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Effects of railway pass-by noise on pleasantness rankings

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ABSTRACT

Due to a recently introduced German railway noise abatement law that prohibits the operation of trains that do not meet the certification criteria for noise emission, the railway companies have been replacing the conventional brake system of freight trains. Since the retrofitting may lead to a change in noise characteristics, we examined how sounds of freight wagons with the conventional and the retrofitted system are rated with regard to their pleasantness. We synthesized thirteen different railway sounds with particular acoustic properties according to brake system, speed and train type. In a laboratory study, using the method of full paired comparison, 44 participants were requested to state which of the presented sounds they perceived as more pleasant. Three preference rankings were derived that were based on a metric scale. The resulting ranking showed that freight trains equipped with a retrofitted brake system were preferred to those with a conventional system, irrespective of their speed. A slow pass-by of a freight train with retrofitted brake system was judged as more pleasant than pass-bys by such a train at higher speeds. The more wagons of a freight train were retrofitted, the more pleasant the sound was rated. Since long-term exposure to unpleasant railway sounds may increase the number of highly annoyed residents near railway tracks, our findings support the ban of freight train wagons with conventional braking systems.

Keywords (3-6): Laboratory study, Railway noise, Brake system, Freight train, Annoyance, Pleasantness