

**ETTORE MAJORANA FOUNDATION AND CENTRE FOR
SCIENTIFIC CULTURE**

(Director: Prof. A. Zichichi)

INTERNATIONAL SCHOOL OF ETHOLOGY

“Danilo Mainardi”

(Director: Prof. S. Parmigiani)

45th Workshop on:

***“Sex Differences, Dimorphisms, Divergences:
Impact on Brain and Behavior in Health and Disease”***

<http://schools.centromajorana.it/sexdiff2019/#home>

May 20-25, 2019

Directors: Paola Palanza, Margareth McCarthy, Stefano Parmigiani



Congress venue:

**ETTORE MAJORANA FOUNDATION AND CENTRE FOR
SCIENTIFIC CULTURE**

Via Guarnotta, 26 - 91016 ERICE (Sicily) - Italy

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<http://www.ccsem.infn.it/>



ERICE

On the lone mount (750 m high) in far west Sicily, stands Erice, a medieval town which has been kept intact until today. It is an artistic center and the main tourist resort of the district. In Erice you can admire the castle of Venus, the Cyclopean walls (around 800 B.C.) and the Gothic Cathedral (around 1300 A.D.)

The Majorana Centre for Scientific Culture offers an opportunity for a relaxed informal exchange of ideas among students and faculty, enhanced by the charm of this old mountain-top city.

Finding your way in Erice can be initially very confusing. If you become lost the centre can be found again by remembering that one has to walk up hill to it and so any route that takes you upwards will eventually bring you there.

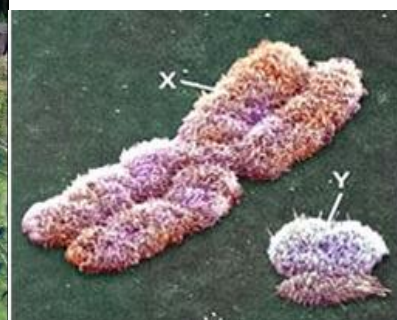
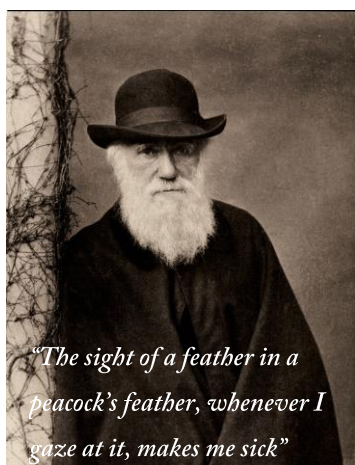


PURPOSE OF THE WORKSHOP

The overall purpose of the Workshop is to explore the extent to which sex differences affect brain and behavior, contribute to vulnerability to disease and how cultural and societal roles intersect with the biological basis of sex. The workshop will focus on several topic areas to increase our understanding of the mechanisms by which sex and gender, in animal models and people, respectively, influence health and disease. The format will involve talks by international renowned scientists, who have been engaged in research comprising multidisciplinary approaches from sexual selection to epigenetic mechanisms, from behavior to gender medicine, from biology to culture. All speakers are prepared to discuss how their research relates to concepts arising from the other disciplines to facilitate a highly interdisciplinary and interactive workshop for all the participants.

TOPICS OF THE WORKSHOP

- *Sexual Selection Theory and Evolution*
- *Comparative studies of male and female strategies*
- *Mechanisms of sex differentiation*
- *Sex specific outcomes*
- *Differential impact of disease*
- *Gender medicine*
- *Consequences for Society, Culture, Religion*



ARRIVAL DAY AND REGISTRATION (May 20, 2019)

It takes about 1.5h from the airport of Palermo and less than 1h from the airport of Trapani to get to Erice.

Please register at the Congress venue (Centro di Cultura Scientifica Ettore Majorana, Istituto S. Rocco, via Guarnotta 26, Erice) on the 20th of May. Your room will be in the S.Rocco Institute itself or in the other locations of the Majorana Center, at walking distance from the congress venue.

As soon as you get your badge, you're allowed to go to one of the restaurants that have an agreement with the Ettore Majorana Center.

A welcome get together drink will take place after dinner, at around 9.00/9.30 pm in the "Marsala Room" in the S. Rocco Institute.



May 21, 2019

Paul Dirac Lecture Hall - San Domenico

Welcome

9:00 -9:20 – **STEFANO PARMIGIANI (University of Parma, IT)**

The Erice Center for Scientific Culture and The International School of Ethology “D.Mainardi”

9:20-9:50 – **MARGARETH MCCARTHY & PAOLA PALANZA**

Introduction to the workshop “Sex differences, divergences, dimorphisms...”

Session#1

9:50-10:40 – **ANDREA PILASTRO (University of Padova, IT)**

Evolution of Anisogamy, Sexual Selection and sexual conflict

10:40-11:00 coffee break

11:00-11:50 – **GREG BALL (University of Maryland USA)**

Sex differences in the songbird brain: hormone plasticity and behavior

11:50 -12:40 – **MELISSA HINES (University of Cambridge, UK)**

Human Gender development

12:40 – Lunch break

Session #2

14:50-15:50 – **SELECTED PRESENTATIONS**

- **Delage CI** (University of Liège, B) – *Microglia and prostanoids, potential players in sexual differentiation of the brain and behavior of the Japanese quail.*

- **Cornil CA** (University of Liège, B) – *Membrane estrogen receptor alpha participate in the organization of the brain by perinatal estrogen.*

- **Lucas E.** (North Carolina State University, USA) - *A sex-specific circuit for fear memory encoding*

- **Szakats SK** (University of Otago, NZ) - *Sex, Brains & RNA*

15:50-16:40 – **DAPHNA JOEL (Tel Aviv University, IL)**

Rethinking sex and the brain: from dimorphism to mosaic

16:40 – 17:00 coffee break

17:00-17:50 – **JACQUES BALTHAZART (University of Liege, BE)**

Sex partner preference in animals and humans

17:50-18:40 – **FR. ALBERTO FRIGERIO (Arcidiocesi di Milano, IT)**

'The two shall become one flesh. This is a great mystery' (Eph 5:31b-32a)

18:40-19:00 – **General discussion**



May 22, 2019

Paul Dirac Lecture Hall - San Domenico

Session #3

9:00-9:50 - **LARRY YOUNG (Emory University, USA)**

Sex differences and similarities in the neurobiology of pair bonding

9:50-10:40 - **DEBRA BANGASSER (Temple University, USA)**

Sex differences in stress regulation of arousal and cognition

10:40 coffee break

11:00-11:45 – **PAOLA PALANZA (University of Parma, IT)**

Sex biased impact of genetic and environmental factors

11-45-12:30 – **CAROLINA EVA - ILARIA BERTOCCHI (University of Torino, IT)**

Sex-dependent regulation of hypothalamic neuropeptide Y-Y1 receptor

12:20-13:10 – **SELECTED PRESENTATIONS**

- **Gaspar R.** (University of Coimbra, P) - *Prenatal stress exerts a sex-specific effect in programming stress coping strategies in adulthood and in modulating microglia morphology in the Nucleus Accumbens*

- **Gomes C.A.** (University of Coimbra, P)- *Testosterone-driven sexual dimorphism in microglia morphology and mood*

- **Marraudino M.** (University of Torino, I) - *Postnatal treatment of estrogen receptor antagonists alters sexual and feeding behavior in male and female mice*

13:10-15:30 - **LUNCH and POSTER SESSION**

Session #4

15:40-16:30 - **MARGARETH MCCARTHY (University of Maryland, USA)**

Immune origins of sex differences in the brain

16:30-17:20 - **ARMIN RAZNAHAN (NIMH, USA)**

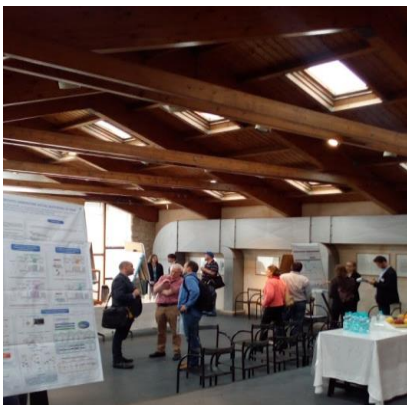
Sex-Biased Brain Development in Humans: Maps, Mechanisms and Meanings

17:20 coffee break

17:50-18:40 – **CHUCK ROSSELLI (Oregon University, USA)**

Sex differences in kisspeptin expression: a role in sexual differentiation

18:40-19:00 – **General Discussion**



May 23, 2019

Paul Dirac Lecture Hall - San Domenico

Session #5

9:00-9:50 – **ARTHUR P. ARNOLD (University of California Los Angeles, USA)**

Sex differences caused by sex chromosome genes

9:50-10:40 – **CHRISTINE DISTECHE (Washington University, USA)**

Regulation and 3 D structure of the X chromosome and impact on sex chromosome disorders

10:40 – coffee break

11:10-12:00 – **DAVID GEARY (University of Missouri, USA)**

Evolution of Sex Differences in Trait- and Age-Specific Vulnerability

12:00-13:00 – **SELECTED PRESENTATIONS**

- **Alonaizan R.** (University of Strathclyde, UK) – *Sex-influenced histopathological changes and immune response during toxoplasma gondii infection*

- **Gonçalves, J.** (University of Coimbra, P) - *Neurofibromatosis 1 results in sex-specific changes in brain morphometry, neurochemical profile and behavior in infant and pre-pubertal mice*

- **Bhargava A.** (University of California San Francisco, USA) - *Lipidome analysis in men and women with posttraumatic stress disorder.*

- **Furman O.** (Sheba Medical Centre, IL) - *Sex Differences in Glioblastoma: Current Status and Future Directions*

13:00 - Lunch

Session#6

15:00-15:50 – **ANNE MURPHY (Georgia State University, USA)**

Influence of sex and age on pain perception and morphine action

15:50-16:40 – **ROBERTA BRINTON (Arizona University, USA)**

Sex Hormones metabolism and Alzheimer disease

16:40 - coffee break

17:00-17:50 – **KATHRYN SANDBERG (Georgetown University, USA)**

Mechanisms underlying increased anxiety and cognitive decline induced by ovarian hormone loss

17:50-18:40 – **GENERAL DISCUSSION AND CLOSING REMARKS**

18:40 - Free time

20:30 – Altogether Dinner



May 24, 2019

FULL-DAY ARCHEOLOGICAL TOUR

A bus will bring us to Segesta and Selinunte, two of the most beautiful Magna Grecia archeological attractions of Sicily.

Selinunte, temples and beach



Segesta, temple and theater

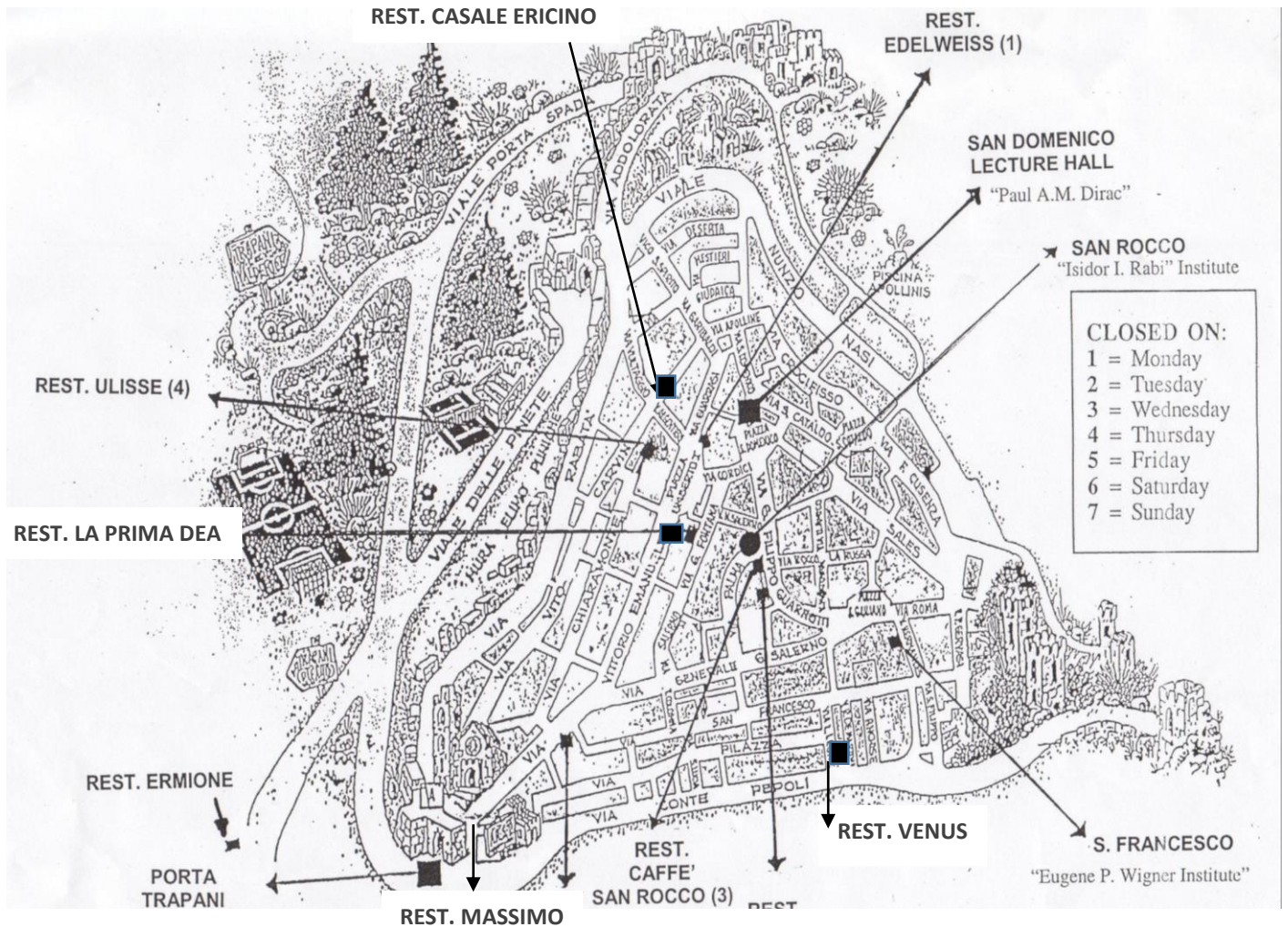


May 25, 2019

-- Departures

Look in the hall in San Rocco for the timetable of your scheduled shuttle to the airport.

ERICE MAP



Restaurants that have an agreement with the E. Majorana Centre:

- Caffè San Rocco
- Edelweiss
- Il Casale Ericino
- La Prima Dea
- Massimo Ristorante
- Venus



POSTER PRESENTATIONS

- Arambula SE**, University of Maryland School of Medicine, Baltimore, Maryland, USA - *Neonatal hypoxia-ischemia during a period sensitive to inflammation impacts the developing cerebellum and reduces purkinje cell dendritic complexity only in males*
- Ashton SE**, University of Maryland School of Medicine, Baltimore, Maryland, USA - *Exploring sex differences in the rewarding properties of juvenile rat social play*
- Baptista FI**, University of Coimbra, Coimbra, Portugal - *Impact of maternal diabetes on the offspring: sex differences in neurodevelopment and in short-term memory*
- Bhargava A**, University of California San Francisco, San Francisco, California, USA - *Corticotropin-releasing hormone type 2 receptor deficiency impairs pancreatic function in a sex-specific manner*
- Bonaldo B**, Università degli Studi di Torino and NICO, Orbassano, Torino, Italy - *Exploring the effects of chronic perinatal exposure to bisphenol a in the experimental autoimmune encephalomyelitis*
- Cosentino L**, Istituto Superiore di Sanità and Sapienza University of Roma, Italy - *Stress affects cognitive functions through an interplay between mecp2 and sex*
- Eck S**, Temple University, Philadelphia, Pennsylvania, USA - *Early life stress has lasting effects on development and sex- specific effects on cognition in rats*
- Galvão S.**, University of Coimbra, Coimbra, Portugal - *Prenatal exposure to stress mediators disturbs early neurodevelopment in a sex-specific manner*
- Godwin J**, North Carolina State University, Raleigh, North Carolina, USA - *Differential impacts of strain, sex, and rearing environment on anxiety-related behavior and baseline corticosterone in wild- derived and domestic mice*
- Hernández A**, Centro de Investigación y de Estudios Avanzados del IPN México City, México - *Influence of maternal multiparity and gestational stress on sexual preference of the male progeny*
- Levinsson A**, Beaulieu-Saucier Université de Montréal Pharmacogenomics Centre, Montreal Heart Institute and Université de Montréal, Montreal, Quebec, Canada - *Sex, alcohol and depression: a study using the UK biobank*
- Marquardt AE**, University of Maryland, Baltimore, Maryland, USA - *Sex-independent and -dependent transcriptional signatures in the medial amygdala reflect differences in juvenile social play behavior*
- Mueller Sven C**, Ghent University, Ghent, Belgium - *Do the brains of transgender persons resemble those of their gender identity or their sex assigned at birth? preliminary findings from the enigma transgender persons working group*
- Nelson JF**, University of Texas Health San Antonio - *Sexual dimorphism and age specificity in the efficacy of lifespan- extending drugs in genetically heterogeneous mice*
- Ordoñez Sanchez E**, Temple University, Philadelphia, USA - *Chronic stress regulation on impulsive choice*
- Sanchis-Segura C**, Universitat Jaume I, Castelló, Spain - *Sex differences in grey matter volume: how many and how large they are really?*
- Sze Y**, University of Edinburgh, Edinburgh, United Kingdom - *Neuroactive steroid responses to acute swim stress in prenatally stressed rats*
- VanRyzin JW**, University of Maryland School of Medicine, Baltimore, Maryland, USA - *Understanding endogenous and exogenous cannabinoids in the development of sex differences in brain and behavior*
- Wolf DC**, Centre Hospitalier Universitaire Sainte-Justine and Université de Montréal, Montréal, Canada - *Sex and inhibition: sex-specific differences in the development of the hippocampal gabaergic network*
- Wyatt TD**, University of Oxford, Oxford, United Kingdom - *Pheromones: sexual dimorphism in production, reception and response*



LIST OF PARTECIPANTS

1. **Alonaizan Rasha**, Strathclyde University, Glasgow, UK
2. **Arambula Sheryl**, School of Medicine, University of Maryland, Baltimore, Maryland, USA
3. **Arnold Arthur P.**, Dept of Integrative Biology & Physiology, University of California Los Angeles, Los Angeles, California USA
4. **Ashton Sydney**, School of Medicine, University of Maryland, Baltimore, Maryland, USA
5. **Ball Gregory F.**, College of Behavioral and Social Science University of Maryland, College Park, Maryland, USA
6. **Balthazart Jacques**, Neuroendocrinology Lab, University of Liegi, Liegi, Belgium
7. **Bangasser Debra**, Dept of Psychology and Neuroscience, Temple University, Philadelphia, Pennsylvania, USA
8. **Baptista Filipa**, Coimbra Institute for Clinical and Biomedical Research, University of Coimbra, Faculty of Medicine, Coimbra, Portugal
9. **Bertocchi Ilaria**, Neuroscience Institute Cav. Ottolenghi, University of Torino, Orbassano (TO), Italy
10. **Bhargava Aditi**, University of California San Francisco, San Francisco, California, USA
11. **Bilic Ilija**, Max Delbrück Centre for Molecular Medicine, Berlin-Buch, Germany
12. **Bonaldo Brigitta**, University of Turin, NICO-Department of Neuroscience "Rita Levi Montalcini", Orbassano (Torino), Italy
13. **Brinton Roberta**, Center for Innovation in Brain Science, Arizona University, Tucson, USA
14. **Collaer Marcia**, Middlebury College- University of Cambridge, Cambridge, UK
15. **Coon Matthew**, NIMH, Bethesda, Maryland, USA
16. **Cornil Charlotte**, Neuroendocrinology Lab GIGA Neurosciences, University of Liege, Belgium
17. **Cosentino Livia**, Center for Behavioral Sciences and Mental Health, Istituto Superiore di Sanità, Roma, Italy
18. **Delage Charlotte**, Laboratory of Behavioral Neuroendocrinology, University of Liege, Belgium
19. **Disteche Cristine M.**, Dept of Pathology, University of Washington Seattle, Washington, USA
20. **Eck Samantha**, Temple University, Philadelphia, Pennsylvania, USA
21. **Frigerio don Alberto**, Pontificio Seminario lombardo, Roma, Italy
22. **Furman Orit**, Sheba Medical Center, Ramat Gan, Israel
23. **Galvão Sofia**, iCBR, Faculty of Medicine, University of Coimbra, Coimbra, Portugal
24. **Gaspar Rita**, iCBR Coimbra Institute for Clinical and Biomedical Research, Coimbra, Portugal
25. **Geary David**, Dept. of Psychological Sciences, University of Missouri, Columbia- MO, USA
26. **Gioiosa Laura**, Department of Medicine and Surgery, University of Parma, Parma, Italy
27. **Godwin John**, Dept Biological Sciences, North Carolina State University, Raleigh, NC, USA
28. **Gomes Catarina**, Faculty of Medicine, University of Coimbra, Coimbra, Portugal
29. **Gonçalves Joana**, CIBIT/ICNAS/UC, Coimbra, Portugal



30. **Halperin Orly**, Bar Ilan University, Tel Aviv, Israel
31. **Hernandez Alejandra**, Department of Pharmacobiology, Centro de Investigación y de Estudios Avanzados del IPN México City, México City, Mexico
32. **Hines Melissa**, Department of Psychology, University of Cambridge, Cambridge, UK
33. **Joel Daphna**, School of Psychological Sciences, Tel Aviv University, Tel Aviv, Israel
34. **Levinsson Anna**, Institute de Cardiologie de Montréal - Centre de Recherche, University of Montreal, Canada
35. **Lucas Elizabeth**, North Carolina State University, Raleigh, North Carolina, USA
36. **Lugli Marco**, Department of Chemistry, Life Science and Sustainability, University of Parma, Parma, Italy
37. **Marquardt Ashley**, School of Medicine, University of Maryland, Baltimore, Maryland, USA
38. **Marraudino Marilena**, NICO - Department of Neuroscience "Rita Levi Montalcini", University of Turin, Italy
39. **McCarthy Margaret**, School of Medicine, Department of Pharmacology, University of Maryland, Baltimore, Maryland, USA
40. **Mueller Sven**, Ghent University, Ghent, Belgium
41. **Murphy Anne Z.**, Neuroscience Institute, Georgia State University, Atlanta, Georgia, USA
42. **Nelson James**, Barshop Institute for Longevity and Aging Studies, University of Texas Health, San Antonio, USA
43. **Norris Colleen**, University of Alberta, Edmonton, Alberta, Canada
44. **Ordones Evelyn**, Temple University, Philadelphia, Pennsylvania, USA
45. **Palanza Paola**, Neuroscience Unit - Department of Medicine and Surgery, University of Parma, Parma, Italy
46. **Parmigiani Stefano**, Department of Chemistry, Life Science and Sustainability, University of Parma, Italy
47. **Pasterski Vickie**, Gender Development Research Centre, University of Cambridge, UK
48. **Pilastro Andrea**, Dept. Biologia, University of Padova, Padova, Italy
49. **Ramundo Greta**, Neuroscience Unit - Department of Medicine and Surgery, Università di Parma, Parma, Italy
50. **Raznahan Armin**, Developmental Neurogenomics Unit, National Institute of mental Health, Bethesda, Maryland, USA
51. **Roberts Craig**, University of Strathclyde, Strathclyde Institute of Pharmacy and Biomedical Sciences, Glasgow, UK
52. **Roselli Chuck**, Dept of Physiology and Pharmacology, Oregon Health & Science University, Portland, Oregon, USA
53. **Ross Jessica**, Scherrer Lab, Stanford University, Palo Alto, California, USA
54. **Sanchis-Segura Carla**, Universitat Jaume I, Castelló de la Plana, Spain
55. **Sandberg Kathryn**, Dept of Medicine - Center for the Study of Sex Differences in Health, Aging and Disease, Georgetown University, Washington DC, USA
56. **Shalom Shir**, The Gonda multidisciplinary brain research center, Bar Ilan University, Ramat Gan, Israel



57. **Spencer Debra**, Department of Psychology, University of Cambridge, Cambridge, UK
58. **Szakats Susie**, University of Otago, Dunedin (Otago), New Zealand
59. **Sze Ying**, University of Edinburgh, Edinburgh, UK
60. **Van Ryzin Jonathan**, School of Medicine, University of Maryland, Baltimore, Maryland, USA
61. **Wolf Daniele**, Université de Montréal, Montréal, Quebec, Canada
62. **Wyatt Tristan**, University of Oxford, Oxford, UK
63. **Young Larry J.**, Dept. of Psychiatry - Center for Translational Neuroscience, Emory University, Atlanta, Georgia, USA
64. **Young Amelia**, Charite- Universitätsmedizin Berlin, Berlin, Germany



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