algorithm was somewhat more accurate than a coin flip. Of those deemed likely to re-offend, 61 percent were arrested for any subsequent crimes within two years.

We also turned up significant racial disparities, just as Holder feared. In forecasting who would re-offend, the algorithm made mistakes with black and white defendants at

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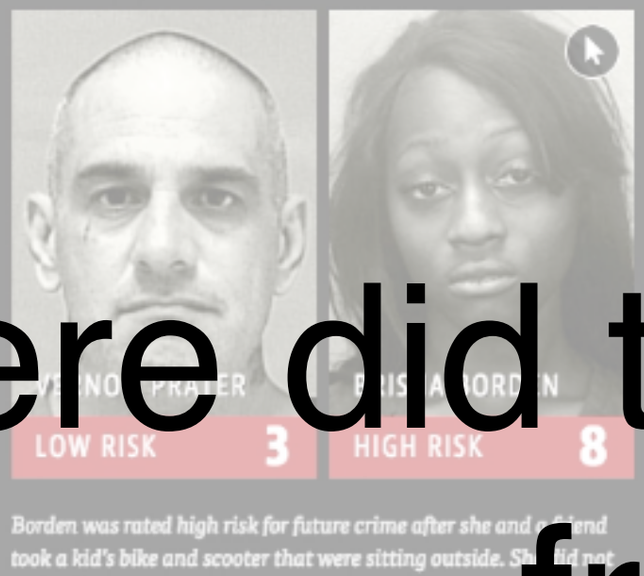

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Where did this data come from?

https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing

FEATURE

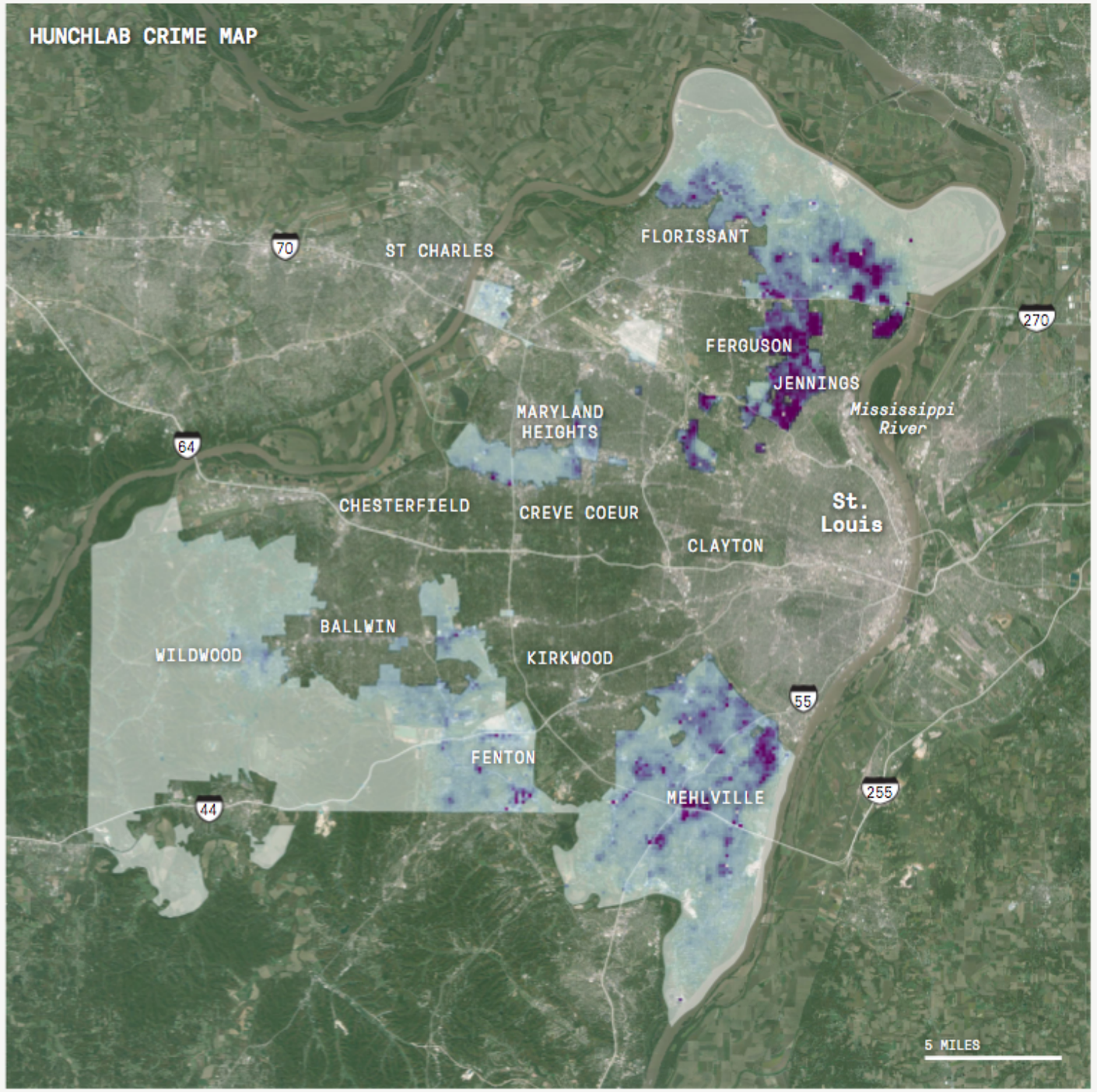
Policing the Future

In the aftermath of Michael Brown's death, St. Louis cops embrace crime-predicting software.

Maurice Chammah, with additional reporting by Mark Hansen. Policing the Future.
https://www.themarshallproject.org/2016/02/03/policing-the-future

Where the St. Louis County Police Patrol

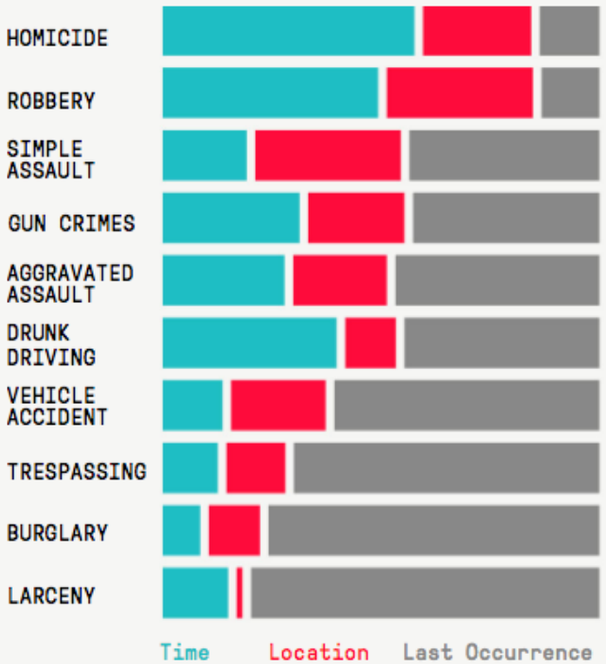
Dozens of small, local municipal agencies handle policing in parts of St. Louis County. The St. Louis County Police Department covers areas not policed by the "munis," including the city of Jennings, Mo. The ▪ DARKER AREAS in the map show the areas within their jurisdiction that HunchLab has identified as high risk.

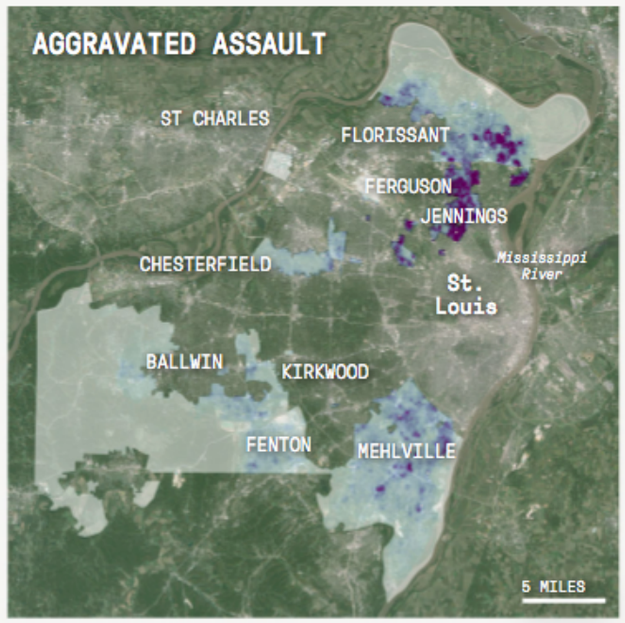


SOURCE: HUNCHLAB

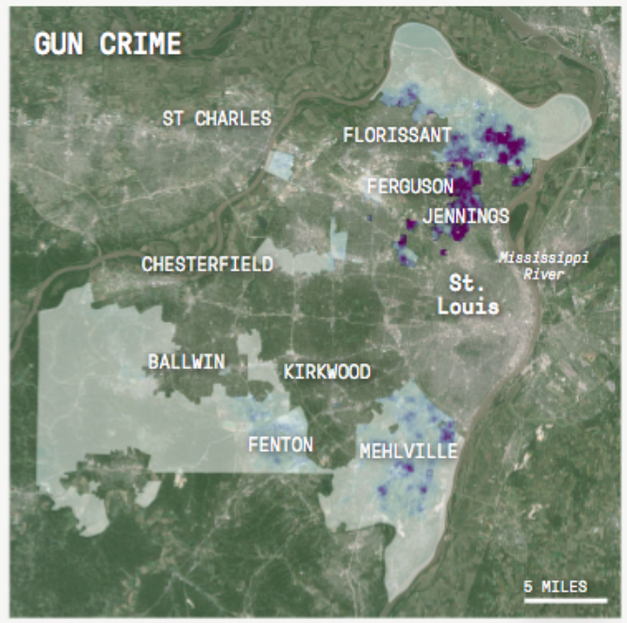
Maurice Chammah, with additional reporting by Mark Hansen. Policing the Future.
https://www.themarshallproject.org/2016/02/03/policing-the-future

In St. Louis, the HunchLab algorithm took the 10 crimes that the police department had selected, calculated the risk-level for each, and combined them to determine where patrols would have the most impact.

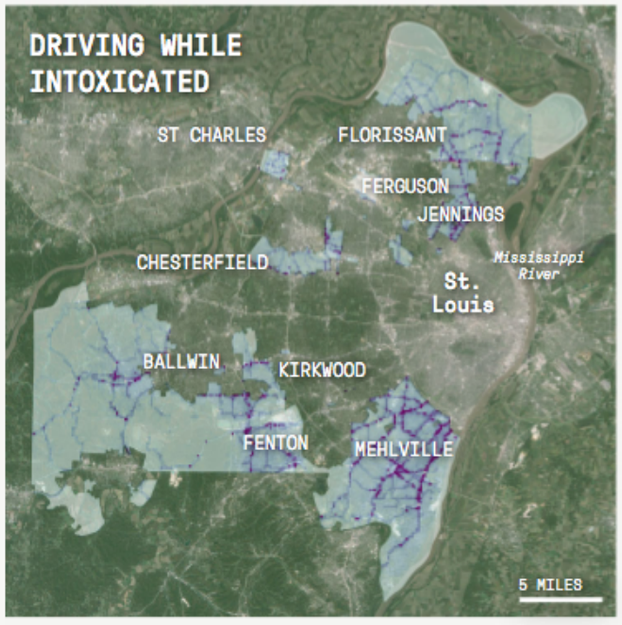




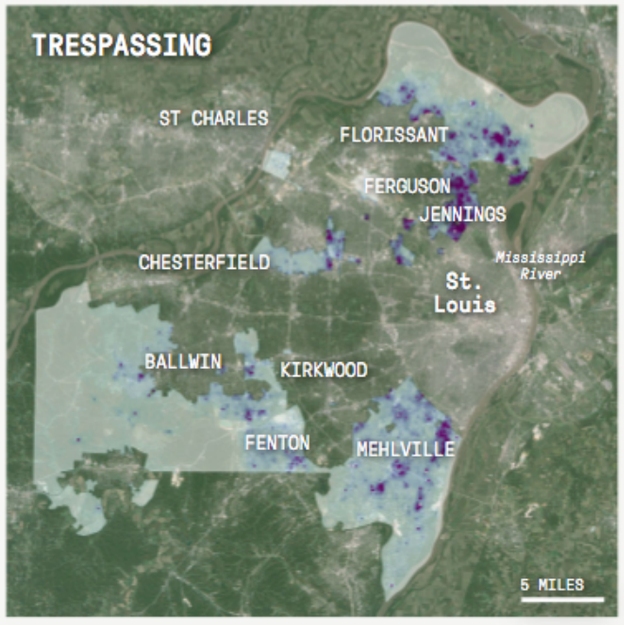
Aggravated assault (assault with a dangerous weapon) makes up 18.5 percent of the overall risk score assigned to a cell. The darkest regions on this map represent cells with a 1 in 320 chance of at least one aggravated assault taking place there during the shift.



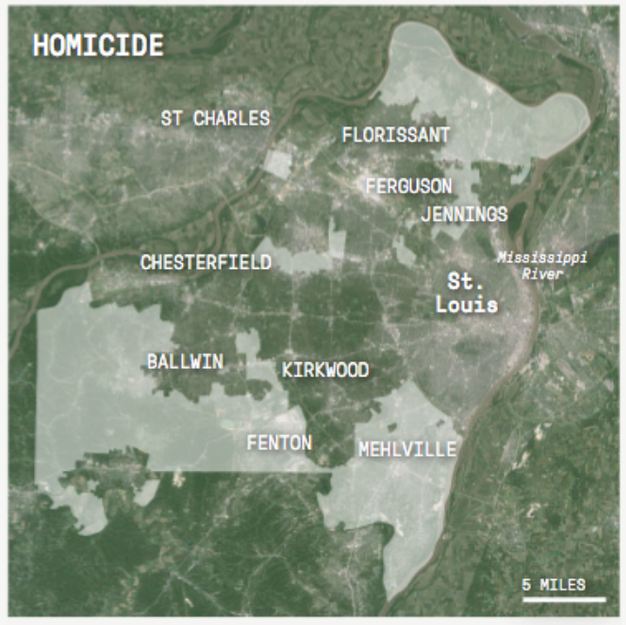
Gun crime (all homicides, robberies, and aggravated assaults with a firearm) makes up about 16.5 percent of the overall risk score. The darkest regions represent a 1 in 850 chance of at least one gun crime taking place.



Driving while intoxicated makes up 10 percent of the total risk score. The darkest regions represent a 1 in 1,300 chance of at least one DWI taking place.



Trespassing makes up about 10 percent of the total risk score. The darkest regions represent cells a 1.7 percent chance of at least one act of trespassing taking place.



Homicides make up 0.66 percent of the total risk score assigned to a cell. The two darkest cells on this map present a 3 percent chance of at least one homicide taking place.

SOURCE: HUNCHLAB

Maurice Chammah, with additional reporting by Mark Hansen. Policing the Future.
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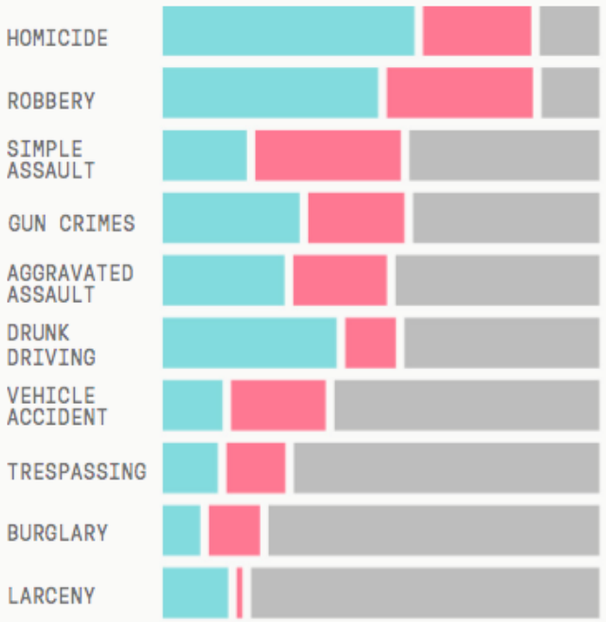
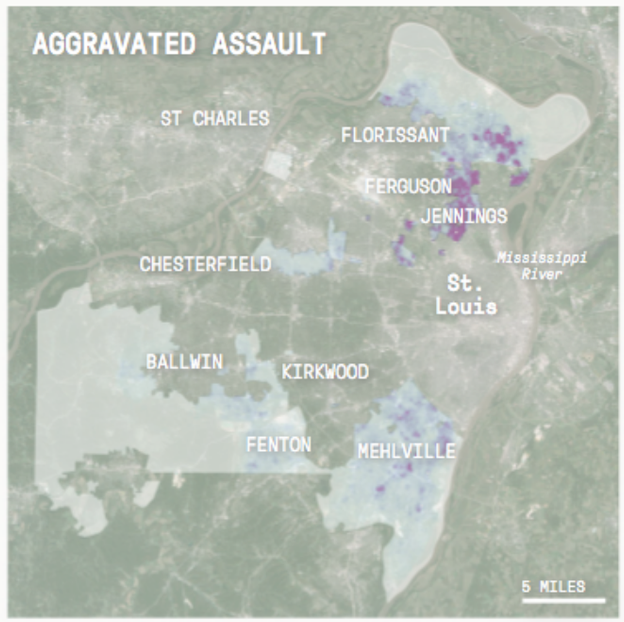
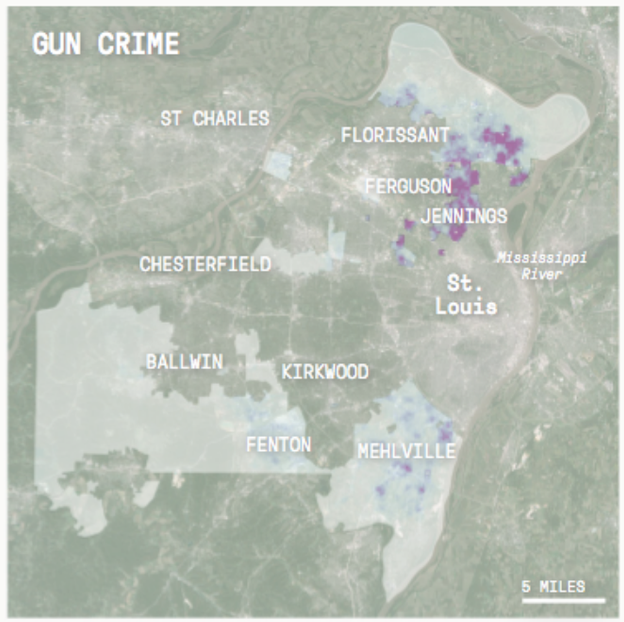


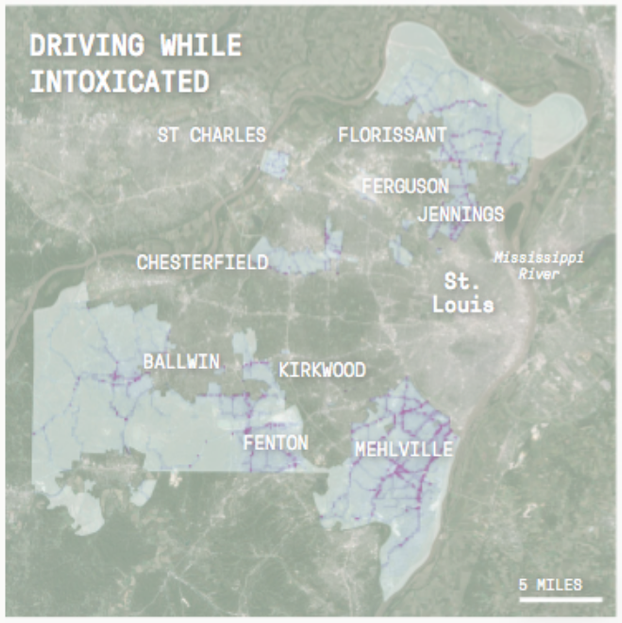


Aggravated assault (assault with a dangerous weapon) makes up 5 percent of the overall risk score assigned to a cell. The darkest regions on this map represent cells with a 1 in [illegible] chance of at least one aggravated assault taking place there during the shift.



Gun crime (all homicides, robberies, and aggravated assaults with a gun) makes up about 6.5 percent of the overall risk score assigned to a cell. The darkest regions represent a 1 in 850 chance of at least one gun crime taking place.

Where did this data come from?



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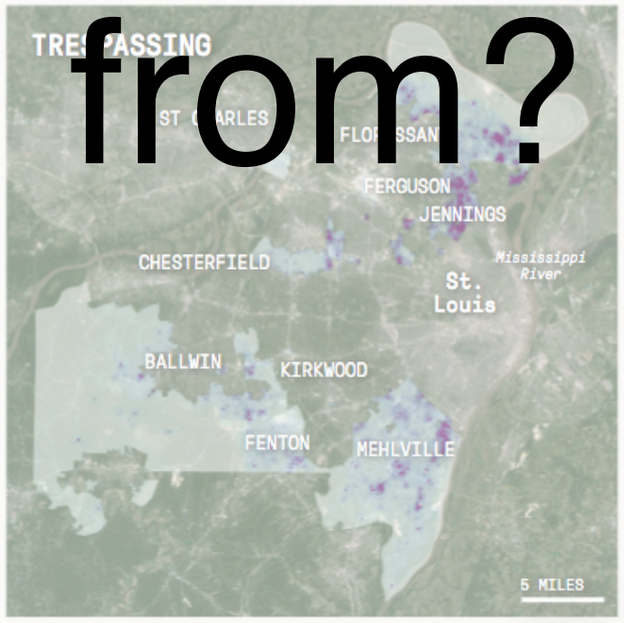

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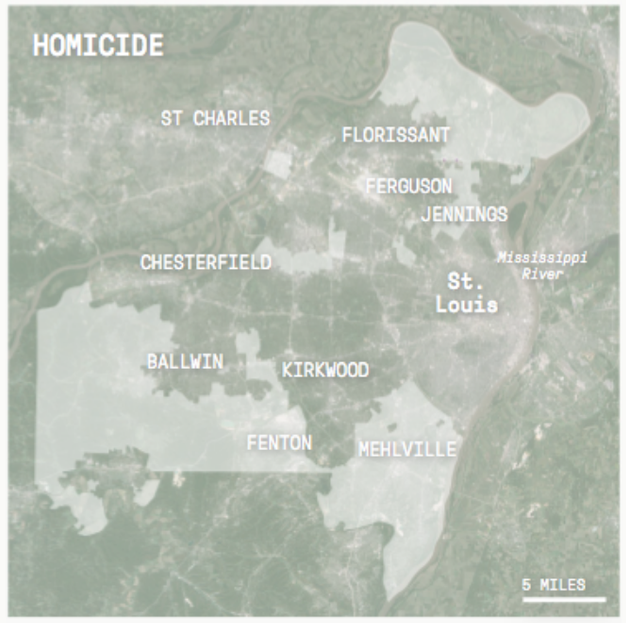

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Image recognition

http://knowyourmeme.com/photos/1090578-puppy-or-bagel

Molly Mulshine. A major flaw in Google's algorithm allegedly tagged two black people's faces with the word ‘gorillas' http://www.businessinsider.com/google-tags-black-people-as-gorillas-2015-7

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“Although the group did not build the algorithm to treat light skin as a sign of beauty, the input data effectively led the robot judges to reach that conclusion.”

Lu Sophia

Age: 18
Real age prediction: 13
Perceived age prediction: 15
AntiAgeist score: 2
PIMPL score: 1,3
RYNKL score: 1
MADIS score: 97
Symmetry Master score: 5,2

Margeri Ottis

Age: 27
Real age prediction: 23
Perceived age prediction: 23
AntiAgeist Score: 7
PIMPL score: 1,2
RYNKL score: 3
MADIS score: 96
Symmetry Master score: 3,1

Kerri Kinney

Age: 26
Real age prediction: 18
Perceived age prediction: 16
AntiAgeist score: 9,5
PIMPL score: 1,2
RYNKL score: 5
MADIS score: 96
Symmetry Master Score: 14,0

Margarita Shestakova

Age: 25
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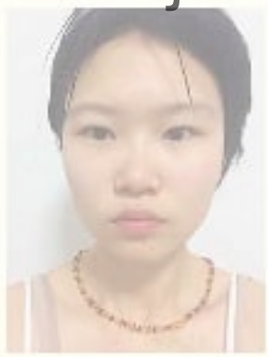

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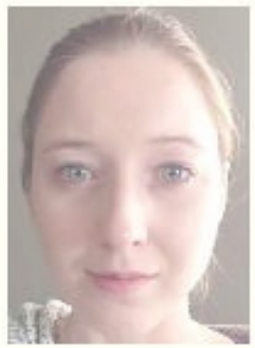

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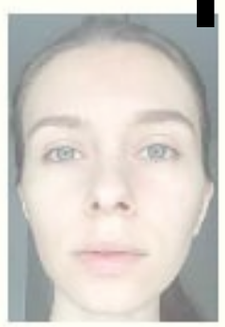

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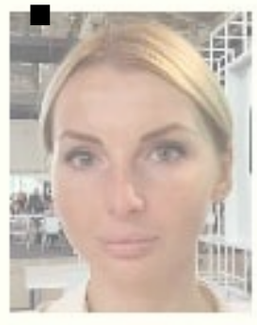

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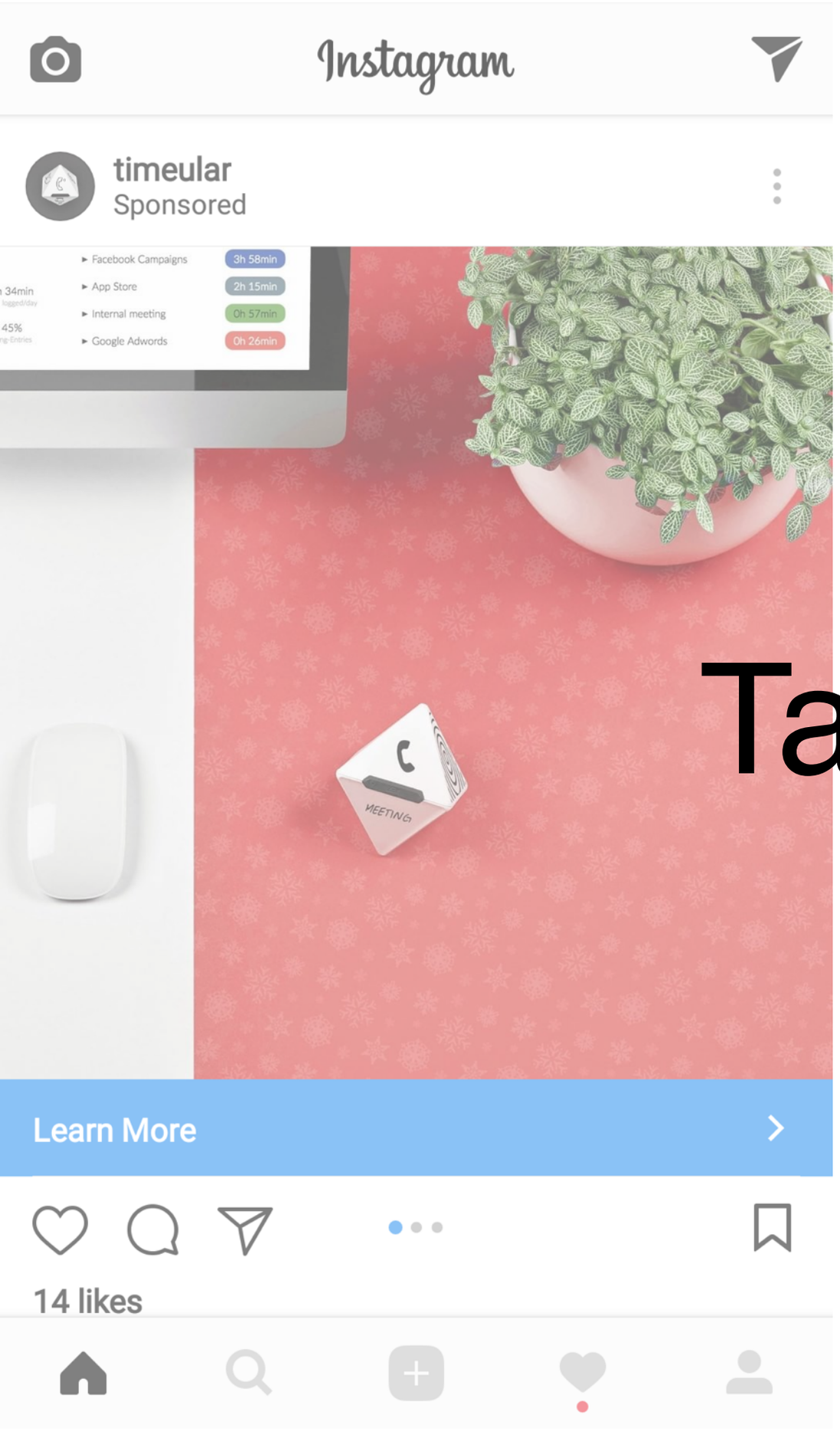
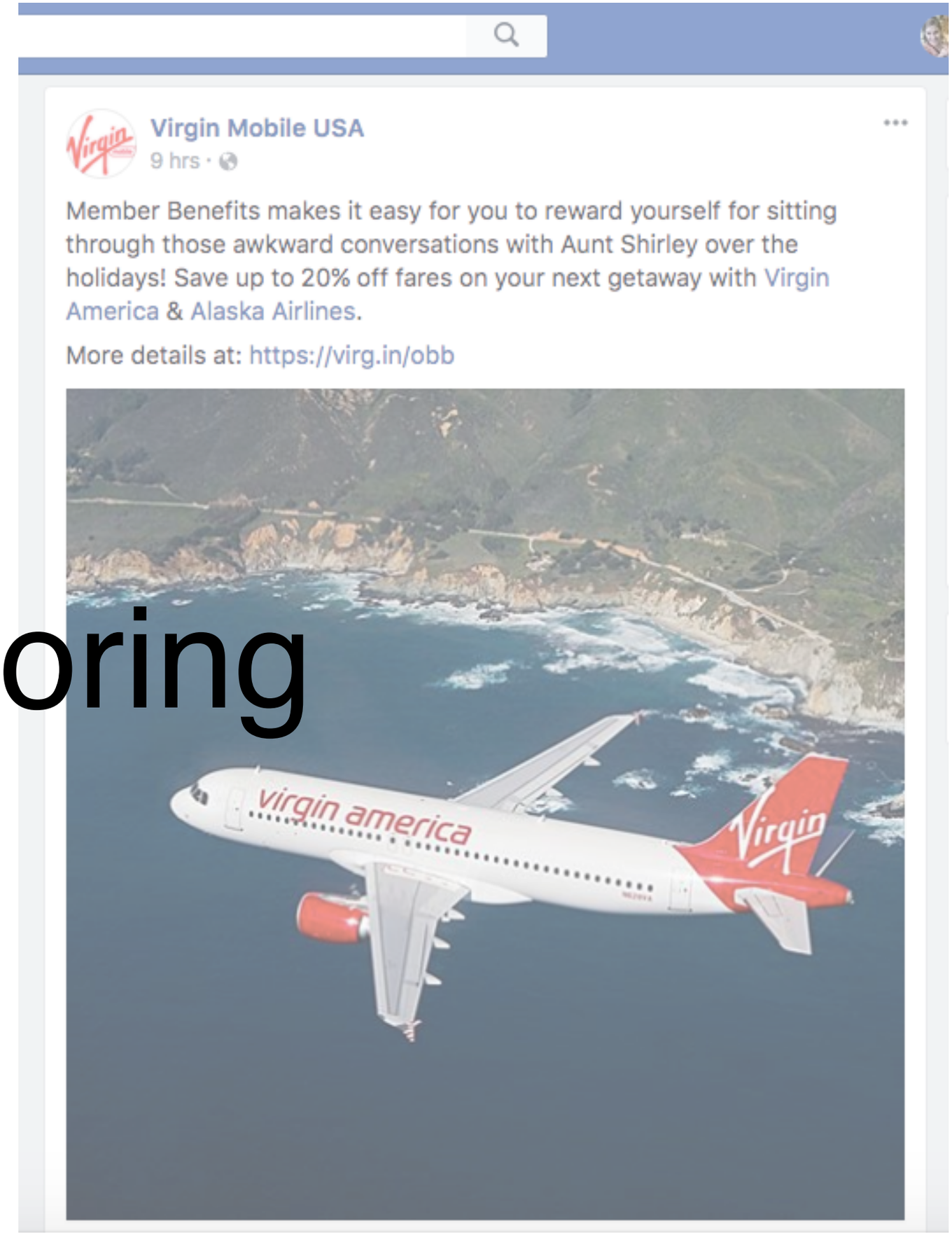
Tailoring

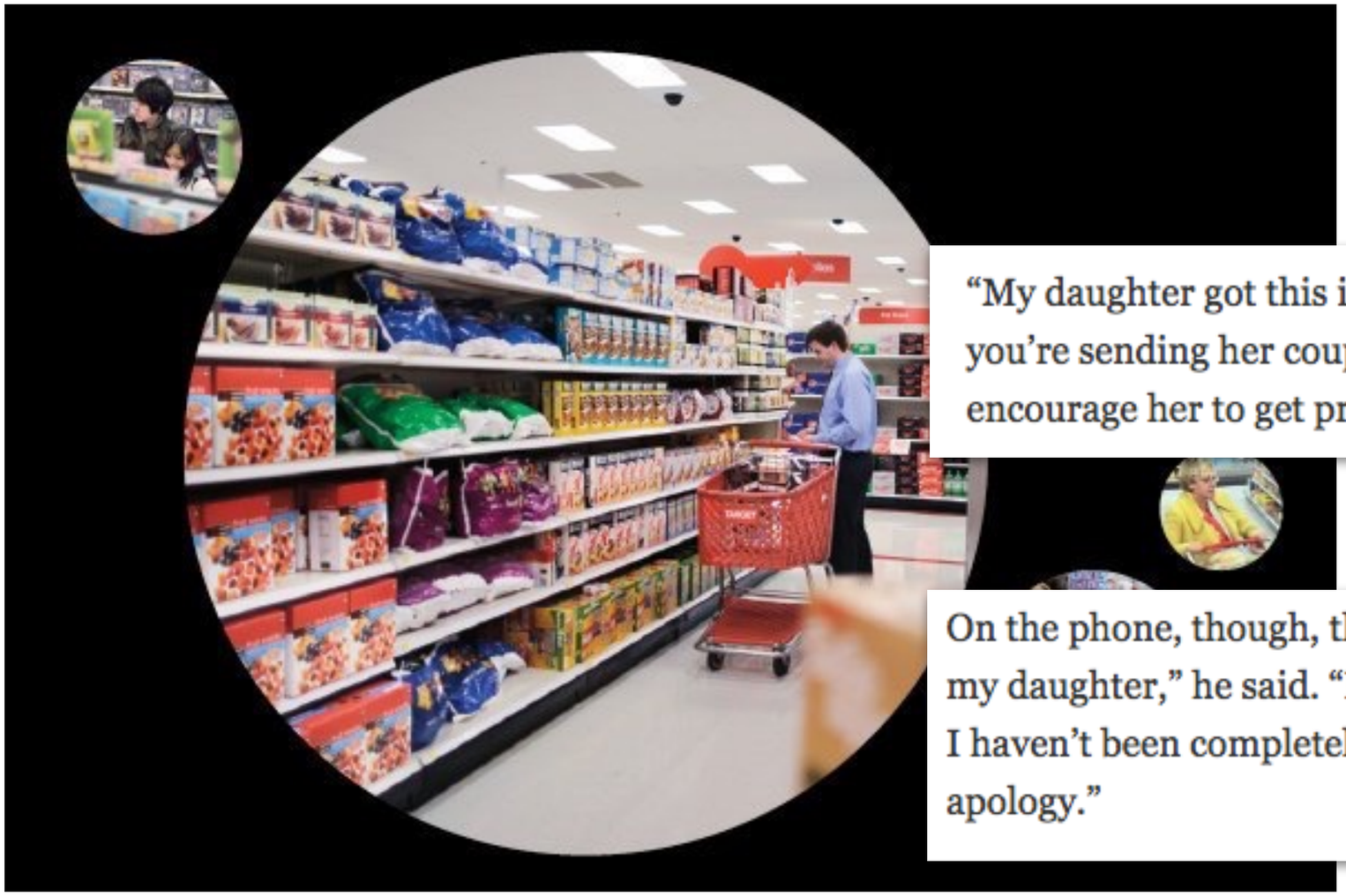

Instagram
timeular
Sponsored
► Facebook Campaigns 3h 58min
► App Store 2h 15min
► Internal meeting 0h 57min
► Google Adwords 0h 26min
MEETING
Learn More
14 likes


Virgin Mobile USA
9 hrs ·
Member Benefits makes it easy for you to reward yourself for sitting through those awkward conversations with Aunt Shirley over the holidays! Save up to 20% off fares on your next getaway with Virgin America & Alaska Airlines.
More details at: https://virg.in/obb
virgin america
Virgin

Magazine

How Companies Learn Your Secrets

By CHARLES DUHIGG FEB. 16, 2012



"My daughter got this in the mail!" he said. "She's still in high school, and you're sending her coupons for baby clothes and cribs? Are you trying to encourage her to get pregnant?"

On the phone, though, the father was somewhat abashed. "I had a talk with my daughter," he said. "It turns out there's been some activities in my house I haven't been completely aware of. She's due in August. I owe you an apology."

Charles Dugigg. How Companies Learn Your Secrets. http://www.nytimes.com/2012/02/19/magazine/shopping-habits.html

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570

Where did this data come from?

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TECH

Google Allowed Advertisers To Target People Searching Racist Phrases

Google prompted BuzzFeed News to run ads targeted to keywords like "black people ruin neighborhoods," then allowed the campaign to go live.

Originally posted on September 15, 2017, at 12:30 p.m.

Updated on September 15, 2017, at 2:15 p.m.

Alex Kantrowitz
BuzzFeed News Reporter

Good quality but low traffic keywords (7)

Keyword	Clicks	Cost	CTR	Impr.	Avg. CPC	Avg. CPM
black people ruin everything	0	$0.00	0.00%	1	$0.00	$0.00
jewish parasite	0	$0.00	0.00%	2	$0.00	$0.00
jews control the media	0	$0.00	0.00%	5	$0.00	$0.00

Alex Kantrowitz. Google Allowed Advertisers to Target People Searching Racist Phrases. https://www.buzzfeed.com/alexkantrowitz/google-allowed-advertisers-to-target-jewish-parasite-black?utm_term=.ec0GyW0Q62#.tdq3yOQ0B1

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jewish parasite	0	$0.00	0.00%	2	$0.00	$0.00
jews control the media	0	$0.00	0.00%	5	$0.00	$0.00

Alex Kantrowitz. Google Allowed Advertisers to Target People Searching Racist Phrases. https://www.buzzfeed.com/alexkantrowitz/google-allowed-advertisers-to-target-jewish-parasite-black?utm_term=.ec0GyW0Q62#.tdq3yOQ0B1

TECH

Google Allowed Advertisers To Target People Searching Racist Phrases

Google prompted BuzzFeed News to run ads targeted to keywords like "black people ruin neighborhoods," then allowed the campaign to go live.

Originally posted on September 15, 2017, at 12:30 p.m.

Updated on September 15, 2017, at 2:15 p.m.

Alex Kantrowitz
BuzzFeed News Reporter

"This violates our policies against derogatory speech and we have removed it," a Google spokesperson told BuzzFeed News after being sent a screenshot of live ad campaign targeted to the search terms "Zionists control the world."

Good quality but low traffic keywords (7)

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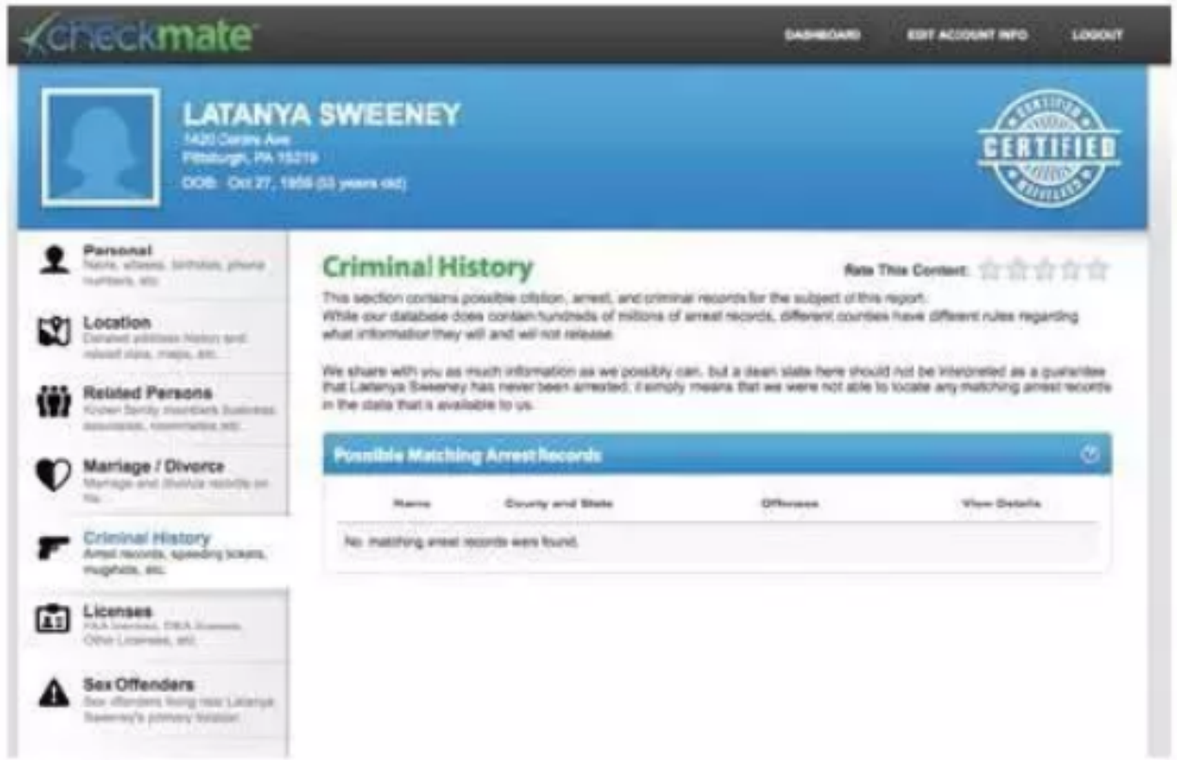
(c)



(d)

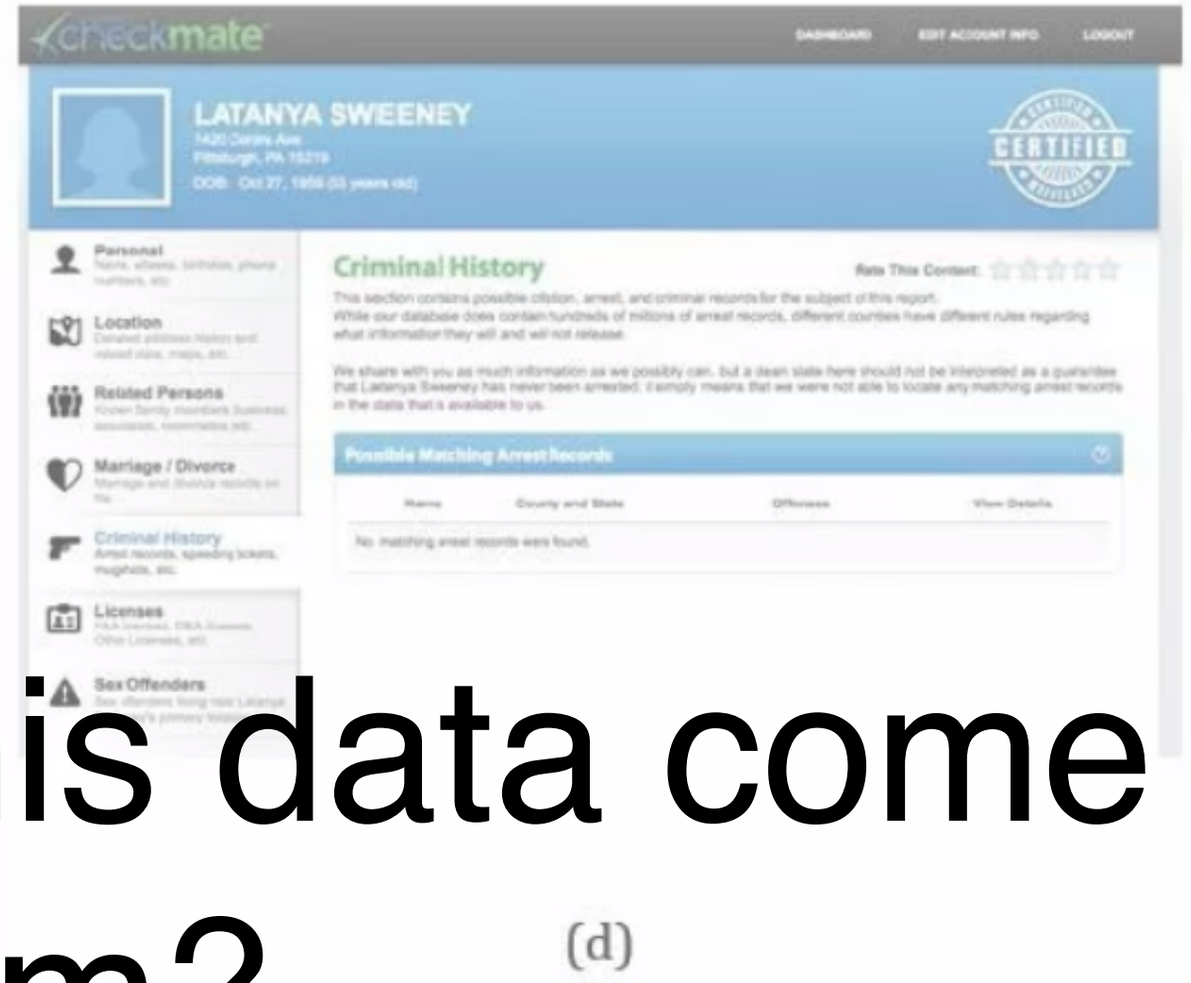
LATANYA SWEENEY

Web page results of ads that appeared on-screen when Harvard professor Latanya Sweeney typed her name in a google search. Ads featured services for arrest records. Sweeney conducted a study that concluded searches with "black sounding" names are more likely to get results with ads for arrests records and other negative information.

Hiawatha Bray. Racial bias alleged in Google's ad results. https://www.bostonglobe.com/business/2013/02/06/harvard-professor-spots-web-search-bias/PtOgSh1ivTZMfyEGj00X4I/story.html

Latanya Sweeney. https://dataprivacylab.org/people/sweeney/

(c)



(d)

Where did this data come from?

LATANYA SWEENEY

Web page results of ads that appeared on-screen when Harvard professor Latanya Sweeney typed her name in a google search. Ads featured services for arrest records. Sweeney conducted a study that concluded searches with "black sounding" names are more likely to get results with ads for arrests records and other negative information.

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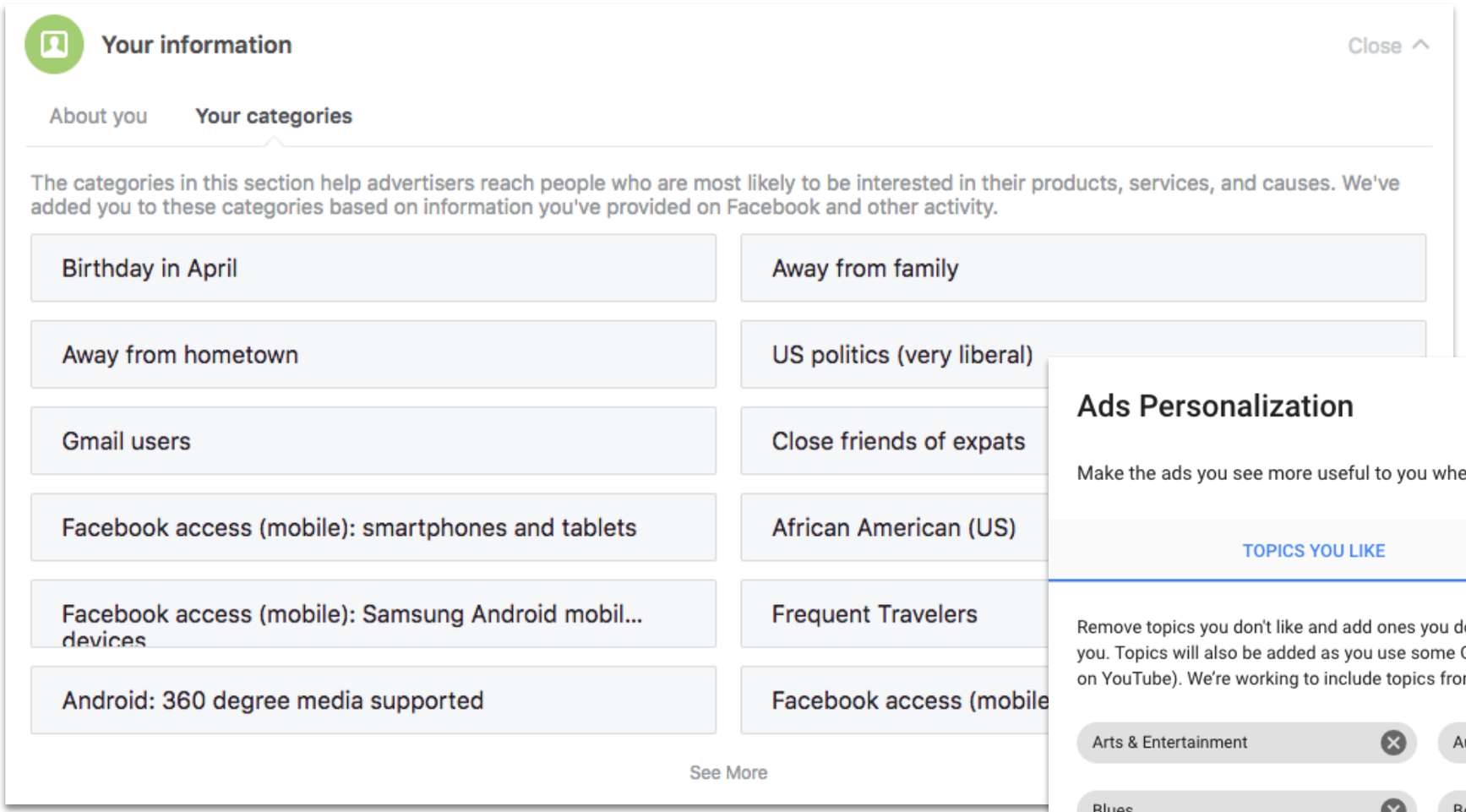
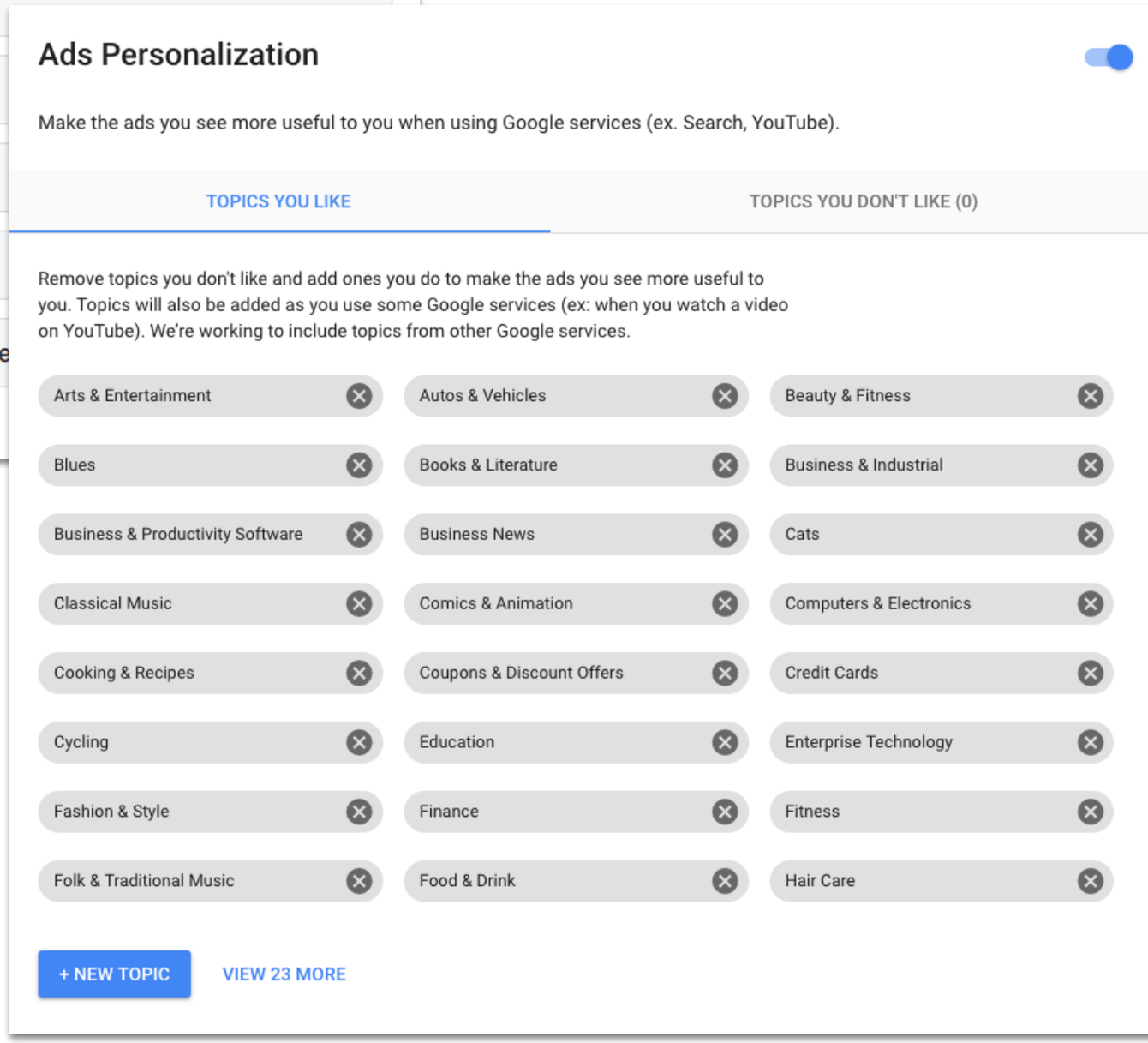
(limited) transparency from companies



https://www.facebook.com/ads/preferences



https://adssettings.google.com/authenticated

Okay, I’m riled up.

Now what?

Brainstorm: ways to fight this

First, let's shake it off.

Then, think of some ways we can combat algorithmic bias (don't worry, I've got ideas on the next slide).

- Keep your eyes open for ways that data and algorithms are being used to perpetuate inequity
- Support investigative journalism
    - ProPublica
    - New York Times
    - Washington Post
- Use your data skills for good
    - “First, do no harm”
    - Diversity is important, particularly at tech giants
- Lobby your representatives for more transparency in algorithms used by the government

1. Design data systems for the well-being of the people from whom the data is taken

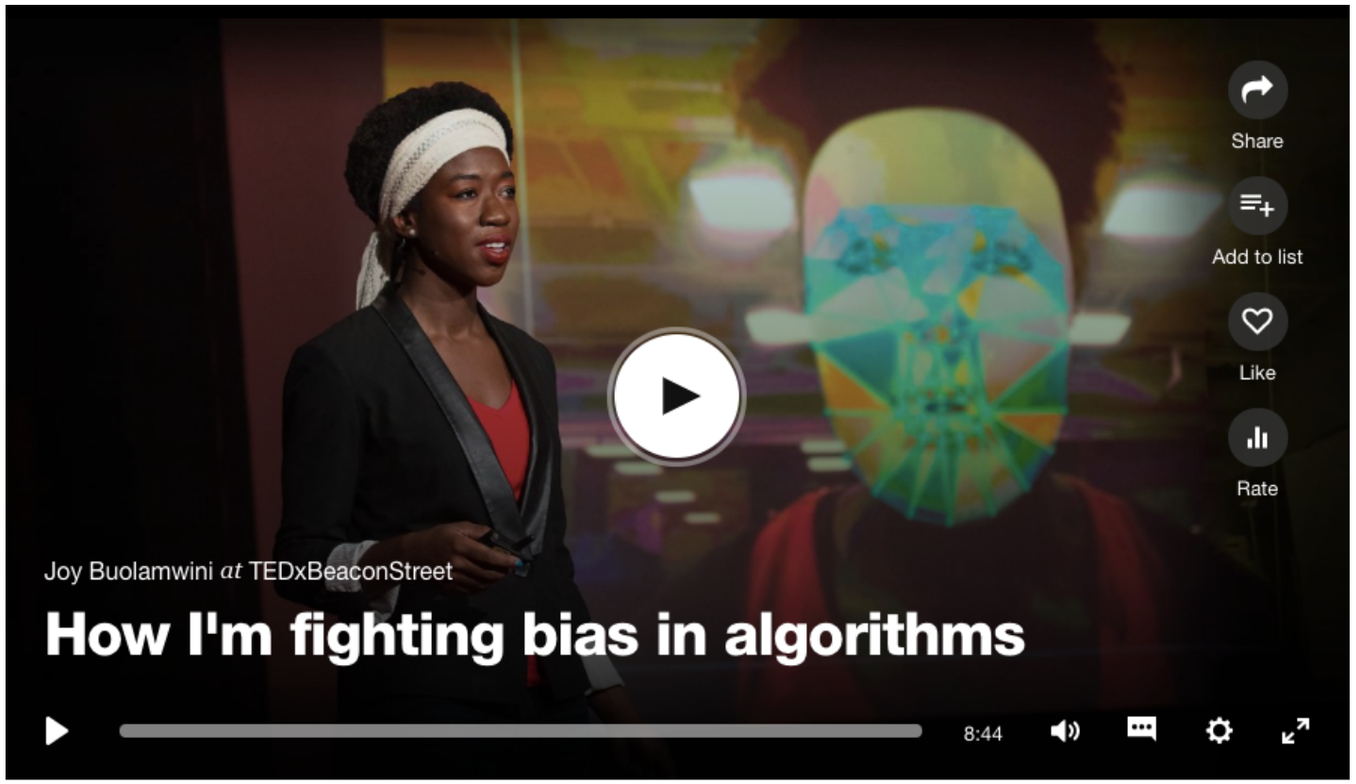
2. Whenever possible, provide mechanisms for feedback

3. Honor the complexity of individual and community realities

4. Create real, functioning data publics

Jer Thorp. Turning Data Around. https://medium.com/memo-random/turning-data-around-7acea1f7479c

Watch



Joy Buolamwini. How I'm fighting bias in algorithms.
https://www.ted.com/talks/joy_buolamwini_how_i_m_fighting_bias_in_algorithms

Matt Mitchell. Cyber JimCrow: Virtual Public Housing and Poor Doors in Digital Security & Surveillance.
https://vimeo.com/232659054

Read

danah boyd & Kate Crawford

CRITICAL QUESTIONS FOR BIG DATA
Provocations for a cultural, technological, and scholarly phenomenon

The era of Big Data has begun. Computer scientists, physicists, economists, mathematicians, political scientists, bio-informaticists, sociologists, and other scholars are clamoring for access to the massive quantities of information produced by and about people, things, and their interactions. Diverse groups argue about the potential benefits and costs of analyzing genetic sequences, social media interactions, health records, phone logs, government records, and other digital traces left by people. Significant questions emerge. Will large-scale search data help us create better tools, services, and public goods? Or will it usher in a new wave of privacy incursions and invasive marketing? Will data analytics help us understand online communities and political movements? Or will it be used to track protesters and suppress speech? Will it transform how we study human communication and culture, or narrow the palette of research options and alter what 'research' means? Given the rise of Big Data as a socio-technical phenomenon, we argue that it is necessary to critically interrogate its assumptions and biases. In this article, we offer six provocations to spark conversations about the issues of Big Data: a cultural, technological, and scholarly phenomenon that rests on the interplay of technology, analysis, and mythology that provokes extensive utopian and dystopian rhetoric.

Keywords Big Data; analytics; social media; communication studies; social network sites; philosophy of science; epistemology; ethics; Twitter

(*Received 10 December 2011; final version received 20 March 2012*)

Technology is neither good nor bad; nor is it neutral . . . technology's interaction with the social ecology is such that technical developments frequently have environmental, social, and human consequences that go far beyond the immediate purposes of the technical devices and practices themselves. (Kranzberg 1986, p. 545)

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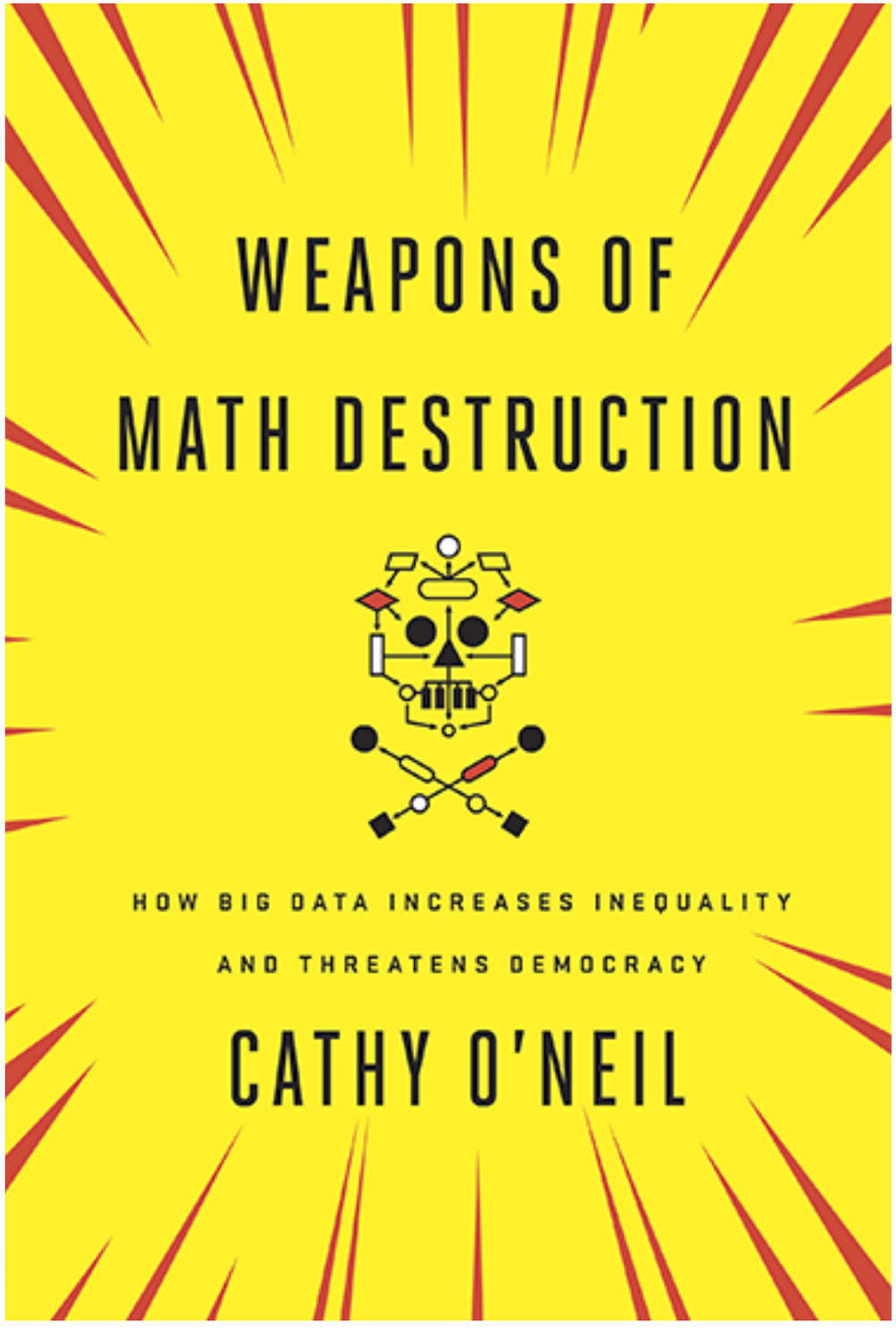
http://www.tandfonline.com http://dx.doi.org/10.1080/1369118X.2012.678878



Stuff at Smith

Data for Black Lives: Conference at MIT November 17-19, 2017. Sold out! But Ben Baumer (bbaumer@smith.edu) will be organizing a local watching party for the remote conference.

ProPublica is really on the forefront of this work. We'll be hosting a talk by at least one of their journalists in Spring 2018.

SDS 236: Data Journalism. Spring 2018, taught by Amelia McNamara. Will address some of these issues.