Short Visit Grant ☒ or Exchange Visit Grant ☐

(please tick the relevant box)

Scientific Report

The scientific report (WORD or PDF file – maximum of eight A4 pages) should be submitted online <u>within one month of the event</u>. It will be published on the ESF website.

<u>*Proposal Title*</u>: Acquiring phonological categories: The role of motherese input

<u>*Application Reference N°*</u>: 6609

1)   Purpose of the visit

The host and the applicant as well as a number of other researchers met first in September 2013 at a Lorentz-Center workshop on "Modelling meets Infant Studies in Language Acquisition" in Leiden, The Netherlands, where we came up with the plan of collaborating in a study investigating the connection between infant-directed speech and the distributional learning of phonological categories. While the idea that "hyperarticulated" input-directed speech should facilitate the acquisition of phonological categories has been expressed in the literature since the 1990s, up to this point, there is no laboratory-experimental evidence supporting this claim. One of the reasons for this may be that this question is difficult to test with behavioral methods. For this reason, we are investigating this research question using electroencephalography (EEG) measuring mismatch negativity (MMN).

The planned study consists of three parts: part 1 focuses on establishing an experimental paradigm by which distributional learning can be assessed using online EEG methods. Part 2 aims at investigating how infants' and adults' distributional learning depends on the type of speech input they receive. More specifically, we plan to investigate how qualitative differences between infant- and adult-directed speech may affect the acquisition of phonological categories. Part 1 and 2 are carried out by the host Jessie Nixon (University of Leiden) and the applicant Natalie Boll-Avetisyan (University of Potsdam) together with Liquan Liu, Tom Lentz, Brigitta Keij and Sandrien van Ommen from Utrecht University. Part 3 aims at showing by means of computational models how input quality can affect distributional learning. This part will be carried out

by Jacolien van Rij (University of Tübingen) and Cagri Çöltekin (University of Groningen). Prior to the visit, the applicant, the host and Jacolien van Rij have been in contact trough Skype meetings to formulate the exact research question. The purpose of the visit was to realize part 1. That is, we aimed at establishing a full-fledged design that would be appropriate to use with both adults and infants, and we aimed at pilot-testing it on a number of adults.

2)   Description of the work carried out during the visit

On the first day, all researchers involved in part 1 and 2 of our study (i.e., the EEG study) gathered for a scientific briefing. We discussed possibilities of the shape of distributions we should take into consideration in our pilot experiment, and made a schedule for the upcoming days. A day later, the host, the applicant and Liquan Liu visited Karin Wanrooij (UvA), who is experienced in using EEG with infants and does research on distributional learning, and gave us useful practical advice.

During the following days, we finalized the methodology for our study. At first, it occurred as a problem that the experimental design we initially had in mind (a multi-feature MMN paradigm) did not turn out to be practical, so we had to rethink the design. We then developed a new design that will allow us to online assess the development of category formation during exposure to a bimodal distribution of a non-native speech sound.

We then decided on the exact phonological contrast the participants in our study will be trained on, and recorded, selected and manipulated linguistic material that would be appropriate for use in both an adult and infant experiment. Furthermore, we selected two types of shapes of distributions (one carrying characteristics of infant-directed speech, and one carrying characteristics of adult-directed speech) we would test in our pilot experiment. Regarding the experimental procedure, we had to calculate how many items we needed vs. would be maximally suitable regarding the length of the testing procedure. We decided on the number of training blocks and the number of items they contained, and the form of the test phase. We had to decide if it would be preferable that adults are given a behaviroral task in parallel to measuring MMNs in the test phase. We have written an "Experiment builder" script, which controls the experiment. A video was selected that participants would watch during the experiment.

In parallel, we checked the lab set-up and trained those who had no prior experience with EEG testing on the experimental procedure. Furthermore, we wrote a questionnaire with which we assess the participants' language and musicality background and selected a musicality test given to the participants after the experiment (given growing evidence for the role of musical experience on phonological/prosodic acquisition). Participants were recruited.

Meanwhile, we have read and discussed many relevant studies on infant MMN, distributional learning and infant-directed speech. Lastly, our manuscript is in the making. We already have a first draft of the introduction and methodology section of a paper.

3)   Description of the main results obtained

The main results obtained are that we were successful in finalizing the methodological part of this study and started testing as originally planned.

Moreover, we now have material that we can use with both infants and adults, and the manuscript is in progress.

4)   Future collaboration with host institution (if applicable)

Further collaborations with the host are planned, but further collaboration possibilities with the host institution in general have, at this point, not been discussed.

5)   **Projected publications / articles resulting or to result from the grant** *(ESF must be acknowledged in publications resulting from the grantee's work in relation with the grant)*

We are currently anticipating that two publications will come out of this study. One will report on the adult data including multiple conditions on different types of distributions. Another one will report on infant data. One of these papers will integrate the computational modelling data. We will acknowledge the ESF/Networks in both publications.

6)   Other comments (if any)

No other comments.