

PHONEMIC CONTRASTS AND THEIR PSYCHOLOGICAL REALITY

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In the 'TRACE model of language comprehension', McClelland & Elman (1986) assume that some phonemic contrasts are smaller than others. In order to confirm the psychological reality of this assumption, event-related potentials (ERPs) were recorded, focussing on two components: the Mismatch Negativity (MMN), measuring unconscious processing (Näätänen et al., 1978) and the P3, which is attention-modulated and influenced by stimulus probability, participants' certainty and resource allocation (Duncan-Johnson & Donchin, 1977; Johnson, 1984).

During ERP recording, 13 participants were presented with a sequence of stimuli: one occurring in 80% of the cases and two others in 10% each (deviants). Participants were instructed to push a button upon detection of a deviant. A control condition with pure tones and a condition with auditory syllables (/pa/ vs. /ka/ & /ta/) were presented.

For the pure tones there was a difference in reaction time (1200Hz detected faster than 1050Hz), indicating a difference in certainty. The accuracy did not differ. For the auditory syllables no difference in accuracy or reaction time was found between the deviants.

The ERP of the pure tones resembled classic findings (Sams et al., 1985): an MMN and a P3 were found for both deviants. The P3 was larger for the 1200Hz-deviant than the 1050Hz-deviant, due to the higher certainty for this difference (cf. behavioral results).

For the syllables no classic MMN, but a later negativity (200-240ms) was found for both deviants, followed by a P3, which was larger for /ta/ than /ka/. As certainty did not differ, only resource allocation differs between both deviants and is responsible for the difference in amplitude. As predicted by the TRACE model, /ka/ requires less resources than /ta/ (evoking a smaller amplitude) because of the bigger difference to /pa/. The theoretical assumptions are therefore supported by the ERP-data and reflect the psychological reality.

References

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