

FROM DATA TO DIVERSITY

ADDRESSING AI BIAS AND LEVERAGING AI BUILD AN INCLUSIVE MINING INDUSTRY

Dr. Gargi Mishra (Pr. Sc. Nat.)

Advisory Council Member, WiMBIZ SA
Strategic Foresight & Innovation Advisor
Championing Ethical AI and Equitable Innovation



Digital Innovation Is Reshaping Mining

But Is Everyone Benefiting?

Tech Impact

- ✓ Predictive Maintenance
- ✓ Remote & Autonomous Operations
- ✓ AI-Assisted Safety Monitoring
- ✓ Smart Hiring Tools

Equity Challenge

- ⚠ Biased hiring algorithms
- ⚠ Safety systems not calibrated for diverse bodies
- ⚠ Data gaps in non-Western mining regions
- ⚠ Under-representation in design teams

Today's Agenda

- **Understanding AI Bias**
How machine learning mirrors systemic patterns in mining
- **Impact on Diversity & Decision Making**
The real cost of biased decisions on workforce inclusion
- **Mitigation Strategies**
Policy, transparency, and ethical design in AI systems
- **Emerging Tech for Inclusivity**
Harnessing AI for equitable hiring, L&D, and outreach
- **Building the Future**
Creating a thriving, inclusive mining industry through the Gender Equity Alliance (GEA) , a subcommittee of the SAIMM ESGS Committee



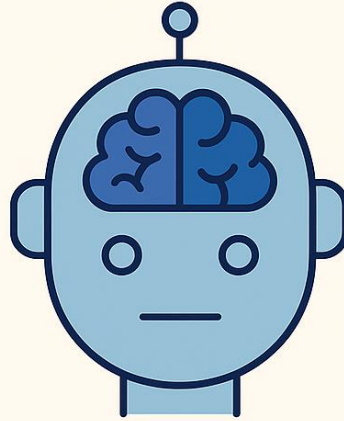
Understanding AI Bias

AI Bias

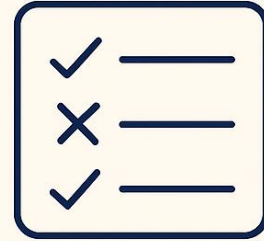
AI systems can be biased due to various factors



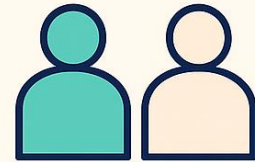
BIAS IN DATA



AI BIAS



BIAS IN ALGORITHM



BIAS IN TEAM

Where Bias Creeps into AI Systems



Data Bias

Arises from non-representative or imbalanced training datasets

Example: CV datasets mostly from male candidates exclude qualified women



Algorithm Bias

Occurs when model design favours certain patterns or optimisations

Example: Safety AI prioritises visual features optimised for male PPE shapes



Human Bias

Introduced by developers' assumptions, design choices, or historical norms

Example: Default assumptions about shift suitability by age/gender

Biases often overlap – effective mitigation requires a holistic approach.

Council calls for targeted efforts to advance gender equality in the AI-driven digital age

Press release >

Generative AI: UNESCO study reveals alarming evidence of regressive gender stereotypes

Ahead of the International Women's Day, a UNESCO study revealed worrying tendencies in Large Language models (LLM) to produce gender bias, as well as homophobia and racial stereotyping. Women were described as working in domestic roles far more often than men – four times as often by one model – and were frequently associated with words like “home”, “family” and “children”, while male names were linked to “business”, “executive”, “salary”, and “career”.

Apple's 'sexist' credit card investigated by US regulator

11 November 2019

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Insight - Amazon scraps secret AI recruiting tool that showed bias against women

"Every day more and more people are using Large Language Models in their work, their studies and at home. These new AI applications have the power to subtly shape the perceptions of millions of people, so even small gender biases in their content can significantly amplify inequalities in the real world. Our Organization calls on governments to develop and enforce clear regulatory frameworks, and on private companies to carry out continuous monitoring and evaluation for systemic biases, as set out in the UNESCO Recommendation on the Ethics of Intelligence artificial, adopted unanimously by our Member States in November 2021."



Audrey Azoulay
UNESCO Director-General

- In 2025, **LLMs** like GPT-2 used 43.4% **fewer female-specific words** than human-written content.
- **ChatGPT** used 24.5% fewer female-related words compared to human writing .



44% of AI systems show gender bias

A study by the Berkeley Haas Center reviewed 133 deployed AI systems across industries and found that **44% exhibited gender bias**, with **25% showing both gender and racial bias**.



AI diagnostic tools often less accurate for women

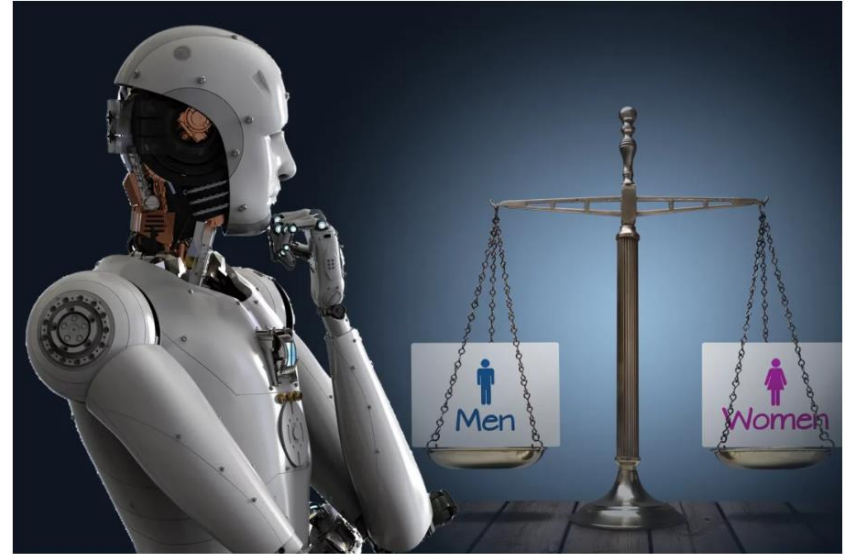
Bias isn't just theoretical—AI-based disease diagnoses have been shown to be considerably **less accurate for women**, potentially worsening health outcomes for female patients.



AI penalizes career breaks taken by women

Hiring algorithms routinely **penalise women** who took career breaks (for instance, to raise children), reinforcing systemic gender disparities.

Source : <https://womensmediacenter.com/fbomb/how-ai-perpetuates-gender-bias>



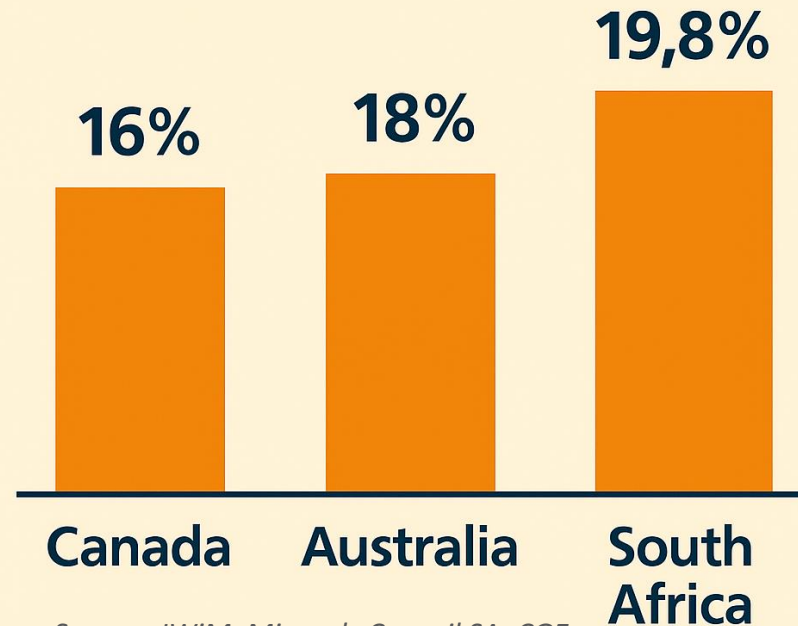
Women make up just **19.8%** of the South African mining workforce.

(CGE, Gender Transformation Report 2024)



Beijing+30: A landmark anniversary in the fight for gender equality

Women in the Mining Workforce



Source :IWIM, Minerals Council SA, CGE

AI + MINING = OPPORTUNITY & RISK

OPPORTUNITY



- Efficiency • Safety
- Decision-making

RISK



Bias can be
encoded into systems

AI risks automating
exclusion

Business Consequences of AI Bias

A 2024 DataRobot survey of over 350 companies revealed

- 62% **lost revenue** due to AI systems that made biased decisions
- 61% **lost customers**
- 43% **lost employees**
- 35% **paid legal fees** from lawsuits or regulatory action
- 6% **suffered public backlash** or brand damage

Source :<https://www.allaboutai.com/resources/ai-statistics/ai-bias/>

When Bias Becomes a Lawsuit: The Workday Example



Companies must move from blind trust in AI to responsible governance.

- **The Case** Derek Mobley vs Workday, over 100 rejected applications
- **The Issue** Alleged bias in resume-screening AI (race, age, disability)
- **Impact** Class-action status, EEOC involved, legal precedent
- **What It Teaches Us** Importance of AI audits, transparency, human oversight

Companies must move from blind trust in AI to responsible governance.

Impact of AI Bias on Diversity

Effect on Workforce Diversity

AI Bias and Stereotypes

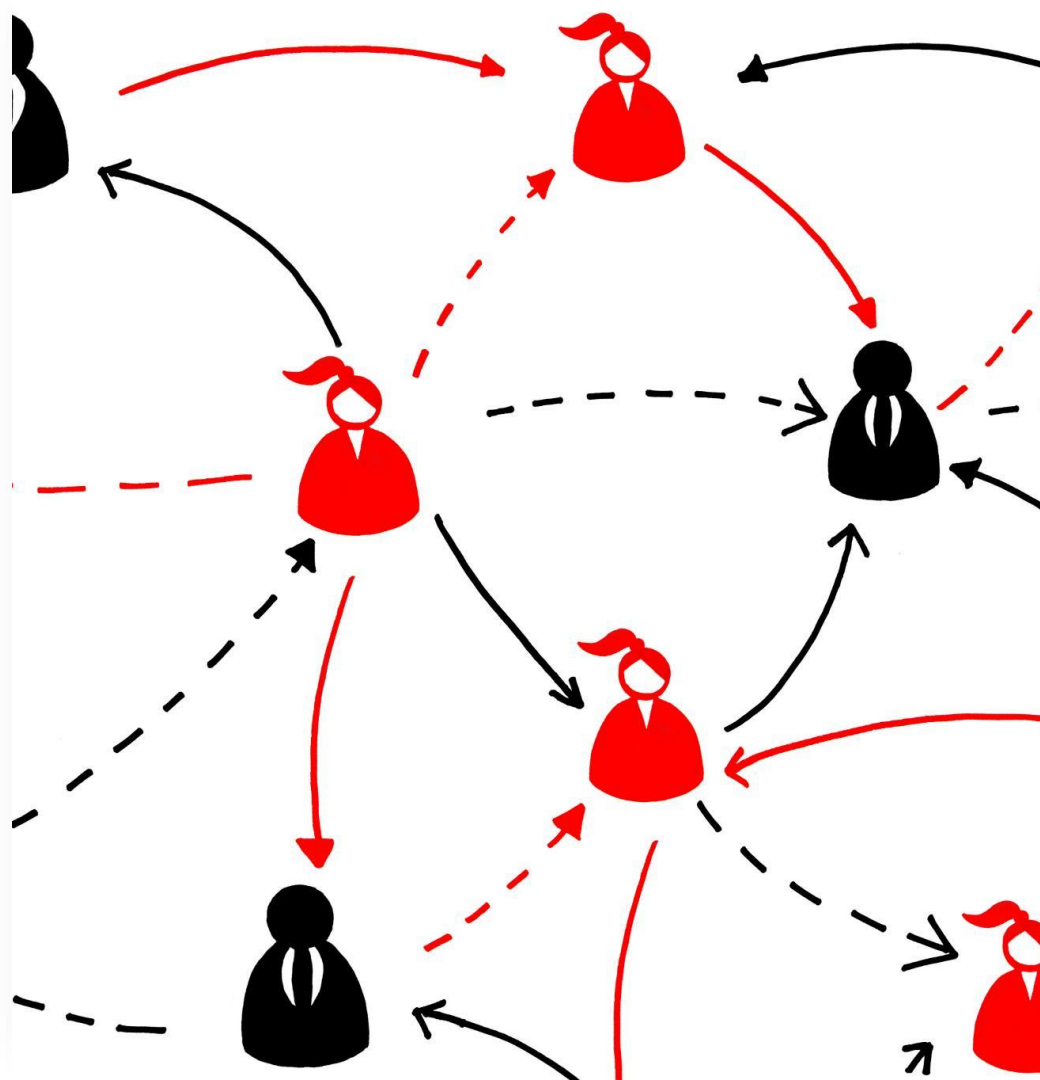
AI bias can perpetuate harmful stereotypes that affect hiring practices and workplace dynamics, limiting diversity.

Impact on Opportunities

AI bias can restrict opportunities for underrepresented groups, leading to fewer chances for advancement and representation.

Homogeneity in Teams

A lack of diversity caused by AI bias creates homogenous teams that miss out on varied perspectives, reducing innovation.



Consequences for Decision-Making Processes

Impact of Biased AI

Biased AI systems can distort decision-making, leading to negative outcomes in mining projects and operations.

Adverse Project Outcomes

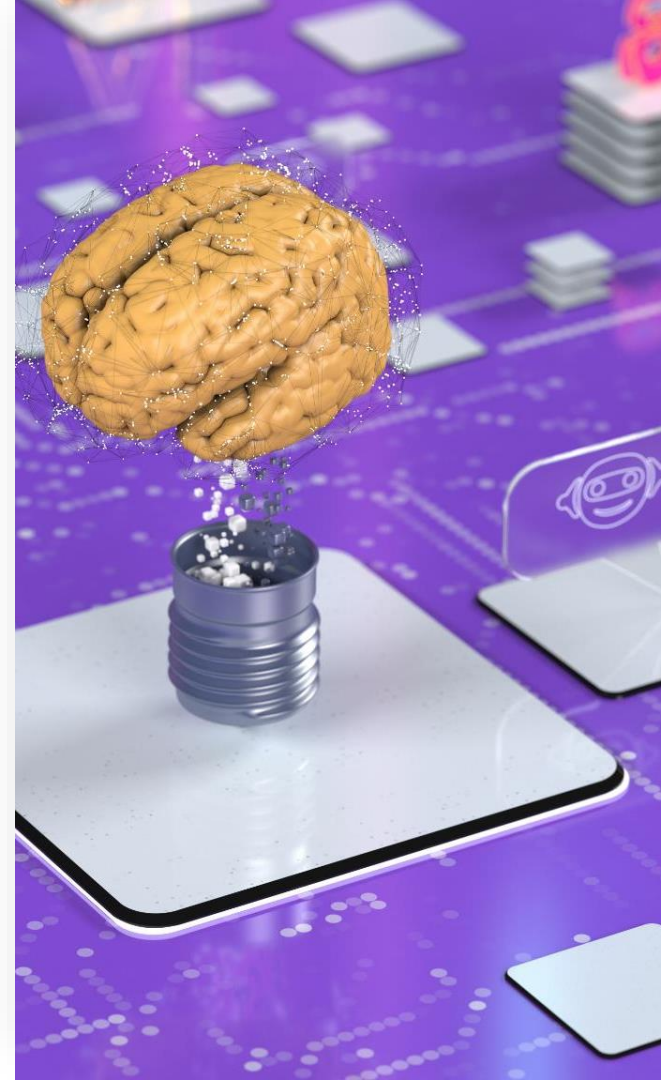
Flawed decisions due to biased AI can result in unsafe practices and unexpected project failures in the mining sector.

Safety Protocols and Risks

Inaccurate AI-driven insights can compromise safety protocols, increasing risks for workers in mining operations.

Community Relations

Poor decision-making influenced by biased AI can damage relationships with local communities, leading to distrust and conflicts.



Why Psychological Safety Is the Missing Link in Inclusive AI

- **Inclusion ≠ Diversity Alone**
You can have a diverse room, but without safety to speak up, there's no real inclusion.
- **Psychological Safety Enables Counterviews**
Diverse perspectives are only useful if they can challenge assumptions.
- **Tech Teams Need Brave Spaces**
Homogeneous teams avoid friction. Diverse, psychologically safe teams *invite* it—constructively.
- **Google's Project Aristotle**
Found that **psychological safety was the #1 predictor of team success**, even above intelligence or skill.



Strategies to Mitigate AI Bias

PRACTICAL STEPS FOR MITIGATING AI GENDER BIAS

Minimizing bias will be critical if artificial intelligence is to reach its potential and increase people's trust in the systems.

Six potential ways forward for artificial-intelligence (AI) practitioners and business and policy leaders to consider

1



Be aware of contexts in which AI can help correct for bias and those in which there is high risk for AI to exacerbate bias

2



Establish processes and practices to test for and mitigate bias in AI systems

3



Engage in fact-based conversations about potential biases in human decisions

4



Fully explore how humans and machines can best work together

5



Invest more in bias research, make more data available for research (while respecting privacy), and adopt a multidisciplinary approach

6



Invest more in diversifying the AI field itself

McKinsey
& Company



Implement Clear AI Policies

- Cover ethics, transparency, and bias mitigation. Ensure decision-making processes are explainable.



Ensure Diversity in Development Teams

Integrate gender diversity when building or sourcing AI tools.



Invest in AI Training for All staff

- Create space and confidence for employees to upskill and engage with AI



Review Input Data Sets

Ensure data used for training is representative and diverse



Conduct Regular Audits of AI Systems

Continuously check for bias

Harnessing AI for Inclusion and Equity

AI as a Catalyst for Inclusivity in the Workplace

AI, when implemented responsibly, offers a powerful opportunity to accelerate diversity and inclusion.

- **Data-Driven Diversity Insights**
 - Identify diversity gaps through advanced analytics.
 - Enable targeted interventions for improvement.
- **Tailored Equity Strategies**
 - Use data to design evidence-based diversity strategies.
 - Ensure decisions are backed by real workforce assessments.
- **Bias-Free Hiring and Promotion**
 - AI can minimise unconscious bias in recruitment and promotions.
 - Screening tools standardise criteria, reducing human subjectivity.
- **Inclusive Job Descriptions**
 - AI tools can flag and revise gendered language in job postings.
 - Leads to broader and more inclusive applicant pools.
- **Attracting Diverse Talent**
 - AI enables targeted outreach and audience analysis.
 - Expands the reach to underrepresented groups.
- **Personalised Learning and Development**
 - AI tailors training to individual needs, supporting inclusive growth.
 - Enhances retention and engagement across diverse groups.



Building an Inclusive Mining Industry



The Gender Equity Alliance (GEA)

The **Gender Equity Alliance (GEA)** is a subcommittee of the **ESGS Committee** that serves as a collaborative platform that fosters dialogue, knowledge-sharing, and actionable change to promote an inclusive and equitable mining industry.

VISION

"To make gender diversity a lived reality by fostering an inclusive, equitable, and thriving mining industry."

Core Values



Equity driven

We **advocate for gender equity** as a foundation for sustainable growth, innovation, and inclusion across the mining industry



Knowledge-sharing

We believe informed dialogue and accessible information empower stakeholders to take **meaningful action on gender diversity**



Constructive Engagement

We foster respectful, open conversations among diverse stakeholders to **build common ground and inspire collective progress**



Collaboration Orientated

We support partnership and **cross-sector collaboration** by creating space for dialogue, shared learning, and alignment around best practices



Evidence-Informed

We promote the **use of data and lived experience** to guide discussions, highlight gaps, and inform decision-making across the sector

Real Transformation

Requires accountability, advocacy, and collaboration across all stakeholders.



Progress through Collaboration

Requires shared responsibility across the industry.



Smart Business Strategy

Gender equity drives decisions, unlocks opportunities, and supports industry progress.



STRATEGIC GOALS



Growth & Innovation

Promote gender equity to unlock innovation.



Policy Advocacy

Support systemic policy change.



Insightful Action

Use data-driven insights to guide strategy.

The Gender Equity Alliance supports an industry where everyone has equitable opportunities to lead, innovate and succeed.

Thanks !

