Does subjective knowledge predict acceptance of automated technologies?

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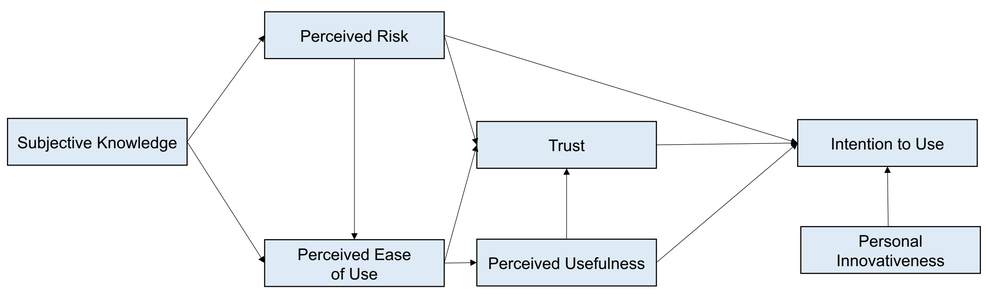
Theory

Road traffic accidents are a global problem, with an estimated fatal accident occurring every 23 seconds worldwide (World Health Organization, 2018). Assistance systems and automation technologies promise to counteract this by increasing safety and comfort.

However, accepting Autonomous Vehicles (AV) remains the main barrier to their widespread adoption (Raj et al., 2020). **Subjective Knowledge** (perceived, self-assessed knowledge) of AVs is considered critical in influencing **acceptance** (Tan et al., 2022). The purpose of this study is to investigate the impact of subjective knowledge on Trust, Perceived Risk, Perceived Usefulness, Perceived Ease of Use, and Intention to Use within the framework of Davis' (1989) **Technology Acceptance Model** using an **Explainer Video** as an information intervention. Understanding the role of subjective knowledge in AV acceptance has important implications for public policy and educational campaigns in the area of autonomous driving technology.

Figure 1
Research Model



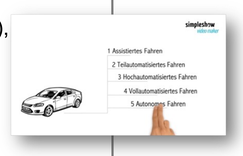
In addition, we hypothetized that delivering information in from of an Explainer Video has a positive influence on Subjective Knowledge about AVs.

Methods

Sample
Size & Sex: N = 435, 66,9% female, 33,1% male
Age: *M* = 28.59, *SD* = 10.04, Range = 19-79
Driver's license: 96.1% in possession
Frequency of using a car: 22.2% daily, 35.5% once or more a week, 18.3% once or more a month, 23.6% less frequently than once a month

Process & Questionnaires

Subjective Knowledge
(Fynn & Goldsmith, 1999)
7-point Likert-Scale
1 (=strongly disagree) to 7 (=strongly agree),
5 Items (α = .76)



Explainer Video (4 minutes)

Subjective Knowledge
(Fynn & Goldsmith, 1999)
7-point Likert-Scale
1 (=strongly disagree) to 7 (=strongly agree),
5 Items (α = .71)

Perceived (safety) Risk
(Zhang et al., 2019; Zmund et al., 2016)
Two combined questionnaires
both on a 5-point Likert-Scale
1 (=strongly disagree) to 5 (=strongly agree),
5 Items (α = .80)

Perceived Ease of Use and Perceived Usefulness
(Hegner et al., 2019)
both on a 5-point Likert-Scale
1 (=strongly disagree) to 5 (=strongly agree),
PEU: 3 Items (α = .90), PU: 2 Items (α = .76)

Trust
(Choi & Ji, 2015)
5-point Likert-Scale
1 (=strongly disagree) to 5 (=strongly agree),
3 Items (α = .90)

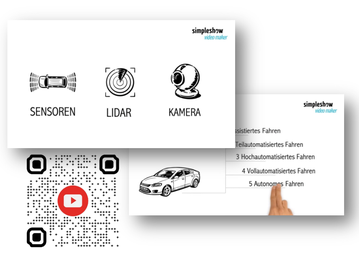
Intention to Use
(Keszey, 2020)
5-point Likert-Scale
1 (=strongly disagree) to 5 (=strongly agree),
4 Items (α = .88)

Personal Innovativeness
(Agarwal & Prasad, 1998)
5-point Likert-Scale
1 (=strongly disagree) to 5 (=strongly agree),
4 Items (α = .87)

Demographics

Explainer Video

- *Content*: Levels of automation, technical components, benefits, high rate of human error in non-AVs, unsolved questions and barriers
- *Implementation*: Classical format of an instructional video style, symbols and labels are pushed into the video by hand, based on design guidelines according to Brame (2016) to reduce cognitive load



Results

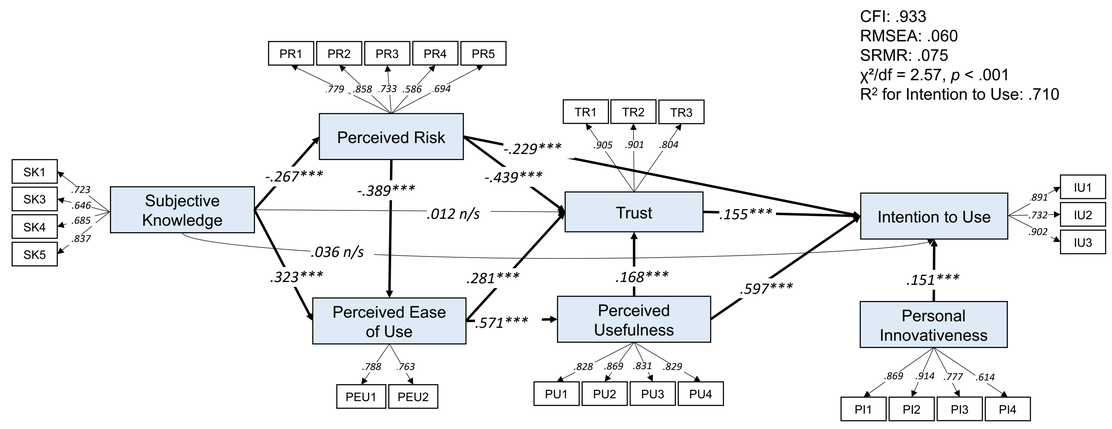
Calculations were performed using SPSS and Mplus

Table 1
Bivariate correlations and Descriptive Data

		1	2	3	4	5	6	7	*M*	*SD*
1	Subjective Knowledge	1	-.198**	.253**	.303*	.256**	.312**	.239**	4.22	1.12
2	Perceived Risk		1	-.282**	-.390**	-.574**	-.470**	-.223**	3.17	0.86
3	Perceived Usefulness			1	.452**	.414**	.686**	.216**	3.53	1.06
4	Perceived Ease of Use				1	.485**	.500**	.392**	3.76	0.86
5	Trust					1	.576**	.237**	3.32	0.79
6	Intention to Use						1	.377**	3.47	0.99
7	Personal Innovativeness							1	3.19	0.95

*Note. * p < .05, ** < .01.*

Figure 2
Structural Equation Model Results



*Note. * p < .05, ** p < .01, *** p < .001., n/s = not significant*

At the descriptive level, it could be observed that all the indirect effects between Subjective Knowledge and Intention to Use became significant (except for the effect only on Trust).

Additionally, as hypothesized, the statistical analysis confirmed that participants' subjective knowledge was significantly higher after the Explainer Video, $t(434) = 21.31$, $p < .001$, $d = 1.02$.

Discussion

Our research builds on recent studies by Tan et al. (2022) and Zhao et al. (2022) that highlight the importance of Subjective Knowledge in accepting AVs.

A **model of AV technology acceptance** that incorporates previously unexplored constructs and examined the influence of Subjective Knowledge was developed. Additionally, Perceived Risk was found to be a strong predictor of Trust in AVs and should be integrated in the acceptance models in user-uncertain contexts such as AVs.

Subjective Knowledge does not have a direct influence on Intention to Use and Trust, which is in contrast with some previous studies that found a direct effects. However, these findings support the original technology acceptance model from Davis (1989), which posits no direct relationship between external influence variables, such as Subjective Knowledge, and Intention to Use.

Perceptions of Risk and Usefulness and Ease of Use were found to be important for the Intention to Use AVs. Variables, such as attitudes and beliefs, may be more important than Subjective Knowledge. However, the relation between Subjective Knowledge and Intention to Use was found to have many **indirect effects via the perception of AVs**.

Video with science-based information about AVs has the potential to increase Subjective Knowledge and differ between individuals with lower or higher initial Subjective Knowledge. There is a great **risk of misinformation and negative attitudes that cannot be changed by simple persuasion** according to Sanbonmatsu et al. (2018). Another hazard is the underestimation of risk, which can be the source of overtrust and misuse (Tenhundfeld et al., 2019).

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