UNIVERSITÉ
DE GENÈVE
FACULTÉ DE PSYCHOLOGIE
ET DES SCIENCES DE L'ÉDUCATION

Scientific report of the NetWordS short visit, grant 6795, awarded to Julien Mayor.

Probing the impact of the infant lexicon on her speech perception with a dual approach: computational modelling and empirical study

1. Purpose of the visit

Late in their second year of life, infants learn new words at a rapid pace. In order to achieve this complex task, they have to decide when a slight modification of a word should be considered a natural variation of a known word (e.g., due to differing pronunciation across speakers) or if it is a novel word, to be learnt.

Typical paradigms for evaluating infants' speech perception present correct pronunciations and mispronunciations of known words. Differences between conditions are interpreted as the sign that infants possess accurate representations of word forms.

A large body of research on "mispronunciation studies" has been accumulated over the last twenty years. Among many other findings, it has been shown that infants detect onset consonant mispronunciations from as early as 12 months of age (Mani & Plunkett, 2010) and medial vowels from as early as 15 months of age (Mani & Plunkett, 2007). It was also shown that infants at 19 months of age display a graded sensitivity to the severity of mispronunciations (White & Morgan, 2008).

In parallel, the TRACE model of speech perception (McClelland & Elman, 1986) was adapted so as to model infant speech perception. The model captured a wide range of experimental findings in the infant word recognition literature. In addition, the model predicted that mispronunciation sensitivity should be modulated by the size and structure of the lexicon, and that asymmetries in mispronunciation can be explained with a fully specified phonology (Mayor & Plunkett, 2014). In particular, an asymmetry in sensitivity to mispronunciations of word initial phonemes is predicted, when the two phonemes are phonetically related but define lexical cohorts that differ in size. Thus, infants should more readily tolerate a /b/-onset word (which has a large cohort in English) mispronounced with a /p/ as a token of the intended word, than they will tolerate a /p/-onset word (which has a small cohort) mispronounced with a /b/. The degree of tolerance demonstrated by infants in this regard will change as the structure and content of their lexicon changes.

The purpose of the intended visit was to set up an inter-disciplinary collaboration, in order to try and validate empirically this prediction, stemming from a computational modelling framework. We believe

that the convergence of methods will help understand the mechanisms involved in early word learning and speech perception.

2-3. Description of the work carried out during the visit and description of the main results obtained

Extensive discussions have been carried out during my visit to Prof. Mani's laboratory in order to set-up an efficient collaboration. In the early stages of the discussions, we have listed half a dozen potential experiments that may demonstrate that the structure and the size of the infant lexicon has an impact of phoneme perception. We subsequently reduced this number to three large, key experiments that would prime this line of collaborative research. These three experiments will form the core of a large grant proposal we are currently writing, in order to be able to hire a post-doctoral researcher who will carry out the planned research.

4. Future collaborations with host institution

The collaboration will involve two participants; the applicant, Julien Mayor, who will bring his modelling expertise to the project and the host, Nivedita Mani, who will provide her experimental expertise on infant speech perception. If successful, the grant will allow for a post-doctoral researcher to gain expertise from the modelling aspect of the project, while he/she will carry out the experimental part of the project in Prof. Mani's laboratory in Göttingen.

5. Projected publications resulting from the grant

Preliminary results will be presented at international conferences and key results will be submitted to top-tier international journals.

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Göttingen, 18th June 2014

Julien Mayor's visit to the "Language Acquisition" Junior Research group

I write to confirm that Julien Mayor visited my group, the "Language Acquisition" Junior Research Group at the University of Göttingen from the 21st to the 24th of May to discuss our ongoing collaboration and to make plans for our work together in the future.

Yours Sincerely,

Prof. Dr. Nivedita Mani

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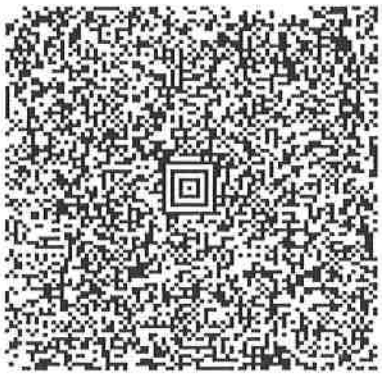

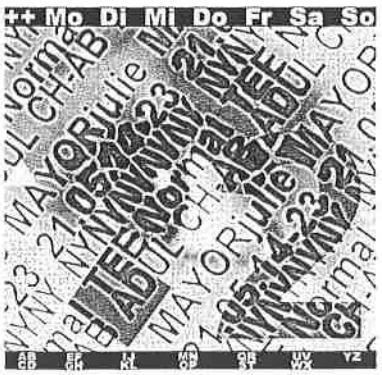

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