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Annex B

Statistical Analysis

B.1 Descriptive Statistics

ASAP data
26 Variables 36 Observations

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duration

n	missing	unique
36	0	2

long (21, 58%), short (15, 42%)

---

length

n	missing	unique
36	0	3

long (19, 53%), middle (12, 33%), short (5, 14%)

---

lane_red

n	missing	unique
36	0	2

no (12, 33%), yes (24, 67%)

---

lane_width

n	missing	unique
20	16	3

equal (1, 5%), smaller (13, 65%), wider (6, 30%)

---

diversion_opposite_lane

n	missing	unique
36	0	2

No (17, 47%), Yes (19, 53%)

---

effect_worker

n	missing	unique
36	0	2

\- (18, 50%), + (18, 50%)

---

effect_driver

n	missing	unique
36	0	2

\- (18, 50%), + (18, 50%)

---

lane_management_effect_worker

n	missing	unique
22	14	2

\- (14, 64%), + (8, 36%)

---

lane_management_effect_driver

n	missing	unique
22	14	2

\- (16, 73%), + (6, 27%)

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layby_shoulder_emergencylane

n	missing	unique
10	26	2

No (3, 30%), Yes (7, 70%)

---

number_entrances_exits

n	missing	unique	Mean
36	0	5	1.167

	0	1	2	7	8
Frequency	12	17	5	1	1
%	33	47	14	3	3

---

safety_measures_treatments

n	missing	unique
36	0	5

	1	2	3	4	5
Frequency	5	10	10	5	6
%	14	28	28	14	17

---

measures_worker_safety

n	missing	unique
36	0	2

- (6, 17%), + (30, 83%)

---

sl_wz

n	missing	unique	Mean	.05	.10	.25	.50	.75	.90	.95
35	1	10	85.71	60.0	70.0	80.0	88.0	96.0	104.4	104.6

	50	60	70	80	88	96	100	104	104.6	112
Frequency	1	2	2	12	8	2	2	2	3	1
%	3	6	6	34	23	6	6	6	9	3

---

variable_message_signs

n	missing	unique
31	5	2

- (24, 77%), + (7, 23%)

---

preinformation

n	missing	unique
31	5	2

- (2, 6%), + (29, 94%)

---

actual_speed_information

n	missing	unique
29	7	2

- (27, 93%), + (2, 7%)

---

radar_enforcement

n	missing	unique
34	2	2

- (28, 82%), + (6, 18%)

---

sec_control

n	missing	unique
34	2	2

- (18, 53%), + (16, 47%)

---

police_enforcement

n	missing	unique
29	7	2

- (28, 97%), + (1, 3%)

---

adt

n	missing	unique
36	0	3

high (12, 33%), low (18, 50%), middle (6, 17%)

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truck_rel

n	missing	unique
36	0	3

high (11, 31%), low (14, 39%), middle (11, 31%)

---

entrances_exits_rel

n	missing	unique	Mean	.05	.10	.25	.50	.75	.90	.95
33	3	11	0.2358	0.00	0.00	0.00	0.09	0.42	0.77	0.77

	0	0.08	0.09	0.17	0.33	0.39	0.42	0.5	0.6	0.77	1
Frequency	12	2	7	1	1	1	1	2	1	4	1
%	36	6	21	3	3	3	3	6	3	12	3

---

length_km

n	missing	unique	Mean	.05	.10	.25	.50	.75	.90	.95
33	3	19	8.31	1.30	1.44	2.70	8.00	11.20	12.50	17.40

	0.1	1.3	2	2.4	2.6	2.7	2.71	3.35	4	6	6.95	7.15	8	9	11.2	11.29	12.8	24.3
Frequency	1	3	2	1	1	1	1	1	2	1	1	1	1	2	7	3	2	1
%	3	9	6	3	3	3	3	3	6	3	3	3	3	6	21	9	6	3

	36.2
Frequency	1
%	3

---

v85

n	missing	unique	Mean	.05	.10	.25	.50	.75	.90	.95
20	16	20	84.81	54.45	60.60	76.75	83.59	93.38	109.14	113.10

lowest :	44.00	55.00	61.22	73.20	76.00
highest:	93.60	95.03	108.80	112.23	129.60

---

v50

n	missing	unique	Mean	.05	.10	.25	.50	.75	.90	.95
22	14	22	77.83	51.99	54.34	71.08	75.25	86.96	100.10	103.82

lowest :	37.00	51.94	53.00	66.40	70.08
highest:	96.76	98.08	100.32	104.00	112.00

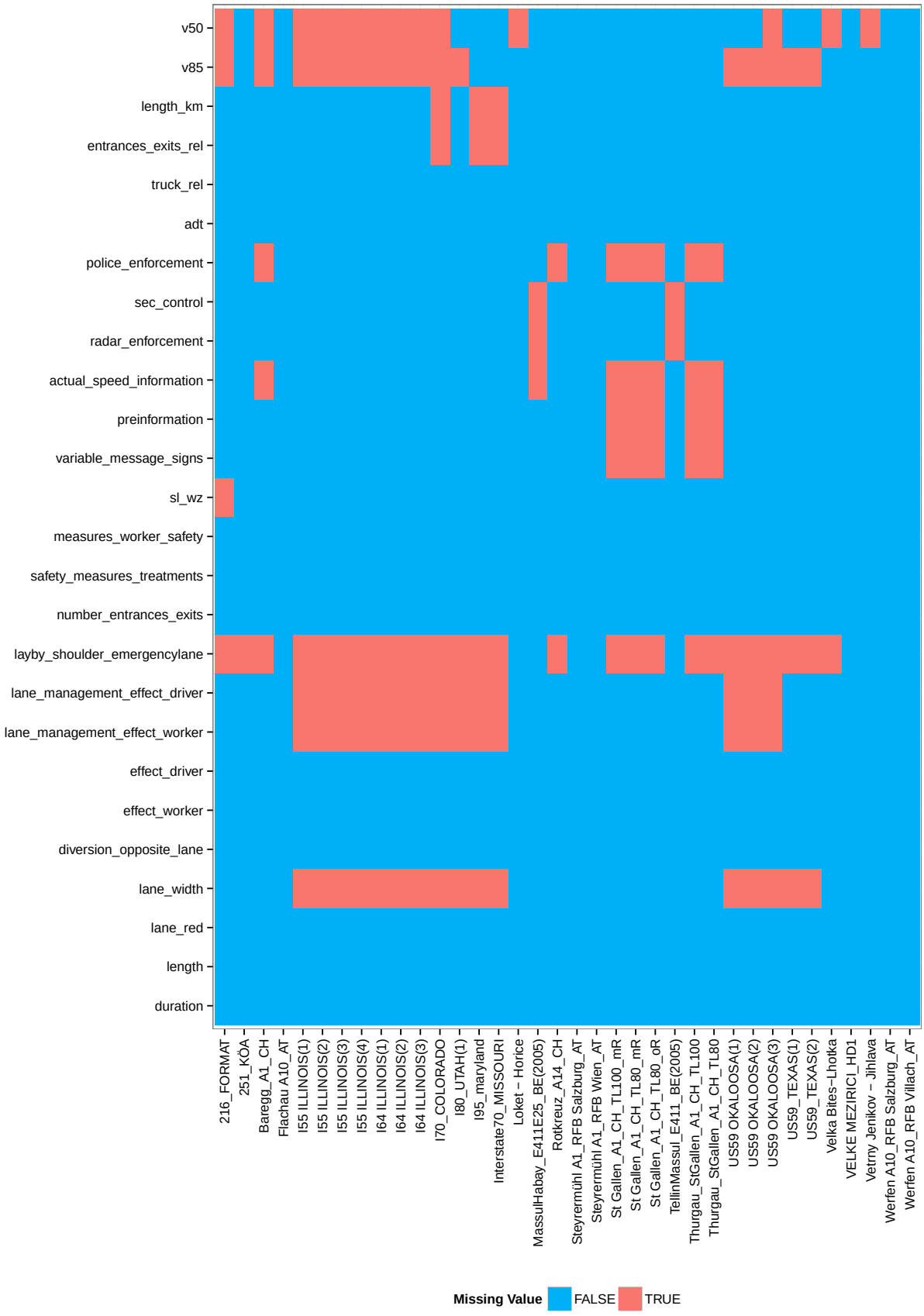


Figure B.1: Missing Values

B.2 Data Imputation v_{85}/v_{50}

It is assumed that speed data are approximately normal distributed with expectation $\mu = v_{50}$, since the sample equals the sample mean under this assumption. The standard deviation σ_v of the distribution is unknown and estimated from samples where both quantiles, v_{50} and v_{85}, are known. The estimated variances are speed dependent, therefore robust linear regression models are fitted do describe these relationships.

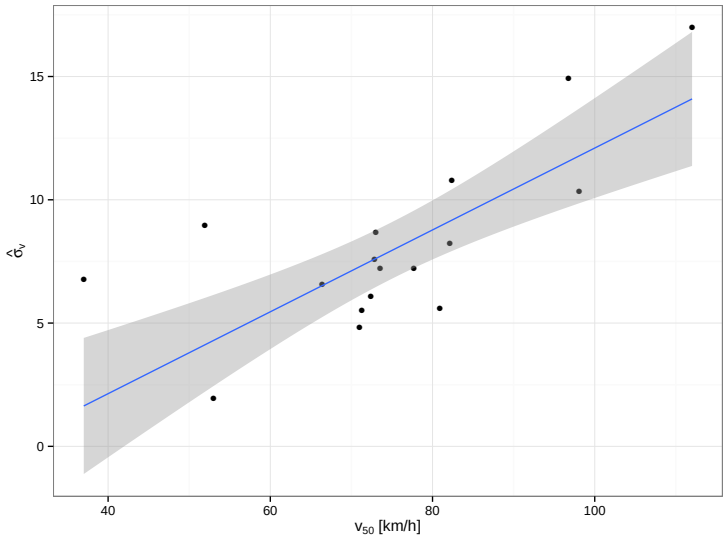


Figure B.2: robust linear model $\hat{\sigma}_v$ vs. v_{50}

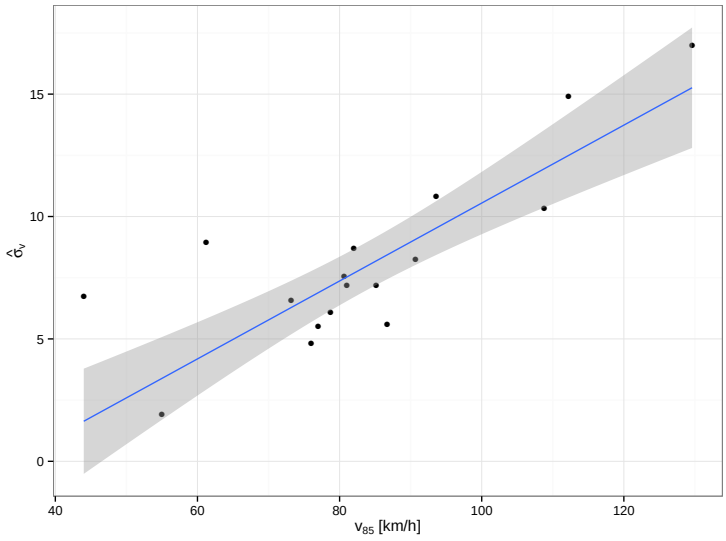


Figure B.3: robust linear model $\hat{\sigma}_v$ vs. v_{85}

	wz_location	v50	v85	v_sd_est
32	Velka Bites-Lhotka	83.47	93.30	9.48
33	Vetrny Jenikov - Jihlava	84.92	95.03	9.76
34	Loket - Horice	82.58	92.23	9.31

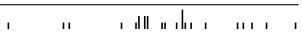
Table B.1: imputed values for v_{50}

	wz_location	v50	v85	v_sd_est
22	US59 OKALOOSA(1)	70.08	77.47	7.13
23	US59 OKALOOSA(2)	76.96	85.53	8.27
25	I80_UTAH(1)	88.48	99.04	10.19
26	US59_TEXAS(1)	100.32	112.91	12.15
27	US59_TEXAS(2)	104.00	117.23	12.76

Table B.2: imputed values for v_{85}

imputed data
2 Variables 36 Observations

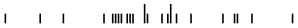
v50



n	missing	unique	Mean	.05	.10	.25	.50	.75	.90	.95
25	11	25	78.53	52.15	58.36	71.30	77.70	84.92	99.42	103.26

```
lowest :  37.00  51.94  53.00  66.40  70.08
highest:  96.76  98.08 100.32 104.00 112.00
```

v85

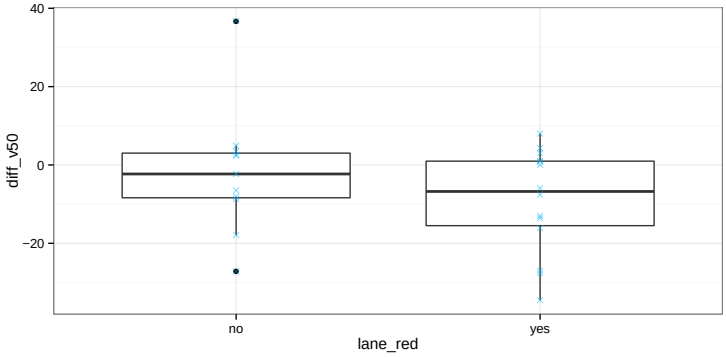


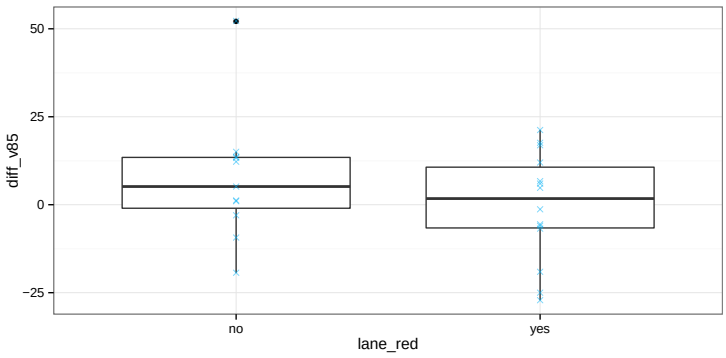
n	missing	unique	Mean	.05	.10	.25	.50	.75	.90	.95
25	11	25	87.53	56.24	66.01	77.47	85.53	95.03	112.64	116.37

```
lowest :  44.00  55.00  61.22  73.20  76.00
highest: 108.80 112.23 112.91 117.23 129.60
```

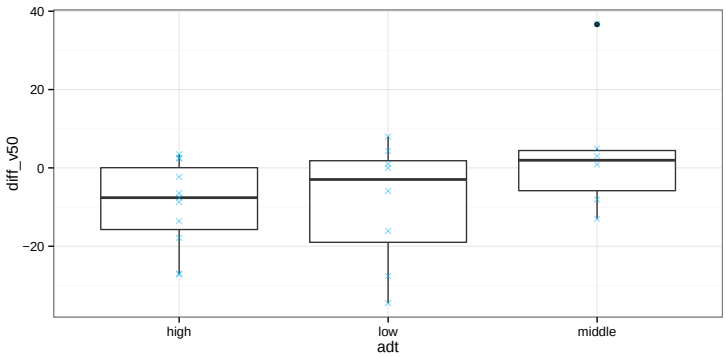
B.3 Figures

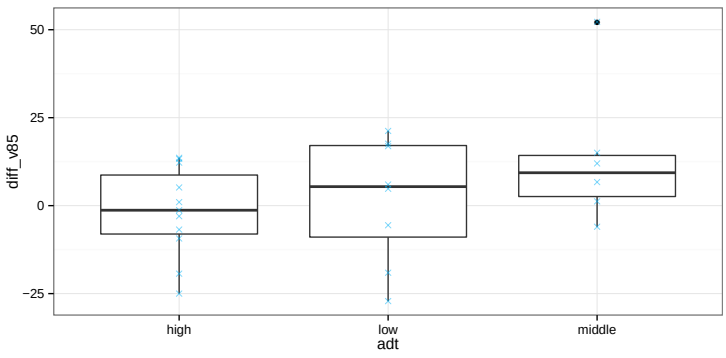
Lane Reduction



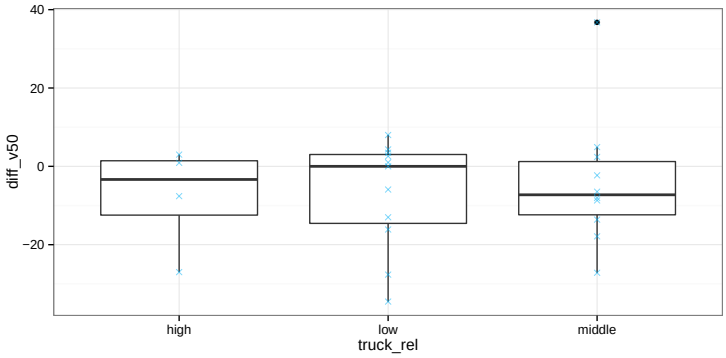


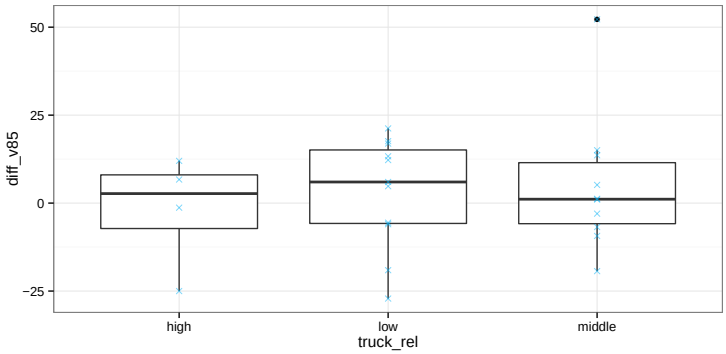
ADT



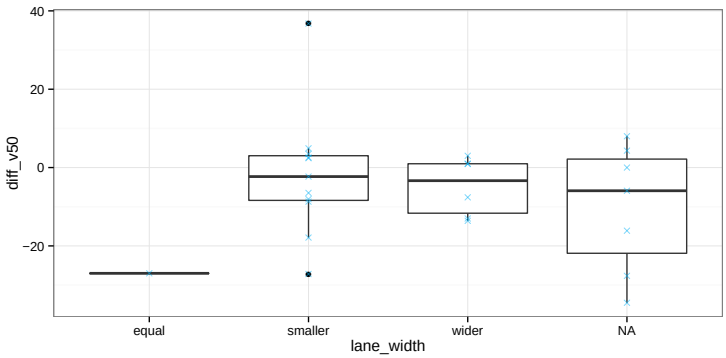


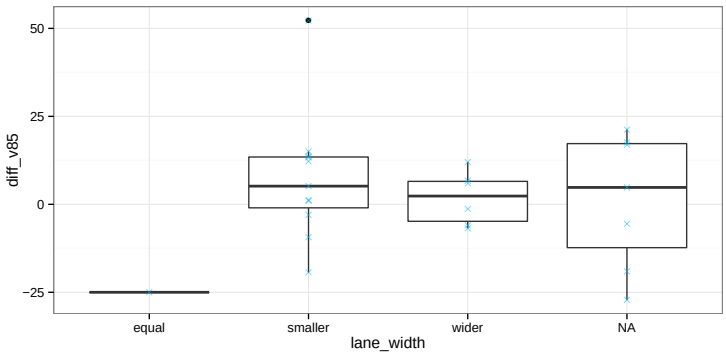
Portion of Trucks



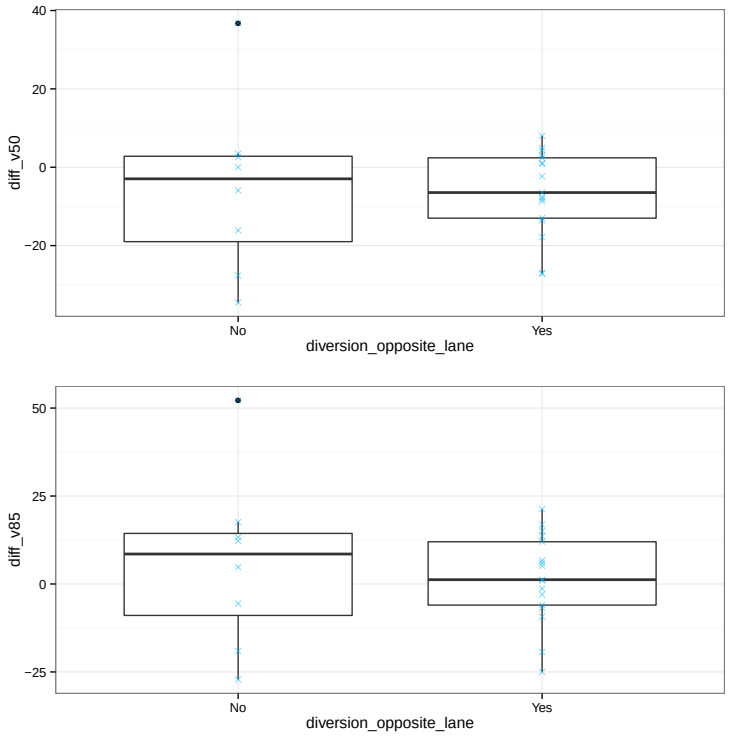


Lane Width

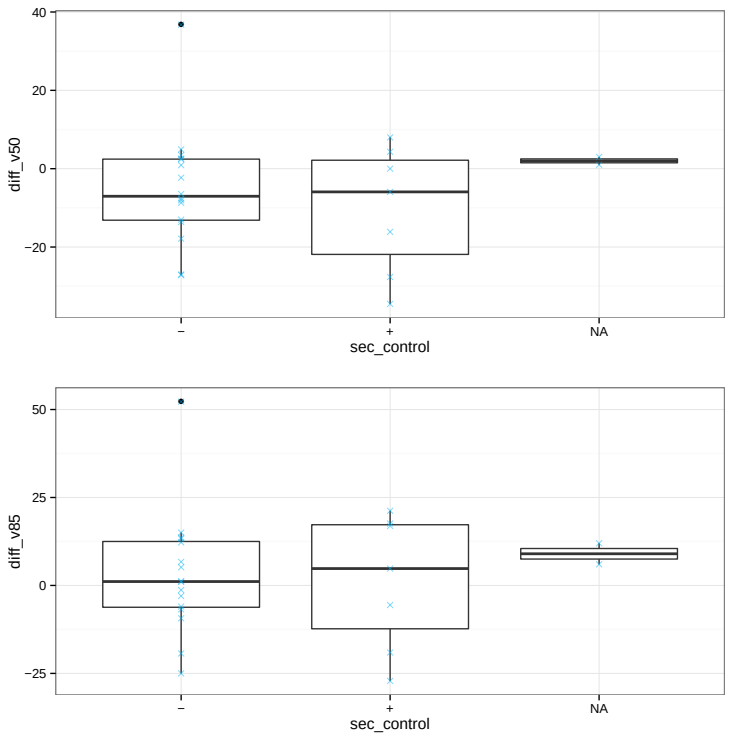




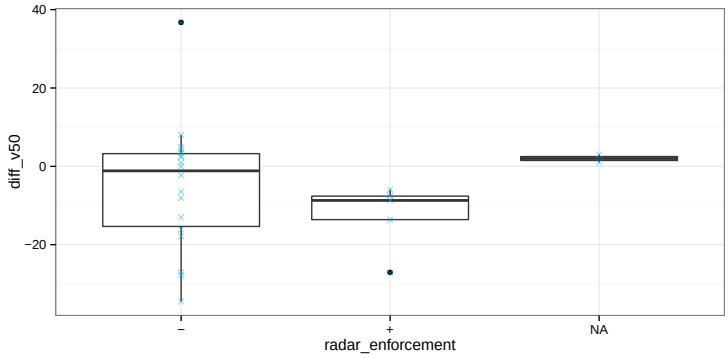
Diversion to Opposite Lane

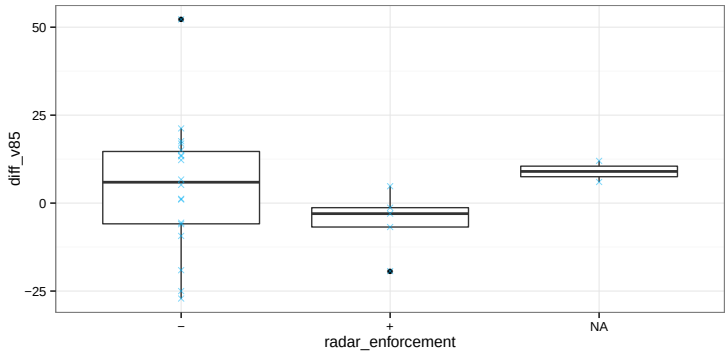


Section Control

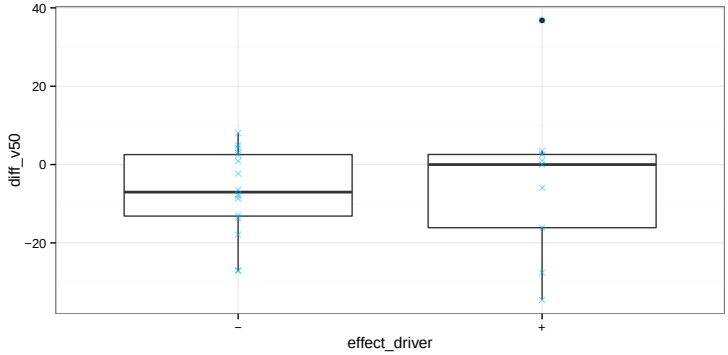


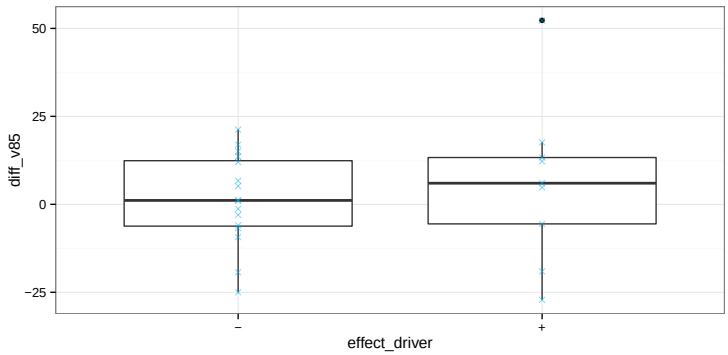
Radar Enforcement



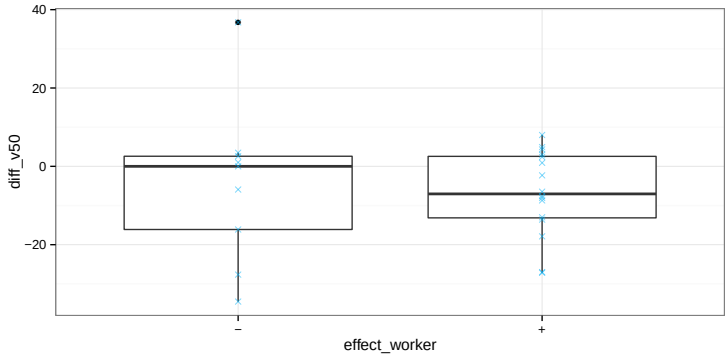


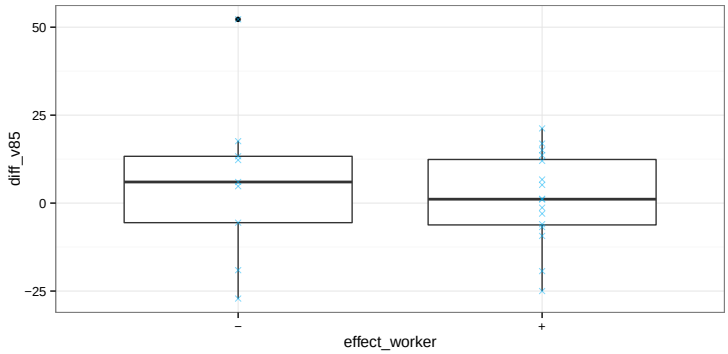
Effect Driver





Effect Worker





B.4 Conditional Inference Trees

Section Control vs. ADT

```
            ADT
sec_control high low middle
          -   12   1      5
          +    0  16      0
```

All variables

Dependent Variable: `safety_measures_treatments`

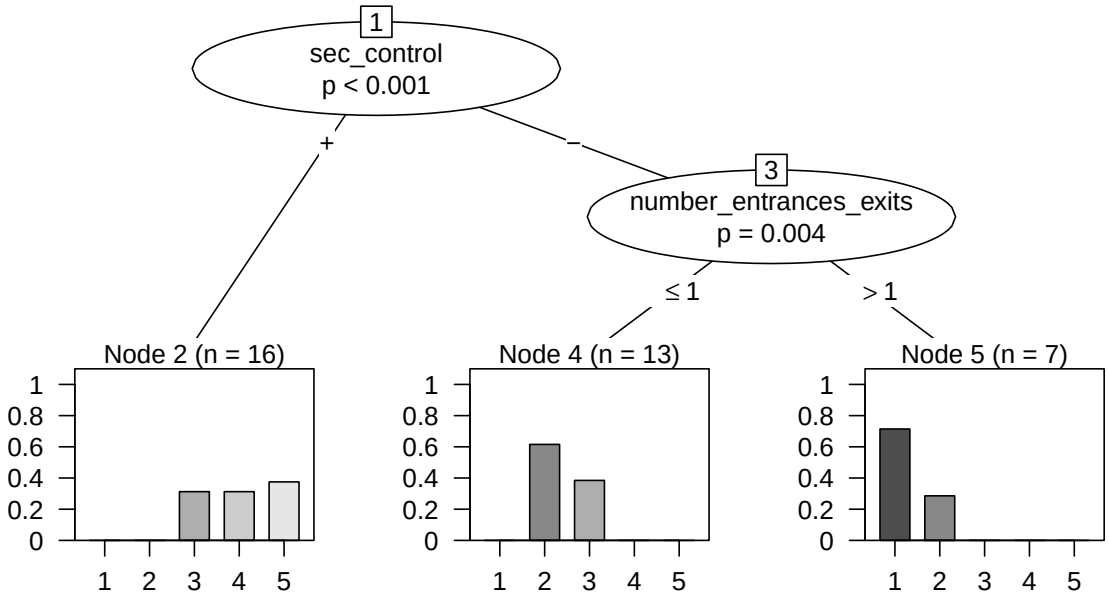


Figure B.4: teststat="quad", testtype="Univ"

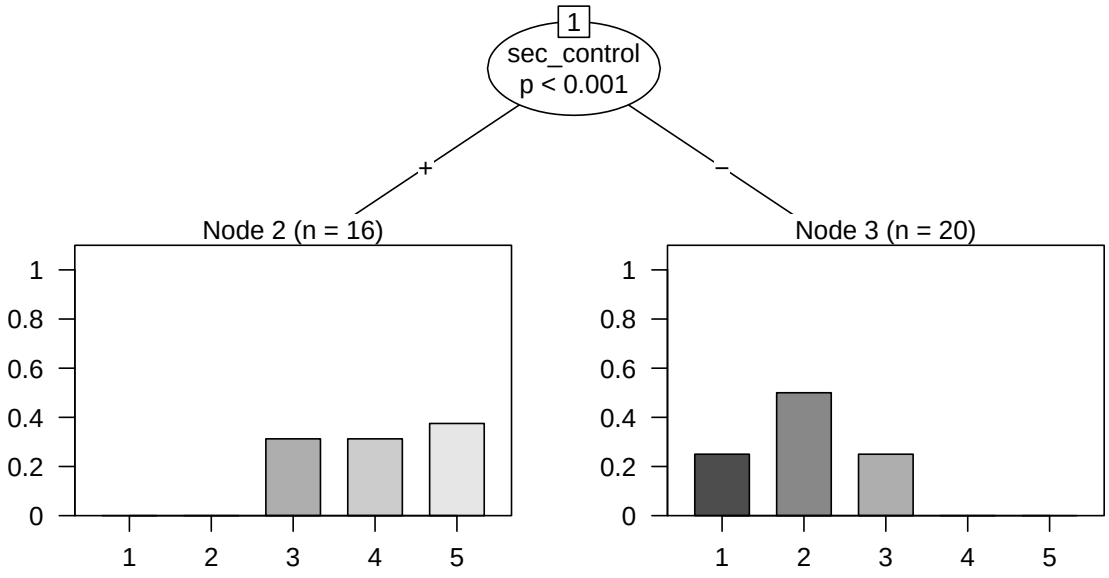


Figure B.5: teststat="quad", testtype="Bonferroni"

Without variable `number_entrances_exits`

Dependent Variable: `safety_measures_treatments`

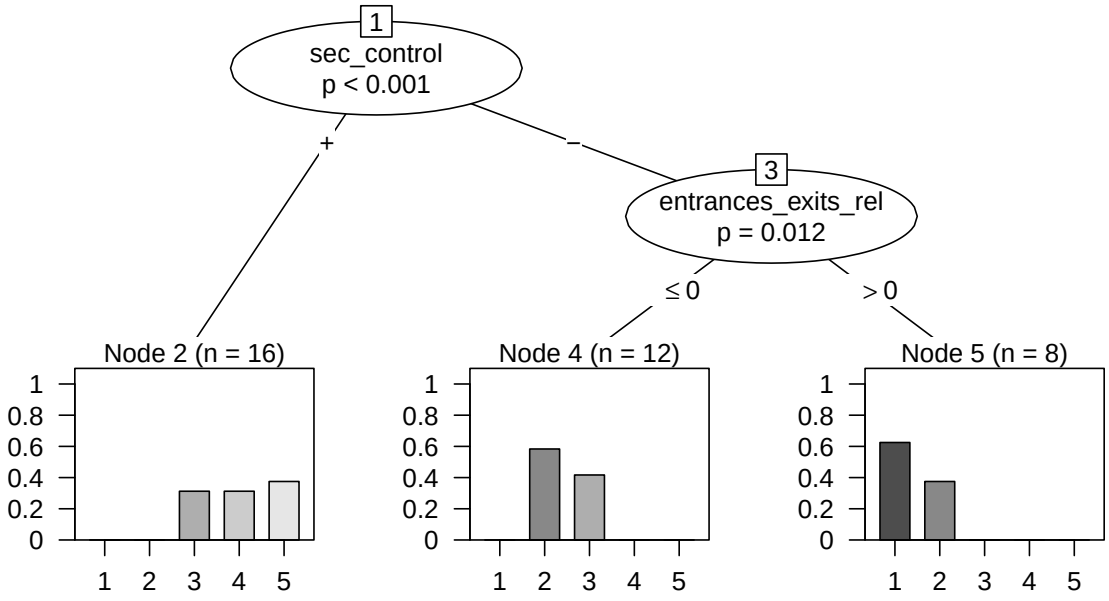


Figure B.6: teststat="quad", testtype="Univ"

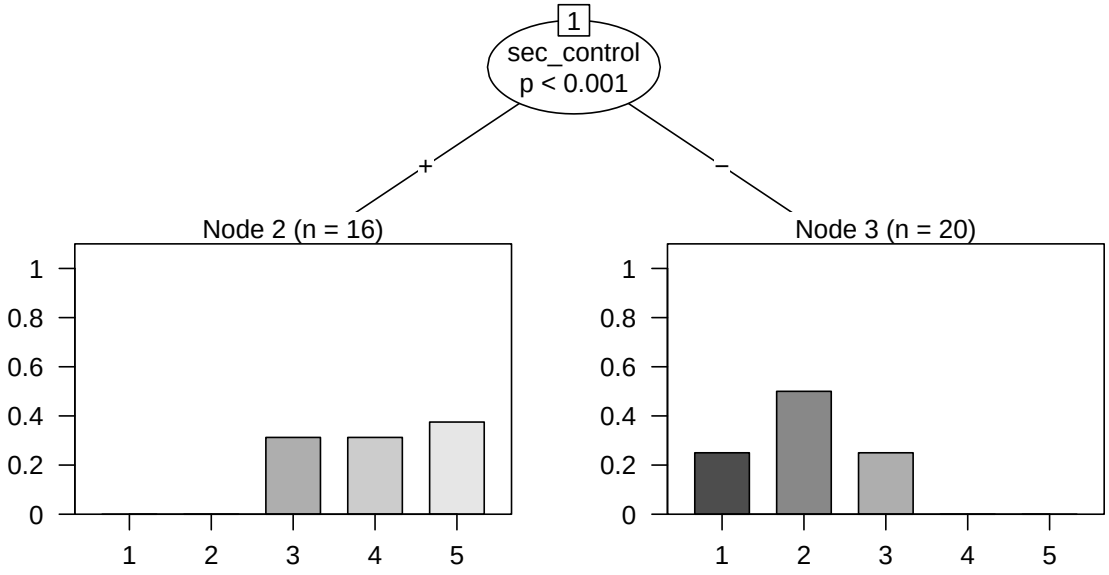


Figure B.7: teststat="quad", testtype="Bonferroni"