

The comparison of warning effectiveness


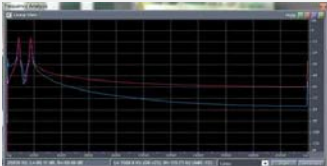
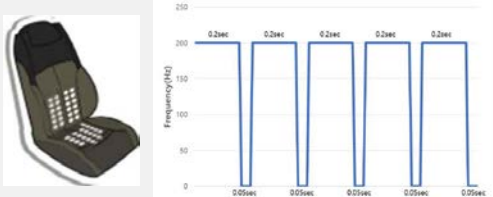
ACSF IWG 20th meeting
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Korea Automobile Testing & Research Institute

warning comparison

- **The Outline for warning experiment**

- Total : 35 persons / Age : 25 ~ 70 years old

Optical warning		Acoustic warning		Haptic warning	
					
Location	HUD	Frequency	880Hz + 1760Hz	Type	Driver's seat vibration
Size	Height : 20 mm Width : 85 mm	Loudness	70dB	Frequency	200 ~ 250 Hz
				Duration	200 ms / 50 ms

Test Case

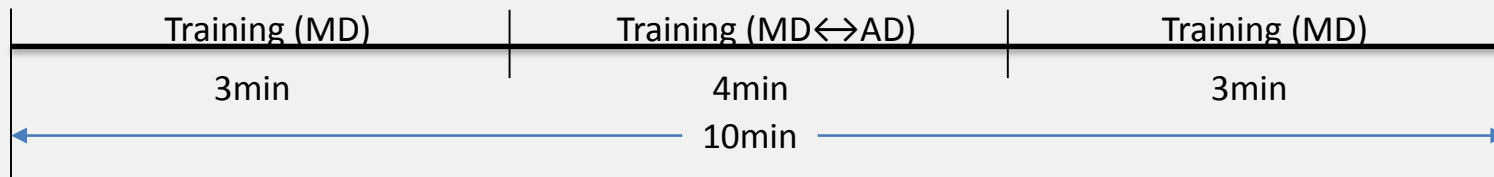
Test [n]	Test [n]	Test [n]	Test [n]	Test [n]	Test [n]	Test [n]	Test [n]
SET A		SET B			SET C		
[n] : 1...7							

Order	NDRTs	Warning
random *. To prevent guessing test case	Visual perceptual task (see 6th slide of ACSF-18-09)	Optical only
		Acoustic only
		Haptic only
		Optical-Acoustic
		Optical-Haptic
		Acoustic-Haptic
		3 Multi

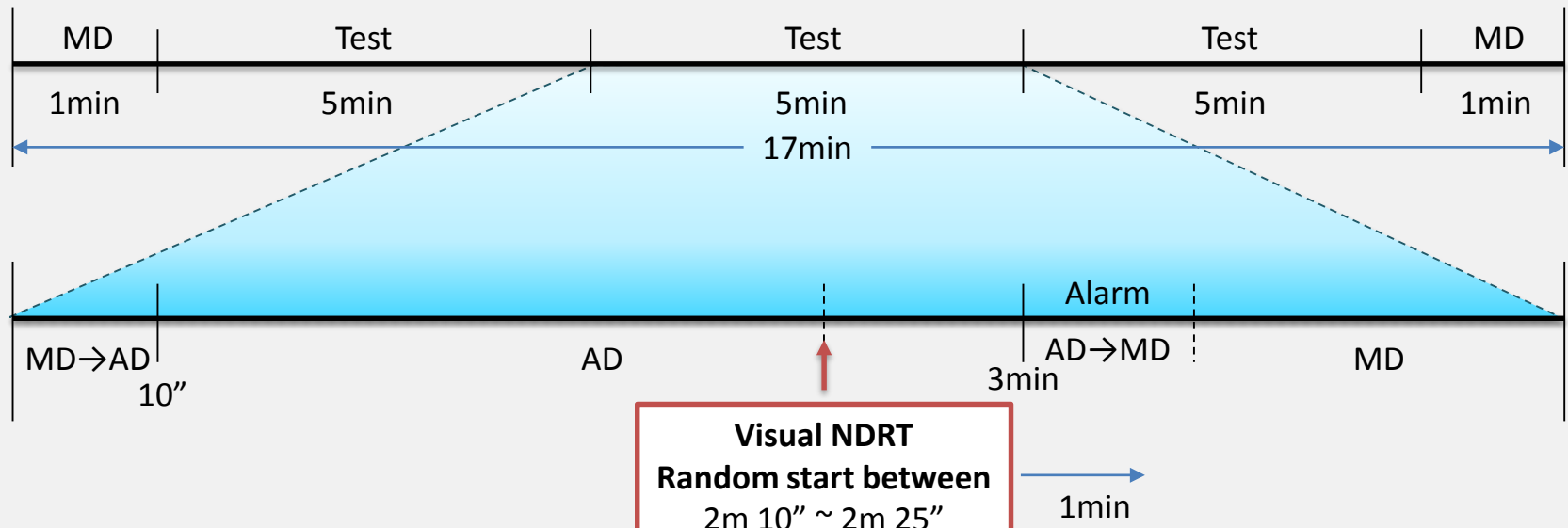
Test Case

MD : Manual Driving

- SET A,B(Training)



- SET C~E(Tests)



Result of warning comparison

- The result of Single/Multi warning experiment

- Probability of reaction(taking handle or pressing brake)

Reaction time	Optical	Acoustic	Haptic	Optical& Acoustic	Optical& Haptic	Acoustic& Haptic	3 Multi
~2sec	0%	34%	46%	40%	77%	64%	74%
~4sec	0%	97%	94%	97%	100%	94%	100%
~8sec	6%	100%	100%	100%	100%	100%	100%
8sec~	100%	100%	100%	100%	100%	100%	100%