

AUTOPIA: What did we learn from 10 months of AV operation in Ski?

Video-observations



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Aim: to explore behaviour of shuttles and their interactions with other traffic participants

Method: Exploratory video observation with external cameras



Selection of locations



+ info from drivers/operator where the problems are (mostly with pedestrians)

= 5 locations selected



- 3 locations in April
- 2 locations in June
- 1 week, daily between 11:00 and 19:00



Data analyses – detection and clipping

- Presence detectors in RUBA software - picture and time of every detection
- Manual selection of the detections containing shuttles (photo viewer)
- Cutting video clips with the whole manoeuvre of each shuttle



Clips analyses

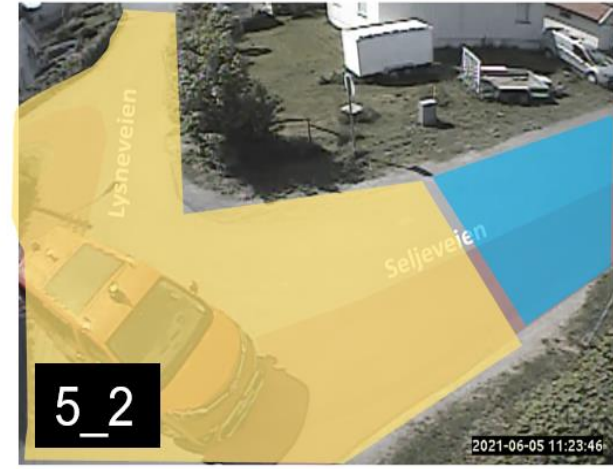
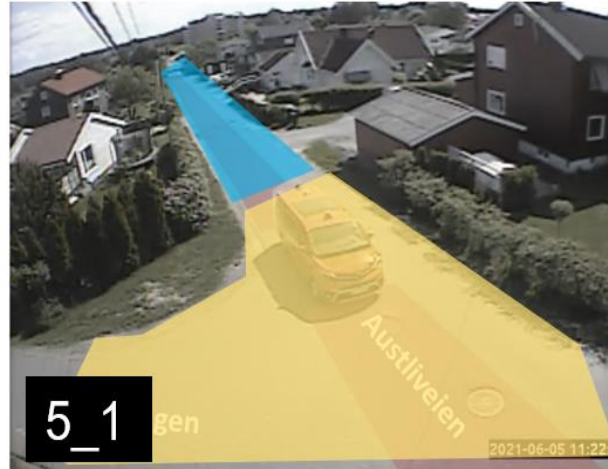
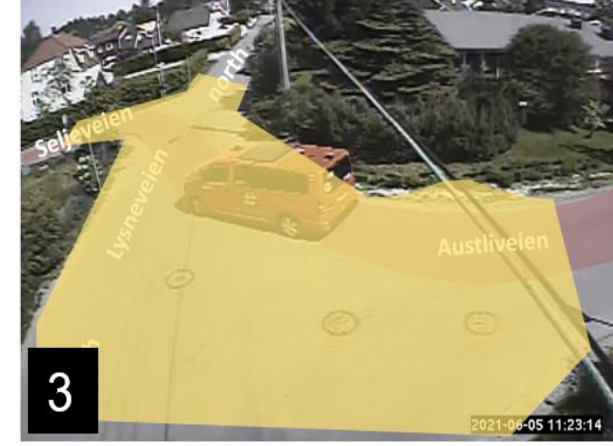
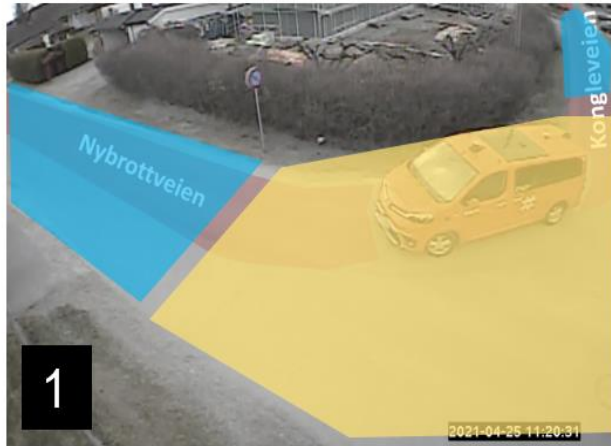
In 328 hours of video, 956 shuttles were detected and video-clips were made

For further analyses, we selected 193 clips that show an interaction with other traffic participants or an oddly behaviour of the shuttle.

From these clips, we collected these **variables**:

- Brief description of the situation
- Type of other road user
- Reaction of the shuttle
- Intensity of the reaction of the shuttle (visual estimate)
- Reason for the reaction of the shuttle
- Place of the shuttle's reaction
- Position and direction of another road user
- Reaction of the other road user

Structure of results



-  Road section
-  T-intersection (right-hand rule)
-  4-arm intersection (right-hand rule)
-  T-intersection (give-way sign)

Results

Infrastructure layout	interaction with				<i>total</i>	<i>%</i>
	vehicle	pedestrian	bike	other		
Road section	21	37	5	4	67	35%
T-intersection (right-hand rule)	29	14	4	7	54	28%
4-arm intersection (right-hand rule)	17	4	3	1	25	13%
T-intersection (give-way sign)	42	3	2	0	47	24%
	<i>total</i>	109	58	14	12	193
	<i>%</i>	56%	31%	7%	6%	

Results: Inadequate reactions of the shuttle

In 40 situations the shuttle reacted inadequately to the context of the situation - mostly different types of stops that were inadequate because of their intensity, timing, purpose or duration (such as too hard, too early, unnecessary or delayed stop).

Overall, these reactions could be attributed to the “defensive” style of the shuttle decision making and strict reactions when an object enters the shuttle’s safety zone/priority area

Infrastructure layout	nr. of situations	nr. of inadequate reactions	% of inadequate reactions
road section	67	7	10,4%
T-intersection (right-hand rule)	54	16	29,6%
4-arm intersection (right-hand rule)	25	9	36,0%
T-intersection (give way sign)	47	8	17,0%

The inadequate reactions, especially hard and unexpected stops, might be risky for others. The intensity and suddenness of these stops can increase the risk of rear-end accidents and might be uncomfortable for the passengers inside.



Results: Reactions of other road users

The most appealing = the high share of car drivers not giving way to the shuttle on the intersections with right-hand yielding rule

These drivers are probably misusing/taking advantage of the slow speed and strict and defensive driving styles of the shuttles.



in 50 % of relevant situations, the car drivers did not give way to the shuttle

Other safety concerns

An inconsistency of the shuttle's mode

A high number of children/pedestrians on the roads in Hebekk



THANK YOU FOR YOUR ATTENTION

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