

# **Size Speed Bias or Size Arrival Effect - How Judgments of Vehicles' Approach Speed and Time to arrival are Influenced by the Vehicles' Size**

## **Abstract**

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### **Introduction**

Crashes at railway level crossings are a key problem for railway operations. It has been suggested that a potential explanation for such crashes might lie in a so-called size speed bias, which describes the phenomenon that observers underestimate the speed of larger objects, such as aircraft or trains. While there is some evidence that this size speed bias indeed exists, it is somewhat at odds with another well researched phenomenon, the size arrival effect. When asked to judge the time it takes an approaching object to arrive at a predefined position (time to arrival, TTA), observers tend to provide lower estimates for larger objects. In that case, road users' crossing decisions when confronted with larger vehicles should be rather conservative, which has been confirmed in multiple studies on gap acceptance. The aim of the experiment reported in this paper was to clarify the relationship between size speed bias and size arrival effect.

### **Method**

Employing a relative judgment task, both speed and TTA estimates were assessed for virtual depictions of a train and a truck, using a car as a reference to compare against.

### **Results**

The results confirmed the size speed bias for the speed judgments, with both train and truck being perceived as travelling slower than the car. A comparable bias was also present in the TTA estimates for the truck. In contrast, no size arrival effect could be found for the train or the truck, neither in the speed nor the TTA judgments. This finding is inconsistent with the fact that crossing behaviour when confronted with larger vehicles appears to be consistently more conservative. This discrepancy might be interpreted as an indication that factors other than perceived speed or TTA play an important role for the differences in gap acceptance between different types of vehicles.