

Punctuality Display in the Driver's Cab: Blessing or Curse for Train Drivers?



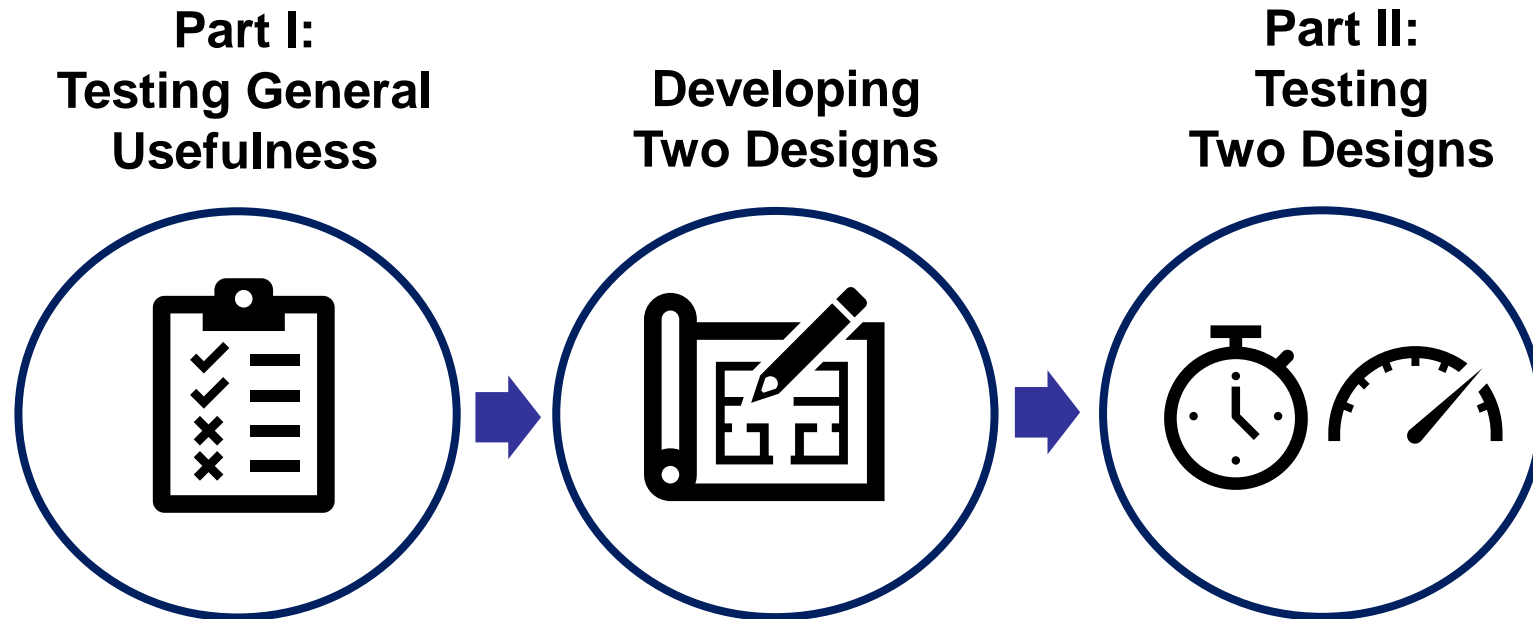
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Wo

M	km	-	+	AE	Wetzikon	R150	PRO	An	Ab	10:11:13 20.04.20
	4.0	10	7	(1315) 1308	Pfäffikon SZ 60 - 100	100	60		09:51:2	SBBP 18538 ADL
	1.8	2	7		<i>Hurden</i>	100	60	(09:53:4)		
Home	1.2				km 1.200 F					
Tour	59.3	0	13	(1311) sms 1-5	Rapperswil 40 80-95	105	95	09:55:5	09:59:1	
					Q→ Zurich via Meilen					-00:01:20
Fahren	60.9	0	12	1303	RW Jona 95	105	95	10:01:1	10:01:4	Manövrieren
	62.4				Block P363					
	63.0				Block P364					
Formulare	65.9	0	12		Rüti ZH 95	115	100	10:05:5	10:06:3	
	65.9				<i>Kurve Ausfahrt</i> 95					
Dokumente	68.6	6	12	1301	Bubikon 115 110	110	95	10:09:0	10:09:4	
	70.8				Block P370					
	71.9									
Private Dokumente	74.5	11	0	1301	Wetzikon 110 125	125	100	10:14:1	10:15:1	
					Q→ Stet via Effretikon					
	75.6				Block P375/Q475					
	77.1	12	0		Aathal	110	100	(10:17:2)		Spalten
	79.5				Block Q478					
	81.3	8	0	(1312) 1301	Uster 110 125	125	115	10:20:1	10:21:0	
	84.3				Nänikon P384/Q484					
		6	1		Nänikon-Greifensee	125	115	(10:23:1)		

Our approach

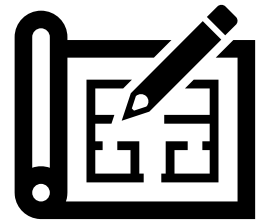




Part I Testing General Usefulness



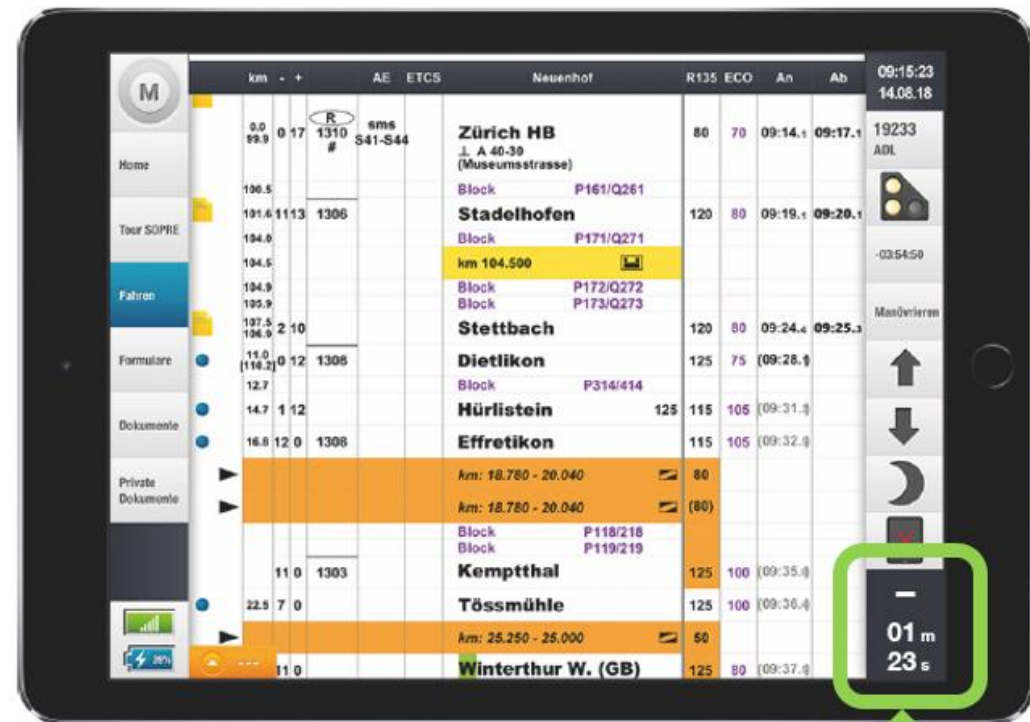
- High level of agreement regarding the usefulness of a punctuality display.
- Agreement slightly higher among novices.
- Evaluation independent of further conditions.

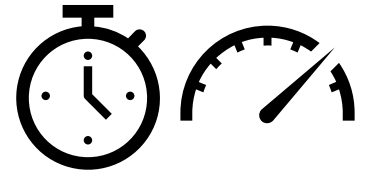


Development of Prototypes

Bar display

Numerical display





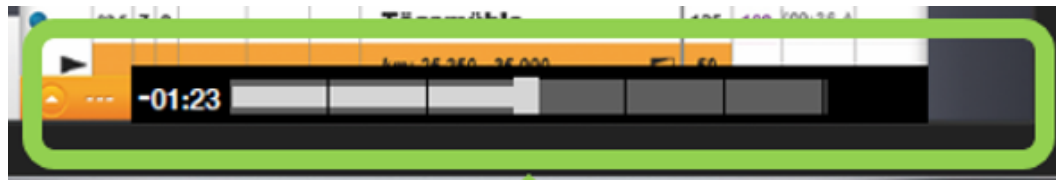
Part II Methods

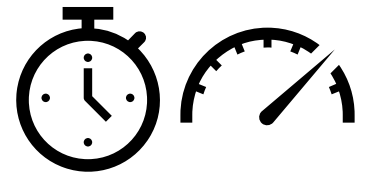
Direct comparison of both types

- 73 participants / 55 valid questionnaires

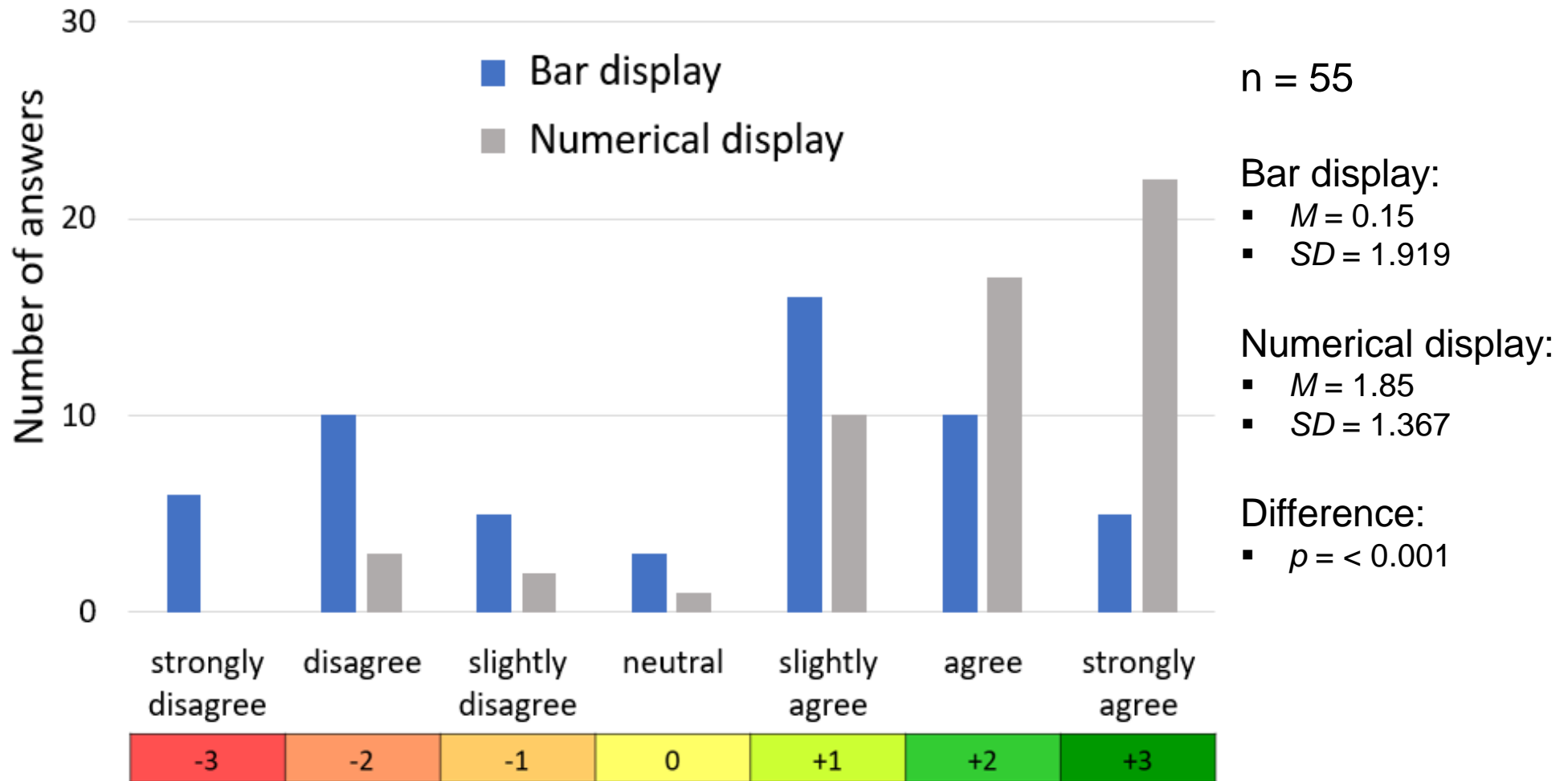
Conditions

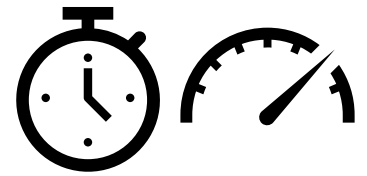
- Two days
- Both displays at an equal amount of time
- Long-distance & suburban traffic
- Evaluation by online questionnaire



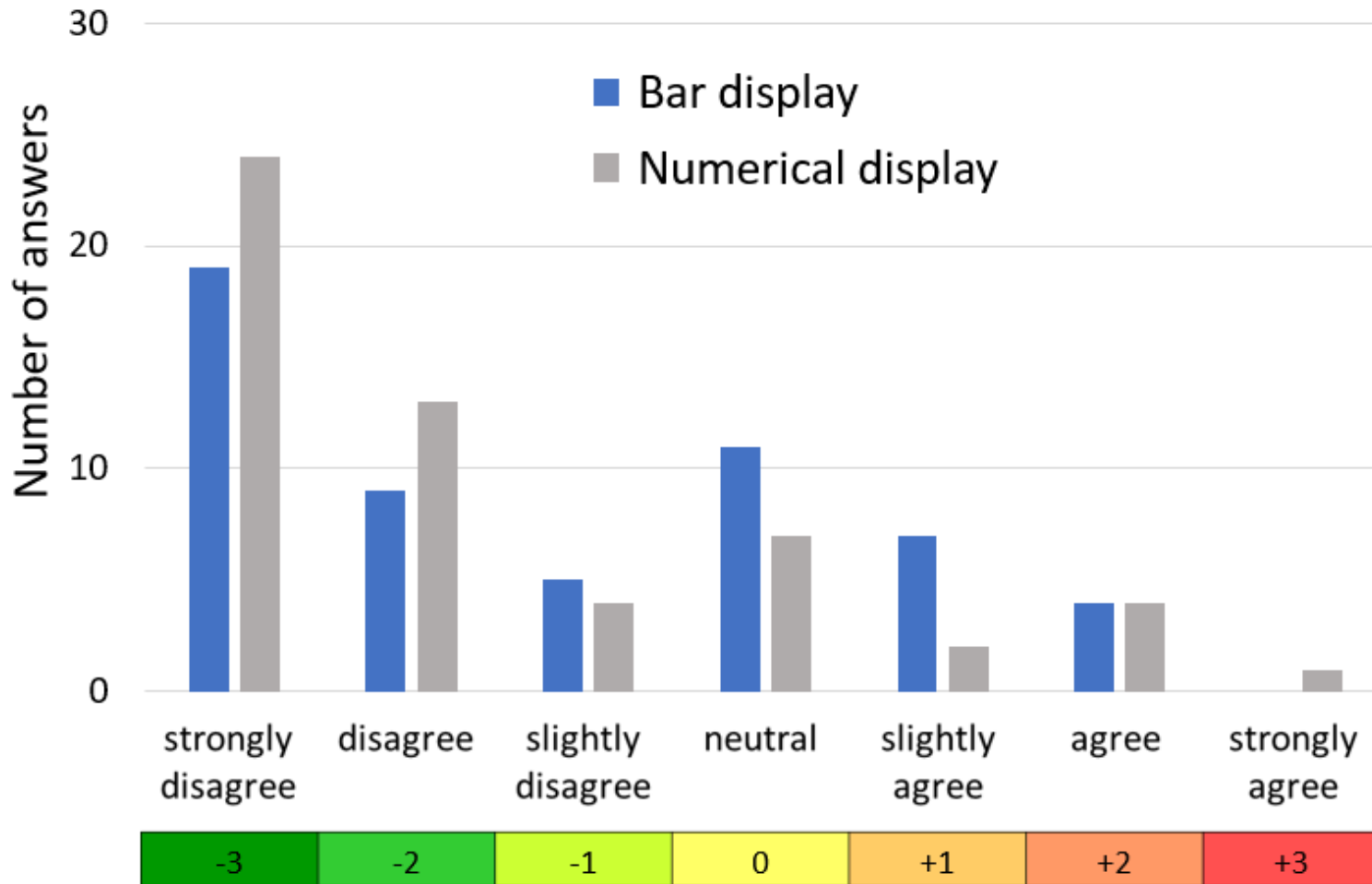


Part II Results: Usefulness





Part II Results: Potential for Stress



n = 55

Bar display:

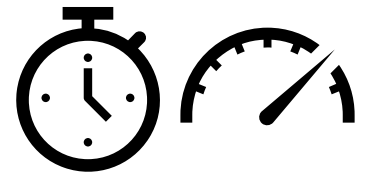
- $M = -1.18$
- $SD = 1.712$

Numerical display:

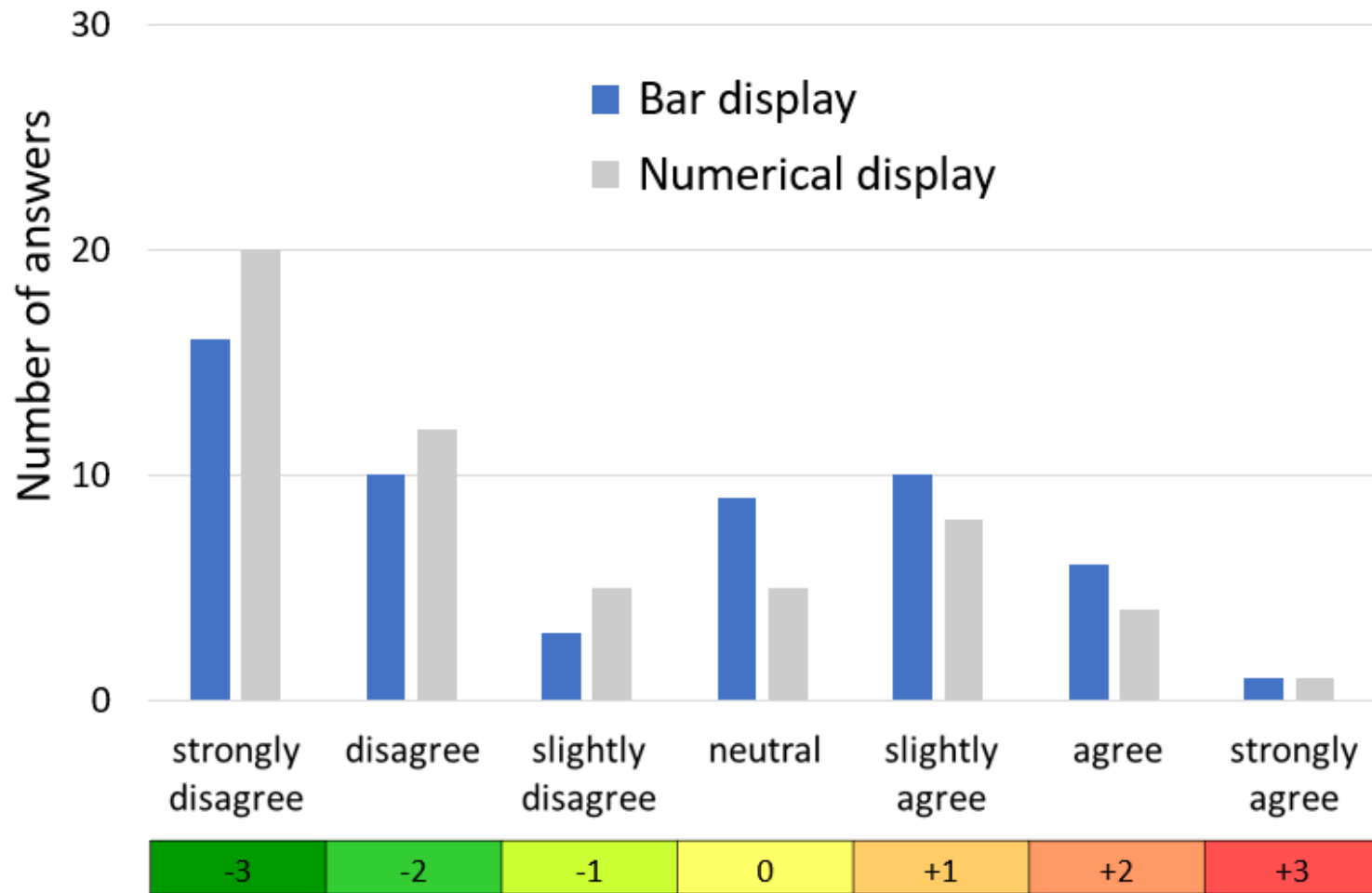
- $M = -1.62$
- $SD = 1.694$

Difference:

- $p = 0.063$



Part II Results: Potential for Distraction



n = 55

Bar display:

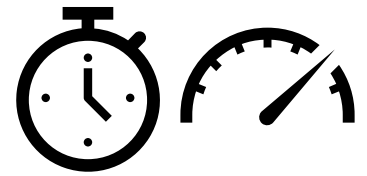
- $M = -0.84$
- $SD = 1.883$

Numerical display:

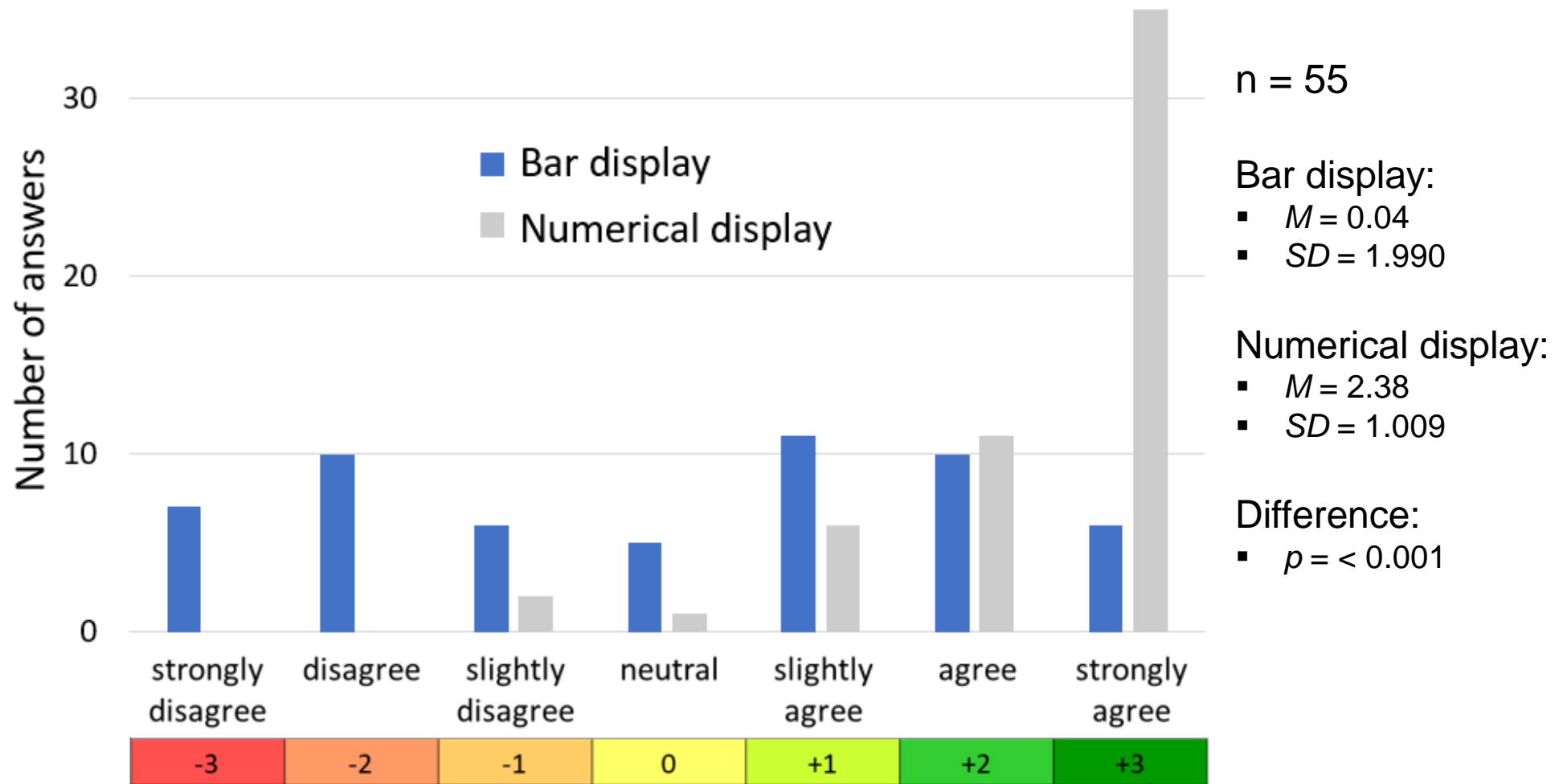
- $M = -1.27$
- $SD = 1.810$

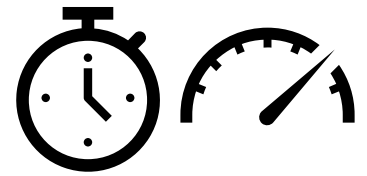
Difference:

- $p = 0.082$

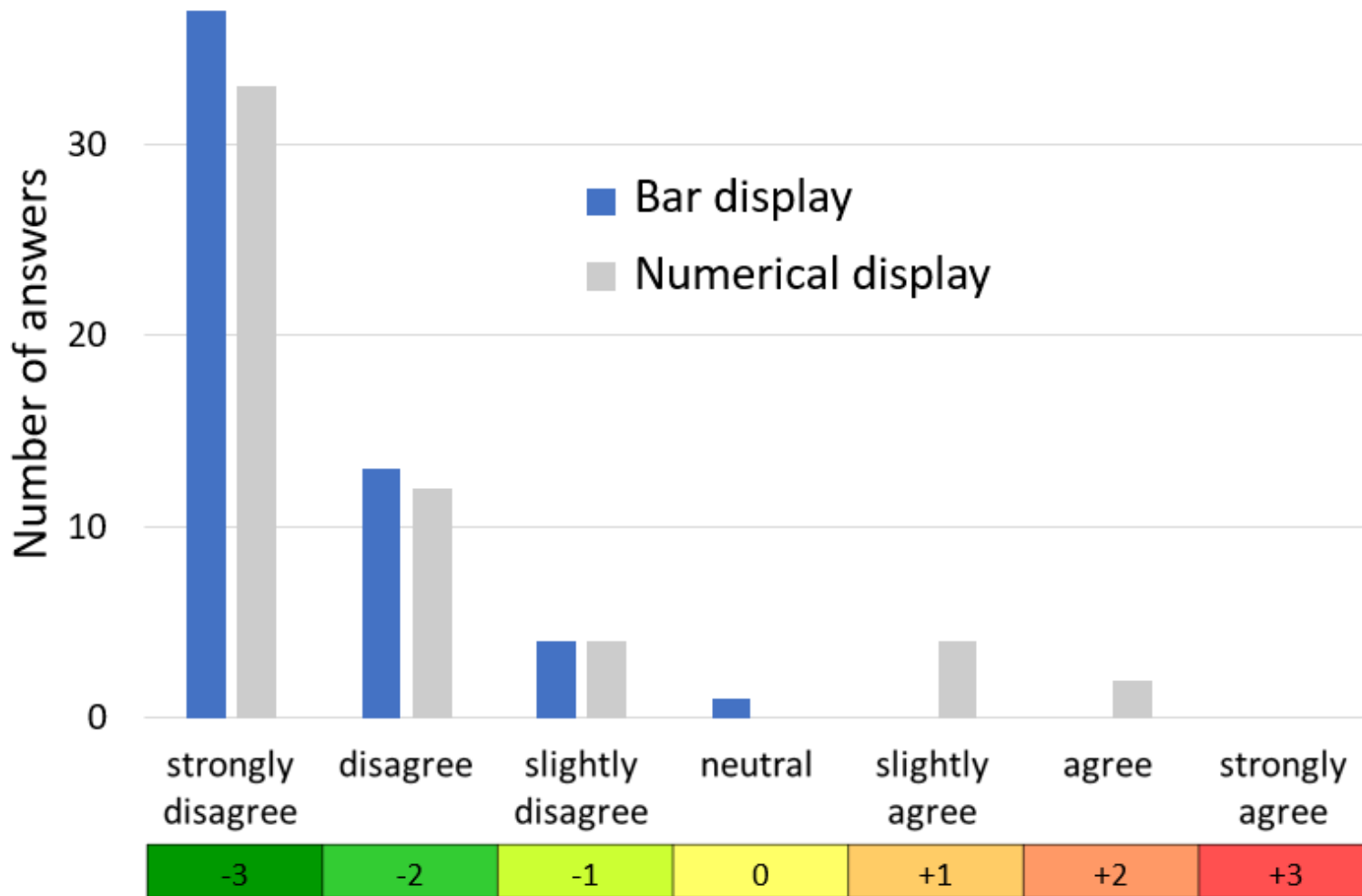


Part II Results: Intuitive design





Part II Results: Risk of confusion



n = 55

Bar display:

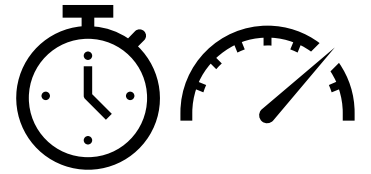
- $M = 2.56$
- $SD = 0.714$

Numerical display:

- $M = 2.16$
- $SD = 1.385$

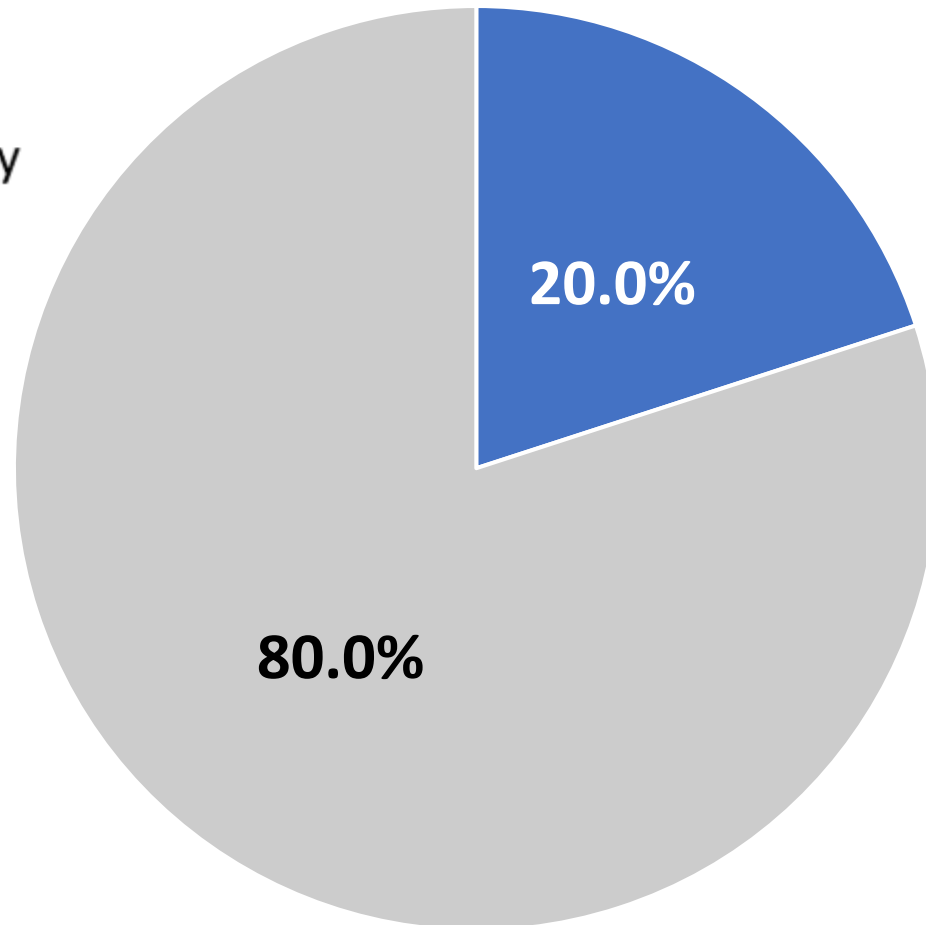
Difference:

- $p = 0.026$

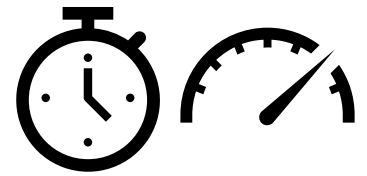


Part II Results: Type preference

- Bar display
- Numerical display



n = 55



Discussion

Numerical display preferred over the bar display

- Higher estimated usefulness
- Easier to read & quicker to interpret
- Intuitively understandable



General discussion

- Stress and distraction potential low for both types
- But: Small potential for distraction?
- Considered as useful by novices and experts alike



Conclusion

Summary

- Drivers appreciate additional support
- Numerical display preferred

Outlook

- Usability criteria must be considered
- Sensible implementation
- Enhancing controllability by operators

Further studies: Objective measure for distraction

Thank you very much for your attention!

