UNITED STATES
DEPARTMENT OF TRANSPORTATION

LIGHT VEHICLE DRIVER ACCEPTANCE CLINICS

PRELIMINARY RESULTS

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Light Vehicle Driver Acceptance Clinic (DAC) Project Scope

Objectives:

- Obtain feedback on connected vehicle technology and safety applications from a representative sample of drivers
- Assess the performance and reliability of 5.9 GHz DSRC communications and GPS in diverse geographic locations and environmental conditions…and
- Promote V2V-based safety technology and potential safety benefits

DAC PROJECT TEAM

CAMP

Vehicle Safety Communications 3

Mercedes-Benz Research & Development North America, Inc.

GM

TOYOTA

HONDA Honda R&D Americas

Ford

NISSAN

HYUNDAI·KIA MOTORS Hyundai·Kia America Technical Center, Inc.

VOLKSWAGEN GROUP OF AMERICA

Intelligent Transportation Systems

DEPARTMENT OF TRANSPORTATION UNITED STATES OF AMERICA

NHTSA www.nhtsa.gov

U.S. Department of Transportation Federal Highway Administration

DENSO North America

RITA Research and Innovative Technology Administration Volpe National Transportation Systems Center

VirginiaTech TRANSPORTATION INSTITUTE

AUTOMOTIVE EVENTS

DAC Location Map

DAC Vehicle Resources

- 16 V2V equipped vehicles
  - 2 from each OEM
  - 8 for use by participants (host vehicles)
  - 8 for use by AE professional drivers during scenario execution (remote vehicles)
- 8 additional V2V equipped “template” vehicles
  - Available as spares for DAC if needed
  - Intended for performance testing (have additional instrumentation)
- DAC vehicles are 16 of the 64 integrated vehicles that will be deployed in Safety Pilot Model Deployment (Ann Arbor, MI)

DAC Applications…

- EEBL: Emergency Electronic Brake Lights
- FCW: Forward Collision Warning
- BSW/LCW: Blind Spot Warning/Lane Change Warning
- LTA: Left Turn Assist
- IMA: Intersection Movement Assist
- DNPW*: Do Not Pass Warning

SAFETY APPLICATIONS & SCENARIOS

- V2V Applications & Scenarios
  - Run the following applications (# of scenarios)
    - EEBL (1); FCW (4); BSW/LCW (2); DNPW (2); IMA (2); LTA (1)

Applications	Ford	GM	Honda	Mercedes	Toyota	Hyundai- Kia	Nissan	VW-Audi
EEBL	X	X	X	X	X			X
FCW	X	X	X	X		X	X	X
BSW / LCW	X	X	X	X	X	X	X (BSW)	
DNPW	X	X	X					
IMA	X	X	X	X	X			X
LTAP / OD							X	

DRIVER VEHICLE INTERFACE (DVI) EXAMPLES

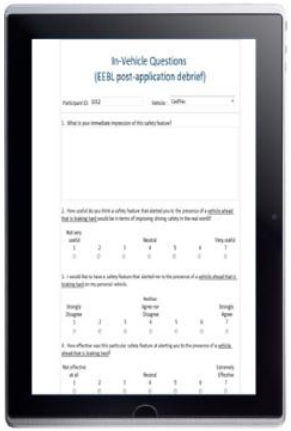
- OEM specific DVIs
  - Audible, visual and / or haptic

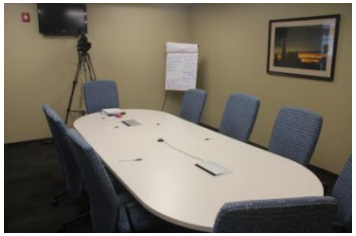
Participant Experience

- Arrival
- Registration
- Pre-drive questionnaire
- Briefing
- Orientation to vehicle and station
- Safety Feature Exposure
- Questionnaire (after each application)
- Post Drive Questionnaire
- Focus Group (if applicable)

Safety Application Exposure

- 112 participants over a 4 day period
- Typically, 4 sessions per day at 8 participants each
- Participants are:
  - Equally split by gender
  - Equally split into three age categories (20-30, 40-50, 60-70)
- Participants experience each V2V safety feature
- After each exposure the experimenter asks a series of questions
  - Captures their immediate impressions
  - Safety Application Effectiveness
  - Relevance of Driver Vehicle Interface (DVI)
- Focus Groups





Demographic and Application Exposure Breakdowns

DAC - Overall

Age	Male	Female	*Total*
20-30	117	111	***228***
40-50	115	117	***232***
60-70	115	113	***228***
Total	***347***	***341***	***688***

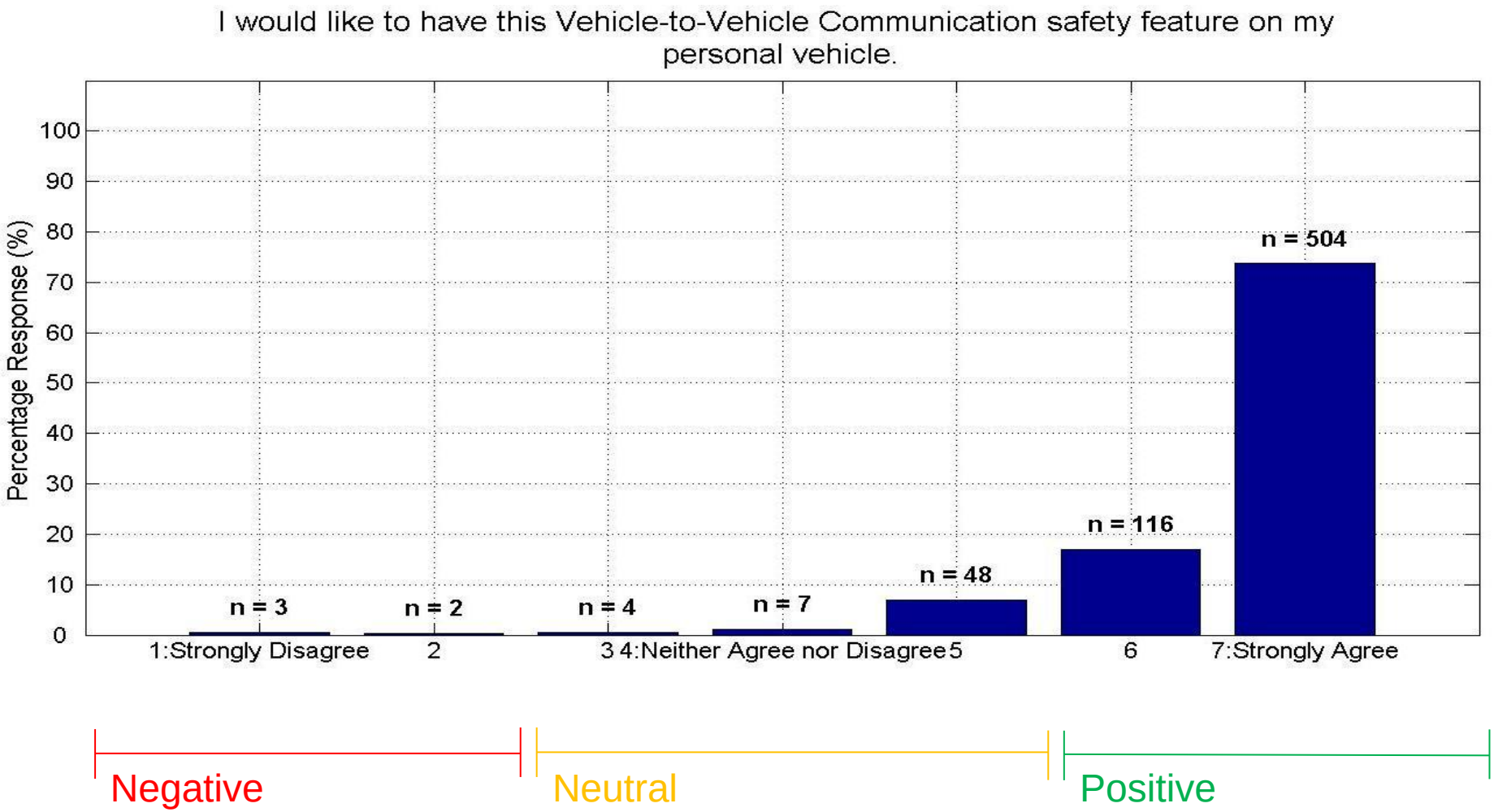
	EEBL	FCW	BSW-LCW*	DNPW	IMA	LTA
Acura	91	88	85	85	91	---
Cadillac	88	87	86	86	88	---
Ford	85	85	85	84	85	---
Hyundai	---	172	87	---	---	---
Infiniti	---	87	173	---	---	173
Mercedes	87	87	87	---	87	---
Toyota	172	---	85	---	172	---
VW-Audi	165	82	---	---	165	---
Total	*688*	*688*	*688*	*255*	*688*	*173*
% of Overall	*100%*	*100%*	*100%*	*37%*	*100%*	*25%*

*LCW was not available on the Infiniti

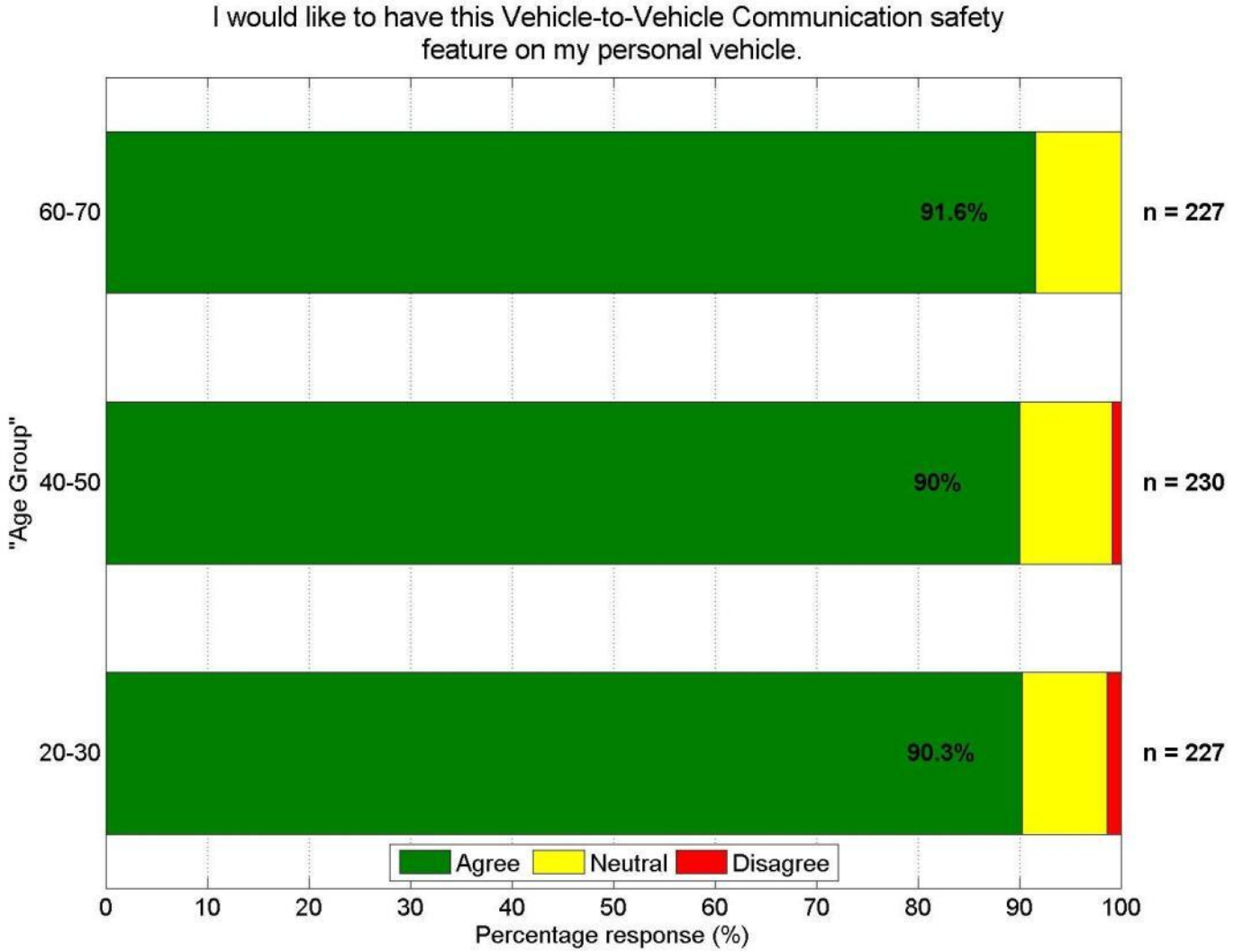
A Single Example Showing The “Big-Picture”

DRIVERS TEND TO DESIRE V2V TECHNOLOGY

DESIRABILITY - ACROSS ALL FACTORS



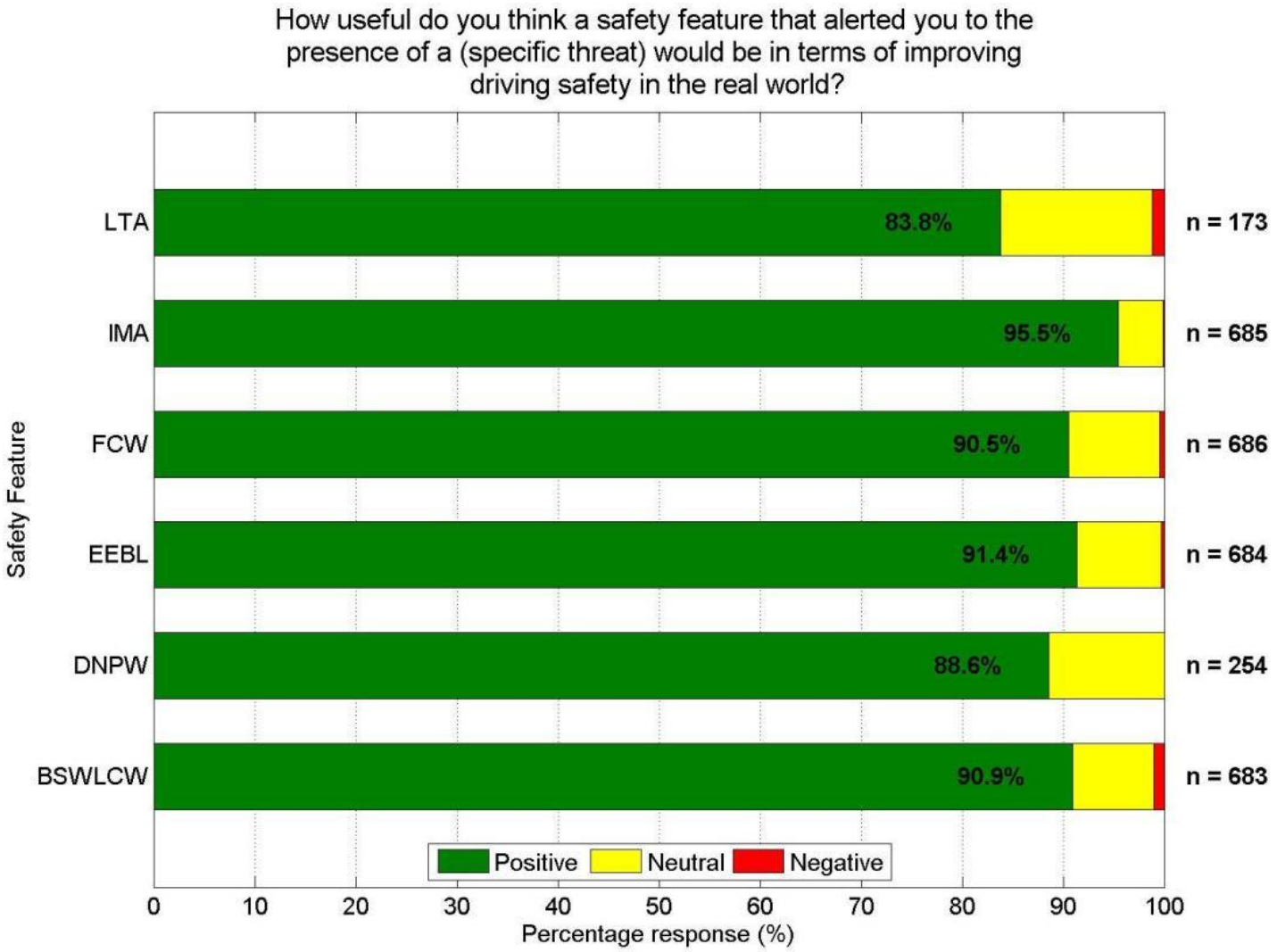
DESIRABILITY
ACROSS ALL FACTORS AND PARSED BY AGE



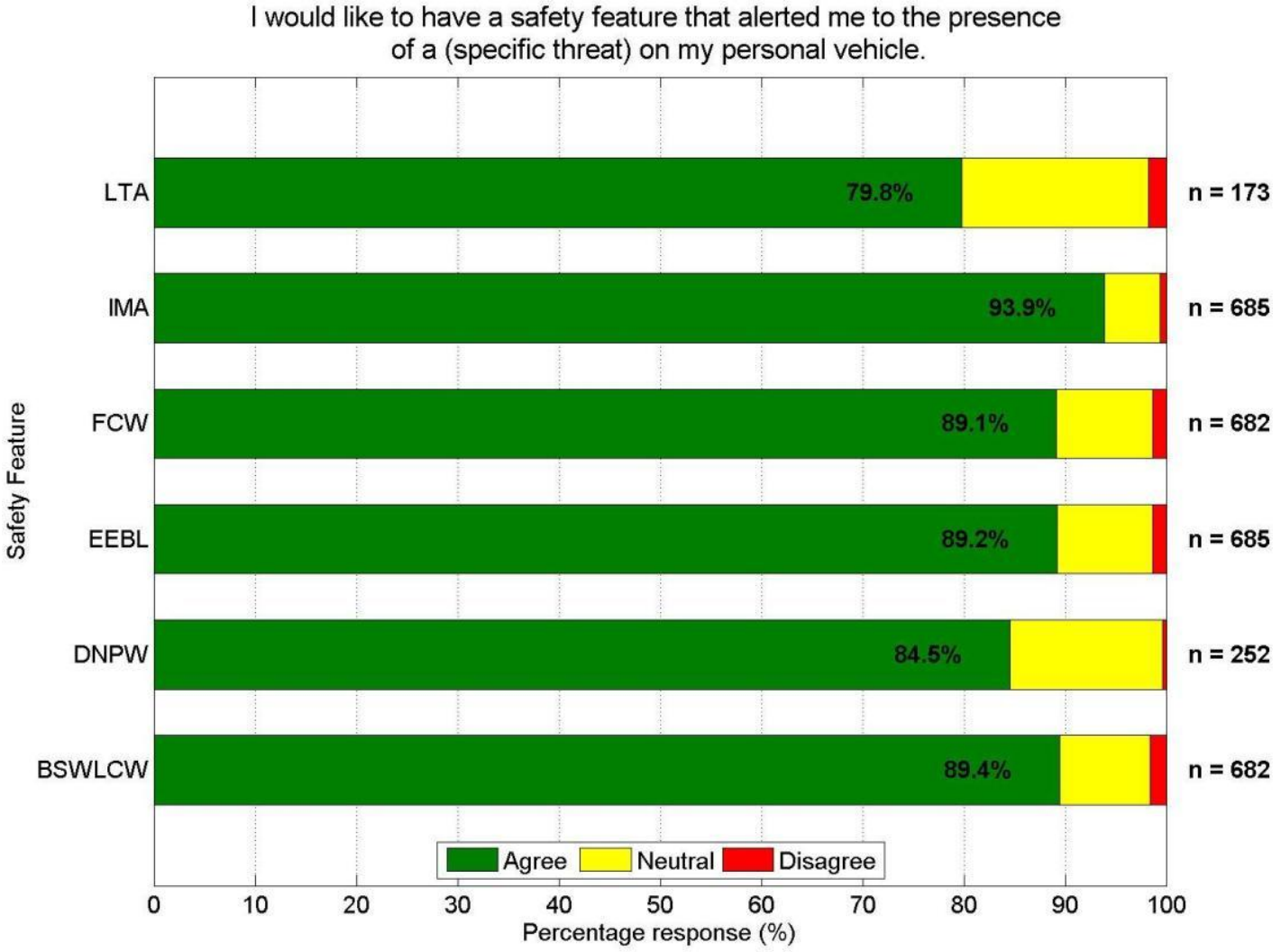
A Few Examples Demonstrating

DRIVER ACCEPTANCE AS A FUNCTION OF SAFETY FEATURE

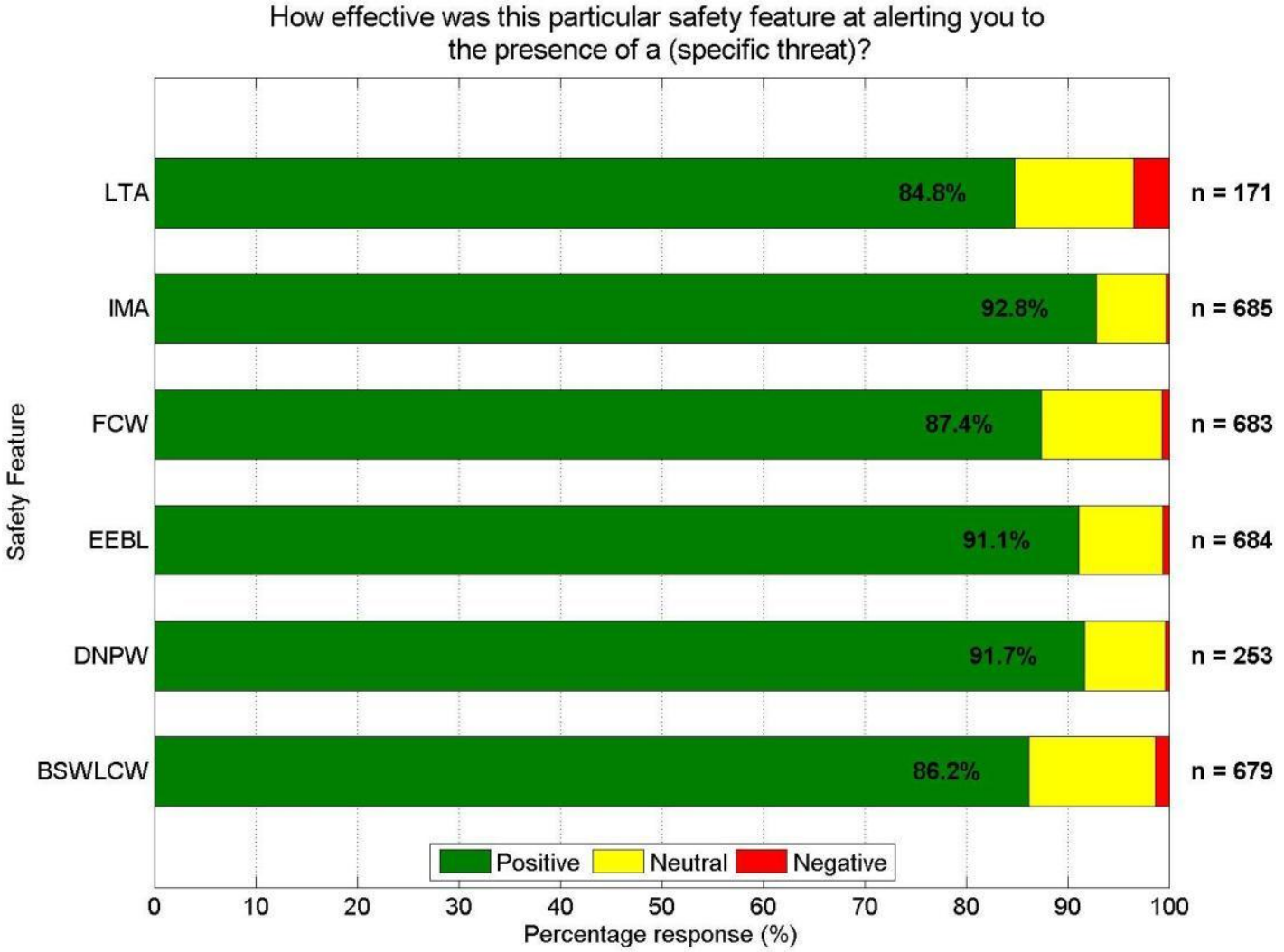
OVERALL IMPRESSIONS - USEFULNESS



OVERALL IMPRESSIONS – DESIRABILITY



OVERALL IMPRESSIONS - INTUITIVENESS

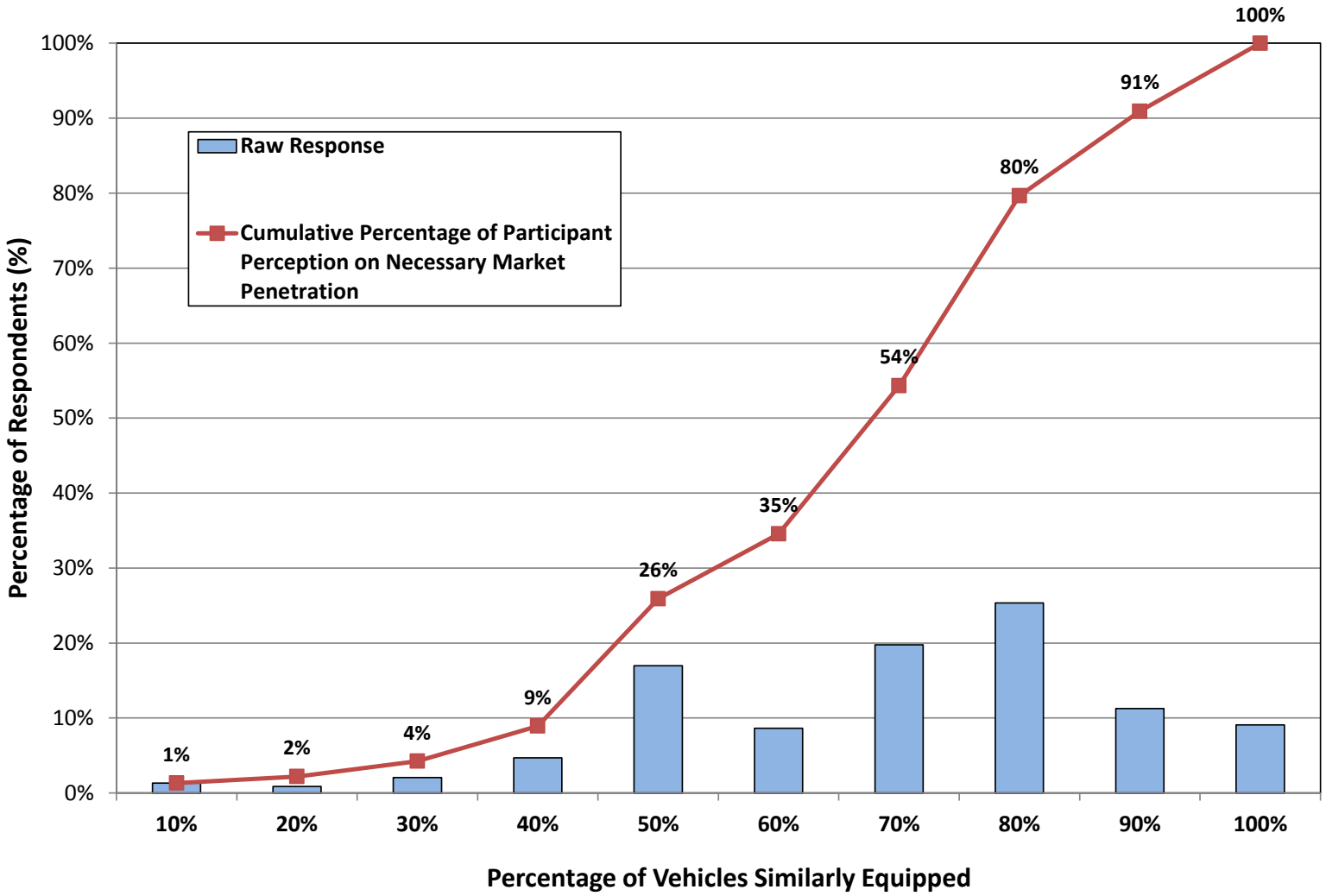


An Example of

DRIVER'S ASSESSMENT OF SYSTEM LIMITATIONS

SYSTEM LIMITATIONS - MARKET PENETRATION

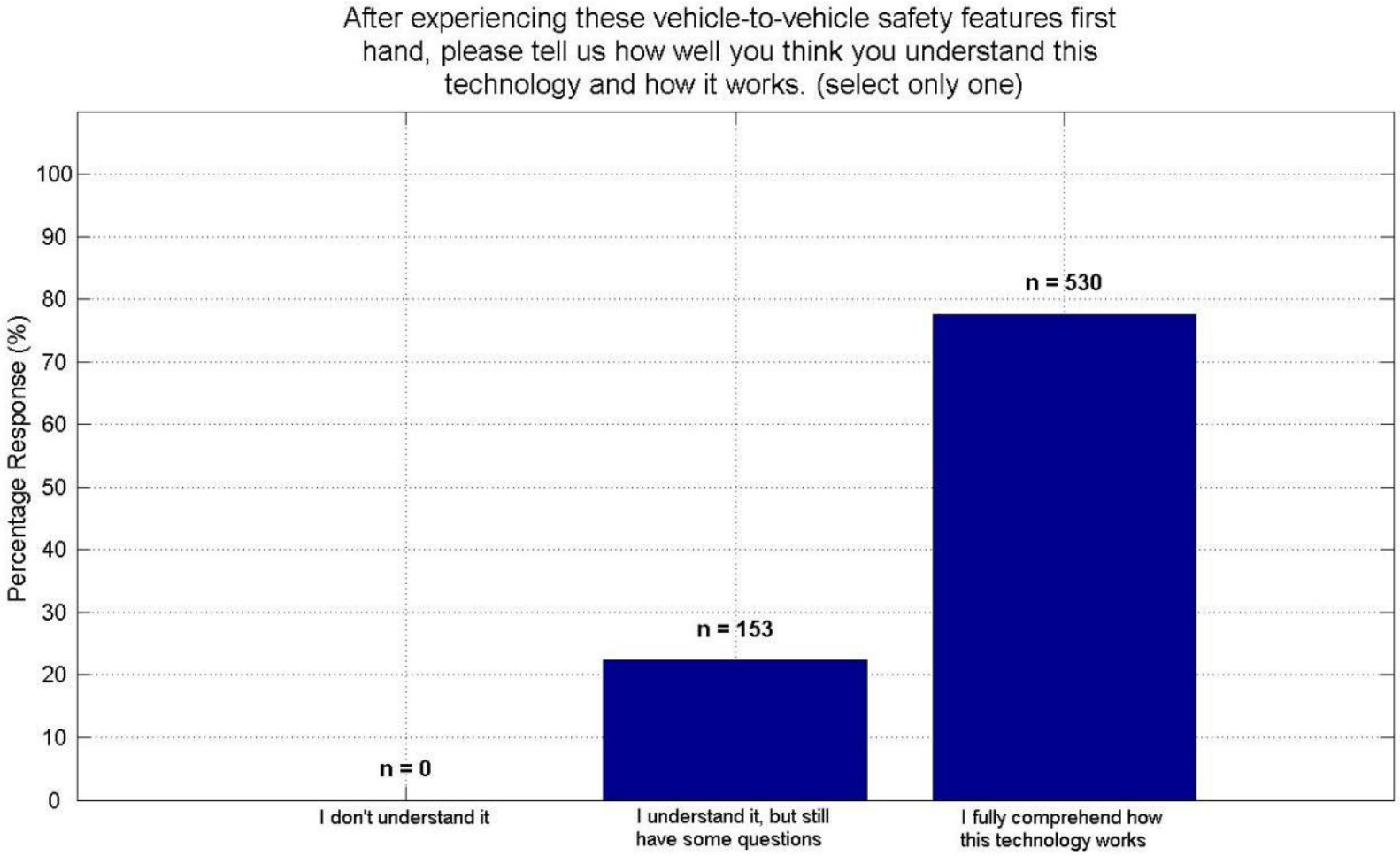
What percentage of vehicles would need to be similarly equipped before you believe the benefits would be noticeable? (select one)



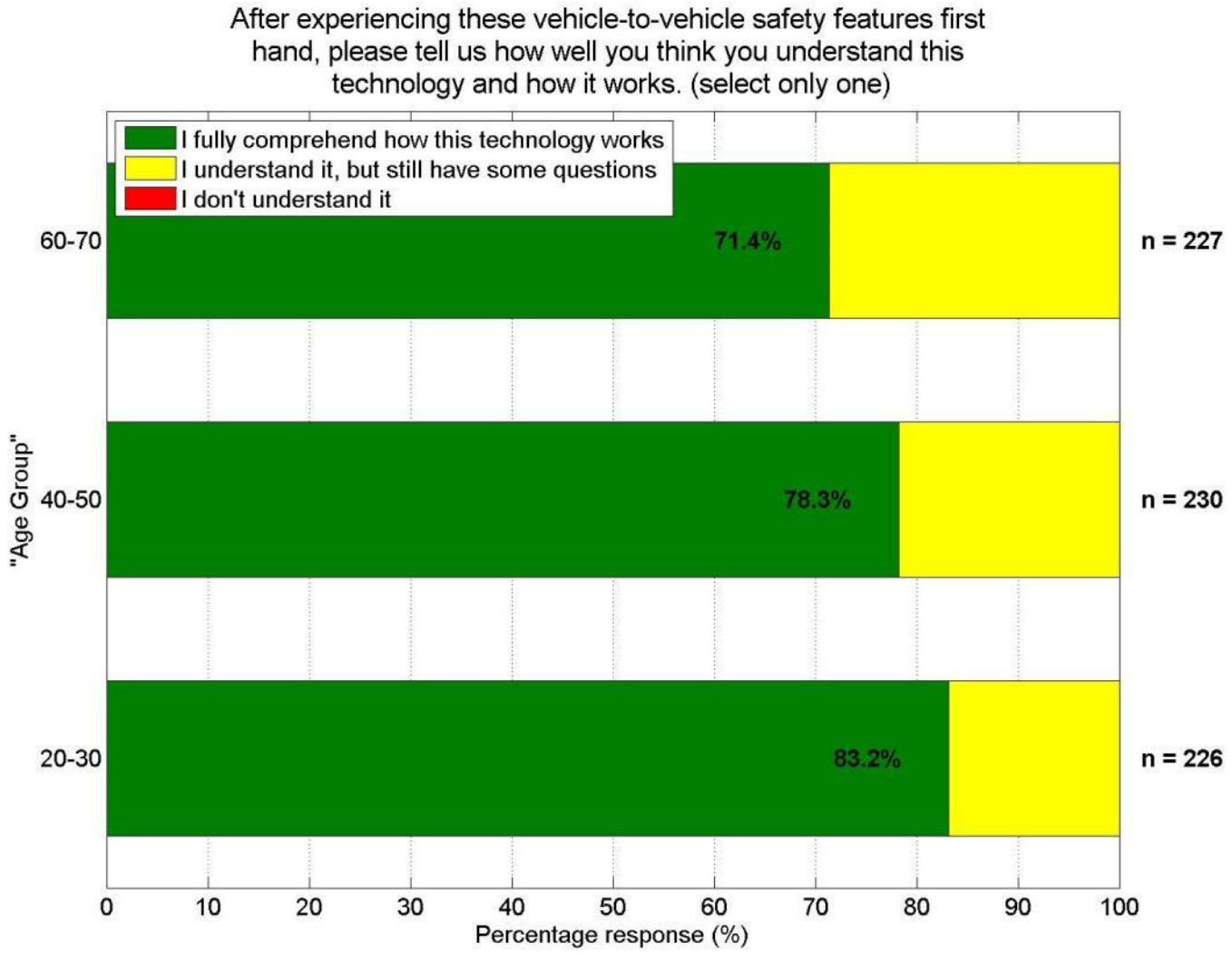
An Example Demonstrating Demographic Relationship to

SELF-REPORTED UNDERSTANDING OF V2V

OVERALL IMPRESSIONS



OVERALL IMPRESSIONS

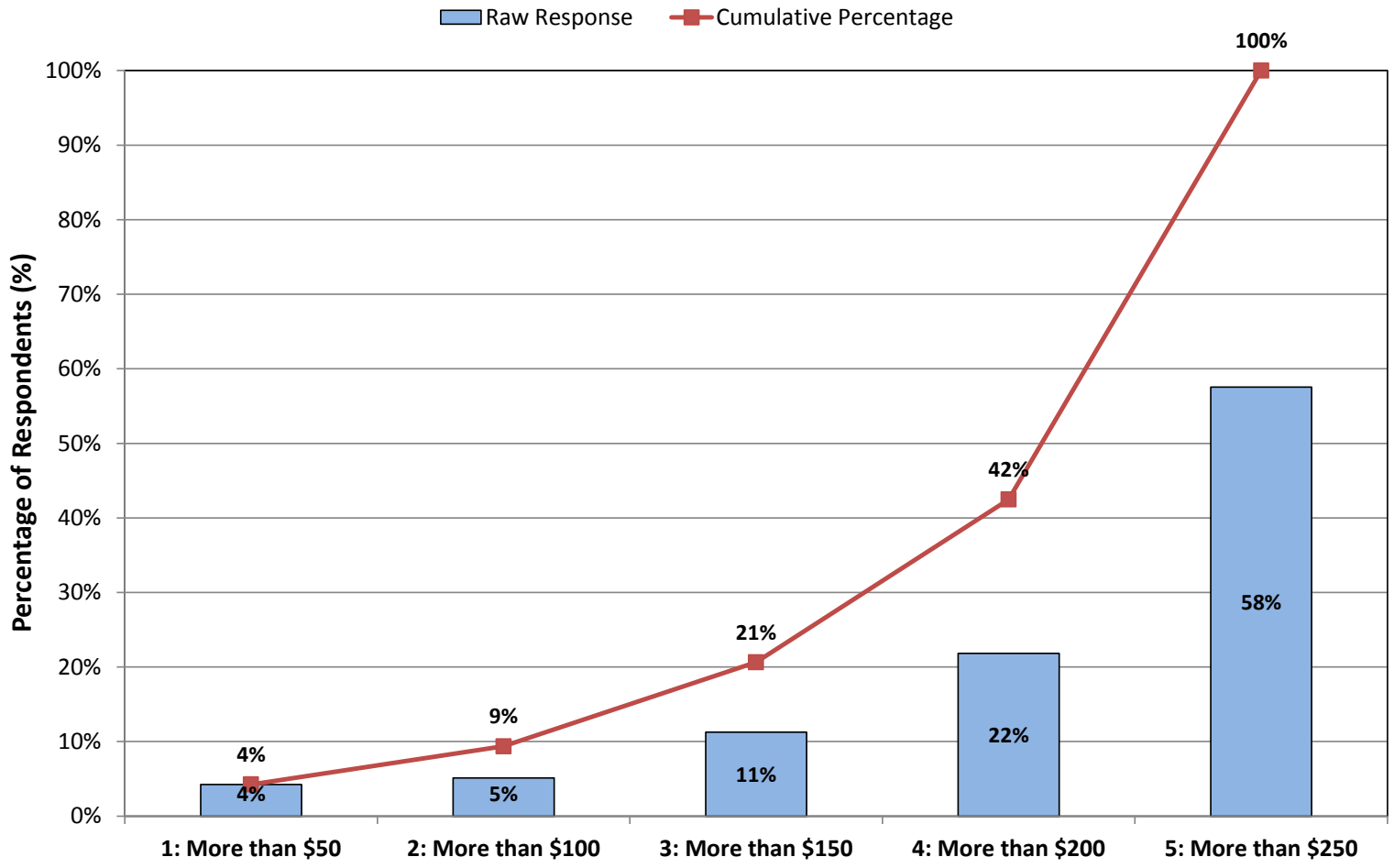


A Willingness to Pay Example Indicating

DRIVER'S VALUE V2V

MONETARY VALUE

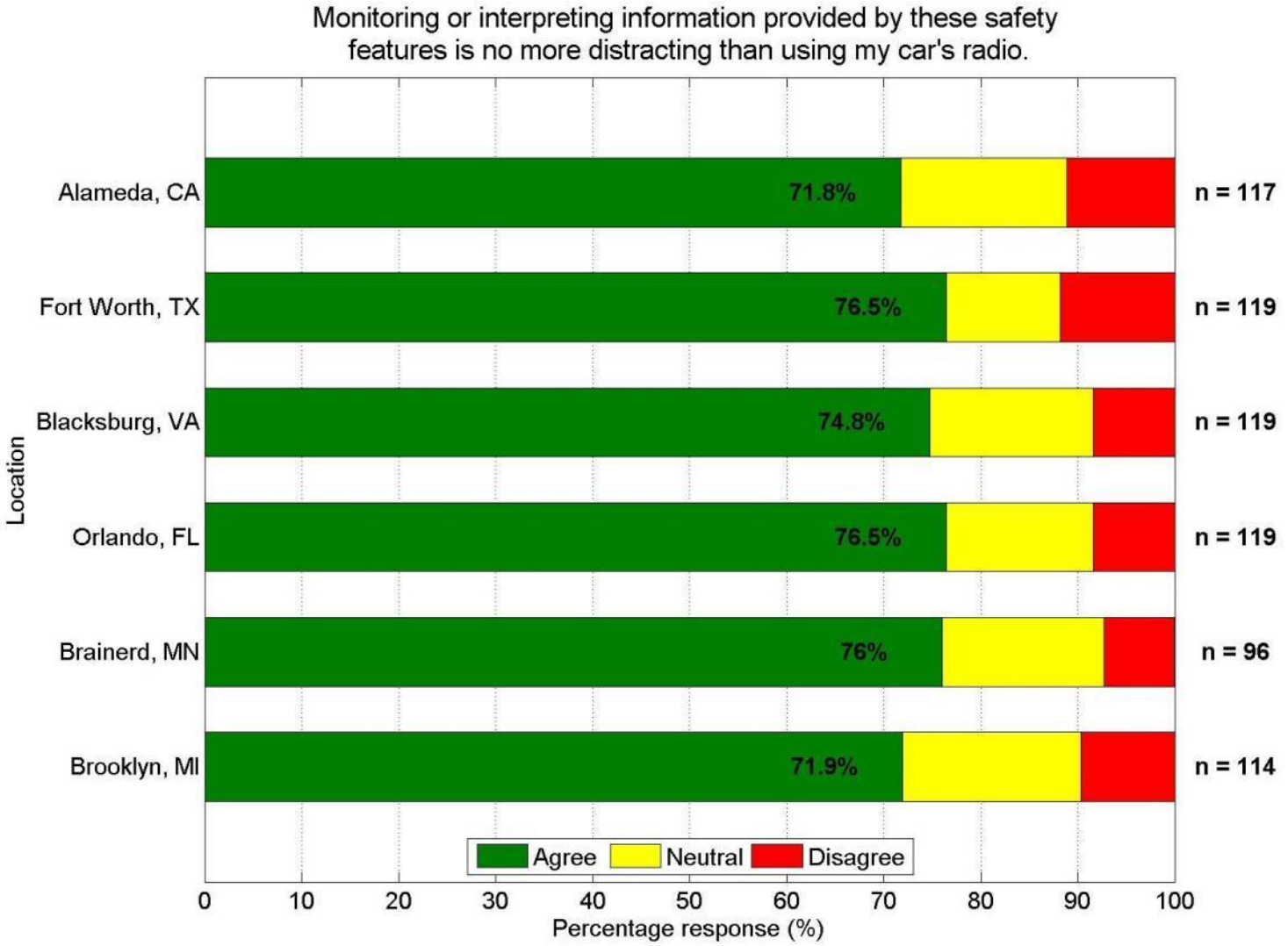
At what price level might you begin to feel this collective group of safety applications (Vehicle-to-Vehicle communications safety feature) is too expensive to consider purchasing? (select one)



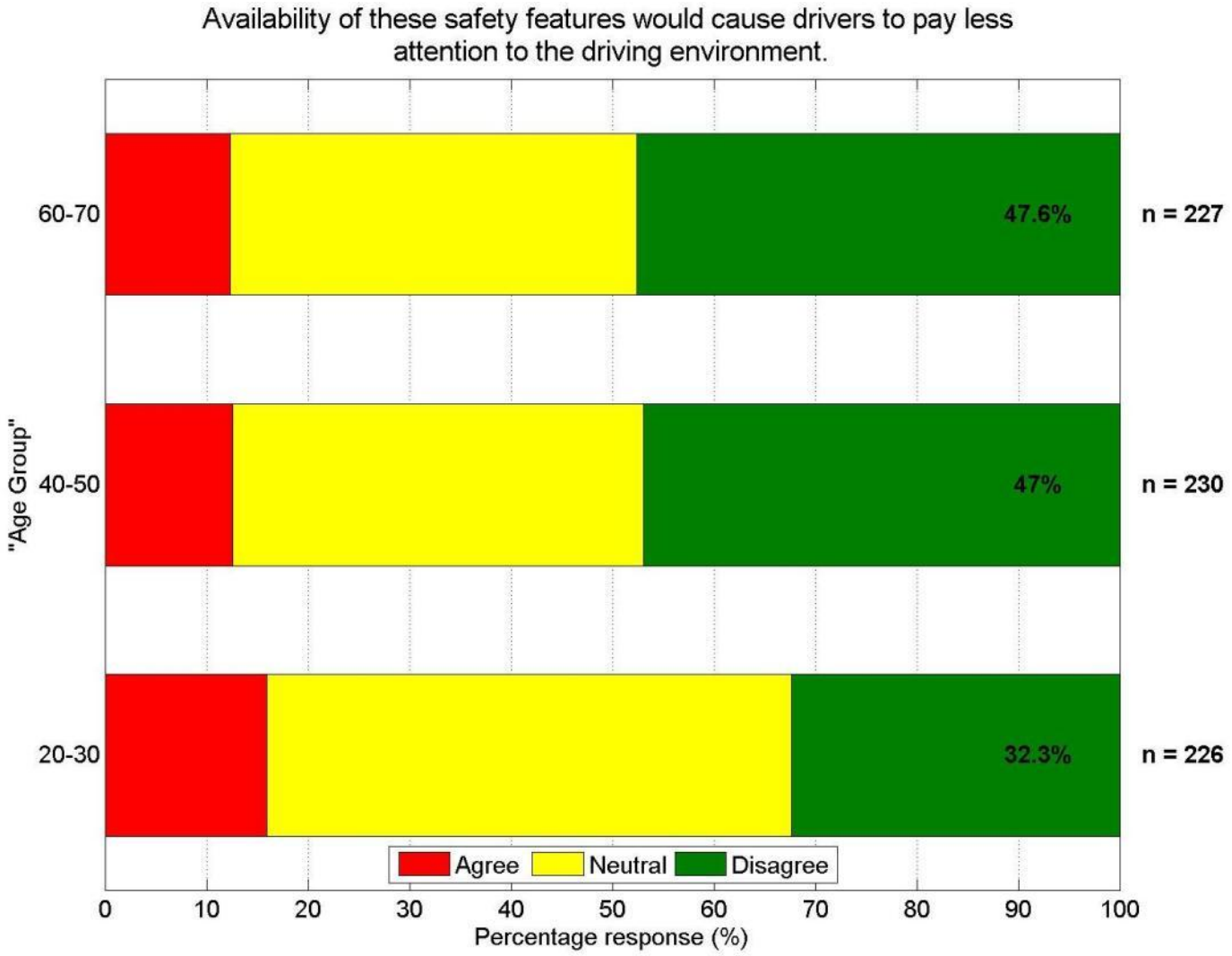
A Couple Examples Asking Drivers About

UNINTENDED CONSEQUENCES

IMPACT ON SAFETY – DISTRACTION



IMPACT ON SAFETY – COMPLACENCY



Executive Summary

FOCUS GROUP

FOCUS GROUP OVERVIEW

- 12 focus groups were conducted
- Each group was comprised of eight participants (for a total of 96) who had just completed the driving portion of the study.
- Mix of gender and ages in each group, randomly assigned to participate in each focus group.
- Each participant per focus group had driven one of the eight OEM vehicles, and had experienced the majority of scenarios.
- The focus group moderator was Helen I. Thomas of Automotive Events.

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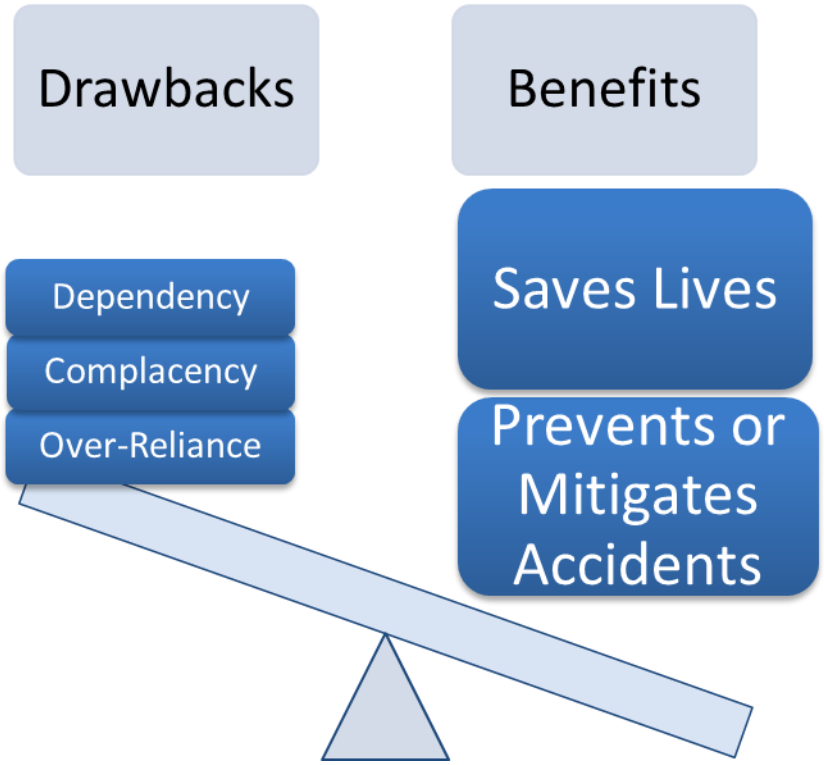
Initial Summary of Overall Reactions

The illustration below demonstrates respondents' most common reactions to this technology … that **saving a life or many lives, far outweighs the potential drawbacks:**



Next Steps

- Final data analysis underway at VTTI
  - Includes Thematic Content Analysis of Focus Group discussion and responses to open ended questions
- Comprehensive presentation of results during RITA ITS-JPO Safety Program Industry Workshop
  - Chicago - Sept 25-27
- Draft Final Report due from CAMP VSC3 in Sept 2012
  - Must be subjected to NHTSA review process prior to publication
  - Published report will be available on NHTSA and RITA ITS websites:
    - NHTSA : http://www.nhtsa.gov/Research/Crash+Avoidance/Office+of+Crash+Avoidance+Research+Technical+Publications
    - RITA ITS: http://www.its.dot.gov/connected_vehicle/connected_vehicle.htm

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