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Two-level description of environmental sounds: comparison and generalization of 4 timbre studies

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The purpose of this study is to propose a scheme of environmental sound description based on the comparison and generalization of 4 timbre studies of diverse environmental sounds. In the medium term, the aim is to make the indexing and classification processes of this kind of sound automatic, which is essential for sound content-based searching and browsing methods using perceptual models of environmental sounds. First, we inventoried the stimuli, experiments and perceptual results of these 4 studies. Then, we experimentally identified 3 main environmental sound categories that constitute this overall sound dataset: impact sounds, motor sounds and instrument-like sounds. We developed an efficient tool that predicts these categories according to only two acoustic features calculated on the signal. However, because of the specificities of the sound production of these three categories, each of them has its own timbre space. Therefore, we finally used perceptually relevant acoustic features to explain these timbre spaces, according to the main acoustic characteristics that define each sound class. We found that timbral brightness is a common feature used to discriminate sounds in all classes, while other particular features are specifically used within each class. [Work partially supported by the SamplerOrchestrator project of the ANR program]