

Computational Modelling of (Semantic) Plausibility

PLAUSI+++

Goal: Build a novel system for modelling what is plausible as compared to the implausible, considering a range of highly relevant cognitive and socio-linguistic parameters that contribute to more fair and accessible computational systems



Computational Approach + Novel System



Cross-Lingual Perspective



Cognitive + Socio-Linguistic Aspects

Defining (Semantic) Plausibility

Semantic plausibility as the ability to discern what is plausible from what is implausible

→ necessary building block for natural language understanding

- **Socio-theoretical perspective:** Plausibility as assessment by a majority based on a common understanding horizon (e.g., Böhnert & Reszke, 2015)

absurd

plausible

necessarily true

→ well-suited relational (≠ objective) criterion for the large number of linguistic expressions between the absurd and necessarily true

- **Goal:** Test the notion of (semantic) plausibility across languages with various cultural backgrounds

DE Die Komponente <Motor> auf Raumtemperatur abkühlen lassen.
EN Allow the component <Engine> to cool down to room temperature.

DE Die Freiheit der Person ist unverletzlich.
RU Свобода человека нерушима.

- **Focus:** Model plausibility in German, Russian, and English data
- **Approach:** Collection of multilingual data based on existing datasets (e.g., Wang et al., 2018; Emami et al., 2021), development of transformer baselines approaches

- **Goal:** Model plausibility using contextual information for (1) phrase/sentence level plausibility (2) multi-sentence level (discourse)
- **Approach:** Harness/collect and model corresponding cross-lingual data (cf. sentence-level: Emami et al., 2021, Pyatkin et al., 2021a)

- **Goal:** Explore relation between (semantic) plausibility and reality and
- **Focus:** Model assumptions with respect to, e.g., fictional language as not *per definitionem* true, but potentially plausible
- **Approach:** Compare factual (Rudinger et al., 2018), fictional, and 'fake'tional (Strässle, 2019) language

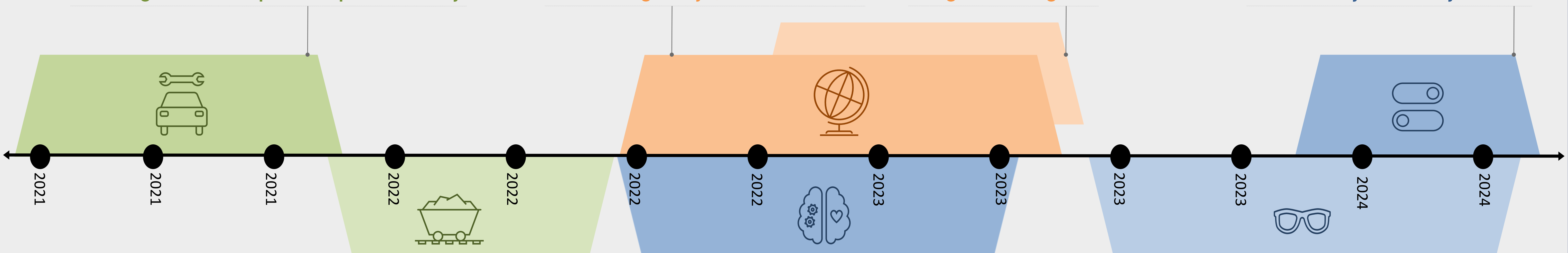
- **Goal:** Develop and formulate PhD topic (in cooperation with the Robert Bosch GmbH)
- Comprehensive review of the state of research
- **Focus:** Vehicle repair domain with specific use cases (search, Q&A, text mining, ...)
- **Data Collection:** Repair shop case study incl. in-presence interviews to elicit user requirements, post-processing, analysis and presentation of data
- **Bosch (internal) projects:** Prototype development, Relation Extraction project

Starting Phase | Repair Shop Case Study

Cross-Linguality (EN ↔ DE ↔ RU)

Linguistic Targets

Plausibility ↔ Reality | Facts



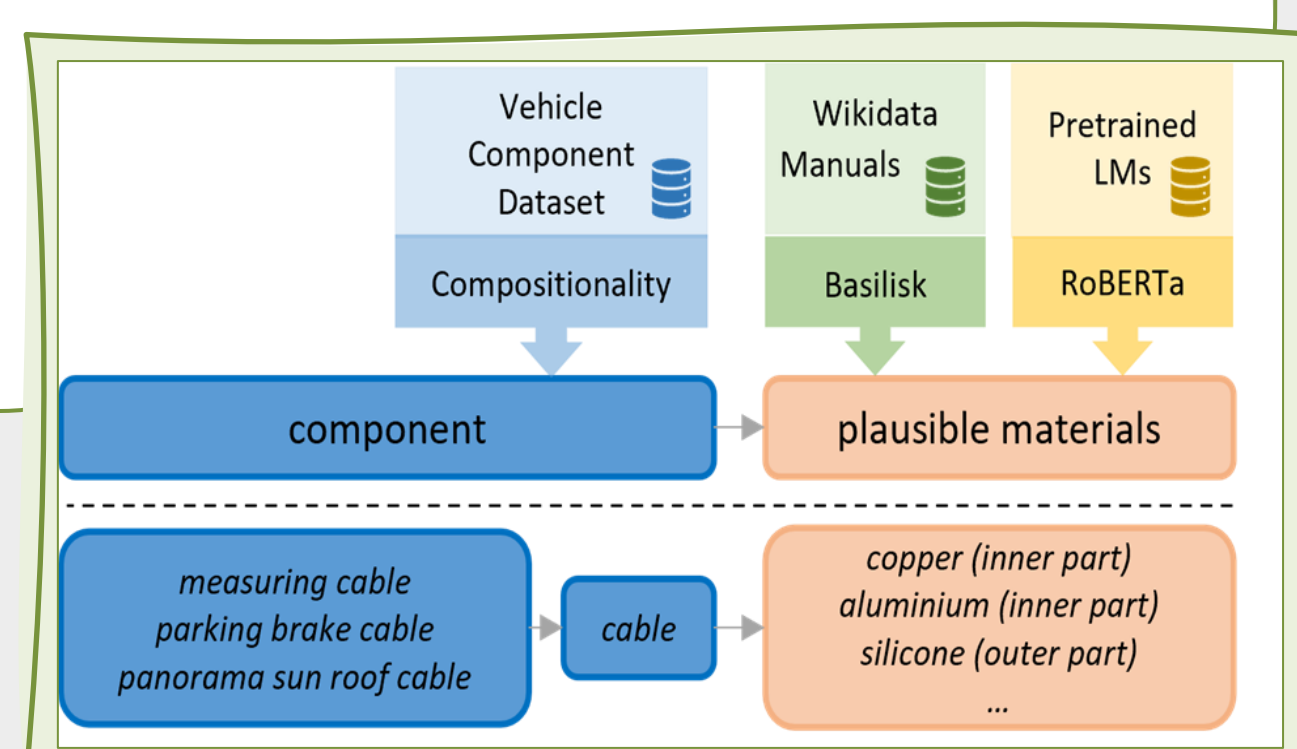
Domain-Specificity | Physical Plausibility

Concrete-/Abstractness

Bias | Human Disagreement

- **Goal:** Explore domain-specific *physical* semantic plausibility in a mono-lingual setting (cf. Wang et al., 2018; Porada et al., 2019)

- **Focus:** Connect observed symptoms to potential underlying cause in vehicle repair domain
- **Solution:** Learn domain-specific plausible materials for vehicle components in the vehicle repair domain
- **Methods:** Pattern-based bootstrapping algorithm (Thelen and Riloff, 2002) vs. pretrained LM (Liu et al., 2019; Clark et al., 2021) using cloze prompt templates, exploit compound-head compositionality for domain-specific multiword expressions (Häyry et al., 2021)
- **Preliminary findings:**
 - Bootstrapping performs well
 - LM further prompt/fine-tuning



- **Goal:** Model and test physical (concrete) vs. abstract semantic plausibility in a systematic, cross-lingual setting (cf. Emami et al., 2021)

Sleep helps to maintain mental health.
*A well-told story only angers the interested reader.

- **Focus:** Analysis of similarities and differences of concrete vs. abstract semantically (im)plausible expressions
- **Approach:** Annotation/validation of concrete/abstractness in a cross-lingual setting, computational modelling

- **Goal:** Uncover potential *bias* and analyze *human disagreement* in the data collection and modelling process

Der Arzt vs. die Ärztin diagnostizierte die Krankheit schnell.
The doctor quickly diagnosed the disease.

Flüchtende können einen Beitrag zur Gesellschaft leisten.
Europäische Flüchtlinge können einen Beitrag zur Gesellschaft leisten.

- **Approach:** Harness prototypical knowledge for bias detection (e.g., Rosch et al., 1977; Jiang and Riloff, 2021), collect and generate explanations for plausibility judgements, integrate human disagreement on various levels, incl. extending evaluation beyond 'hard' metrics (Basile et al., 2021; Fornaciari et al., 2021b)

Project Embedding

Institute for Natural Language Processing (IMS)
SemRel Research Group
Apl. Prof. Dr. Sabine Schulte im Walde

Project Partner

Until 5.2022:



BOSCH

Starting 8.2022:



Hanns Seidel Stiftung



Institut für Maschinelle Sprachverarbeitung