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Martin Baumann – Universität Ulm
Franziska Babel – Universität Ulm
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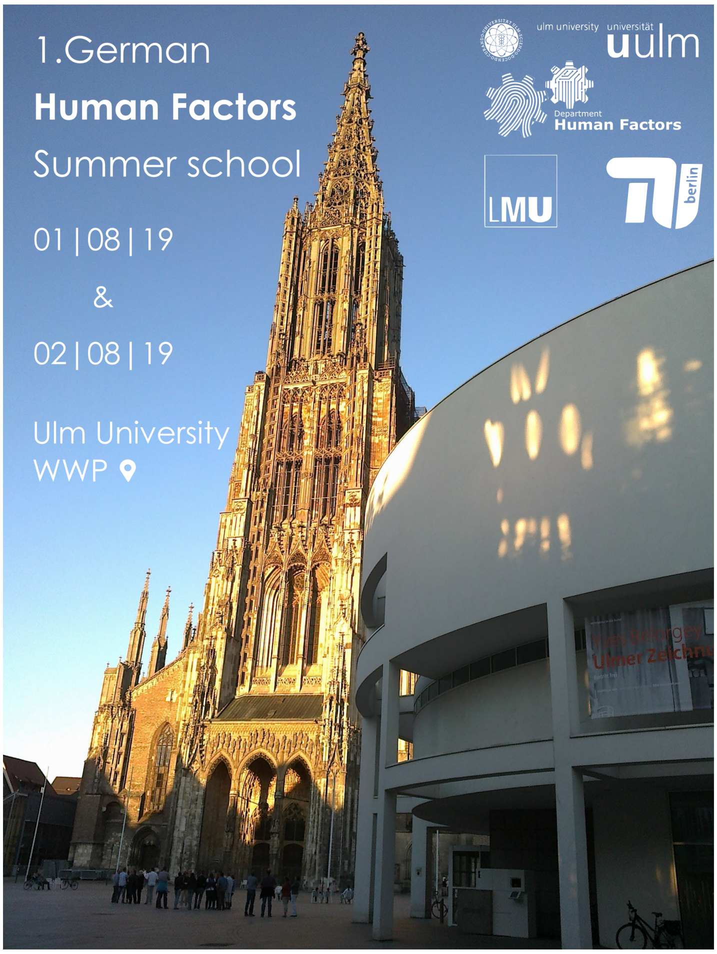
German Human Factors Summer School
August 01st to 02nd 2019



Program & Abstracts

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Stefan Brandenburg – Technische Universität Berlin
Anna K. Trapp – Technische Universität Berlin
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Part I

General Information

Welcome

We are very happy to welcome you all to the First *German Human Factors Summer School 2019*.

The German Summer School for Human Factors is the successor of the *Berlin Summer School of Human Factors* which was initiated and organized in the last 4 years by the Department of Psychology and Ergonomics, Technische Universität Berlin. It is an annual postgraduate event that is supported by the newly founded Section of Engineering Psychology of the German Psychological Society. It is intended to be an interactive platform that promotes the transfer and communication of interdisciplinary skills, relevant to Human Factors research. Successful postgraduate applicants (MSc and PhD candidates) are presented with the opportunity to present their research interests and current projects for critical discussion. Prominent researchers are invited to teach advanced methods and communicate state-of-the-art research from their laboratories.

We are looking forward to interesting talks and discussions.

Target audience

The target audience are PhD students working in the field of human factors independent whether they have just started or almost finished their PhD. The objective of the Summer School Human Factors is to offer a space for PhD students to connect and to help each other with planning, interpreting and handling other obstacles during the PhD. Beside the support from other PhD students, the summer school will be attended by invited senior researchers to further support the discussions.

Venue

The summer school will take place in building WWP (Albert-Einstein-Allee 47, 89069 Ulm) on Campus Uni West of Ulm University.

Public transport

The WWP building can be reached by public transportation (www.ding.de) via bus 5 or tram line 2. Please exit Manfred-Börner-Strasse. From the city center (Ehinger Tor, train station, theater) it takes about 10 minutes with the tram line 2 to campus west. Tickets can be bought at vending machines at the stops or within the tram but not within the busses.

Car

Parking lots are available at the campus in front of the building (P11) or next to it (P10).

Accommodation

At the Ibis budget hotel at the theater, 15 single rooms (63€, with breakfast 70.50€) are reserved until July, 25th. Please contact franziska.babel@uni-ulm.de for the booking number if you want to book a room at the Ibis. Otherwise, we would recommend accommodation near the city center (theater, train station or Ehinger Tor).

Information for presenters

Focus group

Each focus group will be scheduled for 5 + 45 minutes:

- Prior to the focus group (5 minutes), the presenters are kindly asked to give a sneak preview of their focus group (max. 40 seconds without slides).

- During the focus group (45 minutes), the contributor has the opportunity to initialize and lead a discussion about his/her current project. On this account, contributors can give a short introduction to their current project (max. 10 minutes) and use the rest of the time for an intense discussion with the audience. All rooms will be equipped with a projector, a white or chalk board and a flip board.

Poster presentation

The poster session will be held on Thursday, 15:30 to 16:30. Every participant presenting a poster is invited to give a short presentation (5 min) of the poster. After that, the audience can then pose questions and discuss the topic with the presenter (5- 10 minutes).

Discussion forum

If you want to get in touch with the organizers or discuss some ideas for your focus group prior to the summer school with the community please join us on: `https://schoolhumanfactors.slack.com/messages`

Program

Wednesday, 31.07.2019

18:30 – **Pre-event dinner**

at Barfüsser Ulm (Neue Str. 87-89,ULM)

Thursday, 01.08.2019

9:00 – 9:30	Welcome coffee (WWP 47.1.508)	
9:30 – 10:00	Welcome, introduction of the organizers and short introductions of participants without submission (WWP 47.1.506)	
10:00 – 11:00	**The Future of Engineering Psychology**	
	focus groups – parallel sessions	
	WWP 47.1.506	*WWP 47.1.507*
	chair: Lewis Chuang	*chair: Anna Trapp*
11:00 – 11:45	Hueseyin Avsar	Felix Dreger
11:45 – 12:30	Fabienne Roche	Annika Boos
12:30 – 13:30	**Lunch Break**	
	focus groups – parallel sessions	
	WWP 47.1.506	*WWP 47.1.507*
	chair: Martin Baumann	*chair: Franziska Babel*
13:30 – 14:15	Friederice Schroeder	Jan Silberer
14:15 – 15:30	Dissertation presentation (Philipp Hock) 47.1.507	
15:30 – 16:30	**Poster session**	
16:30 – 17:00	**End of the Day Summary**	
18:00 – 19:30	**Guided city sightseeing tour (Start:Stadthaus Ulm)**	
19:30 – ...	**Dinner at Restaurant Lochmühle (Gerbergasse 6)**	

Friday, 02.08.2019

9:00 – 9:30	Welcome coffee (WWP 47.1.508)	
9:30 – 10:30	Teaching element: Contrast Coding (Anna Trapp) 47.1.507	
	focus groups – parallel sessions	
	WWP 47.1.506	*WWP 47.1.507*
	chair: Martin Baumann	*chair: Anna Trapp*
10:30 – 11:15	Sandra Epple	Andrea Mueller
11:15 – 12:00	Mirjam Lanzer	Franziska Babel
12:00 – 12:45	From Ergonomics Research to UX	
	(Andreas Haslbeck, Huawei) 47.1.507	
13:00 – 13:30	Lunch Break and taking farewell	

Focus group topics

Hüseyin Avsar	DLR	Communication Methods of Automated Vehicles in Mixed Traffic Environments.
Felix Dreger	Leibniz Research Centre	A cognitive task analysis for cut-to-length harvester operators: A first approach to identify inter-individual performance differences
Fabienne Roche	TU Berlin	How do drivers take over in critical evasion situations in highly automated driving
Annika Boos	TUM	Compliance and Cooperation in Human-Automation-Systems
Friederice Schröder	TU Berlin	The Influence Of Affects On Body Tilt
Jan Silberer	TH Stuttgart	Promoting Technology Acceptance in People with Low Commitment
Sandra Epple	TU Berlin	Driver-Initiated Take-Over-Behavior in Automated Driving
Andrea Müller	TUM	Development of Methodological Guidelines For Wizard Of OZ Studies In The Context Of Autonomous Driving
Mirjam Lanzer	Ulm University	Interaction with vulnerable road users
Franziska Babel	Ulm University	Negotiation strategies for autonomous service robots

Poster topics

Yulia Neroznikova	TU Berlin	User privacy perception during human-machine interaction
Janik Dostert	TU Dresden	Strategies of Motivating Assistance System Design in Industrial Production
Ashima Keshava	University of Osnabrück	Decoding User's Task From Eye Movement Behavior In Virtual Reality

Part II

Abstracts

Communication Methods of Automated Vehicles in Mixed Traffic Environments

Dr. Hueseyin Avsar, Dr. Fabian Utesch, Anna Schieben, Dr. Caroline Schiessl

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Automated Vehicles (AVs) have seen rapid technological development over the last decade and may soon be integrated on public roads. However, road traffic is unlikely to become fully automated in the near future. Instead, AVs will share the road space with other non-automated vehicles and road users such as cyclists and pedestrians. The road is a social space which requires co-operative behaviour to maintain traffic safety. Currently, automated vehicles (Tesla,Google,Volvo) do not incorporate social norms as human drivers normally do, which may lead to frustrating situations (Brown & Laurier, 2017). A clear communication between AV and other road users may improve the safety and the efficiency of traffic flow. For the comfort of the passengers it may also be beneficial to communicate the AVs intention. Therefore a well designed interface between the passengers on board of the AV and other road users is needed (Dietrich, et al., 2018). Various solutions such as visual displays, light band and projection onto the road surface have been compared and discussed regarding their suitability (Schieben, et al., 2019). Comparable design solutions in other projects revealed that road users struggle to understand the light signals of AV (Neumann, et al., 2019).

Finding an appropriate solution for this challenge is the focus of InterACT project. Cooperation between AV and other road users will be enabled through a novel cooperation and communication planning unit which will control Human Machine Interfaces (HMI) for both the user on-board and surrounding road users (Drakoulis, et al., 2018). Within the InterACT project different internal (iHMI) (Dziennuz, et al., 2016) and external (eHMI) HMI designs (Lee, et al., 2019) were developed and tested. Both HMIs communicate perception and intention based signals, e.g. 'I have seen you' (perception) and 'I will brake' (intention), via a LED light band.

The purpose of this focus group session is to discuss methods measuring the quality of cooperation between an automated vehicle equipped with an eHMI and other road users in urban scenarios.

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Negotiation strategies for autonomous home assistance robots

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In the future, social robots will become ubiquitous in our homes. They will be autonomous and will interact socially with humans. As these robots enter private spaces, acceptance and trust will become more and more important in addition to flawless task execution. A social robot does not only need to perform its tasks correctly, but also in a obedient, friendly and polite manner (Dautenhahn, 2007). However, there might be situations where a home assistance robot has to be assertive. This might be the case when the user is interfering with the robot's planned task execution (e.g. the robot's order is to clean the kitchen but the users wants to cook). A goal conflict occurs for which the robot needs to be equipped with interaction strategies to negotiate further task execution. These strategies need to be accepted by the user but also be effective. As assertive robots are a new field of research in human-robot interaction (HRI), no negotiation strategies for robots yet exist. Hence, in my PhD I will develop negotiation strategies for home assistance robots based on cognitive, motivational and social psychology (Freedman & Fraser, 1966; Kelley & Thibaut, 1978) and research on persuasive technologies (Fogg, 2003). A first set of negotiation strategies will be tested in an online study in June 2019. The online study will feature fifteen robot negotiation strategies that differ with regard to emotional valence (negative, neutral, positive) and the modality (verbal, auditive, physical) they are conveyed by. Each participant will be presented with a) five out of fifteen strategies, b) a scenario description with a human-robot goal conflict at home and c) video material of home assistance robots (Roomba, Pepper and Tiago). The compliance to the robot's request, acceptance of robot's behaviour (i.e. the strategy) and trust in the robot will be assessed.

In the focus group, the developed negotiation strategies will be presented and their applicability to HRI research will be discussed based on the results of the online study.

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Compliance and Cooperation in Human-Automation-Systems

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The proceeding automation in various domains ranging from transportation, health-care to logistics and private use suggests that not only human-automation collaboration in workplaces will increase: By expanding to new contexts and use cases, interactions with automated agents will also be regular in daily life. The introduction of robots interacting in close proximity with a diversity of target groups on a daily basis poses important design challenges on interface and interaction design (Thrun, 2004). Yet, many questions concerning the interaction between human and automation remain unanswered.

To date, I have been researching on compliance in the context of automated driving. If a driver is not aware that the automation needs monitoring, mode errors might occur that indicate poor mode awareness. At the same time, drivers might hold an adequate level of mode awareness and consciously choose to omit their monitoring task. The results indicate that the observed negligence of visual system monitoring during partially automated driving can be considered as intentional non-compliance rather than unintentional mode errors (Boos, Feldhütter, & Bengler, Under Review). Related research finds similar effects on compliance in various domains, e.g. lacking compliance with bar-code controlled medication administration in hospitals (Patterson, Rogers, Chapman, & Render, 2006), lack of compliance with organizational information security policies (Blythe, Coventry, & Little, 2015) or driver's occupation with strongly distracting non-driving-related-tasks during automated and assisted driving (de Winter, J. C. F., Happee, Martens, & Stanton, 2014). Although the intended use of the automated system might be clear to them, users often decide act adversely. This suggests that willingness to comply does not only depend on the comprehensibility of a conveyed message or the formal understanding of the intended use of an automation.

The aforementioned literature suggests that some domain-independent factors could be identified influencing willingness to comply with an automation and use it as intended. Overall costs and benefits, such as risk, efficiency or social acceptance/ likeability might determine whether a person complies with a law, instruction or recommendation given by an automated agent. Factors influencing the readiness to comply with an automated system could be identified on the human user's side as well as the system's side. Concerning the human, these might encompass trust, proxemics or personality traits. On the automated agent's side its kinesic behaviour, geometry or social attributions such as likeability might play a crucial role. I am therefore interested in a cross-domain evaluation of Compliance and Cooperation in Human-Automation-Systems.

As I have just started my PhD, the exact topic yet remains undecided. Contributing to a cross-domain framework on compliance and cooperation between human and automated agents seems to be a promising and relevant field of research. I am currently working on developing focused research questions. My aim is to be able to present a clearer version of my chosen topic, possibly with first study design ideas in a focus group during summer school and would greatly benefit from a productive discussion.

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Strategies of Motivating Assistance System Design in Industrial Production

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Industrial production is still widely sustained by human operators who monitor and adjust mostly automated processes (Müller & Oehm, 2018; Wang, Törngren, & Onori, 2015). They keep them within operational limits, intervene during faulty behaviour in order to diagnose nature and cause of the fault and introduce necessary steps to restore working order. Assistance systems provide operators with valuable information about the system state, past problem cases and possible solutions (Gorecky, Schmitt, Loskyll, & Zühlke, 2014; Nelles, Kuz, Mertens, & Schlick, 2016; Schegner, Hensel, Wehrstedt, Rosen, & Urbas, 2017). This information, combined with operator knowledge about the inner workings of the machine and relationships within a production system can then be used to more effectively diagnose and rectify problem causes. However, operators often lack motivation to learn more about their machine or system (Schult, Beck, & Majschak, 2015). This knowledge is usually brought about by means of organisational trainings and workshops. It is proposed that the will to learn and consequently deeper understanding and transfer can also be attained by a motivating socio-technical design of the assistance system itself. Different psychological theories about motivation in the context of learning, industry and design are being discussed and relevant common factors derived. Together with an exploratory analysis of operators' current context of motivating factors regarding fault detection and correction they build the foundation of a conceptual model of motivating assistance system design in industrial production. Possible strategies and applications derived from the model are being discussed in order to provide practical guidance to designers on how to implement them in real world scenarios.

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A cognitive task analysis for cut-to-length harvester operators: A first approach to identify inter-individual performance differences

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The forest industry is among the largest industries in the Scandinavian countries. Essential for efficient timber production are skilled forestry machine operators to reduce surplus of undesired logging. Observed efficiency differences of about 40% between trained CTL harvester operators in similar stands largely effect the costs in forestry operations (Ovaskainen et al., 2004). The variance in productivity between operators is assumed to be related to expertise, learning, motor skills, and visual perception. Moreover, trait (e.g. conscientiousness) and state (e.g. fatigue, vibrations and shocks (Harstela, 1990; Robert & Oliver, 2008)) related factors of the operators as well as situational factors i.e. terrain gradient and assortment potentially covary with skill level and thus enhancing/hampering the productivity (Berger, 2003). The complex human machine interface of a CTL harvester comprises multiple displays, a minimum of two joysticks, and a vast number of buttons varying based on brand and model. Therefore, extensive vocational education including CTL harvester simulator training is required to operate single-grip harvesters efficiently. Additionally, supervision by experienced mentors in later career stages raises operators' skill level. However, learning curves vary substantially between operators and learning takes on average 9 month until control skill plateaus (Purf́urst, 2010). Previous studies investigating working techniques and operators' tasks in logging describe multiple steps with varying demands such as harvesting head and boom control, felling, bucking, delimbing, manoeuvring as well as adhering to cutting instructions (Apăfăian et al., 2017; Lindroos, et al., 2015; Nordlie & Till, 2015; Nuutinen, 2013). These tasks require both motor skills and higher-level cognition such as decision making and planning. The observed operators' performance discrepancy despite a costly and comprehensive education hints to the fact that acquired skills are (differently) internalized and further improved over time to optimize the workflow. This latent task knowledge (tacit knowledge) may explain for a large portion of the varying productivity. Some operators may be more capable in further improving their skill level themselves than others. To elicit tacit knowledge a holistic analysis of the operators' task and the simulator training is necessary. As part of the assessment of inter-individual performance differences, the actual development of a cognitive task analysis concept will be presented at the summer school. The aspiration of an exhaustive picture of standard and non-standard scenarios, CTL operators have to cope with, requires a broad methodological spectrum. The methodological mapping will be outlined and can be discussed in focus groups with the participants of the summer school. In addition, the presented concept for the assessment of the performance differences can be reflected upon implications for operator training. This current work will serve as theoretical basis for future research on inter-individual performance differences in logging operations. The research is conducted in the scope of the joint European project AVATAR. In later stages of the project an adequate operator support system will be designed.

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Driver-Initiated Take-Over-Behavior in Critical Braking Maneuvers in Automated Driving

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A major safety hazard in automated driving is the transition of vehicle control from the automated vehicle to the human driver. Most research focuses on system-initiated transitions of vehicle control by means of take-over requests (e.g. Petermeijer, Bazilinskyy, Bengler, & de Winter, 2017). However, drivers can also initiate transitions of vehicle control. They may actively take back control of the vehicle if they perceive a driving situation to be critical and if they do not trust the automated system to deal with this critical situation appropriately. However, interrupting the automated driving mode in a safety critical situation can be dangerous if the driver is not able to control vehicle dynamics adequately (McCall, McGee, Meschtscherjakov, Louveton, & Engel, 2016).

In the scope of two simulator studies, we aimed at identifying predictors of driver-initiated take-over behavior. More specifically, we investigated the impact of criticality of the driving situation and trust in automation on driver-initiated take-overs. Criticality of the driving situation was operationalized by means of time headway (.31s, .18s, .05s) and adhesion utilization (.44, .65, .86). Time headway is a measure for the distance in time between ego vehicle and an obstacle. Adhesion utilization is a measure of the horizontal forces acting on the vehicle. In order to simulate these forces in the driving simulator, we used a motion seat. Trust in automation was manipulated via system reliability in an induction phase prior to the actual experimental phase. The driving scenario used for these studies was a braking maneuver. Participants were driving on a two-lane rural road in the automated driving mode. Another vehicle passed them on the left lane, merged onto their lane and started braking.

Time headway was varied via the distance at which the vehicle was merging in front of the ego vehicle. Adhesion utilization was varied via the braking rate of the merging vehicle that translated into the braking rate of the ego vehicle. The automated driving mode handled this situation by braking appropriately and no driver intervention was necessary. However, if drivers took over they could cause a crash. We assessed driver-initiated take-over behavior and trust in automation after each trial. Our findings indicate that reliability of the automated system in the induction phase and criticality of the driving situation affected driver-initiated take-over behavior. The probability of driver-initiated take-overs was higher when drivers experienced an unreliable system in the induction phase and when time headway was low. Moreover, reliability of the automated system in the induction phase affected trust in automation. However, evidence for the impact of trust in automation on driver-initiated take-over behavior was less clear. In the focus group, I would like to discuss the findings and shortcomings of this study, with a particular focus on the assessment of trust in automation. Driver-initiated take-over behavior is an important research topic in the field of automated driving as it can occur in critical situations and has the potential to cause safety-critical events.

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A mixed methods approach for assessing pedestrian behaviour

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With the introduction of autonomous driving, communication between pedestrians and vehicles will face new challenges. To design this interaction in the best possible way, it is important to understand pedestrians' behaviour and means of communication in traffic today. A variety of methods ranging from self-report to observation and simulation can be used to assess pedestrian behaviour (Rasouli & Tsotsos, 2019). However, until now only a few studies combined different methods to examine pedestrian behaviour in traffic in a more thorough way (Schneemann & Gohl, 2016; Sucha, Dostal & Risser, 2017). A field study with a mixed methods approach combining subjective and objective data was conducted with instructed pedestrians in real traffic. A research vehicle equipped with cameras was driving through urban traffic on predetermined routes. Pedestrians were instructed to cross or not to cross the street whenever the research vehicle passed by. Instructed pedestrians filled in 2687 self-report questionnaires about these experienced crossing scenarios from their point of view. They provided information concerning their actions and communication behaviour, the research vehicle's actions, the infrastructure, and their subjective feeling of safety and intention recognition. Additionally, 75 hours of crossing scenarios were video-recorded from the inside of the research vehicle. Video data was annotated for instructed and non-instructed pedestrians' communication and crossing behaviour, the research vehicle's actions, the infrastructure and pedestrians' age and gender. Self-report and video data were then matched based on date, time, instructed pedestrians' gender and infrastructure conditions of the respective scenario. In first analyses, subjective and objective data was compared with regard to instructed pedestrians' communication behaviour, instructed pedestrians' crossing actions and the research vehicle's actions. Furthermore, communication and crossing behaviour of instructed and non-instructed pedestrians was compared.

In the focus group, I would like to discuss the analyses conducted so far and their results, as well as advantages and disadvantages of the mixed methods approach used in this study. Additionally, I would like to infer implications for future studies also in regard to autonomous driving.

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Development of Methodological Guidelines For Wizard Of OZ Studies In The Context Of Autonomous Driving

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The introduction of autonomous vehicles belongs to one of the major disruptive factors the automotive industry will have to face in the coming years (Kaas et al., 2016). Since the relation between the passengers and the vehicle drastically changes with the vehicle gaining more control (Flemisch et al. 2012; Pettersson & Ju, 2017), automotive interaction also needs to be adapted to the new requirements (Pettersson & Ju, 2017). However, the corresponding automation technology does not fully exist yet, which is why lately so-called Wizard of Oz (WoOz) vehicles have become increasingly more popular within the research community to study the effects of automation under real traffic conditions. In this experimental set-up subjects are under the illusion that they are interacting with a real autonomous system (Bernsen et al., 1994), while a concealed driver, the so-called driving wizard (Baltodano et al., 2015), operates the vehicle. The real test environment and the driving wizard introduce various confounding variables in the study. My doctoral project aims at developing methodological guidelines for WoOz studies in the context of automated driving, so that valid test results can be achieved in spite of the confounding variables.

As a first step, existing WoOz studies were examined with regard to the quality criteria for a scientific test, namely objectivity, reliability and validity to gain a better understanding of the confounding variables in a WoOz set-up. This analysis revealed possible research questions for my doctoral project, which are described in the following.

A test is said to be valid, if it measures exactly the feature that it is supposed to measure (Moosbrugger & Kelava, 2012). In the case of WoOz studies in the context auf autonomous driving, this means that it must be ensured that subjects really believe that the vehicle is driving autonomously. To this end, factors that make humans believe in an autonomous system and ones that undo the illusion will be analysed in an explorative simulator study and a subsequent study using a WoOz vehicle. Creating a questionnaire to detect if subjects believed in the illusion during the experiment without suggestively having to ask for this information is also an aim of my doctoral project. Reliability means that a test measures only the feature to be measured without any measuring errors (Moosbrugger & Kelava, 2012). Since WoOz studies can be set in a real traffic environment with changing traffic conditions and the driving wizard being a human instead of a machine, especially re-test reliability is difficult to obtain. Therefore, another aim of my doctoral project is to define cut-off values for pre-defined velocity or acceleration profiles based on which the trial can be accepted or rejected. The development of instructions for test leaders and driving wizards as well as tools for driving wizards to support them in putting the instructions into practice will also be a possible research question in my doctoral project, as objectivity asks for ensuring the comparability of subjects' performance independent of the test administrators (Moosbrugger & Kelava, 2012).

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How do drivers take over in critical evasion situations in highly automated driving?

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In highly automated driving (Gasser et al., 2012), also known as SAE-level 3 (SAE International, 2018) the system executes longitudinal and lateral control for a specific situation or period of time (NHTSA, 2013). In case the system detects a system limit, it requests the driver to take back control. The less time between the takeover request and the system limit, the more critical is the takeover situation, because the driver has less time process and react adequately (Gold, Dambock, Lorenz, & Bengler, 2013). An expectable reaction in an evasion takeover situation is steering or braking. However, high lateral or longitudinal decelerations may result in slip, hence, in instability of the vehicle (Happian-Smith, 2001). The higher the deceleration due to the vehicle automation, the more likely is that the maximal possible adhesion utilization is reached and the vehicle becomes incontrollable. Hence, the criticality of takeover situations highly depends on the available time budget and the declaration by the automation.

In a driving simulator study, we investigated drivers' takeover behavior in critical evasion situations, in which they are confronted with both, short time budget and high lateral accelerations. The static driving simulator was equipped with a motion seat and 180Â° front and 60Â° rear view. The participants' vehicle followed a lead vehicle. After 1:30 min, the lead vehicle performed two lane changes due to hazards on its lane. An auditory signal triggered the participants to take back control and perform the lane changes. The takeovers were triggered either before the first or the second hazard. The takeover situations differed in respect to time headway and adhesion utilization, realized by the lateral acceleration of the vehicle. Two different time headways (1.2 s and 2.1 s) were combined with two different adhesion utilizations (0.24 and 0.38), resulting in 4 different takeover situations for each hazard. In addition, filler trials were added to avoid predictability of the takeovers. Results determine characteristics of evasion situations which result in critical behavior. Based on that, an assistance system will be developed which supports and limit the driver interventions during an automated drive and which will be validated in the future. Analysis and the results will be discussed.

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It has something to do with Kafka and his balance... Or: The Influence Of Affects On Body Tilt

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In the 1950s, Kafka [1] stated that humans unconsciously tend to lean towards positive stimuli and tend to flinch from negative stimuli. The goal of my PhD is to investigate this statement and its applicability in human computer interaction. More precisely, I aim to examine whether there is an unconscious connection between a persons' affect and body tilt and whether this connection can be used as a measuring method of affects in HCI. While common methods like questionnaires always carry the disadvantage of a retrospective evaluation of a period of time, recording a person's body tilt may offer the possibility to measure affects immediately and continuously. Compared to physiological measurements, body tilt could be a money-saving addition to other tools since measuring plates like the Wii Balance Board® are considered equally accurate, yet rather inexpensive [2].

In a first experiment, participants looked at emotional pictures from the International Affective Picture System (IAPS) while standing on a Wii Balance Board®[3]. During the first set of pictures, participants were not briefed on the purpose of the balance board. For the second set of pictures, participants were informed that they should rate the pictures' valence by bending forward or leaning back to indicate a positive resp. negative valence. Finally, participants rated the level of valence for each picture with help of a questionnaire. The result showed the expected correlations between body tilt and ratings, but only for the second condition. Thus, measuring body tilt can be used as a conscious measurement of valence when participants are instructed to rate the valence by their bodily position. However, the findings contradict Kafka's statement, as we did not find evidence for unconscious movements matching the affective state yet.

In following experiments, we plan to further investigate whether there is an unconscious relation between tilt and affect. On this account, we will use a revised instruction by asking participants to lean towards negative stimuli and band back from positive stimuli. If Kafka's postulation is correct, the opposing instruction should cause conflicts leading to delayed movements and more variance in the bodily tilt. Also we are testing the effects of a more immersive environment by showing the pictures on a virtual reality headset. With these and further complementary studies, we want to validate the interpretation of a conscious body tilt as a measure of affect. Additionally, the stimuli eliciting the affect will be varied (e.g., sounds, movies, human computer interactions).

At the Summer School, I plan to discuss possible physiological parameters, the possibility of continuous measurements and the future use of the method in the context of HCI.

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Promoting Technology Acceptance in People with Low Commitment

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In my work as a research associate in the area of Business Psychology, my focus is on Technology Acceptance (TA). On the one hand, I apply TA-models to different applied fields of social interest (e.g. bike sharing systems, demand response systems) in order to foster sustainable behavior. On the other hand, I am interested to further develop current TA-models by integrating ideas from the field of user-experience (UX) research. More precisely, I am planning to connect the Unified Theory of Acceptance and Use of Technology Model 2 (UTAUT2) by Venkatesh et al. (2012) with the more practically oriented Kano model by Kano et al. (1984). During the summer school, I intend to participate in the focus group format with the aim of discussing my current paper about using the Technology Acceptance Framework (TAF) by Huijts et al. (2012) to promote acceptance regarding environmentally friendly projects and technology in people with a low Commitment by highlighting Social Norms. In two studies I discovered that Social Norms had a higher impact on the intention to save energy of people with a low Commitment than on the intention of people with a high Commitment. Similar effects were found by Jaeger and Schultz (2017) in water use, by Dwyer et al. (2015) in waste management and by Mickael (2014) in energy saving at public bathrooms. Study 1 was conducted in an online survey about energy saving measures at a university with 606 participants. Consistent with our idea, an interaction was found between commitment to participate actively in the project and Social Norm. In Study 2 the objective was to discover aspects influencing the acceptance of demand response systems in France. A representative sample of 2020 people was examined. Commitment to actively change settings in the demand respond system was used an as a measure of commitment. The results again showed the same interaction effect with the Social Norm as in the previous study.

As an alternative to discussing my current paper in the focus group format I would be interested in presenting and getting feedback on my PhD topic of connecting the UTAUT2 to the Kano model. UTAUT2 is a widely used model for determining the influences of Technology Acceptance but the variables are too general to infer measures for a specific product. Kari et al. (2016) conducted an interview study examining critical experiences with self-tracking technologies that influence the variables in the UTAUT2. An implication for future research was to follow the same procedure regarding specific products. The Kano model is practically oriented method that can be used for interview studies as well as quantitative studies to gain information on this topic matter for a specific product. I plan large online surveys with the target of examining the influence of product features allocated to a certain category in the Kano model on the UTAUT2 variables Performance Expectancy, Effort Expectancy and Hedonic Motivation.

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