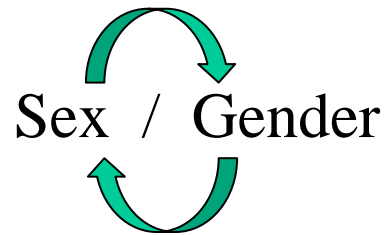


Zwischen Biologie und Kultur: aktuelle Ansätze der Geschlechterforschung in Neurowissenschaft und Epigenetik



Prof. Dr. Sigrid Schmitz,
Universität Graz

Gender & Science Technology Studies

„bringing gender into science“

- Feminist Science Studies: Kritische Analyse von Biologisierungen des Geschlechts (= Naturalisierung Sex)
- Emanzipation durch Sex-Gender Trennung
- Problem: Sex-Gender Dualismus = Natur-Kultur Dichotomie

+ „bringing biology back in“

- Sex/Gender: „two systems indivisible“ (*Fausto-Sterling 2000*)
- Embodiment
 - Körper als Bedeutungsträger sozialer Bedingungen und kultureller Normen (Performativität von Sex und Gender)
 - Körper als Produkt und Produzent von Sozialem
 - Sex/Gender-Wechselwirkungen in Forschung analysieren

→ **Fundierter interdisziplinärer Dialog zwischen Genderforschung & Science & Technology**

Prämissen und Dialogfenster

1. Kritische und konstruktive Analysen der Feminist Science Studies

Feminist Materialism: Intraaktion von Komponenten konstituieren Phänomene

- Materielle Dynamik & Agency
- Soziale Formung
- Bedeutungsgenerierung
- Wissensproduktion aus Forschungspraxen, technischen Apparaturen, Aushandlungsprozesse

2. Diversität / Intersektionalität

- Relevante Kategorisierungen

3. Natur-Kultur-Technik Verschränkung

- Neurowissenschaften, Gender Medizin, Technische Entwicklungen, Embodied Cognition, Epigenetik

Awareness nutzen

*“Biological sex differences and behavioural gender differences – and the **interaction between the two** – can produce very different health outcomes...Interaction often occurs between sex- and gender-relevant factors and it can be hard to distinguish between the two” (LERU Advice paper, 6;
<http://www.leru.org/index.php/public/publications/category/advice-papers/>)*

→ **Lösungen zur Analyse komplexer Natur-Kultur-Verschränkungen finden!**

*“...the risk of exaggerating existing small differences, or of wrongly claiming differences...can result in **perpetuating stereotypical views** and/or in unjustifiable treating men and women differently.”
(LERU Advice paper, 12;
<http://www.leru.org/index.php/public/publications/category/advice-papers/>)*

→ **Ansätze zur Inklusion von Diversität, intersektionalen Verschränkungen und zur Reflexion gesellschaftlicher Auswirkungen in die Forschung!**

Initiativen

Expertinnen Netzwerk NeuroGenderings

Symposium „Epigenetics, Society & Gender“

Initiative I: The international NeuroGenderings Network



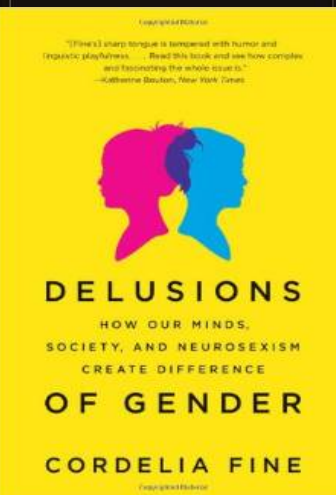
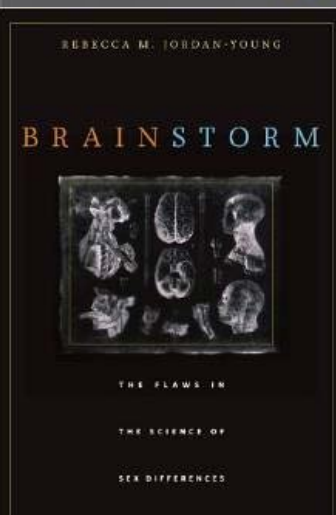
NeuroGenderings is an international and transdisciplinary network which aims to elaborate innovative theoretical and empirical approaches for questions of sex/gender and sexuality for neuroscientists.

<https://neurogenderings.wordpress.com/>

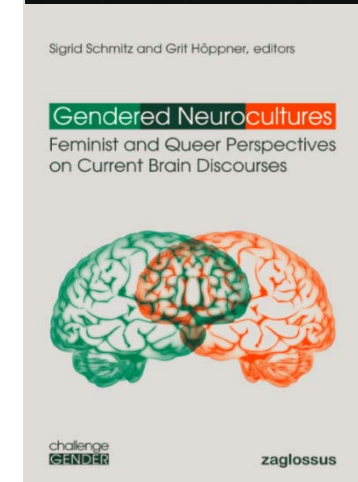
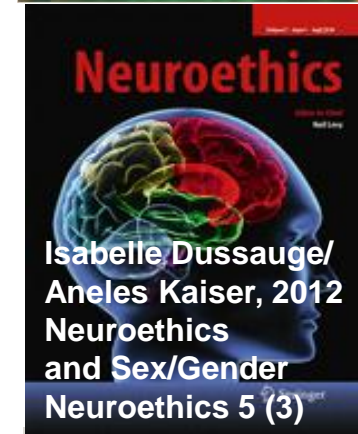
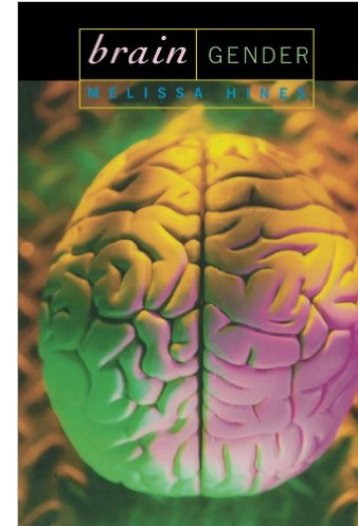


Feminist Neuroscience / Neurofeminism

- Befundwidersprüche und methodische Verzerrungen
- Kritik Homogenisierungen/Generalisierungen
- Publication Bias
- Hirnplastizität
- Konstruktionen Brain Imaging
- Gesellschaftlichen Auswirkungen



Schmitz, Sigrid / Höppner Grit (2014): *Frontiers in Human Neuroscience* 8, doi: 10.3389/fnhum.2014.00546.





Konstruktive Wende

- Verschränkung Biologie/Soziales
 - Diversität
- Begriffsklärungen, Klassifikationen, Kategorisierungen
 - Epistemologien
- Auswirkungen/Neurokulturen



NeuroGenderings IV

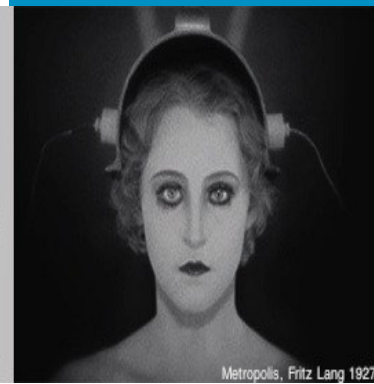
Upcoming 2016

Barnard Colledge
Columbia University,
NY

8-10 may 2014, University of Lausanne, switzerland

NeuroGenderings III

The 1st international Dissensus Conference
on brain and gender





March 25-27 2010, Centre for Gender Research, Uppsala University
neuroGenderings workshop
Critical Studies of the Sexed Brain

“Key Principles” for sex/gender neuroimaging research

- Overlap
- Mosaicism
- Contingency
- Entanglement

Rippon, Gina et al. (2014): *Frontiers in Human Neuroscience* 8, doi: 10.3389/fnhum.2014.00650



NeuroCultures –
NeuroGenderings II

13-15 September 2012
University of Vienna



NeuroGenderings IV

Upcoming 2016

Barnard Colledge
Columbia University,
NY

8-10 May 2014, University of Lausanne, Switzerland

NeuroGenderings III

The 1st international Dissensus Conference
on brain and gender

Unil

UNIL | Université de Lausanne

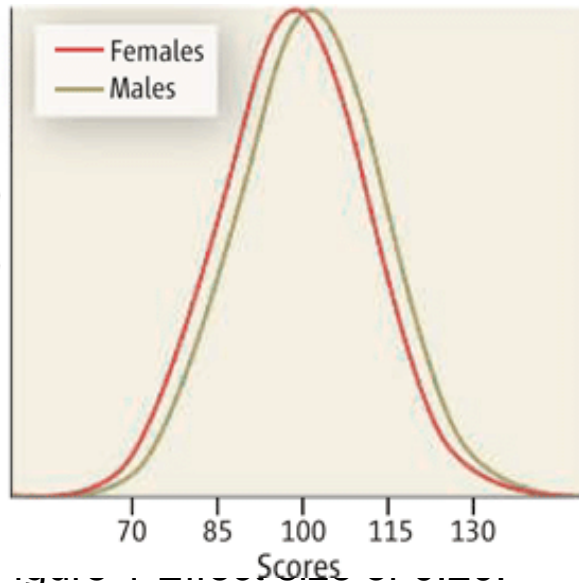


Metropolis, Fritz Lang 1927

Overlap

Geschlechtervergleiche

- Mathematisches Problemlösung:
 $d = 0.08$
- Räumliche Verarbeitung: $d = 0.11-0.35$
- Mentale Rotation: $d = 0.56-0.73$
(Hyde, Janet (2005): Am. Psychol. 60, 581-592)
- Hirngröße und Vernetzungsgrad interagieren
(Luders et al. (2004): Nature Neuroscience 7 (8): 799-800)
- Corpus Callosum (angepasst an Hirngröße):
 $d = 0.21$ *(Bishop, Katehrine / Wahlsten, Douglas (1997):
Neuroscience & Biobehavioral Reviews, 21, 5, 581-601)*
- Lateralität von sprachlichen Hirnregionen: $d = 0.21$ *(Sommer, Iris et al. (2004): Brain 127: 1845-52)*

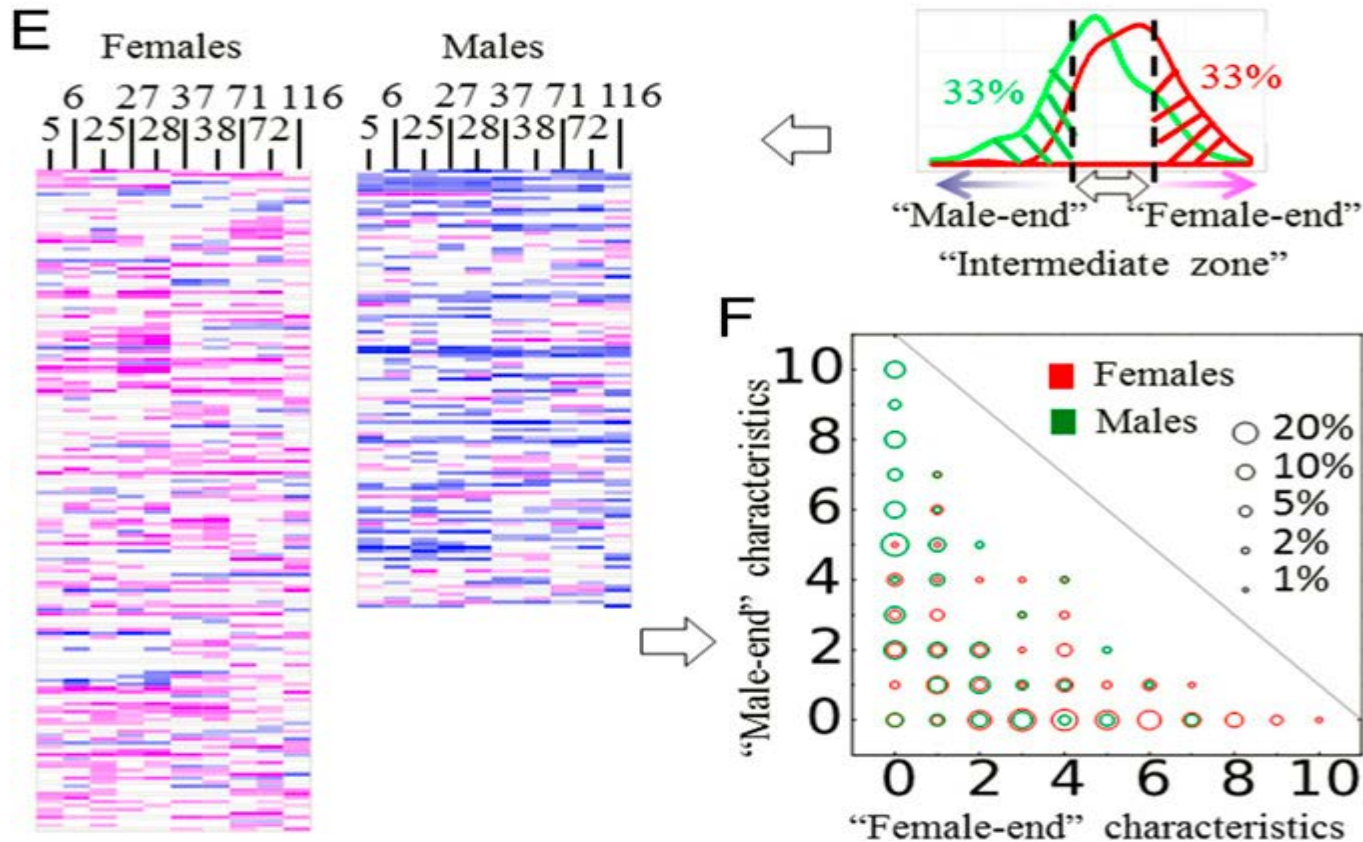


When the effect size between two groups is 0.20, 85.3% of the distributions overlap

Quelle:
Hyde, Janet (2005), Am. Psychol. 60, 581-592

Overlap ≠ Sameness
Diversity

The Human Brain Mosaic



Σ 116 Hirnareale
>1400 Gehirne

Joel, D. et al. (2015): PNAS 112:
doi: 10.1073/pnas.1509654112

- M / F differente Areale + Areale mit überlappenden Volumina
- keine einheitliche geschlechtliche Ausprägung des gleichen Areals
- Intra-individuell: „substantial variability“: 48,2-66,5% / „internal consistency“: 2.2-16,1%

Contingency: Komplexe Einflussfaktoren

Zusammenwirken biologischer und sozialer Faktoren auf Verhalten, Gehirnstrukturen und -funktionen

- Beispiel Mathematische Leistungen interkulturell
 - Strukturelle Merkmale von Geschlechterungleichheit
 - Sozialer / kultureller Status: Schicht, Bildung, Ethnizität
 - Geschlechtsidentität, Geschlechterrollenübernahme
- Stereotype Thread
 - Mentale Rotation, mathematische Performanz abhängig von Aufgabenstellung
 - Hirnaktivitäten zur Stereotypunterdrückung

(Dunst et al. (2013): *Personal and Individual Differences* 55: 744-749

Krendl et al. (2008): *Psychological Science* 19: 168–175)

➔ **erfordern intersektionale Analysen**

Entanglement & Hirnplastizität

Sprachbiographie und Sprachareale

- Zeitsprachenerwerb reorganisiert Sprachareale funktional und strukturell

Krizman, J. et al. (2014): Brain & Language 128: doi: 10.1016/j.bandl.2013.11.006

Mechelli, A. et al. (2004): Nature 431: 457

Hippocampus und Navigationserfahrung

- Taxifahrer mit viel Erfahrung haben mehr Synapsen

Maguire et al. (2000): PNAS 97: 4398-4403;

Wollett; K. / Maguire, E. (2011): Curr. Biol. 21: 2109–2114

Erfahrung und Jonglieren

- beidhändiges Jonglieren erhöht sensomotorische Synapsendichte

Draganski et al. (2004): Nature 427: 311-312

Gendereffekte

- 3-monatiges Tetris-Training erhöht Kortexdichte parietal / temporal bei Mädchen Haier et al. (2008): BMC 2

→ Ähnliche Geschlechtersozialisation → Gruppenunterschiede

→ Diverse Erfahrungen → Inter- und intra-individuelle Heterogenität

Empfehlungen für Sex/Gender Forschung

Research Design

- 1) Is there an empirically and theoretically well-grounded neurocognitive model with specific a priori hypotheses regarding sex differences in all dependent variables (including ROIs and behavioral measures where relevant)?
- 2) Is there an appropriate sample size, given that female/male behavioral phenotypes are not distinctively or qualitatively different?
- 3) Is there an appropriate sample size, given that female/male brains are not distinctively or qualitatively different?
- 4) Are full demographics given on participants, including age, height and weight or BMI, SES, educational experience, and religion?
- 5) Do the sample, participant measures and research design take any account of the contingency and entanglement of sex/gender?
- 6) Has the possibility of selecting subject groups on the basis of gendered experiences, gendered attributes etc. of a person been considered?
- 7) Has the analysis pipeline been specified?

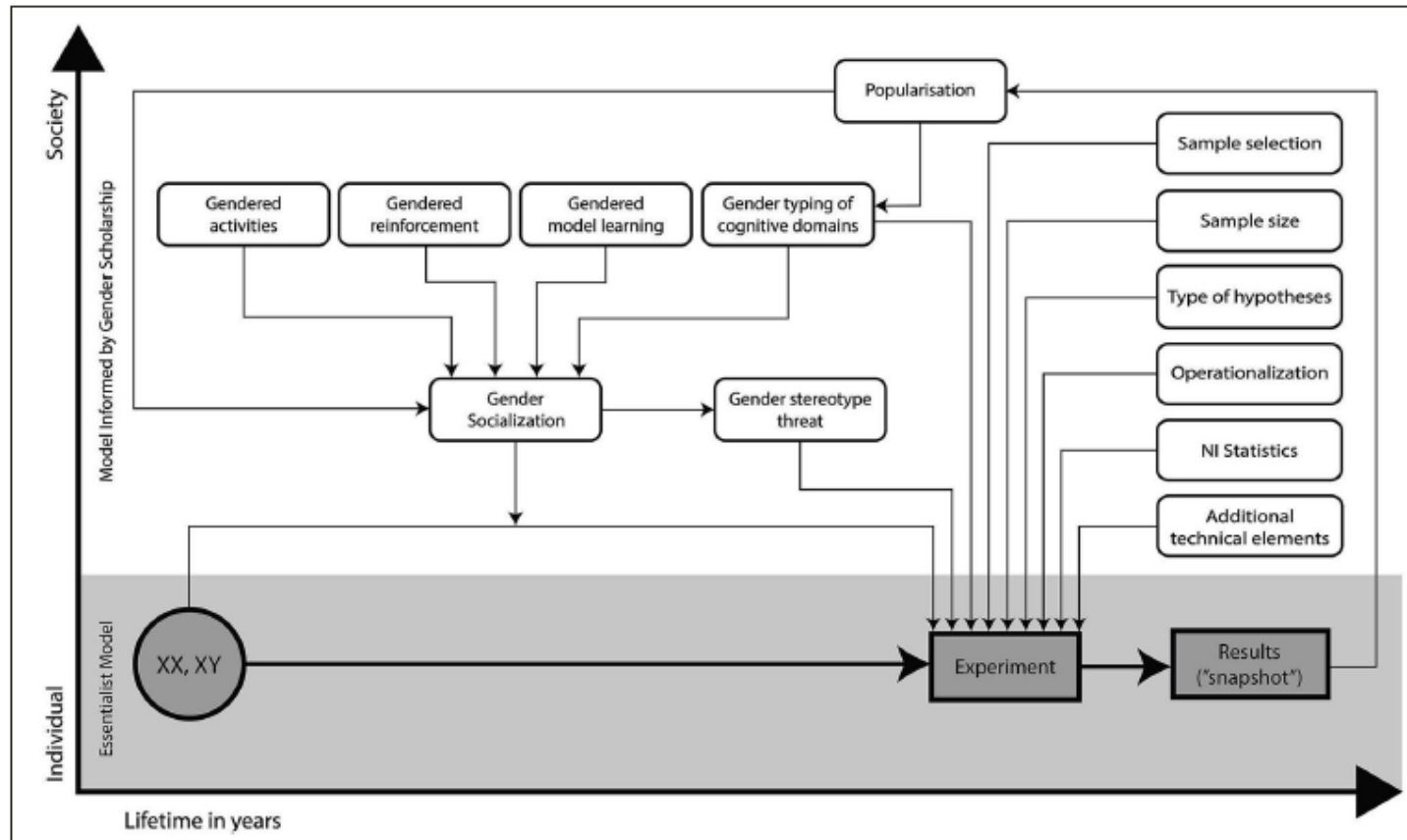
Analysis

- 1) If used, is a Region of Interest analysis appropriate and linked to a priori hypotheses?
- 2) Has the confound of brain size been controlled for?
- 3) Are statistical comparisons and diagrams drawn from between-group, rather than within-group contrasts?
- 4) What is the appropriate measurement of the behavioral task?
- 5) Where both cortical and behavioral measures are taken, are interactions analyzed using appropriate statistical techniques.
- 6) Do different (statistically accepted) thresholds lead to different results in terms of sex/gender difference and similarity?

Interpretation

- 1) Are effect sizes provided, and information about overlap also represented diagrammatically, where applicable?
- 2) Is there a mix of positive and null findings? Which results are emphasized in the abstract and discussion? Are null findings 'lost'?
- 3) Is the functional or theoretical significance clearly addressed (avoiding the assumption, without supporting reasons, that these are implied by statistical significance)?
- 4) Are any reverse inferences consistent with behavioral data, with brain-behavior correlations (provided in a follow-up study, if necessary), and with previous empirical research regarding the behavioral implications of less versus more activation in a particular region (or particular connectivity patterns) on the task?
- 5) Does the discussion explore any documented evidence of the plasticity or contingency of the behavior of interest and relate that to the interpretation of findings?
- 6) Is terminology (such as dimorphism, sex difference, female or male phenotype, and variables "affected by sex") appropriate to the research design and the size of the distribution of any sex/gender differences found?
- 7) If the female/male comparison is exploratory and post-hoc, has it been replicated in an independent sample?
- 8) Has it been considered that a study that approaches sex/gender as a subject variable is only an ex-post facto study and, thus, it cannot demonstrate that sex/gender causes differences in any behaviour?

Sex/Gender informed Neuroscience



Rippon, Gina et al. 2014: *Frontiers in Human Neuroscience* 8, doi: 10.3389/fnhum.2014.00650

Initiative II: Epigenetische Dialoge

Ziel:

Interdisziplinärer Dialog auf gleicher Ebene zwischen Biomedizin, Gender Studies, Wissenschaftsforschung (STS)

Leitfragen:

- Von bio-medizinischer Seite:
Wie können soziale Einflüsse auf das Epigenom untersucht werden?
- Von Seiten der Gender Studies / STS:
Wie können biologische Prozesse differenziert berücksichtigt werden?
- Gemeinsame Fragen:
Welche gesundheitsrelevanten, individuelle und gesellschaftliche Implikationen hat epigenetische Forschung?



Epigenetics, Society & Gender

INTERDISCIPLINARY WORKSHOP

The workshop brings together scholars from biology, the social sciences and the humanities to discuss relevant questions in the field of epigenetics, science studies and gender studies.

Participation is free of charge. Registration is asked for by 15 June 2012 to epigenetik.gender@univie.ac.at.

22 June 2012
10.00–19.00

Campus Vienna Biocenter
Dr.-Bohr-Gasse 9 (6th Floor)
1030 Vienna

<http://gender.univie.ac.at>



Organisation

Sigrid Schmitz and Ruth Müller | Gender Research Office at the University of Vienna
in co-operation with Renée Schroeder | Department of Biochemistry and Cell Biology at the University of Vienna
E-Mail: epigenetik.gender@univie.ac.at | <http://gender.univie.ac.at>

PROGRAMME

- 10.00 c.t. **Welcome Note & Introduction**
Ao. Univ.-Prof.ⁱⁿ Dr.^a Christa Schnabl | Vice Rector University of Vienna
Univ.-Prof.ⁱⁿ Dr.^a Renée Schroeder | University of Vienna
Univ.-Prof.ⁱⁿ Dr.^a Sigrid Schmitz | University of Vienna
- 10.30–11.30 **Epigenetics: From Basic Mechanisms to Disease**
Ass.-Prof.ⁱⁿ Dr.^a Gerda Egger | Medical University of Vienna
- 12.00–13.00 **Epigenetics & Practice: How Bodies-in-Action May Constitute a Common Epistemic Object for Social Science and Biology**
Dr. Jörg Niewöhner | Humboldt University Berlin
- 13.00–14.00 Lunch Break
- 14.00–16.00 **Guided Discussion Groups**
Chair: Ass.-Prof.ⁱⁿ Dr.^a Gerda Egger | Medical University of Vienna
Martha Kenney B.A. | University of California, Santa Cruz
Dipl.-Biol.ⁱⁿ Barbel Mauss | Technical University Berlin
Mag.^a Ruth Müller | University of Vienna
Dr. Jörg Niewöhner | Humboldt University Berlin
Univ.-Prof.ⁱⁿ Dr.^a Sigrid Schmitz | University of Vienna
& students of the MA Gender Studies | University of Vienna
- 16.30–17.30 **Gendered Politics of the Epigenome. Nature, Nurture, and Parenthood in Environmental Epigenetics**
Martha Kenney B.A. | University of California, Santa Cruz
Mag.^a Ruth Müller | University of Vienna
- 17.30–19.00 **Epigenetics, Society & Gender: Developing New Perspectives Together**
Final Discussion and Outlook

"Epigenetics, Society & Gender" is kindly supported by



Kooperative Organisation: Prof. Dr. Sigrid Schmitz (Gender Studies/Biologie), Prof. Dr. Renée Schroeder (Leiterin Dep. Biochemie und Max F. Perutz Laboratories), Dr. Ruth Müller (Molekularbiologie/Wissenschaftsforschung)

Aktuelle Forschungsbeispiele und Herausforderungen

Environmental Epigenetics

- Diät, Umweltbelastung, Verhalten → Krebs, Diabetes
→ **Nutrigenomics und Kommerzialisierung?**

Transgenerational Epigenetics

- Ernährungsdeprivation auf Immunabwehr über sechs Generationen (Dutch Hunger Winter, *Heijmans et al. 2008: PNAS 105: 17046–17049*)
→ **Operationalisierung komplexer sozialer Faktoren?**
- Maternales Sozialverhalten auf Adipositas-Disposition der Kinder
→ **Begriffsdefinitionen, Verantwortungszuschreibung?**

Genomic Imprinting

- Wachstum und Immunabwehr
- Sozialität
→ **Widersprüche sexueller Binarität**

Schmitz, Sigrid (2014): Gender in Science. In: Paulitz et al. (Hg.): Akademische Wissenskulturen, 228-250.

Krall, Lisa / Schmitz, Sigrid (2016): Potenziale epigenetischer Forschung für das Konzept ‚sex vs. gender‘. Gender 2/16 (in press).

Pickersgill, Martin et al. (2013): New Genetics and Society 32, doi: 10.1080/14636778.2013.861739

Alte-Neue Ansätze für Dialog

- Einstieg: Forschungsfelder der “natureculture” Intra-Aktionen
- Inklusion: Sex/Gender und intersektionale Kategorien im Zentrum der Analysen
- Herausforderung: Kategorisierung multidimensionaler Faktoren und ihrer Wechselwirkungen
- Hinterfragen: Potentiale und Grenzen empirischer Ansätze in MINT und Sozialwissenschaften
- Problematisieren: Biologisierung des Sozialen
- Einbinden: Ethische und soziale Impacts, Verantwortung der Forschung
- Reflektieren: Prozesse der Wissensproduktion und -konstruktion