DEI
DIPARTIMENTO DI
INGEGNERIA DELL'INFORMAZIONE

CENTRO
DI ATENEO
Elena Cornaro
saperi, culture e politiche di genere

Gendering ICT
Data and Innovations

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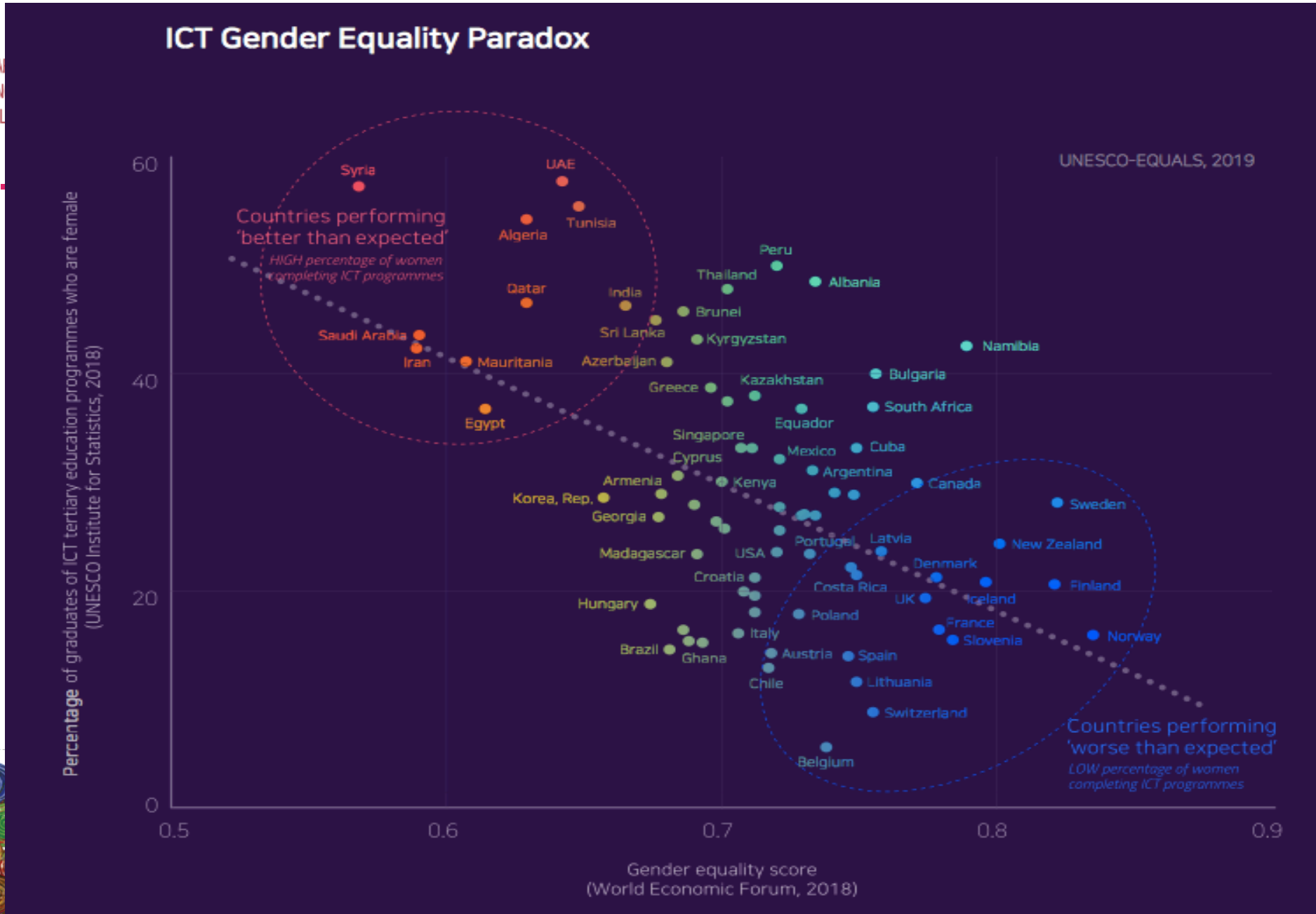*S.Badaloni, WS2 womENcourage2019, Rome, September 17th 2019*

DONNE e scienza

Outline

- ICT Gender Equality Paradox
- AI and diversity
- Gendered Innovation
- Biased Machine Learning
- Voice Assistants

ICT Gender Equality Paradox

UNESCO-EQUALS, 2019

Percentage of graduates of ICT tertiary education programmes who are female (UNESCO Institute for Statistics, 2018)

Countries performing 'better than expected'
HIGH percentage of women completing ICT programmes

Countries performing 'worse than expected'
LOW percentage of women completing ICT programmes

Syria, UAE, Tunisia, Algeria, Peru, Thailand, Albania, Qatar, India, Brunei, Sri Lanka, Kyrgyzstan, Namibia, Saudi Arabia, Iran, Mauritania, Azerbaijan, Kazakhstan, Bulgaria, Greece, South Africa, Egypt, Equador, Singapore, Cuba, Mexico, Cyprus, Argentina, Armenia, Kenya, Canada, Korea, Rep., Sweden, Georgia, Portugal, Latvia, New Zealand, Madagascar, USA, Denmark, Croatia, Costa Rica, Finland, Hungary, UK, Iceland, Poland, France, Norway, Italy, Slovenia, Brazil, Ghana, Austria, Spain, Chile, Lithuania, Switzerland, Belgium

Gender equality score (World Economic Forum, 2018)

0.5   0.6   0.7   0.8   0.9

S.Badaloni, WS2 womENcourage2019, Rome, September 17th 2019

AI and diversity

- Women comprise 15% of AI research staff at Facebook and just 10% at Google

- It's not much better in Academia: 18% authors at leading AI conference are women and more than 80% of AI professors are male

- For black workers the picture is worse

- The diversity problem is not just about women. It's about gender, race, and most fundamentally, about power

- 'The asymmetry of power is ripe for abuse'

- 'Bias is not just in our datasets, it's in our conferences and communities'

- S.M. West, M. Whittaker, K. Crawford. (2019). Discriminating Systems. Gender, Race and Power in AI. AI Now. https://ainowinstitute.org/discriminatingsystems.html

Gender Equality Index

- European Project FP7 **GenderTIME** where TIME stands for Transferring Implementing Monitoring Equality (2013-2016) (Scientific Responsible UNIPD S. Badaloni) www.gendertime.org

- Gender Equality Index **UNIPD-GEI** on the basis of a conceptual model of seven domains: work, money, time, knowledge, space, health, power

- $\forall$ domain, we calculated the corresponding values of simple indicator I_{Wd} and I_{Md} and $I_d = I_{Wd}/ I_{md,}$ if the ratio is equal to 1 $\rightarrow$ gender equality, if < 1 there is a gender gap against women, if > 1 there is a gender gap in favour of women

- **I_{power} = 0.699**
  thus measuring a gender gap against women
  of 30,1 % in the domain power

S. Badaloni, L. Perini
http://www.padovauniversitypress.it/publications/9788869380983
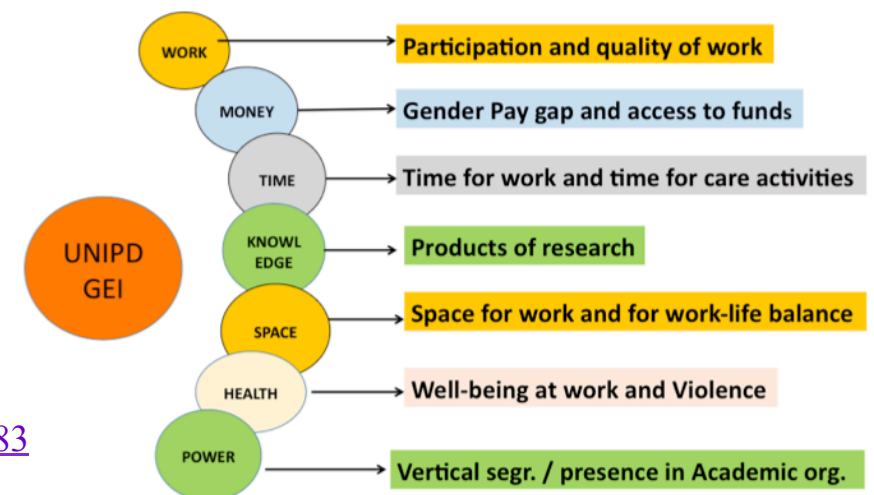
Gendered Innovation

- To include the gender dimension in the content of Science and Technology, and, in particular, in the content of AI and Robotics

1. how can a new gendered Science be developed taking into account the gender dimension? A formal reflection is needed

2. Are tools, algorithms, technologies and devices that AI develop and Robotics use really "gender neutral"?
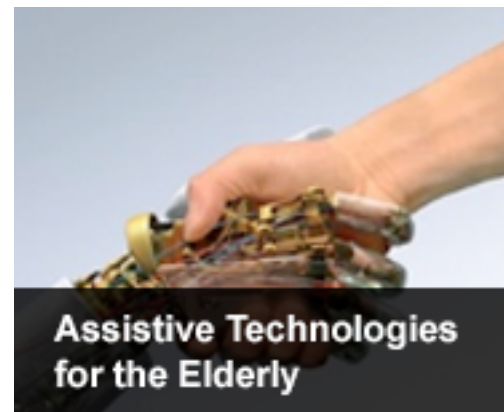
How? New questions!

- For producing a new gendered innovation in all fields of Science is not enough to apply the *pinking method* but it is necessary to radically change the assumptions

- Using the logical rules of argumentation we have demonstrated that we have to formulate new scientific questions for re-designing a Gendered Science and producing Gendered Innovation.

- Only a complete redefinition of the method and the research model with new applications and new ways of observation can re-design the science in a gender perspective.

Gendered Innovations

Pregnant Crash Test Dummies: Rethinking Standards and Reference Models

Brain Research: Analyzing how Sex and Gender Interact

Heart Disease in Women: Formulating Research Questions

Osteoporosis Research in Men: Rethinking Standards and Reference Models

Assistive Technologies for the Elderly

Londa Schiebinger – Stanford University
http://genderedinnovations.stanford.edu/index.html

S.Badaloni, WS2 womENcourage2019, Rome, September 17th 2019

Are tools, algorithms, technologies and devices that AI develop and Robotics use really "gender neutral"?

BIASED MACHINE LEARNING

Amazon Recruitment Tool

- Amazon machine-learning specialists have discovered that "their new recruiting engine did not like women"

- The company's experimental hiring tool uses Machine Learning to give job candidates scores ranging from one to five stars

- The system has been trained to vet applicants by observing patterns in resumes submitted to the company over a 10-year period. Most came from men, a reflection of male dominance across the tech industry.

- So the automatic recruitment tool preferred male candidates

- Jeffrey Dastin. (2018). Amazon scraps secret AI recruiting tool that showed bias against women. Reuters.

Word Embeddings

- To find similar concepts automatically
- Query

man: king = woman: x ➔ x = queen

man: computer programmer = woman: x ➔ x = homemaker

- Toluk Bolukbasi (Boston University) has shown that the database is loaded with stereotypes captured by the system
- The word embedding tool can be terribly sexist.
- Debiasing method: a vector space can be cleaned from bias by compiling a list of gender biased pairs to remove this warp

A first conclusion

- No blind application of ML

- When we use tools and algorithms coming from the bottom-up paradigm of Machine Learning it is necessary to analyze if the knowledge used to train the ML methods includes also all the bias about gender and ethnicity diffused in the society.

- New method to debiasing the dataset have to be studied and found in order to develop Responsible Gendered Research Innovation.
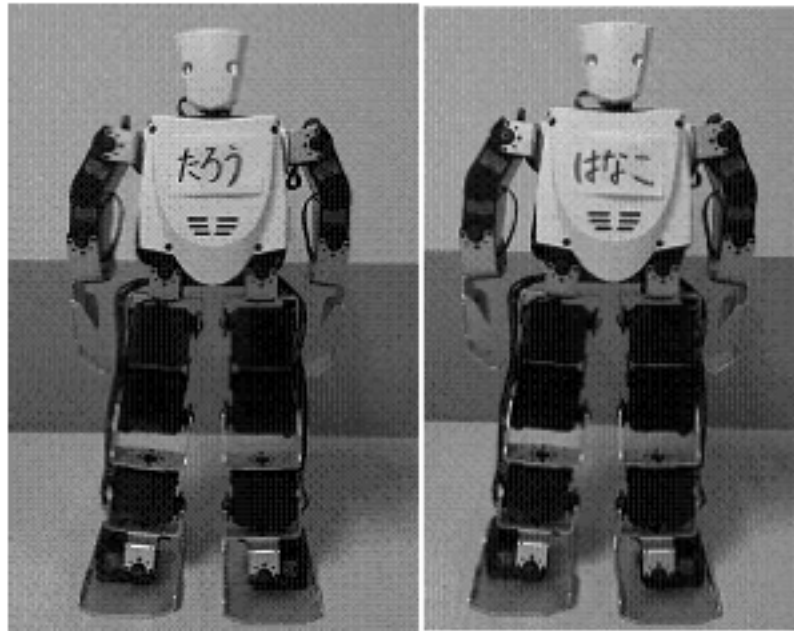
What genders a robot?

Takagi et al experiment

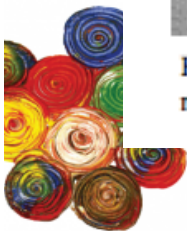Figure 1.   "Robovie-X" used in the experiment (left: labeled as a male, right: labeled as a female).

Pepper

- Color
- Voice
- Name
- Anatomy
- Personality

Source: Londa Schiebinger's talk, Padova, October 2018
Video

Voice assistants

- Most leading voice assistants are female (Alexa, Cortana, Siri)
- Companies justify their decisions on the basis of academic researches but also … 85-90 % of their programmers are white males
- People like the sound of a male voice when it is making authoritative statements but a female voice when it is being helpful
- 'People will have more conversation with digital assistents than with their spouse"
- Virtual assistants are being designed to be gentle and sympathetic, tolerant to the point that subjected to a vulgar appellation Alexa reacted kindly "I would blush if I could". Now the answer has been changed…
- This fact is likely to perpetuate underisable and maybe uncosciouss cultural stereotypes
- A virtual assistent should helpful and competent rather than deferential!
- Voice assistant with a neutral voice
- Involving users in the personality design of a digital assistant

Thanks

Last but not least our shared awareness that a gender awareness is now inside the society. In particular, in Science and ICT the dual role in profession and gender of a women scientist has the potential to shape and disseminate such a consciousness.

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