Society for Risk Analysis Europe DACHL Chapter
"Methods in Risk Research" Conference
27-28 September 2023
Programme

Wednesday Sept. 27

12.00-13.30 **Conference Registration and Lunch**

13.30-14.15 **Keynote 1**
Philipp Sprengholz will share insights from COVID-19 Snapshot Monitoring (COSMO) study, a national survey on pandemic-related perceptions and behaviours. The longitudinal study was started in spring 2020 and is ongoing.

Philipp Sprengholz[1]
[1]*Universität Bamberg, Germany*

14.15-14.40 Please imagine the following situation… - Using scenarios and vignettes to investigate risk perception and behaviour

Angela Bearth[1]
[1]Consumer Behavior, Institute for Environmental Decisions, Eidgenössische Technische Hochschule Zurich, Switzerland

There exist various ways to investigate people's risk perceptions, behaviour, or acceptance of novel technologies. Qualitative approaches allow for in-depth investigations of people's mental models but are resource-intensive, and hence, sample sizes cannot easily be scaled up. It is, therefore, not surprising that vignette and scenario experiments are applied widely in paper-and-pencil and online experiments. Scenario or vignette experiments ask participants to imagine a previous, future, or hypothetical scenario while manipulating specific aspects (e.g., indicated benefit, used terminology). Despite their widespread application and benefits, these approaches are frequently criticized for their hypothetical nature and unclear links to actual decision-making. In the presentation, I will discuss learnings from various projects using scenario and vignette designs in online and laboratory settings. A particular focus in the presentation will be on immersive Virtual Reality (VR) as one strategy to increase people's immersion into these designs and the costs, benefits, and challenges of using VR for risk research. Overall, the

presentation will be an opportunity to exchange experiences with scenario or vignette experiments and will provide participants with applicable recommendations on how this method could be adapted to other risk contexts. As many of the featured projects were planned in close collaboration with the regulatory offices in Switzerland, the presentation will be concluded with learnings from applying these methods to generate implications for regulation and policy.

14.40-15.05 Modelling the Influence of Situational Uncertainty on Risk Taking in Everyday Life

Aaron Lob[1], Frey, Renato[1]
[1]*University of Zurich, Switzerland*

Individuals make countless risky decisions under uncertainty on a daily basis. These range from high-stakes situations such as surgeries, to habitual decisions such as the mode of transportation. Although stable trait-like predictors of interindividual differences (e.g., a person's risk preference) have been identified, up to 50% of variance in individual risky choices remain unexplained. With the current study, we investigate one potential mechanism underlying the variability in risk taking between different choice-situations, specifically, the perception of uncertainty. People intuitively distinguish epistemic uncertainty, reflecting a lack of subjective knowledge about the world, from aleatory uncertainty, referring to the innate randomness of the world. Previous laboratory research has found that one becomes increasingly risk-averse the more epistemic one perceives the uncertainty to be, however, it remains unclear if this tendency generalizes to real world decisions. We are targeting this gap by tracking an individual's decisions during their everyday life with an experience sampling study. This enables us to model how different levels of epistemic uncertainty can predict participant's risk taking in various situations. Additionally, we are collecting data on individuals' perception of situational uncertainty with a classic, yet often neglected method: Participants record think-aloud protocols, describing decision-situations as they experience them. With the resulting language-data, we investigate two novel research questions. First, we use participants' verbal descriptions of choice-situations to quantify the degree of uncertainty an individual faces, and to predict variability in risk taking. Second, explore a relatively new way of using natural language data to model which features of a situation are relevant, salient, and accessible to individuals when making decisions,

captured in the situation itself. With that, we can show how semantic information such as word embeddings can be used for inferring cognitive processes underlying decision-processes such as risk taking.

-Break (20 min.)-

15.25-15.50 Integrating three perspectives on real-life risk taking

Olivia Fischer[1], Frey, Renato[1]
[1]*University of Zurich, Switzerland*

1. Background
   How people deal with risks is a key question of the behavioral sciences. But what do different stakeholders have in mind when they talk about "risk taking"? It is currently unclear to what extent the risky choices studied in research align with actual concerns of people's everyday lives, as well as with actuarial data on the severity of the consequences of these risky choices. In this project, we aim to bridge this gap by taking a three-perspective approach to the study of real-life risky choices. Specifically, we will compare the prevalence of risky choices across the research, layperson, and actuarial perspectives to thereby address the following research question: To what extent do these three perspectives (dis)agree on the importance of different types of risky behaviors and the consequences they may entail?
2. Methods
   For the layperson perspective and by means of representative population surveys, we have already assembled an extensive inventory of real-life risky choices that laypeople had faced in their own lives. For the research perspective, we are currently finalizing data collection for a preregistered survey of researchers in different behavioral science subfields. We asked participants about frequency measures of risk taking (i.e., "How often...?") they were familiar with or used to capture the frequency of real-life risky behaviors in their own research. For the actuarial perspective, we are conducting a literature review to gather information on the consequences of risky behaviors described in the research and layperson perspectives, such as costs and life years lost.

3. Analytic pipeline
   We are running a comparative analysis on the resulting inventory of unique real-life risky choices across the three perspectives. The outcome will refine the focus of risk research and help the field make informed decisions about the most relevant risky choices to study.

15.50-16.15 Adapting data collection methods for risk perception research in the global South

Nadja Contzen[1]
[1]*Eawag: Swiss Federal Institute of Aquatic Science and Technology, Zurich, Switzerland*

A large part of psychological research in general and of risk perception research in particular stems from high-income countries in the global North. The majority of the global population, however, lives in low- and middle-income countries, mostly located in the global South. Not least because people in these regions are especially vulnerable to both health and environmental risks, there is an urgent need to strengthen risk perception research in the global South. However, many of the data collection methods we regularly use in the global North, such as (online) questionnaires, are not applicable in the global South or have to be adapted to the respective context. This is especially true when conducting research with vulnerable communities, such as people living in informal settlements or rural pastoralists, as in these communities literacy is usually low. In this talk, I will present some of the data collection methods me and my colleagues adapted in our risk perception research in the global South, including but not limited to research with vulnerable communities. This includes projects on public opinions on solar radiation management, on behaviour change in the field of Water, Sanitation, and Hygiene (WaSH), and on intentions to switch to sustainable farming. The adapted methods span from questionnaire translation, where group translations have often proven to be the best method, over item testing, for which cognitive interviewing have proven as a valuable method, to the actual data collection, which is usually done through structured face-to-face interviews. For each adapted method, I will discuss the lessons learned as well as remaining issues.

16.15-16.40 Citizen workshops on EMF as an instrument of participatory risk communication research

Himmelsbach, Elke[1]; McDonnel, Sophia[1], **Corinna Lüthje[2]**
[1]Kantar Public, Munich, Germany; [2]Bundesamt für Strahlenschutz, Salzgitter, Germany

To inform about radiation risks, the Federal Office for Radiation Protection (BfS) initiated and funded a project "citizen workshops", where randomly selected citizens listen to talks by experts and themselves. To measure the effectiveness of such events in increasing knowledge and impacting individual risk assessment, we developed an empirical, theory-based evaluation design.
In June 2022, citizens in four German cities were randomly contacted with an invitation to a citizen workshop on 5G and health. We then reached out to those who signed up with a quantitative telephone survey measuring attitudes towards 5G and health, risk evaluation and other general values. Everyone who completed the survey was invited to take part in in-person citizen workshops in September 2022. In total, 134 citizens took part. Two weeks after, we conducted another telephone survey testing some of the attitudinal factors measured earlier and asking respondents to evaluate the events. Consequently, we could measure within-person differences and between-person differences. To measure whether changes in beliefs were sustainable, we carried out another telephone survey 2 months after and are preparing a third wave 4 months after.
Analysis of the first post-event survey shows significant shifts in several attitudes and health risk evaluation towards 5G. Concerns have decreased considerably, while knowledge about the topic in general have increased. The analysis of the quantitative surveys, qualitative observation and qualitative interviews with some participants revealed that particularly the engagement with credible experts and peer discussions contributed here. We plan to use statistically advanced methods to isolate the impact of intervening factors. We consider this project valuable because to our knowledge, few citizens' dialogue events have been empirically validated. We employed an ambitious survey design consisting of a quantitative baseline measurement and several directly comparable follow-up measurements supplemented by qualitative data.

-Break (15 min.)-

16.55-17.20 Providing necessary information vs. biasing results – Challenges of assessing perceptions of new technologies

Josianne Kollmann[1], Contzen, Nadja[1]
[1]*Eawag: Swiss Federal Institute of Aquatic Science and Technology, Zurich, Switzerland*

Public health and environmental challenges often require the development and implementation of new technologies. Yet, how successfully such technologies can be implemented often depends on peoples' perceptions of the technologies' risks, costs, and benefits. The lower people perceive the risks and costs and the higher they perceive the benefits, the more likely they are to find the technology acceptable and to use it. To better be able to predict whether a new technology will be accepted by the general public, it is therefore helpful to investigate public perceptions of the technology before its implementation or even already during the development phase. Yet, this approach inherently implies that most people are not yet familiar with the technology of interest, which makes it necessary to provide study participants with information about the technology, for example in the beginning of the study. This brings with it the challenge that the information provided may not only inform but also bias participants' perceptions. For example, the selection of risks, costs, and benefits presented as well as the wording used for their description may influence how people subsequently perceive the technology. Thus, a careful selection of the information presented in the study is crucial. Moreover, providing participants with 'objective' risk estimates might directly translate into participants' answers in the questionnaire and not necessarily represent individual risk perceptions. Thus, what is needed is a balanced presentation with enough room for participants to develop their personal perceptions. In this presentation, we aim to discuss with the audience the challenges of this approach. Specifically, which information about new technologies (or other risk-inherent developments) to present and how to present it best.

17.20-17.45 Creating Fast and Frugal Heuristics Against Cybersecurity Risks

Thierry Schaltegger[1]
[1]*University of Zurich, Switzerland, Zurich University of Applied Sciences, Switzerland*

In my last paper, I argued for the use of fast and frugal heuristics to combat different cybersecurity risks. The aim of this work was to demonstrate that while the current methods we use are great for eliciting and sharing historical knowledge, they are not sufficient to deal with the evolving, uncertain threat we have to deal with in the cybersecurity domain.
I laid out the theoretical arguments for the use of heuristics rather than complex statistics in predicting uncertain environments. This point was further reinforced with examples of practical applications in different domains where heuristics outperformed more complex decision algorithms like medical diagnostics or deception detection in both speed and accuracy. The military context delivers a great example of how to create one's own fast and frugal decision tree to solve novel and time-critical problems. Another approach is the construction of such a decision tree through the use of a novel algorithm. Both of these examples offer promising strategies to tackle diverse problems from phishing detection to incident response and vulnerability assessment, yet they still have to be applied in a cybersecurity context.
The next paper I am working on aims to gather the specific strategies of experts in different cybersecurity-related tasks and transform this knowledge into fast and frugal heuristics which can be shared with non-experts.
The goal of this talk is to discuss the methodological hurdles one has to overcome when measuring risk and decision-making in the cybersecurity context. The first task is how to measure and define optimal risk assessment and what an adequate response should look like. The next question then is, how to distill this knowledge into simple, teachable guidelines.

17.45-18.10 Engaging stakeholders for risk governance and management of climate change adaptation (CCA) and disaster risk reduction (DRR): A systematic literature review

Paul Einhäupl[1], Bharwani, Sukaina[2], Parviainen, Janne[2], Hochrainer-Stigler, Stefan[3], Cubie, Dug[4], Cumiskey, Lydia[4], Steinhausen, Max[5], *Schweizer, Pia-Johanna*[1]
[1]Systemic Risks Research Group, Research Institute for Sustainability – Helmholtz Centre Potsdam (RIFS), Germany, [2]SEI Oxford Office Limited, Oxford Eco Centre, United Kingdom, [3]Internationales Institut für Angewandte Systemanalyse (IIASA), Laxenburg, Austria, [4]University College Cork, Ireland, [5]Technische Universität Braunschweig, Germany

The recent droughts in Central Europe and unprecedented floods in Central Europe have disclosed our vulnerability to extreme weather events. Besides climate change as a driver of more frequent and intensifying weather extremes, demographic change and socio-economic development exacerbate severe impacts. International frameworks for disaster risk reduction and climate change adaptation (e.g. SENDAI framework, EU Strategy on adaptation to climate change) acknowledge the critical need for integrating risk governance, communication and operational mechanisms for coping with extreme climate events throughout the entire Disaster Risk Management cycle. To integrate current state-of-the-art governance approaches for improved knowledge integration by means of co-creative approaches towards user and stakeholder engagement and increased accountability, we first need to identify and analyses existing methods. Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Page et al. 2021), we have developed a protocol for a systematic literature review and started the review process. The aim of the systematic review is to provide a state-of-the-art overview of risk governance and risk management approaches through stakeholder engagement and transdisciplinary knowledge co- production processes. The review will focus on the areas of climate change adaptation (CCA) and disaster risk reduction (DRR). It is anticipated to better understand the three academic communities, i.e. the CCA, DRR, and risk governance community, to identify commonalities and differences as well as potential for effective collaboration. Findings will be synthesized qualitatively to identify similarities and differences as well as strength and weaknesses.

Quantitative analysis regarding the occurrence of certain approaches should help to identify research gaps and develop a taxonomy. We will present an overview of the protocol development process as well as preliminary results of the systematic literature review. We aim to further synthesize the results to inform the development process of an integrated framework for the assessment of systemic risks. This should entail the qualitative identification and assessment of systemic risks, ethical and societal implications, as well as the quantitative analysis thereof.

-Check-in at hotel, transfer to restaurant-

19.30 **Conference Dinner at Badische Weinstuben**

Thursday Sept. 28

8.30-8.55 Risk communication of hypothesis test results

Christoph Böhmert[1], Schulz, Carolin[1]; Grotheer, Melanie[1]
[1]*IU Internationale Hochschule, Erfurt, Germany*

Establishing new scientific knowledge operates by falsification or verification of scientific theories, which are often translated into hypotheses in statistical models where the latter are then tested via empirical data. Hypothesis tests are applied in a wide range of scientific domains and disciplines, including risk research. In many disciplines, especially in the social sciences, most researchers conduct hypothesis tests that follow the frequentist approach of testing hypotheses. An alternative approach that has not been used as extensively in most disciplines is the Bayesian approach. Both approaches differ in their fundamental definition of probability as well as in their central parameters. Nevertheless, the conclusions they reach are often similar. Arguments for and against each approach have been brought forward on statistical grounds. What has not yet been regarded is how well hypothesis test results obtained with one approach or the other can be communicated to lay audiences, i.e. how well the approaches fare in science communication (including risk communication). We addressed this question by means of online experiments in which we used text stimuli that either reported results of hypothesis tests in the frequentist

or the Bayesian manner, or purely descriptive results. Results are complex but suggest that results of Bayesian hypothesis tests might be better understood by lay audiences. Implications for risk communication are discussed and future alleys for research delineated.

8.55-9.20 Showing instead of telling: How visual stimuli can support the expression of hard-to-articulate beliefs.

Sarah Link[1], Eggeling, Marie[1]; Abacioglu, Ferdinand[1]; Böhmert, Christoph[1]
[1]*IU Internationale Hochschule, Erfurt, Germany*

Some topics that are relevant for risk research play only a minor role for the public. One example is mobile communications (MC), or more specifically the current expansion of the 5G-network. Perceptions regarding MC/5G are therefore difficult to measure. To capture laypeople's exposure perceptions of 5G as well as their siting preferences for MC base stations (BS), we used an innovative, image-based approach. We assumed that these visual stimuli would help participants express hard-to-articulate assumptions and trigger thinking about (implicit) attitudes. In order to assess exposure perception in different situations, respondents were given a series of pictures in which a person was surrounded by MC. However, in contrast to an earlier approach by Freudenstein et al. (2015), we asked participants to put themselves in the situation, think about, and discuss their perceived exposure. To better empathize with the person depicted, an over-the-shoulder perspective was chosen. In addition to the situational evaluation, a second task was a hierarchical ranking according to the individual's perception of exposure. Which sites laypeople prefer for a new BS antenna was surveyed as a third task with the support of visual material. Similar to Cousin & Siegrist (2010) and Cousin et al. (2011), participants were given a picture of a village with six possible BS-locations. However, all participants were first asked to make an intuitive decision before being informed that for regular smartphone users, individual exposure increases with increasing BS distance. Afterwards, they could change their selection. In both cases – for exposure perception as well as siting preferences – people's motivations and reasoning are explored rather than imposed. These image-based approaches will be presented and discussed. The method has already been successfully applied in six focus groups in December 2022. In August 2023, it will also be used in an international, quantitative study.

9.20-9.45 Increase understanding through stories: A storytelling approach for narrative risk communication

Marie Eggeling[1], Link, Sarah[1]; Abacioglu, Ferdinand[1]; Böhmert, Christoph[1]
[1]*IU Internationale Hochschule, Erfurt, Germany*

"Imagine the world 300 years in the future. The discovery of warp-technology now allows humans to travel across the universe and interact with other civilizations, enabling revolutionary technological, scientific and societal advances as well as interplanetary alliances."
Scenarios like this (from the Star Trek Universe, TnG, s7xe09) could be used for narrative risk communication by parallelizing them with present issues. Risk communicators are challenged with making risk information understandable and vivid to the public, in order to persuade risk reduction behaviour or support informed decision making, e.g., regarding possible precautionary measures (Cho & Friley, 2014). Narratives have the potential to do that by triggering imagination and emotion, however they can also constrain rational information processing and bias judgements (Winterbottom et al., 2008). Using a fictional situation which is only related to the topic in question may encourage self-reflection and could be particularly helpful when communicating with people who have strong prior attitudes toward the topic and are therefore more likely to perceive information selectively in order to avoid cognitive dissonance. Even though risks of warp-technology are purely fictional, parallels to current issues like environmental pollution and climate change can easily be drawn. The scenario continues: "However, evidence is found that warp-technology has negative effects and poses a risk for some planets. Measures to restrict warp-travel appear appropriate, however society's dependence on the technology and disagreements between governments influence risk perception of citizens and decision makers." Moreover, similar scenarios for other risk-related topics could be created. This storytelling approach could encourage people to change perspectives for a while, think about the topic in a new way and consider different points of view. How exactly this approach might work and what should be considered when establishing the parallels to the actual risk in question is open to discussion.

-Break (15 min.)-

10.00-10.45 **Keynote 2:**
Peter M. Wiedemann will critically examine the relevance of surveys on risk perceptions for policy advice. Based on an online study (N = 1653) he will argue that risk perceptions can be recorded in a more differentiated way if the affective, thematic, and motivational relevance of risk perceptions are assessed.

Peter Wiedemann[1]
[1]*Monash University, Melbourne, Australia*

10.45-11.10 Protecting the same ecosystem under different regulations: Differences and similarities of prospective and retrospective risk assessment for pesticides

Alexandra Kroll[1], Andres, Sandrine[2]; Casado, Carmen[1]; Duquesne, Sabine[3]; von der Ohe, Peter[3]; Aldrich, Annette[4]; Junghans, Marion[1]
[1]*Oekotoxzentrum, Dübendorf, Switzerland;* [2]*INERIS: Institut National de l'Environnement Industriel et des Risques, Verneuil-en-Halatte, France;* [3]*UBA: Unabhängige Beschwerdestelle für das Alter, Zurich, Switzerland;* [4]*BAFU, Bundesamt für Umwelt, Bern, Switzerland*

The regulatory framework and thus scope of environmental risk assessment of chemicals depends on the intended use of the respective substance. Consequently, several environmental threshold values may be available for the same substance due to data requirements and availability under different regulations. Further, for many industrial chemicals and pharmaceuticals, no environmental risk assessment is available at all. In view of these discrepancies, the European Commission has set a goal coined “one substance one assessment” and currently finances a large 7-year project to improve regulatory risk assessment also for human health (PARC). As a case study within PARC, we currently perform a review of the effects and exposure assessments for pesticides under different prospective regulations 1107/2009 (plant protection products), 528/2012 (biocidal products), 2019/6 (veterinary pharmaceuticals) as well as the retrospective directive 2000/60/EC (water framework directive) with a focus on water and sediment and compare actual risk assessments for substances regulated under all four legal frameworks. The planned ouput of the case study are recommendations for regulators in decision making and for consolidation of the assessments.

-Break (15 min.)-

11.25-11.50 Challenges in chemical risk assessment

Lothar Aicher[1]
[1]*Swiss Centre for Applied Human Toxicology, University of Basel, Department of Pharmaceutical Sciences, Basel, Switzerland*

Human health risk assessment clarifies if and to what extend chemicals presents a health risk. It is a structured five-step process encompassing problem formulation, hazard identification, hazard characterization, exposure assessment and risk characterization. Chemicals are typically evaluated as individual substances, primarily based on animal studies. Although this approach works reasonably well, it is increasingly challenged. The chemicals market is expected to grow fast and new chemicals will be developed to solve challenges in health, energy and climate change, water and food production. As a result, more chemicals need to be evaluated for a growing number of different applications. Current methods are considered inefficient in this context. They take too long, cost too much and consume too many animals. Also, the relevance of animal testing for human safety assessment is questioned because of species differences. Similarly, testing individual chemicals in isolation is criticized as inappropriate because in real life we are exposed to a variety of chemicals simultaneously. Therefore, the next generation risk assessment needs to incorporate alternative non-animal methods that are faster and cheaper, based on human cell lines and capable of assessing risk to chemical mixtures. Alternative approaches have been developed to some extent, but regulators rarely apply them. This presentation will address technical aspects of the current and future risk assessment process and challenges in risk communication. The latter may result from the public's unwillingness to acknowledge uncertainties in the assessment and accept certain residual risks, or from a lack of confidence in the assessment process, especially if new data require a revision of the expert assessment. Laypersons may interpret uncertainty as incompetence, and experts may lose credibility if they revise their assessments based on new data. They are assumed to be wrong again because they have already drawn incorrect conclusions in the past.

11.50-12.15 Assessing preschool children's risk perception of household chemicals: A behavioral approach

Noah Bosshart[1]

[1]*ETH: Eidgenössische Technische Hochschule, Zurich, Switzerland*

The ability to perceive and assess risk is crucial for preschool children, as it provides a possible guide for their decision-making and behavior. However, in a complex and ambiguous world, children's ability to recognize risks is limited and their risk perceptions might sometimes be distorted. It is of interest to public health, to understand these limitations and distortions. During my doctoral studies, I dealt intensively with how to conduct behavioral studies with preschool children and how to assess their risk perception in the context of unintentional poisonings with household chemicals. In a short talk, I want to share my experience about the Do's and Don'ts in behavioral studies with children and how their risk perception can be assessed under consideration of their cognitive development. Children are not simply small adults, and many methods established in risk research (e.g., observation of risk perception and behavior, measurement of risk aversion) need to be adapted with the support of insights from developmental psychology. The goal of the talk is to engage in a methodological discussion and to provide an overview of study procedures, paradigms, and tasks that help to conduct risk perception studies with children.

12.15-12.30 **Feedback and Quo Vadis Conference**

From 12.30 **Brown-bag Lunch (take-away possible) and Departure**