Tutorial #1 – Design strategies and techniques to better support collaborative, egalitarian and sustainable musical interfaces

Dr. Anna Xambó Sedó (Queen Mary University of London)

DAFx 24

Materials

https://shorturl.at/EarNU

DAFx 24

Abstract

A common challenge in the community of designing audio effects and algorithms to synthesise musical instruments is **what are the design considerations to accommodate interaction experiences relevant to musicians, particularly among a diverse community of practitioners**. This hands-on tutorial will cover some **theoretical and practical foundation**s for designing interfaces for digital sound instruments and effects looking at **how best to support collaborative, egalitarian and sustainable spaces**.

Who Are the Women Authors in NIME?—Improving Gender Balance in NIME Research

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ABSTRACT

In recent years, there has been an increase in awareness of the underrepresentation of women in the sound and music computing fields. The New Interfaces for Musical Expression (NIME) conference is not an exception, with a number of open questions remaining around the issue. In the present paper, we study the presence and evolution over time of women authors in NIME since the beginning of the conference in 2001 until 2017. We discuss the results of such a gender imbalance and potential solutions by summarizing the actions taken by a number of worldwide initiatives that have put an effort into making women's work visible in our field, with a particular emphasis on Women in Music Tech (WiMT), a student-led organization that aims to encourage more women to join music technology, as a case study. We conclude with a hope for an improvement in the representation of women in NIME by presenting WiNIME, a public online database that details who are the women authors in NIME.

Lately, there has been an increase in awareness of the underrepresentation[1] of women in the sound and music computing fields as highlighted by a number of meta-review studies presented in neighbouring conferences [1, 6, 7, 10]. NIME is not an exception, with a number of open questions remaining around the underrepresentation of women in our field and how we can improve the situation. Specifically, we need to ask ourselves as a community: (1) how can we incentivize women authors to come to the NIME conference?; (2) how can we raise awareness throughout the community about the issue of women's underrepresentation at NIME?; (3) how can we involve the NIME community in the mission of bringing more diversity to this field?

This paper is in line with the above papers, but with a focus on the NIME community. In particular, we survey and reflect on the proportion and persistence of women authors that have had works in the conference proceedings from 2001 until 2017. We summarize the actions taken by a number of worldwide initiatives oriented towards making women's work visible in our field, with a close-up view of the organization WiMT, presented as a case study. This paper concludes with

Xambó, A. (2018). Who Are the Women Authors in NIME?–Improving Gender Balance in NIME Research. In T. M. Luke Dahl Douglas Bowman (Ed.), Proceedings of the International Conference on New Interfaces for Musical Expression (pp. 174–177).

Outline

Part 1 - Interface design

Part 2 - Mappings & user experience

Part 3 - Data / References

Part 1 - Interface design

What do these 10 illustrations have in common?

PARTICIPATE

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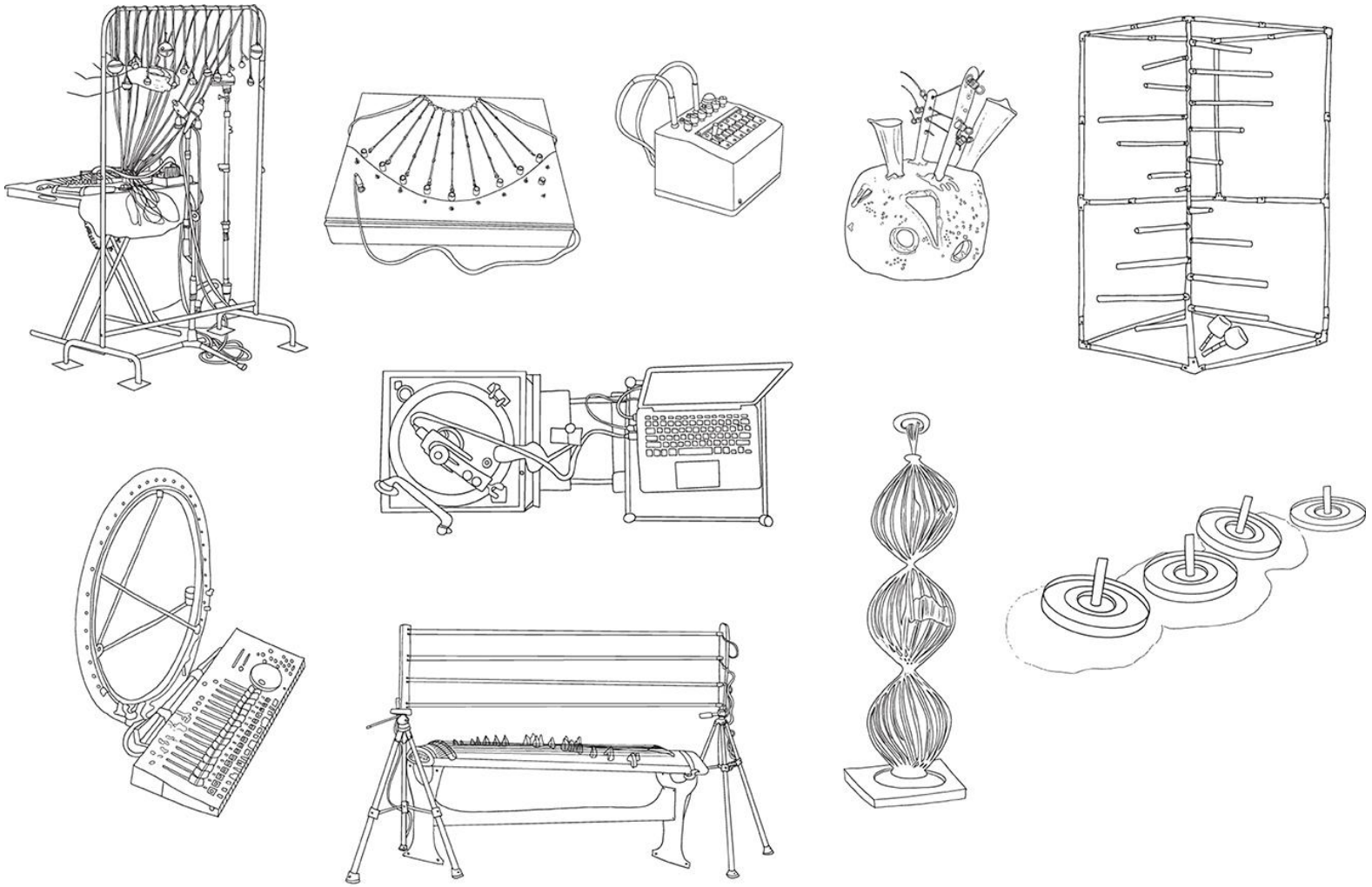

What do these 10 words have in common?

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The Exchange

Electronic_Khipu_

Mermy

Bell Controller

Prism Bell

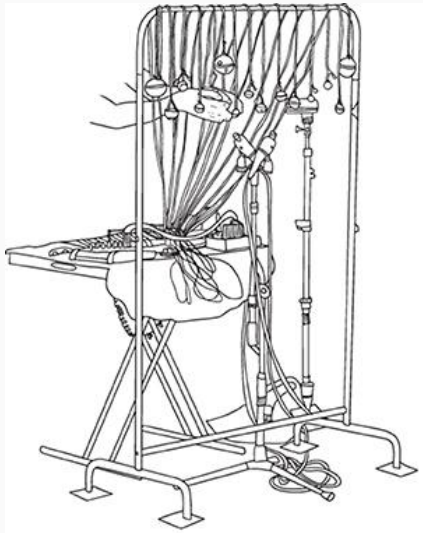
GramFX

Soft Revolvers

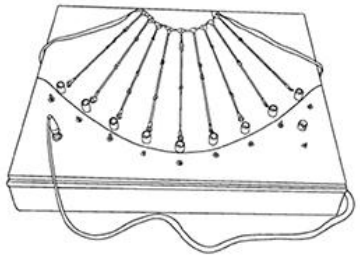
Spring Spyre

SpaceTime Helix

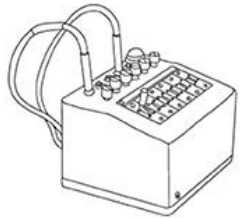
Laser Koto



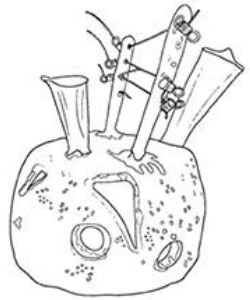
Bell Controller



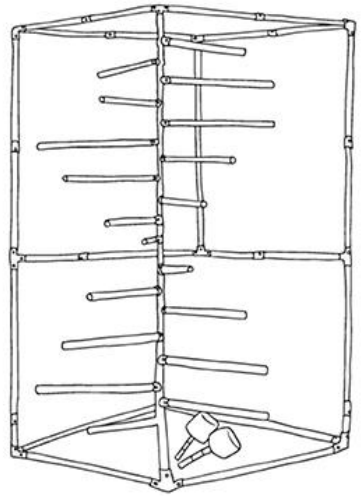
Electronic_Khipu_



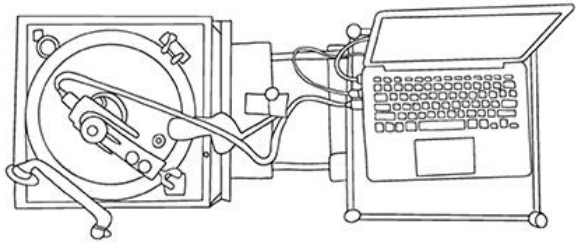
The Exchange



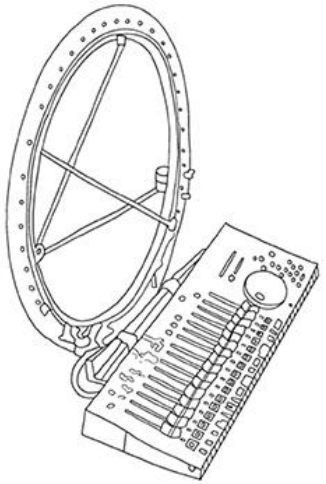
Mermy



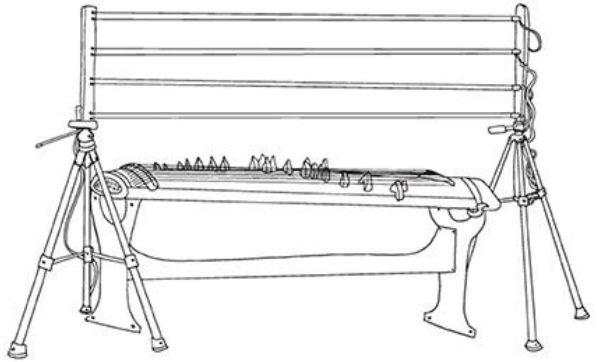
Prism Bell



GramFX



Spring Spyre



Laser Koto

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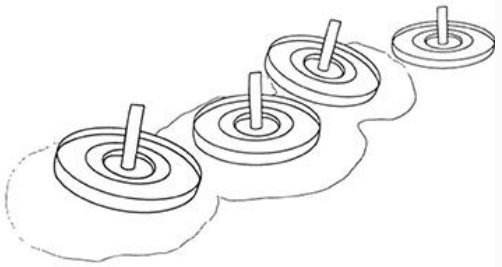

Soft Revolvers

Illustrations by Isla Sharpe (@sharpearts)

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Feminist HCI and narratives of design semantics in DIY music hardware

Karolina Jawad[1]* and Anna Xambó Sedó[2]

[1]Independent Researcher, Berlin, Germany, [2]Music, Technology and Innovation – Institute for Sonic Creativity (MTI[2]), De Montfort University, Leicester, United Kingdom

Feminist Human-Computer Interaction (HCI) integrates gender, diversity, equity, and social justice into technology research and design, fostering a more inclusive and socially aware technology landscape. This article explores the design semantics of ten Do-it-Yourself (DIY) musical instruments created by women builders. Design semantics refers to the associations conveyed by designed objects so as to identity, emotions, performance or the environment and their sensory qualities such as shape, size, touch or vision. Together these associations and qualities can establish design narratives that influence the way meaning is ascribed. We conduct an analysis of these instruments to answer the question of how fabulations of design semantics, through the lens of feminist HCI principles, can reshape our understanding of gender bias in object design within the realm of DIY musical instruments constructed by women builders. Our investigation uncovers a feminist narrative taking shape as we found out that DIY instruments design contributes to the fabulation of alternative futures that challenge prevalent current gender expectations associated with commercial music hardware. DIY instruments provide a platform for questioning established gender norms, enabling the development of technologies that embrace diverse perspectives and maintain a technical identity.

KEYWORDS

Feminist Human-Computer Interaction, music technology, design, fabulations, women, Do-it-Yourself, instruments

Jawad, K., & Xambó Sedó, A. (2024). Feminist HCI and narratives of design semantics in DIY music hardware. Frontiers in Communication, 8, 1345124.

1 Interface design

1.1 Glossary of key terms

1.2 Gender expectations in commercial music hardware

1.3 Recommendations for embracing a broader diversity in perspectives

1.4 Practical exercise

bias, n., adj., & adv. - 3.c. Tendency to favour or dislike a person or thing, especially as a result of a preconceived opinion; partiality, prejudice (OED).

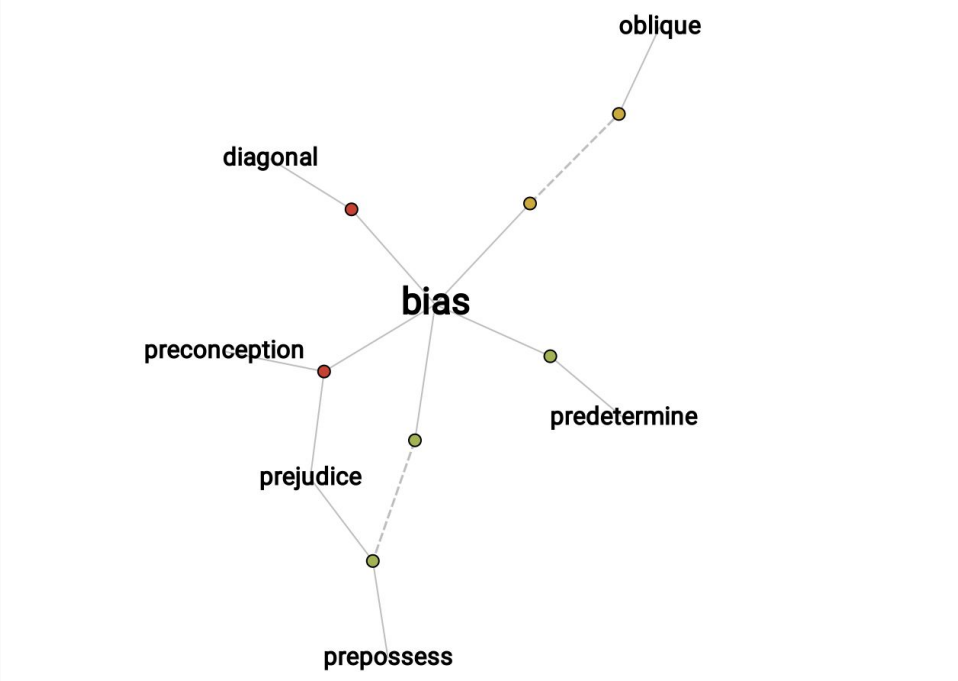
unconscious bias, n. - any personal preference, attitude, or expectation that unconsciously affects a person's outlook or behaviour; (now in negative sense) unconscious favouritism towards or prejudice against people of a particular race, gender, or group that influences one's actions or perceptions Cf. *implicit bias* (OED).

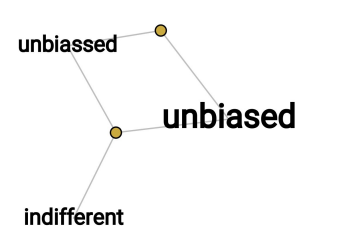
implicit bias, n. - any unconscious or unacknowledged preference that affects a person's outlook or behaviour; (now esp.) an unconscious favouritism towards or prejudice against people of a particular race, gender, or group that influences one's actions or perceptions Cf. *unconscious bias* (OED).

gender bias, n. - prejudiced actions or thoughts based on the gender-based perception that women are not equal to men in rights and dignity *(*European Institute for Gender Equality).

gender HCI, n. - a tool to deconstruct how gender identities shape the design and use of technological items (Bardzell 2010).

gender-neutral, adj. - suitable for, applicable to, or common to both males and females; (of a word, expression, etc.) not specifying gender (OED).





visualthesaurus.com

Bias (Synonyms) - bigotry, favoritism, inclination, intolerance, leaning, preconceived idea, preconceived notion, preconceived opinion, preference, prejudgment, prejudice, tendency, tilt, unfairness (Thesaurus.com)

Bias (Antonyms) - disinterest, equitableness, fair-mindedness, fairness, justice, neutrality, objectivity, open-mindedness, tolerance, unbiasedness (Thesaurus.com)

thesaurus.com

What are current gender expectations associated with commercial music hardware?

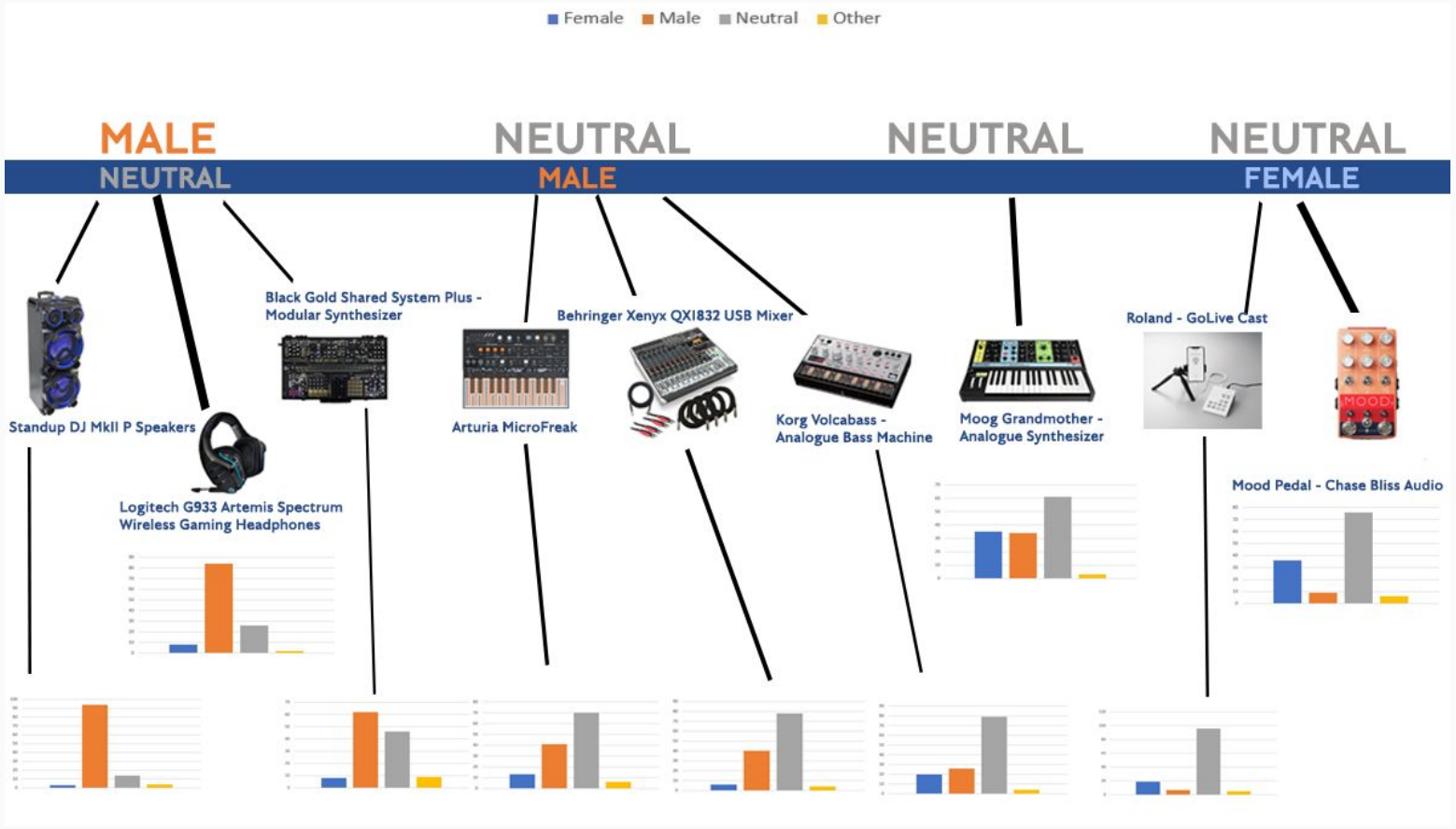
How language of live interfaces in music can inform about whether and how gender shapes musical tools?

- 7 interviews with practitioners identifying as women (WoNoMute seminars).
- Practitioners with artistic background build their technological artistic items and avoid associations with engineering/programming/STEM attributes
- A gendered tool can become excluding or inclusive depending on the context e.g.
  - masculine stereotypes can discourage women's sense of ambient belonging (Cheryan et al. 2009).
  - feminine stereotypes (e.g. e-textiles) can boost women's interest in computing and engineering (Stewart et al. 2018).
- Practitioners do not like to describe what they do as 'music technology', it does not resonate to the diversity of practices.

Jawad, K., & Xambó, A. (2020). How to Talk of Music Technology: An Interview Analysis Study of Live Interfaces for Music Performance among Expert Women. Proceedings of the International Conference on Live Interfaces.

To what extent can gender bias in the design of musical interfaces be detected through visual cues?

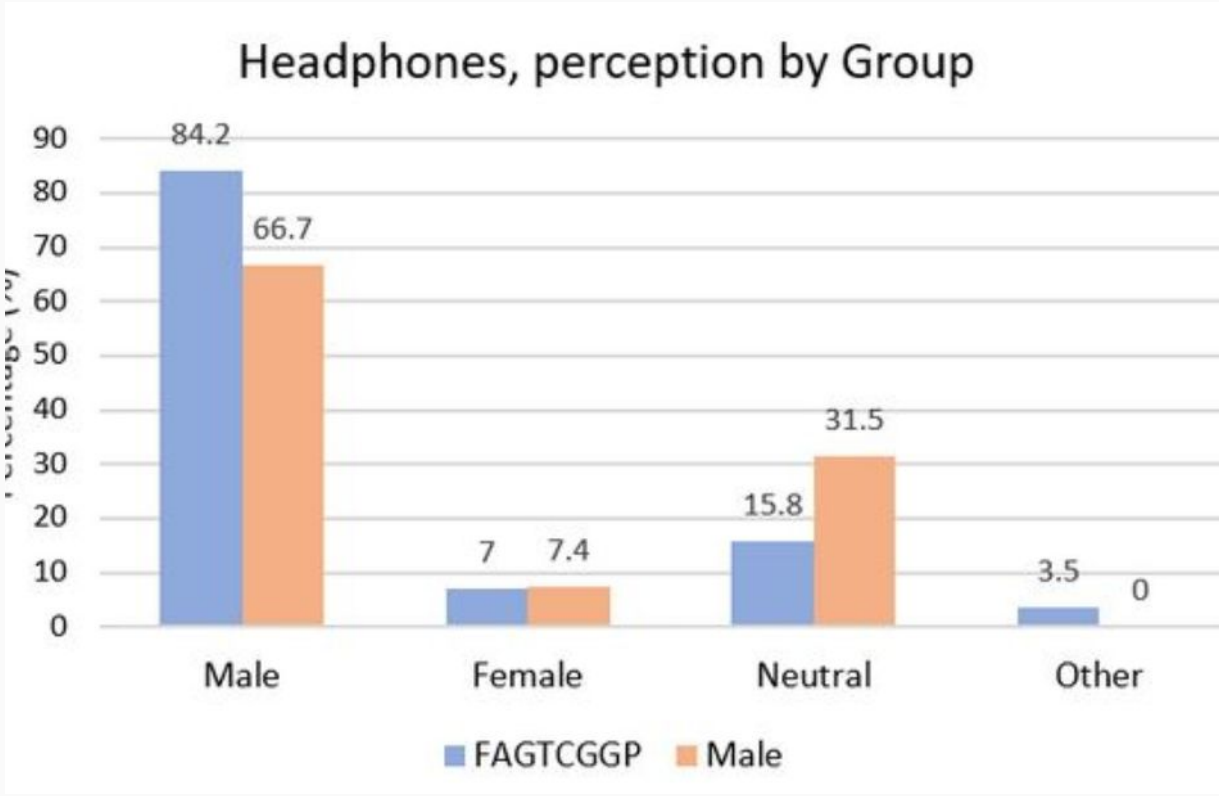
111 participants in an online survey with questions on colour, shape and wording of 9 exemplary artefacts of music hardware.



Jawad, K. (2020). Gatekeepers by Design? Gender HCI for Audio and Music Hardware. PhD, NTNU / UiO. p. 23.

Example of a '**male**/neutral' instrument: Logitech Gaming Headphones

Logitech G933 Artemis Spectrum Wireless Gaming Headphones (Image source: Logitechg.com)



Stacked bar chart of the rating percentage (%) of each gender category by gender groups for the gaming headphones

Jawad, K. (2020). Gatekeepers by Design? Gender HCI for Audio and Music Hardware. PhD, NTNU / UiO. p. 26-27.

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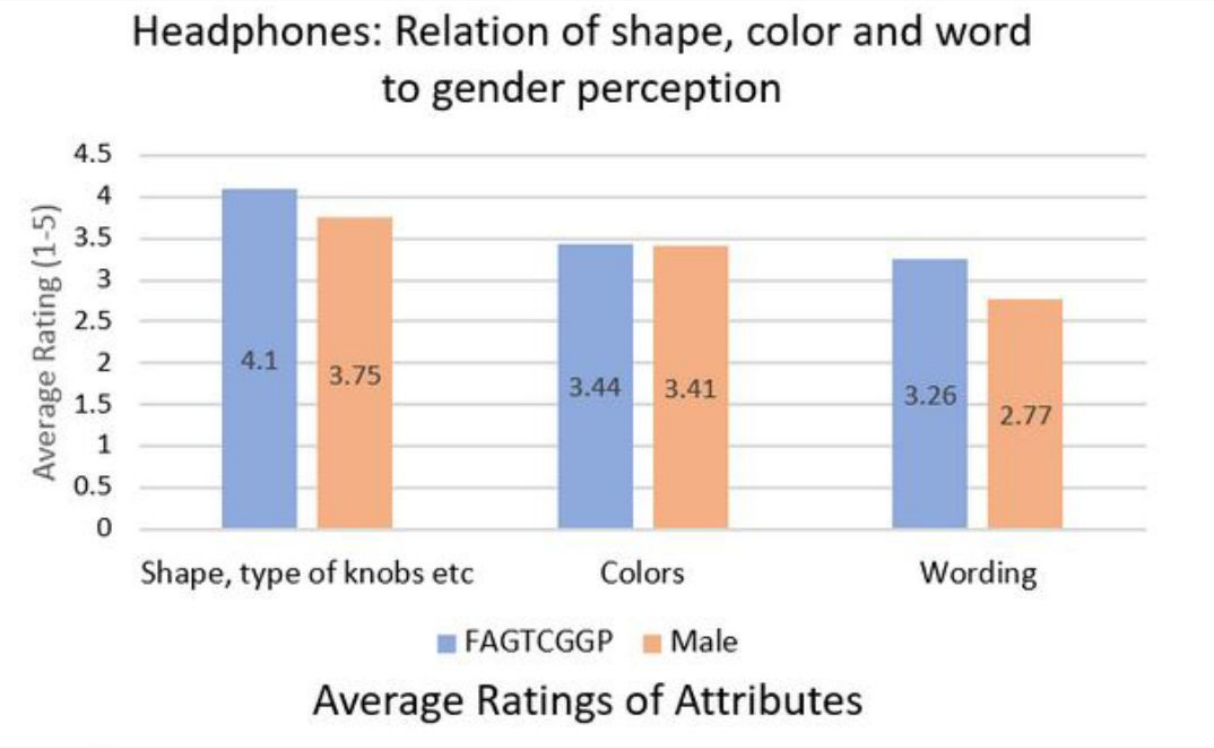

Bar plot of average ratings (1 not at all, 3 neutral, 5 very strong) of shape, colours and wording by gender group.

Jawad, K. (2020). Gatekeepers by Design? Gender HCI for Audio and Music Hardware. PhD, NTNU / UiO. p. 26-27.

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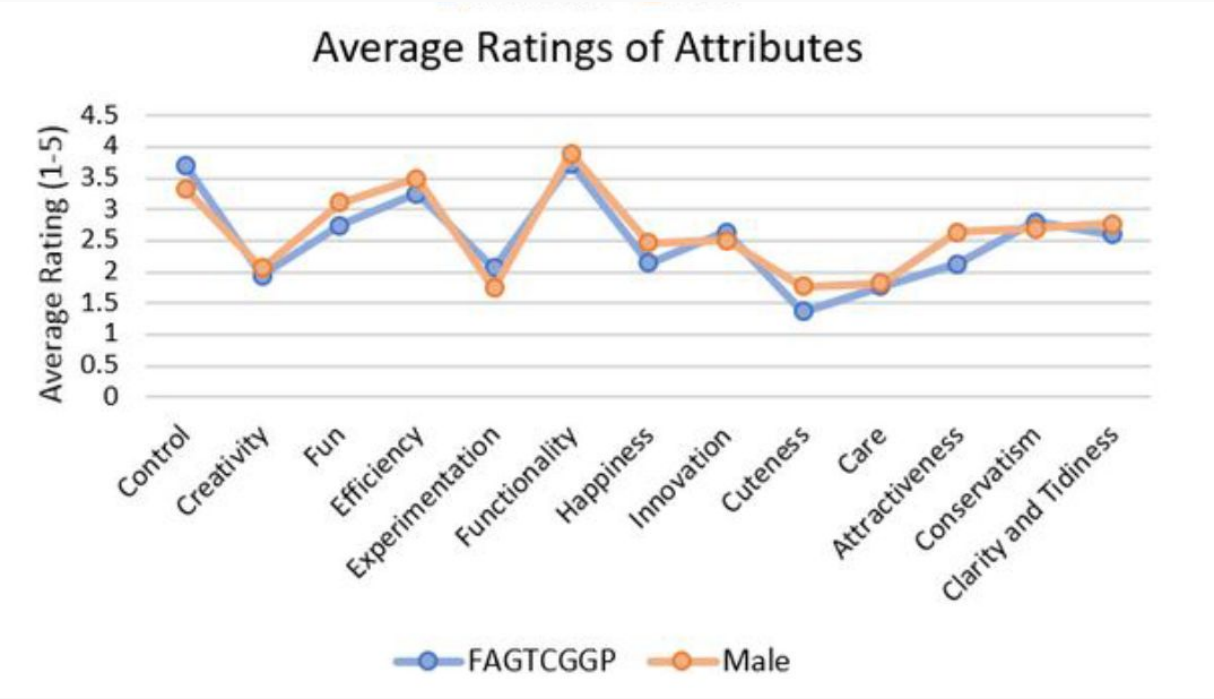
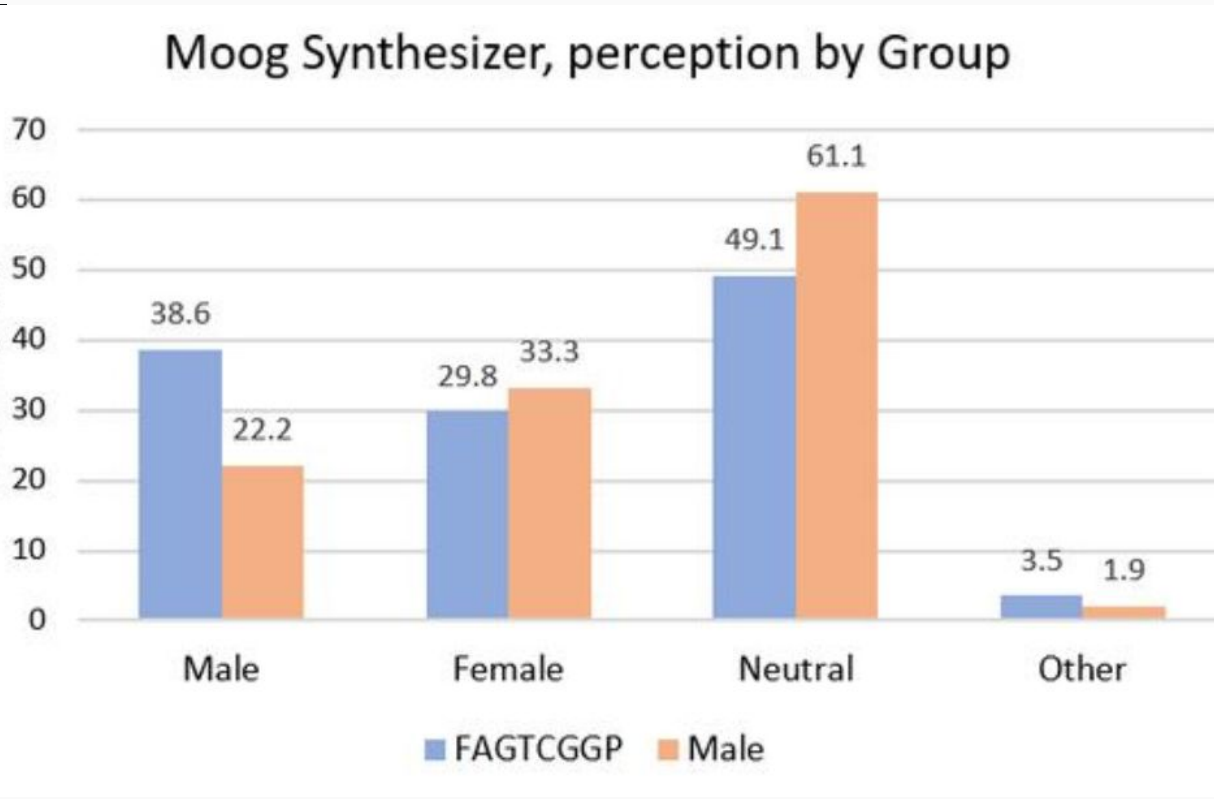


Average of ratings (1 not at all, 3 neutral, 5 very strong) of the 13 attributes that are seen in the gaming headphones.

Jawad, K. (2020). Gatekeepers by Design? Gender HCI for Audio and Music Hardware. PhD, NTNU / UiO. p. 26-27.

Example of a **'neutral'** instrument: Moog Grandmother Synthesiser

Moog Grandmother, analogue semi modular, 32 key synthesizer (Image source: Moogmusic.com)



Stacked bar chart of the rating percentage (%) of each gender category by gender groups for the Moog Grandmother Synthesizer.

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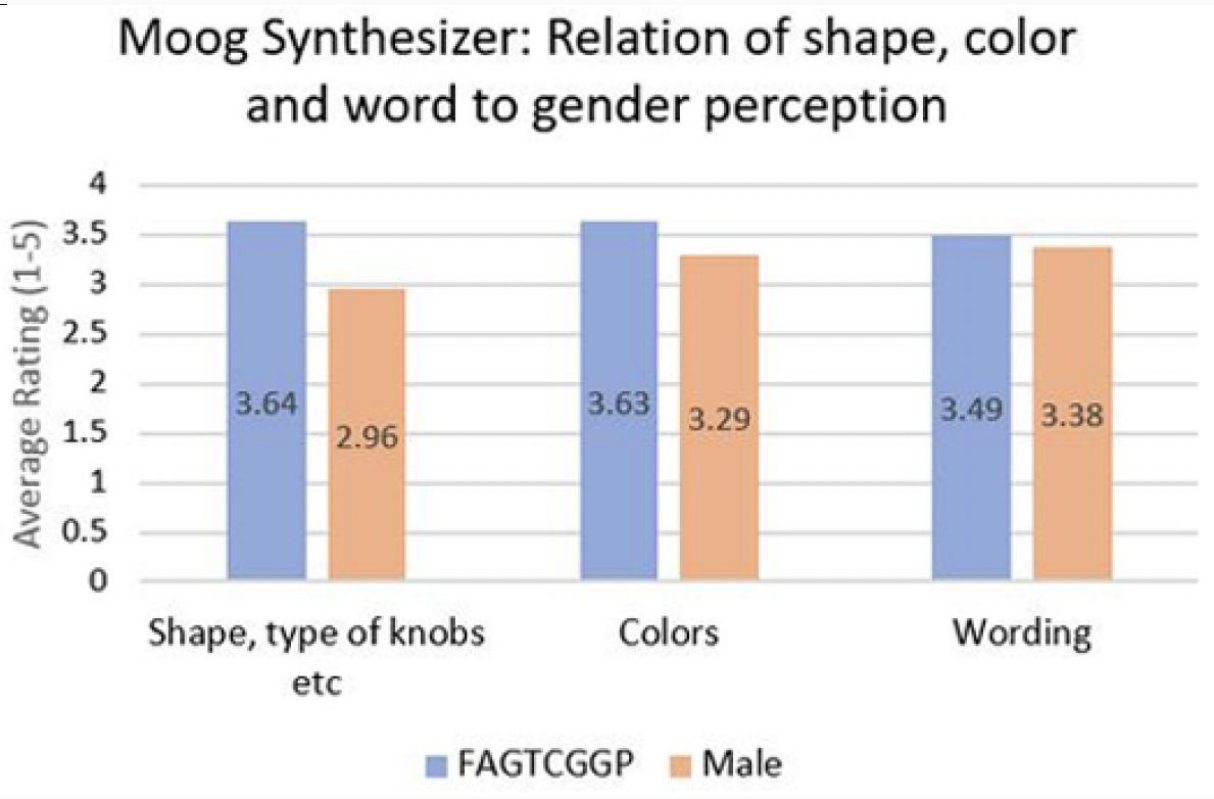

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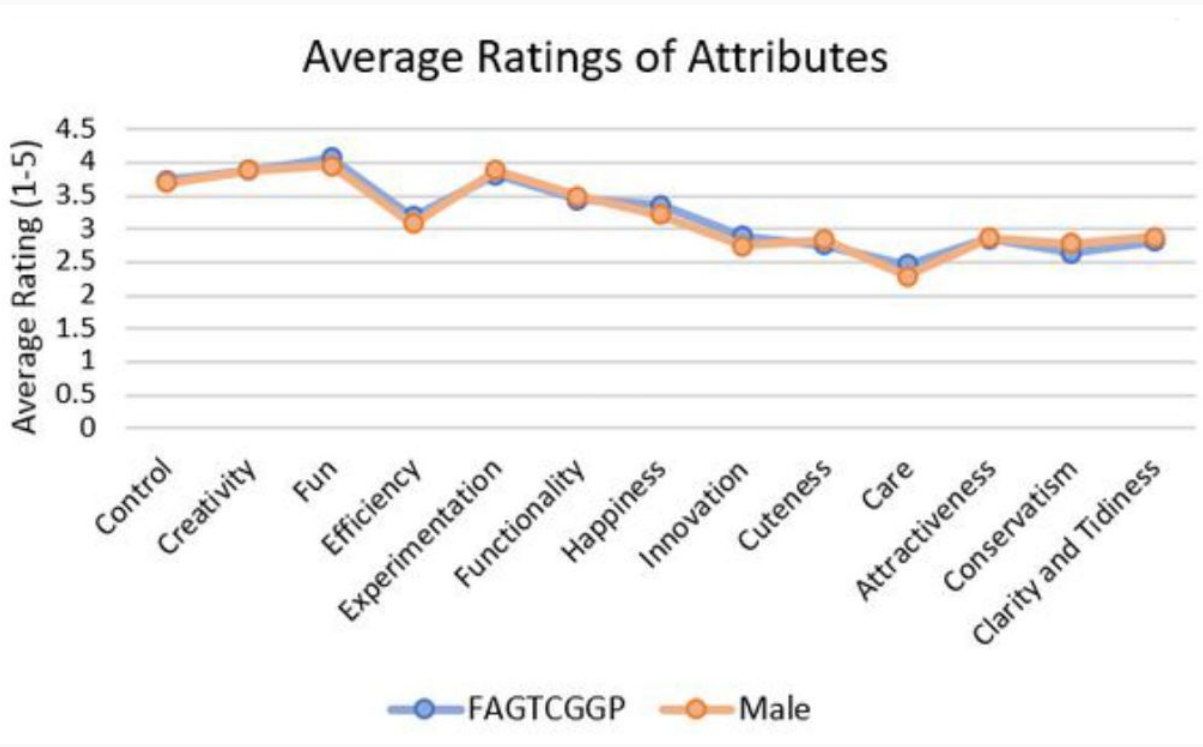

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BRAND

How to embrace diverse perspectives and maintain a technical identity?

What an ideal design approach for audio and music hardware would involve in terms of design recommendations?

- **Participatory design, in favour of inclusive design** - potential users with different backgrounds need to be more present in the development process.
- **Universal, pluralistic or neutral interfaces?** - attention to individual differences within genders can be emphasised by the notion of pluralism (closer to the reality of the variety of gender identities, abilities, social settings, cultural and economic backgrounds, and ethnicities) rather than universality.

How fabulations of design semantics, through the lens of feminist HCI principles, can reshape our understanding of gender bias in object design within the realm of DIY musical instruments constructed by women builders?

- **DIY instruments design** contributes to the fabulation of alternative futures that **challenge prevalent current gender expectations** associated with commercial music hardware.
- **DIY instruments** provide a platform for **questioning established gender norms**, enabling the development of technologies that embrace diverse perspectives and maintain a technical identity.
- **Patterns** as **challenges to traditional norms** of instrument design/musical interaction:
    - Reimagining familiar gestures for new musical interfaces
    - Repurposing traditional technologies for new musical interfaces
    - Promoting round and soft elements

Jawad, K., & Xambó Sedó, A. (2024). Feminist HCI and narratives of design semantics in DIY music hardware. Frontiers in Communication, 8, 1345124.

Prism Bell
Lia Mice

Reimagining familiar gestures for new musical interfaces

Created in 2019, is a standalone large-scale system consisting of pipes with embedded Bela Mini units for sound modeling and synthesis.

Prism Bell

Lia Mice

Reimagining familiar gestures for new musical interfaces

Ecology

Prism Bell is constructed from upcycled PVC pipes arranged in an accessible winding configuration. The technology remains concealed, while emphasis is placed on the bells.

*Electronic_ Khipu_*

Patricia Cadavid

Repurposing traditional technologies for new musical interfaces

An instrument created in 2020 by weaving knots with conductive rubber cords to encode sound compositions. It is based on the Andean khipu, an ancient textile computer used for information processing and transmission.

*Electronic_ Khipu_*

Patricia Cadavid

Repurposing traditional technologies for new musical interfaces

Ecology

Electronic_Khipu_ consists of conductive rubber strings on a wooden plate, arranged like the original khipu’s wool strings. The technology serves a technological purpose and allows for knotting interaction, being partly visible and partly hidden.

Spring Spyre
Laetitia Sonami

Promoting round and soft elements

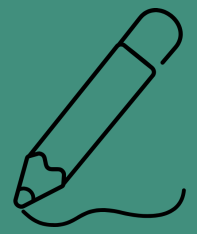
Developed in 2013, incorporates a metal wheel, three strings, and audio pickups controlled by a Roland PC1600 MIDI controller, with feature extraction and machine learning done using MaxMSP and Wekinator software.

Spring Spyre
Laetitia Sonami

Promoting round and soft elements

Ecology

Spring Spyre is a vertically aligned metal disk with taut, pliant springs and a compromised console. Its technology is partially visible in its performance, showcasing a minimalistic use of components.



Exercise: Imagine/speculate a (re-)design for a musical interface focusing on shape, colour, and material/texture

Consider:

- Reimagining familiar gestures for new musical interfaces.
- Repurposing traditional technologies for new musical interfaces.
- Promoting round and soft elements.

Tools:

- Turtle (Python):
  - Tutorial 1: https://shorturl.at/AhJfR
  - Tutorial 2: https://shorturl.at/xhrOs
- Handwritten drawings (e.g. pen/paper, tablet…).

drawing by popcornarts from Noun Project (CC BY 3.0)

Part 2 - Mappings & UX

2 Mappings & UX

What do we mean by mapping?

Mapping is the way in which we create a relationship between human gestures/physical quantities (e.g. dialing a knob, pressing a button, operating a sensor, moving a hand left-right) and musical/synthesis parameters.

2 Mappings & UX

What values can we use for mapping?

Continuous values

Discrete values

Indexes (e.g. averages)

Other manipulations (e.g. thresholding, counters, timers)

2 Mappings & UX

Different types of mappings (mapping strategies)

One-to-one mapping - one numerical physical quantity is mapped with one audio feature.

One-to-many mapping (divergent): one control operates many parameters.

Many-to-one mapping (convergent): many controls operate one parameter.

Many-to-many mapping: any number of controls being mapped to many parameters (e.g. audio features).

Prism Bell

Lia Mice

Reimagining familiar gestures for new musical interfaces

Pluralism

Prism Bell is a digital instrument with physical qualities, designed so that the timbre of the instrument changes with each piece. The instrument’s chromatic scale provides pluralism.

*Electronic_ Khipu_*

Patricia Cadavid

Repurposing traditional technologies for new musical interfaces

Pluralism

Electronic_Khipu_ incorporates elements from different cultural traditions, referring to the practices of the former Inca Empire and Andean societies. There is a hybridity that brings together both worlds, western electronic music and ancient traditions.

Spring Spyre
Laetitia Sonami

Promoting round and soft elements

Pluralism

Spring Spyre harnesses the power of machine learning to analyse Sonami's performance data, dynamically altering the synthesis process for transition between predictable and unpredictable outputs. The essence of pluralism emerges from the ongoing dialogue between the artist and the algorithm, fostering a rich interaction with the AI system.

Prism Bell

Lia Mice

Reimagining familiar gestures for new musical interfaces

Embodiment

Prism Bell is played with large gestures, that trigger synthesized percussive tones resembling distorted electric guitar strings and bells.

*Electronic_ Khipu_*

Patricia Cadavid

Repurposing traditional technologies for new musical interfaces

Embodiment

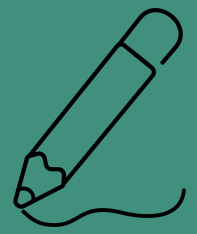
Electronic_Khipu_ retains the traditional form and interaction in a new electronic interface, allowing for real-time knotting of strings. This technology brings back ancient traditions of calculating and decrypting. Sample-based music is heard, featuring textural and synthetic algorithmic note-based sounds, with low frequencies and slow rhythmic beats.

Spring Spyre
Laetitia Sonami

Promoting round and soft elements

Embodiment

Spring Spyre consists of intersecting wire coils that can be gently plucked with the fingers, generating a noisy texture combined with a low, steady drone. This instrument facilitates active listening and contemplation.



Exercise: Propose a mapping strategy from action to sound synthesis using your previous drawing.

Consider:

- Type of mappings (one-to-one, one-to-many, many-to-one, many-to-many).
- Type of values (continuous, discrete, derived/averaged, other manipulations)
- Type of qualities (e.g. ecology, pluralism, embodiment).

Tools:

- Turtle (Python)
- Handwritten drawings (e.g. pen/paper, tablet…).

drawing by popcornarts from Noun Project (CC BY 3.0)

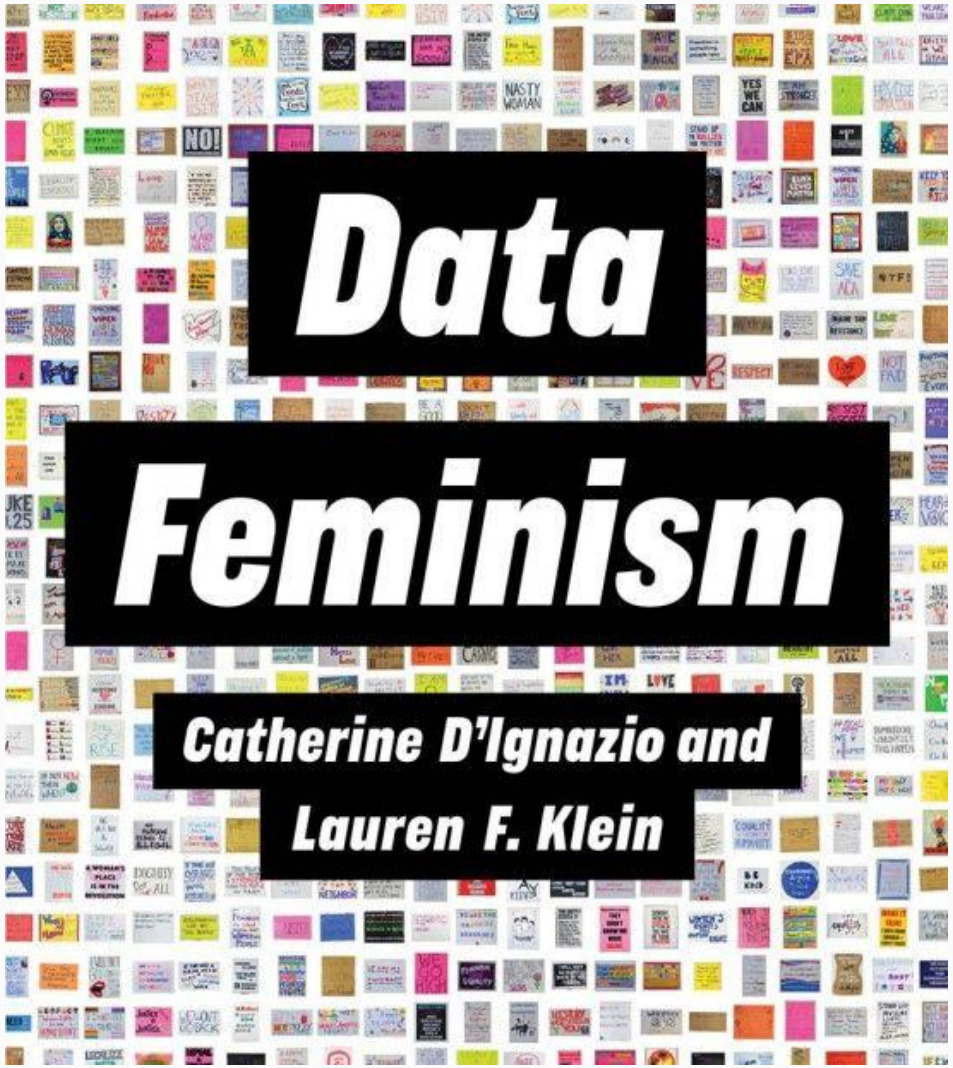
Part 3 - Data / References

3 Data / References

3.1 Data bias

3.2 Bias and discrimination in AI systems / Practical exercise

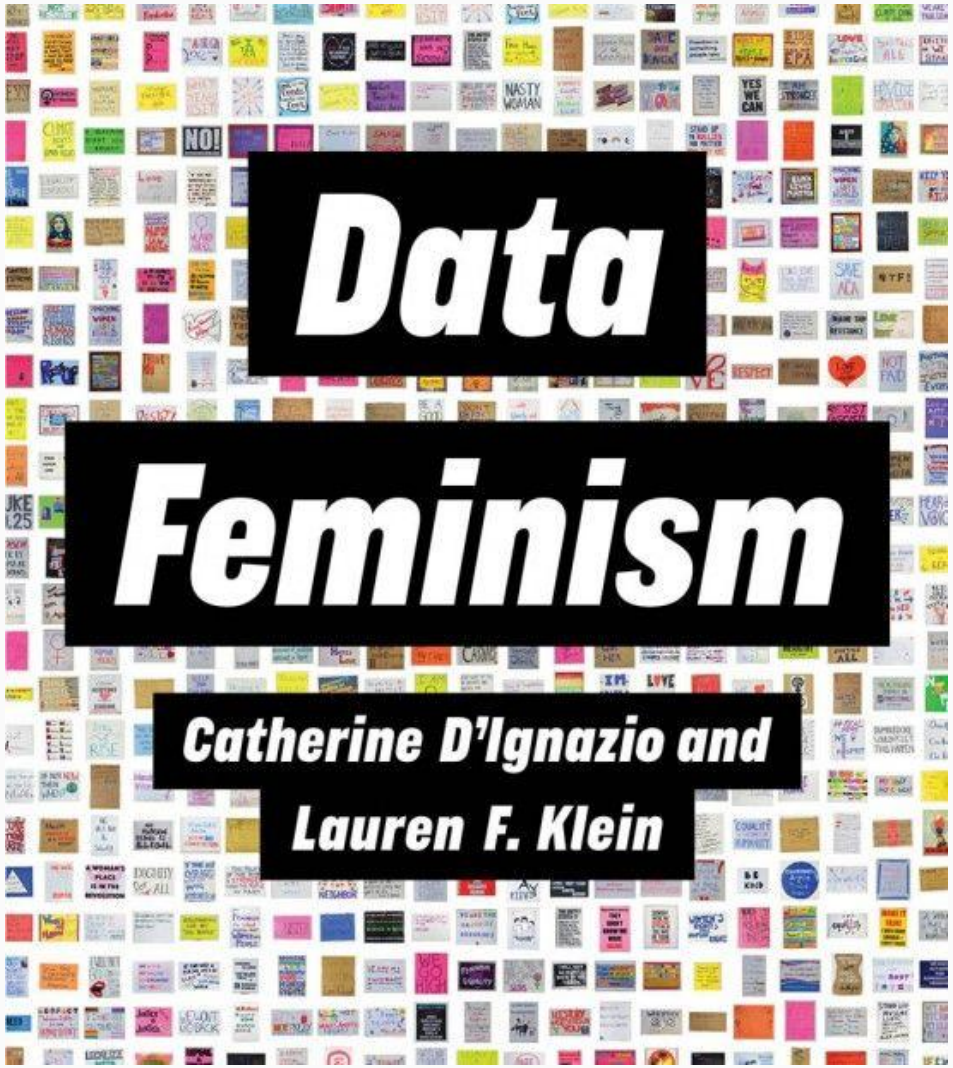
3.3 Citation practices



Data Feminism

- **The power of data science**:
  - **Potential for good**: Expose injustice, improve health outcomes, topple governments.
  - **Potential for harm**: Used to discriminate, police, and surveil (surveillance capitalism)
- **The narratives around big data and data science tend to be typically *WEIRD*** (white, educated, industrialized, rich, operating within democracies) (Henrich et al. 2010, Born 2020)
- **Intersectional feminism can challenge stereotypes** e.g. male/female binary classification system as well as other hierarchical classification systems.

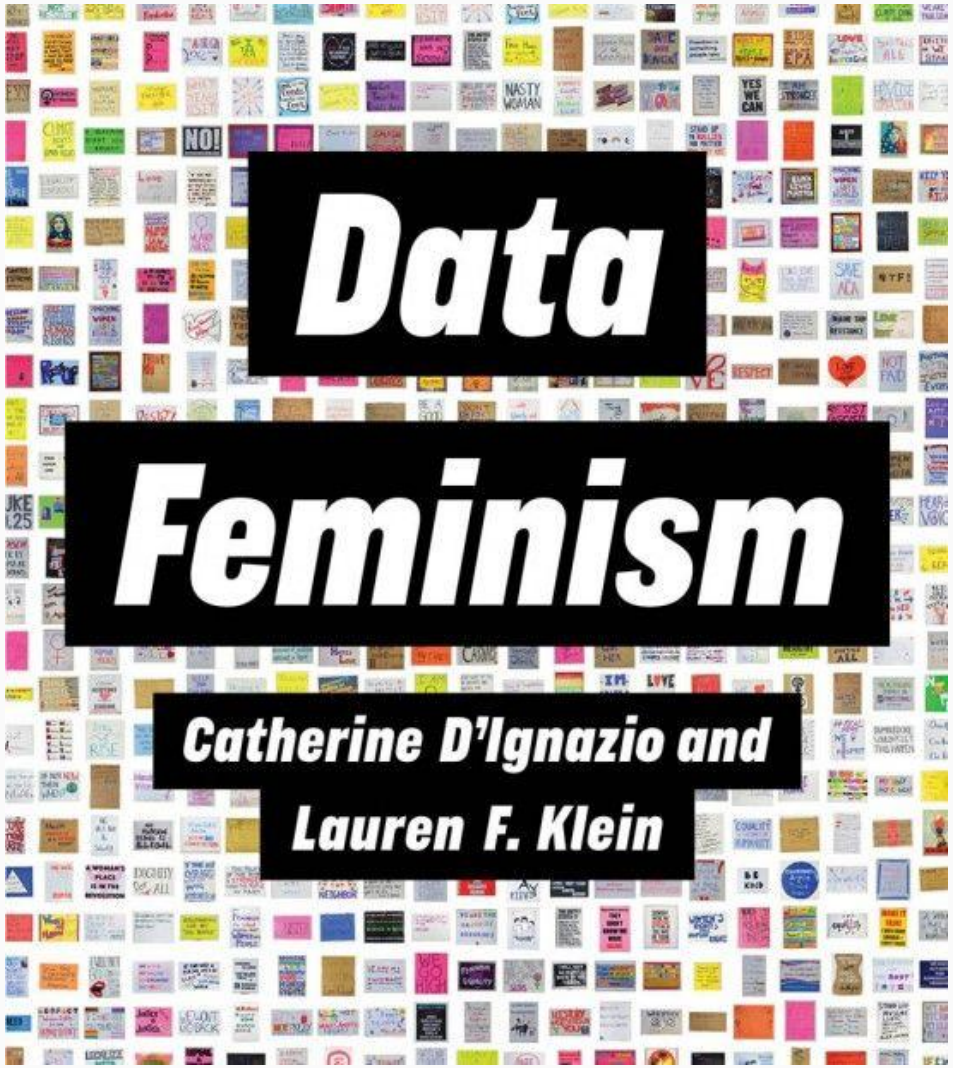
Klein, L., & D'Ignazio, C. (2020). Data Feminism. The MIT Press.



Data Feminism: Principles

- Examine Power
- Challenge Power
- Elevate Emotion and Embodiment
- Rethink Binaries and Hierarchies
- Embrace Pluralism
- Consider Context
- Make Labor Visible

Klein, L., & D'Ignazio, C. (2020). Data Feminism. The MIT Press.



Example of data bias (The Power Chapter)

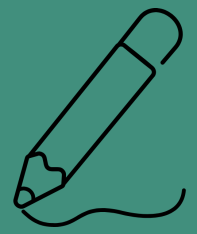
Joy Buolamwini found that she had to put on a white mask for the facial detection program to "see" her face. Klein & D'Ignazio (2020, p.30)

Klein, L., & D'Ignazio, C. (2020). Data Feminism. The MIT Press.

Recommendations for Addressing Bias and Discrimination in AI Systems

- **Remedying bias in AI systems is almost impossible when these systems are opaque** - transparency is essential, and begins with tracking and publicizing where AI systems are used, and for what purpose.
- **Rigorous testing should be required across the lifecycle of AI systems in sensitive domains** - pre-release trials, independent auditing, and ongoing monitoring are necessary to test for bias, discrimination, and other harms.
- **The field of research on bias and fairness needs to go beyond technical debiasing to include a wider social analysis of how AI is used in context** - this necessitates including a wider range of disciplinary expertise.
- **The methods for addressing bias and discrimination in AI need to expand -** to include assessments of whether certain systems should be designed at all, based on a thorough risk assessment.

West, S. M., Whittaker, M., & Crawford, K. (2019). Discriminating Systems: Gender, Race, and Power in AI – Report [Techreport]. AI Now Institute.



Exercise: Assessing the diversity of a dataset

Objective:

- Critically evaluate a dataset to identify potential biases and discuss the implications of these biases in data analysis and decision-making.

Steps:

- **Select a dataset**.
- **Think about a task** (e.g. pitch detection)**.**
- **Analyse the dataset against the task:** examine representation, identify gaps, consider context (historical, social, cultural factors).
- **Discuss implications**: bias and impact, ethical considerations.
- **Propose solutions**: improve diversity, documentation (e.g. data statement).

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ISMIR

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Resources

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Resources / Datasets

The list of datasets presented here pulls from the mir-datasets repository; if you'd like to add a dataset, create an issue / pull request there and the changes will propogate here.

The community owes a huge thanks to the hard work of Alexander Lerch in compiling and maintaining this list of datasets.

status	dataset	metadata	contents	with audio
☠	200DrumMachines	audio samples	7371 one-shots	yes
✅	ACM_MIRUM	tempo	1410 excerpts (60s)	yes
✅	AcousticBrainz-Genre	15-31 genres with 265-745 subgenres	audio features for about 2000000 songs	no
☠	ADC2004	predominant pitch	20 excerpts	yes
✅	Acoustic Event Dataset	28 event classes	5223 audio snippets	yes
✅	AIST Dance Video Database	street dance videos	13,940 videos for 60 pieces	yes
✅	Amg1608	valence & arousal	1608 excerpts (30s)	no
✅	AMT-pilot	structure by multiple annotators	8 songs	yes
✅	Automatic Practice Logging	piano practice	620 segments	yes
☠	artist20	20 artists	1413 songs	no
		aligned MIDI/audio	1068 MIDI	

ISMIR Datasets: https://ismir.net/resources/datasets/

Citation practices

Consider what you might want to change about your academic citation practices. Who do you choose to link and re-circulate in your work? Is there a dominant demographic in your citations?

Check this Citation Practices Challenge

Thank you!

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