

September 2024

# Assessment of external vehicle sound

Evaluation of situations where  
vehicles might be overheard

Joint Event of  
WBU / EBU  
and ACEA

## BACKGROUND

Exterior vehicle sound can be a source of annoyance or excitement for people nearby. For visually impaired people (VIP) or pedestrians which are distracted, e.g. by their smartphones, it means safety to recognise an approaching vehicle in time.

ACEA had organised for GRBP a sound assessment of different electric vehicles and one ICE vehicle for comparison. This was done at the test track of the ika, the automotive institute of the RWTH Aachen in June 2024 and is subject to a separate report.

## WHY ANOTHER EVENT AFTER THE GRBP SOUND ASSESSMENT IN AACHEN IN JUNE 2024?

1. In Aachen the World Blind Union (WBU) was only represented by a non-blind colleague from the European Blind Union (EBU)
2. The event in Aachen focussed rather on demonstrating that EVs are no source of high noise levels, even with exterior sound enhancement systems (ESES). The relevant question for VIP on the other hand is whether a vehicle can be detected in time.

For the reasons above WBU and ACEA jointly organised a sound assessment event for which Audi kindly provided a part of their test track in Neuburg, Germany.

## HOW WAS THE GENERAL SET-UP?

Participants met on August 1<sup>st</sup> at the Audi Experience Center in Neuburg an der Donau, Germany. The WBU was represented by Mr. John Pare. Another 5 participants came from the Bavarian members of the EBU.

ACEA through its member companies provided vehicles from Audi, Mercedes, Porsche and Volkswagen representing all kinds of EVs (without AVAS, with EU- and US-AVAS, with AVAS and ESES).

Again, the event was again scientifically accompanied by the ika

The background noise came from the following sources:

- Wind blowing
- Sound files recorded in urban areas (the same as used in Aachen)
- A vehicle in standstill with an ICE idling

- In the afternoon also vehicles driving at another part of the test track were heard

The background noise level was measured and subjectively assessed by the blind colleagues as typical urban noise level.

## WHICH SCENARIOS HAVE BEEN CHOSEN?

Scenario 1 (“use case 1”): Zebra-crossing, EV passing by with 20 km/h

From left, an ICE-driven vehicle already stopped before the crossing with engine in idle.

Different EVs approached individually from the right side with 20 km/h. The test subjects were clear about the test set-up and gave a show of hands once they recognised the approaching EV. The time from that sign until the EV reached the (imaginary) zebra-crossing was measured.



Scenario 2 (“use case 4”): Zebra-crossing, EV passing by with 33 km/h

Same scenario as the first but with slightly over 30 km/h

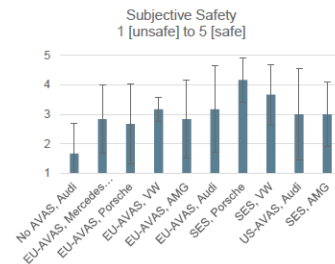
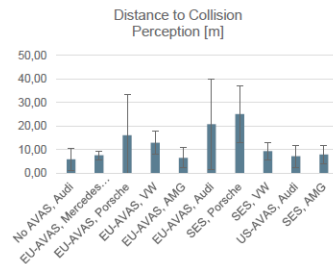
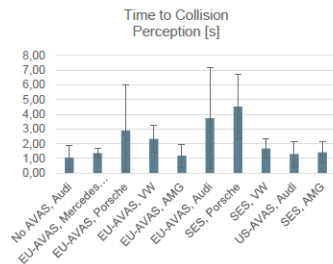
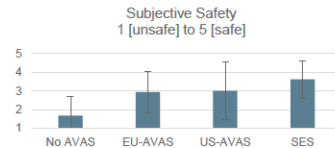
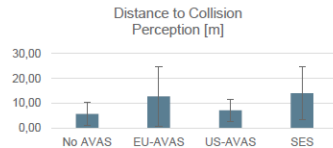
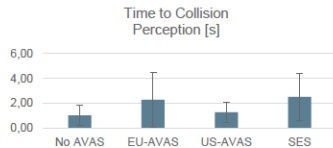
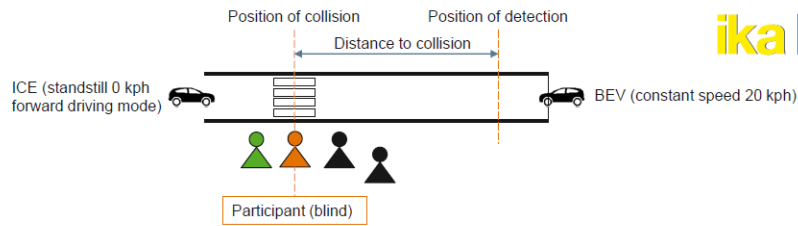
Scenario 3 (“use case 6): Supermarket Parking

On an imaginary supermarket parking stood in a row a BEV with forward drive engaged in standstill and a BEV with reverse drive engaged in standstill. The next slot was free and the EVs individually approached with low speed to park in. At the place behind that stood a vehicle with ICE idling.

The test subjects walked along behind the vehicles coming from the side where the EV in reverse stood. The matter of interest was if they could hear the oncoming EV (from behind the idling ICE) in time. (A guard made sure that the test subject would not come too close to the approaching vehicle, which turned out to be necessary.)

## RESULTS AND FINDINGS

### Results Use Case 1

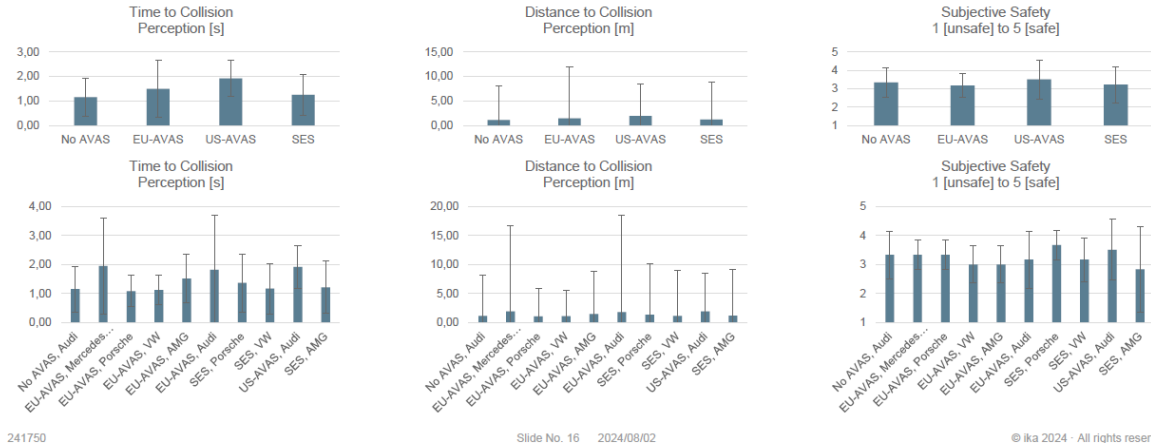
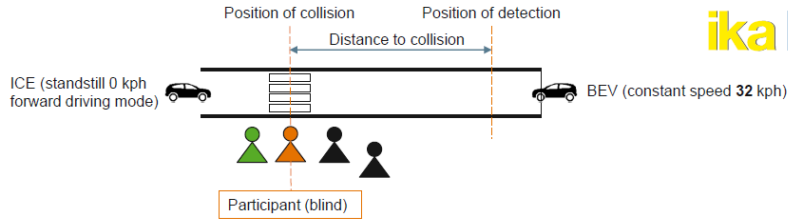


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## Results Use Case 4

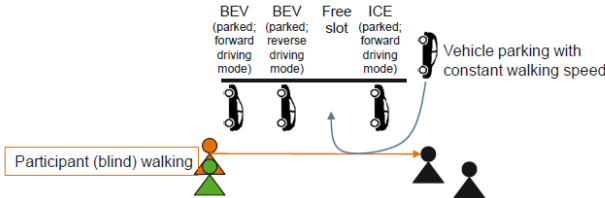


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## Results Use Case 6



Wie sicher haben Sie sich in der Situation gefühlt? (1 - unsicher; 5 - sicher)	Konnten Sie die Situation einschätzen?	Begründung	Haben Sie das parkende Auto wahrgenommen?	Begründung	Konnten Sie einordnen, wie das Fahrzeug fahren wird?	Begründung	Würden Sie sich in einer solchen Situation noch weitere Informationen wünschen?	Welche?/Wie?
1	1nein	2 parked cars, not moving, never detected 3rd (it was 4), felt save, but not now	nein	insgesamt nur 2 Fahrzeuge	nein	nicht gehört.. Parked (ICE) lauder	ja	parking spot layout
2	4nein	Nur Rückfahrer sonst nichts, parkenden Wagen nicht gehört	nein	Nur Rückwärtsfahrer	nein	nur rückwärts Fahrender	nein	
3	3nein	Wusste etwas kommt, aber nicht was, Ton nicht dramatisch	nein	nicht gehört, weil Rückwärtsfahrer, auf den er sich konzentriert hat	nein		ja	Ton müsste dramatischer sein (Rückwärtsfahrer, Ton veränderlich mit Fahrsituation, wie bei einer Ampel)
4	1nein	Eingeparktes/einparkendes nicht hörbar	nein	Auto leise und Geräuschkulisse von rechts (R8), sehr laut drumherum	nein		ja	langsamfahrende lauter
5	2nein	wusste nicht, was hier ist, weder sicher noch sicher, Diesel, sonst nichts, rechte Seite nichts	nein	nein	nein		ja	würde es gerne wahrnehmen das fahrende Fahrzeug; erkennbares Geräusch, dass es ein Auto ist
6	bedingt (vorgewarnt) 3konzentriert	Was wahrgenommen? Ohne Infos vorher hätte sich nicht warkonzentriert, wäre sonst bei rückwärts	nein	andere zu laut, parkendes zu leise, Piepsgeräusch (Gefahr) → vorsichtiger	nein		nein (eh nichts gehoffen)	Zu viele Geräusche, bei einem wusste er nicht, ob es an ist, Kollege hat mit Kollegen gesprochen (typische Situation)

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## ABOUT THE EU AUTOMOBILE INDUSTRY

- 13.0 million Europeans work in the auto industry (directly and indirectly), accounting for 7% of all EU jobs
- 11.5% of EU manufacturing jobs – some 3.4 million – are in the automotive sector
- Motor vehicles are responsible for €374.6 billion of tax revenue for governments across key European markets
- The automobile industry generates a trade surplus of €101.9 billion for the European Union
- The turnover generated by the auto industry represents over 7% of the EU's GDP
- Investing €59.1 billion in R&D per year, automotive is Europe's largest private contributor to innovation, accounting for 31% of the EU total

## ACEA REPRESENTS EUROPE'S 15 MAJOR CAR, VAN, TRUCK AND BUS MANUFACTURERS

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