

AI in de gezondheidszorg: hip hip hoera of AIAI?

Prof Dr W. Van Biesen

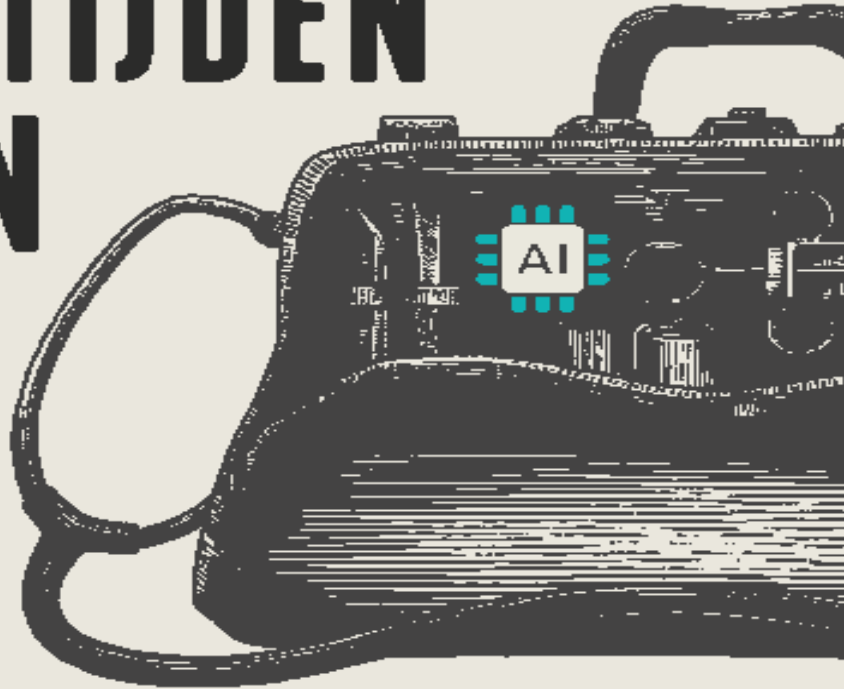
Universitair Ziekenhuis Gent

Consortium for Justifiable Digital Healthcare



SIGRID STERCKX EN WIM VAN BIESEN (RED.)

GENEESKUNDE IN TIJDEN VAN AI

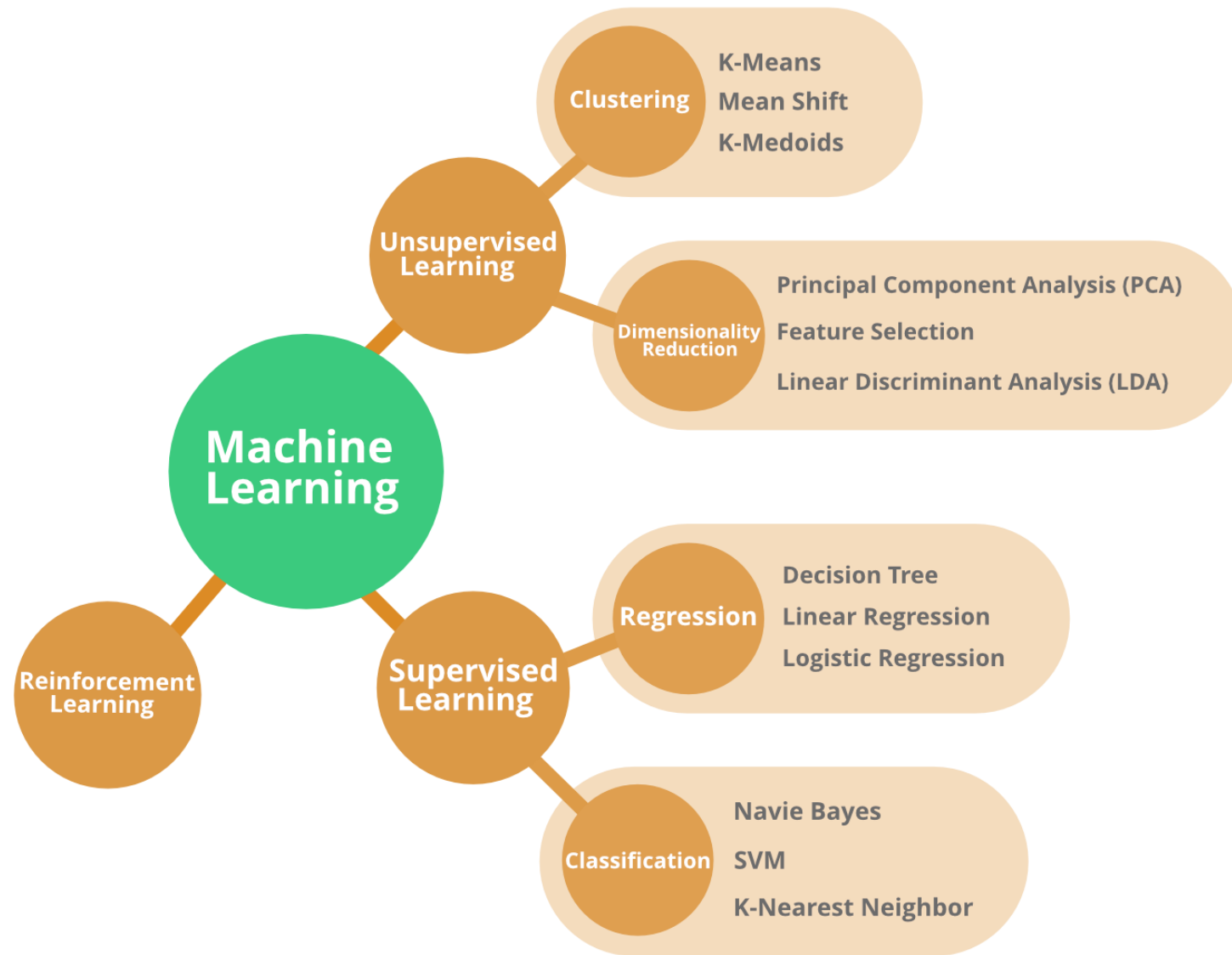


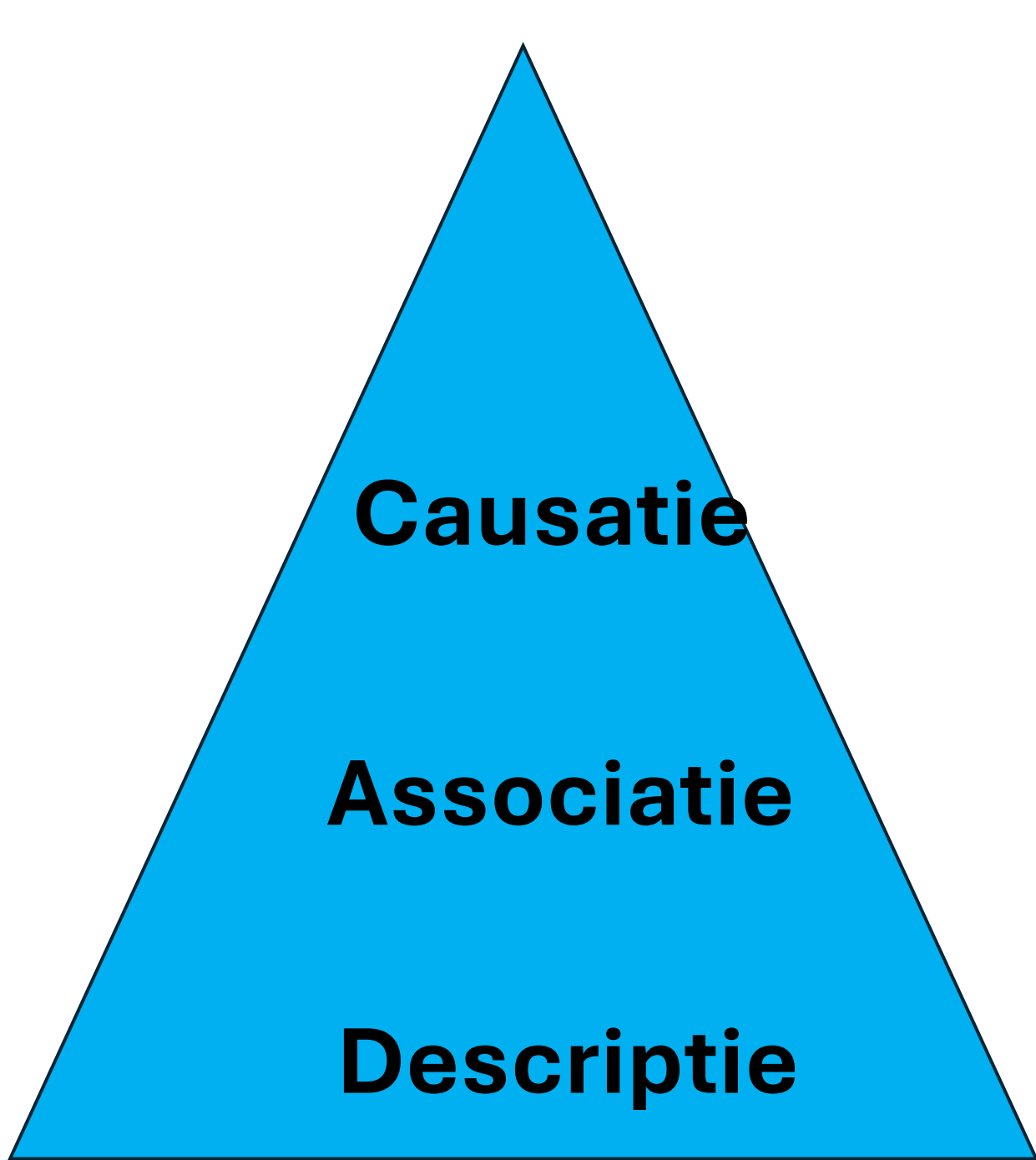
Handvatten voor vandaag en morgen

ACADEMIA
PRESS

<https://www.academiapress.be/nl/geneeskunde-tijden-van-ai>

- **AI: hoe werkt het (niet) in 2025**
- **Jumping from (big) data to knowledge**
- **Applicaties van AI in gezondheidszorg**
- **Valkuilen**
- **Impact op zorgverleners**





Causatie

Associatie

Descriptie

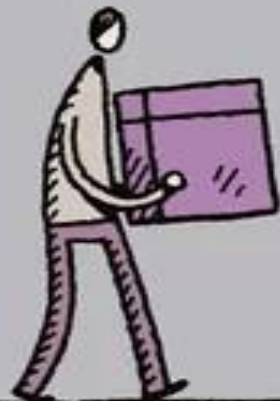
**Begrijpen *waarom* dingen gebeuren,
en daaruit kunnen voorspellen wat
mogelijke alternatieve acties zijn
(counterfactuals) en wat daar de
gevolgen van zijn**

PATROONHERKENNING
Predictie => Prognose
Classificatie => Diagnose

DATAPRESENTATIE
Weergeven van de wereld
zoals hij is op een voor de
gebruiker gemakkelijk
behapbare manier

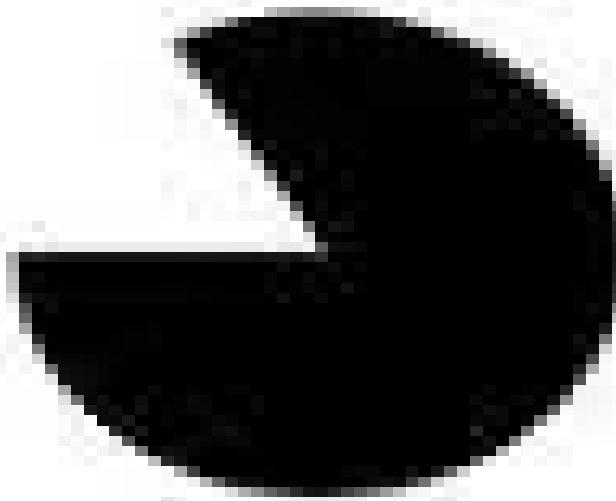
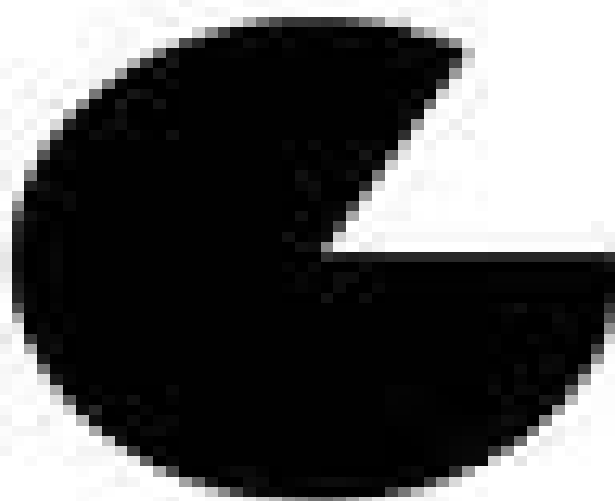
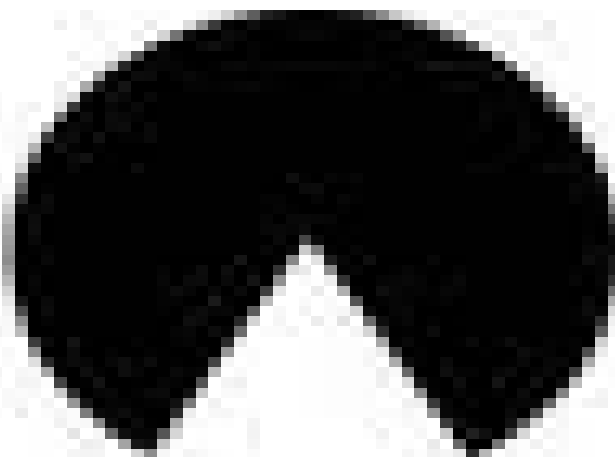
DE PROFESSOR ORDENT ZIJN AANTEKENINGEN VOOR TOEKOMSTIG GEBRUIK

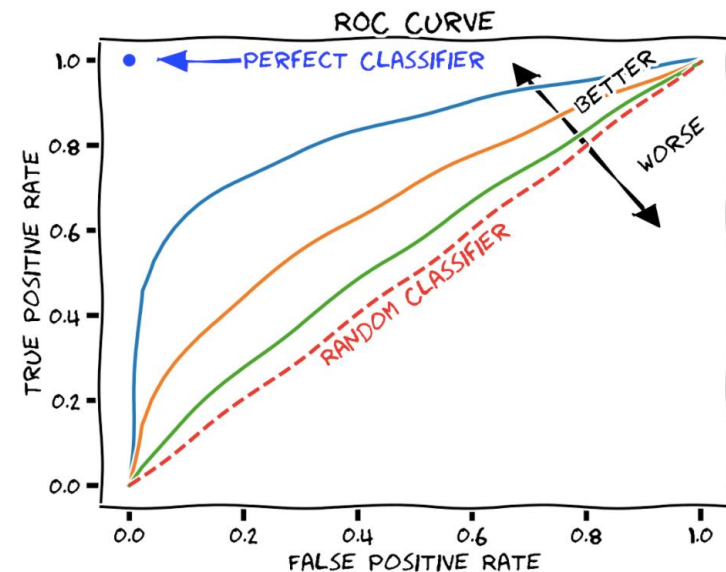
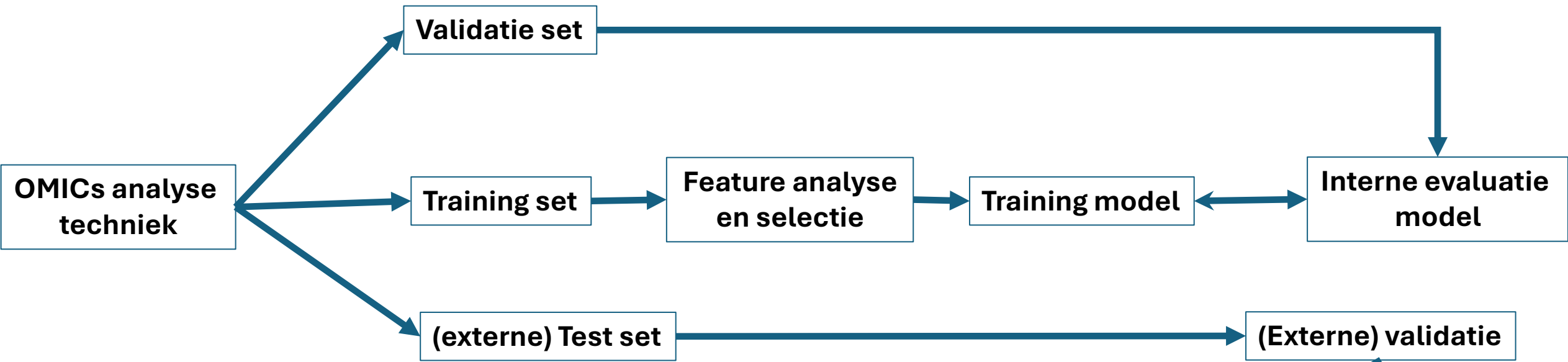
IK HEB
MEER
PAARSE
DOZEN
NODIG.



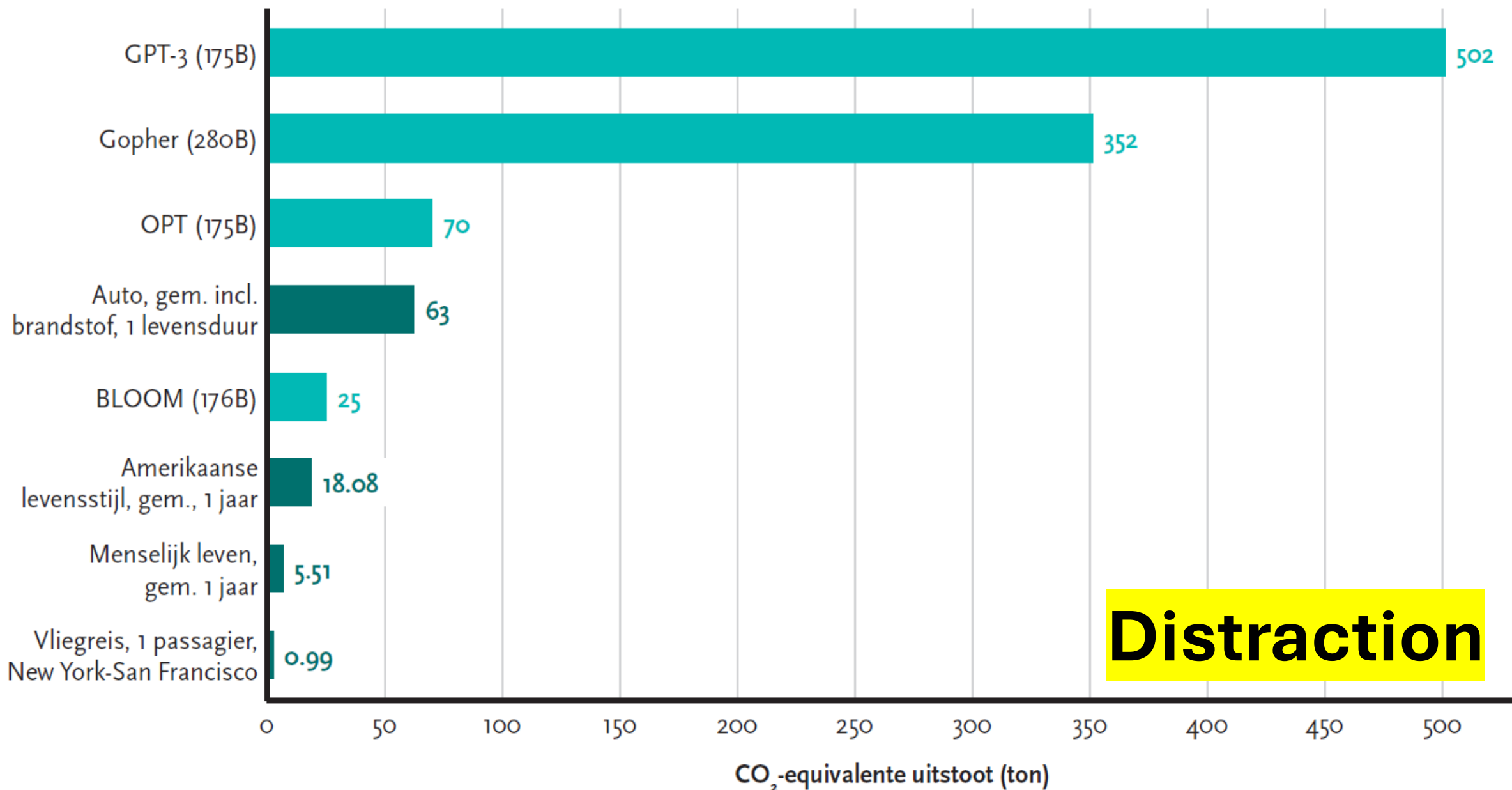
LEGENDE

-  RONDUIT GENIAAL
-  GOEDE IDEEËN
-  RUWE THEORIEËN
-  DRONKEN GEDACHTEN
-  MIDDELMATIGE IDEEËN
-  LEEK INITIEEL WEL EEN GOED IDEE
-  WAT BEZIELDE MIJ IN GODSNAAM?
-  COMPLETE NONSENS





Vergelijking van (geschatte) CO₂-uitstoot van sommige AI-systemen met die van enkele voorbeelden uit het dagelijks leven, 2022



Bestaande ongelijkheid en discriminatie:

- Ongelijkheid in toegang en middelen voor gezondheidszorg
- Discriminerende processen in de zorg
- Bias in diagnostiek

Bias in de data:

- Gebrek aan representatieve, inclusieve datasets
- Datasets met verborgen bias en ongelijkheid

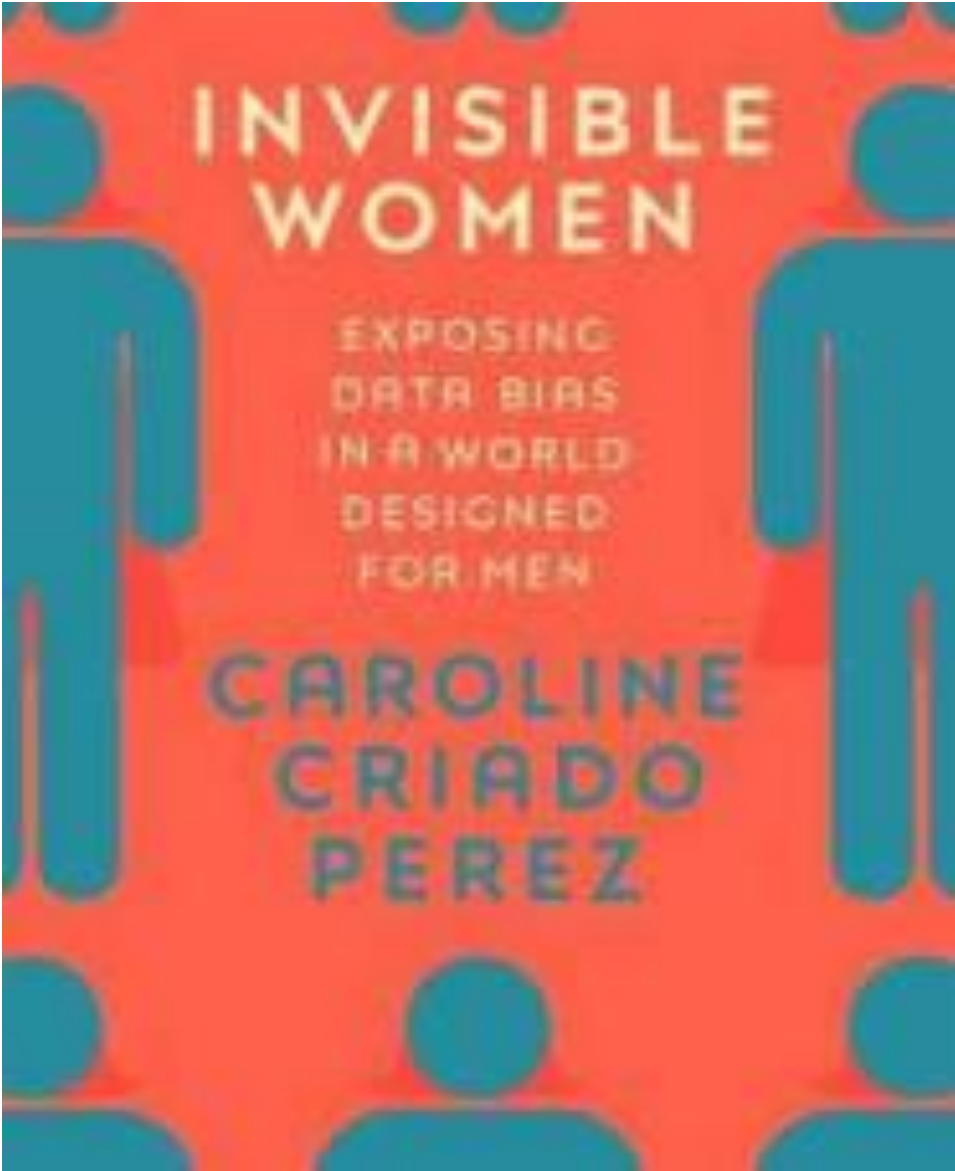


Ongelijke beschikbaarheid van AI:

- Veronachtzaming en toename van de digitale kloof
- Stijgende ongelijkheid in toegang tot gezondheidszorg
- Misbruik en discriminatie in niet-medische toepassingen (verzekering, werving en selectie)

Bias in ontwerp van AI-systemen:

- Ongelijkheid door keuze van problemen die met AI aangepakt worden
- Bias in ontwerpkeuzes en evaluatie
- Ongelijkheid in beveiliging en monitoring van systemen



INVISIBLE WOMEN

EXPOSING
DATA BIAS
IN A WORLD
DESIGNED
FOR MEN

CAROLINE
CRIADO
PEREZ

RESEARCH ARTICLE

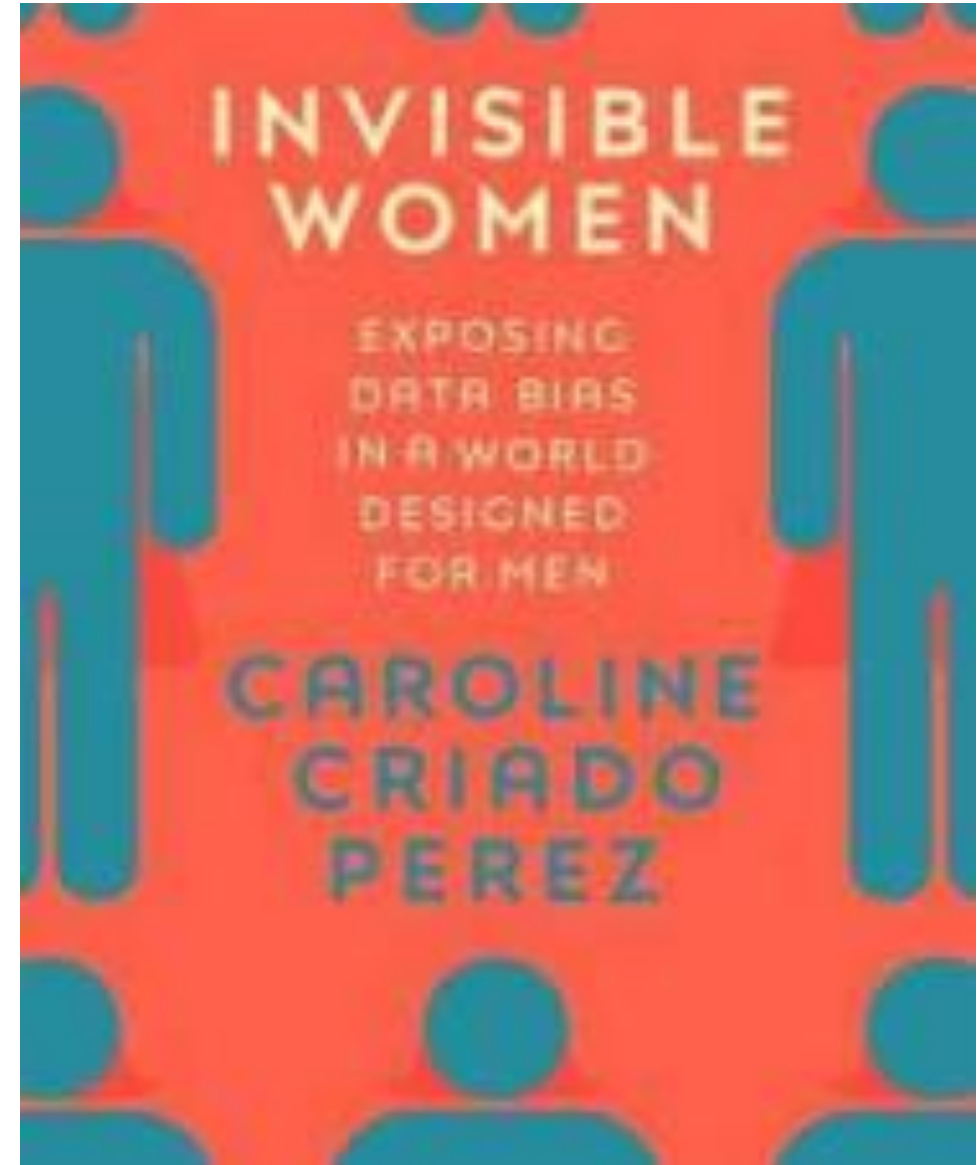
ECONOMICS

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

Ziad Obermeyer^{1,2*}, Brian Powers³, Christine Vogeli⁴, Sendhil Mullainathan^{5*†}

Health systems rely on commercial prediction algorithms to identify and help patients with complex health needs. We show that a widely used algorithm, typical of this industry-wide approach and affecting millions of patients, exhibits significant racial bias: At a given risk score, Black patients are considerably sicker than White patients, as evidenced by signs of uncontrolled illnesses. Remedying this disparity would increase the percentage of Black patients receiving additional help from 17.7 to 46.5%. The bias arises because the algorithm predicts health care costs rather than illness, but unequal access to care means that we spend less money caring for Black patients than for White patients. Thus, despite health care cost appearing to be an effective proxy for health by some measures of predictive accuracy, large racial biases arise. We suggest that the choice of convenient, seemingly effective proxies for ground truth can be an important source of algorithmic bias in many contexts.

metadata



The Alignment Problem from a Deep Learning Perspective

Richard Ngo
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Sören Mindermann
University of Oxford (CS)
soren.mindermann@cs.ox.ac.uk

Abstract

=> Alignment= Hoe kunnen we zeker zijn dat AGI dezelfde doelen zal hebben dan wat de menselijke gebruiker voor ogen heeft?

The Alignment Problem from a Deep Learning Perspective

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Abstract

=> Alignment= Hoe kunnen we zeker zijn dat AGI dezelfde doelen zal hebben dan wat de menselijke gebruiker voor ogen heeft?

Current LLMs =>

- + Pretrained self supervised learning**
- + fine tuned by reinforcement learning from Human Feedback**

Operational Efficiency Can Bring



zal hebben

=> Alignment= I
dan wat de mer

Current

We learn

- MAX

Benefits, Limits, and Risks of GPT-4 as an AI Chatbot for Medicine

Peter Lee, Ph.D., Sebastien Bubeck, Ph.D., and Joseph Petro, M.S., M.Eng.

MEDICAL NOTE TAKING

To decrease “err

the software would produce the note. GPT-4 can produce notes in several well-known formats, such as SOAP (subjective, objective, assessment, and plan), and can include appropriate billing

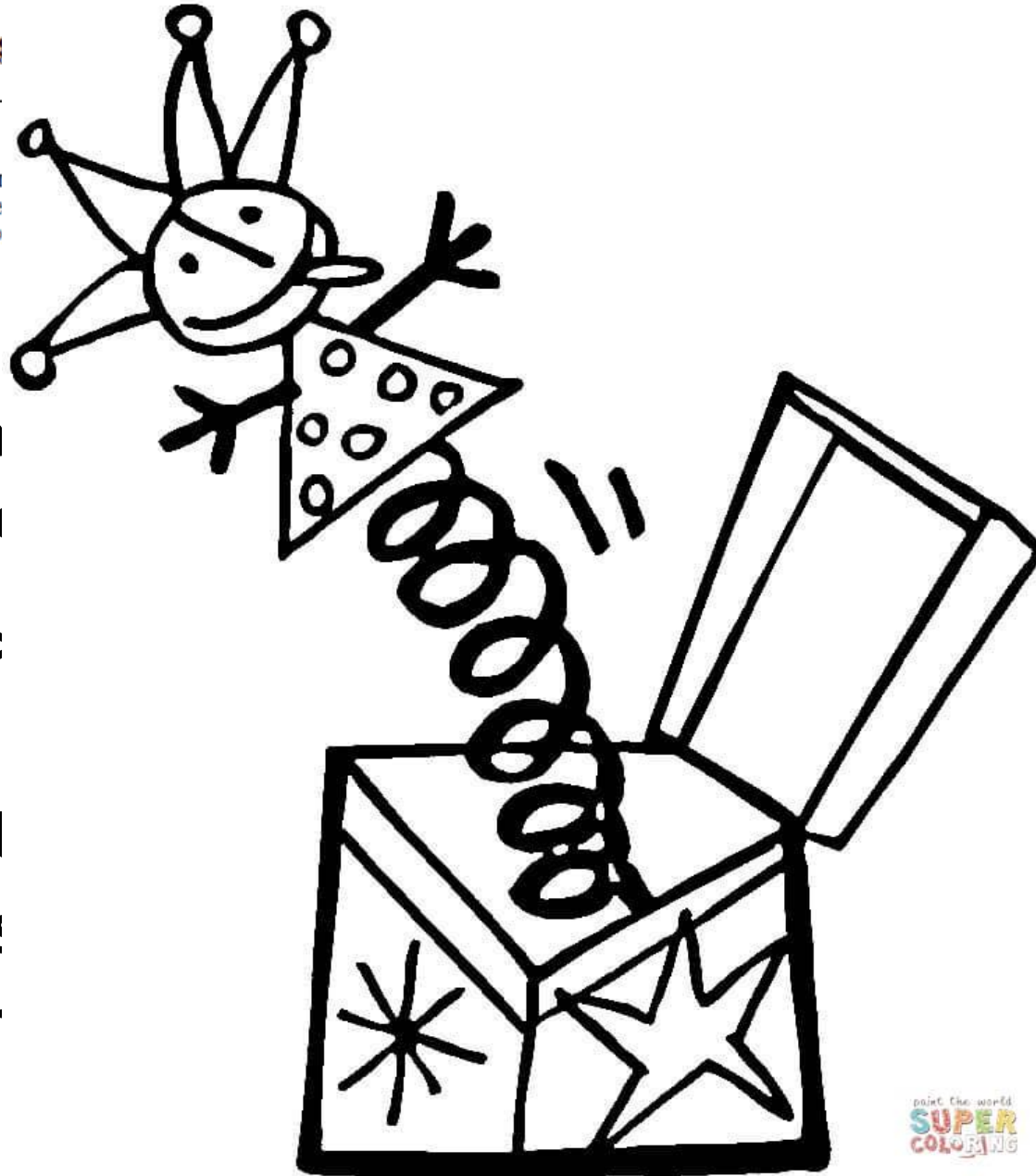
To increase efficiency?

codes automatically. Beyond the note, GPT-4 can

- so physicians can spend more time with the patient rather than doing administration?
- So physicians can see more patients in the same time?

The Ali

Richard
Ope
richard@o



=> Alignment= Hoe kunn
dan wat de menselijke g

elen zal hebben

Current LLMs =>

We learn LLMs t

- MAXIMIZE us
- Appear Harm

??)

Remote digital monitoring of medication intake: methodological, medical, ethical and legal reflections

Wim Van Biesen, Johan Decruyenaere, Katerina Sideri, Julian Cockbain & Sigrid Sterckx

To cite this article: Wim Van Biesen, Johan Decruyenaere, Katerina Sideri, Julian Cockbain & Sigrid Sterckx (2019): Remote digital monitoring of medication intake: methodological, medical, ethical and legal reflections, Acta Clinica Belgica, DOI: [10.1080/17843286.2019.1708152](https://doi.org/10.1080/17843286.2019.1708152)

To link to this article: <https://doi.org/10.1080/17843286.2019.1708152>

INSURANCE
SOLIDARITY

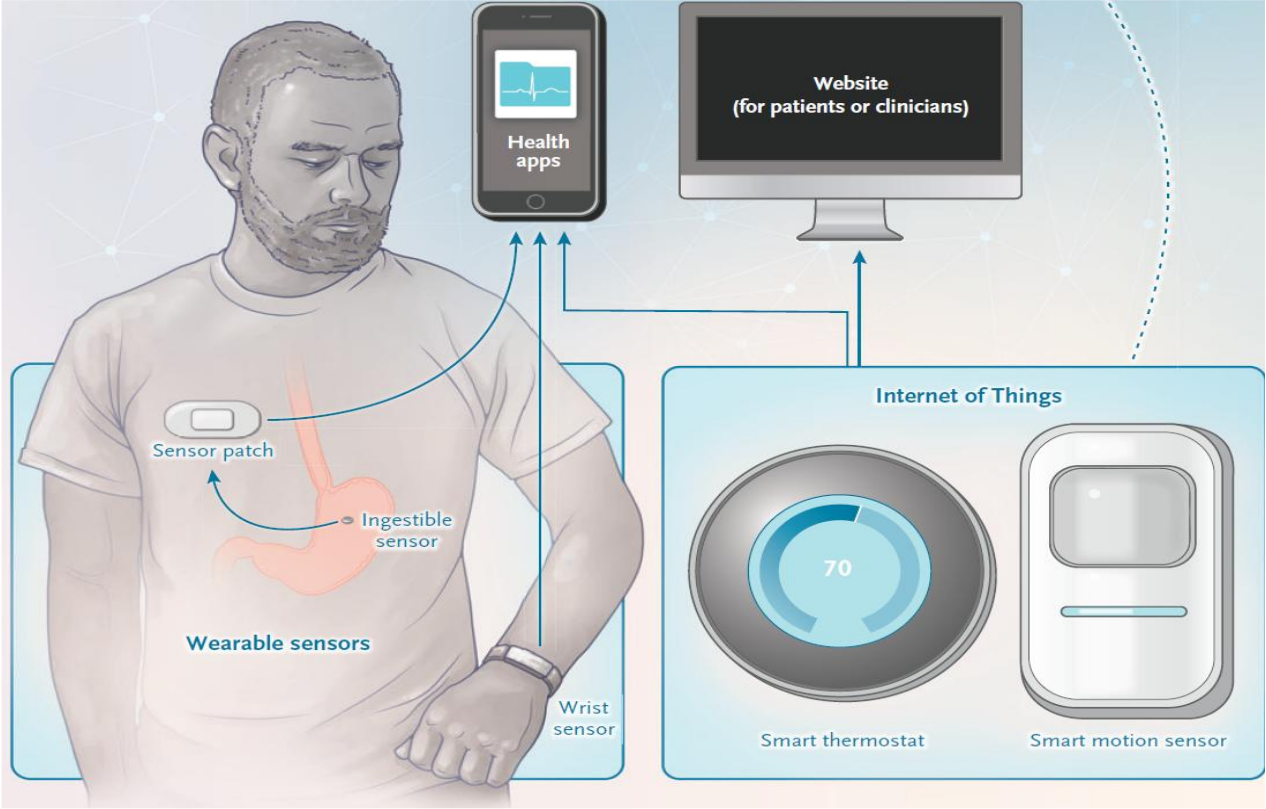
The NEW ENGLAND JOURNAL of MEDICINE

REVIEW ARTICLE

FRONTIERS IN MEDICINE

Mobile Devices and Health

Ida Sim, M.D., Ph.D.



Predictie en theoretische modellen: De beloften en beperkingen van big data

Reduction

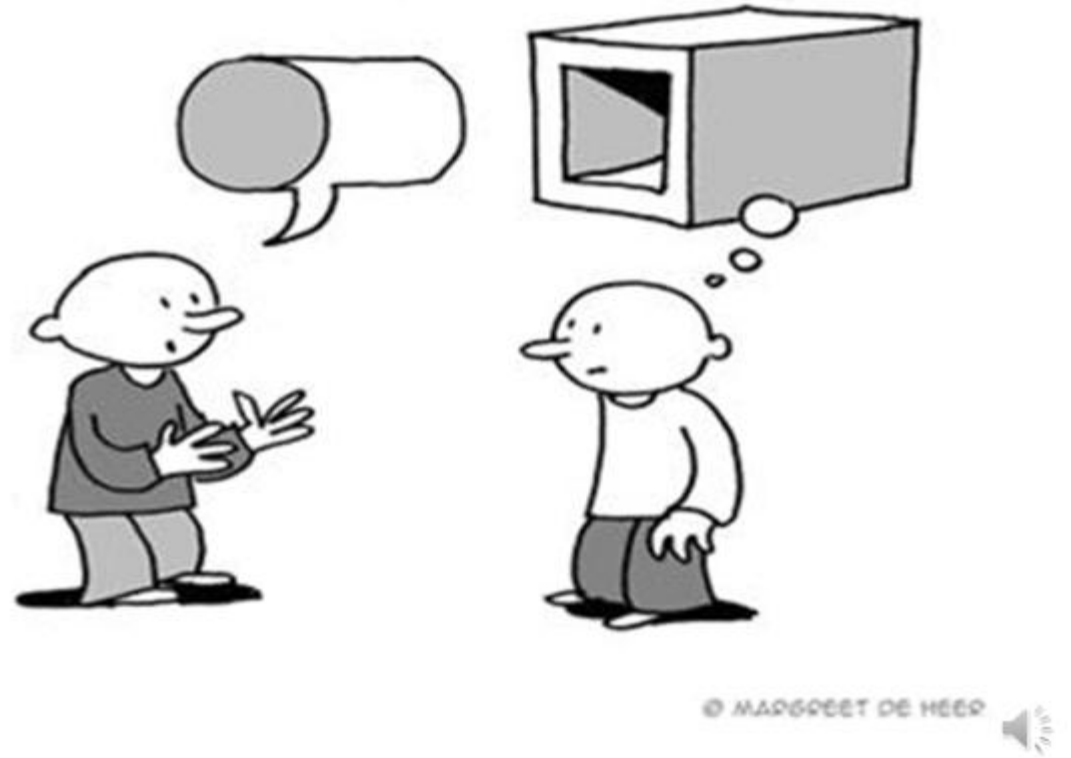
Wim Van Biesen

“Volwassenen houden van cijfers. Wanneer je hen vertelt dat je een nieuwe vriend hebt, stellen ze nooit vragen over echt belangrijke dingen. Ze vragen nooit: hoe klinkt zijn stem? Van welke spelletjes houdt hij het meest? Houdt hij van vlinders? In plaats daarvan willen ze weten hoe oud hij is, hoeveel hij weegt, hoeveel broertjes hij heeft en hoeveel zijn vader verdient. Op basis van die cijfers denken ze iets te weten over jouw vriend.”
(De Kleine Prins, Antoine de Saint-Exupéry)

“De patiënte is bang, haar mama is overleden aan kanker toen ze nog jong was, ze kan haar medicatie niet betalen, en ze heeft een tienerkind dat worstelt met autisme.

Kan er mij iemand zeggen hoe ik dit verhaal ingevoerd kan krijgen in het EPD door zoals een robot velden aan te klikken?”

(Robert Wachter, How Artificial Intelligence Could Transform Health Care)



Reductie

We gebruiken enkel wat meetbaar (digitaliseerbaar) is

Enkel wat meetbaar is, is relevant

Wat niet meetbaar is, is niet (meer) relevant

The art of medicine

Vulnerability and ethics: considering our Cartesian hangover

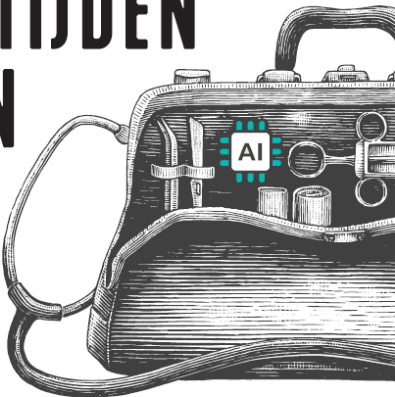
Geneesmiddelenontwikkeling en AI: Rollen de moleculen nu gewoon uit de computer?

Evelien Wynendaele, Hannah Hirmz en Bart De Spiegeleer

“Life could not exist without proteins. That we can now [with the help of an AI model] predict protein structures and design our own proteins confers the greatest benefit to human kind”
(Nobelprijsc comité over de Nobelprijs Chemie 2024)

SIGRID STERCKX EN WIM VAN BIESEN (RED.)

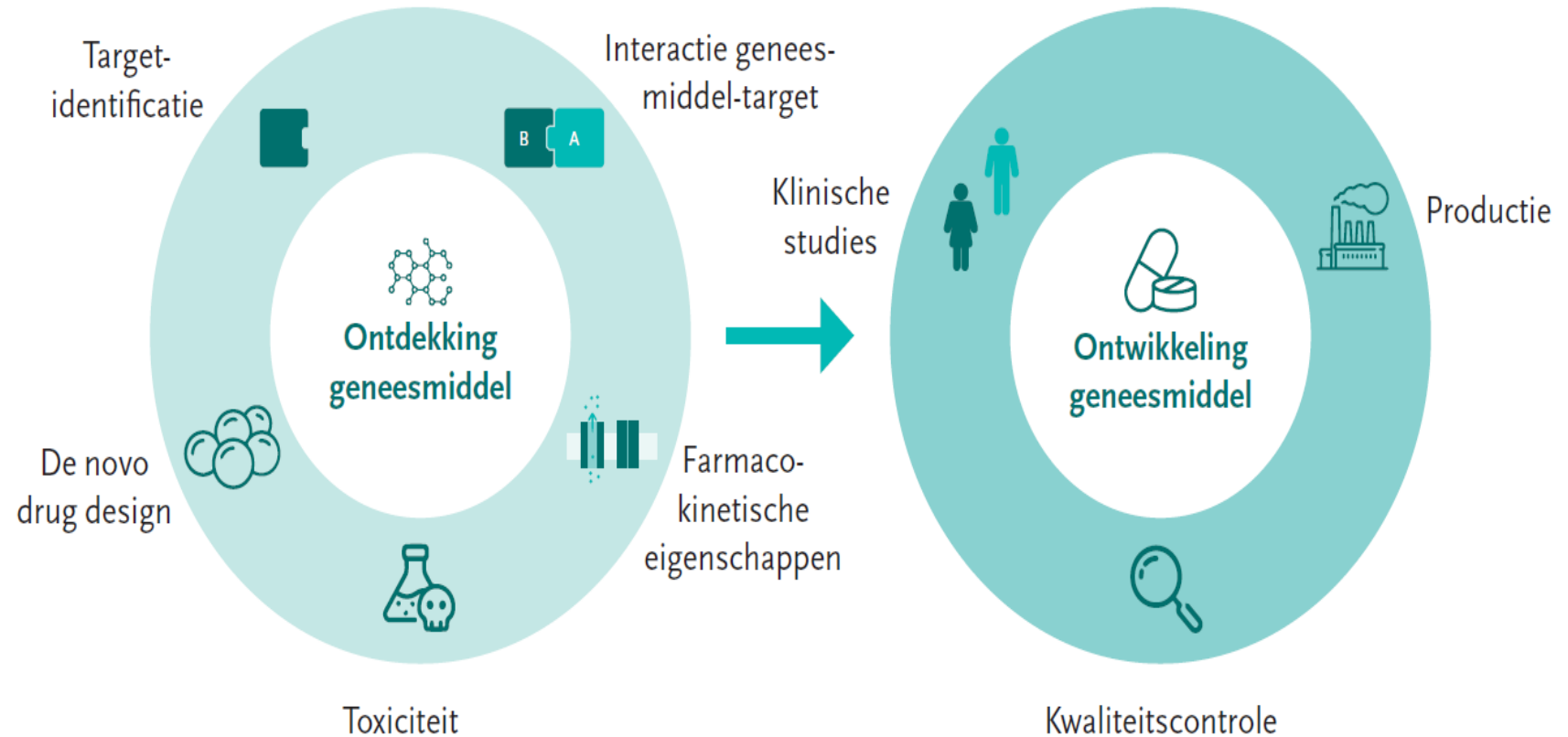
GENEESKUNDE IN TIJDEN VAN AI



Handvatten voor vandaag en morgen

ACADEMIA
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distraction

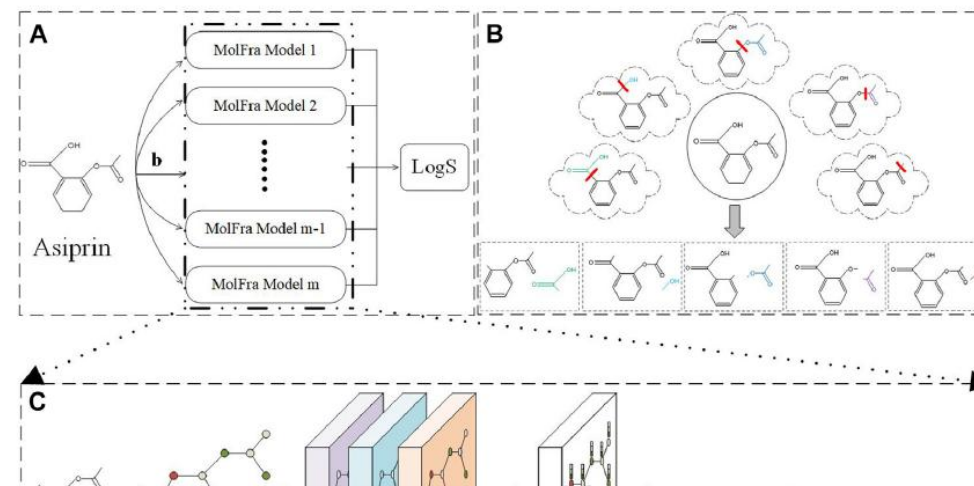


Figuur 6.1: Toepassingen van AI in het volledige ontwikkelingsproces van het geneesmiddel (Bron: auteurs)

Fragment-pair based drug molecule solubility prediction through attention mechanism

Jianping Liu¹, Xiujuan Lei^{1*}, Chunyan Ji² and Yi

¹School of Computer Science, Shaanxi Normal University, Xi'an, China, ²Comp BNU-HKBU United International College, Zhuhai, China, ³Faculty of Comput Engineering, Shenzhen Institute of Advanced Technology, Chinese Academy China, ⁴Shenzhen Key Laboratory of Intelligent Bioinformatics, Shenzhen Ins Technology, Shenzhen, China



Review

Deep learning tools to accelerate antibiotic discovery

Angela Cesaro, Mojtaba Bagheri, Marcelo Torres, Fangping Wan & Cesar de la Fuente-Nunez 

Pages 1245-1257 | Received 19 May 2023, Accepted 18 Aug 2023, Published online: 18 Oct 2023

 Cite this article  <https://doi.org/10.1080/17460441.2023.2250721>

 Check for updates

Precision medicine and the fragmentation of solidarity (and justice)

Leonard M. Fleck¹ 

Accepted: 4 January 2022 / Published online: 10 January 2022

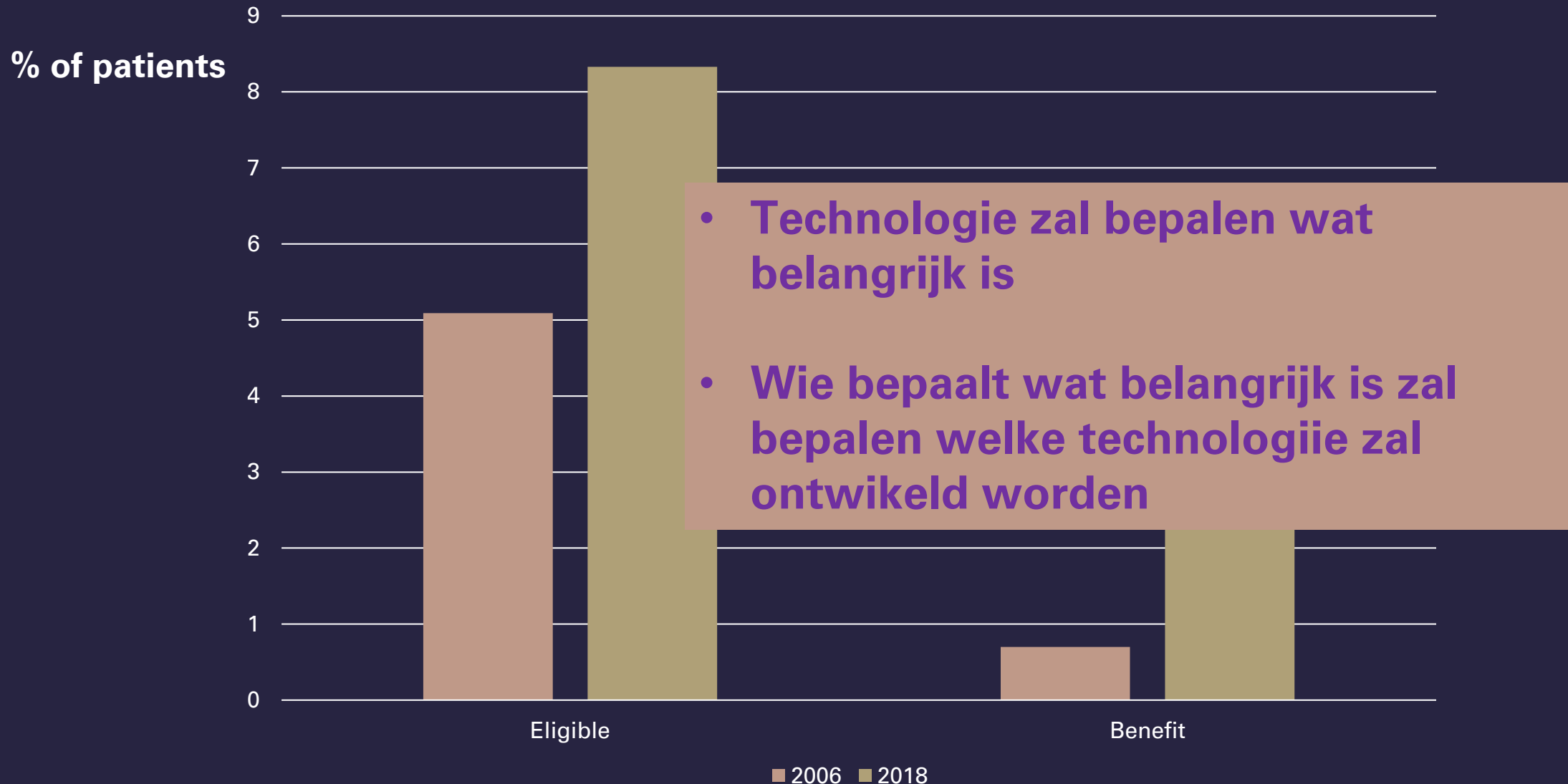
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Abstract

Solidarity is a fundamental social value in many European countries, though its precise practical and theoretical meaning is disputed. In a health care context, I agree with European writers who take solidarity normatively to mean roughly equal access to effective health care for all. That is, solidarity includes a sense of justice. Given that, I will argue that precision medicine represents a potential weakening of solidarity, albeit not a unique weakening. Precision medicine includes 150 targeted cancer therapies (mostly for metastatic cancer), all of which are extraordinarily expensive. Our critical question: Must a commitment to solidarity as defined mean that all these targeted cancer therapies should be guaranteed to all within each country in the European Union, no matter the cost, no matter the degree of effectiveness? Such a commitment would imply that cancer was ethically special, rightfully commandeering unlimited resources. That in itself would undermine solidarity. I offer multiple examples of how current and future dissemination of these targeted cancer drugs threaten a commitment to solidarity. An alternative is to fund more cancer prevention efforts. However, that too proves a threat to solidarity. Solidarity, with or without a sense of justice, is too abstract a notion to address these challenges. Further, we need to accept that we can only hope to achieve “rough justice” and “supple solidarity.” The precise practical meaning of these notions needs to be worked out through a fair and inclusive process of rational democratic deliberation, which is the real and practical foundation of just solidarity.

JAMA Oncol. 2018 Aug; 4(8): 1093–1098.

Estimation of the Percentage of US Patients With Cancer Who Benefit From Genome-Driven Oncology



Which conditions need to be treated?

Which conditions need to be treated?

DISEASES of course you stupid!

Conceptualisation of the world

Manipulating symbols:

***\$*£%; %\$*£M; *\$*\$*\$£M**

Conceptualisation of the world

Manipulating symbols:

$2+2=4$; $4+2=6$; $2+2+2=6$

$*\$*\pounds\%$; $\%\$*\pounds M$; $*\$*\$*\pounds M$

Creating “meaning”

AI's Threat to the Medical Profession

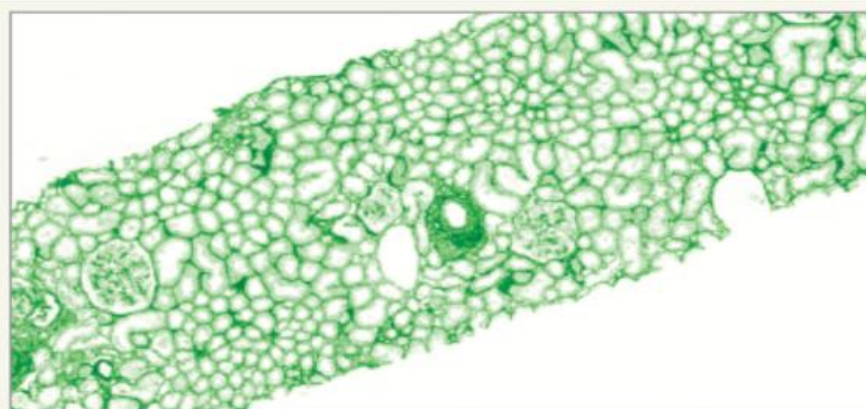
Agnes B. Fogo, MD

Department of
Pathology,
Microbiology and
Immunology,
Vanderbilt University
Medical Center,
Nashville, Tennessee.

The Authors Guild and 17 authors recently filed a suit against OpenAI for copyright infringement of their works of fiction on behalf of writers whose works were used to train GPT. The complaint states that "Defendants then fed Plaintiffs' copyrighted works into their...algorithms designed to output human-seeming text responses" and that "at the heart of these algorithms is systematic theft on a mass scale." How different is this situation from the

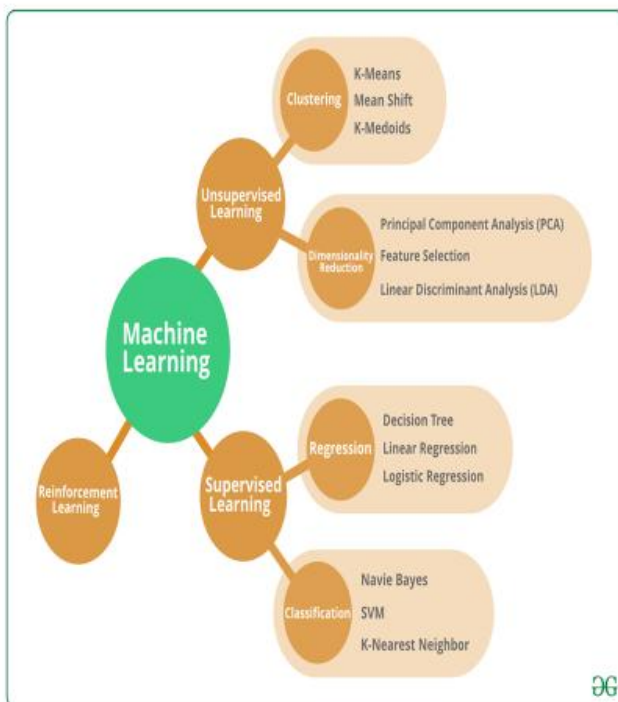
ments that

Figure. Whole Slide Image of Kidney Biopsy in Artificial Intelligence (AI) Staining Accompanied by AI-Generated Data



No. of glomeruli:	23
Global sclerosis:	4
Segmental sclerosis detected:	No
GBM changes detected:	No
Crescents detected:	No
Endocapillary hypercellularity:	2%
Podocyte density:	86.8 (below normal value)
Mesangial hypercellularity (maximum):	5
Adhesions:	No
Interstitial fibrosis:	17.4%
Tubular atrophy:	13.9%
Inflammation, area:	12.1%
Inflammatory cells detected:	Lymphocytes (82%) Granulocytes (1.2%) Plasma cells (3.5%) Undetermined (13.3%)
IF/IH:	Still in process
EM:	Still in process

The staining symbolizes a new, not currently used stain developed for AI purposes. EM indicates electron microscopy; GBM, glomerular basement membrane; and IF/IH, immunofluorescence/immunohistochemistry.



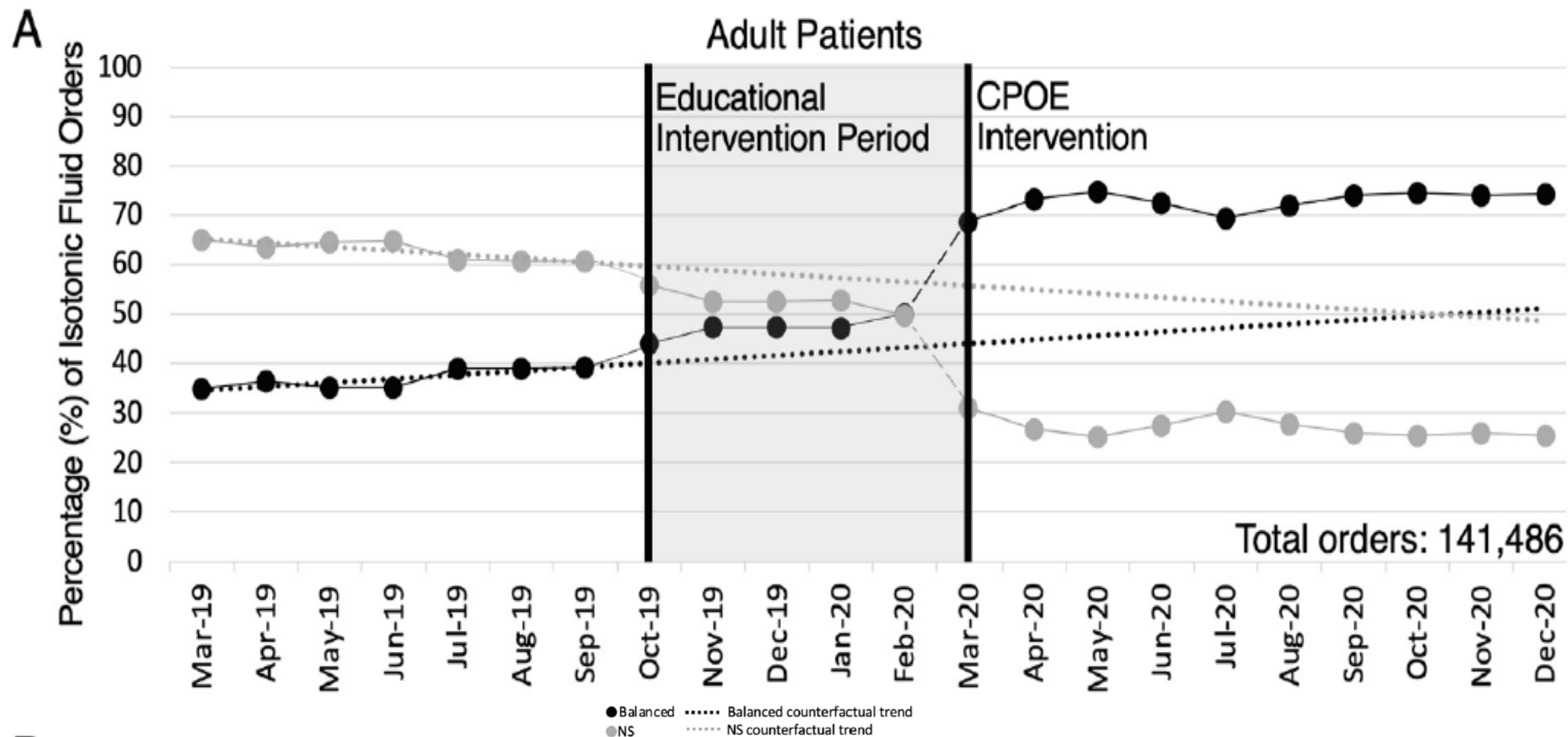
AUTOMATION BIAS

DESKILLING

MEANINGFUL HUMAN CONTROL

Development and implementation of a clinical decision support-based initiative to drive intravenous fluid prescribing

Michelle C. Spiegel^{a,*}, Annie N. Simpson^b, Achsah Philip^c, Carolyn M. Bell^d,
Nandita R. Nadig^a, Dee W. Ford^a, Andrew J. Goodwin^a

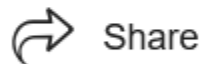


THE WALL STREET JOURNAL.

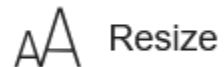
Pilot Reliance on Automation Erodes Skills

By Andy Pasztor

Nov. 5, 2010 3:48 am ET



Share

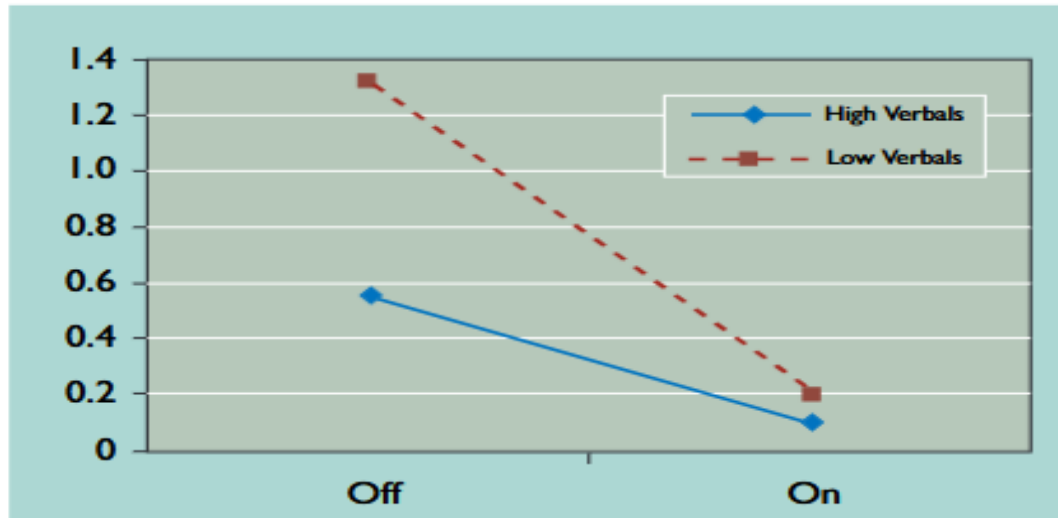


Resize

MILAN—Increasing reliance on cockpit automation appears to be significantly eroding the manual flying skills of many airline pilots, who are then "sometimes not prepared to deal with non-routine situations," according to the researcher behind a sweeping air-safety study released Thursday.

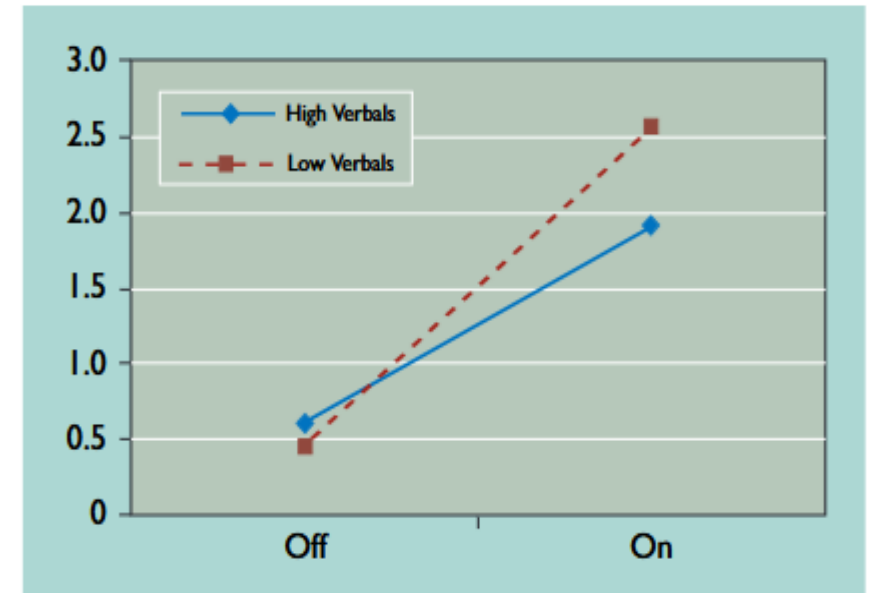
Does Spell-Checking Software Need a Warning Label?

Users—ironically, often those most verbally armed—put too much trust and little effort in questioning spell- and grammar-checking programs.



Research in computer credibility has examined how credibility is gained, lost, and regained [5, 8]; how the context in which the

Figure 1.
Uncorrected errors
when flagged
correctly.

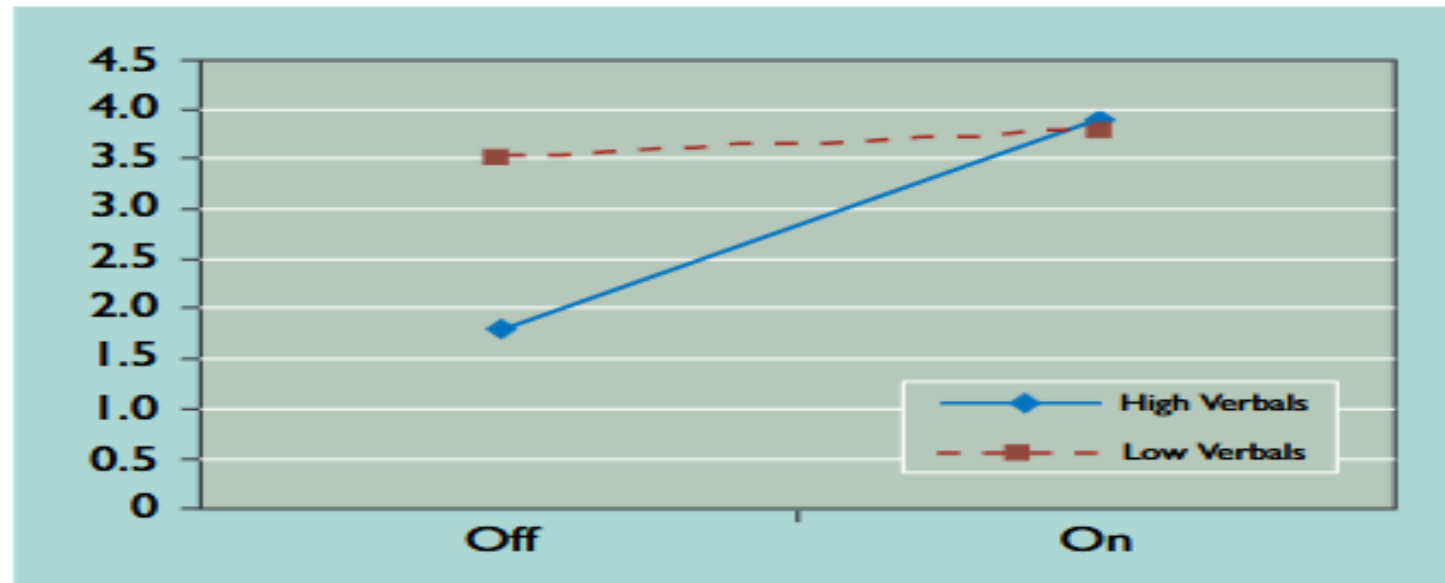


result, 32 subjects were categorized as low verbals and 33 were

Figure 2. Uncorrected
false positives.

Does Spell-Checking Software Need a Warning Label?

Users—ironically, often those most verbally armed—put too much trust and little effort in questioning spell- and grammar-checking programs.



degrade the performance of only low verbals because those individuals are more likely to be fooled by

Figure 3.
Uncorrected false
negatives.

How to Discriminate between Computer-Aided and Computer-Hindered Decisions: A Case Study in Mammography

Andrey A. Povyakalo, Eugenio Alberdi, Lorenzo Strigini,
Peter Ayton

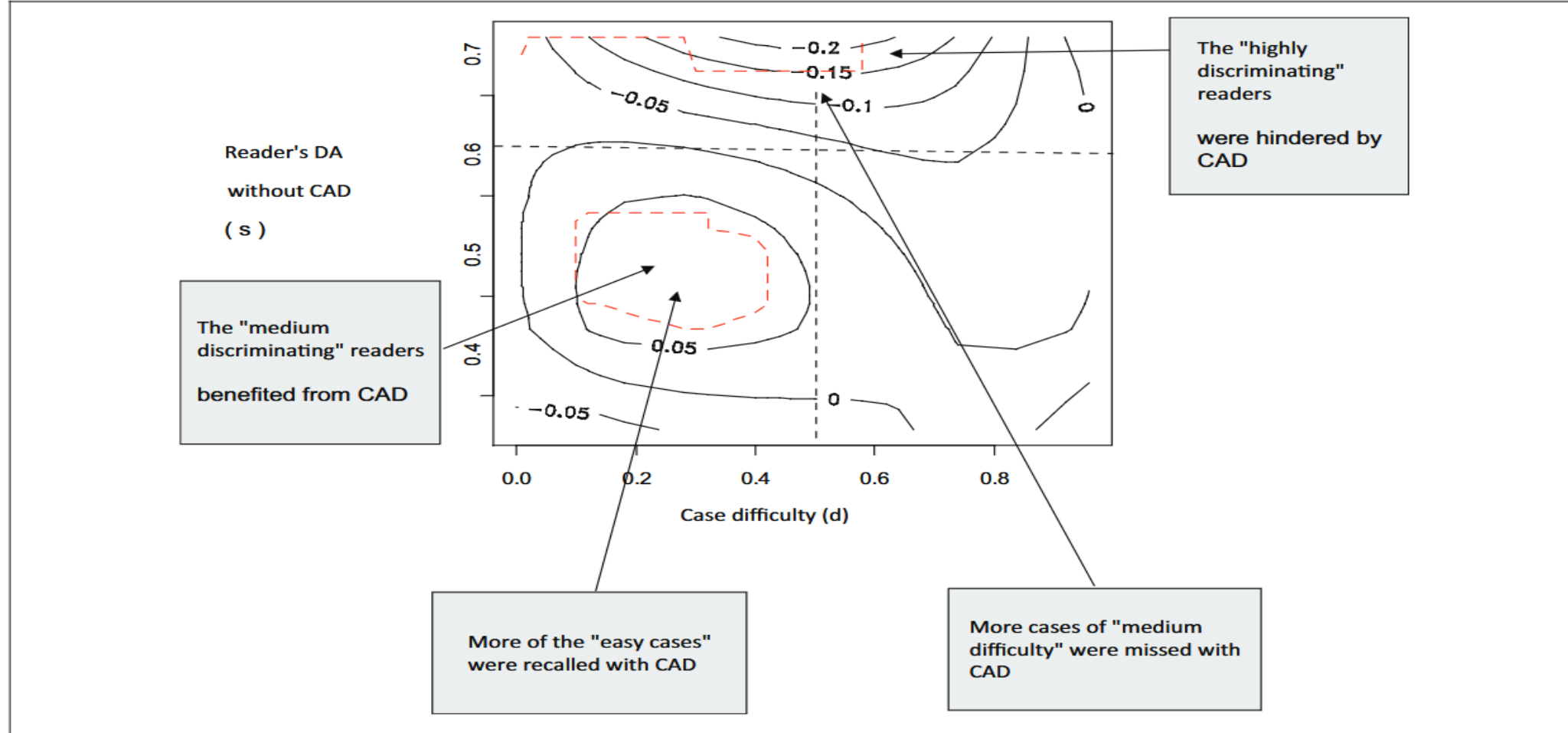


Figure 4 Contour plot of estimated impact of computer-aided detection (CAD) $\text{imp}(d, s)$ for all cancers. Here and in the following figures, we consider the impact significant if the 95% pointwise confidence intervals for $p_{\text{un}}(d_i, s_j)$ and $p_{\text{pr}}(d_i, s_j)$ do not overlap; statistically significant values of impact are outlined with the dashed curve. Values for the points with extreme impact are given in Table 2. DA, discriminating ability.

Endoscopist deskilling risk after exposure to artificial intelligence in colonoscopy: a multicentre, observational study



Krzysztof Budzyń, Marcin Romańczyk, Diana Kitala, Paweł Kołodziej, Marek Bugajski, Hans O Adami, Johannes Blom, Marek Buszkiewicz, Natalie Halvorsen, Cesare Hassan, Tomasz Romańczyk, Øyvind Holme, Krzysztof Jarus, Shona Fielding, Melina Kunar, Maria Pellise, Nastazja Pilonis, Michał Filip Kamiński, Mette Kalager, Michael Bretthauer, Yuichi Mori

Summary

Background It is not known if continuous exposure to artificial intelligence (AI) changes endoscopists' behaviour when conducting colonoscopy. We assessed how endoscopists who regularly used AI performed colonoscopy when

Lancet Gastroenterol Hepatol
2025

Endoscopist deskilling: an unintended consequence of AI-assisted colonoscopy?



Computer-aided polyp detection (CADE) in colonoscopy represents one of the most extensively evaluated uses of AI in medicine, demonstrating clinical efficacy in multiple randomised controlled trials (RCTs). A recently published meta-analysis of 44 RCTs suggested an absolute increase of 8% in the adenoma detection rate (ADR) with CADE-assisted colonoscopy.¹ However, professional

There are of course limitations to the current study that the authors acknowledge. These include the observational study design, absence of procedural metrics such as withdrawal time, small per-operator sample sizes limiting endoscopist-level analyses, use of only experienced endoscopists, and evaluation of just one AI manufacturer's device. Nevertheless,

Lancet Gastroenterol Hepatol
2025

Published Online
August 12, 2025
[https://doi.org/10.1016/S2468-1253\(25\)00164-5](https://doi.org/10.1016/S2468-1253(25)00164-5)
See Online/Articles
[https://doi.org/10.1016/S2468-1253\(25\)00133-5](https://doi.org/10.1016/S2468-1253(25)00133-5)

Taylorism

(scientific management)

Standardisation (reduction of variability)

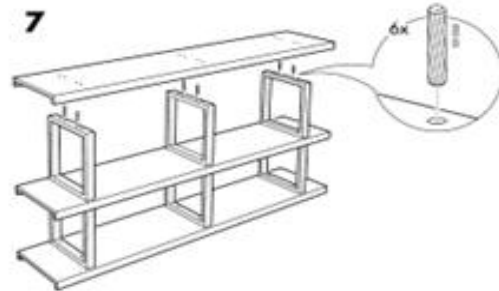
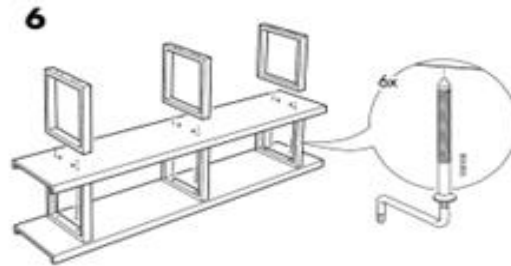
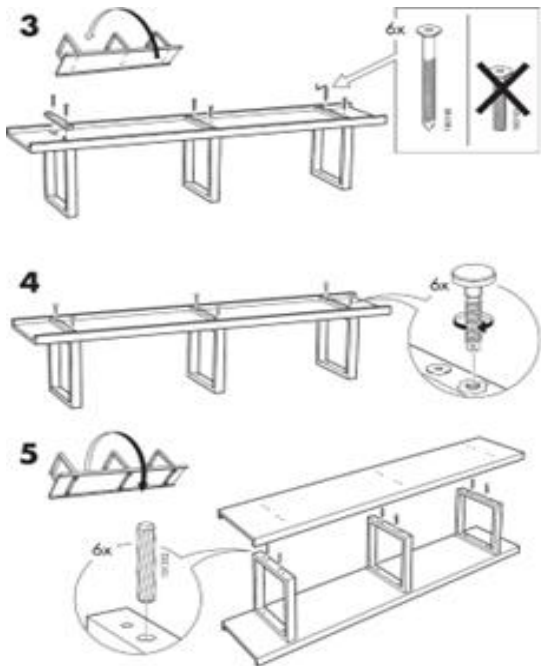
“one best way” to do things

Strict separation between “thinkers” and “do-ers”

Taylorism

(scientific management)

CONTROL



Taylorism

(scientific management)

“advantages”

- **Increase productivity**
- **Increase and standardize quality**
- **Increase profit**
- **No need for experts => exchangeability**

“disadvantages”

- **Deskilling**
- **Reduce variability and flexibility**
- **Decrease meaning of work**

HOOFDSTUK 12.

AI als transformator van geneeskunde: Een pleidooi voor gezamenlijke betrokkenheid

Wim Van Biesen en Sigrid Sterckx

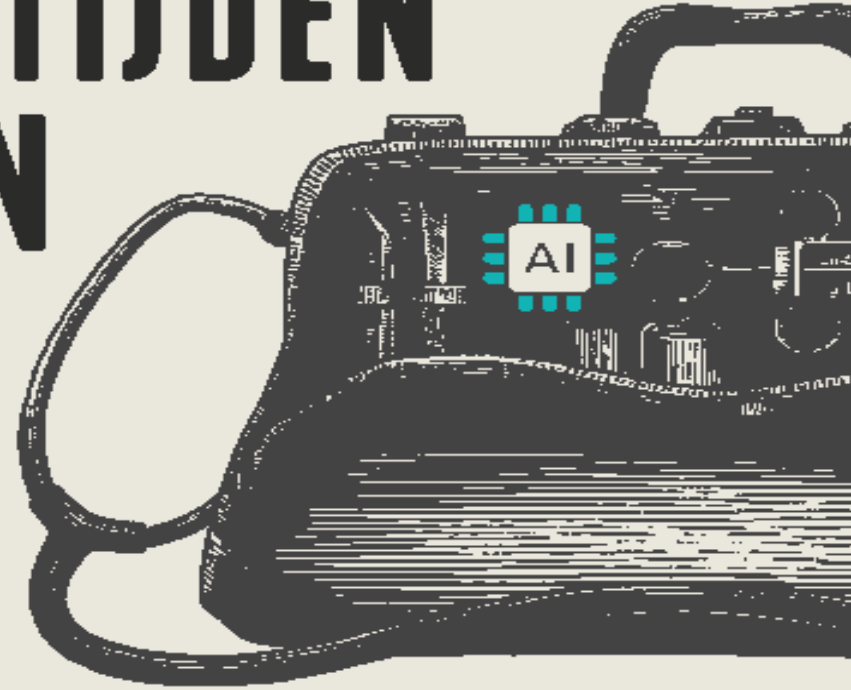
*“And it dawned on me that I might have to change my inner
thought patterns... that I would have to start believing in
possibilities that I wouldn't have allowed before ...”*

(Bob Dylan)



SIGRID STERCKX EN WIM VAN BIESEN (RED.)

GENEESKUNDE IN TIJDEN VAN AI



Handvatten voor vandaag en morgen

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