**Naturalness Brainstorming**

1. Conceptual
   1. Definition (Human Likeness, odd/rare, predicted/expected sound “probability-based vs. typicality-based predictability”). Dimensions: Categorical, individual, deviation, prediction.
      1. Does this voice sound like a real human speaker?
      2. Does this voice (of a real familiar speaker) sound like the real person, or like a (similar, synthesized) voice
      3. Does this voice sound distinctive/untypical/rare/unexpected?
      4. Does this voice sound distorted?
         1. (How? Telephone, technical artifact, noise, speech disorder….)
   2. Conceptual Models & Implications (Are voices special?)
      1. “Auditory face model”
      2. Voice space model in analogy to face space model
         1. Norm-based or exemplar-based?
   3. Research Fields (Clinical, computational, human empirical, methods)
2. Empirical
   1. Acoustic features
   2. Voice samples
      1. Length/complexity:
         1. Vowel, (pseudo) word, sentence, conversational
      2. Types
         1. Human
            1. Age, gender, pathologies
         2. Synthesized
         3. Human-manipulated / re-synthesized
   3. Measurement
   4. Test/questionnaire development
   5. Perceptual dimensions and verbal descriptions
   6. Interaction with other dimensions (emotion, identity, age, personality, impressions…)
   7. Voice manipulations (e.g. morphing, ….)
3. Neurophysiological – naturalness in the brain
   1. Brain processing – TVA specificity for natural voices?
   2. Networks
   3. Activation
   4. Timing (e.g., ERP)
4. Applied
   1. Healthcare
   2. Synthesized voices (uncanny valley for voices?)
   3. Adaptability of naturalness perceptions by interaction with synthesized voices?
   4. Research: Validity, Quality, Replicability
   5. Deepfakes