



Healthcare's Big Wave: Data

Shomit Ghose — May 4, 2021 —
shomit@berkeley.edu

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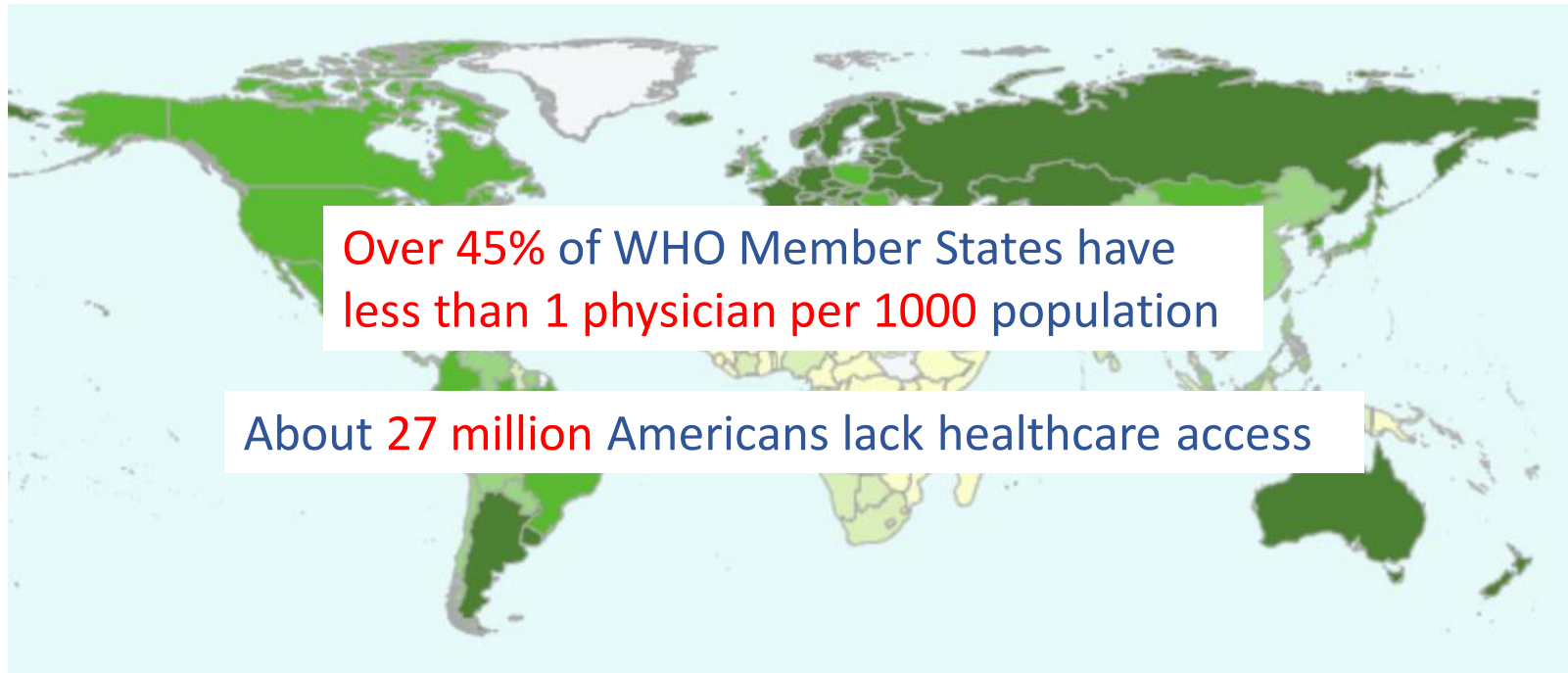


Riding the giant: big-wave surfing in Nazaré

▲ Mother of all waves:
Brazilian surfer Rodrigo
Koxa at Nazaré,
November 2019.
Photograph: Olivier
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A small fishing hamlet in Portugal has become a magnet for the world's most fearless big-wave surfers. Tim Lewis reports how Nazaré became the ocean's Everest.

Healthcare Access





Healthcare's (Idealized) Asymptotic Goal #1

- That healthcare be accessible to everyone; a human right
 - Scalable & frictionless



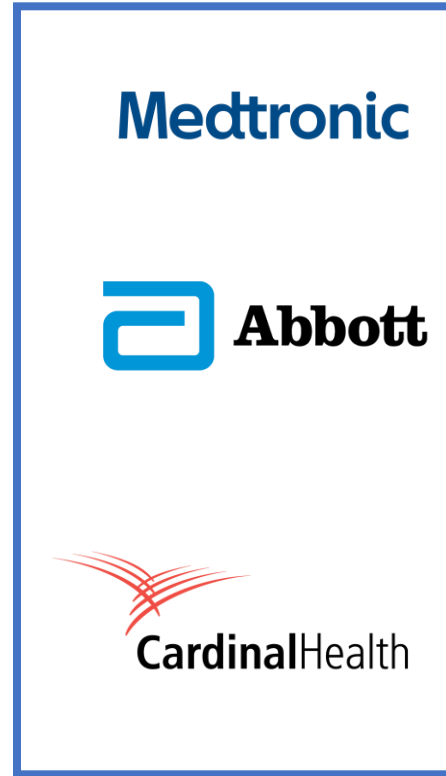
Healthcare's (Idealized) Asymptotic Goal #2

- That we all die in our sleep at age 115 with \$0 in lifetime healthcare needs
 - Predictive & preventive

Who Will Disrupt Healthcare's Future?



Drug companies



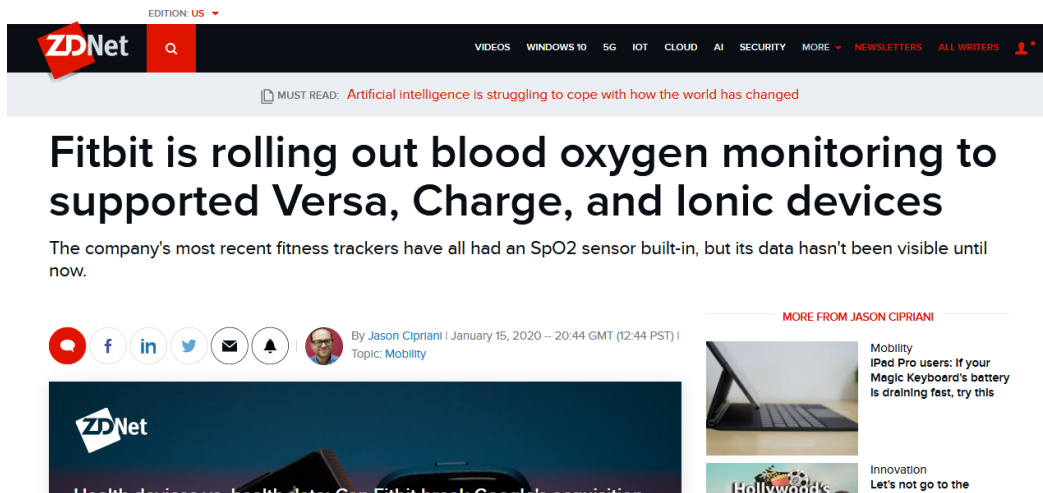
Device companies



Data companies

Data Enables Healthcare to be...

... Frictionless & scalable



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Fitbit is rolling out blood oxygen monitoring to supported Versa, Charge, and Ionic devices

The company's most recent fitness trackers have all had an SpO2 sensor built-in, but its data hasn't been visible until now.

By Jason Cipriani | January 15, 2020 -- 20:44 GMT (12:44 PST) | Topic: Mobility

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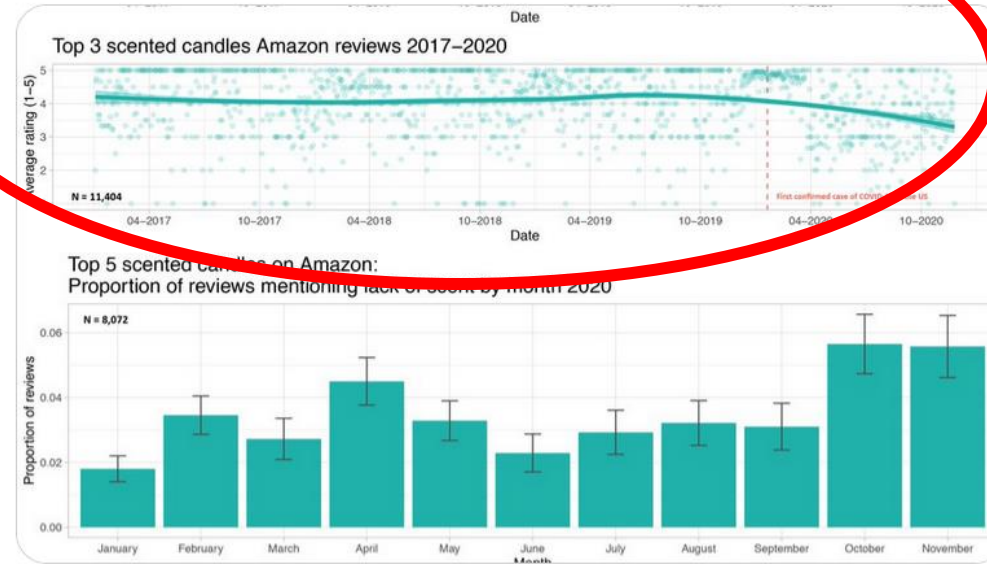
Skyler Place¹, PhD ; Danielle Blanch-Hartigan², PhD, MPH ; Channah Rubin¹, BA ; Cristina Gorrostieta¹, PhD ; Caroline Mead¹, BA ; John Kane¹, PhD ; Brian P Marx^{3,4}, PhD ; Joshua Feast¹, MBA ; Thilo Deckersbach⁵, PhD ; Alex "Sandy" Pentland⁶, PhD ; Andrew Nierenberg⁵, MD ; Ali Azarbayejani¹, PhD

Data brings healthcare access, data brings healthcare disruption



I couldn't just walk past this Tweet, so here is some fun [#dataviz](#)

Scented candles: An unexpected victim of the COVID-19 pandemic 1/1



Terri Nelson @TerriDrawsStuff · Nov 24

There are angry ladies all over Yankee Candle's site reporting that none of the candles they just got had any smell at all. I wonder if they're feeling a

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Can "All" Data
Speak?

- How about negative online reviews for scented candles...
- ... correlating with COVID-19 outbreak?(!)

The Data Monopolies Understand...

- ... And are aggressively pursuing data-driven solutions to scalable healthcare

Facial feature selection for heart rate detection

Abstract

The location of a user's head, for purposes such as head tracking or motion input, can be determined. For example, a computing device (e.g., a tablet, mobile phone, etc.) can utilize one or more detectors or other image classifiers to detect the presence objects such as features of the face in images captured by one or more cameras of the computing device. Based on the detected feature(s), the subject technology provides embodiments for detecting a heart rate of the user of the computing device without requiring invasive procedures or addition sensors on the computing device by selecting a region of interest for analyzing color or other image data measurements over a period of time. Changes in color at the select region of interest may be further processed to extract a user's heart rate using techniques described further herein.

US9750420B1
United States

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Inventor: Anil Kumar Agrawal, Wei Li, Nicholas Juhel Du, Ambresh Tyagi

Current Assignee: Amazon Technologies Inc.

Assessing Cardiovascular Function Using an Optical Sensor

Abstract

This document describes assessing cardiovascular function using an optical sensor, such as through sensing relevant hemodynamics understood by pulse transit times, blood pressures, pulse-wave velocities, and, in more breadth, ballistocardiograms and pressure-volume loops. The techniques disclosed in this document use various optical sensors to sense hemodynamics, such as skin color and skin and other organ displacement. These optical sensors require little if any risk to the patient and are simple and easy for the patient to use.

US20180000355A1
United States

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Inventor: Brian Derek DeBussche

Current Assignee: Google LLC

Voice-based determination of physical and emotional characteristics of users

Abstract

Systems, methods, and computer readable media are disclosed for voice based determination of physical and emotional characteristics of users. Example methods may include determining first voice data, wherein the first voice data is generated by a user, determining a first real-time user status of the user using the first voice data, generating a first data tag indicative of the first real-time user status, determining first audio content for presentation at a speaker device using the first data tag and the first voice data, and causing presentation of the first audio content via a speaker of the speaker device.

US10096319B1
United States

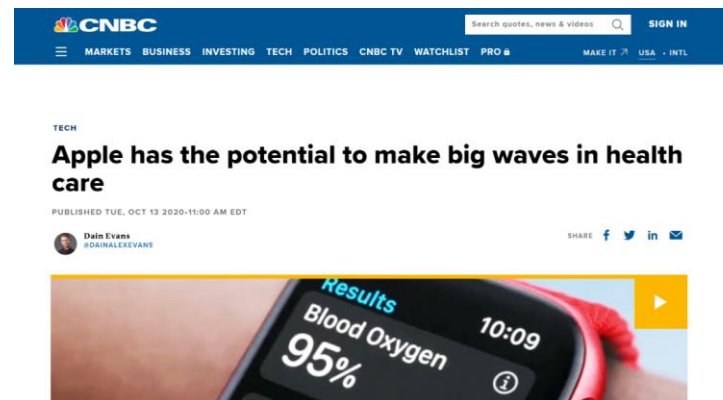
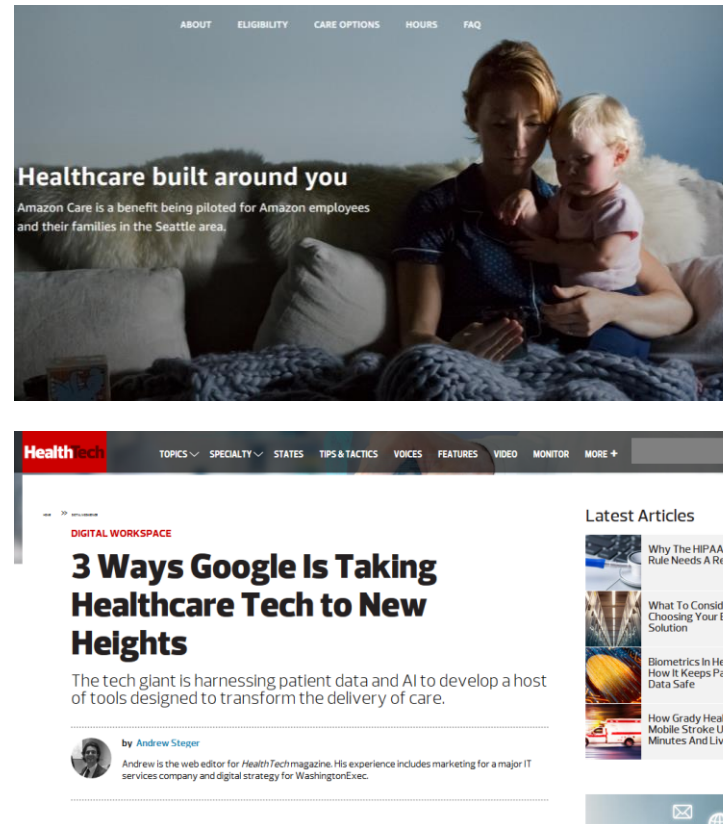
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Inventor: Hualing Jin, Shun Wang

Current Assignee: Amazon Technologies Inc.

Providing the Counterweight to the Data Monopolies?

Data Lake?



- Big Tech is disrupting healthcare using data
- Are we well served if the only source of scalable healthcare is from these companies?
 - As healthcare consumers?
 - As healthcare innovators?

The Opportunity: Impact-driven Innovation



- If a = impact and b = complexity...
- ... then identify the unsolved a/b innovation equations with the biggest values of a , not b
- Digital healthcare solutions have biggest impact due to ubiquity of mobile devices and our deluge of data



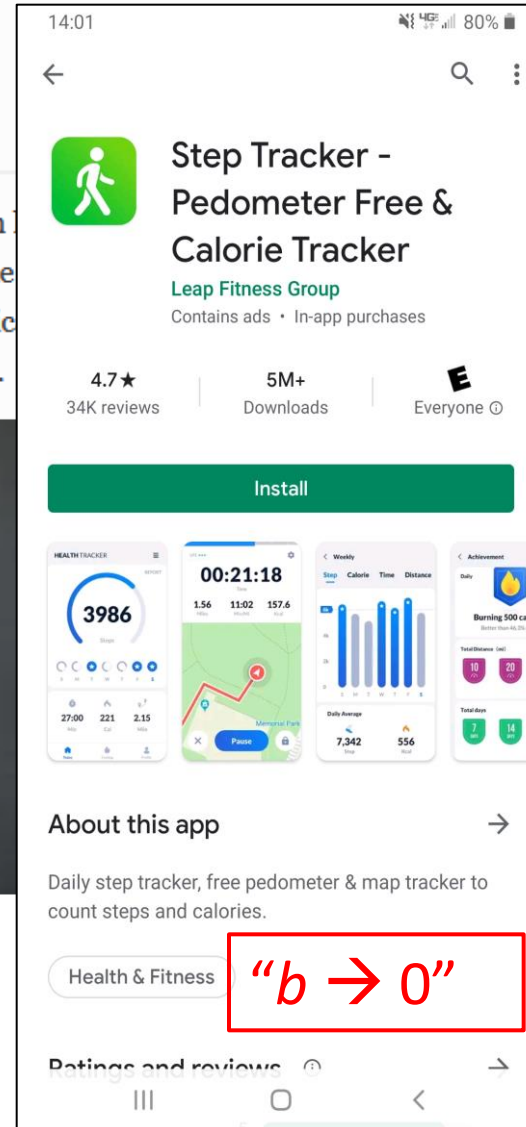
131,259 views | Jan 16, 2019, 12:02am EST

Novartis CEO Who Wanted To Bring Tech Into Pharma Now Explains Why It's So Hard

David Shaywitz Contributor
Healthcare

$b \rightarrow \infty$

The current challenge for data science and technology (DST) in the “dancing bear” stage, where “the wonder is not how well the dances at all.” It’s time for DST to evolve past the novelty public demonstrate its ability to materially impact health and disease.



Digital Health: A Broad Spectrum

Impact Innovation

- Start-ups will never have enough \$ to innovate on “large b ” problems. Leave that to the giants.
- Innovate on large a , with tractable b



With the Right Data You Can Do: a/b Prevention

Journal List > Internet Interv > v.6; 2016 Nov > PMC6096297



Internet Interv. 2016 Nov; 6: 89–106.

PMCID: PMC6096297

Published online 2016 Nov 2. doi: [10.1016/j.invent.2016.10.002](https://doi.org/10.1016/j.invent.2016.10.002)

PMID: [30135818](https://pubmed.ncbi.nlm.nih.gov/30135818/)

Gamification for health and wellbeing: A systematic review of the literature

Daniel Johnson,^{a,*} Sebastian Deterding,^b Kerri-Ann Kuhn,^a Aleksandra Staneva,^a Stoyan Stoyanov,^a and Leanne Hides^a

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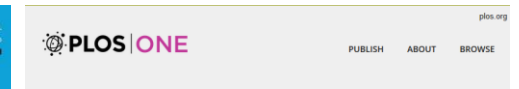
[Benjamin G. Voyer](#)

'Nudging' behaviours in healthcare: insights from behavioural economics

Article (Accepted version)
(Refereed)

Original citation:

Voyer, Benjamin G. (2015) 'Nudging' behaviours in healthcare: insights from behavioural economics. *British Journal of Healthcare Management*, 21 (3). pp. 130-135. ISSN 1358-0574



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PEER-REVIEWED
RESEARCH ARTICLE

Testing the decoy effect to increase interest in colorectal cancer screening

Sandro Tiziano Stoffer, Jiahong Yang, Ivo Vlaev, Christian von Wagner

Published: March 26, 2019 • <https://doi.org/10.1371/journal.pone.0213668>

Article	Authors	Metrics	Comments	Media Coverage
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Correction
Abstract
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Study 1
Study 2
General discussion
Supporting information
References
Reader Comments (0)
Media Coverage (0)
Figures


Correction

19 Jul 2019: Stoffer ST, Yang J, Vlaev I, von Wagner C (2019) Correction: Testing the decoy effect to increase interest in colorectal cancer screening. PLOS ONE 14(7): e0219811. <https://doi.org/10.1371/journal.pone.0219811> | [View correction](#)

Abstract

Literature on consumer choice has demonstrated that the inclusion of an inferior alternative choice (decoy) can increase interest in a target product or action. In two online studies, we tested the impact of decoys on the probability of previous non-intenders to have a screening test which could significantly lower their chances of dying of colorectal cancer. We find that the presence of a decoy increased the probability to choose screening at the target hospital (over no screening) from 39% to 54% and 37% to 59% depending on how many hospital attributes were communicated and how strongly the decoy was dominated by the target. We also show that the presence of the decoy was associated with lower levels of reported decisional complexity while not undermining information seeking and knowledge acquisition. These findings offer a 'proof of principle' that decoys have the potential to increase screening uptake without negatively influencing informed choice.

With the Right Data You Can Do: a/b Treatment


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[Published: 17 May 2016](#)

The effectiveness of email-based exercises in promoting psychological wellbeing and healthy lifestyle: a two-year follow-up study

[Mikoa Samuels-Smith](#)
[Vijaya Desai](#)
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[Carmen Szusterman](#)
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Eur Arch Psychiatry Clin Neurosci. 2020 Mar 27(2):139-152. doi: 10.1007/s00406-018-0974-3. Epub 2019 Jan 3.

Smartphone applications for depression: a systematic literature review and a survey of health care professionals' attitudes towards their use in clinical practice.

Kerst A^{1,2}, Zalsman J³, Gabelot V^{4,5,6}

⊕ Author information

Abstract

Smartphone applications ("apps") may contribute to closing the treatment gap for depression by reaching large populations at relatively low costs. The general public seems open towards the use of apps for mental disorders but less is known about the attitudes of health care professionals. Therefore, the aim of this study was to examine the available evidence on the effectiveness of apps for depression and to explore the attitudes of health care professionals towards their use in practice. A systematic literature search was performed aimed at studies utilizing smartphone applications for depression. In addition, a survey was conducted to explore health care professionals' attitudes towards

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Published on 06.06.17 in Vol 4, No 2 (2017): Apr-Jun
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Original Paper

Delivering Cognitive Behavior Therapy to Young Adults With Symptoms of Depression and Anxiety Using a Fully Automated Conversational Agent (Woebot): A Randomized Controlled Trial

Kathleen Kara Fitzpatrick¹, PhD ; Allison Darcy², PhD ; Molly Vennette¹, BA 

¹Stanford School of Medicine, Department of Psychiatry and Behavioral Sciences, Stanford, CA, United States
²Woebot Labs Inc., San Francisco, CA, United States

^{*}These authors contributed equally



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CID: PMC5454064

Front Psychol. 2017; 8: 796.
Published online 2017 Jun 2. doi: [10.3389/fpsyg.2017.00796](https://doi.org/10.3389/fpsyg.2017.00796)

Artificial Intelligence-Assisted Online Social Therapy for Youth Mental Health

[Simon D'Alfonso](#),^{1,2,*} [Olga Santesteban-Echarri](#),^{1,3,4} [Simon Rice](#),^{1,3} [Greg Wadley](#),² [Reeva Lederman](#),² [Christopher Miles](#),¹ [John Gleeson](#),⁵ and [Mario Alvarez-Jimenez](#)^{1,3}

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Abstract

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Dissecting racial bias in an algorithm used to manage the health of populations


Ziad Obermeyer^{1,2,*}, Brian Powers³, Christine Vogeli⁴, Sendhil Mullainathan^{5,†}
 * See all authors and affiliations

Science 25 Oct 2019:
 Vol. 366, Issue 6464, pp. 447-453
 DOI: 10.1126/science.aax2342

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VIEWPOINT

Machine Learning and Ethics in Plastic Surgery

Koimizu, Jungen MD¹; Numajiri, Toshiaki MD, PhD²; Kato, Kazuto PhD¹ [Author Information](#)

Plastic and Reconstructive Surgery – Global Open: March 2019 – Volume 7 – Issue 3 – p e2162
 doi: 10.1097/GOX.00000000000002162

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Riding the giant: big-wave surfing in Nazaré

▲ Mother of all waves: Brazilian surfer Rodrigo Koa at Nazaré, November 2019. Photograph: Olivier Morin/Getty Images

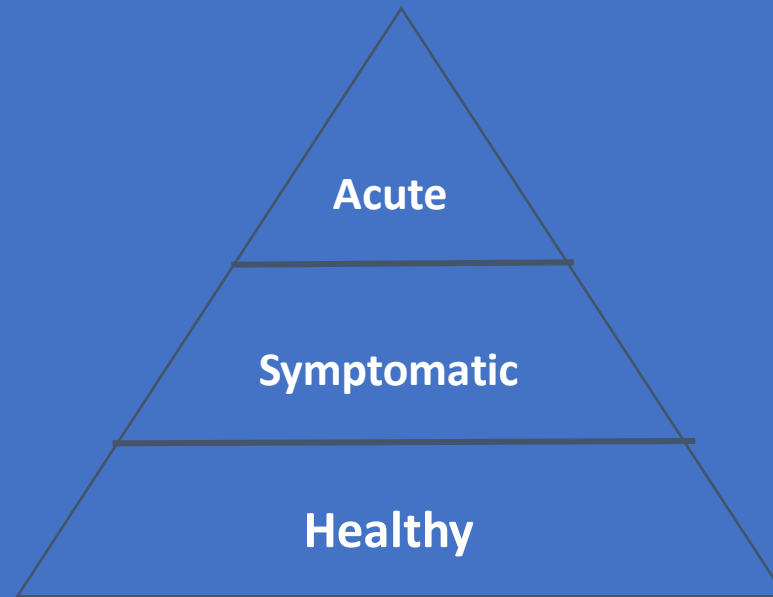
A small fishing hamlet in Portugal has become a magnet for the world's most fearless big-wave surfers. Tim Lewis reveals how Nazaré became the ocean's Everest

But Only If You Have the Right Data

- Scale
- Accuracy
- Ethically-sourced
- Bias-free

Healthcare is a Zero-Sum Game

Cost (prevention!)



Healthcare AI
interventions

Population (scalability!)



Summarizing: What Does This All Mean?

- Focus on tractable problems
- Focus on impact
- “a/b”: Using Data to deliver healthcare that is...
 - Scalable and frictionless
 - Predictive and preventive
- Simple! 😊

Obrigada!

Riding the Data
Wave

