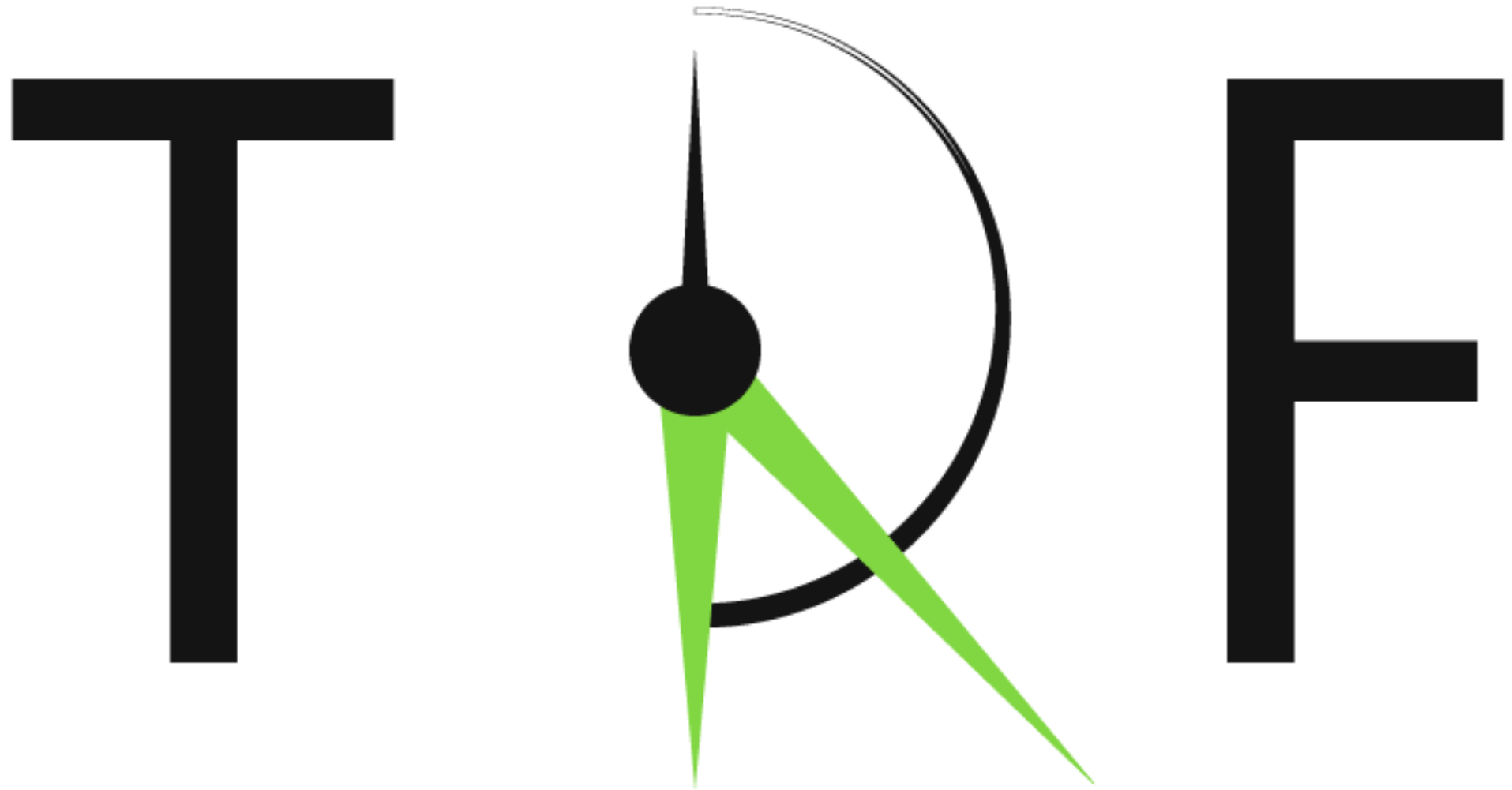


**Sundeeep Teki & Argi Vatakis**




TIMING RESEARCH FORUM


**#TRF1, Strasbourg**



# TIMELY (2010-14)




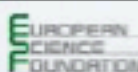
**cost** Action TD0904 2010-2014 



**Time In MEntaL activiTY**  
theoretical, behavioral, bioimaging, and clinical perspectives (TIMELY)

[www.timely-cost.eu](http://www.timely-cost.eu)

 COST is supported by the EU RTD Framework Programme

ESF provides the COST Office through an EC contract 



# TIMELY

TIMELY brought together 318 timing researchers  
(112 female and 122 early-stage researchers)

- 1 the definition and measurement of timing;
- 2 the developmental and cognitive factors affecting time perception;
- 3 the use of basic research findings in real-world applications;  
the definition of the neural correlates of time perception.



# TIMELY

## Significant achievements

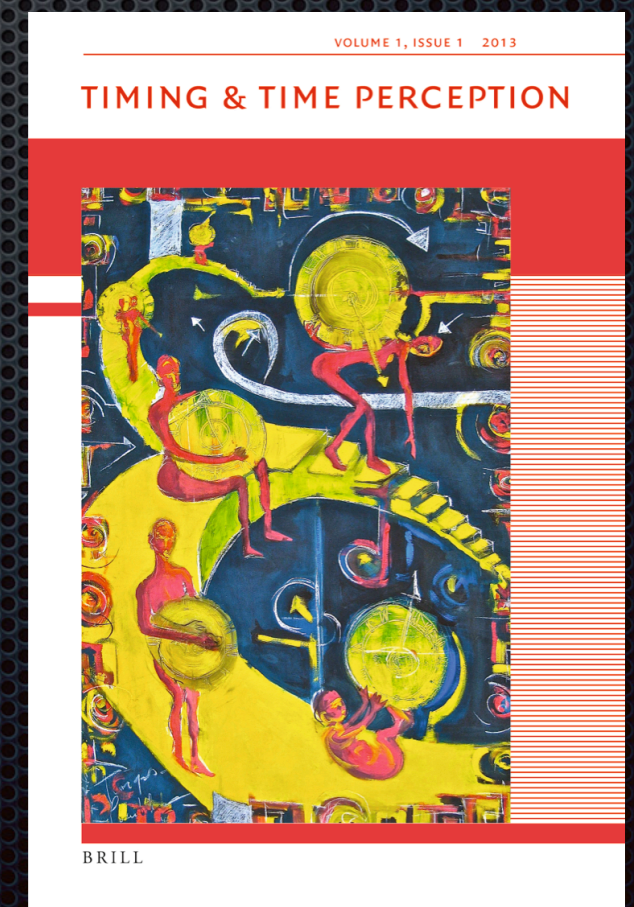
Thanks to TIMELY, Europe has become an active hub for European and international cooperation, time-related events, training courses for young scientists, and many publications.

### DISSEMINATION ACTIVITIES

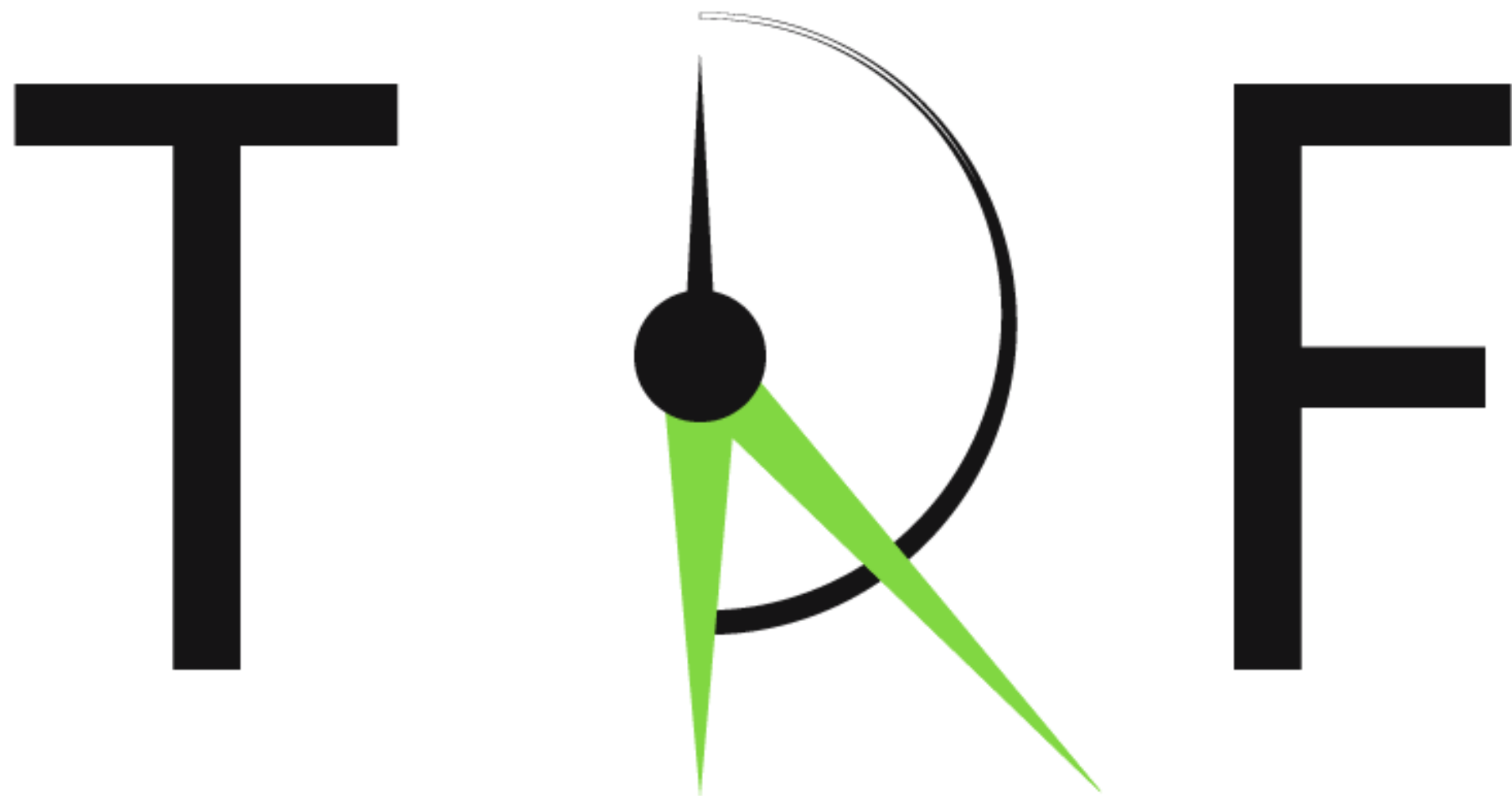
This large network of scientists organised numerous activities and produced many publications, including:

- three conferences
- 20 workshops/ symposiums
- six training schools
- 17 STSMs (short-term scientific missions)
- 14 collaborative works (e.g. edited books, Journal issues).

Furthermore, TIMELY was the main driving force behind the establishment of two new journals devoted solely to timing and time perception:







TIMING RESEARCH FORUM

**June 2016 - present**



# A Citation-Based Analysis and Review of Significant Papers on Timing and Time Perception

Sundeep Teki \*

**TABLE 1 | List of 150 papers on timing and time perception from 2000 to present sorted according to the number of citations (minimum of 100 citations) in Google Scholar collated on 10 April, 2016 (see Section Key Papers on Timing and Time Perception for More Details).**

Citation and rank	Reference	Year	Journal	Summary
1305* [1, 1]	Patel	2008	Oxford Uni Press	A book that analyses music cognition in relation to language from the standpoint of cognitive neuroscience.
1192*, [2, 2]	Buhusi and Meck	2005	<i>Nat. Rev. Neurosci.</i>	Time is represented in a distributed manner through coincidental activation of cortico-striatal neuronal populations.
1054, [3, 4]	Boroditsky	2001	<i>Cogn. Psychol.</i>	Native language shapes how we think about time.
1036, [4, 6]	Boroditsky	2000	<i>Cognition</i>	Time structure is shaped by metaphorical mapping from experiential domains like space.
719, [5, 13]	Rao et al.	2001	<i>Nat. Neurosci.</i>	Cortical-subcortical network mediates different components of temporal processing.
623, [6, 3]	Casasanto and Boroditsky	2008	<i>Cognition</i>	Spatial information affects judgments about duration but not vice versa.
622*, [7, 14]	Lewis and Miall	2003	<i>Curr. Opin. Neurobiol.</i>	Timing is measured by automatic (motor) system and cognitive (prefrontal and parietal) systems.
587*, [8, 12]	Mauk and Buonomano	2004	<i>Ann. Rev. Neurosci.</i>	Temporal processing depends on state-dependent changes in network dynamics.
569*, [9, 15]	Matell and Meck	2004	<i>Cogn. Brain. Res.</i>	Striatal beat frequency model proposes basal ganglia as coincidence detector of cortical and thalamic input.
551*, [10, 16]	Ivry and Spencer	2004	<i>Curr. Opin. Neurobiol.</i>	Cerebellum mediates precise timing and basal ganglia mediates decisions for longer intervals.
512, [11, 11]	Wittmann et al.	2006	<i>Chronobiol. Int.</i>	Social jetlag, i.e., the discrepancy between social and biological timing affects wellbeing and stimulant consumption.
469, [12, 10]	Grahn et al.	2007	<i>J. Cogn. Neurosci.</i>	Basal ganglia and Supplementary Motor Areas mediate beat perception, in addition to motor production.
450, [13, 23]	Coull et al.	2004	<i>Science</i>	Attention to time is mediated by a corticostriatal network.
410*, [14, 45]	Matell and Meck	2000	<i>Bioessays</i>	Coincidence detection of neural activity represents a fundamental mechanism of timing.
379*, [15, 47]	Grondin	2001	<i>Psychol. Bull.</i>	Weber's law provides a framework for psychological models of time.
364*, [16, 25]	Ivry et al.	2006	<i>Ann. N. Y. Acad. Sci.</i>	Cerebellum provides an explicit representation of time.
364, [17, 50]	Coull et al.	2000	<i>Neuropsychologia</i>	Temporal orienting depends on sensory events and top-down expectations.



# Mission

- ✦ Provide an open platform for timing researchers to get together, collaborate, share research and exchange resources and information relevant for timing research.
- ✦ Promote timing research and open science practices and support early career researchers
- ✦ Organize dedicated conferences focused on timing
- ✦ Engage with the timing research community - website, newsletters, blogs, social media



# Committee

- ✦ 20 members with diverse timing research experience
  - ✦ 10 countries
  - ✦ 8F, 12M
- ✦ **Call for Early Career Researcher Committee**  
comprising of senior graduate students and postdoctoral researchers.

Apply with a statement of how you would like to contribute to TRF and shape it's vision - [trf@timingforum.org](mailto:trf@timingforum.org).



# Membership

- ✦ **Website:**

- ✦ > 625 members

- ✦ **ResearchGate:**

- ✦ > 325 members, > 3000 views

- ✦ **Twitter:**

- ✦ > 350 followers, > 400 tweets

- ✦ **Facebook:**

- ✦ ~ 400 followers



# Resources

- ✦ Blogs - article reviews, Q&A interviews etc.
- ✦ Newsletter
- ✦ Host publications of all TRF members
- ✦ Timing meetings
- ✦ Timing Books
- ✦ Job/conference advertisements
- ✦ Mentoring resources



# Blogs (n > 85)



**Molly Henry**



**Bronson Harry**



**Bowen Fung**  
**(Social Media Manager)**



**Mukesh Makwana**  
**(Website Manager)**



**Bharath Chandra**



**Ryszard A.**



# TRF Conferences

- ✦ **Open-science**

- ✦ Collaboration with Open Science Foundation
- ✦ Encourage every attendee to share their science

- ✦ **Program:**

- ✦ Keynotes / Symposia / Oral / Posters
- ✦ Workshops / Tutorials
- ✦ Proceedings to be published in T&TP
- ✦ Focus on ECRs: keynote speaker/poster blitz/travel grants

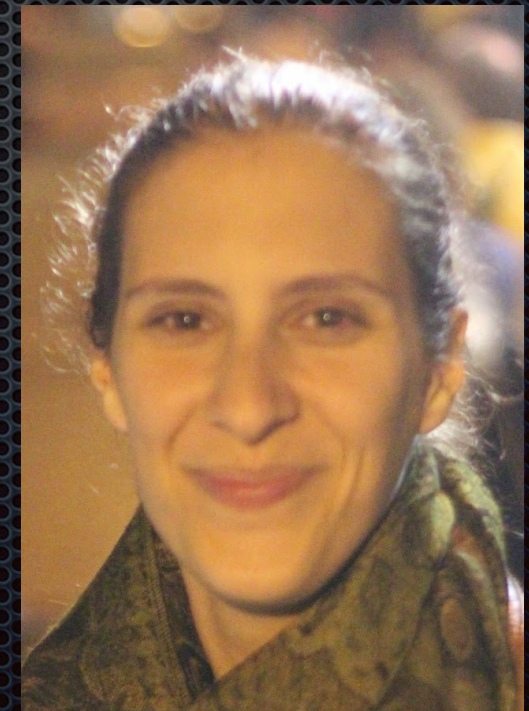
- ✦ **Organization:**

- ✦ Location: Europe / Americas / Asia-Pacific
- ✦ 3 days (single-track / parallel sessions)
- ✦ Annual



# TRF1 ECR Keynote Speaker

- ✦ TRF Committee Members were invited to nominate their top 3 timing papers published in 2016.
- ✦ The first author of the top-rated paper is invited to give a Keynote lecture.
- ✦ **Sofia Soares**, PhD Candidate, Champalimaud Foundation (Paton lab) for her paper -  
*'Midbrain dopamine neurons control judgment of time'* (Science, 2016)





# Open Science - [osf.io/view/trf2017](https://osf.io/view/trf2017)

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Title ^ v	Author ^ v	Category ^ v	Date Created ^ v	Downloads ^ v
<a href="#">Moving and multisensory stimulation for enhancing visual rhythm perception</a>	<a href="#">Vatakis</a>	poster	2017-10-04 04:53 PM	15
<a href="#">Time Perception for Simple Stimuli: Effect of Inter- and Intra-modal Stimulus Charact...</a>	<a href="#">Vatakis</a>	poster	2017-10-04 04:55 PM	15
<a href="#">Causality as the determinant factor for Intentional Binding in naturalistic event sequ...</a>	<a href="#">Vatakis</a>	poster	2017-10-04 04:55 PM	16
<a href="#">Poster of Miriam Ruess and Poster of Roland Thomaschke/Andrea Kiesel</a>	<a href="#">Binding</a>	poster	2017-10-05 11:40 AM	8
<a href="#">Time Perception and Temporal Processing in Schizophrenia: A Meta-analysis</a>	<a href="#">Thoenes</a>	poster	2017-10-06 10:06 AM	14
<a href="#">Caloric Rewards Alter Time Perception and Time-Dependent Decision Making</a>	<a href="#">Fung</a>	talk	2017-10-06 07:37 PM	14
<a href="#">Climbing and timing: attentional biases mediate the affect-time perception binding i...</a>	<a href="#">Castellà</a>	poster	2017-10-09 11:08 AM	10
<a href="#">Motor Origin of Temporal Predictions in Auditory Attention</a>	<a href="#">Morillon</a>	talk	2017-10-13 07:06 AM	11
<a href="#">Time-Based Event Expectancies in Children with Autism Spectrum Disorders</a>	<a href="#">Kunchulia</a>	poster	2017-10-13 08:16 AM	6
<a href="#">Deteriorated millisecond timing and deficient executive functions in aging: evidence ...</a>	<a href="#">Szelag</a>	poster	2017-10-13 09:11 AM	6
<a href="#">Meditation-induced changes in subjective time are mediated by heart-rate variability ...</a>	<a href="#">Kübel</a>	poster	2017-10-13 11:07 AM	8
<a href="#">Decoding the Representation of Time in Brain States using Multivariate Pattern Analy...</a>	<a href="#">Morita</a>	poster	2017-10-15 12:07 AM	5
<a href="#">Motor synchronization in Schizophrenia: preserved rhythmic representation with ab...</a>	<a href="#">Wilquin</a>	poster	2017-10-16 01:09 PM	1
<a href="#">Time perception, symptoms and emotions in psychiatric conditions: A daily life study</a>	<a href="#">Dupuy</a>	poster	2017-10-17 11:50 AM	2
<a href="#">TRF poster</a>	<a href="#">SARABI</a>	poster	2017-10-17 12:50 PM	1
<a href="#">Poster: Does dosage change the effect of focused attention meditation on time perc...</a>	<a href="#">Cox</a>	poster	2017-10-17 12:52 PM	2

> 60 submissions uploaded



# TRF Conferences

- ✦ TRF1, 2017
  - ✦ > 250 abstracts
  - ✦ > 250 attendees
  - ✦ 40+ travel grants
  - ✦ Funding (Anne)
- ✦ TRF2, 2018 - Announcement due shortly
- ✦ TRF3, 2019 - Confirmed

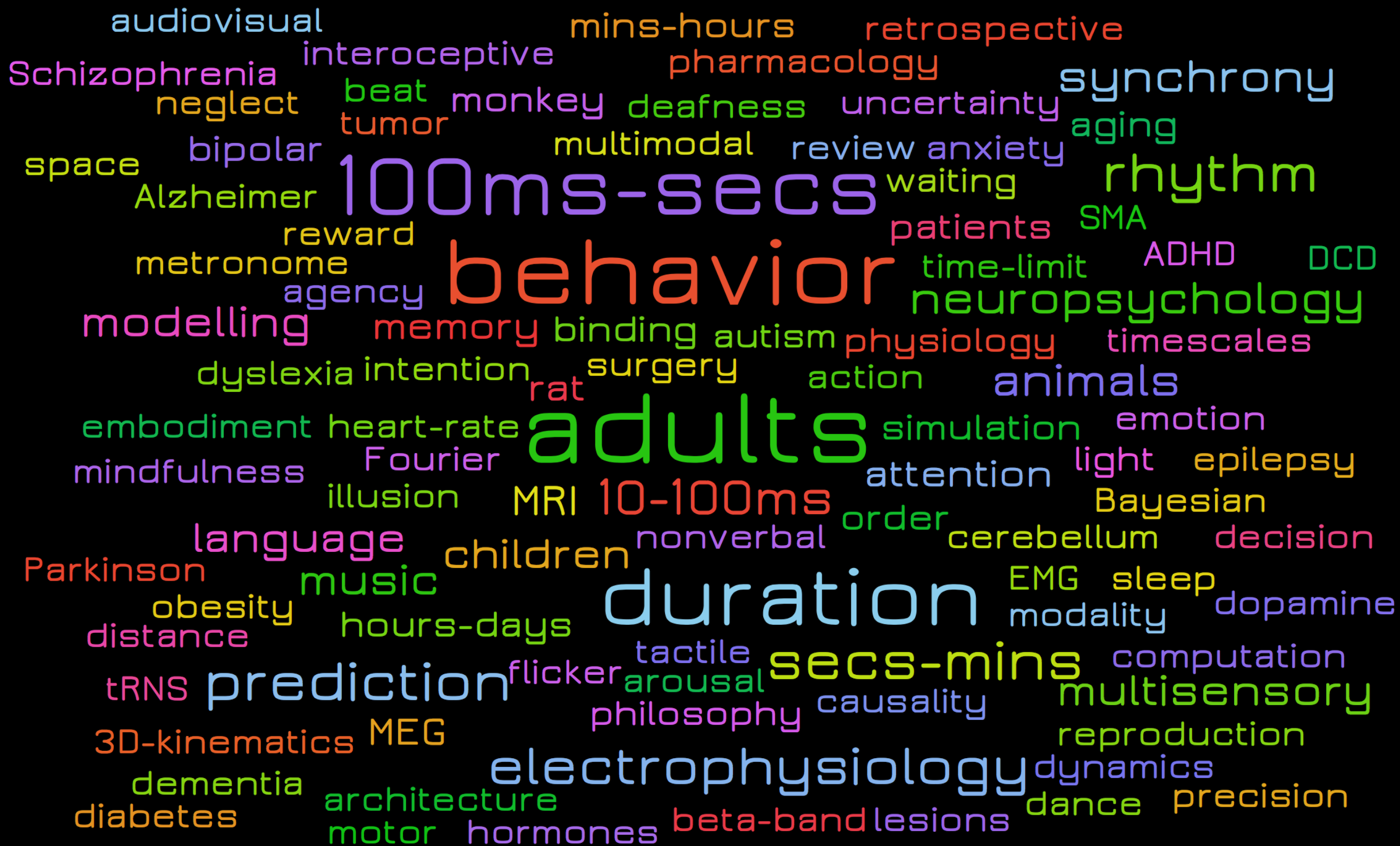


# Call for TRF4 (2020) organizers

- ✦ Proposals should outline the following (less than 10 slides):
  - ✦ Organizers
  - ✦ Schedule
  - ✦ Scientific program
  - ✦ Funding
  - ✦ Local events
  - ✦ Promote ECRs
- ✦ All proposals will be rated on the above features and Location (preference: Asia-Pacific > Americas > Europe)
- ✦ Send your proposals to TRF - [trf@timingforum.org](mailto:trf@timingforum.org)



# TRF1: Keywords (n ~ 150)





# TRF1: Topics

- ✦ Prediction
- ✦ Rhythm
- ✦ Synchrony
- ✦ Multi-sensory
- ✦ Music
- ✦ Language
- ✦ Attention
- ✦ Memory
- ✦ Magnitude
- ✦ Attention
- ✦ Arousal
- ✦ Reward
- ✦ Order, Beat, Beta, Action, Decision-making, Space, Agency



# TRF1: Methods

- ✦ Behavior
- ✦ Electrophysiology
- ✦ Neuropsychology
- ✦ fMRI
- ✦ M/EEG
- ✦ Modeling & simulations
- ✦ Neurophysiology
- ✦ Pharmacology
- ✦ Physiology
- ✦ 3-D Kinematics
- ✦ EMG
- ✦ tRNS



# TRF1: Brain regions

- ✦ Hippocampus
- ✦ Cerebellum
- ✦ Basal ganglia
- ✦ Amygdala
- ✦ Supplementary motor area

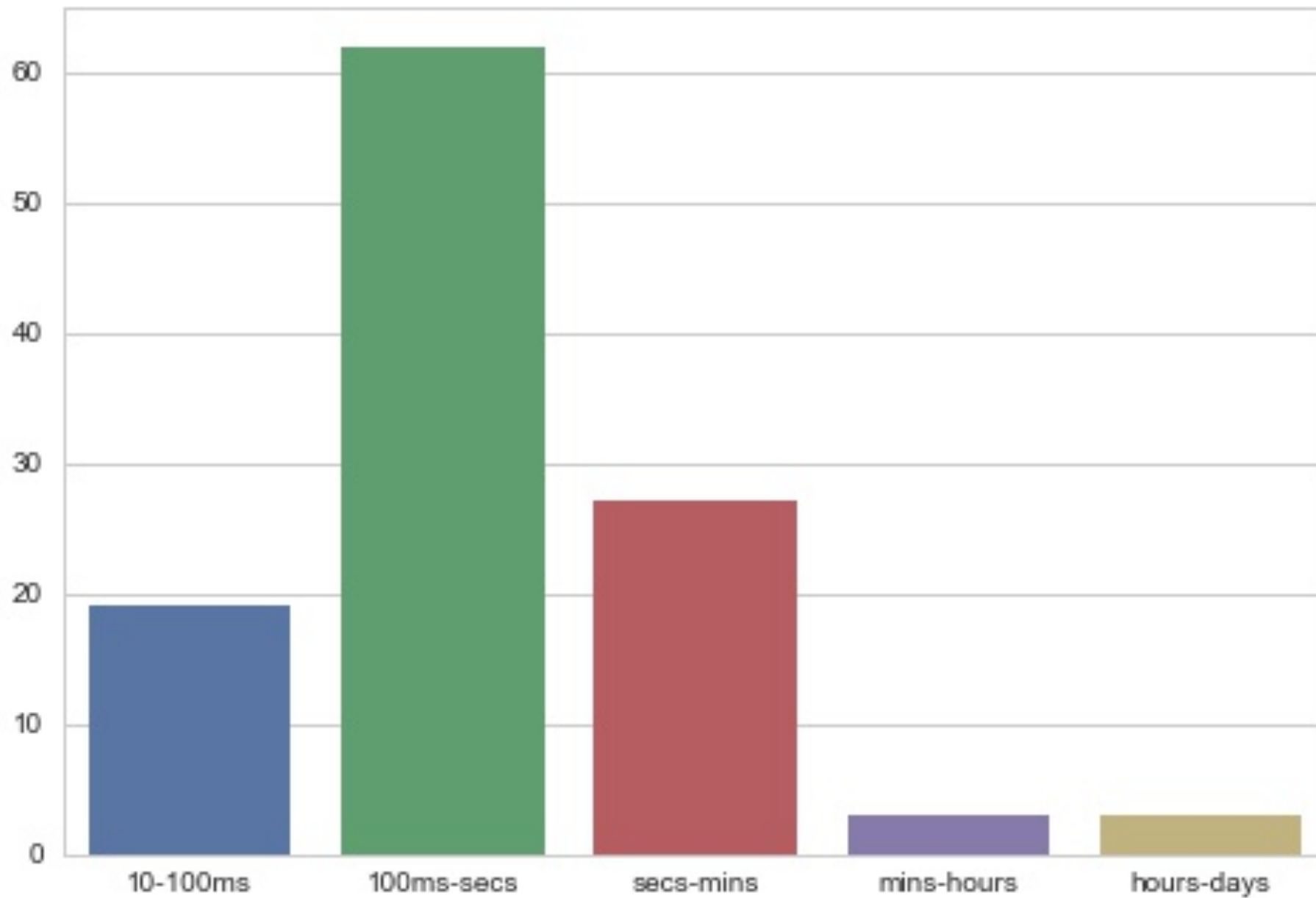


# TRF1: Disorders

- ✦ Parkinson's
- ✦ Alzheimer's
- ✦ Bipolar
- ✦ Schizophrenia
- ✦ ADHD
- ✦ DCD
- ✦ Autism
- ✦ Dementia
- ✦ Dyslexia
- ✦ Deafness
- ✦ Aging
- ✦ Diabetes
- ✦ Obesity



# TRF1: Time scales





# TRF1: Proceedings

*Proceedings of the 1st Annual Conference of the Timing Research Forum*  
23-25 October 2017  
Strasbourg, France



REVIEWS

*TIMING &*  
***TIME***  
*PERCEPTION*

***Editors-in-Chief***

**Warren H. Meck**  
Duke University  
Durham, USA

**Hedderik van Rijn**  
University of Groningen  
Groningen, The Netherlands

**Argiro Vatakis**  
Cognitive Systems Research Institute  
Athens, Greece

Available on  
Conference  
website



# Contribute to TRF

- ✦ Website
- ✦ Blogs
- ✦ Newsletter
- ✦ Social media
- ✦ Membership
- ✦ Any new feature that would benefit the TRF community...
- ✦ Join us - [trf@timingforum.org](mailto:trf@timingforum.org)



# Acknowledgment

- ✦ **Warren Meck** - vision
- ✦ **Hedderik van Rijn** - website funding
- ✦ **Bowen Fung** - Social Media Manager
- ✦ **Mukesh Makwana** - Blogs Manager / Website support
- ✦ **Molly, Ryszard, Bronson, Bharath** - blogs
- ✦ **Max di Luca** - Facebook advertising
- ✦ **Synthese** - graphic design for TRF website







