# Gender bias and military applications of AI:
# An academic perspective

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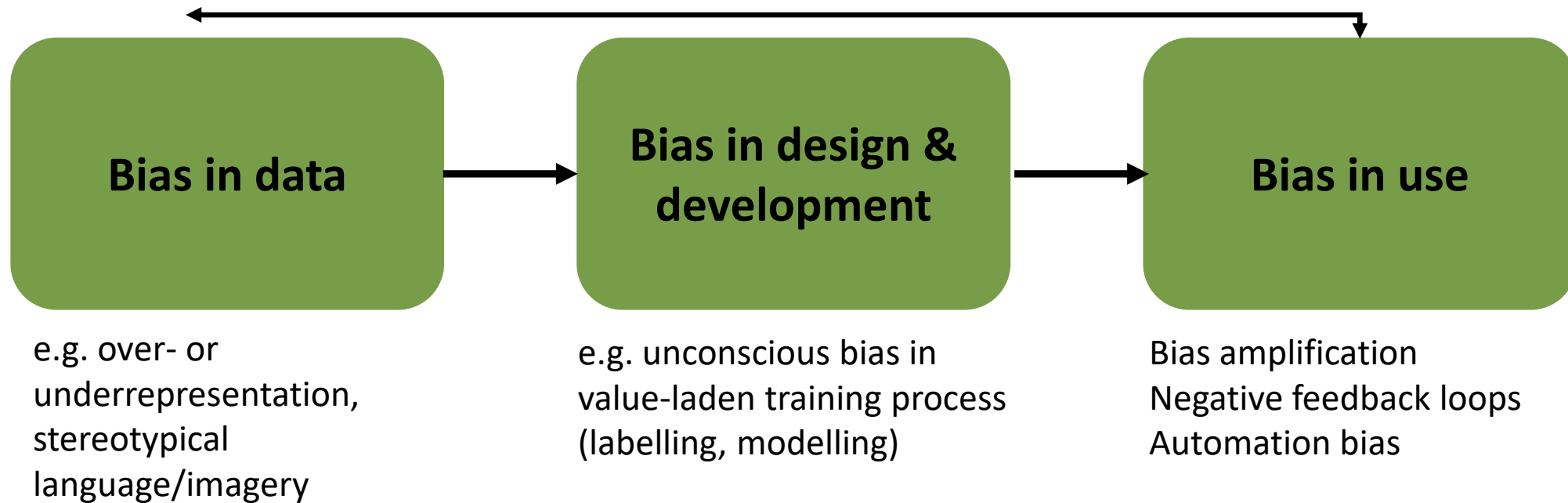bode@sam.sdu.dk

# Introduction

- **Algorithmic bias**: "The application of an algorithm that compounds existing inequities in socioeconomic status, race, ethnic background, religion, gender, disability" (Igoe 2021).

- "Although evidence of bias in civilian applications of AI is easy to find, **less research exists on how military applications of AI may draw on and reproduce inequalities**" (Chandler 2021).
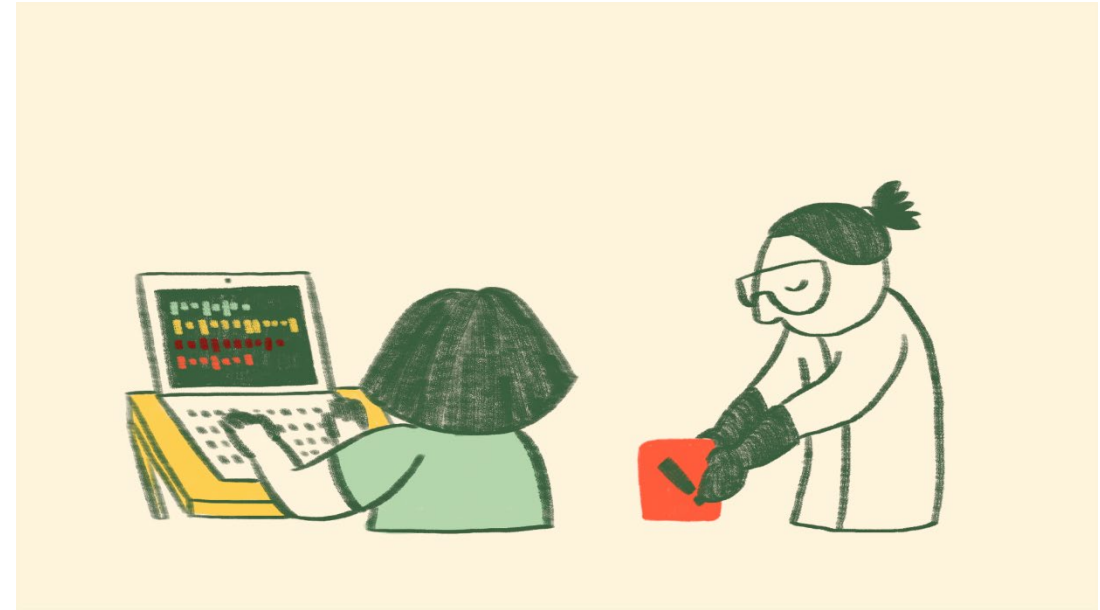
Yasmin Dwiputri & Data Hazards Project / Better Images of AI / Safety Precautions / CC-BY 4.0

Dr Ingvild Bode                    marts 2024

# Bias in AI technologies

Bias can occur throughout the entire lifecycle of algorithmic models from data collection, to training, evaluation, use, and archiving/disposal

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**Bias in data**

**Bias in design & development**

**Bias in use**

e.g. over- or underrepresentation, stereotypical language/imagery

e.g. unconscious bias in value-laden training process (labelling, modelling)

Bias amplification
Negative feedback loops
Automation bias

**Encoding of bias**

Margaret Mitchell, "Bias in the Vision and Language of Artificial Intelligence. Power Point Presentation" 2022

# Academic literature on gender bias

**(1) Gender bias perpetuation:** how is gender bias amplified?

**(2) Gender bias mitigation:** how and by what methods can gender bias be mitigated?



| Gender Classifier | Darker Male | Darker Female | Lighter Male | Lighter Female | Largest Gap |
|---|---|---|---|---|---|
| Microsoft | 94.0% | 79.2% | 100% | 98.3% | 20.8% |
| FACE++ | 99.3% | 65.5% | 99.2% | 94.0% | 33.8% |
| IBM | 88.0% | 65.3% | 99.7% | 92.9% | 34.4% |

Bualoamwini & Gebru 2018: Gender shades

# Consequences of (gender) bias in military applications of AI

- Legal and moral harms
- Dysfunctionality
- Unpredictability

- Potential exacerbation of bias in datasets used for military applications
- Limited quantity and quality of data



Amritha R Warrier & AI4Media / Better Images of AI / error cannot generate / CC-BY 4.0

# Bias and AI Technologies as Social

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- AI technologies mirror our societies

- "Bias is inherent in society and thus it is inherent in AI is well" (O'Connor and Liu 2024)



Anne Fehres and Luke Conroy & AI4Media / Better Images of AI / Data is a Mirror of Us / CC-BY 4.0

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"Shift the narrative of AI as something 'external' or technologically deterministic,
**to something 'human' that is not happening to us but is created, directed, controlled by human beings and reflective of society"**

(UNESCO Recommendations on AI and gender equality 2020)

# Ways forward

- Mitigating gender and other forms of biases in AI technologies goes beyond technical solutions
- Whose interests are represented in the current design of AI technologies?
- Address bias embedded in (work) cultures and professions



FEMALE IT PROFESSIONALS
SEPTEMBER 2023

18.7%

As a percentage of the workforce

As a percentage of the workforce

301,900 Female IT Professionals

301,900 Female IT Professionals

wise

wise

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"The people who design and develop technology are unrepresentative of society, with tech firms employing few women, minorities, or those aged over 40" (Howcroft & Rubery 2019, 221)

# Conclusion

- Bias and harm mitigation part of many responsible AI principles
- **Simultaneous**: logic that military applications of AI can make conduct of war more rational, predictable – "better than human judgment"
- **But**: development of AI technologies deeply enmeshed in human judgement throughout the entire lifecycle
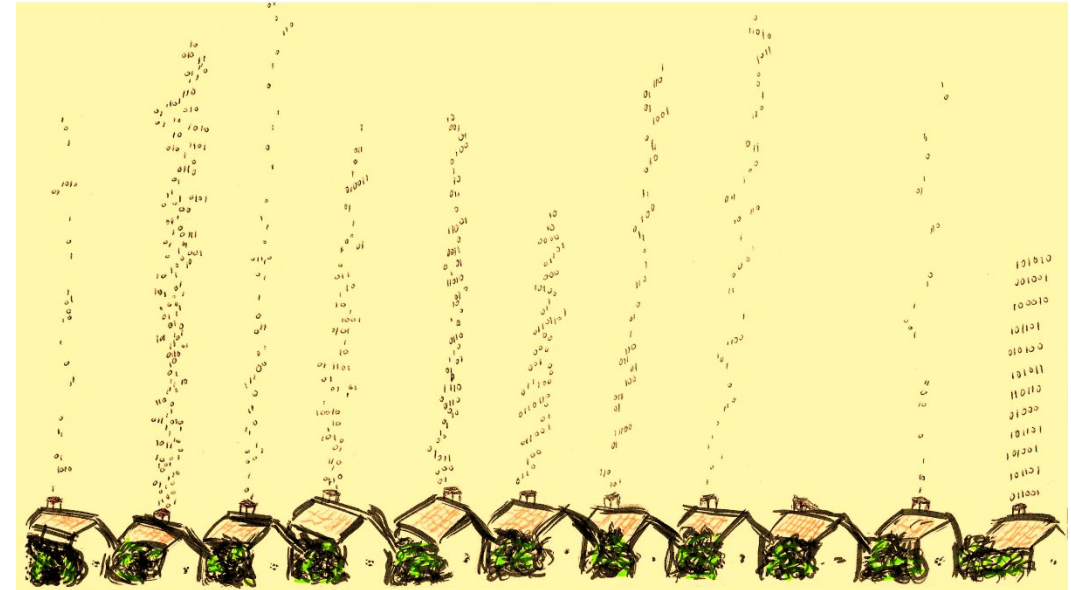


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# References

Katherine Chandler. 2021. "Does Military AI Have Gender? Understanding Bias and Promoting Ethical Approaches in Military Applications of AI" (Geneva: UNIDIR, 2021), https://unidir.org/sites/default/files/2021-12/UNIDIR_Does_Military_AI_Have_Gender.pdf

Sinead O'Connor and Helen Liu. 2024. "Gender bias perpetuation and mitigation in AI technologies: challenges and opportunities" AI & Society, online first: 10.1007/s00146-023-01675-4

Debra Howcroft and Jill Rubery. 2019. "Bias in, Bias Out: Gender Equality and the Future of Work Debate" Labour and Industry 29 (2), 213-227.

Katherine J. Igoe. 2021. "Algorithmic Bias in Health Care Exacerbates Social Inequities - How to Prevent It," Harvard T.H. Chan School of Public Health, March 12, 2021, https://www.hsph.harvard.edu/ecpe/how-to-prevent-algorithmic-bias-in-health-care/.

Margaret Mitchell. 2022. "Bias in the Vision and Language of Artificial Intelligence". Presentation. https://www.youtube.com/watch?v=QlTILYi-w1Y

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