

## Dr. Jonas Rose

junior PI

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## Research Interests

Comparative approach to higher cognitive processes including working memory, attention and executive control. Research with crows and pigeons using modern neurophysiological methods (behavioral paradigms with gaze tracking and parallel recordings of single unit and local field activity with up to 128 channels). Direct comparison of neural network processes between birds and mammals with the aim of identifying general biological principles.

## Education & Positions

<i>since Feb 2017</i>	<b>Junior group leader</b> Volkswagen-Foundation Freigeist-Fellow. Dept. of Psychology, Ruhr-University Bochum, Germany
<i>Jun 2014 - Jan 2017</i>	<b>Junior group leader</b> Volkswagen-Foundation Freigeist-Fellow. Animal physiology, University Tübingen, Germany
<i>Apr 2014 - May 2014</i>	<b>Postdoc</b> Prof. Andreas Nieder, University Tübingen, Germany. DFG-Fellowship
<i>Apr 2010 - Feb 2014</i>	<b>Postdoc</b> Prof. Earl Miller PhD, Picower Institute, MIT, USA; DFG-Fellowship Jun 2010 - May 2012
<i>Aug 2009 - Mar 2010</i>	<b>Postdoc</b> Prof. Michael Colombo PhD, University of Otago, New Zealand; DAAD-Fellowship until Feb 2010
<i>May 2005 - Jul 2009</i>	<b>Phd</b> ( <i>summa cum laude</i> ) Prof. Dr. Drs. h.c. Onur Güntürkün, Ruhr-University Bochum. Thesis: 'The Role of Reward-Signals in the Avian Pallium.'
<i>Feb 2004 - Feb 2005</i>	<b>Master of Science</b> Neuroscience ( <i>Distinction</i> , A+) Prof. Michael Colombo PhD, University of Otago, New Zealand. Thesis: 'The Neural Basis of Avian Magnetic Navigation.'
<i>Okt 2000 - Okt 2003</i>	<b>Bachelor of Science</b> Cognitive Science ( <i>Excellent</i> ) University Osnabrück. Thesis: 'Is Delay Activity an Index of Working Memory?'

## Grants/ Fellowships

<i>ongoing</i>	Contributing applicant, research building THINK
<i>ongoing</i>	Contributing applicant, third funding period SFB 874
<i>Aug 2017</i>	Contributing applicant, 5x5000 e-learning course rism

<i>since Jun 2014</i>	Volkswagen Foundation, Freigeist-Fellowship, junior research group: <i>Establishing crows as a new model in cognitive neuroscience</i>
<i>Feb 2014 - May 2014</i>	DFG Return-Fellowship
<i>2012</i>	GAIN travel award; FENS/IBRO travel award
<i>Jun 2010 - Jun 2012</i>	DFG Postdoc-Fellowship: <i>Stability vs. Flexibility: Seemingly contradictory roles of the prefrontal cortex in the working-memory network</i>
<i>2010</i>	FENS/IBRO travel award; DAAD travel award
<i>Sep 2009 - Feb 2010</i>	DAAD Postdoc-Fellowship: <i>Control of working memory in the 'prefrontal cortex' of pigeons</i>
<i>2008</i>	DFG travel award; FENS/IBRO travel award
<i>2004</i>	NZNF travel award

## Invited Talks

<i>June 2017</i>	Working Memory: A Tale of Birds and Monkeys. <i>Division of Behavioral &amp; Neural Biology, Hokkaido University, Sapporo, Japan.</i>
<i>May 2017</i>	Cognitive Flexibility in Birds. (Keynote) <i>Bochum-Rutgers Workshop in Philosophy and Cognitive Science, Bochum, Germany.</i>
<i>Nov 2016</i>	Exploring the Cognitive Capacity of birds. <i>The Trieste Symposium on Perception and Cognition, Trieste, Italy.</i>
<i>Jun 2016</i>	A Bird's Eye View on the Evolution of Cognition: Crows as a New Model for Cognitive Neuroscience. <i>Volkswagen Foundation, Hannover, Germany.</i>
<i>Feb 2016</i>	Capacity and Control of Working Memory. <i>Biopsychology, Ruhr University Bochum, Bochum, Germany.</i>
<i>Jun 2015</i>	Capacity and Control of Working Memory. <i>Institute of Experimental Psychology, University of Düsseldorf, Düsseldorf, Germany.</i>
<i>Apr 2015</i>	Capacity and Control of Working Memory. <i>Institute for Zoology, University of Bonn, Bonn, Germany.</i>
<i>Apr 2015</i>	Capacity and Control of Working Memory. <i>Department of Systems Neuroscience, University Medical Center Hamburg-Eppendorf, Hamburg, Germany.</i>
<i>Apr 2013</i>	Constraints and Neural Mechanisms Underlying Working Memory. <i>Center for Mind/ Brain Sciences (CIMeC), University of Trento, Rovereto, Italy.</i>
<i>Mar 2013</i>	Bird Brains. <i>Harvard/ MIT Brain Evolution Interest Group, Cambridge, USA.</i>
<i>Jul 2012</i>	Control of Working Memory. <i>Dept. of Neurobiology, University of Tübingen, Tübingen, Germany.</i>
<i>Dec 2009</i>	Dopamine in the Avian Brain. <i>Dept. of Anatomy, University of Otago, Dunedin, New Zealand.</i>

## Teaching

<i>Apr 2017 - Jul 2017</i>	Pract. Course (Bochum): Introduction to Matlab
<i>Apr 2016 - Jul 2016</i>	Pract. Course (Tübingen): Training and histology in pigeons
<i>Apr 2015 - Jul 2015</i>	Pract. Course (Tübingen): Training and histology in pigeons
<i>Nov 2009 - Feb 2010</i>	Pract. Course (Otago): Introduction to Matlab
<i>Oct 2008 - Feb 2009</i>	Seminar (Bochum): Learning
	Pract. Kurs (Bochum): Introduction to Matlab
<i>Apr 2008 - Jul 2008</i>	Seminar (Bochum): The prefrontal cortex
<i>Oct 2007 - Feb 2008</i>	Pract. Course (Bochum): Introduction to Matlab
	Seminar (Bochum): Sex, drugs and conditioning
<i>Apr 2007 - Jul 2007</i>	Seminar (Bochum): The prefrontal cortex
<i>Oct 2006 - Feb 2007</i>	Seminar (Bochum): Sex, drugs and conditioning
<i>Apr 2006 - Jul 2006</i>	Seminar (Bochum): Evolution and emotion
<i>Oct 2005 - Feb 2006</i>	Pract. Course (Bochum)
<i>Apr 2005 - Jul 2005</i>	Seminar (Bochum): Evolution and emotion
	Stand-in lecture (IGSN, Bochum): Dopamine

## Supervision

<i>Current PhD-Theses</i>	Dmitry Balakhonov, Erica Fongaro, Lukas Hahn
<i>2017 PhD-Coexaminer</i>	Martin Stacho
<i>2017 MSc-Theses</i>	Lukas Hahn, Aylin Klarer; Co-supervision: Paul Rinnert
<i>2017 Bsc-Theses</i>	Kira Andrea
<i>2009 MSc-Theses</i>	Joswin Kattoor, Christian Krawutschke
<i>2009 BSc-Theses</i>	Dominique Jaeger, Sarah Starosta
<i>2008 BSc-Theses</i>	Marco Grabemann, Marike Schiffer, Marco Zimmermann
<i>2007 BSc-Theses</i>	Antonia Althen, Kathrin Hubbert Vera Grunert-Fischer
<i>since 2005</i>	several interships

## Editorial and Peer Review

Review Editor:

Frontiers in Physiology, Avian Physiology

Ad hoc review:

Behavioral Neuroscience; Current Biology; European Journal of Neuroscience; Frontiers in Decision Neuroscience; Frontiers in Psychology; Journal of Comparative Physiology; Journal of Neuroscience; Künstliche Intelligenz; Neuroimage; Proceedings of the National Academy of Sciences; Scientific Reports

## Publications

### Research Articles

- Madeline Dykes, Aylin Klarer, Jonas Rose, Michael Colombo. Value Coding in Pigeon NCL. *Scientific Reports* (in press).
- Michael Colombo, Aylin Klarer, Melissa Johnston, Jonas Rose (2017) Prospective processing: Behavioral and neural evidence. *Japanese Journal of Animal Psychology* 67:47-61.
- Dmitry Balakhonov, Jonas Rose (2017) Crows rival monkeys in cognitive capacity. *Scientific Reports* 7:8809 [\[Download\]](#).
- Mikael Lundqvist\*, Jonas Rose\*, Pawel Herman, Scott L. Brincat, Timothy J. Buschman, Earl K. Miller (2016) Gamma and beta bursts underlie working memory. *Neuron* 90:152-164, (\* Co-first author) [\[Download\]](#).
- M. Victoria Puig, Jonas Rose, Robert Schmidt, Nadja Freund (2014) Dopamine modulation of learning and memory in the prefrontal cortex: insights from studies in primates, rodents, and birds. *Frontiers in Neural Circuits* 8:39 [\[Download\]](#).
- Jonas Rose, Anne-Marike Schiffer, Onur Güntürkün (2013) Striatal dopamine D1 receptors are involved in the dissociation of learning based on reward-magnitude. *Neuroscience* 230:132-138. [\[Download\]](#).
- Marco Hirnstein, Stuart Leask, Jonas Rose, Markus Hausmann (2010) Disentangling the relationship between hemispheric asymmetry and cognitive performance. *Brain and Cognition* 73:119-27. [\[Download\]](#).
- Jonas Rose, Anne-Marike Schiffer, Lars Dittrich, Onur Güntürkün (2010) The role of dopamine in selective attention in the ‘prefrontal cortex’ of pigeons. *Neuroscience* 167:232-237. [\[Download\]](#).
- Lars Dittrich, Jonas Rose, Jens-Uwe Frank Buschmann, Morgane Bourdonnais, Onur Güntürkün (2010) Peck-tracking - a method for localizing critical features within complex pictures for pigeons. *Animal Cognition* 13:133-143. [\[Download\]](#)
- Nadja Freund, Martina Manns, Jonas Rose (2010) A method for the evaluation of intracranial tetrodotoxin injections. *Journal of Neuroscience Methods* 186:25-28. [\[Download\]](#)
- Janina Kirsch, Jannis Vlachos, Markus Hausmann, Jonas Rose, Man Yi Yim, Ad Aertsen, Onur Güntürkün (2009) Neuronal encoding of meaning: Establishing category-selective response patterns in the avian ‘prefrontal cortex’. *Behavioural Brain Research* 198:214-223. [\[Download\]](#)
- Jonas Rose, Robert Schmidt, Marco Grabemann, Onur Güntürkün (2009) Theory meets pigeons: The influence of reward-magnitude on discrimination-learning. *Behavioural Brain Research* 198:125-129. [\[Download\]](#)
- Janina Kirsch, Onur Güntürkün, Jonas Rose (2008) Insight without cortex: lessons

from the avian brain. *Consciousness & Cognition* 17:475-483. [\[Download\]](#)

Michelle Milmine, Jonas Rose, Michael Colombo (2008) Sustained activation and executive control in the avian prefrontal cortex. *Brain Research Bulletin* 76:317-323. [\[Download\]](#)

Jonas Rose, Tobias Otto, Lars Dittrich (2008) The Biopsychology Toolbox: A free, open-source Matlab-toolbox for the control of behavioral experiments. *Journal of Neuroscience Methods* 175:104-107. [\[Download\]](#)

Tobias Kalenscher, Sabine Windmann, Jonas Rose, Bettina Diekamp, Onur Güntürkün, Michael Colombo (2005) Impulsive decisions can be predicted from single unit activity. *Current Biology* 15:594-602. [\[Download\]](#)

Tobias Kalenscher, Sabine Windmann, Onur Güntürkün, Jonas Rose, Bettina Diekamp, Michael Colombo (2005) Single neurons code delay- and amount-dependent subjective reward value and relative reward preference during impulsive decision making. *Journal of Psychophysiology* 18:202-202.

Jonas Rose, Michael Colombo (2005) Neural correlates of executive control in the avian ‘prefrontal cortex’. *PLoS Biology* 3(6):e190. [\[Download\]](#)

## Book Chapters

Jonas Rose. Neurophysiology Techniques in the Avian brain: Single Units and Field Recordings, *Handbook of In Vivo Neural Plasticity Techniques*, Denise M Vaughan (in revision).

Jonas Rose, Robert Schmidt. Models of Discrimination Learning, *Encyclopedia of the Sciences of Learning*, Norbert M. Seel (Ed.), Berlin, Heidelberg: Springer (2012) Part 4, pp 1013-1015. [\[View\]](#)

Jonas Rose, Onur Güntürkün, Janina Kirsch. Evolution of Association Pallial Areas: in Birds, *Encyclopedia of Neuroscience*, Binder MD, Hirokawa N, Windhorst U (Eds.), Berlin, Heidelberg: Springer (2009) pp 1215-1219. [\[Download\]](#)

## Monographs

Jonas Rose. The Neural Basis of Avian Magnetic Navigation. Köln: LAP, Lambert Academic Publishing (2010).

## Conference Contributions

Dmitry Balakhonov, Jonas Rose (2016) The working memory capacity of crows rivals monkeys. Refereed abstract / poster, 46<sup>th</sup> Annual Meeting of the Society for Neuroscience, San Diego, USA.

Dmitry Balakhonov, Jonas Rose (2016) The working memory capacity of crows rivals monkeys. Refereed abstract / poster, 9<sup>th</sup> Forum of European Neuroscience, Copenhagen, Denmark.

- Erica Fongaro, Lukas Hahn, Jonas Rose (**2016**) Hierarchy of visual responses in the pallium of pigeons. Refereed abstract / poster, 9<sup>th</sup> *Forum of European Neuroscience*, Copenhagen, Denmark.
- Christ Devia, Jonas Rose, Earl Miller (**2015**) Oscillatory synchrony and working memory updating in the monkey cortex. Refereed abstract / poster, 45<sup>th</sup> *Annual Meeting of the Society for Neuroscience*, Chicago, USA.
- Mikael Lundqvist, Jonas Rose, Pawel Herman, Scott Brincat, Timothy Buschman, Earl Miller (**2015**) Temporal fine-structure of activity in PFC of macaque during in multi-item working memory. Refereed abstract / poster, 45<sup>th</sup> *Annual Meeting of the Society for Neuroscience*, Chicago, USA.
- Jonas Rose, Timothy Buschman, Earl Miller (**2012**) Neural recoding from the prefrontal network during the update of working memory. Refereed abstract / poster, 42<sup>nd</sup> *Annual Meeting of the Society for Neuroscience*, New Orleans, USA.
- Jonas Rose, Timothy Buschman, Earl Miller (**2012**) Neural recoding from the prefrontal network during the update of working memory. Refereed abstract / poster, 8<sup>th</sup> *Forum of European Neuroscience*, Barcelona, Spain.
- Jonas Rose, Timothy Buschman, Valerie Yorgan, Earl Miller (**2011**) Evidence from capacity limitations for a dual-model of working memory. Refereed abstract / poster, 41<sup>st</sup> *Annual Meeting of the Society for Neuroscience*, Washington, USA.
- Jonas Rose, Anne-Marika Schiffer, Onur Güntürkün (**2010**) The role of dopamine in selective attention in the ‘prefrontal cortex’ of pigeons. Refereed abstract / poster, 7<sup>th</sup> *Forum of European Neuroscience*, Amsterdam, Netherlands.
- Jonas Rose, Anne-Marika Schiffer, Onur Güntürkün (**2009**) The role of dopamine in selective attention in the ‘prefrontal cortex’ of pigeons. Refereed abstract / talk, 27<sup>th</sup> *Australasian Winter Conference on Brain Research*, Queenstown, New Zealand.
- Evrin Gülbetekin, Jonas Rose, Josine Verhaal, Onur Güntürkün (**2008**) The neuronal changes in avian prefrontal cortex during pavlovian conditioning and reversal learning. Poster, I. Autumn School, Neurocognition, Montegrotto, Italy.
- Lars Dittrich, Tobias Otto, Jonas Rose (**2008**) The Biopsychology Toolbox - An open source Matlab toolbox to control experimental hardware and run behavioural paradigms. Refereed abstract / poster, 38<sup>th</sup> *Annual Meeting of the Society for Neuroscience*, Washington, USA.
- Jonas Rose, Onur Güntürkün (**2008**) Less is more: how dopamine-antagonists in the avian striatum can improve learning. Refereed abstract / poster, 38<sup>th</sup> *Annual Meeting of the Society for Neuroscience*, Washington, USA.
- Nadja Freund, Jonas Rose, Onur Güntürkün, Matrina Manns (**2008**) The diffusion gradient of tetrodotoxin in neural tissue: An immunohistochemical study in pigeons. Refereed abstract / poster, 6<sup>th</sup> *Forum of European Neuroscience*, Geneva, Switzerland.

Jonas Rose, Janina Kirsch, Onur Güntürkün (2008) Reward magnitude modulates the rate of discrimination-learning in pigeons. Refereed abstract / poster, 6<sup>th</sup> *Forum of European Neuroscience*, Geneva, Switzerland.

Marco Hirnstein, Jonas Rose, Markus Hausmann (2008) Brain asymmetry at its best - What degree of lateralisation is optimal for cognitive performance? Refereed abstract / presentation, *Psychologie und Gehirn*, Magdeburg, Germany.

Lars Dittrich, Sabine Kesch, Frank Buschmann, Jonas Rose, Morgane Bourdonnais, Onur Güntürkün (2007) How to read a pigeon's mind: Pecking density as an indicator for relevance of visual features. Refereed abstract / poster, *Göttingen Neurobiology Conference*, Göttingen, Germany.

Jonas Rose, Michael Colombo (2006) Neural correlates of executive control in the avian brain. Refereed abstract / poster, *Executive Functions of the Frontal Lobes*, Tübingen, Germany.

Tobias Kalenscher, Sabine Windmann, Jonas Rose, Bettina Diekamp, Onur Güntürkün, Michael Colombo (2004) Predicting impulsive decisions: single forebrain neurons integrate delay and reward information into subjective reward value and reflect impulsive choice behaviour. Refereed abstract / poster, 34<sup>th</sup> *Annual Meeting of the Society for Neuroscience*, San Diego, USA.

Tobias Kalenscher, Sabine Windmann, Jonas Rose, Bettina Diekamp, Onur Güntürkün, Michael Colombo (2004) Single neurons code delay- and amount-dependent subjective reward value and relative reward preference during impulsive decision making. Refereed abstract / poster, *Journal of Psychophysiology*, 18:202-202.

Jonas Rose, Michael Colombo (2004) Stimulus control of working memory cells. Refereed abstract / poster, 34<sup>th</sup> *Annual Meeting of the Society for Neuroscience*, San Diego, USA.

Jonas Rose, Michael Colombo (2004) Stimulus control of working memory cells. Refereed abstract / talk, 22<sup>nd</sup> *Australasian Winter Conference on Brain Research*, Queenstown, New Zealand.

Jonas Rose, Michael Colombo (2004) Control of delay activity with instructions to remember or forget. Refereed abstract / poster, 4<sup>th</sup> *Forum of European Neuroscience*, Lisbon, Portugal.