

Supplemental Material S2. Details of transmitted information computation.

The percentage of transmitted information (I) was calculated using entropy with the same method as Robert-Ribes, Schwartz, Lallouache, and Escudier (1998):

$$I = 100 \frac{H(s, r)}{H(s)}$$

where $H(s, r)$ is the information shared between stimulus (s) and response (r) and $H(s)$ is the information in the stimulus, with:

$$H(s, r) = - \sum_i \sum_j p(s_i, r_j) \log_2 \left(\frac{p(s_i)p(r_j)}{p(s_i, r_j)} \right)$$

$$H(s) = - \sum_i p(s_i) \log_2(p(s_i))$$

where:

- $p(s_i)$ is the probability of occurrence of feature s_i in the stimulus;
- $p(r_j)$ the probability of occurrence of feature r_j in the response;
- $p(s_i, r_j)$ is the joint probability of occurrence of feature s_i in the stimulus and feature r_j in the response.

These probabilities are estimated using the concatenated confusion matrices (M_c) in which consonants with the same feature are grouped together (i.e., resulting 2×2 matrix for voicing, 3×3 matrix for place of articulation, and 4×4 matrix for mode of articulation) as:

$$p(s_i) = n_i/n ; p(r_j) = n_j/n ; p(s_i, r_j) = n_{ij}/n$$

where:

- n_i is the number of stimuli with feature s_i ;
- n_j is the number of responses with feature r_j ;
- n_{ij} is the number of items with feature s_i in the stimulus and feature r_j in the response;
- n is the total number of stimuli.

Reference

Robert-Ribes, J., Schwartz, J. L., Lallouache, T., & Escudier, P. (1998). Complementarity and synergy in bimodal speech: Auditory, visual, and audio–visual identification of French oral vowels in noise. *The Journal of the Acoustical Society of America*, 103(6), 3677–3689. <https://doi.org/10.1121/1.423069>