

Procedure Master Thesis

Because the number of thesis projects per faculty member is limited, we decided on the following procedure: students study all proposed projects. If in need of additional information, they contact the responsible staff member(s). They make a choice of three topics and send this list of three (in order of preference) to Marianne van Stel (mstel@fsw.leidenuniv.nl). After receiving all applications, an attempt will be made to enroll the students in their project of first preference. If that turns out to be impossible, they will be contacted for further consultation before a decision is made.

Title of the project: Does action planning direct our attention?

Supervisor Name: Bernhard Hommel

Location: 2B05/MA Lab

Course Requirement: Experimentation I, module E-prime or ERTS

Number of positions available: not limited

Description: Attention is commonly seen as the mechanism that filters out those stimuli that are then acted upon. However, it also makes sense to think that having a particular action goal and planning a particular action directs our attention to stimuli and locations the planned action relates to (environmental affordances). This idea can be investigated by having people to plan particular actions and test whether and how this affects the way they process action-related information.

Title of the project: Emotion and cognition

Supervisor Name: Bernhard Hommel

Location: 2B05/MA Lab

Course Requirement: Experimentation I, module E-prime or ERTS

Number of positions available: not limited

Description: Affective information is assumed to attract attention, negative events more so than positive events. E.g., if people are presented with two pictures their visual attention is attracted to the picture showing a negatively arousing event or object. Is this specific for emotional information or a reflection of a more general principle of "concern-related processing"? For instance, people may simply be more concerned about negative events. If so, one would expect that any event that relates to one's concerns and goals attracts attention.

Title of the project: How do we represent our environment?

Supervisor Name: Bernhard Hommel

Location: 2B05/MA Lab

Course Requirement: Experimentation I, module E-prime or ERTS

Number of positions available: not limited

Description: We do not perceive our environment by making mental copies of it. For instance, research has shown that cognitive representations of spatial layouts (e.g., maps) are strongly affected by global perceptual characteristics of the layout, background knowledge about the elements making it up, and general world knowledge. Even action opportunities structure cognitive representations; e.g., people underestimate distances between elements that afford the same action, such as restaurants on a city map.

Title of the project: Action control and inner speech

Supervisor Name: Bernhard Hommel

Location: 2B05/MA Lab

Course Requirement: Experimentation I, module E-prime or ERTS

Number of positions available: not limited

Description: We often speak to ourselves, but why is that? Recent research has rediscovered earlier suggestions that inner speech may enhance one's action control and one's ability to withstand distraction and interference. But how does this work? Are actions linked to verbal labels that make them easier to retrieve or maintain? Does verbal coding shift action planning to another representational level? Recent findings have revealed astonishing effects of verbal coding of actions and events, and we will investigate the underlying mechanisms, e.g., by manipulating the instructions people receive and the goals they follow.

Title of the project: How do we learn from travel experience?

Supervisor Name: Enide Bogers (TU Delft), Bernhard Hommel

Location: 2B05/MA Lab/TU Delft

Course Requirement: Experimentation I, module E-prime or ERTS

Number of positions available: not limited

Description: In our current traffic system, people often experience congestion and consequent delays. How do they react to their experiences, how do they use travel information? Traffic information has a short-term and a long-term impact on route and departure time choices of a driver. On the short-term, a driver can be faced with a message and has to act on it within a few seconds, e.g., the message 'Left: 2 km queue, Right: 4 km queue'. This short-term choice is however affected by what the driver has learned on the long-term about both the left and the right route and about the value of the information provided. Until now, this learning has always been modeled from an engineering point of view but the question is whether the underlying models are sufficiently psychological. How do people from a psychological point of view learn from traffic information and travel experiences?

Title of the project: Cognitive impairments among users of antidepressant drugs

Supervisor Name: Lorenza S. Colzato

Location: 2B.21

Course Requirement: Experimentation I, module E-prime & ERTS

Number of positions available: not limited

Contact: colzato@fsw.leidenuniv.nl

Description: Perceiving a visual object requires the integration of information about that object's shape, color, location, and other features, and from experiments we know a great deal about how that integration works. But how are integration processes affected by drug consumption, such as antidepressant? There are several, direct and indirect ways how this drug might influence integration: For instance, this may affect neurotransmitter systems that drive perceptual integration or it may increase neural noise. Antidepressant consumption is also known to increase arousal, which again may facilitate or impair attentional processes directly or indirectly. The proposed project looks into the impact of antidepressant drug consumption on feature integration in visual perception by investigating users compared to "never-users" young adults.

Internship: possibility to run an internship on the topic

Title of the project: High-risk schizophrenia: the influence of Spontaneous Eye Blink Rate and Dopamine on Feature Binding

Supervisor Name: Lorenza S. Colzato

Location: 2B.21

Course Requirement: Experimentation I, module E-prime & ERTS

Number of positions available: not limited

Contact: colzato@fsw.leidenuniv.nl

Description: The eye blink rate (EBR) is a functional marker of central dopaminergic function: high EBR is related with enhanced Dopamine (DA) activity. Schizophrenic patients, who have an increased activity of the dopamine system, show elevated blink rates (Freed,

1980). Visuomotor integration is supposed to be under dopaminergic control. Colzato, van Wouwe and Hommel (submitted) show that binding effects across perception and action are modulated by central dopaminergic activity as measured by EBR. Specific hypothesis are the following: high-risk schizophrenia person would show high EBR and impairments in behavioral feature integration measurement.

Internship: possibility to run an internship on the topic

Title of the project: Effect of action video game on Feature Binding

Supervisor Name: Lorenza S. Colzato

Location: 2B.21

Course Requirement: Experimentation I, module E-prime & ERTS

Number of positions available: not limited

Contact: colzato@fsw.leidenuniv.nl

Description: As video-game playing has become a ubiquitous activity in today's society. Action-video-game playing (AVGP) is capable of altering a range of visual skill: it enhances the capacity of visual attention and its spatial distribution (Shawn Green and Bavelier, 2003). By forcing players to simultaneously juggle a number of varied tasks (detect new enemies, track existing enemies and avoid getting hurt, among others), action-video-game enhances the attentional bottleneck. Indeed, AVG player show less AB deficit and greater attentional resources. The proposed project looks into the impact of AVGP on feature integration in visual perception by investigating players compared to non-video-game-players.

Internship: possibility to run an internship on the topic

Title of the project: Binding of Faces with Emotional Context

Supervisor Name: Lorenza S. Colzato & Andre Keizer

Location: 2B.21

Course Requirement: Experimentation I, module E-prime & ERTS

Number of positions available: not limited

Contact: colzato@fsw.leidenuniv.nl

Description: Binding research has shown that once features of an object are bound together, they will influence perception in the future (Hommel, 1998). Binding research has mainly been focusing on bindings between features of a visual object (Treisman, 1980), but Hommel (1998, 2001, etc.) showed that action features can also be bound to visual features. The current project investigates the possibility, through erotic and fearful pictures, of binding emotional features to visual features. We hypothesize that once a visual feature is bound to a particular emotion, it will be hard to make a fast judgment about the visual feature when the visual feature is shown with a different emotional context.

Internship: possibility to run an internship on the topic

Title of the project: Aging, positive affect and cognitive control

Supervisor Name: Nelleke van Wouwe, Richard Ridderinkhof and Guido Band

Location: 2A41

Course Requirement: Experimentation I, module E-prime

Number of positions available: not limited

Contact: Nelleke van Wouwe, wouwe@fsw.leidenuniv.nl, 071 527 34 07

Description: Performance in cognitive control tasks often relies on the use of context information given by the cue stimulus or a task set. Updating this background information occurs concurrently with an increase in dopamine (Braver, Barch & Cohen, 1999). Dopamine projections to the PFC are thought to facilitate working memory performance, whereas increased cognitive flexibility and facilitation of set switching is attributed to the dopamine projections into the anterior cingulate. Older adults or neurologically impaired groups are often limited in their ability to anticipate for demanding situations or events due to deficiencies in their dopamine system.

Dreisbach and Goschke (2004) and Ashby, Turken and Isen (1999) suggested that dopamine can be temporarily increased by means of a positive affect induction. Positive affect can be induced in different ways, for example with IAPS pictures, positive memory recall or short movies. We expect a positive affect induction to facilitate updating and maintenance of context in working memory in older adults.

Title of the project: working memory load limitations in dual-tasking

Supervisor Name: Merel Pannebakker, Guido Band

Location: 2A41/MA Lab

Course Requirement: Experimentation I, module E-prime

Number of positions available: not limited

Contact: Merel Pannebakker, mpannebakker@fsw.leidenuniv.nl, 071 527 34 07

Description: In a dual-task, performance on both tasks is limited compared to if you would do the two tasks separately. These extra costs depend on several different components. For example, the compatibility of the tasks, and the difficulty of the tasks all play a role. Also, these factors can mediate the amount of parallel processing of the two tasks. Currently we are investigating the influence of working memory (WM) capacity on the amount of parallel processing in dual-task performance per subject. In this next project we want to elaborate on the effect of WM load per trial. How is parallel processing influenced by concurrent WM load?

Title of the project: the effects of music on Attentional Blink performance

Supervisor Name: Merel Pannebakker, Guido Band

Location: 2A41/EEGLab

Course Requirement: Experimentation I, module E-prime; start with Experimentation II

Number of positions available: not limited; could be a shared project (working as a team)

Contact: Merel Pannebakker, mpannebakker@fsw.leidenuniv.nl, 071 527 34 07

Description: In a behavioral experiment, Olivers and Nieuwenhuis (2005) have shown that concurrent task-irrelevant mental activity like listening to music reduced the Attentional Blink (AB). At the moment, we are investigating how neuropsychological correlates like P3 are affected by this manipulation. Next, in this project, we want to elaborate on the different aspects of music that might cause this improvement. Therefore we will investigate different variations of the music, like duration and strength, with EEG to obtain better insight in the neuropsychological basis of the effect.

Title: The Critical Binding

Supervisor Name: Michiel Spapé & Lorenza Colzato

Location: 2A43/MA Lab

Course Requirement: Experimentation I, module E-prime

Number of positions available: not limited

Binding features into coherent event files has been shown to account for many cognitive effects that were previously seen as distinct phenomena. When features are integrated and a subsequent trial repeats a feature, but not the others, overlap-costs are observed in responding to this. Still, it is unclear where exactly this binding effect occurs: does the integration itself cause interference when a file is encoded; or, does the retrieval of the previously related features cause competition? Our experiment tackles this question by using two objects, either one of which may be similar to a target or the distracter that is presented simultaneously.

Title: Imitation inhibition or self-definition?

Supervisor Name: Michiel Spapé

Location: 2A43/MA Lab

Course Requirement: Experimentation I, module E-prime

Number of positions available: not limited

The recent discovery of an area in the brain where 'mirror neurons' (Rizzolatti et al., 1996) fire both when a particular behavior is executed or its execution is observed has enhanced our insight into acts of imitation, empathy and joint action. However, a system of this sort also comes with its own unique problem: if behaviour of others is coded similarly to behaviour of the individual, how does the individual distinguish between 'the self' and 'the other'? One way to look at this problem is inspired by the Theory of Event Coding (Hommel et al., 2001): imitation and refraining from imitation is only possible if observed features can be bound to a 'self' or an 'other' person. This would mean that imitation is related to self-definition, perhaps a first step in the forming of a self-consciousness. We use video/audio recording of participants to demonstrate the effects of using the self as a source of conflict, priming to imitate vis-à-vis defining the boundaries of the self.

Title: Confidence and accuracy of memory.

Supervisor: dr. G. Wolters (wolters@fsw.leidenuniv.nl)

Number of positions available: 2

Description: People are able to estimate the accuracy of their memories in terms of a confidence judgment. Although it is generally assumed that there is a strong relationship between accuracy and confidence, experimental work has shown that this relationship is far from perfect. Also, it has been found that people can be made to believe with great confidence in the accuracy of implanted (i.e., false) memories. An interesting question therefore is to find out which factors determine the accuracy-confidence relation. This question will be studied by having subjects learn various types of material (e.g., pictures and high and low imagery words). After varying retention intervals, memory, confidence and reasons for confidence will be tested with recall or recognition tests. It is expected that remembering specific details of the presentation or encoding of stimuli is a major determinant of the confidence-accuracy relationship.

Literature: Roediger & McDermott (1996), JEP: LMC, 21, 803-814; Johnson et al. (1993), Psychological Bulletin, 114, 3-28; Scriptie Steven Verschoor (2000).

Title: Interference between working memory functions.

Supervisor: dr. G. Wolters (wolters@fsw.leidenuniv.nl)

Number of positions available: 1

Course requirement: E-prime module

Description: The working memory model of Baddeley (2003) assumes a multi-modular system for the maintenance of limited amounts of visual or auditory information and for task-control. Interference as a result of concurrent maintenance of information in the same or different modalities has been amply studied. In this project the aim is to study possible interference between different WM functions in behavioral tasks. For instance, are subjects able to maintain information in WM and at the same exert top-down control in a selective attention task? Or can they maintain information and at the same time control the retrieval of other information from LTM? An additional question is to what extent the efficiency of WM functions is sensitive to emotional arousal. By manipulating the arousal state (using, for instance, the Trier stress induction task) the effect on single or combined WM tasks can be determined.

Literature: De Fockert et al. (2001), Science, 291, 1803-1806; Spinks et al. (2004), Neuroimage, 23, 517-524; Scriptie Patricia Bulsing (2004).

Title of the project: Control processes in language production.

Supervisor Name: dr. Wido La Heij, drs. Jan-Rouke Kuipers.

Location: 2B18, 2A43

Course Requirement: Experimentation I, module E-prime, would be nice, not obligatory.

Number of positions available: 4

Description: In tasks like picture naming, color naming and word translation, speakers have to retrieve a word from their “mental lexicon” on the basis of conceptual information.

This process, called “lexical access” is often investigated with the help of Stroop-like tasks in which, in addition to a to-be-named target (picture, color, or L2 word), a context word is presented that the participant is instructed to ignore.

The “standard” findings obtained with this paradigm are:

- (1) semantic interference; it takes longer to produce a word (e.g., “cat”) when the context is semantically similar to the target (e.g., “dog”), and
- (2) phonological facilitation; it takes less time to produce a word (e.g., “cat”) when the context is phonologically similar to the correct response (e.g., “cap”).

With this paradigm, much is learned about the basic processes involved in simple picture naming. However, context effects change considerably when instead of a simple naming task (say “chair” to the picture of a chair), a categorization task (“furniture”) or a function-naming task (“sit”) is used. For that reason, researchers started to investigate the role of the speaker’s intention (determined by the instruction) in the process of lexical access. Our present research is aimed at testing and expanding a recently developed model of lexical access, with an emphasis on the control processes involved.

Selected readings: Bloem, I., van den Boogaard, S., & La Heij, W. (2004). Semantic facilitation and semantic interference in language production: Further evidence for the conceptual selection model of lexical access. *Journal of Memory and Language*, 51, 307-323. La Heij, W. (2005). Selection Processes in Monolingual and Bilingual Lexical Access. In: J.F. Kroll and A.M.B. de Groot (Eds.) *Handbook of bilingualism* [pp. 289-307]. Oxford University Press.

La Heij, W., Kuipers, J-R, & Costa, A. (in press). A further look at semantic context effects in language production: The role of response congruency. *Language and Cognitive Processes*.

Title of the project: Unexpected events after the response

Supervisor Name: Guido Band, Bernhard Hommel, Richard Ridderinkhof

Location: SB12

Course Requirement: Experimentation I, module E-prime; start with Experimentation II

Number of positions available: 1

Description: Immediately after subjects make a response error, the event-related potentials show a negative peak, arising from the mediofrontal cortex. This peak seems to reflect the brain’s response to the detection of an error or the preceding response uncertainty. This detection is followed by an increased investment of cognitive control to prevent future errors. In a different research tradition, it has been shown that subjects are aware of the effects that follow after an action. For example, if you press the light switch, you anticipate that the light will turn on. Violations of these expectations are quickly detected. In this project, it will be investigated whether these two error detection functions are related.

Title of the project: Dual task performance and neuroscience

Supervisor Name: Guido Band

Location: SB12

Course Requirement: Experimentation I, module E-prime; start with Experimentation II

Number of positions available: 1

Description: Dual-task performance is always limited when decisions are involved. If subjects have to make two decisions almost simultaneously, dual-task costs are observed in the reaction time (RT). If subjects have to decide by two different rules in a row, there are task-switching costs. For both types of costs, it is unclear where they arise. Both behavioral (RT) and neuroscientific techniques (e.g. brain potential, ERP; neurotransmitter modulation) are used to isolate the processes that are responsible for the dual-task costs. In this ongoing line of research, we try to unravel the source of interference inspired by the latest developments in dual-task research.

Title of the project: Aging and strategy in dual task performance

Supervisor Name: Guido Band

Location: SB12

Course Requirement: Experimentation I, module E-prime

Number of positions available: 1

Description: In a previous study we have tested the possibility that subjects' ability to perform two tasks in parallel is not only modulated by capacity limitations, but also by strategic settings that have to do with controlling the order of actions. Subjects had to combine an auditory-pedal task and a visual-manual task under different reinforcement conditions. As expected, reward for speed of the second task facilitated parallel processing. In a follow-up study, we test the performance of older adults (60+ years old) on the same task. Older adults are known to use a rather cautious strategy and experience larger dual-task costs. In this project, it will be tested whether the strategy of older adults is just as sensitive to reward as in young adults, or whether the strategy is fixed.

Title of the project: Emotions change our brain

Supervisor Name: Guido Band

Location: SB12/SB29

Course Requirement: Experimentation I, module E-prime

Number of positions available: 1

Description: The literature shows several examples of how mood or emotions change information processing. Creativity and associative flexibility increases if you are in a good mood. Pictures or words with emotional content can improve our performance. These phenomena are remarkable. How can the stream of processes change, if the brain remains the same? How can a word like BLOOD immediately draw attention, while BLOOM does not, given that it takes some time to become aware of the meaning of the word. In this project, changes to information processing under the influence of mood are investigated. Is it true that happy people have an open mind, also for information they do not need (such as advertisements)? And do people close their eyes for danger? This project can be filled in in several ways, so there is some room for your own ideas. It is possible to run an ERP experiment, but only after following Experimentation II.

Title of the project: Infants' understanding of goal-directed actions

Supervisor name: Szilvia Biro

Location: 2B07

Course Requirements: none

Number of positions: 1

Description: To explain and predict the behavior of other people, that is, making sense the social world around, one needs to interpret actions in terms of goals. The project will investigate the origins of this ability in infancy. A growing body of evidence indicates that goal-directed action interpretation emerges during the first year of life. How this understanding develops is, however, still controversial. The project will investigate the time of onset of goal-directed action interpretations, the range of entities to which infants are willing to attribute goals, and the role of abstract behavioral cues and/or experience with particular actions play in generating such interpretations. Looking time method will likely be used. Good social skills in communicating with parents and infants are essential. Since conducting experiments with infants takes a lot of preparation and testing time this project is recommended for those who would be willing to combine it with the Internship and planning to do their thesis project in the academic year 2006/2007.

Title: Qualitative vs quantitative risk evaluation

Supervisor: Jop Groeneweg

Location: 2A46

Number of positions available: 2 (as a team)

Starting date: 1 Februari 2007

Course requirement: Cognitive ergonomics and Human Error 1

Description: The world of risk management is sharply divided between people who favour 'quantitative risk management tools' and people who prefer 'qualitative risk management tools'. There is some evidence in the literature that this preference may be considered a personality factor. This project is aimed at developing a short and userfriendly test that will be applied in risk management courses and syndicates that can distinguish between quantifiers and qualifiers or rate them on a scale ranging from 'extreme quantifiers' to 'extreme qualifiers'.

Title: Evaluating the reliability of the Tripod Extended investigation model

Supervisor: Jop Groeneweg

Location: 2A46

Number of positions available: 2 (as a team)

Starting date: 1 Februari 2007

Course requirement: Cognitive ergonomics and Human Error 1

On request of the Dutch Safety Board an accident investigation and analysis is being developed to facilitate investigators in the process of identifying contributing factors of accidents. It is of utmost importance that such a tool has a high inter- investigator reliability, e.g. two or more investigators using the same tool will identify the same factors and categorise them in the same way. Especially cognitive biases play an important 'disturbing role'. This project is aimed at answering two questions: 1) how reliable is the tool and 2) which cognitive biases influence the reliability. This study is partly a 'do-it-yourself' and partly a laboratory experiment involving subjects who have to analyse accidents with the method.

Title: Developing design guidelines for a computer assisted accident investigation tool

Supervisor: Jop Groeneweg

Location: 2A46

Number of positions available: 2 (as a team)

Starting date: 1 Februari 2007

Course requirement: Cognitive ergonomics and Human Error 1

A Tripod-extended accident investigation model is being developed for the Dutch Safety Board. At present, this model is 'paper and pencil' instrument. In the near future a computer-based version of this tool will be developed. This project is aimed at generating a design guideline, based on cognitive ergonomical principles to assist software developers to generate a software version of the tool, including the graphical representation of the results. If possible, some of these guidelines will be tested in a laboratory environment.

Title of the project: The learning of non-adjacent dependencies in sequential structure

Supervisor Name: Fenna Poletiek

Location: 2B24

Course Requirement: Experimentation I, module E-prime

Number of positions available: 1

Description: Humans ability to learn long distant dependencies in sequential materials is a refractory puzzle for cognitive researchers. Indeed, theoretical accounts of sequential learning based on associative learning of each element in the sequence to the next, are incompatible with this ability to associate an element with some other distant one and to 'ignore' the next

one in row. Recursive sequential structures generating center embedded exemplars (like in language: The man who thinks that I think he is Dutch, is French) are supposed to be particularly complex to learn. In the present project, we test the opposite hypothesis, that learning non adjacent dependencies is facilitated when the center embedding part has the same structure as the main part of the sequence, as compared to when the center embedded part is random, or otherwise structured.

Title of the project: Implicit efficiency in implicit learning

Supervisor Name: Fenna Poletiek & Esther van den Bos

Location: 2B24

Course Requirement: Experimentation I, Programming skills are helpful.

Number of positions available: 1

Description: When subjects perform a sequence reaction time task, (i.e. they press as fast as possible keys corresponding to the locations of a stimulus appearing according to a structured pattern over time) their reaction time decreases as they learn the underlying structure of the pattern. Surprisingly this effect has not been found in a task in which the stimulus follows a continuous pattern, moving from one side of the screen to the other following a sinusoid trajectory. Van den Bos & Poletiek (submitted) have proposed that implicit learning is efficient and not automatic; it selects the most simple cue needed to perform the task at hand, and neglects more complex structural properties of the stimuli. We hypothesize that this efficiency-model can explain the lack of structure learning in the continuous reaction time task. The present project tests this explanation.

Title of project: Correction versus sentence-effectiveness in artificial grammar learning

Supervisors: Esther van den Bos & Fenna Poletiek

Location: 2A45

Course requirements: Experimentation I, module E-prime

Number of positions available: 1

Contact: evdbos@fsw.leidenuniv.nl

Description: It has long been debated whether or not children learning a natural language benefit from correction of the ungrammatical sentences they produce. We hypothesize that this issue may be mediated by the effectiveness of a sentence in reaching the speaker's goal. Van den Bos and Poletiek (submitted) proposed that implicit structure learning only occurs if it is helpful to achieve one's goal. From this proposal it can be predicted that people would not learn from corrections if their sentences, in spite of being ungrammatical, produce a desired effect. In addition, it suggests that people may benefit from correction if they find that their ungrammatical sentences fail to produce the desired effect. The present project aims at investigating the roles played by correction and effectiveness of the sentences in artificial grammar learning.

Title of the project: How to give a sound meaning to aircraft sounds?

Supervisor Name: Pieter Jan Stallen & Bernhard Hommel

Course Requirement:

Number of positions available: not limited

Description: We would like to investigate 'meaning' in the context of aircraft noise. Why? The unwanted exposure to aircraft sounds is a serious threat to residential quality of life at many Western airports, therefore, more effective noise measures might be developed if we would better understand what factors basically affect the 'meaning' of (various) aircraft sounds. Real-life sounds such as at a gated railway-road crossing are generally rated as louder than acoustically equivalent (intensity, duration, bandwidth) but otherwise unrealistic sounds (Hellbrück et al., 2002). Apparently, our brain is processing the real-life sounds in different ways, at least partly so. Different nets of neural bonds will be formed, loosened or strengthened which differential processes altogether may be referred to as the creation of

meaning. 'Meaning' appears to shape already a judgment (loudness) of the auditory features of sound. However, if 'meaning' is so inescapable in simple and general responses, then, it is important to know by which (neuro)psychological factors meaning is determined, and by which settings it could be influenced. After all, in most countries the environmental noise policies are largely based upon (assumptions about) such primitive responses. We foresee several lines of research, and they may be redirected depending upon students interests. First, differential brain activities (e.g., f-MRI) might be assessed for judgments of loudness of real-life sounds and acoustically equivalent but otherwise unrealistic sounds (cooperation with TU-München). Second, We are particularly interested in the role of emotive stimuli, like (un)fairness of outcomes of exposure, or (dis)trustful behavior of the noise producing source. For example, when (un)fairness is perceived or when the source is (dis)trusted, then, will this lower the lowest level at which sounds of aircraft are identified? Will differences of induced (students) or pre-existing (residents) emotive meanings lead to different (robustness of) loudness estimates?

Third, we suspect that the meaning of aircraft sounds to which one is exposed, will have a strong affective component (see also research line 1). Could this component be made visible by facial electro myogram (or even less intrusive measures of facial temperature)?

Literature: Hellbrück et al. => <http://www.ia.csic.es/sea/sevilla02/noi04002.pdf>

Title of the project: Human error in health care

Supervisor: Simone Akerboom

Location: 2 B26 / LUMC

Number of positions available: 2, from September 2007

Description: Since the publication of the Institute of Medicine report "To err is human" in 1999 it is believed that as many as 10 % of all patients admitted to hospital suffer some kind of harm, about half of which is preventable with current standards of treatment. Consequently, improving patient safety has become an important political issue in many countries, of which the Netherlands is one. In recent years health care has increasingly accepted a systems approach for the analysis of medical incidents. The translation of this approach to techniques for determining systemic failures objectively has evolved largely to reactive methods focusing on the behaviours, circumstances and organizational factors that lead up to the particular adverse events. For this reason a study was directed at the development of a measurement instrument that operating theatres and intensive care units can use to illuminate structural shortcomings before they can lead to incidents; the Leiden Operating Theatre & Intensive Care Safety Scale (LOTICS).

(1) The instrument has been validated with respect to factor structure and reliability of the scales, as well as its content and discriminative validity. The instrument has yet to be tested on its predictive validity. The first study aims to address this issue by answering the following questions: Are the structural shortcomings as assessed with the LOTICS-scale also present in incident scenarios, while no important incident causes are missing in the LOTICS analysis? Is there a match between the proactive profile resulting from the LOTICS investigation and the reactive profile from the incident analyses?

(2) The second study looks at the causal relationship of latent risk factors as measured with the LOTICS-scale with indicators of work-related outcomes (safety performance and job attitudes), well-being (work stress), safety culture and perceived error rates, based on a two-wave panel design with a time lag of 18 months and a sample of 250 operating theatre and intensive care staff.

(3) Previous studies have shown that the way employees think and feel about their work goals, i.e. the cognitions and emotions involved in the pursuit of self-set mid-level work goals, is significantly associated with employee well-being and work-related outcomes, even after controlling for work conditions such as workload, job autonomy and social support. In this study we will investigate this relationship for safety related work goals, and will look at cross-sectional associations between work conditions, goal-efficacy and goal control on the one hand and indicators of work-related outcomes (job satisfaction, organizational commitment, error reporting, rule violation) and well-being (work stress) on the other hand.

Internship: Possibility to run an internship on the topic.

Title of the project: Effects on spatial memory of sharing action codes

Supervisor: Karel Hurts

Location: 2 B23

Number of participants available: not limited

Description: When using spatial maps, for example for travelling purposes, one perceptual distortion that has been reported in the literature is the so-called perceptual clustering effect: map cities that are directly connected by lines (roads) are perceived as closer to each other than cities that are not directly connected, even if the objective distances are the same. Though the effect is small, it is reliable and is not only observed if the distances between the cities must be remembered (memory-based distortion), but also if the map remains visible all the time (perception-based distortion).

A related finding is that symbols on a map-like display that have been experienced together in some kind of action pattern appear closer to each other than symbols not sharing such action-code. Symbols can be made to share action-codes by having subjects, e.g., click map symbols in a certain sequence, before they estimate the distances between them. However, this effect was only observed if the common action was ecologically significant, for example, if the symbols represented "houses", and the actions directed at these symbols resembled "opening doors".

In this project we will investigate if sharing action-codes can also affect spatial memory if the common action consists of traveling roads on a map-like display. In addition, the question will be addressed if the effect of common action-codes interacts with the above-mentioned phenomenon of perceptual clustering: does the effect of sharing a traveling experience on the accuracy of remembering distances depend on whether or not the traveler follows existing roads ("drives" from one city to another)? Or is it also observed if the traveler ignores existing roads ("flies" from one city to another, so to speak)?

A final question is whether the above-mentioned effect on spatial memory of sharing a traveling experience is also observed if the traveled distance between two cities is obviously not the shortest distance. For example, if the most direct route from one city to another is temporarily blocked, people have to adjust their travel plan and choose a less direct (longer) route. Under these circumstances, people may memorize the very act of travel plan adjustment somehow, and this may, in turn, affect their spatial memory. In other words, people may somehow "correct" their estimate of the Euclidean distance between the cities on the basis of the re-planning they were forced to undertake. As a result, they may think the cities are closer to each other than they would have otherwise thought (i.e., only on the basis of shared perception or action-codes).

Title of the project: Common Region and Common Color as Grouping Principles in Spatial Perception

Name: Karel Hurts

Location: 2 B23

Number of participants available: not limited

Description: When people study 2D maps for travel planning, or just in order to about learn the spatial layout of a physical environment, their spatial judgments may be subject to various kinds of perceptual bias. For example, their judgments of physical distances between map symbols may be distorted or may be made slower. Sometimes the biases are due to semantic (memory-related) factors. For example, when estimating the horizontal location of Reno compared to that of San Diego, people generally think that Reno is more to the east, whereas, in fact, this city is more to the west. Various geographical features of North America and of the states California (San Diego) and Nevada (Reno) seem to be responsible for the phenomenon. Surprisingly, the phenomenon is even observed when the US map may be consulted before the question is answered, though, obviously, the effect is much smaller in that case. In other cases, the bias seems to arise at a much earlier, perceptual stage of the human information processing system, due to principles of perceptual grouping. One such principle is called Common Region. According to this principle, city symbols that appear to belong to the same geographical region (as indicated by contour lines appearing in the maps) somehow seem to be more alike. In a recent experiment it was demonstrated that judging the spatial orientation of a pair of city symbols takes more time if the cities belong to different

regions. On the other hand, using color instead of contour lines as a means of making groups of city symbols stand out visually from other groups (i.e., symbols in different groups were drawn in different colors) did not affect spatial judgments (analogous to Common Region, the color-based principle may be referred to as Common Color). In other words, these judgments were not made faster or more accurately if the symbols belonged to the same color group. However, there are reasons to assume that both findings (the one related to Common Region and the one related to Common Color) depend on specific characteristics of the way the principles were implemented in the map stimuli. Specifically, with differently shaped contour lines it is likely the spatial judgments sometimes will not be affected (Common Region). Similarly, with different sizes for the colored city symbols, it is likely the judgments sometimes will be affected (Common Color). In this project, the earlier experiment will be replicated with a modified design, aimed at elucidating the generality of, and explanations for, the earlier findings.

Title: Older drivers, the type of accidents in which they are involved and mobility

Supervisor: William L.G.Verschuur

Number of positions available: 1-2

Course requirement: -

Description: The number of older drivers will rise in the coming years. Besides it is expected that the number of license holders of older drivers will increase, especially of women to a similar level of that of men. The number of fatalities (per thousand million kilometers) for all age categories shows a u-curve i.e. the curve is highest for the youngest drivers (18-24), with a minimum for the drivers between 40 and 60 years of age and then rising with a maximum at the drivers of 75 years and older. While the number of seriously injured drivers for most age categories declined or remained stable this number increased for the drivers of 75 and over. In the research literature it is suggested that older drivers are overrepresented in several types of accidents (at intersections, failing to give way, fatigue/illness, turning, weaving in and out) and that they are less involved in single vehicle accidents. Drivers do not have as many accidents as one might expect because they generally drive less in difficult conditions (night-time, poor weather) or in stressful situations (for example: unfamiliar roads, busy times of the day).

It is suggested here that accident data (VOR data) and data from police records (for using these sources we need the permission from the Ministry of Transport) might be helpful to analyze the kind of accidents older drivers are involved in. Questions are: What does classification of these accidents tell us about how accidents of older drivers differ from those of younger drivers? What are the relations between older drivers' accidents and their mobility behaviour?

Literature: Relevant articles from: Transportation Research Part F: Traffic Psychology and Behaviour, Accident Analysis & Prevention, Ergonomics.

Title: Hazard Perception and Unsafe Acts

Supervisor: William L.G.Verschuur

Number of positions available: 1

Course requirement: -

Description: In a current research project subjects assessed the degree to which they felt 'unsafe' (more specifically to the extent they were dangerous or uncontrollable) carrying out maneuvers as shown on video, with other vehicles. The study was set up within the framework of hazard perception as developed by Grayson and Groeger (2002) in short this framework tells us that hazard perception has four components: hazard detection, threat appraisal, action selection and implementation.

Subjects were shown video clips with three types of maneuvers: 'cutting in', 'turning right', and 'overtaking'. Each of the maneuvers was carried out in three ways (between a passenger car and another passenger car (as a 'baseline'), a passenger car and a very large truck (> 22.5 meters) and a passenger car and a 'normal' truck). One of the findings showed that overall maneuvers with trucks are estimated as being far more dangerous and less controllable

compared to passenger cars. Another result was that older drivers and female drivers felt less safe in traffic than younger drivers and male drivers. However the unsafe acts research shows the opposite results: young male drivers violate and report dangerous errors more frequently (Verschuur, 2003a; 2003b). These results at least suggest that 'feeling safe' in traffic will not always lead to acting safely. The aim of the master thesis: to combine 'hazard perception' test scores with unsafe acts as reported by drivers. Stimulus material: video clips (which are available) of maneuvers of passenger cars and trucks.

Title of the project: Associative learning is Learning that after A comes B. But do we learn that before B comes A?

Name: Poletiek, Wolters & Hommel

Location: 2B24

Course Requirement: Experimentation I, module E-prime

Number of positions available: -

When faced with all kinds of sequential stimuli (events, motor & social patterns, linguistic materials) people are very sensitive to statistical properties of these sequences (for example transitional probabilities), especially when they are meaningful to them. Indeed, these statistics may be a cue for a causal relation, a grammatical rule needed to use language efficiently, or allow for the prediction of a meaningful event to come up. However, little is known about how much we encode about the backward relationship of the two elements (A and B) in a sequence? Thus, how much is encoded about the probability that A preceded B, when B is given. Though A is important as a predictor of B, B may also be predicted, or even better by another element. Backwards associations can be important when knowing the backward relationships is useful to use the system. For example, one may learn that if Aunt A comes along, she brings in sweets. But if she occasionally does not, it is relevant to know that others (uncle C, D and E) also do are good predictors of sweets gifts. Also, in language, it may be important to know what can precede a given word to make sense of a whole sentence.

In the present master study, we test the hypothesis that forward associations are learned explicitly, and backward associations in a more subtle, implicit way. This hypothesis is tested with the process dissociation procedure, separating explicit from implicit structure knowledge after exposure to sequential stimuli. Explicit learning is expected to contribute more to learning forward associations, and implicit learning more to the learning of backwards contingencies.

Netherlands Institute for Neuroscience, Amsterdam. (formerly Netherlands Institute for Brain Research)

Student projects in the "behavioural neurochemistry group" starting from July 2006.

1. Serotonin in the prefrontal cortex and the coding of reward value.

The prefrontal cortex (PFC) is known to be involved in cognitive flexibility, the ability to adjust behaviour to changes in the environment. The separate roles of monoamine neurotransmitters are now being studied. Cognitive flexibility is impaired in affective disorders such as major depression and obsessive compulsive disorder. The role of serotonin in this is highly debated but is essentially unknown.

Serotonin is generally thought to be involved in flexibility when changes in affective impact of stimuli or rewards are imposed. In a previous study we observed that a reversal of an instrumental spatial discrimination paradigm is only affected by depletion of serotonin in the medial PFC of rats when at the same time a switch is imposed from a non-preferred to a preferred reward.

Several explanations are possible: mPFC serotonin is important for performance monitoring when reward values are changing; or for resolving response conflicts; or is involved in the attribution of affective value during reward discrimination. A highly interesting issue is the more precise location of the serotonin involvement: in one of the subareas of the medial PFC or in the orbital PFC.

The project aims at answering these questions by using peripheral and intracerebral pharmacological treatments and selective serotonergic lesions in rats. Behaviour is tested in operant boxes and in the T-maze.

Techniques: Behaviour, pharmacology.

Minimum period: 5 months.

Contact: g.van.der.plasse@nin.knaw.nl or m.feenstra@nin.knaw.nl

2. Effects of dopaminergic and serotonergic drugs on neuronal activity and information encoding in the orbital prefrontal cortex during operant behaviour.

The orbital PFC is important in encoding and updating information regarding stimuli and rewards. Measurements of neuronal activity during the acquisition and reversal of stimulus-reward associations show specific neuronal correlates of the various task-related events. In the present project we aim to study the involvement of two monoamine neurotransmitters in the formation and adaptation of these correlates, i.e. serotonin and dopamine. Both transmitters are known to be involved in motivated behaviour and in cognitive flexibility, but different hypotheses exist regarding their respective involvement. To study this, we developed a "combidrive" which for the first time allows the local perfusion of brain tissue with selective pharmacological agents during electrophysiological recording of neuronal activity in cognitive behaviour. We use odour-guided go/no-go tasks where the rat learns that different odours predict the presentation of different rewards or no reward. Subsequently, a reversal of a rewarded and the non-rewarded stimulus-reward association is imposed. Drugs will be infused during the acquisition and/or the reversal stage.

We expect that activation of serotonin receptors is needed for the encoding of the different reward correlates and the subsequent reversal of these correlates.

Techniques: Behaviour, electrophysiology, microdialysis.

For this project we are looking for a highly-motivated student, preferably with a background in experimental biology. A trial period of 1-2 weeks is included as the project poses high demands on experimental skills.

Minimum period: 6 months.

Contact: e.van.duuren@nin.knaw.nl or g.van.der.plasse@nin.knaw.nl or m.feenstra@nin.knaw.nl

3. Subsecond measurements of dopamine release during Pavlovian and instrumental learning and reversal.

Instrumental learning underlies all forms of goal-directed behaviour. We have shown that some rats perform better in instrumental learning than others. Thus, when they are introduced in a skinner box for the first time there is a wide variety in their performance, with a mean value of 50% correct responses. In a second session about 60% of the rats show an optimal performance (>90% correct), while the remainder does not improve.

This project is aimed at the mechanisms underlying this difference. One possibility relates to transmitter actions in the first session. In the first phase of instrumental learning dopamine release in the nucleus accumbens is increased more strongly in rats that later show to have learned well than in rats that do not improve in performance. The increase is also higher than during later execution of the task. The time resolution of these measurements was minutes and no relation can be made between the dopamine increases and specific task events. We now have the possibility to study this with a unique 100 ms time resolution, using in vivo fast-scan cyclic voltammetry.

We measure dopamine release in the nucleus accumbens during the acquisition of operant responses and, as a control, of Pavlovian associations.

Techniques: Behaviour, voltammetry.

For this project we are looking for a highly-motivated student, preferably with a background in experimental biology. A trial period of 1-2 weeks is included as the project poses high demands on experimental skills.

Minimum period: 6 months.

Contact: r.joosten@nin.knaw.nl or m.feenstra@nin.knaw.nl

4. Effects of sleep deprivation or fragmentation on prefrontal function in cognitive flexibility and working memory.

Cognition and sleep are closely linked. Sleep deprivation selectively disturbs the encoding and consolidation of information and the performance of complex tasks that depend on the integrity of the PFC. We aim to clarify the mechanism of this disturbance. We hypothesize that altered patterns of monoamine activity after sleep deprivation (or sleep fragmentation) result in suboptimal functioning of the PFC.

Using a new "sleep deprivation box" we will disturb the sleep of rats and subsequently test them in prefrontal operant tasks, probing functions of working memory and cognitive flexibility. When such functions are shown to be disturbed we will determine the release of monoamine neurotransmitters (dopamine, noradrenaline, serotonin, histamine, see project 6) during sleep deprivation and during task performance following the deprivation.

Techniques: Behaviour, possibly EEG-registration and/or microdialysis.

Minimum period: 5 months.

Contact: c.leenaars@nin.knaw.nl or m.feenstra@nin.knaw.nl

5. Serotonin and dopamine release in the prefrontal cortex during reward discrimination and operant responding.

Both prefrontal serotonin and dopamine are involved in motivated behaviour and cognitive flexibility. Measurements of transmitter release have resulted in clear patterns of activation for dopamine, but not for serotonin. We now hypothesize that serotonin may be activated when the affective impact of stimuli or rewards is altered. We aim to study this in Pavlovian and instrumental tasks using different rewards and switching between rewards (e.g. negative and positive contrast).

We determine the release of these transmitters in rat brain using set-ups in which microdialysis sampling, HPLC-analysis and operant boxes are combined.

Techniques: Behaviour, microdialysis.

Minimum period: 5 months.

Contact: g.van.der.plasse@nin.knaw.nl or c.leenaars@nin.knaw.nl or m.feenstra@nin.knaw.nl.

6. Histamine release in the prefrontal cortex during Pavlovian and operant behaviour.

We run microdialysis methods for dopamine, noradrenaline and serotonin in rat brain during behaviour in conditioning/operant boxes. A further monoamine neurotransmitter that is of high interest in the study of prefrontal functions is histamine. Microdialysis methods for histamine have been described, using HPLC and fluorimetric detection (after derivatization). This project is aimed at the introduction, validation and application of histamine microdialysis in our lab. The final aim is to use this method in the study of effects of sleep deprivation on prefrontal functions, but first we want to characterize the relation between histamine release and Pavlovian and operant conditioning.

Techniques: Microdialysis, HPLC, behaviour.

For this project we are looking for a highly-motivated student, preferably with a background in pharmacy or chemistry and affinity with method development.

Minimum period: 5 months.

Contact: c.leenaars@nin.knaw.nl or m.feenstra@nin.knaw.nl

The Netherlands Institute for Neuroscience is situated in Amsterdam ZO, next to the AMC hospital and easily accessible by public transport.