EXTINCTION LEARNING
Young Scientists Symposium

FOR 1581: Extinction Learning

November, 25th - 26th 2013
Local Organizers

(Young Scientists of FOR1581)
Extinction Learning
Nov 25th – 26th 2013
Bochum
Contents

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Program

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CVs Young Scientists

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Key information

Optional Program for Saturday and Sunday

Saturday, 23.11.
6.30 pm: *Currywurst* at Dönninghaus and Christmas Market in Bochum

Sunday, 24.11.
12.30 pm: Meeting at the restaurant of the hotel for a snack
1.35 pm Departure for Zeche Zollverein in Essen, guided tour
(www.zollverein.de)
6.30 pm Yamas, Bochum (www.yam.as)

Schedule for the Symposium

Monday, 25.11.
9 am Arrival at Beckmanns Hof
*Program see below*
6.15 pm shuttle service back to the hotel (invited speakers only)
7.30 pm Dinner at Haus Rietkötter (altes-brauhaus-rietkoetter.de)

Tuesday, 26.11.
10 am Beckmanns Hof
*Program see below*
5.30 pm shuttle service back to the hotel
6.45 pm shuttle service to Haus Kemnade (hauskemnade.de)
afterwards optional visit to the Christmas market in Hattingen

Helpful Phonenumber

Sandra: 0176-24899658
Onur’s Office: 0234-32-28213
Bochum Tourism

For more information see www.bochum.de (English version)

Körperwelten

Monday to Thursday 9 am-7 pm
Friday 9 am-9 pm
Saturday/Sunday 10 am-7 pm

Address:
Hermannshöhe 42
44789 Bochum (only 5 minutes away from the central station)

Advance booking:
Bochum Ticketshop Touristinfo
RUHR.INFOCENTER
Huestraße 9
44787 Bochum
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Program
Monday 25th

9.00  Arrival and Registration

9.30  Welcome by Onur Güntürkün
      Introduction by the Young Scientists

10.15 Juan M. Rosas
      Pavlov’s dog is on Freud’s couch

11.30 Coffee break

11.45 Tom Beckers
      Cognitive processes in fear extinction and fear reduction

13.00 Lunch

14.15 Talk by Gonzalo Urcelay

15.30 Poster session (incl. coffee break)

17.00 Stephen Maren
      Brain circuits for contextual control of fear

(Each talk will start with a short introduction of topic and speakers by the Young Scientists (10 min) – length of each talk 45 minutes followed by 15 minutes discussion)
Tuesday 26th

10.00  Arrival and coffee

10.30  Talk by Andreas Olsson
       Aversive Learning and Extinction in Social Contexts

11.45  Coffee break

12.00  Talk by Travis Todd
       Mechanisms of renewal after the extinction of free
       and discriminated operant behavior

13.15  Lunch followed by an open discussion in subgroups

15.15  Talk by Mohammed Milad
       Examining the influence of sex hormones and
       hormonal contraceptives on the neurobiology of
       fear extinction

16.30  Final discussions and farewell

17.30  Official end of the conference

(Each talk will start with a short introduction of topic and speakers by
the Young Scientists (10 min) – length of each talk 45 minutes followed
by 15 minutes discussion)
Extinction Learning
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Speaker Abstracts
(alphabetical order)
Contemporary, propositional theories of learning assume that fear learning relies on conscious, declarative memory processes. According to such theories, it is the acquisition of propositional knowledge about CS-US contingencies that drives conditioned responding. Psychological and neurobiological evidence would suggest that this is even more true for extinction learning and other forms of fear inhibition, as they appear to involve working memory resources and effortful prefrontal control. The strong dependence of extinction learning on effortful prefrontal inhibition may in fact help to explain why conditioned fear is so prone to recovery (reinstatement, renewal, spontaneous recovery).

I will first review evidence that illustrates the important role of declarative knowledge in fear reduction and extinction in humans and shows how modifying people’s conscious knowledge or expectations can be a very powerful way to affect conditioned fear responding. I will then go on to point out evidence that human conditioned fear responses do not always track conscious contingency knowledge quite so closely. In particular, I will argue that conditioned fear responses can be demonstrated even in the complete absence of US expectancy (and, perhaps, US expectancy can also go hand in hand with the absence of conditioned fear responses). This poses a challenge to propositional theories of learning and simple prefrontal theories of extinction learning.
While it is generally adaptive to rapidly learn about threats in the environment, this form of learning can lead to psychopathology including post-traumatic stress disorder (PTSD). In the clinic, exposure therapy is an effective method for suppressing pathological fear, but relief can be transient and prone to relapse. Recent work from my laboratory has explored the neural mechanisms underlying fear relapse after extinction, a form of learning that models exposure therapy in humans. Interestingly, extinction memories are labile and fear relapses upon the passage of time and changes in context. The return of fear after extinction is consistent with Konorski’s proposal that extinction results in a new inhibitory memory that is formed along side the excitatory fear memory. We have now identified a network of brain structures in the rat including the amygdala, hippocampus, and prefrontal cortex that contribute to regulation of fear responses after extinction. In particular, we show using electrophysiological and cellular imaging approaches that reciprocal hippocampal-prefrontal circuits control fear output by regulating amygdala neurons involved in fear expression.
Mohammed Milad

Examining the influence of sex hormones and hormonal contraceptives on the neurobiology of fear extinction

*Department of Psychiatry, Harvard Medical School, Massachusetts General Hospital, Boston, MA (USA)*

Increasing evidence from rodents and human imaging studies shows that males and females may differ in how fear is acquired and extinguished in the brain across the sexes. Stress also differentially affects the neurobiology of the fear in males and females. In addition, we know that prevalence of mood and anxiety disorders is higher in women, relative to men. Lastly, we also know that sex hormones, such as estrogen, play critical role in synaptic plasticity and memory consolidation across different learning paradigms. Recently, we and others have begun to explore how sex hormones such as estrogen may contribute to differences in the way men and women acquire and extinguish fears. In my talk, I will focus on data relating to this domain. In addition, data related to the use of estrogen administration in both women and female rodents, along with data related to the influence of hormonal contraceptives on fear extinction circuitry will be presented and discussed.
Andreas Olsson

Aversive Learning and Extinction in Social Contexts

Emotion Lab, Department of Clinical Neuroscience, Karolinska Institute (Sweden)

The biological basis of emotional learning through direct aversive experiences (classical conditioning) is well studied. Yet, little is known about the mechanisms underlying indirect emotional learning through social means, which may be more representative of human every-day learning. Indeed, many of our learned fears and aversions are acquired by observing the emotional expressions of others (‘learning models’). Moreover, we might acquire safety information from others by, for example, observing a safe learning model being repeatedly exposed to a feared stimulus without aversive consequences (‘vicarious extinction’). My research aims to better describing the mechanisms underlying social aversive learning and regulation by bringing together two hitherto unconnected lines of research; the biology of emotional learning and social cognition. I will discuss behavioral, psychophysiological, and neuroimaging (fMRI) research showing that aversive learning through observation (1) shares important behavioral and neural qualities with traditional conditioning, but unlike non-social learning, it (2) is distinguished by its reliance on social information. For example, both stimulus bound (e.g. ethnic group belonging) and conceptual (e.g. attributed mental state) features of the learning model affect the learning outcome.
When an organism learns that a cue signals an outcome and such a relationship is then extinguished by presenting the cue by itself, subsequent performance will depend on the background (context) present at the time of testing. When testing takes place in the same context in which the relationship was extinguished, extinction performance is observed. Yet, when the test occurs in a context different from the extinction context, original learning is renewed, and extinction performance substantially decreases. And this is true for rats, as it is for humans, and regardless of whether the context is physical, temporal, conceptual or physiological. This is a well-known phenomenon, and its relevance for behavioral therapy should be obvious, especially when relapse has been found not only after extinction, but also after different interference treatments. If the original association is understood as the problem that needs to be solved, conditioned responding is viewed as the symptom, and interference is seen as the treatment, relapse suggests that whenever there is a contextual change, the symptom reappears. But what happens in the absence of a contextual change? Does extinction eliminates the problem, as a behavioral therapist would say, or just the symptom so that the problem will reappear with a different symptom, as a Psychoanalyst will say? The answer to this question is searched within the experimental work devoted to analyze the contents of extinction in both, human and nonhuman animals.
Renewal indicates that extinction is context dependent, and the ABC and AAB forms of it suggest that extinction likely involves context-specific inhibitory learning. Using both free-operant and discriminated operant procedures with rats, several experiments examined renewal of extinguished instrumental behavior when the reinforcement histories of the contexts were equated by giving complementary training and extinction of a different response (lever press and chain pull) in each context. In Experiments 1 and 2 (free-operant), following extinction, renewal occurred when the response was tested in the acquisition context (ABA) or outside the extinction context (AAB and ABC). Renewal occurred during tests where only one response was available, and also affected choice during tests when both responses were simultaneously available. In Experiment 3 (free-operant), renewal was not reduced when testing occurred in a context that had been associated with extinction of the other instrumental response. Experiments 4 and 5 examined renewal using a discriminated operant procedure. In both experiments, ABA renewal was observed. However, in Experiment 5, renewal was reduced when the renewing context was previously associated with extinction of responding to a separate discriminative stimulus (S) that set the occasion for the same response. Finally, Experiment 6 tested for AAB renewal using a discriminated operant procedure. Although AAB renewal was observed, previous extinction of the response in the renewing context (occasioned by a different S) eliminated AAB renewal more than did extinction of a different response. Overall, the results indicate that differential context-reinforcer associations are not necessary for renewal, and they also raise questions about configural and occasion-setting accounts. The results are consistent with the idea that during extinction an inhibitory association is formed between the context and the response. Renewal is due to a release from context-specific response inhibition.
Over the last 15 years, significant progress has been made in the field of extinction and this has been paralleled by research on reconsolidation, the impairment that results from the administration of amnestic agents soon after memory reactivation. In this talk, I will briefly summarize the historical background of the ideas behind amnesia, extinction learning, and reconsolidation. I will present three sets of data looking at the reconsolidation-extinction (RE) manipulation pioneered by Monfils et al (2009). The first will shed light on what is learned using the RE manipulation. Then I will present data shedding light on the conditions that allow to observe the RE benefit, and will end with experiments exploring the role of prediction error on reconsolidation and extinction.
Extinction Learning
Nov 25\textsuperscript{th} – 26\textsuperscript{th} 2013
Bochum

Young-Scientists Abstracts
for Poster Presentation
(alphabetical order)
Effect of mGlu5 receptor antagonism on the extinction of context-specific memory

Marion ANDRE1,2, Valentina WIESCHOLLECK1, Denise MANAHAN-VAUGHAN1,2

1Department Neurophysiology, Faculty of Medicine, Ruhr-University Bochum, Germany
2International Graduate School of Neuroscience, Ruhr-University Bochum, Germany

Metabotropic glutamate receptors mGlu5 are critically important for hippocampus-dependent learning, memory and plasticity processes. Extinction is a phenomenon which has never been studied on that kind of memory but has been intensively studied in the field of conditioning research, notably fear conditioning. In this context, after learning an association between a behaviour (e.g. freezing) and a signal (e.g. footshock), extinction is defined as the disappearance of this conditioned behaviour when the conditioning signal is no longer present. It has been shown that mGlu5 can be involved in this kind of extinction. We examined if antagonising mGlu5 can affect extinction of context-specific spatial memory.

To allow us to study this phenomenon with regard to context-specific spatial memory, we developed a new paradigm. We trained rats in a T-maze, within a specific sensory context (visual and olfactory) to find a small food reward in a certain proportion of trials. Once this behaviour was acquired with a food reward probability of 25%, we studied the extinction of this memory by comparing two animal cohorts: one cohort was exposed to a new unrewarded context (B) (one day after having achieved the learning performance criterion of 80% in context A) and the other cohort was exposed once more to context A in the absence of food reward. Renewal was assessed a day later by returning both groups to the original (now unrewarded) context. In the ABA cohort, significant extinction was followed by renewal whereas in the AAA cohort, only extinction occurred, showing that the extinguished memory was declarative-like.

In this paradigm, the antagonism of mGlu5 during the extinction trial prevented the formation of a long term memory of the extinction trial in both conditions, but the extinction was delayed only in the AAA context. These context-specific effects appear to relate to context-specific learning and possibly to impairments in working memory. Our data support that context-specific extinction and extinction memory are mediated by the activation of mGlu5.
Effect of drug pre-exposure on learned immunosuppression in rats

Katharina BÖSCHE¹, Martin HADAMITZKY¹, Kathrin ORLOWSKI¹, Harald ENGLER¹, Manfred SCHEDLOWSKI¹

¹Institute of Medical Psychology and Behavioral Immunobiology, University Hospital, University Duisburg-Essen

Within an established model of behaviorally conditioned immunosuppression in the rat, we employ a conditioned taste aversion (CTA) paradigm in which the novel taste saccharin (conditioned stimulus, CS) is paired with the immunosuppressive drug cyclosporine A (unconditioned stimulus, US). Previous studies show that this association causes a reduced fluid intake (CTA), as well as a significant inhibition of the cytokine IL-2 in splenic T cells during acquisition and evocation. In the present study we exposed male dark agouti rats to either the unconditioned or the conditioned stimulus, respectively, three days prior to conditioning. Pretreatment with cyclosporine A (US) accelerated the extinction process of the CTA, however did not affect the learned suppression of anti-CD3 stimulated IL-2 production. In contrast, the presentation of saccharine (CS) before the conditioning trial did not accelerate the extinction of the CTA, but erased the suppression of IL-2 production.
Effects of stress on retrieval and consolidation of extinction memory in humans

Tanja C. HAMACHER-DANG\textsuperscript{1,2}, Metin UENGOER\textsuperscript{3}, Harald ENGLER\textsuperscript{4}, Manfred SCHEDLOWSKI\textsuperscript{4}, Oliver T. WOLF\textsuperscript{1,2}

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Stress has been shown to modulate learning and memory in a phase-dependent fashion, with retrieval of episodic memory usually being impaired and consolidation being enhanced. First evidence from rodent studies suggests that this might also be the case for extinction memory.

Retrieval of extinction memory is also modulated by contextual cues, as a recovery of conditioned responding is often more pronounced when retrieval is tested outside the extinction context (renewal effect). In two studies, we investigated the potential modulatory effects of stress and contextual cues in a predictive learning task designed as a renewal paradigm.

In the mornings of three consecutive days, participants learned an association between stimuli and outcome in one context (on day 1), underwent extinction in a second context (on day 2) and were then tested for retrieval in both contexts (on day 3). We applied an acute stressor (socially evaluated cold pressor test, SECPT) either prior to retrieval testing on day 3 (study 1), or directly after extinction learning on day 2 (study 2), presumably affecting the consolidation of extinction memory. As assessed by salivary cortisol concentrations, blood pressure measures, and subjective stressfulness ratings, stress induction proved to be successful in both studies. A general renewal effect was present, as reflected by a stronger recovery of responding when retrieval was tested in the presence of acquisition context cues compared to extinction context cues. Compared to controls, participants who were stressed prior to retrieval testing showed an overall impaired retrieval of extinction memory, which was more pronounced in acquisition context test trials. In contrast, stress directly after extinction learning enhanced the consolidation of extinction memory, as indicated by a strongly reduced spontaneous recovery on day 3.

Thus, the effects of stress on extinction memory retrieval in humans seemingly parallel those on declarative memory retrieval - whereas stress impairs retrieval of extinction memory, it enhances its consolidation. These results have important implications for psychotherapeutic treatment of anxiety disorders, especially for extinction-based methods such as exposure therapy: stress, especially outside the therapeutic context, might increase the probability for experiencing relapse or symptom reoccurrence, whereas stress induction included in the end of an (extinction-based) psychotherapy session may aid in enhancing the consolidation of the corrective memories formed during therapy.
Context-dependent effects on extinction and renewal of classically-conditioned fear memories in a visceral pain model

Adriane ICENHOUR¹, Joswin KATTOOR¹, Sven BENSON¹ and Sigrid ELSENBRUCH¹

¹Institute of Medical Psychology and Behavioral Immunobiology, University Hospital, University Duisburg-Essen

The role of associative learning and memory processes is widely acknowledged in the pathophysiology and treatment of anxiety disorders, drug abuse and relapse, but far less is known about their contribution in the context of chronic visceral pain like in irritable bowel syndrome (IBS). Fear conditioning is a well-established model for investigating the pathophysiology of anxiety, but it also serves as a translational model in neuroscience and provides useful insights into mechanisms contributing to a large number of disorders, including fibromyalgia and chronic back pain. Given the well-documented overlap between IBS and other somatization disorders with pre-clinical and clinical anxiety, it also appears well-suited for exploring the central mechanisms underlying the generation and persistence of IBS, particularly visceral hyperalgesia, which may be mediated by conditioned fear of pain.

In “real life” situations, pain is never an isolated experience, but is always embedded in specific contexts, so not only aversive learning and memory processes themselves, but also the context in which they take place, could play a crucial role in the pathophysiology of IBS, particularly in the chronification and relapse of symptoms. In a series of conditioning studies, we aim to address context effects on extinction and renewal in a clinically-relevant visceral pain model in healthy volunteers, as well as in patients with IBS. More translational knowledge about the influence of learning processes on visceral pain, particularly the potential role of the context in extinction and reactivation of extinguished fear memories, could contribute to refining recently emerging new treatment options in the field of IBS such as pain-focussed exposure therapy.
Effects of CS-US learning trials on fear acquisition and extinction: A pilot study

Joswin KATTOOR¹, Carolin GRAMSCH², Adriane ICENHOUR¹, Sigrid ELSENBRUCH¹

¹Inst. of Medical Psychology & Behavioral Immunobiology, University Hospital of Essen, University of Duisburg-Essen, Essen, Germany
²Institute of Diagnostic and Interventional Radiology and Neuroradiology, University Hospital of Essen, University of Duisburg-Essen, Essen, Germany

Disturbed associative learning may play a role in chronic abdominal pain syndromes. We have recently implemented a visceral aversive fear conditioning paradigm (Kattoor et al., 2013a). Given the putative evolutionary significance of visceral stimuli, aversive visceral conditioning may require only very few learning trials. Therefore, we modified the established conditioning paradigm (which contained 12 conditioned stimuli (CS) – unconditioned stimuli (US) pairings) by reducing the number of CS – US pairings to 4 pairings in order to examine if differential aversive learning is still evocable.

In N = 24 healthy humans, fear acquisition was accomplished by pairing visual conditioned stimuli (CS⁺) with painful rectal distensions as US, while different visual stimuli (CS⁻) were presented without US. During extinction, all CSs were presented without US. In this pilot study we investigated the effect of a reduced number of CS – US pairings on extinction. Using event related fMRI, conditioned anticipatory activation was assessed along with perceived CS-US contingency and CS unpleasantness.

A significant valence change was found, indicating successful differential aversive learning. CS-US contingency awareness was not fully established, suggesting that differential visceral conditioning does not require full contingency awareness. This was paralleled by activation of the putamen, insula and the secondary somatosensory cortex in response to the CS⁺. Extinction involved activation of the cingulate gyrus and the primary motor cortex to the CS⁻.

Visceral stimuli are effective US that elicit conditioned fear even after very few learning trials even in the absence of full contingency awareness. These findings contribute to understanding the role of associative learning processes in the pathophysiology of chronic abdominal pain syndromes.
A within-subject appetitive conditioning paradigm to assess the role of the hippocampus and the 'prefrontal cortex' for extinction learning and renewal in pigeons.

Daniel Lengersdorf, Maik Stüttgen, Onur Güntürkün

Ruhr University Bochum, Universitätsstr. 150, D-44780 Bochum, Germany
International Graduate School of Neuroscience

The prefrontal cortex (PFC) and the hippocampus are crucially involved in the neural circuit of context-specific extinction learning. Most extinction research is based on Pavlovian fear conditioning in rodents. However to elucidate fundamental mechanisms of learning and refine extinction-based behavior therapy for phobias and drug addiction, learning under appetitive requirements should be investigated.

Therefore, we established an appetitive conditioning paradigm to investigate context-specific extinction learning with pigeons in a within-subject design. Subjects acquired responses to a rewarded conditioned stimulus (CS) in a defined acquisition context. Once a defined performance criterion was reached, responding to the CS was extinguished in a different context. Subsequently the CS was tested in the acquisition (ABA-condition) as well in the extinction context (ABB-condition). The within-subject version of ABA renewal allows for testing a single individual in an ABA as well as an ABB design for direct comparison. In order to characterize the neural substrate for the renewal effect (ABA) and spontaneous recovery (ABB) we a) inactivated the hippocampus via local administration of tetrodotoxin (TTX) or b) blocked NMDA-receptors locally in the nidopallium caudalaterale (functional analog to the mammalian PFC) via 2-amino-5-phosphonopentanoic acid (AP-5) before extinction. The TTX-injection did not affect the extinction dynamic per se but increased spontaneous recovery whereby the renewal effect remained unimpaired. Previous work has shown that the NMDA-receptor antagonist treatment prolongs successful extinction, presumably influencing the magnitude of renewal via impairing memory consolidation. Hence, NMDA-receptors are involved in encoding contextual information.

Keywords: bird, instrumental conditioning, context-specific learning, hippocampus, PFC, sign-tracking, TTX, AP-5
Manipulating the informational value of contexts during extinction learning

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¹Philipps-Universität Marburg, Germany
²Ruhr-Universität Bochum, Germany

In one predictive-learning experiment, we investigated the role of the informational value of contexts for the formation of context-specific extinction learning. The contexts were each composed of two elements, a color spot (dimension A) and a picture of an animal (dimension B). In Phase 1, participants received acquisition training with a target cue Z in a context A1B1 (numbers assign particular values on the context dimensions). In Phase 2, participants were trained with conditional discriminations between two other cues, X and Y, for which only one of the two context dimensions was relevant. In a third phase, participants received extinction trials with cue Z in context A2B2. During a final test phase, we observed that a partial change of the extinction context disrupted extinction performance when the context manipulation involved a shift of the value on the context dimension that was trained as relevant for the conditional discrimination. However, when the extinction context was partially changed by a shift of the value on the irrelevant context dimension, extinction performance was not affected. Our results are consistent with the idea that contexts with a higher informational value receive more attention, leading to stronger context-specific processing of information learned in these contexts.
Acute stress reduces fear retrieval in healthy men

Christian J. MERZ, Tanja C. HAMACHER-DANG, Oliver T. WOLF

1Institute of Cognitive Neuroscience, Department of Cognitive Psychology, Ruhr-University Bochum

The stress hormone cortisol reduces retrieval of emotional memories, which has been suggested to support the treatment of psychiatric disorders characterized by exaggerated fear-related memories. Indeed, studies in patients with anxiety disorders have indicated that the success of exposure therapy can be enhanced with accompanying cortisol administration. Fear renewal refers to the clinically relevant phenomenon that successfully extinguished fear can return after a context change. It remains to be investigated whether the effects of stress hormones on fear retrieval also generalize across different contexts. Healthy men were exposed to a fear renewal design with fear acquisition in context A and extinction in context B. Pictures of rooms served as contexts, colored lights were introduced as conditioned stimuli (CS), and an electrical stimulation served as the unconditioned stimulus (UCS). On the next day, participants were randomly assigned to a stress or a control condition. We tested for fear retrieval in contexts A and B during peak cortisol concentrations after stress induction. Overall, a context x stress interaction occurred, revealing that stress attenuated skin conductance responses in the extinction context B. Additionally, stress abolished the renewal effect (differentiation between CS in context A) at the electrodermal level. These results demonstrate a decreased return of fear after acute exposure to stress. Stress interferes with the retrieval of the original fear memory. Thus, acute stress reduces rather than promotes the return of fear.
The extinction of conditioned taste aversion is modulated by intra-insular infusions of anisomycin or propranolol

Kathrin ORLOWSKI1, Katharina BÖSCH1, Martin HADAMITZKY1, Harald ENGLER1, and Manfred SCHEDLOWSKI1

1Institute of Medical Psychology and Behavioral Immunobiology, University Hospital Essen, University of Duisburg-Essen, Germany

Based on Pavlovian conditioning we established a conditioned taste aversion paradigm (CTA) in rats. Injection of cyclosporine A (CsA) (i.p., 20 mg/kg) as an unconditioned stimulus (US) is paired together with a saccharin drinking solution (0.2 %) as a conditioned stimulus (CS) during acquisition. CsA is an immunosuppressant known for its ability to suppress cytokine production (IL-2 and IFN-γ) in T cells. Re-exposure to the CS during evocation induces a CTA and concomitantly a conditioned suppression of cytokine production and T cell activation. However, extinction of the CTA as well as of the learned immunosuppression occurs after repeated re-exposures to the CS alone. Therefore, the present study aimed to elucidate neurobiological mechanisms responsible for the extinction process in CTA. As the evocation of this conditioned immunosuppression is mediated centrally via the insular cortex (IC), we analyzed whether bilateral infusions of either the protein synthesis inhibitor anisomycin (120 µg/µl) or the β-adrenergic antagonist propranolol (20 µg/µl) into the IC affect the extinction of CTA. Daily administration of anisomycin or propranolol for six consecutive days during evocation significantly delayed (anisomycin) or accelerated (propranolol) the extinction of CTA compared to the vehicle injected conditioned controls. Though, the mRNA expression of IL-2 and IFN-γ was unaffected after six re-exposures. These data indicate that in this paradigm repeated inhibition of protein synthesis or β-adrenergic blockade in the IC modulate the extinction process of CTA.
Observing single-unit activity across three stages of learning

Sarah STAROSTA1, Onur GÜNTÜRKÜN1, Maik C. STÜTTGEN1

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Neuronal mechanisms underlying extinction learning are primarily studied employing fear conditioning in rodents. Neural processes underlying the extinction of appetitive, operantly conditioned responses are way less understood. This is quite remarkable, considering that most animal behavior is operant in nature. Additionally, it offers the opportunity to disentangle the time courses of plasticity which has been notoriously difficult with fear conditioning because of the low number of trials required for both acquisition and extinction. We therefore seek to investigate the differences and similarities of acquisition, extinction and also reacquisition on the behavioral as well as on the neuronal level in an appetitive conditioning paradigm. For investigating the neuronal correlates at the level of single cells, it is critical to record one and the same neuron during all three stages of learning. Since it is difficult to record from the same cells over days, we established a behavioral paradigm in which the animals run through all three stages of learning within one experimental session. A prerequisite for this is that experimental animals are willing to perform several hundred of trials over an extended period of time for a relatively low number of reinforcers. Additionally, they should acquire a new association in a reasonable time span and show stable performance across sessions. Here we present a behavioral paradigm which allows for the within-assessment of acquisition, extinction, and reacquisition in one experimental session in pigeons. In addition, highly dynamic, single unit response patterns across the three learning stages are shown.
Contribution of the cerebellum to acquisition and extinction of conditioned eyeblinks: A 7T fMRI study

Markus THÜRLING, F. KAHL, S.K.E. KOEKKOEK, J. DIEDRICHSEN, S. MADERWALD, M.E. LADD, D. TIMMANN

1 Department of Neurology, University of Duisburg-Essen, 2 Department of Neuroscience, Erasmus MC Rotterdam
2 Institute of Cognitive Neuroscience, UCL, 4 Erwin L. Hahn Institute for Magnetic Resonance Imaging, University of Duisburg-Essen

Contribution of the cerebellum to acquisition of conditioned eyeblink responses is well known both in animals and humans. Although animal studies suggest that the cerebellum is equally involved in extinction, cerebellar contribution has rarely been assessed in humans. Furthermore, human studies of both acquisition and extinction focus on the cerebellar cortex. Due to a number of methodological constraints studies of the cerebellar nuclei are sparse. Based on animal data, intermediate parts of cerebellar lobule VI and interposed nuclei appear to be of particular importance. To test the hypothesis that overlapping areas of the intermediate cerebellum, more specifically intermediate lobule VI and interposed nuclei, contribute to acquisition and extinction of the classically conditioned eyeblink in humans.

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Curriculum Vitae

Since 2008 PhD Student in the Neurophysiology department of Neurophysiology under the supervision of Prof. Dr. Manahan-Vaughan

2008 MSc (+5) in Integrative and Cognitive Neurosciences, University of Provence, Aix-Marseille I, France

Thesis : Single unit recording in wild and L7-PKCI mice hippocampus during spatial navigation under supervision of Dr. Etienne Save.

2007 Maitrise (+4) in Integrative and Cognitive Neurosciences, University of Provence, Aix-Marseille I, France

Effects of post-natal iron overload on spatial behaviour in the rats under supervision of Dr. Etienne Save

2006 License (eq. BS) in Integrative and Cognitive Neurosciences, University of Provence, Aix-Marseille I, France

2005 DEUG (+2) in Integrative and Cognitive Neurosciences, University of Provence, Aix-Marseille I, France

2002 High School Graduation, Lycée d’Apt, Apt, France
Methods and Research interests

- Place cell recordings and EEG recordings in freely moving rodents
- Animal behaviour
- Spatial and declarative memory
- Hippocampal plasticity

Publications


Spatial olfactory learning facilitates long-term depression in the hippocampus. André MAE, Manahan-Vaughan D. Hippocampus. 2013

The metabotropic glutamate receptor, mGlu5 is required for extinction learning that occurs in the absence of a context change. André MAE, Güntürkün O, Manahan-Vaughan D. Hippocampus. Submitted.
M.Sc. Biol. Katharina Bösche

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Curriculum Vitae

<table>
<thead>
<tr>
<th>Since 11/2011</th>
<th>Member of the DFG Research Unit 1581: Extinction learning: Neural Mechanisms, Behavioral Manifestations and Clinical Implications</th>
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<tr>
<td>Since 11/2011</td>
<td>PhD student in the Institute of Medical Psychology and Behavioral Immunobiology of Prof. Dr. rer. biol. hum. Manfred Schedlowski</td>
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<tr>
<td>2011</td>
<td>M.Sc. Thesis: “Functional expression and electrophysiological characterization of vertebrate chemoreceptors in a recombinant system” (Prof. Dr. Dr. Dr. med. habil. H. Hatt)</td>
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<td>2009-2011</td>
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<tr>
<td>2009</td>
<td>B.Sc. Thesis: “The influence of the murine receptor type protein tyrosine phosphatase phogrin and the effects of mutated phogrin on the neurite outgrowth of PC12 cells” (Prof. Dr. S. Wiese)</td>
</tr>
<tr>
<td>07-08/2008</td>
<td>Internship at the Institute of Forensic Medicine (University Hospital Essen)</td>
</tr>
<tr>
<td>2006-2009</td>
<td>B.Sc. Biology, Ruhr-University Bochum</td>
</tr>
<tr>
<td>2006</td>
<td>Abitur/ A-level Exam Theodor-Heuss-Gymnasium Waltrop</td>
</tr>
</tbody>
</table>

Methods and Research Interests

Associative Learning Paradigms

Clinical Implications of Conditioned Immunosuppression

Real Time quantitative PCR
Main Research Projects

Reconsolidation of the conditioned immune response after heterotopic heart transplantation

Extinction, Reconsolidation and Renewal in behaviorally conditioned immunosuppression

Influences of small molecule-drug immunosuppression on amygdala-dependent behavior

Neurobehavioral consequences of acute mTOR blockade using rapamycin

Publications


Abstracts

Katharina Bösche, Martin Hadamitzky, Kathrin Orlowski, Raphael Doenlen, Harald Engler, Manfred Schedlowski (2013) Impact of the immunosuppressant rapamycin on amygdala activity and behavior (2013) 10th Congress of the German Endocrine Brain Immune Network (GEBIN), Regensburg

Grants

Grant of the “exploratory treasure” for young scientists within the DFG Research Unit FOR 1581 entitled Reconsolidation of the conditioned immune response following subtherapeutic CsA treatment: Acute allograft rejection.

Recent teaching activity

Supervision of medical students and interns
M.Sc. Psych. Tanja C. Hamacher-Dang

Ruhr-University Bochum  
Faculty of Psychology  
Department of Cognitive Psychology  
44780 Bochum, Germany  
Room: GAFO 02/381  
Phone: +49 (0)234/32-22678  
Fax: +49 (0)234/32-14308  
E-Mail: Tanja.Hamacher@rub.de  
Office hours: best to reach per email

Curriculum Vitae

| Since 10/2011 | PhD Student at the Department of Cognitive Psychology, Prof. Dr. Oliver T. Wolf  
Associate PhD student at the International Graduate School of Neuroscience (IGSN) |
(Prof. Dr. Oliver Wolf, Dr. Uta Wiemers) |
| 2009 - 2011 | M.Sc. Psychology, Ruhr-University Bochum |
(Prof. Dr. Axel Schölmerich, Dipl.-Psych. Jens-Ulrich Heete) |
| 2006 - 2009 | B.Sc. Psychology, Ruhr-University Bochum |
| 2004 | Abitur/ A-level Exam Schiller-Gymnasium Bochum |

Methods and Research Interests

- Stress induction
- Physiological measures: neuroendocrine marker of Hypothalamus-Pituitary Adrenal (HPA) axis activity (salivary cortisol), blood pressure, electrodermal activity (EDA) as marker of the fear response
- Stress effects on extinction and renewal in neutral and aversive learning paradigms
Research Project

- **Stress effects on extinction and renewal in healthy humans**

The goal of our project is to investigate systematically how stress influences extinction and renewal. We apply acute stress at distinct points in the course of extinction memory formation and its subsequent retrieval in order to distinguish between stress effects on extinction learning, on the consolidation of extinction memory and on its retrieval. The role of contextual cues as modulators of stress effects is studied by using within-subjects A-B-AB renewal designs. In addition, we investigate whether the emotionality of the memory also plays a role by comparably applying fear conditioning and predictive learning paradigms.

The knowledge we gain in these studies significantly contributes to our understanding of modulatory factors that influence extinction in the human and is of relevance for basic science studies and clinical applications alike.

**Publications**


**Poster presentations and talks**


Dipl.-Psych. Adriane Icenhour

University of Duisburg-Essen
University Hospital Essen
Institute of Medical Psychology and Behavioral Immunobiology
Hufelandstr. 55
D-45147 Essen, Germany

MFZ Room 0.025
Phone: +49 201 723 83680
Fax: +49 201 723 5948
Email: adriane.icenhour@uk-essen.de

Curriculum Vitae

| Since 2012 | PhD Student in the Lab of Prof. Sigrid Elsenbruch, University of Duisburg-Essen |
| 2011      | Diploma in Psychology, Justus-Liebig-University of Giessen                     |
| 2008-2011 | Diploma thesis “The influence of cortisol and sex hormones on neural and peripheral correlates of fear conditioning” (Prof. Dr. Rudolf Stark, Dr. rer. nat. Katharina Tabbert, Dr. rer. nat. Christian Merz) |
| 2008-2009 | Student research assistant at the Bender Institute for Neuroimaging (BION), Giessen |
| 2003-2011 | Studies of Psychology (major) and Medicine (minor), Justus-Liebig-University of Giessen |
| 2001-2003 | Studies of Psychology and Anglistics for a teaching profession, University of Duisburg-Essen |
| 1999      | Abitur, Karl-Ziegler-Gymnasium, Muelheim an der Ruhr |

Methods and Research Interest

- Neuroimaging
- Neural Mechanisms of Learning and Memory
- Pain Research
- Sex differences and impact of sexual hormones
- Stress Research

Research Projects

**Neural Mechanisms of Associative Learning Processes in Visceral Pain**

Little is known about the role of associative learning and memory processes in the context of chronic visceral pain such as in the Irritable Bowel Syndrome (IBS). Using functional Magnetic Resonance Imaging (fMRI) along with the assessment of Skin Conductance Responses (SCR), salivary cortisol and behavioral measures, we are investigating the neural mechanisms of acquisition, extinction and the context-dependent renewal of previously extinguished fear memories in an established visceral-aversive conditioning paradigm in humans. Given the strong female preponderance for the development of IBS, data will also be analyzed addressing potential sex differences in visceral aversive learning and memory processes.
Associative Learning Processes in Patients with Irritable Bowel Syndrome (IBS)
In an aversive visceral conditioning paradigm, we are assessing possible alterations in acquisition, extinction and the reinstatement of the previously extinguished pain-relevant associations in IBS-patients compared with healthy controls by analyzing fMRI, SCR, salivary cortisol and behavioral data.

Classically-conditioned Nocebo-Hyperalgesia in Visceral Pain
There is broad evidence for conditioned placebo-analgesia in the field of pain research, but far less is known about the counterpart, the learned nocebo-hyperalgesia, which could play a crucial role in the pathophysiology of chronic pain disorders. Our lab is investigating neural, psychophysiological and behavioral correlates of a classically-conditioned nocebo-effect in the context of visceral pain.

Grants
“Exploratory treasure”-Grant for young scientists within the DFG Research Unit FOR 1581 “Extinction learning: neuronal mechanisms, behavioral manifestations, and clinical implications”
Promotion of young scientists from the Deutsche Schmerzgesellschaft e.V. (Section of the International Association for the Study of Pain, IASP) (2nd prize; 1.500,00 €)

University Hospital Essen
Institute for Medical Psychology and Behavioral Immunobiology
Institutsgruppe 1, 10. OG, Room 10
Virchowstr. 171
D- 45147 Essen
Phone +49 201 / 723-4267
Fax +49 201 / 723-5948
Joswin.kattoor@uk-essen.de
www.uk-essen.de
http://www.uk-essen.de/medizinische-psychologie/

Curriculum Vitae

<table>
<thead>
<tr>
<th>Since 01/2011</th>
<th>Member of the DFG Research Unit 1581: Extinction learning: Neural Mechanisms, Behavioral Manifestations and Clinical Implications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Since 06/2010</td>
<td>PhD Student at the Institute of Medical Psychology and Behavioral Immunobiology; Experimental Psychobiology, University of Duisburg-Essen (lab of Prof. Dr. Elsenbruch)</td>
</tr>
<tr>
<td>04/2007 to 10/2009</td>
<td>M.Sc. studies of biology, focus neurobiology at the Ruhr-University of Bochum; Master Thesis: Neuronal principles of perceptual decision-making in pigeons, Department of Biopsychology, Institute of Cognitive Neuroscience (lab of Prof. Dr. Dr. hc. Güntürkün)</td>
</tr>
<tr>
<td>03/2007 to 08/2007</td>
<td>Student assistant at the Max-Planck Institute for Neurological Research in Cologne in the research group for multimodal imaging concerning experimental and clinical stroke (lab of PD Dr. Endepols)</td>
</tr>
<tr>
<td>10/2004 to 02/2007</td>
<td>B.Sc. studies of biology at the University of Cologne; Bachelor Thesis: Intersegmental information transfer in the central nervous system of running stick insects, Zoological Institute at the University of Cologne (lab of Prof. Dr. Büschges)</td>
</tr>
<tr>
<td>10/2003 to 10/2004</td>
<td>B.Sc studies of biology and psychology at the University of Vechta</td>
</tr>
<tr>
<td>2002</td>
<td>Abitur/A-level Exam at Siegtal Gymnasium Eitorf</td>
</tr>
</tbody>
</table>

Methods and Research Interests

Neural mechanisms of associative learning, neuroimaging (fMRI)

Functional genetic polymorphisms in pain sensitivity, genetic association studies (real time PCR)

Psychophysics (pressure algometry, barostat)

Programming (Presentation, Matlab, SPM8)

Main Research Projects

Neural Mechanisms of Associative Learning Processes in Visceral Pain
Fear conditioning is relevant for elucidating the pathophysiology of anxiety, but could also be useful in the context of chronic pain syndromes which often overlap with anxiety. Therefore, we implemented a fear conditioning paradigm and analyzed the conditioned response to rectal pain stimuli using functional magnetic resonance imaging (fMRI) during acquisition of fear, extinction, context dependent renewal and context independent reinstatement. Additionally, sex differences were examined given the female preponderance of chronic abdominal pain. Moreover, the putative role of fear conditioning in the cerebellum is still unknown. Hence, we investigated the cerebellar contribution to visceral aversive extinction learning.

The role of the functional genetic polymorphism COMT val\(^{158}\)met in visceral pain sensitivity

The enzyme catechol-O-methyltransferase (COMT) plays a key role in catecholamine metabolism. A common functional polymorphism (rs4680) in the COMT gene (val\(^{158}\)met) has been associated with higher pain sensitivity in several pain modalities, and has recently been linked to abdominal symptoms in irritable bowel syndrome. Therefore, we analyzed the putative role of this gene polymorphism in visceral sensitivity in healthy volunteers.

Publications


Grants

Grant of the “exploratory treasure” for young scientists within the DFG Research Unit 1581
“Extinction learning: neuronal mechanisms, behavioral manifestations, and clinical implications”

Teaching

Supervision of medical doctoral students; Seminar for Medical Psychology, topic: Learning / Memory
M.Sc. Biol. Daniel Lengersdorf

Ruhr-University Bochum
Faculty for Psychology
Department for Biopsychology
D-44780 Bochum, Germany

Room: GAFO 05/624
Phone: +49 234 32 24917
E-Mail: Daniel.Lengersdorf@rub.de

Curriculum vitae

Since 10/2011 International School of Neuroscience in Bochum
Since 06/2011 PhD Student in the lab of Prof. Onur Güntürkün

(Prof. Dr. Dr. hc. Onur Güntürkün, Dr. rer. nat. Maik C. Stüttgen)

2009 – 2011 M.Sc. Biology, Ruhr-University Bochum

(Prof. Dr. Hermann Wagner, Martin Singheiser)


Methods and Research Interests

- Neuropharmacology
- Behavioral Neuroscience
- Neuronal basis of the dynamics of learning
- Acquisition, Extinction, Renewal
- Single-unit recordings


**Research Project**

*Neuronal Foundations of Extinction and Renewal*

It has been shown that the blockade of NMDA receptors in the NCL retards reversal learning, but not the original acquisition of an operant response. Here, we seek to extend this result to investigate differential effects of context-specificity in acquisition, extinction and renewal. Aside from the nidopallium caudolaterale (a presumed functional equivalent of the mammalian prefrontal cortex), we also focus on the role of the hippocampus in contextual conditioning. In experiments, we employ a discrete occasion setter as a context for the acquisition and extinction of learned associations. During task executions, the activity of specific brain regions are modified through pharmacological interventions.

**Awards**

RWTH UROP (Undergraduate Research Opportunities Program; 2008)

**Publications**

Lengersdorf D, Stüttgen MC, Uenguer M, Günterkün O. Transient inactivation of the pigeon hippocampus or the nidopallium caudolaterale during extinction learning impairs extinction retrieval in an appetitive conditioning paradigm. Behav Brain Res. Submitted Sept 2013.

Dipl.-Psych. Sara Lucke

Philpps-Universität Marburg
Fachbereich Psychologie
AG Allgemeine und Biologische Psychologie
D-35032 Marburg, Germany
Room: 01049
Phone: +49 6421 28 23693
E-Mail: sara.lucke@uni-marburg.de
Office hours: best to reach per email

Curriculum Vitae

02/2013 Research intern at Ruhr-University Bochum (Prof. Onur Güntürkün, “Influence of attention on the context-specificity of acquisition and extinction learning”
Since 08/2011 Postgraduate Training in Clinical Psychology (Cognitive-Behavioral-Treatment) at the „Institut für Psychotherapieausbildung an der Philipps-Universität Marburg“ (IPAM)
Since 04/2011 PhD Student in the lab of Prof. Harald Lachnit
2011 Diploma in Psychology, Philipps-Universität Marburg
Title of diploma thesis: Influence of prolonged training and extinction on resurgence of instrumental behavior (Prof. Dr. Harald Lachnit, Dr. Anja Lotz)
Data collection: University of Vermont, Biobehavioral Psychology, lab Mark Bouton
Psychology, Philipps-Universität Marburg
2006-2011 School leaving examination (Abitur) at Städtisches Gymnasium Kreuztal (ehem. Friedrich-Flick-Gymnaisum)

Methods and Research Interests

♦ Attentional Processes in human predictive and eye tracking paradigms
♦ Post-extinction phenomena and their underlying mechanisms

Research Projects

♦ The Role of Attention in Renewal
We investigate the role of attention for renewal regarding context-dependent behavior in humans. Therefore, we try to influence the amount of attention to contextual stimuli by manipulation of either the informational value of contexts or the degree of expectancy violation experienced within a context.
Extinction in Evaluative Conditioning
We are interested to reverse effects of affective learning. In an evaluative conditioning paradigm we investigate different treatments to change affective acquisition learning.

Publications


Grants/Scholarships

- Grant of the “exploratory treasure” for young scientist within the DFG Research Unit FOR 1581 “Extinction learning: neuronal mechanisms, behavioral manifestations, and clinical implications”
- Since 2008 Scholarship for highly-qualified students awarded by Evangelisches Studienwerk Villigst e.V. (German official scholarship organization)

Teaching

- **WS 11/12** Seminar “Introduction to academic research”
- **WS 09/10** Tutor for Research practical “Associative learning of negative correlations between events”
- **WS 08/09, WS 09/10** Tutor for “Introduction to academic research”
Dr. Christian Josef Merz, Dipl.-Psych.

Ruhr-University Bochum
Institute for Cognitive Neuroscience
Department of Cognitive Psychology
Universitätsstr. 150
44780 Bochum, Germany
E-mail: Christian.J.Merz@rub.de
Phone: +49 234 3224498
Fax: +49 234 3214308

Curriculum Vitae

Studies

2002-2007 Studies of Psychology at the Justus Liebig University Giessen, Germany; Diploma in 2007

Professional experiences

2006-2007 Student assistant in degree programme "Psychological Psychotherapy (Cognitive Behavioural Therapy)", Justus Liebig University Giessen, Germany

2008 Student assistant at the Bender Institute of Neuroimaging, Justus Liebig University Giessen, Germany

2008-2011 Research assistant at the Department of Cognitive Psychology (Prof. Dr. O. Wolf), Ruhr-University Bochum, Germany

February 2011 PhD (Dr. rer. nat.) at the Faculty of Psychology, Ruhr-University Bochum, Germany; Title of the Dissertation: "The influence of stress and sex hormones on fear conditioning in different learning conditions" (Grade: summa cum laude)

2011-2012 Research fellow at the Department of Psychotherapy and Systems Neuroscience and at the Bender Institute of Neuroimaging (Prof. R. Stark), Justus Liebig University Giessen, Germany

Since October 2012 Postdoc at the Institute for Cognitive Neuroscience, Department of Cognitive Psychology (Prof. Dr. O. Wolf), Ruhr-University Bochum, Germany
Scholarships/Grants

2009 Grant for the project "Neurobiological bases of social anxiety in women" (together with Dr. Andrea Hermann) from the women’s representative of the Justus Liebig University Giessen, Germany

2011 Scholarship for the participation in the Spring School of the DGPA "Genes, brain, and behavior: From personality to psychopathology" in St. Goar, Germany

2011 Young Investigator Award of the International Society for Psychoneuroendocrinology

2012 Research grant for the project „Neuronal basis of generalization of extinction learning“ from the Justus Liebig University Giessen, Germany (joint application with Dr. A. Hermann)

2012 Funding of a conference trip to New Orleans: „Neuroscience 2012“ (DAAD)

2013 Research grant from the German Research Foundation (DFG) for studies concerning the topic “Neurobiology of context-dependent extinction learning: modulation by multiple extinction contexts and cortisol” (joint application with Dr. A. Hermann)

2013 Principal Investigator of the DFG Research Unit 1581 “Extinction Learning: Neural Mechanisms, Behavioural Manifestations, and Clinical Implications”

Publications


M. Sc. Psych. Carina Mosig

Ruhr- University Bochum

Faculty of Psychology
Department of Clinical Psychology and Psychotherapy
44780 Bochum, Germany

Room: GAFO 03/910
Phone: +49 234 32 28177
E-Mail: Carina.Mosig@rub.de
Office hours: best to reach per email

Curriculum Vitae

<table>
<thead>
<tr>
<th>Education</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Since 05/2013</td>
<td>Research assistant at the Department of Clinical Psychology and</td>
</tr>
<tr>
<td></td>
<td>Psychotherapy, Ruhr University Bochum</td>
</tr>
<tr>
<td></td>
<td>Psychotherapie – Zusammenhänge zwischen Stimmparametern,</td>
</tr>
<tr>
<td></td>
<td>Kompetenzmaßen und dem Therapieerfolg “</td>
</tr>
<tr>
<td></td>
<td>(Prof. Dr. Jürgen Margraf, Dr. Armin Zlomuzica)</td>
</tr>
<tr>
<td>2010-2013</td>
<td>M. Sc. Clinical Psychology, Ruhr University Bochum</td>
</tr>
<tr>
<td></td>
<td>ein Vergleich zwischen Netzwerk- und Datingplattform“</td>
</tr>
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<td></td>
<td>(Prof. Dr. Hans Werner Bierhoff, PD Dr. Elke Rohmann)</td>
</tr>
<tr>
<td>2007-2010</td>
<td>B. Sc. Psychology (focus on Cognitive Neuroscience), Ruhr</td>
</tr>
<tr>
<td></td>
<td>University Bochum</td>
</tr>
<tr>
<td>2007</td>
<td>Abitur / A-level Exam Nellenburg Gymnasium Stockach</td>
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<th>Work and Internships</th>
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<tr>
<td>04/2012-05/2012</td>
<td>Internship in psychiatry, psychotherapy and preventive medicine</td>
</tr>
<tr>
<td></td>
<td>at the LWL Universitätsklinikum Bochum</td>
</tr>
<tr>
<td>08/2011-09/2011</td>
<td>Internship in psychosomatic medicine and psychotherapy at the</td>
</tr>
<tr>
<td></td>
<td>LWL Universitätsklinikum Bochum</td>
</tr>
<tr>
<td>01/2011-12/2011</td>
<td>Student assistant at the department of social psychology, Ruhr</td>
</tr>
<tr>
<td></td>
<td>University Bochum</td>
</tr>
<tr>
<td>06/2010-10/2010</td>
<td>Student assistant at the department of developmental psychology,</td>
</tr>
<tr>
<td></td>
<td>Ruhr University Bochum</td>
</tr>
<tr>
<td>02/2010-05/2010</td>
<td>Research internship at the department of developmental psychology,</td>
</tr>
<tr>
<td></td>
<td>Ruhr University Bochum</td>
</tr>
</tbody>
</table>
Methods and Research Interests

Etiology and therapy of anxiety disorders
neurobiology and psychophysiology of anxiety disorders
virtual reality exposure therapy

Research Project

Clinical Implications of Extinction and Renewal
Dipl. Biol. Kathrin Orlowski

University Hospital Essen
Institute for Medical Psychology and Behavioral Immunobiology
Institutsgruppe 1, 10. OG, Room 4
Virchowstr. 171
D- 45147 Essen
Phone +49 201 / 723-4749
Fax +49 201 / 723-5948

kathrin.orlowski@uk-essen.de
www.uk-essen.de
http://www.uk-essen.de/medizinische-psychologie/

Curriculum Vitae

<table>
<thead>
<tr>
<th>Since 10/2011</th>
<th>Associate member of the International Graduate School of Neuroscience (IGSN), Bochum, Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td>Since 01/2011</td>
<td>Member of the DFG Research Unit 1581: Extinction learning: Neural Mechanisms, Behavioral Manifestations, and Clinical Implications</td>
</tr>
<tr>
<td>Since 01/2011</td>
<td>PhD Student in the Institute of Medical Psychology and Behavioral Immunobiology of Prof. Dr. rer. biol. hum. Schedlowski</td>
</tr>
<tr>
<td>12/2010 to 01/2011</td>
<td>Tutor for biological questions for a “Jugend forscht” project (“Youth researchers”)</td>
</tr>
<tr>
<td>06/2009 to 07/2010</td>
<td>Diploma thesis at the Department of Neuropharmacology in Tubingen, Germany: The influence of NOS+-interneurons and serotonin on the haloperidol-induced catalepsy sensitization in the rat</td>
</tr>
<tr>
<td>02/2006 to 03/2006</td>
<td>Internship in a pharmacy</td>
</tr>
<tr>
<td>10/2004 to 09/2010</td>
<td>Diploma in Biology, Eberhard-Karls-University of Tubingen, Germany</td>
</tr>
<tr>
<td>08/1995 to 06/2004</td>
<td>Abitur/A-level Exam at Friedrich-Harkort-Schule in Herdecke (secondary school)</td>
</tr>
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</table>

Methods and Research Interests

Intracerebral lesions and implantations of cannula for pharmacological manipulation

Associative learning paradigms

Neurodegenerative diseases
Main Research Projects

Extinction, Reconsolidation and Renewal in behaviorally conditioned immunosuppression

Reconsolidation of the conditioned immune response after heterotopic heart transplantation

Neurobehavioral consequences of acute mTOR blockade (Rapamycin)

Influences of small molecule immunosuppressive drugs on behavior and immune response

Publications


Abstracts:

Kathrin Orlowski, Martin Hadamitzky, Katharina Bösche, Harald Engler and Manfred Schedlowski (2013) Repeated anisomycin microinjections into the insular cortex delay extinction of conditioned taste aversion, 43rd annual meeting of the Society for Neuroscience, San Diego

Kathrin Orlowski, Katharina Bösche, Martin Hadamitzky, Jan Claudius Schwitalla, Harald Engler, and Manfred Schedlowski (2013) Mediation of the extinction process in behaviorally conditioned immunosuppression, 10th Congress of the German Endocrine Brain Immune Network (GEBIN), Regensburg


Grants

Grant of the “exploratory treasure” for young scientists within the DFG Research Unit 1581 entitled “Effects of Tetrodotoxin in the conditioned taste aversion paradigm”

Teaching

Supervision of medical students and interns
M.Sc. Psych. Sarah Starosta

Ruhr-University Bochum
Faculty for Psychology
Department for Biopsychology
D-44780 Bochum, Germany
Room: GAFO 05/624
Phone: +49 234 32 24917
E-Mail: Sarah.Starosta@rub.de

Curriculum Vitae

<table>
<thead>
<tr>
<th>Since</th>
<th>PhD Student in the lab of Prof. Onur Güntürkün Associated member of the International Graduate School of Neuroscience</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>M.Sc. Thesis: “Representation of value and reinforcement in the avian brain as assessed with a generalization task” (Prof. Dr. Dr. hc. Onur Güntürkün, Dr. rer. nat. Maik C. Stüttgen)</td>
</tr>
<tr>
<td>01/2011-03/2011</td>
<td>Research intern at the Istituto Superior di Sanità, Rome, Italy (Dr. Igor Branchi, “Epigenetic influences of the early social environment on brain and behavior development”)</td>
</tr>
<tr>
<td>2010/2011</td>
<td>Erasmus scholarship, University “La Sapienza”, Rome, Italy</td>
</tr>
<tr>
<td>2008-2011</td>
<td>M.Sc. Psychology, Ruhr-University Bochum</td>
</tr>
<tr>
<td>2008</td>
<td>B.Sc. Thesis: “Aktivität striataler Neurone während klassischer Konditionierung mit verschiedenen Belohnungsgrößen” (Prof. Dr. Dr. hc. Onur Güntürkün, Dr. rer. nat. Jonas Rose)</td>
</tr>
<tr>
<td>2005-2008</td>
<td>B.Sc. Psychology, Ruhr-University Bochum</td>
</tr>
<tr>
<td>2005</td>
<td>Abitur/ A-level Exam Stadtgymnasium Dortmund</td>
</tr>
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</table>

Methods and Research Interests

- Single-unit recordings in freely-moving animals
- Neuronal basis of the dynamics of learning
- Animal learning theory
- Value coding in the brain
Research Projects

- **Neuronal Foundations of acquisition, extinction and reacquisition**

We are interested in the neuronal basis of extinction as a new and probably specific learning process. We are using single neuron recording techniques to investigate neuronal activity in avian forebrain areas during acquisition, extinction and reacquisition of positively reinforced operant behavior.

- **Influence of attention on the context-specificity of acquisition and extinction learning**

We are investigating the influence of context-directed attention on the context-specificity of acquisition and extinction by manipulating expectancy violation in a sign tracking paradigm. Expectancy violation is operationalized by the magnitude of a reward which is expected but not delivered.

Publications

Starosta, S., Güntürkün, O., Stüttgen, M.C., Stimulus-Response-Outcome Coding in the Pigeon Nidopallium Caudolaterale, PLoS ONE (2013)


Starosta, S.*, Stüttgen, MC.* Güntürkün, O., Recording single neurons’ action potentials from freely moving pigeons across three stages of learning, accepted by the Journal of Visualized Experiments.

Grants

- Grant of the “exploratory treasure” for young scientist within the DFG Research Unit FOR 1581 “Extinction learning: neuronal mechanisms, behavioral manifestations, and clinical implications”; Title: “Influence of reward expectancy on the context-specificity of acquisition and extinction”

Teaching

<table>
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<tr>
<th>SS 13</th>
<th>Research practical “Introduction to programming in MATLAB”</th>
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<tr>
<td>WS 12/13</td>
<td>Research practical “Influence of reward expectancy on the context-specificity of acquisition and extinction”</td>
</tr>
<tr>
<td>SS 09, SS 10</td>
<td>Tutor for the Painting and Crafts Workshop on the Human Brain</td>
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<tr>
<td>WS 09/10</td>
<td>Tutor for the Seminar “Learning”</td>
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</table>

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Erwin L. Hahn Institute for Magnetic Resonance Imaging
Arendahls Wiese 199,
Tor 3; 45141 Essen (Germany)
Phone: +49 201 183 6067
Fax: +49 201 183 6073
Email: markus.thuerling@uni-duisburg-essen.de

Curriculum Vitae

Since 09/2008 PhD Student in the lab of Prof. Dr. Timmann-Braun

2008

(Prof. Dr. H. Franke)

2006

(Prof. Dr. S. Conti)

2000-2008 Studies of physics, University Duisburg-Essen

2000-2006 Studies of mathematics, University Duisburg-Essen


Methods and Research Interests

- Structural and functional MRI including DTI with a focus on the cerebellum
- fMRI and structural MRI of the cerebellar nuclei
- MRI data acquisition and data processing using SPM, ECCET, MRICRON, FSL, SPSS, Matlab
- 7T MRI

Research Projects

- Eyeblink conditioning in healthy subjects using 7T fMRI
- Focus is on interposed nuclei and cerebellar cortex; compare acquisition, extinction and renewal
- Structural MRI of cerebellar patients
- Lesion symptom mapping in patients with focal and degenerative disease including VBM; analyze cerebellar areas related to extinction of cognitive and motor associative learning.
Publications


* contributed equally to the work

Grants

Grant of the “exploratory treasure” for young scientist within the DFG Research Unit FOR 1581 “Extinction learning: neuronal mechanisms, behavioral manifestations, and clinical implications”

Teaching

Co-supervision of medical students who work on their doctoral thesis