**Representations of conspecific vocalizations in the marmoset auditory cortex**

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Communication sounds are a subset of sounds that are characterized by their unique acoustic structures, biological relevance and specificity for social interaction. Animals have been found to share similar vocal behaviors such as representative signaling and categorical perception with human. In addition, cortical organizations are similar between human and non-human primates. Therefore, it is believed that revealing the neural basis of primate vocalizations can give us insight on how human perceive speech. Over the past decades, several experiments have been conducted to elucidate the computational principles of neural representations of species-specific vocalizations in the auditory cortex of non-human primates. However, no consistent picture has emerged. This is partly due to the lack of consideration of statistical structures of vocalizations and the behavioral relevance of their acoustic features.

Here we developed an automatic call classification and feature measurement algorithm to analyze a large number of marmoset vocalization recordings from a captive colony maintained at Johns Hopkins University since 1996. We quantified the statistical distributions of acoustic features. We then used a synesthetic vocalization stimulus design to systematically probe the neural coding of vocalizations in marmoset auditory cortex with consideration of statistical structures. We found that A1 neurons showed relatively low selectivity to vocalizations and the selectivity increased in lateral belt neurons. Interaction between spatial location and neuronal selectivity of vocalizations showed a distributed code in the auditory cortex. Overall, our study provided a new integrated approach to study monkey vocalization structures, their communication behaviors, and computational principles of vocalization processing in the auditory cortex.