



João Vicente Dornas  
08/12/1979

<http://dornas.org>

## SUMMARY CV

### Main Skill

Build complex algorithms to solve scientific or business problems, in any programming language, with any dataset size and kind, with any mathematical and/or physical method.

### Goal

- Lead Teams in Scientific Research projects
- Scientific Research on Applied or Basic Science using Information Technology
- Publish research papers in top peer-reviewed journals and present results at international conferences
- Collaborate with academia and private sector

### Qualifications

- PhD in Computational Neuroscience (fMRI research, healthy humans) (March 2018)
- Master in Visual Neuroscience (electrophysiology research, owls)
- MBA in Project Management
- Bachelor in Mathematical Physics
- Experience in software design and engineering
- Experience with large data sets (doctoral research done with MRI data with hundreds of subjects, I wrote +70 thousand lines of Matlab code to mathematically analyse hundreds of TeraBytes of brain image)
- +22 years solving problems with computers (software eng., network eng., project management)
- Experience managing small group of entry, mid level professionals (bachelors, masters)
- Deep logical and creative skills to solve problems
- Led two small companies for 2 years as project manager and entrepreneur

### Technical Skills

- Programming Languages (C++, Objective-C, Java, JavaScript, Python, Perl, C# .NET, Scala, Go, Ruby, bash, GPU, Linux cluster computing)
- Search Technology (Apache Lucene/Sorl, ElasticSearch, Splunk)
- Machine Learning/Deep Learning (TensorFlow, DeepLearning4j, Neural Networks, Clusterization)
- Computer Vision (OpenCV)
- Semantic Search (RDF/OWL, Ontologies, Natural Language Processing (NLP))
- Query Languages (SQL, BigSQL, NoSQL)
- Statistics Bundle (Matlab, R, SAS, Tableau)
- Clouds (AWS, Google Cloud, Azure)
- fMRI Software (SPM, FSL, FreeSurfer)
- EEG Software (EEGLab)

### Productivity

4 scientific papers in neuroscience as first author (manuscripts being submitted until PhD deadline)  
4 scientific papers in neuroscience as co-author (manuscripts being submitted until PhD deadline)  
[6 poster presentations in international congresses about neuroscience \(in 2016 and 2017\)](#)  
1 research project as co-supervisor  
1 Apple iPhone App published on Apple Store  
2 companies as entrepreneur

### Awards

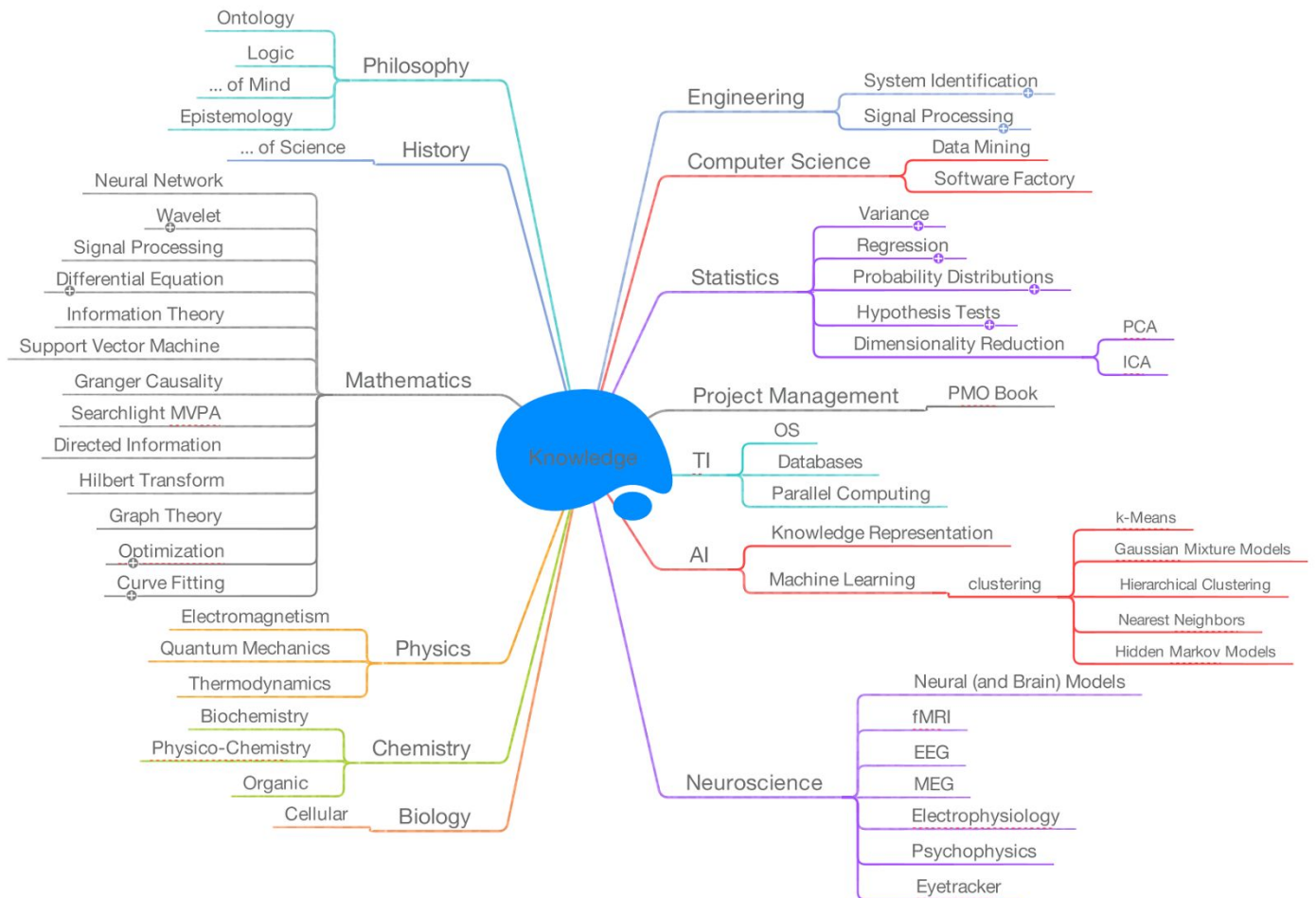
Marie Curie Fellowship (Early Stage Researcher) - (2013-2017)

(I was a fellow in INDIREA Marie Curie Training Network, [www.indirea.eu](http://www.indirea.eu))

**CV in TIME**  
<https://www.dornas.org/resume-graphic>

age (yo)	date	IT		PHYSICS		NEUROSCIENCE			
		studying	working	studying	working	studying	working	workshops	conferences
15	1995		IT Technician (IT Shop)						
16	1996								
17	1997	Microsoft Certified Systems Engineer	IT Technician (freelancer)						
18	1998								
19	1999		Network Engineer (STI Informatica)						
20	2000		Entrepreneur (CTI do Micro)						
21	2001			bachelor (UNICAMP)					
22	2002								
23	2003								
24	2004		Network Engineer (TechBiz Informatica)	bachelor (UFMG)					
25	2005								
26	2006								
27	2007								
28	2008		IT Supervisor (Ferrous)						
29	2009	MBA in Project Management (FGV)	IT Supervisor (CSU CardSystem)						
30	2010		Entrepreneur (Wider Software)						
31	2011					Master in Visual Neuroscience (UFMG)			International Symposium of Neuroscience of UFMG (Oral)
32	2012							LASCON (Latin American School of Computational Neuroscience)	
33	2013								
34	2014							European Summer School in Visual Neuroscience	
								Marie Curie INDIREA (1st in Oxford, 2nd in Copenhagen, 3rd in Magdeburg)	
35	2015						Marie Curie Fellowship (INDIREA)	Marie Curie INDIREA (4th in Munich, 5th in Barcelona)	
								Marie Curie INDIREA (6th in Dublin, 7th in Oxford)	FORUM FENS, Copenhagen (Poster)
36	2016					PhD in Visual Attention Neuroscience (OVGU.de)			Bernstein Conference, Berlin (Poster)
									Oxford Autumn School in Cognitive Neuroscience (Poster)
									British Neuroscience Association, Birmingham (Poster)
37	2017						Research Associate (OVGU.de)		Organization for Computational Neurosciences, Antwerp (Poster)
									European Conference in Visual Perception, Berlin (Poster)

## KNOWLEDGE CV



## MAIN CV

### Academic Formation:

**PhD** in Neuroscience. Otto-von-Guericke Universität Magdeburg. (Germany) (to finish in March 2018).  
**Master of Science** in Neuroscience. Federal University of Minas Gerais (UFMG) (2011-2012). (Brazil).  
**MBA** in Project Management. Getúlio Vargas Foundation (FGV) (2009-2010). (Brazil).  
**Specialization** in Computers Networks. Catholic University Minas Gerais (2008-2009) (Brazil).  
**Bachelor** in Physics. UNICAMP (2001-2002). UFMG (2003-2006). (Brazil).

### Publications: (manuscripts in preparation)

Main Goal of My PhD: We did an fMRI experiment with 8 healthy subjects using three conditions: Resting State, Passive Viewing with Visual Stimulation and Attentive Tracking (MOT paradigm). Our aim was to apply several mathematical methods to analyse brain activity and understand the effects of LOAD of Attention in different brain regions.

João V. Dornas, Jochen Braun, Finer parcellation reveals detailed correlational structure of resting-state fMRI signals, In Journal of Neuroscience Methods, Volume 294, 2018, Pages 15-33, ISSN 0165-0270. DOI: [10.1016/j.jneumeth.2017.10.020](https://doi.org/10.1016/j.jneumeth.2017.10.020)

**ABSTRACT:** Anatomical and functional parcellations of the human brain are widely used, for example, 'automated anatomical labelling' into 90 cortical and subcortical regions ('AAL90', Tzourio-Mazoyer et al., 2002), spatially constrained clustering of functional correlations ('C400', Craddock et al., 2013), or multi-modal parcellation from the Human Connectome Project ('HPC360', Glasser et al., 2016). However, only a modest amount of correlational information can be retrieved at these comparatively coarse resolutions (and only about half of the pairwise functional correlations between resting-state signals are consistently significant). We propose a finer parcellation ('MD758') which increases the bivariate mutual information retrieved by functional correlations approximately 100-fold (and the multivariate mutual information approximately 10-fold). Subdividing each AAL area separately on the basis of local functional correlations, we define 758 highly inter-correlated and spatially largely contiguous volumes ('functional clusters'). At this finer resolution, a large majority of pairwise functional correlations is consistently significant (86% with  $p < .01$ ,  $cv < 1.0$ ). Moreover, fibre tracking reveals consistent anatomical connectivity between these 'functional clusters', echoing the global pattern of functional correlations. In fact, even local patterns of cluster-to-cluster correlations often mirror cluster-to-cluster connectivity in detail and with high significance ( $p < .00001$ ). The global and local correspondence of functional correlations and anatomical connectivity at the level of 'functional clusters' further validates the proposed parcellation. We conclude that a finer parcellation, which combines both anatomical and functional criteria, unlocks a treasure trove of intricate correlational structure in resting-state BOLD signals.

Dornas, João V., Braun, Jochen. (2017) *Changes in Local Correlation due to Attention*.

**ABSTRACT:** Attentive tracking of multiple moving targets is known to engage widely distributed networks of cortical regions (Corbetta & Shulman (2002)), leading to significant functional correlations between time-varying average MRI signals in these regions. We studied more fine-grained functional correlations between voxel pairs in eight observers under three conditions (resting, passive viewing, attentive tracking). For each voxel, we established the density of significant correlations (positive or negative) with others in the same region (FCD, (Tomasi & Volkow (2010))). Attentive tracking induced far more extensive and consistent changes in FCD than did passive viewing the same stimulus. Within the ventral frontoparietal network (VAN), FCD tended to decrease. Within the dorsal frontoparietal network (DAN), positive FCD tended to decrease and negative FCD to increase. Outside the attention networks, significant changes were evident in all four cortical lobes as well as subcortically, with increases predominating in occipital and temporal cortices, but decreases subcortically. Adjacent to DAN, frontal superior medial cortex exhibited increased FCD and angular gyrus decreased positive, but increased negative FCD. In summary, we found different changes for positive and negative correlations as well as for areas within and adjacent to frontoparietal networks. We conclude that attentive tracking extensively changes the fine-grained cooperative dynamics of brain activity, as

indexed by time-varying MRI signals from individual voxels, confirming and extending traditional studies of coarse-grained cooperative dynamics.

Dornas, João V., Braun, Jochen. (2017) *Global Changes in Connectivity due to Attention (to be published in two separated papers)*

Local Functional Connectivity Density showed a widespread Increase in Negative correlations and a high amount of voxels with significant Decrease in Positive correlations (results showed on FORUM FENS, Copenhagen, 2016). In this new study, we analyzed the Global correlation using a more coarse spatial resolution but more fine grained than usual Anatomical parcellations. For each AAL parcel, we defined clusters of around 200 voxels which are highly correlated to each other in Resting State condition. We then calculated the Functional Connectivity and Granger Causality among all clusters using the mean time series of all voxels inside each cluster for each run in each condition (Resting State, Passive Viewing, Attentive Tracking). Doing a contrast between Passive Viewing and Resting State, and Attentive Tracking and Passive Viewing, for both analysis, we established when there were Increases or Decreases for Functional and Granger Connectivity due to Stimulus and Attention, individually, in a Global level. 1. There is much less Increase in FC for Attention and much more Decrease while for the Stimulus contrast we have a widespread Increase and a slightly smaller Decrease. 2. If you look carefully, you will see that the seeds are not random. On Attention Summary plot with Increase in FC there are several, the majority, of Dorsal Attention Network seeds, which are related to Top-Down Attention. 3. If you compare the Decrease in Attention with the Increase in Stimulus you will find out that there are several seeds that are present on both plots. So, those seeds in clusters where there is an Increase due to Stimulus are almost the same for those that have a Decrease due to Attention. And on the other two plots the seeds are different. 4. The Increase due to Stimulus is present on all AAL parcels, while the Increase due to Attention is more concentrated in fewer parcels. 5. The Decrease due to Attention is very strong in almost all clusters, the strength of Decrease in FC is very big for everybody, while on the Decrease due to Stimulus the strength is less prominent. 6. The Increase due to Attention has a few hubs, based on FC strength. Particularly Insula-R. On the Increase due to Stimulus, there is a prominence in FC strength on subcortical areas.

New Results Expected until the End of the PhD:

1. I co-supervised a Master Student doing analysis on EEG data. Our main experiment was repeated in Hungary under the supervision of Dr. Ilona Kovacs, from Pázmány Péter Catholic University, Hungary. We expect to have a publication about Attentional Load changes in brain activity measured in different frequency bands using EEG.
2. My fellow from INDIREA Marie Curie Training Network, Dr. Katharina Glomb, working under the supervision of Prof. Gustavo Deco from Pompeu Fabra University, is currently preparing a manuscript with results about Attentional Load where she applied her methods on our dataset.
3. Dr. Selen Atasoy is a postdoc working under the supervision of Prof. Gustavo Deco and is currently applying specific mathematical methods to our dataset as well.
4. Dr. Stepan Aleshin is a postdoc located in the lab at Otto von Guericke University, under the supervision of Prof. Jochen Braun, and he is working in a project involving TVA (Theory of Visual Attention), in collaboration with Prof. Signe Vangkilde at Copenhagen University. I worked on this project in collaboration helping with the experimental paradigm.

#### **Congress and Symposiums:**

European Conference in Visual Perception, Berlin - 2017 (Poster Presentation)  
Organization for Computational Neurosciences, Antwerp - 2017 (Poster Presentation)  
British Neuroscience Association, Birmingham - 2017 (Poster Presentation)  
Oxford Autumn School in Cognitive Neuroscience, Oxford - 2016 (Poster Presentation)  
Bernstein Conference, Berlin - 2016 (Poster Presentation)  
FORUM FENS, Copenhagen - 2016 (Poster Presentation)  
INDIREA BootCamp 6, Dublin - 2016 (Oral Presentation)  
INDIREA BootCamp 5, Barcelona - 2015 (Poster Presentation)  
International Symposium of Neuroscience of UFMG, Brazil - 2011 (Oral Presentation)

#### **Awards**

Marie Curie Fellowship (Early Stage Researcher) - (2013-2017)  
(I was a fellow in INDIREA Marie Curie Training Network, [www.indirea.eu](http://www.indirea.eu))

### **Supervision**

I co-supervised a Master student which is learning to process and analyse EEG data.

### **Event Organization**

For two years I organized the transfer between airport and university/hotel of more than 100 national and international guests in the local symposium of UFMG, Brazil.

International Symposium of Neuroscience of UFMG, Brazil - 2012 (member of organization committee)

International Symposium of Neuroscience of UFMG, Brazil - 2011 (member of organization committee)

### **Collaboration**

I collaborated with my fellow in INDIREA network Dr. Katharina Glomb, which just finished her Ph.D. in Barcelona at the beginning of 2017 under the supervision of Prof. Gustavo Deco. We are expecting to have one or more two publications from her using our dataset from my Ph.D.

### **INDIREA Workshops - training during PhD**

12<sup>th</sup>-13<sup>th</sup> May 2014 - *Attention – from neurons to cognition* - Oxford, UK

10<sup>th</sup>-11<sup>th</sup> June 2014 - *TVA Bootcamp* - Copenhagen, Denmark

23<sup>th</sup>-24<sup>th</sup> September 2014 - *MRI Bootcamp* - Magdeburg, Germany

11-13<sup>th</sup> March 2015 - *EEG and MEG Bootcamp* - Munich, Germany

17-18<sup>th</sup> September 2015 - *Neurocomputational Modelling* - Barcelona, Spain

4-6<sup>th</sup> May 2016 - *Career Development* - Dublin, Ireland

29-30<sup>th</sup> September 2016 - *Oxford Autumn School* - Oxford, UK

### **Graduate Schools**

10<sup>th</sup> – 22<sup>nd</sup> August 2014 - *European Summer School on Visual Neuroscience* - Marburg, Germany

15<sup>th</sup> Jan – 10<sup>th</sup> Feb 2012 - *Latin American School of Computational Neuroscience* - Ribeirão Preto, Brazil

### **Professional Experience (last five positions):**

(2009). Wider Software (Brazil) Software Engineer

(Start-up company in the mobile software industry, specialized in iPhone platform.)

#### **• PROJECTS:**

- a. Development of a new application for iPhone called Wider Clock. It is a pointer clock with 5 different themes. It has alarm and time zones. As a free App on Apple Store it reached more than 30 thousand downloads from more than 20 different countries.

(2008 - 2009). CSU CardSystem S/A (Brazil) Technical Supervisor

(Company is responsible for administering credit cards holding 52% of Brazil's market share. More than 10.000 employees in 7 sites in Brazil.)

- COORDINATION:

- a. Responsible for monitoring the job systems engineers level I.  
Guidance of how these engineers should solve users problems.
- b. Responsible for the selection of new systems engineers level I,  
reading resume and interviewing people. Responsible for choosing  
the new engineer for the opens positions.
- c. Coordination of delivering infrastructure and support services to  
attend demands of other departments.

- PROJECTS:

- a. Installation, configuration and implementation of a file transfer server  
with Connect Direct, rvsXP, STCP, PGP, and Sitef software. This  
server will be running 24x7 and will be accessed by the 34 clients,  
among them Alfa Bank, Bank of Brazil, Hotels Accor, Correios e  
HSBC. The files are transferred between clients and local  
Mainframe.

(position: project manager, stakeholders: 4, time: 1 year)

- b. Installation, configuration and implementation of Sharepoint  
Services 3.0 using portal, list forms and document library  
functionality. This server will be accessed by the entire company,  
almost all 10 thousand employees.

(position: project manager, stakeholders: 4, time: 1 month)

- c. Implementation of antivirus technology of TrendMicro OfficeScan  
7.3 and 8.0 Server on 55 servers and 250 workstations on the  
network.

(position: project manager, stakeholders: 4, time: 1 month)

- OTHER RESPONSIBILITIES:

- a. Administration of antivirus server TrendMicro OfficeScan. Which  
blocked any virus for more than 500 computers in a network.
- b. Maintenance of 55 Windows servers (including NT/2K/2K3) and 250  
Windows workstations (including 98/2K/XP) .

(2008). Digicomp Eng./Ferrous Resources (Brazil) Technical Supervisor

(Outsourced from Digicomp to work at Ferrous Resources do Brasil. Ferrous is a multinational English mining company exploring many mines on the state of Minas Gerais, in Brazil, and other places like Greenland. One billion dollars

investments in the whole state. More than 500 employees in Brazil in 10 sites.)

- COORDINATION:

- a. Responsible for monitoring the job of 5 system engineers level I. Guidance of how these engineers should solve users problems.
- b. Responsible for managing contact with suppliers and control of SLAs.

- PROJECTS:

- a. Implementation of WSUS 3.0 SP1 for the patches and updates administration among 200 workstations and 9 servers.  
(position: project manager/systems engineer, stakeholders: 2, time: 1 month)
- b. Implementation of Symantec Endpoint Protection Manager. Set up of security policies. Installation of Endpoint Protection Client in 200 workstation by script.  
(position: project manager/systems engineer, stakeholders: 3, time: 1 month)

- OTHER RESPONSIBILITIES:

- a. Responsible for the maintenance of 9 Windows 2003 servers, including:
  - i. Exchange 2007 Server.
  - ii. File Server.
  - iii. LDAP (Active Directory).
  - iv. WSUS 3.0 SP1.
  - v. Symantec Backup Exec 11d.
  - vi. IBM Director.
  - vii. Symantec Endpoint Protection Manager.

(2004–2005). TechBiz Informática Ltda. (Brazil) Systems Engineer  
(Microsoft partner company with the certification Microsoft Gold Certified Partner. Offers support and projects services in IT, with major clients among the biggest companies in Brazil, like Usiminas, Belgo, Correios, MBR, Telemar, TIM.)

- RESPONSIBILITIES:

MCSE responsible to support the clients that have service contract with the company, supporting the Microsoft server software. I offered support to Exchange Server 2003, ISA Server, Systems Management Server 2.0 and 2003, Analysis Server and the operating systems Windows 2000 and 2003 Server. The clients have an IT environment with between 1000 and 10000 workstations.



(1999–2000). STI Informática Ltda. (Brazil) Systems Engineer  
(Microsoft partner company, offers services in IT, having as its main client Petrobras, one of the biggest oil and petroleum companies in the world.)

- **PROJECTS:**

- i. I planned, installed and configured the server software Microsoft SMS 2.0 (Systems Management Server) in 450 workstation and 20 servers in the network of Petrobras in Betim, Minas Gerais, Brazil.  
(position: systems engineer, stakeholders: 3, time: 3 months)

- **RESPONSIBILITIES:**

- i. MCSE responsible to support clients that have service contract with the company, supporting the Microsoft server software.

**Idioms:**

**Portuguese:** native. **English:** fluent (reading, writing, speaking).

**Mathematical Methods:**

Information Theory, Mutual Information applied to Neural Data (Directed and Metric Space Methods), Directed Information and Granger Causality, K-Means and Wavelet clusterization, Graph Theory, PCA/ICA, Hilbert Transform. Signal Processing.

**Experimental Techniques:**

Electrophysiological Recording of Extracellular Activity of Neurons In Vivo.  
Animal Surgery for Craniotomy.  
fMRI Preprocessing pipeline (eg.: unwarped, spatial normalization, signal cleaning).

**Technical Knowledge:**

Programming Languages (Matlab, R, C++, Objective-C, Java, JavaScript, Python, Perl, C# .NET, Scala, Go, Ruby, bash, GPU, Linux cluster computing)  
Search Technology (Apache Lucene/Solr, Elasticsearch, Splunk)  
Machine Learning/Deep Learning (TensorFlow, DeepLearning4j)  
Query Languages (SQL, BigSQL, NoSQL)  
Clouds (AWS, Google Cloud, Azure)  
fMRI Software (SPM, FSL, FreeSurfer)  
EEG Software (EEGLab)

**Technical Certifications:**

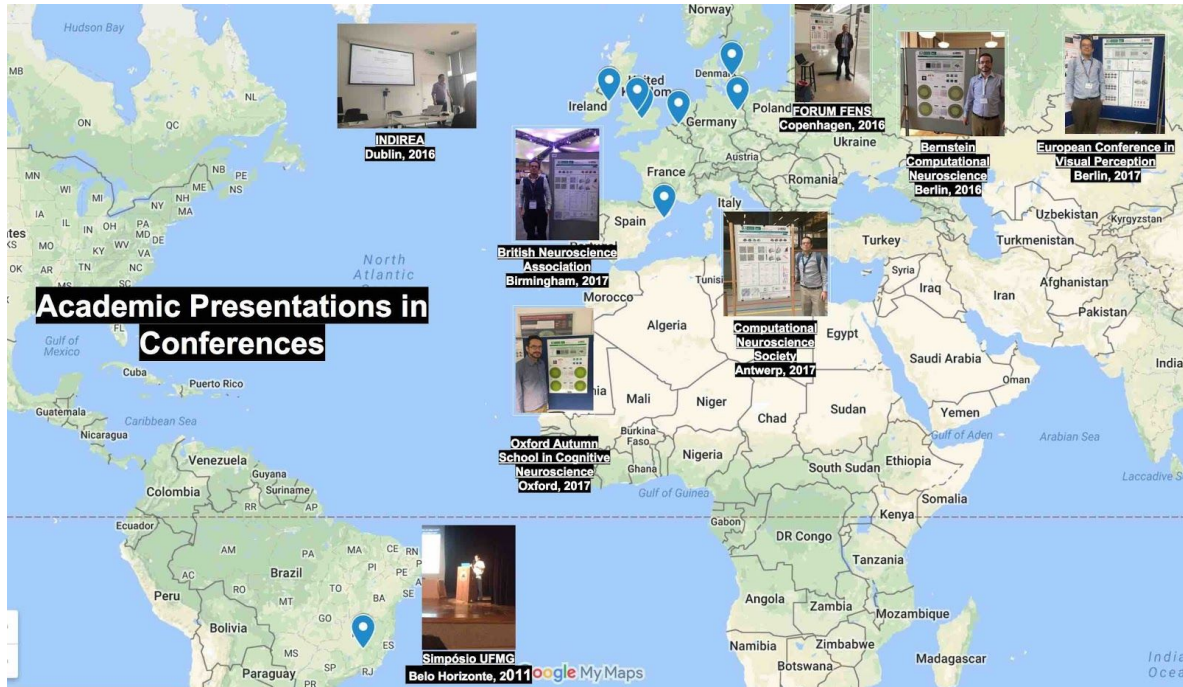
MCSE version Windows NT 4.0 Server  
Microsoft Certified System Engineer  
MCP specialist in Systems Management Server 2.0  
MCP version Windows 2000 Server  
MCP version Windows 2003 Server

**Extra Activities:**

I have a very healthy lifestyle. I do physical exercises every single day: workout, swimming, running or bicycle. I also feed myself only with fruits, vegetables, milk and cereals, and a small portion of white meat.

## PRESENTATIONS

<https://www.dornas.org/projects>  
<https://www.dornas.org/professional>



# POSTERS



NAT

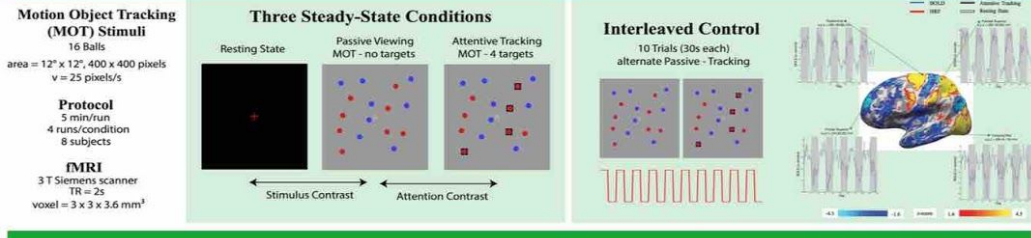
FAKULTÄT FÜR  
NATURWISSENSCHAFTEN



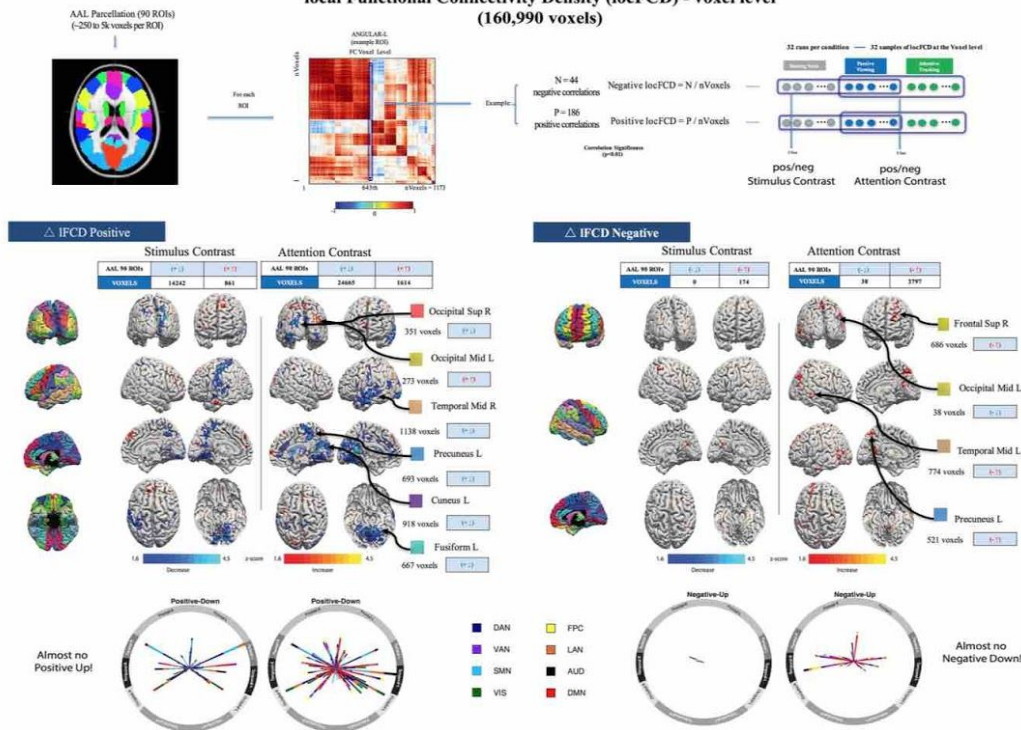
## Density of local correlations varies extensively with attentive tracking

João V. Dornas, Stepan Aleshin, Alexander Pastukhov, Jochen Braun

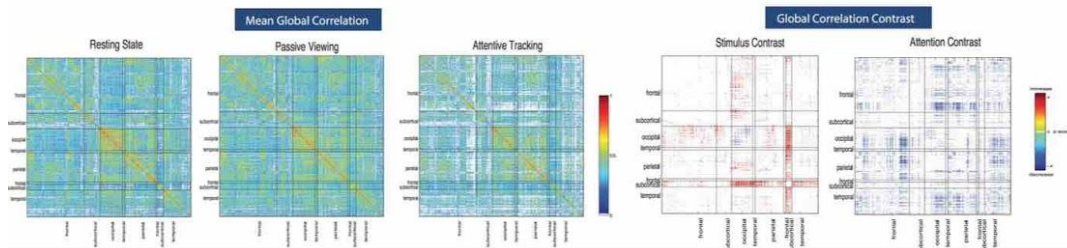
Cognitive Biology, Otto-von-Guericke University, Magdeburg, Germany



### local Functional Connectivity Density (locFCD) - voxel level (160,990 voxels)



### global Functional Connectivity- cluster level (758 clusters, ~200 voxels per cluster)



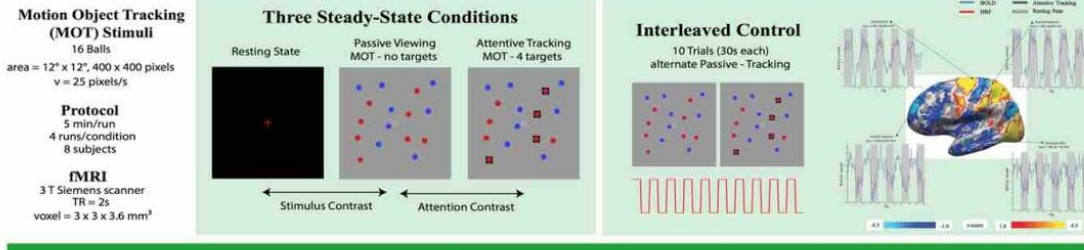




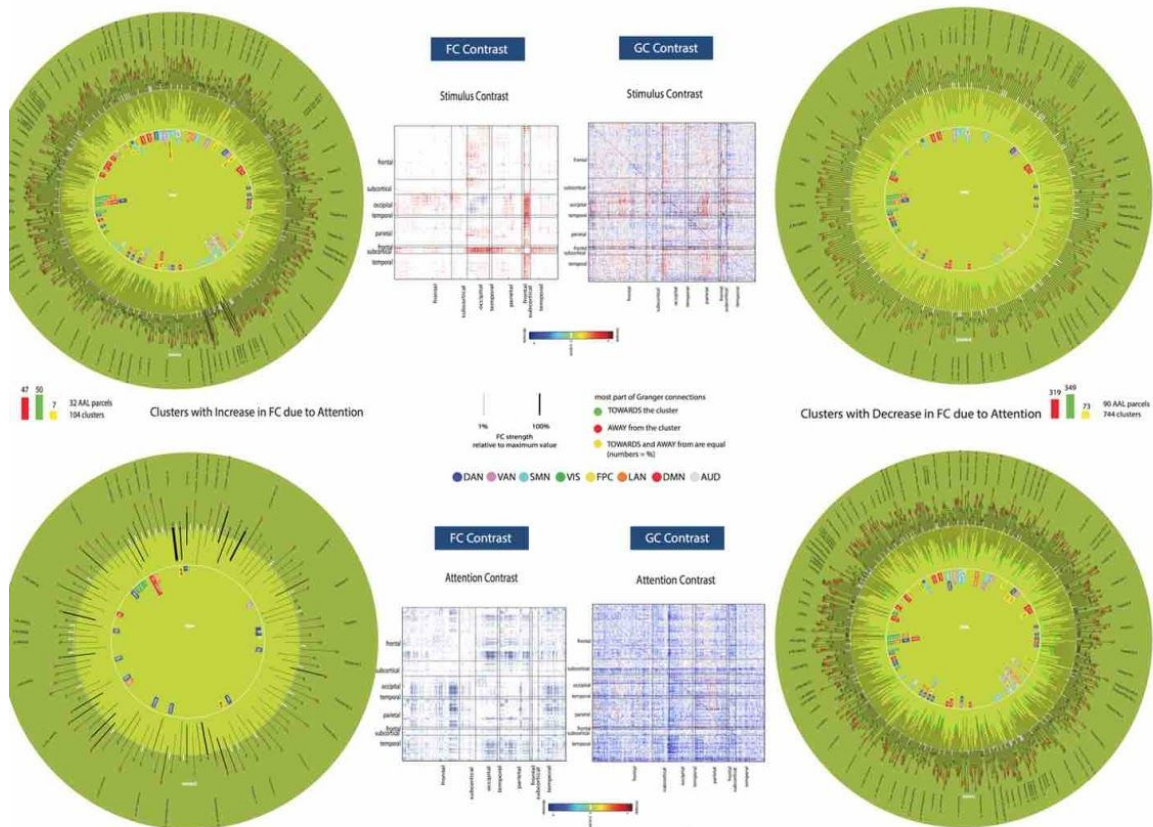
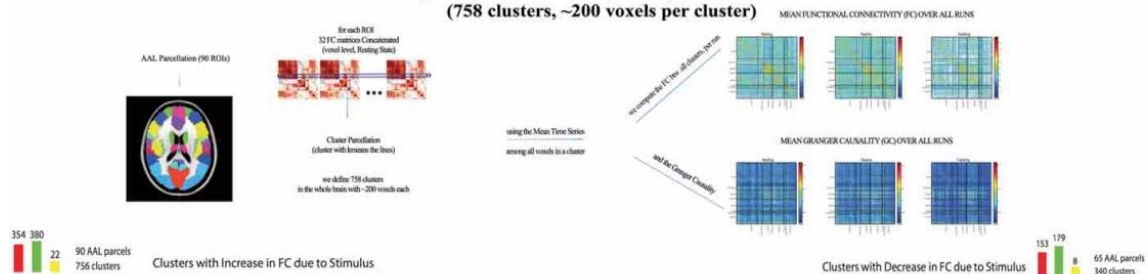
## Global Changes in Connectivity due to Attention

João V. Dornas, Stepan Aleshin, Alexander Pastukhov, Jochen Braun

Cognitive Biology, Otto-von-Guericke University, Magdeburg, Germany

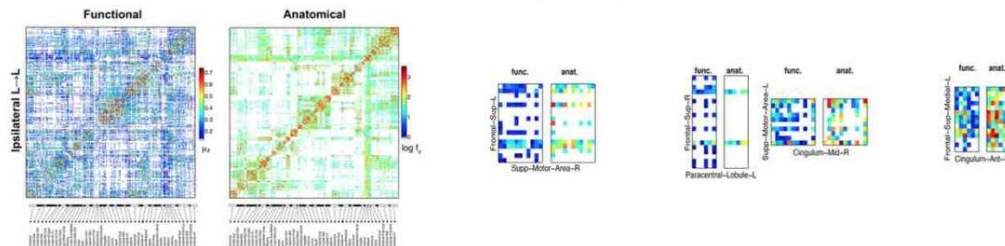


### global Functional Connectivity- cluster level (758 clusters, ~200 voxels per cluster)



contact: [dornas.org](http://dornas.org)

1. Increasing LOCAL range correlations and decreasing GLOBAL ones, we improve INTEGRATION of SIMILAR brain activity and SEGREGATION of DISSIMILAR ones.
2. Reduction of REDUNDANCY while increasing the RESOLUTION, but avoiding the overwhelming computation at voxel level.





# Detailed changes in global functional connectivity during attentional tracking

João V. Dornas, Jochen Braun  
Cognitive Biology, Otto-von-Guericke University, Magdeburg, Germany

