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PhD Project Title:
Individual differences in perceptual learning

Start PhD project:
01-09-2011

End date PhD contract:
15-01-2016

1. What sort of activities would you like to implement and who are the stakeholders of your initiative?
see attachment

2. Please explain the social benefit of your project and demonstrate the knowledge utilisation of your PhD project.
see attachment

3. Please consider a detailed planning consisting of a timeline of deliverables as well as a budget plan to implement your initiative. All spendings must be planned for 2015.
see attachment

Attachment (if applicable)
valorisationgrant-thordisneger.pdf
1. What sort of activities would you like to implement and who are the stakeholders of your initiative?

I aim to identify and implement clinical guidelines for the use of altered auditory feedback in the treatment of stuttering. With the aid of the valorisation grant, I will be able (1) to put findings from my academic research into speech- and language therapy practice and (2) to make findings from my work directly accessible for individuals who stutter. Thus, stakeholders of my initiative are

1. people who stutter
2. speech and language therapists
3. students & lecturers speech and language therapy

To reach the stakeholders of my initiative, I set up collaborations with the department of speech and language therapy from the University of Applied Science in Nijmegen (opleiding logopedie, Hogeschool van Arnhem en Nijmegen) and with the stuttering association in Germany (Bundesvereinigung Stottern & Selbsthilfe e.V. [BVSS]). These collaborations imply, in concrete terms, that a group of three bachelor students of the German speech and language therapy track at the Hogeschool van Arnhem en Nijmegen will support me in the preparation and implementation of the valorisation activities. For these students, participation in the project will form the basis of their bachelor thesis (i.e., a group thesis). Importantly, the implementation project, as well as participation of at least one bachelor group, has already been confirmed by the department of speech and language therapy. The stuttering association has indicated that they are highly interested in this implementation project and has already agreed to provide a platform for valorisation activities via their website, their quarterly journal for members and their network. I also aim to initiate a collaboration with the Dutch stuttering association (i.e., Nederlandse Federatie Stotteren which combines the Nederlandse Stottervereniging Demosthenes and the Nederlandse Vereniging voor Stottertherapie).

The project will consist of two phases: a data acquisition phase and a knowledge utilisation phase. Previous findings obtained in my PhD project on individual differences in language processing have led to the formulation of a new clinically relevant question. There are some indications that providing altered auditory feedback (i.e., the speaker hears back a manipulated version of his/her own speech while talking) benefits speech fluency for individuals who stutter, but some benefit more than others (cf. section 2). The novel question is which individual characteristics account for the variability in the responsiveness of persons who stutter to altered auditory feedback. Therefore, the current project aims to answer this question and to directly implement the findings into clinical practice as well. That is, the current project serves knowledge utilisation and at the same time yields data for a scientific publication.

In the first part of the bachelor project, students will test persons who stutter on their individual responsiveness to altered auditory feedback and their executive functioning. Moreover, students will help to transcribe and analyse the data. Importantly, one of the evaluation criteria of the speech and language pathology bachelor thesis at the HAN is the student's ability to implement findings of a research project into clinical practice. Thus, an integral part of the assessment of the bachelor thesis is the realisation of implementation activities or development of applied products. Therefore, in the
second part of their bachelor project, students will prepare and carry out knowledge utilisation activities. At least four of the following activities will be carried out in collaboration with bachelor students from the HAN (i.e., two activities aimed at persons who stutter and two activities aimed at speech and language therapists). Students will be responsible for the preparation and realisation of at least two of those activities (under my supervision):

Knowledge utilisation activity aimed at a patient population (i.e., people who stutter):
- Writing a contribution for the website of the Bundesvereinigung Stottern & Selbsthilfe e.V. and/or the Dutch stuttering association on (individual) limitations and possibilities of altered auditory feedback
- Organizing an information and tryout workshop on altered auditory feedback for people who stutter (e.g., in a stuttering support-group)
- Producing a short information video on altered auditory feedback (possibly in collaboration with the Bundesvereinigung Stottern & Selbsthilfe e.V.) to be posted on the website of the stuttering association
- Presenting outcomes of the project at the annual conference of the stuttering association in Germany. This conference is specifically designed for a non-academic public and combines scientific presentations (in lay terms) with talks by people who stutter about their experiences.

Knowledge utilisation aimed at (future) speech and language therapists:
- Writing an article for the journal of speech and language therapists in the Netherlands ("Nederlands tijdschrift voor logopedie") and/or Germany ("Forum Logopädie")
- Organizing a workshop on altered auditory feedback for students, lecturers and/or speech and language therapists
- Preparing a training/class on altered auditory feedback that is given to 2nd year speech and language therapy students
- Writing and printing of an information booklet on altered auditory feedback
- Presenting outcomes of the project at the annual conference of the Dutch or German association for speech and language therapists

2. Please explain the social benefit of your project and demonstrate the knowledge utilisation of your PhD project.
Devices that present speakers with altered auditory feedback (AAF) have been found to enhance speech fluency in people who stutter. When wearing such a device, speakers hear back a manipulated version of their own speech while speaking, e.g., the speech signal is shifted in frequency or delayed by a short interval. Beneficial effects of altered auditory feedback on speech fluency have been reported across a wide range of speech tasks (e.g., reading out loud, making phone calls, storytelling or talking in face-to-face conversations). Such devices may therefore complement traditional stuttering therapy programs. However, AAF devices have not been generally accepted in speech- and language therapy, probably due to high acquisition costs of commercial devices and due to the observation that effects of altered auditory feedback vary extremely between individuals who stutter. Recently, inexpensive apps have been developed that allow manipulations of auditory feedback via smartphones and tablets. Thus, altered auditory feedback has become within easy reach for therapists and people who stutter. However, therapists as well as individuals who stutter still lack information on which patients are most likely to benefit from the use of altered auditory feedback. In previous studies, we found that cognitive and linguistic abilities can be used to predict how well a person processes unexpected speech input. Therefore, we hypothesise that individuals' cognitive abilities may
also be associated with individual responsiveness to altered auditory feedback in persons who stutter. We therefore aim to investigate the influence of impairment-related factors (e.g., stuttering severity) and of individual cognitive abilities (e.g., executive functioning) on individuals' responsiveness to altered auditory feedback.

Identifying individual characteristics that predict a person's responsiveness to altered auditory feedback will help to formulate evidence-based clinical indications for the use of altered auditory feedback. That is, we will compile novel guidelines for people who stutter and for speech and language therapists regarding who is likely to benefit from altered auditory feedback, who is less likely to benefit and which factors can be disregarded in the decision to recommend the use of an AAF device. AAF-devices cannot remedy stuttering. However, for some individuals AAF-devices clearly have an added value by increasing speech fluency considerably. Those individuals should be enabled to make use of such devices as these devices have been reported to decrease individuals' stress in frightening speaking situations (e.g., introducing yourself, delivering a speech), thereby facilitating individuals' participation in social and professional life.

To reach the primary stakeholders of this initiative (i.e., people who stutter), we utilise the obtained knowledge of this project via two routes. First, we directly inform people who stutter about the identified individual factors (cf. section 1 for different activity options). This will be done in collaboration with the Bundesvereinigung Stottern & Selbsthilfe e.V., as the stuttering association is the largest association for people who stutter in Germany, offering us contacts to more than 90 self-support groups across Germany. I aim to initiate a similar collaboration with the Dutch stuttering association. Second, we aim to reach individuals who stutter by informing (future) speech and language therapists (cf. section 1 for different activity options). The bachelor project, including the implementation of two different activity options, has already been evaluated by three lecturers of the HAN speech and language therapy program. They all agree that the project is clinically relevant and of high interest to the field of speech and language therapy.

3. Please consider a detailed planning consisting of a timeline of deliverables as well as a budget plan to implement your initiative. All spendings must be planned for 2015

The bachelor project will be conducted in the period from 2nd February to 26th June 2015. The first phase of data collection will take place from February to April 2015. The second phase of the bachelor students project (and thus the preparation and realisation of at least two valorisation activities) will take place from May to June 2015. Students are free to select the activities of their choice. Therefore, it is not possible to specify which of the four activities are going to be realised (maximum costs amounting to the grant maximum of € 1000; see examples of possible activity combinations on p. 4). I will prepare and realise two more (complementary) valorisation activities between July and November 2015.

**Data acquisition (DA):**

<table>
<thead>
<tr>
<th>Code</th>
<th>Activity</th>
<th>Timeline</th>
<th>Costs</th>
<th>Total costs for the activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA</td>
<td>Testing participants</td>
<td>- February - April</td>
<td>Travel costs: € 150 (3 students a € 50) Presents for participants (45 participants a € 5): € 225</td>
<td>ca. € 375</td>
</tr>
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</table>
## Knowledge utilisation in people who stutter (S):

<table>
<thead>
<tr>
<th>Code</th>
<th>Activity</th>
<th>Timeline</th>
<th>Costs</th>
<th>Total costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Produce text for website of a stuttering association</td>
<td>- Writing text for the website: May &lt;br&gt;- Add Pictures/links and launch the website: June</td>
<td>none</td>
<td>€ 0</td>
</tr>
<tr>
<td>S2</td>
<td>AAF workshop / information evening</td>
<td>- Planning: May-June &lt;br&gt;- Realisation: June-July</td>
<td>- Acquisition of five different AAF-apps: € 50 &lt;br&gt;- catering: € 150 &lt;br&gt;- Travel costs: € 25 &lt;br&gt;- no room rent (in rooms of the support group)</td>
<td>ca. € 225</td>
</tr>
<tr>
<td>S3</td>
<td>Information video (only feasible in collaboration with the stuttering association)</td>
<td>- contact with BVSS and their video producer: May &lt;br&gt;- preparing video synopsis: June &lt;br&gt;- video production: July &lt;br&gt;- introduction of video: October (22nd October: International Stuttering Awareness Day)</td>
<td>max. € 600 of the valorisation grant</td>
<td>ca. € 600</td>
</tr>
<tr>
<td>S4</td>
<td>visit to annual conference</td>
<td>Preparation of talk/poster: September Conference: October 2015</td>
<td>Travel costs: € 150 &lt;br&gt;Poster: € 50</td>
<td>ca. € 200</td>
</tr>
</tbody>
</table>

## Knowledge utilisation in (future) speech and language therapists (T):

<table>
<thead>
<tr>
<th>Code</th>
<th>Activity</th>
<th>Timeline</th>
<th>Costs</th>
<th>Total costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Article</td>
<td>Writing article: July-October</td>
<td>none</td>
<td>€ 0</td>
</tr>
<tr>
<td>T2</td>
<td>AAF workshop / information evening</td>
<td>- Planning: May-June &lt;br&gt;- Realisation: June-July</td>
<td>- Acquisition of five different AAF-apps: € 50 &lt;br&gt;- catering: € 300 &lt;br&gt;- no room rent (booking rooms at the HAN is free)</td>
<td>ca. € 300</td>
</tr>
<tr>
<td>T3</td>
<td>Training/class on AAF</td>
<td>- preparing class and training materials: May &lt;br&gt;- realisation: June</td>
<td>- Acquisition of five different AAF-apps: 50 € &lt;br&gt;- printing costs: 50 €</td>
<td>ca. € 100</td>
</tr>
<tr>
<td>T4</td>
<td>Information booklet / flyer</td>
<td>- Design: May-June &lt;br&gt;- Print: June</td>
<td>100 booklets a 8 pages (A5)</td>
<td>ca. € 65</td>
</tr>
<tr>
<td>T5</td>
<td>Visit to conference</td>
<td>- Preparation of talk/poster: October Conference: November 2015</td>
<td>Travel costs: € 50 &lt;br&gt;Poster: € 50</td>
<td>ca. € 100</td>
</tr>
</tbody>
</table>

**Examples of activity packages:**

Package 1: DA + S1 + S3 + T1 + T4 = € 1040  
Package 2: DA + S2 + S4 + T3 + T5 = € 1000  
Package 3: DA + S1 + S2 + T2 + T3/T5 = € 1000