

## Learning Contract for the Mobility Semester

**Home University: Comenius University, Bratislava**

**Student Name: Barbora Mináriková**

**Study Programme ID: cognitive science**

**Host University: University of Ljubljana**

This learning contract ensures that the ECTS credits the MEi:CogSci student acquires at the host university will be accredited at the home university.

In order to make this contract valid, please follow the procedure/steps listed below:

### A Preparation Phase at the home university

- 1.) **Negotiation of Special Topic of Interest Module(s):** The student negotiates the *special topic of interest/phenomenon* (i.e., a cognitive phenomenon) he/she wants study and the way how he/she wants to study it (i.e., a combination of courses, lab work, self-study, literature used) with the supervisor and/or local coordinator at the *host* university.
- 2.) **Concrete plan of the project:** The student fills in the subject specific learning outcomes which he/she will have acquired after completing the module and specifies the work-plan for the module (elements of module, milestones, deliverables, dates,...) according to the negotiations with the supervisor at the host university.
- 3.) **Acknowledgement of the supervisor:** The supervisor checks and verifies the contract; by sending it (in digital version) to the local coordinator at the *home* university of the student (+ cc to the student) the supervisor acknowledges that he/she accepts the proposal
- 4.) **Approval by the home university:** The local coordinator at the home university approves it or requests changes (go back to step 2)
- 5.) **Signature of student**

### B Mobility phase at the host university

- 6.) **Planning of studies and courses at the host university:** Student fills out the semester contract in negotiation with local coordinator
- 7.) Grade for the project, signature & stamp of supervisor at host university (at end of semester at host university)

### C Grading & acknowledgement phase at home university

- 8.) **Final grading & acknowledging:** Signed contract & certificates/transcripts are returned to local coordinator at *home* university, who accredits the contract.

**SEMESTER CONTRACT****S-I-CS New Trends in Cognitive Science Module****10 ECTS**

| Course Title                | Course Type (e.g. lecture, seminar,...) | ECTS | Grade (host) | Grade (home) |
|-----------------------------|---|------|--------------|--------------|
| Trends in Cognitive Science | SE                                      | 10   |              |              |
|                             |   |      |              |              |
|                             |   |      |              |              |
| <b>Module Grade</b>         |   |      |              |              |

**S-I-PJ Special Topic of Interest (Project) Module****15 ECTS**

| Project Title   | Supervisor                              | ECTS | Grade (host) | Grade (home) |
|---|---|------|--------------|--------------|
| An empirical study on phenomenology and physiology of placebo effects | Mara Bresjanac                          | 12.5 |              |              |
| Course Title  | Course Type (e.g. lecture, seminar,...) | ECTS | Grade (host) | Grade (home) |
| Placebo Research Team Meeting and Journal Club                        | SE                                      | 2.5  |              |              |
|   |   |      |              |              |
|   |   |      |              |              |
| <b>Module Grade</b>   |   |      |              |              |

**W-D-C Elective Module****5 ECTS**

| Course Title                          | Course Type (e.g. lecture, seminar,...) | ECTS | Grade (host) | Grade (home) |
|---------------------------------------|---|------|--------------|--------------|
| Neuroscience for Cognitive Scientists | SE                                      | 5    |              |              |
|                                       |   |      |              |              |
|                                       |   |      |              |              |
| <b>Module Grade</b>                   |   |      |              |              |

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Date, Stamp & Signature of *Local Coordinator*  
at *Host* University

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Date, Stamp & Signature of *Local Coordinator*  
at *Home* University

**1.) SPECIAL TOPIC OF INTEREST****ECTS**

Your first special topic of interest must include project work (to be specified in box 1.c). Beyond that it can include courses (to be specified in box 1.b).

*(Everything written in italics has to be replaced by text specified by the student and supervisor.)*

**Name of Supervisor, Host University: Maja Bresjanac, University of Ljubljana, Institute of Pathophysiology**

**1.a****TOPIC OF SPECIALISATION**

Research of placebo effect

**PHENOMENON & (PERSONAL) GOALS**

At first the phenomenon of placebo has been a paradox for official medicine: How can something inert make changes in the system? Now it turns out more and more, that there are several physiological pathways, which can be activated or altered due to a placebo effector. This has been robustly shown in clinical environment as well in the laboratory (Finnis et al. 2010). This possible top down control is particularly interesting as it points to important aspects of interaction between consciousness and physiology. Ideally, one should study these interactions using various methods of different disciplines in one experiment. We aim to do so in our project, which will combine different perspectives: on one hand, the first person perspective should shed light on the conscious processes and personality characteristics of the placebo receivers, on the other hand performance tests such as muscle force and work measurement and EEG recording during a cognitive task, one can directly measure physiological parameters. These methods complement each other and this interdisciplinary double-perspective account is likely to be superior to only a single observation method, having less epistemological blindness.

**LEARNING OUTCOMES****Subject specific**

- Insight into medical research, especially placebo controlled studies
- A deeper understanding of underlying mechanisms of placebo effect
- Possibilities of applications in clinical and individual context

**Methodological**

- Ability to approach a phenomenon in an interdisciplinary manner
- Experience to work with human subjects in a clinical environment
- Ability to design a complex study without obvious methodological flaws

**Generic****Instrumental**

- Ability to write and follow a project plan

**Interpersonal**

- Team competences:
  - Work within an interdisciplinary team
  - Deal with conflicts and different viewpoints
  - Moderating group work

**Systemic**

- Interdisciplinary work/thinking
- Project-oriented work and organisational skill
- Critical evaluation of approaches & methods
- Quick orientation & navigation in mother and/or novel complex field
- Change of viewpoint/perspectives (intellectual mobility)
- Phenomenon-oriented thinking
- Problem-solving abilities

**1.b****LECTURE & COURSES**

*Please fill in the courses that are part of the module (in case there are some).*

| Course Title                   | Course Type | Discipline        | ECTS |
|--------------------------------|-------------|-------------------|------|
| Placebo Research Team Meetings | SE          | Interdisciplinary | 2.5  |
|                                |             |                   |      |
|                                |             |                   |      |

**1.c**

As part of your special topic of interest you will have to do project work. Please specify below the concrete plan and workflow of your project.

**PROJECT****ECTS 15****An empirical study on phenomenology and physiology of placebo effects****Short Project Description (300-500 characters)****Project Plan**

In order to achieve the learning outcomes specified for the module I will take the following measures:

**1.) Project steps:****Recherché & literature research**

In preparation for this project, we already researched the literature and found a sensible study paradigm by Pollo et al. (2008) and thought about possible modifications. After methodological reasoning and in contrast to the majority of clinical studies concerning placebo, we settled for a similar study design with healthy subjects, as there are no confounding effects due to disease. However, a psychological approach with evaluation of personality traits would add an important perspective and more insight into the phenomenon. The Milestones of these steps have already been passed, but the final study design has still to be discussed:

**Already Passed Milestones:**

| <i>Milestone</i>  | <i>Date</i> |
|---|-------------|
| Rough project idea                                      | 01.10.2011  |
| Discussion with Urban Kordes and Metka Kuhar            | 11.10.2011  |
| Discussion with Svezdan Pirtosek                        | 12.10.2011  |
| Discussion with Jure Bon                                | 25.10.2011  |
| First Discussion with Mara Bresjanac (final supervisor) | 26.10.2011  |

**Milestones in the future:**

| <i>Milestone</i>   | <i>Date</i> |
|--|-------------|
| Presentation of Placebo study and Theoretical background in Cognitive Journal Club | 16.11.2011  |
| Start of the Project   | 21.11.2011  |
| Deadline for preliminary results   | mid January |
| Deadline for Data Analysis   | end January |

**Deliverables:**

A Laboratory Journal documenting the work with the subjects in the experiment as well as the training for the phenomenological subgroup.

A dataset in table format of preliminary results including physiological data and phenomenological protocols due mid January.

A statistical analysis of the given dataset due end of January.

A final report in form of a paper.

**Formulating hypotheses**

The original hypothesis was formed in beginning of October and followed by a vivid discussion with a manifold of competences in the University of Ljubljana (see milestones above).

Our working hypotheses propose that (1) the expectation of the enhancement will lead to the measurable changes in physical and cognitive performance in susceptible individuals under placebo condition compared to their performance under control or baseline condition, and (2) expectation-induced performance enhancement will correlate with certain personality traits.

### Planning of experiment

| <i>Steps</i>   | <i>Done/ due to on</i> |
|--|------------------------|
| Literature Research                                      | Sept - Dec 2011        |
| Formulation of hypothesis                                | 01.10 2011             |
| Presentation and discussion of hypothesis and background | 16.11.2011             |
| Second round of discussion                               |                        |
| Hypothesis adaption                                      | end of November        |
| Final Presentation and Discussion(research meeting)      | end of November        |
| Start of Experiment                                      | 01.12.2011             |
| Start of Data analysis                                   | 15.01.2012             |

### Realisation of the experiment

In general the realization of the experiment implies a test for the postulated hypothesis and is, if the hypothesis and experiment is constructed in the right way, always a step towards new knowledge. (Principle of inductive logic).

From previous research (Pollo et al 2008) we saw a first good testing paradigm for testing of physiological enhancement due to expectations. There were the weaknesses of a priori exclusion of women and not using a "pure" placebo (ergogenic caffeine in very low doses was administered).

Therefore the remaining questions to this experiment are:

Does the ergogenic placebo effect remain significant under a broader population of subjects (men and women)?

Does the ergogenic placebo effect remain significant with administering a pure placebo, such as a vitamin c tablet, without the priming of subjects? (Every subject knew some physiological effects of caffeine).

Is there also a significant cognitive enhancement within subjects due to expectation?

| <i>Steps</i>   | <i>To be finished on</i> |
|--|--------------------------|
| Step 1: Recruiting of Subjects                           | end of measurement       |
| Step 2 (optional): Phenomenological Training of Subgroup | 15.12.2011               |
| Step 3: Acquisition of Subject Data                      | 30. 01.2012              |
| Step 4: Data Analysis                                    | 01.02.2012               |

### Data analysis & interpretation of data

Using a paired within subjects paradigm, we expect individual differences within subjects between placebo and no placebo conditions compared to the baseline performance. We will roughly replicate the study design by Pollo et al 2008, with two sessions (baseline performance and placebo / cotrol substance condition performance) condensed to one experiment. In addition, we will measure the cognitive performance with the auditory oddball paradigm and analyze the P3 component of the EEG to look for possible changes in cognitive processing within subjects due to expectation.

### Documentation of project (according to supervisor)

Documentation of the project will be realised in the shape of a lab journal and a final report. The purpose is to learn structured working procedure and compose final project evaluation, which can be used as a reference for future research.

The final project report has to be handed in until the 1<sup>st</sup> of March.

**Internal publication of project description and results (S-I-PJ report) on MEi:CogSci www-platform (3000-5000 characters; approved by supervisor)*****Introduction***

A total of 22 university students (age 21.6 +/- 1.9) of both genders (F/M=1) signed the informed consent for their voluntary participation in this study. The experiment was using short tests of physical and cognitive performance. Physical part consisted from testing the maximal hand grip force and maximal leg extension count performed in 1 minute. For this purpose we used body workout machine with maximum load 55 kg. Cognitive performance was tested by three-stimulus auditory oddball test with silent counting.

Participants scheduled two experimental sessions at least three days apart at the same time of day. During each visit they completed two measurement runs, which were separated by a brief break. During this break an effervescent tablet of vitamin C dissolved in water was administered and announced either as "a stimulant" or a "control" beverage. Subjects were told that stimulant effects vary with individual susceptibility and might be accompanied by a transient calorogenic effect. During the session EEG, EMG of hand flexors and ECG recordings were collected. Perceived test difficulty and presence/intensity of side effect were also recorded.

***Procedure******Session 1***

Each session started with short questionnaire about basic information of participant, like gender, age, sleeping time... Two test measurements (individual calibrations) followed: first, maximum weight (max\_m) was determined, which the participant was able to lift by leg extension and subsequently 60% of this maximum weight was used during performance tests. Second, we determined the minimal difference in tone frequency that the subject was able to detect and used it to define the difference between the standard and target tone in the auditory oddball test.

EEG cap with 42 electrodes was mounted for measuring brain activity during tests and additional electrodes were employed for registration of electromyography (EMG) and electrocardiography (ECG).

The experiment began with the measurement of the maximal hand grip force by dynamometer. The participant had to squeeze dynamometer three times for 5 seconds with 15 second breaks between each grip.

The second part of the experiment was the measurement of maximal leg extension work performed in one minute employing the 60% of the subject's own max\_m.

The third part was three-stimulus (standard tone (80%), target tone (oddball, 10%) and distractor (noise, 10%)) auditory oddball test with silent counting. The test comprised 6 three minute blocks. Subject task was to silently count perceived target tones, and to report the count after every block.

These tests were followed by a 5 minute break. In the break, an effervescent tablet of vitamin C dissolved in water was administered with appropriate comment regarding the performance enhancement potential and possible side effects of the beverage. Following the administration of the beverage the subject was allowed to rest before resuming the performance testing.

After the break the oddball, handgrip and leg extension tests were repeated once again.

At the end of the session, the participant was asked to answer a few questions about his/her personal experience with all tests. Using a numerical scale (from 0 to 10) we asked how difficult the tests seemed to the participant before and after the administration of the beverage.

***Session 2***

The course of session 2 was the same as in session 1 with a few changes. The calibration tests were not repeated. Also during the break participants received vit C beverage labeled as the other of the two substances used in the experiment (either performance enhancer (PEp) or control (C)).

After the second session participant filled out the last questionnaire: the Big Five Personality Traits Inventory.

***Results***

Preliminary results showed significant effect of enhancement expectation on total leg workout ( $p=0.004$ ) but not on maximal hand grip force ( $p=0.39$ ), revealing an objectively measured placebo effect on motivation dependent performance endurance but not on the core muscle strength. A correlation between conscientiousness personality trait and leg extension work performance ( $p = 0,01$ ) was also found. Results of other analyses which are under way will provide further information on the possible performance enhancement effect of placebo in the cognitive task. Analyses of P3 wave latency and topography as well as ECG and EMG recordings will provide additional insight into possible mediating mechanisms of the measured effects. .

### Final Grade for the Project

**9 (very good) /**

host grade/home grade  
see grade conversion matrix on last page

February 14, 2012

Mara Bresjanac

Date, Stamp & Signature of Supervisor  
at Host University

I herewith confirm that I will follow the module plan in order to successfully complete the module.

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Signature of Student

## Grade Conversion Matrix

| BRAT     |                                | BUD      |                             | LJUB      |                              | VIE      |                                  | ZAG      |                                |
|----------|--------------------------------|----------|-----------------------------|-----------|------------------------------|----------|----------------------------------|----------|--------------------------------|
| <b>A</b> | výborne<br>(excellent)         | <b>5</b> | jeles<br>(excellent)        | <b>10</b> | odlično<br>(excellent)       | <b>1</b> | sehr gut<br>(excellent)          | <b>5</b> | odličan<br>(excellent)         |
| <b>B</b> | vel'mi dobre<br>(very good)    | <b>4</b> | jó<br>(good)                | <b>9</b>  | prav dobro<br>(very good)    | <b>2</b> | gut<br>(good)                    | <b>4</b> | vrlo dobar<br>(very good)      |
| <b>C</b> | dobre<br>(good)                | <b>4</b> | jó<br>(good)                | <b>8</b>  | prav dobro<br>(very good)    | <b>2</b> | gut<br>(good)                    | <b>4</b> | vrlo dobar<br>(very good)      |
| <b>D</b> | uspokojivo<br>(satisfactory)   | <b>3</b> | közepes<br>(fair)           | <b>7</b>  | dobro<br>(good)              | <b>3</b> | befriedigend<br>(satisfactory)   | <b>3</b> | dobar<br>(good)                |
| <b>E</b> | dostatočne<br>(sufficient)     | <b>2</b> | elégséges<br>(satisfactory) | <b>6</b>  | zadostno<br>(sufficient)     | <b>4</b> | genügend<br>(sufficient)         | <b>2</b> | dovoljan<br>(satisfactory)     |
| <b>F</b> | nedostatočne<br>(insufficient) | <b>1</b> | elégtelen<br>(fail)         | <b>5</b>  | nezadostno<br>(insufficient) | <b>5</b> | nicht genügend<br>(insufficient) | <b>1</b> | nedovoljan<br>(insatisfactory) |