

Fear and Loathing in Self Driving Cars

Bryan Reinicke
breinicke@saunders.rit.edu
Rochester Institute of Technology
Rochester, NY 14623, USA

Frederika Spencer
spencerf@uncw.edu
University of North Carolina Wilmington
Wilmington, NC 28403, USA

Abstract

The models for technology adoption (in Management Information Systems) and purchasing decisions (in Marketing) are well established, extensively tested and reliable. However, they weren't developed with fear in mind. This study looks at the results from a survey on consumers intent to recommend and purchase self-driving cars (a specific type of Artificial Intelligence). To say that the study did not go as planned would be an understatement. In the presence of fear, specifically fear of death or grave bodily injury, our established models do not appear to work. This could have enormous implications for the adoption of various Artificial Intelligence technologies, and the models that we use to measure acceptance and use of these technologies.

Keywords: Technology Adoption, Artificial Intelligence, Purchase Intent, Fear.

1. INTRODUCTION

From the Technology Acceptance Model (TAM) (Davis, 1989) to the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003), the factors that go into selecting technology to use have been studied extensively in Management Information Systems (MIS). In Marketing, the factors that go into selecting products to buy and recommend to others have also been studied extensively. These factors in both fields have been found to be reliable time and time again, across various products and technologies.

Self-driving cars are an interesting example of the newest technology obsession - Artificial Intelligence (AI). While we have studied technological adoption for decades in MIS, AI, and self-driving cars in particular, pose a new challenge. They are technologies that can actually kill us. Therefore, we endeavored to apply these well-established models to this new

technology.

To begin this research, we used literature from Marketing and Management Information Systems. While MIS is new to products that can be physically harmful, there is research in marketing on the acceptance of products that can harm the consumer. For this reason, we designed this study primarily from a marketing perspective. As we will discuss, there are similarities between the MIS adoption literature and the Purchasing literature in Marketing, and we thought it would be better to start from the marketing perspective, and use that to inform the research in IS.

Specifically, we wanted to determine if the existing measures would work as expected in this area. Due to the newness of autonomous vehicles and the physical risk associated with them, as well as the recent explosion of other AI systems we expected that there could be some variance from earlier studies (Wells et al., 2010)..

2. LITERATURE REVIEW

To design this study, we pulled literature from both information systems and marketing. However, for the initial study we focused primarily on the factors from the marketing literature.

Marketing

There is extensive research in the marketing literature on the factors that influence the consumers decision to purchase items and to recommend those purchases to others. We will examine each of them in turn.

Consumer Decision-Making.

It is important to recognize the assumption that a decision process precedes purchase or adoption. Regardless of the model, the consumer decision-making process recognizes four main ideas (Olshavsky & Granbois, 1979). There are two or more alternative actions (e.g. purchase product A or product B) and because of this, a choice must be made. Consumers forecast the consequences of each alternative using evaluative criteria such as Rogers' Five Factors. The alternative that is chosen is selected through an evaluative procedure. The evaluative procedure processes information sought from external sources and/or retrieved from memory (Olshavsky & Granbois, 1979).

With respect to choosing a new, previously unknown product, this decision-making process is affected by Rogers' Five Factors of Innovation Adoption when examining the evaluative criteria that consumers use to decide between alternatives as discussed below.

Perceived risk on the other hand, affects the stage where consumers forecast the consequences of selecting an alternative. When looking specifically at the nature of autonomous vehicles, their newness provides an interesting vantage point from which to study their combined effects.

While Rogers (Rogers, 2003) identified five factors of adoption for innovation and (Conchar et al., 2004) identified perceived risk as a factor of innovation adoption, no investigation has been conducted into their relationship in regards to attitude toward adoption. This study, examines the relationship between Rogers' Five Factors of Adoption and perceived risk for potential main effects on attitude toward the innovation as well as interactions that may magnify or mitigate the effects on such additional variables.

Rogers' Five Factors of Innovation Adoption.

The adoption of innovation is especially important to understanding attitudes toward adoption of autonomous vehicles given the state-of-the-art technology that will be included in the product. Rogers (Rogers, 2003) defined five main characteristics of innovation in his prominent work on diffusion of innovation. These factors are relative advantage, compatibility, complexity or simplicity, trialability, and observability.

Each of Rogers' five factors were identified in a separate study of the most addressed characteristics of innovation that was conducted by Tornatzky and Klein (Tornatzky & Klein, 1982). In the case of adoption of autonomous vehicles, each of these characteristics has been deemed important.

Relative advantage refers to how improved an innovation is over the previous generation. Relative advantage was found to be positively related to adoption by Tornatzky and Klein (Tornatzky & Klein, 1982) in their meta-analysis.

In the case of autonomous vehicles, relative advantage is assumed to be in comparison to traditional vehicles that are operated entirely by the driver with no autopilot capabilities. If a consumer identifies relative advantage, their attitude toward adoption is likely to become more positive (Tornatzky & Klein, 1982).

The compatibility factor looks at how an innovation has to be assimilated into an individual's life. The easier it is for this assimilation to occur; the higher compatibility is expected to be. Prior studies on innovation have found it to be an important aspect of explaining innovation adoption and diffusion (Tornatzky & Klein, 1982). Studies have also found it to be positively associated with adoption (Cooper & Zmud, 1990; Ettlief & Vellenga, 1979). In examining this factor, we will see how much a consumer feels that an autonomous vehicle will fit with their lifestyle and how the response affects their attitude toward adoption.

Rogers' third factor, complexity or simplicity, states that an innovation is perceived as complicated or difficult to use, an individual is unlikely to adopt it. Since complexity of an innovation can act as an inhibitor to adoption it is usually negatively related to adoption (Cooper & Zmud, 1990). This has obvious parallels in the TAM concepts of ease of use and usefulness. In this study we will investigate whether or not consumers deem autonomous vehicles complex and what effect if any this has on their attitude

toward adoption. Trialability is the ease with which an innovation may be experimented with or used prior to purchase.

In the case of autonomous vehicles, trialability is envisioned as the ease with which a consumer can test drive or experiment with the vehicle. Observability is the extent to which an innovation is visible to others. In the case of autonomous vehicles, observability is described as the ability to view or observe these vehicle in the environment. Both trialability and observability have been shown to have a generally positive relationship with innovation adoption (Ostlund, 1974). With the technology of autonomous vehicles still in its early stages, we will inspect whether a lack of trialability or observability has a negative effect on consumers' attitudes toward adoption. Each of these factors play an important role in determining the overall attitude toward adoption in the case of autonomous vehicles.

Perceived Risk.

Since Bauer's initial research into the construct of perceived risk, it has been an area of interest for marketers. The concept of perceived risk relates to consumers' uncertainties about the outcome of their decisions. Risks associated with the purchase of new products are often high in part because of consumers' lack of information or prior experience with these products (Havlena & DeSarbo, 1991). Perceived risk influences the five stages of the consumer decision-making process, which will influence consumer purchase decisions towards automobiles (Mitchell, 1992).

Jacoby & Kaplan (Jacoby & Kaplan, 1972) identified the various types of perceived risk as financial, performance, physical, psychological, social, and time loss (see Table 1).

This categorization has allowed researchers to study this area in more detail. Germünden (Gemünden, 1985) argued that the ability of each dimension to predict total risk depended upon the class of good or service. For complex goods (i.e. goods that consist of more elemental units so that overall performance depends on component performance), such as autonomous vehicles, it is proposed that perceived risk would have a large impact on the consumers' attitudes toward adoption (Gemünden, 1985).

In our study each of these components is measured because of their overall importance in the case of consumers' attitudes toward adoption of autonomous vehicles. Products such as automobiles typically have high levels of social and psychological risk associated with them due

to their highly visible and potentially dangerous nature, but with the evolution of the vehicle into a state of autonomy (i.e. where the consumer is not required to control the vehicle), close attention should be paid to all components of perceived risk (Havlena & DeSarbo, 1991).

Component of Perceived Risk	Definition
Financial	Concern over any financial loss that might be incurred due to the purchase of an autonomous vehicle.
Performance	Concern over the functionality of an autonomous vehicle after purchase.
Physical	Concern about the chances of being physically injured in an autonomous vehicle after purchase.
Psychological	Concern about the psychological discomfort and tension that may arise due to the purchase of an autonomous vehicle.
Social	Concern about the likelihood that purchasing an autonomous vehicle will affect the way others think of the person who purchased the vehicle.
Time	Concern about the amount of time required to research the product prior to purchase.

Table 1: Components of Perceived Risk Defined

Information Systems

The literature on TAM is extensive, to say the very least (e.g. (Venkatesh et al., 2003). However, the variables Ease of Use and Usefulness have been represented in every study, and have shown themselves to be reliable predictors of the intention to adopt new technology. These variables are very similar to the variables from Marketing on Compatibility and Complexity/Simplicity.

We also collected data on gender, as there are indications from some studies on TAM that gender can be a factor for some of the variables tied to adoption (Venkatesh et al., 2003). Past studies on TAM also examined the role of subjective norm, which is similar to the marketing concept of Social Risk.

3. METHODOLOGY

Our intention for this study was to determine if the factors that had been previously identified as driving consumer choices for purchasing and using a new product would hold in the context of autonomous vehicles. While the variables identified in the previous section have been validated in multiple settings, we feel that autonomous vehicles are distinct from other consumer products in a number of ways, and thus provided an excellent opportunity to extend the theories in question. Specifically, we asked, do the same factors hold for this new product?

Based on the extensive literature in marketing, we chose variables that had been validated in prior studies (Tornatzky & Klein, 1982). These questions were designed to measure the components of perceived risk that were identified in Table 1 in the previous section. The wording of the questions was modified to match the current study's focus on self-driving cars.

In addition, we added questions that would measure other factors that could be relevant to the selection of self-driving cars. Specifically, questions regarding how much the individual enjoys driving and the perception of physical risk from autonomous cars. The complete list of questions can be found in Appendix A.

The sample was comprised of 315 complete responses out of 345 total responses. A summary of the demographics for the sample can be found in tables 2, 3 and 4.

The survey was conducted online, with the sample coming primarily from classes at a mid-sized public university in the southeastern United States. Some participants were also recruited by the team members participating in the study, and all came from within the USA. All participation was voluntary and unpaid.

The sample was primarily comprised of individuals between the ages of 18 and 25 (64.8%). The gender split on the sample was 58.7% female, and 41% male. Over 90% of the sample had at least some college education.

Gender	Frequency	Percent
Male	129	41.0
Female	185	58.7
Total	314	99.7
Missing	1	0.3
Total	315	100.0

Table 2: Gender

Education Level	Frequency	Percent
No High School	1	0.3
High School/GED	23	7.3
Some College	122	38.7
2 year degree	25	7.9
4 year degree	124	39.4
Masters Degree	14	4.4
Doctoral	1	0.3
Missing	5	1.6
Total	315	100.0

Table 3: Education

Age	Frequency	Percent
18-25	204	64.8
26-34	15	4.8
35-44	15	4.8
45-54	44	14.0
55-64	25	7.9
65 +	10	3.2
Missing	2	0.6
Total	315	100.0

Table 4: Age

4. RESULTS

As we were using questions validated in prior studies and risk components that were well known, we weren't expecting major deviations from prior studies. We anticipated that fear would play a role, but that it would work as a mediator or a moderator on the established variables measuring intention. Possibly, it would act as a new factor that would directly impact the intention to recommend and intention to purchase. This was not the case.

Well that didn't work

We attempted to run the model in AMOS 26 using the components of Perceived Risk identified earlier. We say attempted, because the model failed - repeatedly. No matter what combinations of variables were tried, the model never converged. In those cases where it could be coaxed to run by excluding variables, the goodness of fit indices were very low, and never exceeded the established thresholds (Byrne,

1994). A sample of the model can be found in Appendix B.

What is even more interesting is that recommendation intent and purchase intent, which should be directly related to one another, could not be placed in the model at the same time, or the model would refuse to converge. This happened even when the variables for fear were excluded, which indicates that the traditional model for measuring purchase intent in marketing may not work in the context of self-driving cars.

The reasons for this start to become clear when you look at the correlation table for all of the questions in the study, which can be found in Appendix C. As you can see, many of the variables were very highly correlated with one another. While some of this was expected, the extent of it was not.

Looking specifically at the questions related to Physical Risk and Psychological Risk, we can see that they are correlated with every other question, with the exception of the first question on Driving Enjoyment. Looking at the table in Appendix D, we can see the correlations for the variables measuring physical risk specifically are high for effectively every other question in the study. As can be seen in the data, the correlations are especially strong with the questions measuring Psychological Risk. It is also worth noting that the majority of the correlations are significant at the .01 level.

Breaking out the correlations for the question on Psychological Risk (shown in Appendix E) shows that these questions were also much more highly correlated with the other aspects of risk than were expected. Not only for the questions on Physical Risk, but for those related to Compatibility as well. Once again, the correlations are almost all significant at the .01 level.

So what is it that causes previously established variables to cease to be predictive? One of the differences between self-driving cars and other technologies and products is the degree of physical risk posed to the user. We can see this by looking at the descriptive statistics for the questions asked regarding risk (see Appendix F). The means for each answer aren't incredibly high or low, but the Kurtosis shows that the answers are skewed away from a normal distribution (0 indicates a normal distribution).

Looking at the individual questions in the following tables highlights this.

I would not feel comfortable riding in a driver-less vehicle. (Psychological Risk 1)		
	N	%
1	5	1.6%
2	28	8.9%
3	50	15.9%
4	48	15.2%
5	86	27.3%
6	64	20.3%
7	34	10.8%

Table 5: Answer Distribution

I feel comfortable giving control of my vehicle to an autopilot system. (Psychological Risk 2)		
	N	%
1	41	13.0%
2	67	21.3%
3	83	26.3%
4	41	13.0%
5	58	18.4%
6	21	6.7%
7	4	1.3%

Table 6: Answer Distribution

I would feel comfortable with my loved ones riding in a self-driving car. (Psychological Risk 3)		
	N	%
1	34	10.8%
2	69	21.9%
3	72	22.9%
4	63	20.0%
5	47	14.9%
6	26	8.3%
7	4	1.3%

Table 7: Answer Distribution

I feel that I could relax while riding in an autonomous car. (Psychological Risk 4)		
	N	%
1	36	11.4%
2	58	18.4%
3	77	24.4%
4	42	13.3%
5	54	17.1%
6	40	12.7%
7	8	2.5%

Table 8: Answer Distribution

I feel that it would be dangerous to ride in an autonomous vehicle. (Physical Risk 1)		
	N	%
1	6	1.9%
2	39	12.4%
3	33	10.5%
4	61	19.4%
5	100	31.7%
6	53	16.8%
7	23	7.3%

Table 9: Answer Distribution

Autonomous vehicles are safer than human operated traditional vehicles. (Physical Risk 2)		
	N	%
1	29	9.2%
2	56	17.8%
3	61	19.4%
4	115	36.5%
5	36	11.4%
6	11	3.5%
7	7	2.2%

Table 10: Answer Distribution

So what does this tell us?

We can see that there is a noticeable skew on the answer in each question – effectively indicating that the individuals involved in this study do not trust that the technology is safer than a traditional car. In fact, this is consistent across the questions – all of them have a significantly higher percentage of respondents who are “Strongly” against than for.

Looking at **table 5** (I would not feel comfortable riding in a driverless car) 31.1% answered 6 or 7

(Strongly Agree) while only 10.5% answered 1 or 2 (Strongly Disagree). **Table 7** looks at a similar question, but in this case involving the respondents loved ones (I would feel comfortable with my loved ones riding in a self-driving car). Here the difference is even more pronounced – with only 9.6 % answering 6 or 7 (Strongly Agree) while 32.7% answered 1 or 2 (Strongly Disagree). It’s notable that in this case 10.8% said they strongly disagree, while only 1.3% strongly agreed.

We also specifically asked questions about the perception of danger involved in using this new technology. **Table 9** asks about the danger involved directly – only 1.9% of respondents strongly disagreed, while 7.3% strongly agreed that it would be dangerous to be in an autonomous car. **Table 10** asks if individuals believed that autonomous vehicles are safer, and they clearly do not – 2.2% strongly agreed, while 9.2% strongly disagreed. Again, looking at 1 and 2 (27%) vs 6 and 7 (5.7%), we see a large difference in the tails of the distribution. It seems that fear becomes a primary factor in people’s perceptions of self-driving cars.

These findings are even more interesting, given that the majority of the participants in this study were between the age of 18 and 25, and younger people are more likely to accept/adopt new technology than older ones.

5. LIMITATIONS

As with any study, this one has limitations. The subject pool for this study was primarily college students, which would typically skew toward more technology acceptance. As self-driving cars are still quite rare in the wild, the subjects had no direct exposure to the technology. Finally, the questions around fear were generalized.

It would be useful in another study to examine the perceptions of the individual systems that help to create a self-driving car. For example, are people comfortable with blind spot monitoring systems, back up monitoring systems, automated emergency braking systems, etc. If so, then where is the tipping point for comfort? Is it when the car takes control of all of the functions, or is there a point before that where individuals become fearful?

Future studies should ideally include a more diverse subject pool. Future studies should also include a more diverse set of questions measuring fear. The psychology literature has references for this, and should be used to more finely measure

this. Ideally, a study could be conducted measuring impressions of self driving cars before and after experiencing them, but this would be both difficult and expensive to arrange at this time, given their relative rarity.

6. CONCLUSIONS

This study highlights a new factor that we, as a field, need to consider when evaluating the adoption and acceptance of Artificial Intelligence - fear. While we have dealt with concerns around technology replacing employees in MIS since the inception of the field, we have never had to deal with technology that is actually dangerous to life and limb.

This study was focused on marketing constructs (which are in many respects similar to ones measuring adoption intent in MIS), it points to some serious issues that will crop up in MIS research. After all, if the marketing is to be believed, self-driving cars are effectively the model for easy to use and useful. You simply climb into the car and tell it where to go. Yet, people don't seem to be embracing them enthusiastically. This is likely not helped by the news reports of people being killed by their self-driving cars. Of course, this is, again, a technology that could kill you in the course of normal operation.

After reviewing the data, we began to look at the literature in Psychology on fear and fear-based responses. We believe that in future research on any AI technology that is physically dangerous, we need to draw on the findings from Psychology to inform us.

As the use of AI becomes more wide spread, we need to understand what will drive users to accept or reject it. In order to overcome their fear, we first need to understand it. We need to conduct more studies in this area of research.

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APPENDIX A
Study Questions

Measure	Question
Time Risk	I feel that the research that I would have to do to purchase an autonomous vehicle would take a substantial amount of time. (Time Risk)
Social Risk	Others may be hesitant to ride with me in an autonomous vehicle. (Social Risk)
Financial Risk	The cost of a self-driving vehicle may be more than I am willing to pay. (Financial Risk)
Physical Risk	I feel that it would be dangerous to ride in an autonomous vehicle. (Physical Risk 1)
	Autonomous vehicles are safer than human operated traditional vehicles. (Physical Risk 2)
Psychological Risk	I would not feel comfortable riding in a driver-less vehicle. (Psychological Risk 1)
	I feel comfortable giving control of my vehicle to an autopilot system. (Psychological Risk 2)
	I would feel comfortable with my loved ones riding in a self-driving car. (Psychological Risk 3)
	I feel that I could relax while riding in an autonomous car. (Psychological Risk 4)
Performance Risk	The actual performance of the driver-less vehicle may not match its description. (Performance Risk 1)
	I do not expect glitches in the autopilot system to be a problem with an autonomous vehicle. (Performance Risk 2)
Trialability	I feel that it is easy to experiment with an autonomous vehicle. (Trialability 1)
	I would not purchase a driver-less car without testing it first myself. (Dropped)
Relative Advantage	I feel that a self-driving vehicle offers more value than a traditional car. (Relative Advantage 1)
	An autonomous vehicle is an improvement over a traditional car. (Relative Advantage 2)
Observability	I have seen vehicles that are self-driving. (Observability 1)
	I feel that the technology of driver-less cars is visible to the public. (Observability 2)
Complexity / Simplicity	I understand how the systems of a self-driving car work. (Complexity / Simplicity 1)
	I feel that an autonomous vehicle would be difficult to use. (Complexity / Simplicity 2)
Compatibility	An autonomous vehicle is well suited to my transportation needs. (Compatibility 1)
	I could not see myself riding in a driver-less car. (Compatibility 2)
Adoption Intention	On a scale of 1-7 (1=Very Unlikely), please rate the degree to which you would be likely to purchase an autonomous vehicle when they come to market in the future. (Adoption Intention)
	What are your major concerns with adopting a self-driving vehicle? Please describe in as much detail as possible.
Recommendation Intention	On a scale of 1-7 (1=Very Unlikely), please rate the degree to which you would be likely to recommend that your friends look into the technology of autonomous vehicles. (Recommendation Intention)
	What are your major concerns with recommending driver-less vehicles to your friends? Please describe in as much detail as possible.
Misc (Enjoy Driving)	I enjoy driving.
	I feel that an autonomous vehicle would diminish my driving experience.
	A self-driving vehicle would take away the freedom associated with traditional driving.
Familiarity	On a scale of 1-7 (1 = Not Familiar at All), to what extent are you familiar with the technology of autonomous (or self-driving) vehicles and how they work? (Familiarity)
	Which best represents your awareness of autonomous (or self-driving vehicles)? (Awareness)

APPENDIX B

Sample AMOS Model

It was our intention to include the model here. Unfortunately, due to a currently unresolved licensing dispute that our technology group is having with IBM (the publishers of the AMOS software), we do not have access to that software. We do have access to an error message when we try to open our previously saved work, but that does nothing to advance our research. We are assured that this will be resolved "soon".

APPENDIX C
Full Correlation Matrix

		Correlations									
		TimeRIs	FinRisk1	SocRisk	PerfRisk	PerfRisk	Driving1	Driving2	Driving3	PsyRisk	PsyRisk
TimeRIsk1	Pearson Correlation	1	.335**	.365**	.454**	-.254**	-0.028	.140*	.175**	.331**	-.242**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.621	0.013	0.002	0.000	0.000
FinRisk1	Pearson Correlation	.335**	1	.376**	.390**	-.210**	-0.006	.132*	.165**	.188**	-.217**
	Sig. (2-tailed)	0.000		0.000	0.000	0.000	0.916	0.019	0.003	0.001	0.000
SocRisk1	Pearson Correlation	.365**	.376**	1	.455**	-.191**	-.113*	.169**	.141*	.332**	-.169**
	Sig. (2-tailed)	0.000	0.000		0.000	0.001	0.044	0.003	0.012	0.000	0.003
PerfRisk1	Pearson Correlation	.454**	.390**	.455**	1	-.357**	-0.005	.159**	.208**	.293**	-.298**
	Sig. (2-tailed)	0.000	0.000	0.000		0.000	0.928	0.005	0.000	0.000	0.000
PerfRisk2	Pearson Correlation	-.254**	-.210**	-.191**	-.357**	1	0.002	-.137*	-.213**	-.356**	.421**
	Sig. (2-tailed)	0.000	0.000	0.001	0.000		0.977	0.015	0.000	0.000	0.000
Driving1	Pearson Correlation	-0.028	-0.006	-.113*	-0.005	0.002	1	.384**	.302**	0.071	-0.072
	Sig. (2-tailed)	0.621	0.916	0.044	0.928	0.977		0.000	0.000	0.209	0.205
Driving2_Rev	Pearson Correlation	.140*	.132*	.169**	.159**	-.137*	.384**	1	.594**	.442**	-.321**
	Sig. (2-tailed)	0.013	0.019	0.003	0.005	0.015	0.000		0.000	0.000	0.000
Driving3_Rev	Pearson Correlation	.175**	.165**	.141*	.208**	-.213**	.302**	.594**	1	.340**	-.248**
	Sig. (2-tailed)	0.002	0.003	0.012	0.000	0.000	0.000	0.000		0.000	0.000
PsyRisk1	Pearson Correlation	.331**	.188**	.332**	.293**	-.356**	0.071	.442**	.340**	1	-.610**
	Sig. (2-tailed)	0.000	0.001	0.000	0.000	0.000	0.209	0.000	0.000		0.000
PsyRisk2_Rev	Pearson Correlation	-.242**	-.217**	-.169**	-.298**	.421**	-0.072	-.321**	-.248**	-.610**	1
	Sig. (2-tailed)	0.000	0.000	0.003	0.000	0.000	0.205	0.000	0.000	0.000	
PsyRisk_Rev	Pearson Correlation	-.284**	-.133*	-.304**	-.351**	.422**	-0.019	-.245**	-.242**	-.632**	.629**
	Sig. (2-tailed)	0.000	0.018	0.000	0.000	0.000	0.734	0.000	0.000	0.000	0.000
PsyRisk4_Rev	Pearson Correlation	-.265**	-.207**	-.242**	-.337**	.422**	-0.075	-.389**	-.284**	-.660**	.657**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.185	0.000	0.000	0.000	0.000
Compat1	Pearson Correlation	-.245**	-.214**	-.251**	-.273**	.276**	-.143*	-.414**	-.321**	-.468**	.454**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.011	0.000	0.000	0.000	0.000
Compat2_Rev	Pearson Correlation	.380**	.193**	.305**	.319**	-.245**	0.076	.354**	.310**	.637**	-.446**
	Sig. (2-tailed)	0.000	0.001	0.000	0.000	0.000	0.180	0.000	0.000	0.000	0.000
Complex1	Pearson Correlation	-0.107	-0.057	-0.074	-.156**	.292**	.119*	0.007	-0.036	-.225**	.251**
	Sig. (2-tailed)	0.057	0.312	0.188	0.006	0.000	0.035	0.898	0.521	0.000	0.000
Complex2_Rev	Pearson Correlation	.270**	0.070	.226**	.248**	-.157**	-0.055	.268**	.185**	.405**	-.307**
	Sig. (2-tailed)	0.000	0.217	0.000	0.000	0.005	0.332	0.000	0.001	0.000	0.000
RelAdv1	Pearson Correlation	-.233**	-.153**	-.188**	-.257**	.345**	0.014	-.321**	-.229**	-.397**	.441**
	Sig. (2-tailed)	0.000	0.006	0.001	0.000	0.000	0.800	0.000	0.000	0.000	0.000
RelAdv2	Pearson Correlation	-.209**	-0.098	-.178**	-.248**	.361**	-.115*	-.333**	-.245**	-.414**	.417**
	Sig. (2-tailed)	0.000	0.082	0.001	0.000	0.000	0.041	0.000	0.000	0.000	0.000

		Correlations									
		TimeRIs	FinRisk1	SocRisk	PerfRisk	PerfRisk	Driving1	Driving2	Driving3	PsyRisk	PsyRisk
Trial1	Pearson Correlation	-.212**	-.151**	-.221**	-.214**	.267**	0.101	-.203**	-.158**	-.282**	.345**
	Sig. (2-tailed)	0.000	0.007	0.000	0.000	0.000	0.074	0.000	0.005	0.000	0.000
PhysRisk1	Pearson Correlation	.349**	.230**	.392**	.403**	-.355**	-0.047	.295**	.208**	.635**	-.499**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.408	0.000	0.000	0.000	0.000
PhysRisk2_Rev	Pearson Correlation	-.246**	-.118*	-.211**	-.357**	.366**	-0.016	-.239**	-.199**	-.436**	.502**
	Sig. (2-tailed)	0.000	0.036	0.000	0.000	0.000	0.772	0.000	0.000	0.000	0.000
Observ1	Pearson Correlation	-.141*	-0.071	-0.084	-.159**	.261**	.131*	-0.028	0.026	-.145*	.249**
	Sig. (2-tailed)	0.012	0.208	0.139	0.005	0.000	0.020	0.615	0.642	0.010	0.000
Observ2	Pearson Correlation	-.170**	-.132*	-0.105	-.155**	.192**	0.051	-0.034	-0.006	-.172**	.250**
	Sig. (2-tailed)	0.003	0.020	0.064	0.006	0.001	0.368	0.546	0.909	0.002	0.000

** . Correlation is significant at the 0.01 level (2-tailed). * . Correlation is significant at the 0.05 level (2-tailed).

		Correlations									
		PsyRisk	PsyRisk	Compat	Compat	Comple	Comple	RelAdv1	RelAdv2	Trial1	PhysRis
TimeRisk1	Pearson Correlation	-.284**	-.265**	-.245**	.380**	-0.107	.270**	-.233**	-.209**	-.212**	.349**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.057	0.000	0.000	0.000	0.000	0.000
FinRisk1	Pearson Correlation	-.133*	-.207**	-.214**	.193**	-0.057	0.070	-.153**	-0.098	-.151**	.230**
	Sig. (2-tailed)	0.018	0.000	0.000	0.001	0.312	0.217	0.006	0.082	0.007	0.000
SocRisk1	Pearson Correlation	-.304**	-.242**	-.251**	.305**	-0.074	.226**	-.188**	-.178**	-.221**	.392**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.188	0.000	0.001	0.001	0.000	0.000
PerfRisk1	Pearson Correlation	-.351**	-.337**	-.273**	.319**	-.156**	.248**	-.257**	-.248**	-.214**	.403**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.006	0.000	0.000	0.000	0.000	0.000
PerfRisk2	Pearson Correlation	.422**	.422**	.276**	-.245**	.292**	-.157**	.345**	.361**	.267**	-.355**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000	0.000	0.000
Driving1	Pearson Correlation	-0.019	-0.075	-.143*	0.076	.119*	-0.055	0.014	-.115*	0.101	-0.047
	Sig. (2-tailed)	0.734	0.185	0.011	0.180	0.035	0.332	0.800	0.041	0.074	0.408
Driving2_Rev	Pearson Correlation	-.245**	-.389**	-.414**	.354**	0.007	.268**	-.321**	-.333**	-.203**	.295**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.898	0.000	0.000	0.000	0.000	0.000
Driving3_Rev	Pearson Correlation	-.242**	-.284**	-.321**	.310**	-0.036	.185**	-.229**	-.245**	-.158**	.208**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.521	0.001	0.000	0.000	0.005	0.000
PsyRisk1	Pearson Correlation	-.632**	-.660**	-.468**	.637**	-.225**	.405**	-.397**	-.414**	-.282**	.635**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PsyRisk2_Rev	Pearson Correlation	.629**	.657**	.454**	-.446**	.251**	-.307**	.441**	.417**	.345**	-.499**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PsyRisk_Rev	Pearson Correlation	1	.638**	.512**	-.569**	.261**	-.352**	.488**	.443**	.332**	-.520**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PsyRisk4_Rev	Pearson Correlation	.638**	1	.488**	-.514**	.215**	-.354**	.508**	.533**	.339**	-.542**
	Sig. (2-tailed)	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Compat1	Pearson Correlation	.512**	.488**	1	-.518**	.172**	-.257**	.502**	.456**	.344**	-.347**
	Sig. (2-tailed)	0.000	0.000		0.000	0.002	0.000	0.000	0.000	0.000	0.000
Compat2_Rev	Pearson Correlation	-.569**	-.514**	-.518**	1	-.173**	.369**	-.400**	-.375**	-.207**	.501**
	Sig. (2-tailed)	0.000	0.000	0.000		0.002	0.000	0.000	0.000	0.000	0.000
Complex1	Pearson Correlation	.261**	.215**	.172**	-.173**	1	-.187**	.261**	.187**	.244**	-.237**
	Sig. (2-tailed)	0.000	0.000	0.002	0.002		0.001	0.000	0.001	0.000	0.000
Complex2_Rev	Pearson Correlation	-.352**	-.354**	-.257**	.369**	-.187**	1	-.319**	-.279**	-.243**	.458**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.001		0.000	0.000	0.000	0.000
RelAdv1	Pearson Correlation	.488**	.508**	.502**	-.400**	.261**	-.319**	1	.678**	.294**	-.371**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000
RelAdv2	Pearson Correlation	.443**	.533**	.456**	-.375**	.187**	-.279**	.678**	1	.359**	-.311**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.001	0.000	0.000		0.000	0.000

Correlations											
		PsyRisk	PsyRisk	Compat	Compat	Comple	Comple	RelAdv1	RelAdv2	Trial1	PhysRis
Trial1	Pearson Correlation	.332**	.339**	.344**	-.207**	.244**	-.243**	.294**	.359**	1	-.259**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
PhysRisk1	Pearson Correlation	-.520**	-.542**	-.347**	.501**	-.237**	.458**	-.371**	-.311**	-.259**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
PhysRisk2_Rev	Pearson Correlation	.530**	.501**	.344**	-.441**	.211**	-.344**	.394**	.379**	.193**	-.488**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000
Observ1	Pearson Correlation	.225**	.258**	.185**	-.136*	.244**	-.125*	.249**	.221**	.278**	-0.098
	Sig. (2-tailed)	0.000	0.000	0.001	0.016	0.000	0.027	0.000	0.000	0.000	0.084
Observ2	Pearson Correlation	.199**	.266**	.185**	-.120*	.333**	-0.088	.186**	.154**	.184**	-.197**
	Sig. (2-tailed)	0.000	0.000	0.001	0.033	0.000	0.119	0.001	0.006	0.001	0.000

** . Correlation is significant at the 0.01 level (2-tailed). * . Correlation is significant at the 0.05 level (2-tailed).

Correlations				
		PhysRis	Observ1	Observ2
TimeRisk1	Pearson Correlation	-.246**	-.141*	-.170**
	Sig. (2-tailed)	0.000	0.012	0.003
FinRisk1	Pearson Correlation	-.118*	-0.071	-.132*
	Sig. (2-tailed)	0.036	0.208	0.020
SocRisk1	Pearson Correlation	-.211**	-0.084	-0.105
	Sig. (2-tailed)	0.000	0.139	0.064
PerfRisk1	Pearson Correlation	-.357**	-.159**	-.155**
	Sig. (2-tailed)	0.000	0.005	0.006
PerfRisk2	Pearson Correlation	.366**	.261**	.192**
	Sig. (2-tailed)	0.000	0.000	0.001
Driving1	Pearson Correlation	-0.016	.131*	0.051
	Sig. (2-tailed)	0.772	0.020	0.368
Driving2_Rev	Pearson Correlation	-.239**	-0.028	-0.034
	Sig. (2-tailed)	0.000	0.615	0.546
Driving3_Rev	Pearson Correlation	-.199**	0.026	-0.006
	Sig. (2-tailed)	0.000	0.642	0.909
PsyRisk1	Pearson Correlation	-.436**	-.145*	-.172**
	Sig. (2-tailed)	0.000	0.010	0.002
PsyRisk2_Rev	Pearson Correlation	.502**	.249**	.250**
	Sig. (2-tailed)	0.000	0.000	0.000
PsyRisk_Rev	Pearson Correlation	.530**	.225**	.199**
	Sig. (2-tailed)	0.000	0.000	0.000
PsyRisk4_Rev	Pearson Correlation	.501**	.258**	.266**
	Sig. (2-tailed)	0.000	0.000	0.000
Compat1	Pearson Correlation	.344**	.185**	.185**
	Sig. (2-tailed)	0.000	0.001	0.001
Compat2_Rev	Pearson Correlation	-.441**	-.136*	-.120*
	Sig. (2-tailed)	0.000	0.016	0.033
Complex1	Pearson Correlation	.211**	.244**	.333**
	Sig. (2-tailed)	0.000	0.000	0.000
Complex2_Rev	Pearson Correlation	-.344**	-.125*	-0.088
	Sig. (2-tailed)	0.000	0.027	0.119
RelAdv1	Pearson Correlation	.394**	.249**	.186**
	Sig. (2-tailed)	0.000	0.000	0.001
RelAdv2	Pearson Correlation	.379**	.221**	.154**
	Sig. (2-tailed)	0.000	0.000	0.006

Correlations				
		PhysRis	Observ1	Observ2
Trial1	Pearson Correlation	.193**	.278**	.184**
	Sig. (2-tailed)	0.001	0.000	0.001
PhysRisk1	Pearson Correlation	-.488**	-0.098	-.197**
	Sig. (2-tailed)	0.000	0.084	0.000
PhysRisk2_Rev	Pearson Correlation	1	.235**	.244**
	Sig. (2-tailed)		0.000	0.000
Observ1	Pearson Correlation	.235**	1	.272**
	Sig. (2-tailed)	0.000		0.000
Observ2	Pearson Correlation	.244**	.272**	1
	Sig. (2-tailed)	0.000	0.000	
**. Correlation is significant at the 0.01 level (2-tailed). *.				

APPENDIX D
Correlations for Measures of Physical Risk

		Correlations									
		TimeRisk 1	FinRisk1	SocRisk1	PerfRisk1	PerfRisk2	Driving1	Driving2_ Rev	Driving3_ Rev	PsyRisk1	PsyRisk2 _Rev
PhysRisk1	Pearson Correlation	.349**	.230**	.392**	.403**	-.355**	-0.047	.295**	.208**	.635**	-.499**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.408	0.000	0.000	0.000	0.000
PhysRisk2_Rev	Pearson Correlation	-.246**	-.118*	-.211**	-.357**	.366**	-0.016	-.239**	-.199**	-.436**	.502**
	Sig. (2-tailed)	0.000	0.036	0.000	0.000	0.000	0.772	0.000	0.000	0.000	0.000

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

		Correlations									
		PsyRisk_ Rev	PsyRisk4 _Rev	Compat1	Compat2 _Rev	Complex 1	Complex 2_Rev	RelAdv1	RelAdv2	Trial1	PhysRisk 1
PhysRisk1	Pearson Correlation	-.520**	-.542**	-.347**	.501**	-.237**	.458**	-.371**	-.311**	-.259**	1
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	
PhysRisk2_Rev	Pearson Correlation	.530**	.501**	.344**	-.441**	.211**	-.344**	.394**	.379**	.193**	-.488**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

		Correlations		
		PhysRisk 2_Rev	Observ1	Observ2
PhysRisk1	Pearson Correlation	-.488**	-0.0977	-.197**
	Sig. (2-tailed)	0.000	0.084	0.000
PhysRisk2_Rev	Pearson Correlation	1	.235**	.244**
	Sig. (2-tailed)		0.000	0.000

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

APPENDIX E
Correlations for Measures of Psychological Risk

		Correlations									
		TimeRisk1	FinRisk1	SocRisk1	PerfRisk1	PerfRisk2	Driving1	Driving2_Rev	Driving3_Rev	PsyRisk1	PsyRisk2_Rev
PsyRisk1	Pearson Correlation	.331**	.188**	.332**	.293**	-.356**	0.071	.442**	.340**	1	-.610**
	Sig. (2-tailed)	0.000	0.001	0.000	0.000	0.000	0.209	0.000	0.000		0.000
PsyRisk2_Rev	Pearson Correlation	-.242**	-.217**	-.169**	-.298**	.421**	-0.072	-.321**	-.248**	-.610**	1
	Sig. (2-tailed)	0.000	0.000	0.003	0.000	0.000	0.205	0.000	0.000	0.000	
PsyRisk_Rev	Pearson Correlation	-.284**	-.133*	-.304**	-.351**	.422**	-0.019	-.245**	-.242**	-.632**	.629**
	Sig. (2-tailed)	0.000	0.018	0.000	0.000	0.000	0.734	0.000	0.000	0.000	0.000
PsyRisk4_Rev	Pearson Correlation	-.265**	-.207**	-.242**	-.337**	.422**	-0.075	-.389**	-.284**	-.660**	.657**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.185	0.000	0.000	0.000	0.000

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

		Correlations									
		PsyRisk_Rev	PsyRisk4_Rev	Compat1	Compat2_Rev	Complex1	Complex2_Rev	RelAdv1	RelAdv2	Trial1	PhysRisk1
PsyRisk1	Pearson Correlation	-.632**	-.660**	-.468**	.637**	-.225**	.405**	-.397**	-.414**	-.282**	.635**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PsyRisk2_Rev	Pearson Correlation	.629**	.657**	.454**	-.446**	.251**	-.307**	.441**	.417**	.345**	-.499**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PsyRisk_Rev	Pearson Correlation	1	.638**	.512**	-.569**	.261**	-.352**	.488**	.443**	.332**	-.520**
	Sig. (2-tailed)		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
PsyRisk4_Rev	Pearson Correlation	.638**	1	.488**	-.514**	.215**	-.354**	.508**	.533**	.339**	-.542**
	Sig. (2-tailed)	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Correlations				
		PhysRisk 2_Rev	Observ1	Observ2
PsyRisk1	Pearson Correlation	-.436**	-.145*	-.172**
	Sig. (2-tailed)	0.000	0.010	0.002
PsyRisk2_Rev	Pearson Correlation	.502**	.249**	.250**
	Sig. (2-tailed)	0.000	0.000	0.000
PsyRisk_Rev	Pearson Correlation	.530**	.225**	.199**
	Sig. (2-tailed)	0.000	0.000	0.000
PsyRisk4_Rev	Pearson Correlation	.501**	.258**	.266**
	Sig. (2-tailed)	0.000	0.000	0.000
** . Correlation is significant at the 0.01 level (2-tailed).				
* . Correlation is significant at the 0.05 level (2-tailed).				

Appendix F
Descriptive Statistics for Risk

	N	MIN	MAX	Mean		Std. Deviation	Skewness		Kurtosis	
				Statistic	Std. Error	Statistic	Statistic	Std. Error	Statistic	Std. Error
I would not feel comfortable riding in a driver-less vehicle. (Psychological Risk 1)	315	1	7	4.62	0.086	1.529	-0.297	0.137	-0.742	0.274
I feel comfortable giving control of my vehicle to an autopilot system. (Psychological Risk 2)	315	1	7	3.28	0.086	1.528	0.287	0.137	-0.808	0.274
I would feel comfortable with my loved ones riding in a self-driving car. (Psychological Risk 3)	315	1	7	3.36	0.085	1.507	0.250	0.137	-0.757	0.274
I feel that I could relax while riding in an autonomous car. (Psychological Risk 4)	315	1	7	3.55	0.093	1.649	0.193	0.137	-0.974	0.274
I feel that it would be dangerous to ride in an autonomous vehicle. (Physical Risk 1)	315	1	7	4.46	0.084	1.487	-0.350	0.137	-0.566	0.274
Autonomous vehicles are safer than human operated traditional vehicles. (Physical Risk 2)	315	1	7	3.43	0.077	1.365	0.112	0.137	-0.133	0.274