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Bergen, 13 June 2016

**Report on the Short Term Scientific Mission “Advanced analysis methods of longitudinal Tinnitus data” (COST-STSM-BM1306-33511) of Jan Bulla
BMBS COST Action BM1306**

1. Purpose of your mission

The STSM had two main purposes. First purpose is the extension of statistical methods applied to the Tinnitus Database (a large database of clinical tinnitus data, maintained at Regensburg, see Landgrebe et al. 2010). Second purpose is the training of colleagues from Regensburg in statistical analysis methods. In the following, we illustrate these two scopes more detailed.

1. **Primary aim** of the STSM was a continuation of the work started in autumn 2015, which consists mainly in the application of statistical methods belonging to the field of time-series and panel data analysis to the tinnitus database. Focus was the selection and application of appropriate statistical methods which permit the identification of factors mediating and/or moderating the relief of tinnitus.
Additional focus was lying on a specific data set extracted from the Tinnitus Database dealing with the relationship of various factors with tinnitus distress. One of the key variables investigated was tinnitus pitch frequency, which has not been investigated in a larger framework with several hundred observations before.
2. **Secondary aim** of the STSM was the interdisciplinary exchange on experimental design for experiments with longitudinal structure and advanced analysis methods for such data in the medical domain. During several meetings, the colleagues from Regensburg were supposed to receive training in statistical analysis via the software package R (R Development Core Team 2015).

Landgrebe M., Zeman F., Koller M., Eberl Y., Mohr M., Reiter J., Staudinger S., Hajak G., Langguth B. (2010), ‘The Tinnitus Research Initiative (TRI) database: A new approach for

delineation of tinnitus subtypes and generation of predictors for treatment outcome', *BMC Medical Informatics and Decision Making* 10, 42–7.

R Development Core Team (2015), 'R: A language and environment for statistical computing', *R Foundation for Statistical Computing*, Vienna, Austria. ISBN 3-900051-07-0, URL <http://www.R-project.org>.

2. Description of the work carried out during a mission

- Winfried Schlee received the training in advanced statistical methods described within the secondary aim described above (see Section 1). The total duration was one week; the sessions mainly took place on a half-day basis.
- We analysed a data set extracted from the Tinnitus Database. Main focus was the impact of the perceived tinnitus frequency on TQ (Tinnitus Questionnaire) score with the goal to identify different tinnitus subtypes, but various other variables were considered as well. Data preparation, in particular the identification of data flaws and determination of exclusion criteria played a significant role.
- In collaboration with www.tinnitustalk.com a survey data set was sighted and determined suitable for future investigation.

3. Description of the main results obtained

The list below contains the main results, ordered by progress in decreasing order.

1. While extracting and preparing data from the Tinnitus Database, we discovered a number of minor improvements that could be incorporated into the automatic data extraction procedure which will be available soon within the new user interface. Moreover, minor data quality flaws have been detected. We investigated strategies for avoiding these in the future, and excluding them from future data extraction procedures in a semi-automated way.
2. Analysis of a data set extracted from the Tinnitus Database showed a significant impact of the perceived various variables on the TQ score. While, age is one of the main drivers, various other variables such as perceived tinnitus frequency or tinnitus type contribute significantly as well. Of particular interest is a discrepancy between perceived tinnitus frequency and the frequency determined by an audiologist, which turns out to possess less predictive power.
We started with the redaction of a paper presenting our results, which we intend to submit within the next 2-3 months. The work will be continued in collaboration with researchers from Poland. Other partners may join as well.
3. The application of mixture models as exploratory tool for the Tinnitus Database has been further investigated, and we could confirm the usefulness of this method.

4. Future collaboration with the host institution

The collaboration with the research group in Regensburg will be continued. We have currently no further STSM planned. However, in autumn 2016 we will apply for a travelling grant at the DAAD and NRC, respectively. In addition, I plan to stay for a couple of months in Regensburg during my sabbatical at the end of 2017 / beginning of 2018, the application has been prepared.

5. Foreseen publications/articles resulting from a mission

A submission of the results obtained from analysing the Tinnitus Database is planned for this summer in *Frontiers in Aging Neuroscience* within the research topic 'Towards an Understanding of Tinnitus Heterogeneity', which is currently open for submissions (<http://journal.frontiersin.org/researchtopic/4725/towards-an-understanding-of-tinnitus-heterogeneity>).

6. Confirmation by the host institution of the successful execution of your mission

The confirmation is going to be sent by email directly.