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- Director of Institute of Legal Informatics, Saarland University
- Judge, Oberlandesgericht Hamm [higher regional court] (2012–2015)
- Chairman of the Board, Arbeitsgruppe Identitätsschutz im Internet, a-i3 [Working Group Identity Protection on the Internet, a-i3]
- Member of the Board, EDV-Gerichtstag e.V. [German Association for eJustice]
- Member of the Board, Stiftung Datenschutz [Data Protection Foundation]
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Agenda

I.   **Introduction**

II.   **The Potential of Collecting Implicit Rules From Case Law**

III.   **Conclusion**

1

Introduction

Automated Driving and Traffic Rules

- Sec. 1e para. 2 No. 2 German Road Traffic Act (StVG): **Compliance with traffic rules**

Sec. 1e German Road Traffic Act
Operation of motor vehicles with autonomous driving function
(2) Motor vehicles with autonomous driving function shall provide for technical equipment capable of,
[...]
2. complying independently with the traffic regulations addressed to the vehicle driver

Automated Driving and Traffic Rules

- **Prerequisite:** Knowledge of the relevant traffic rules

- **Theses:**
    1. There is a sufficiently large body of known and accepted traffic rules to enable participation in road traffic.
    2. Gaps in the traffic rule body can be closed by a safety rule (minimal risk condition; *risikominimaler Zustand*)

Which rules does the body of known and accepted traffic rules comprise?

The Body of Traffic Rules

- Statute

> *Section 4 of the German Road Traffic Ordinance (StVO)*
>
> **Distance**
>
> (1) [1]A person operating a vehicle moving behind another vehicle must, as a rule, keep a sufficient distance from that other vehicle so as to be able to pull up safely even if it suddenly slows down or stops. [2]The person operating the vehicle in front must not brake suddenly without a compelling reason. […]

- Traffic signs, as indicated by statutes

> *Section 41 of the German Road Traffic Ordinance (Straßenverkehrsordnung, StVO)*
>
> **Regulatory Signs**
>
> (1) Road users must comply with the requirements or prohibitions indicated by the regulatory signs shown in Annex 2.

- Case Law

- Other Authorities (Experts)

2

The Potential of Collecting Implicit Rules From Case Law

The Corpus of Traffic Rules

- **Goal:** Systematic compilation of known and generally accepted rules in road traffic law

- **Approach:** Identification of norms in five steps
  - (1) Identifying pertinent sources
  - (2) Extracting the fragment containing normative statements from the source
  - (3) Extracting the norm form the normative statement = making the implicit rule explicit
  - (4) Classification of the normative statement (new rule vs. variation of the same rule)
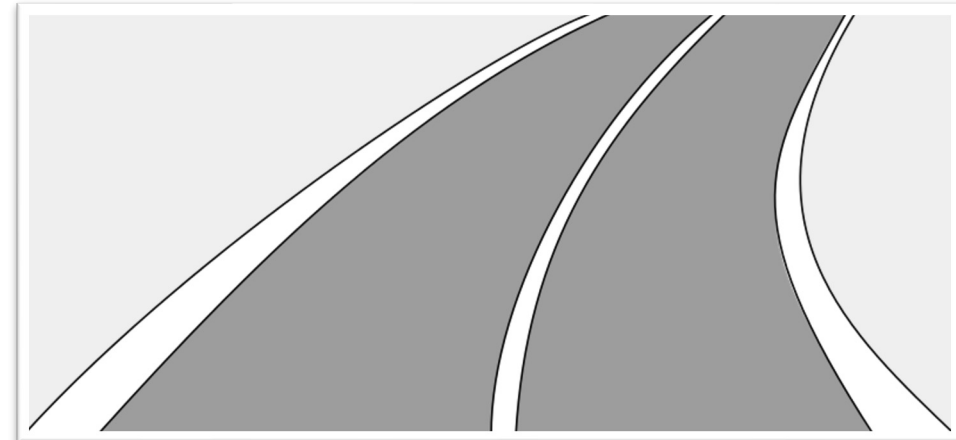 - (5) Checking acceptance of the rules
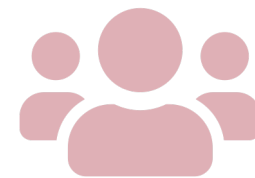
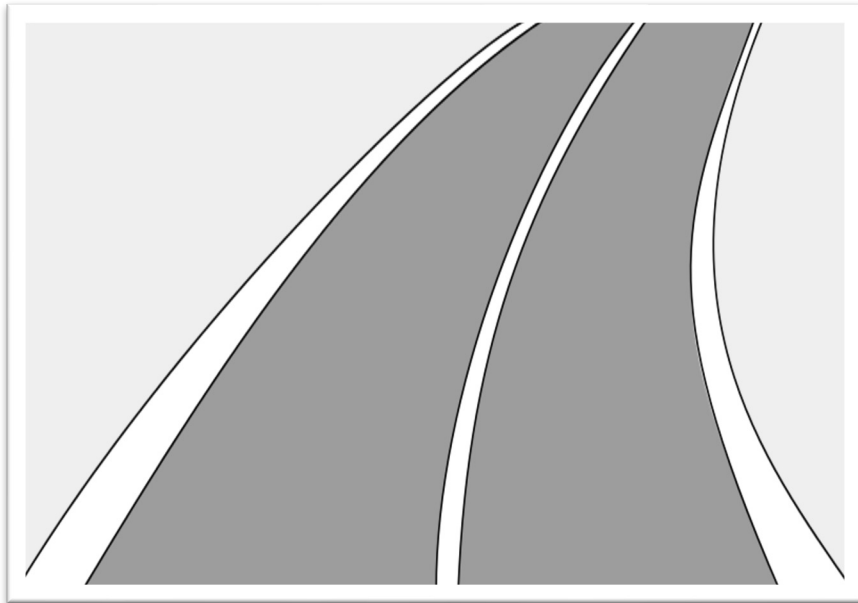# Systematic Compilation of Traffic Rules

- Approach in the KI Wissen project: Systematic rule compilation based on two sets of legal rules
    - Sec. 6 German Traffic Law Ordinance (StVO)
    - Sign 295

Sec. 6 StVO ("passing")

Sign 295

# Systematic Compilation of Traffic Rules

Sign 295

68.

1.

a) A person driving a vehicle may not even partially cross the continuous line.

b) If the continuous line separates the part of the carriageway or the special path for oncoming traffic, one must drive to the right of it.

[...]

Approach by the Example of Sign 295

Step 1: Collecting court rulings on sign 295

- **Method:**
  - Research in legal databases (Juris, Beck-Online) on keyword "sign 295"
  - Research in VRS case law collection on keyword "sign 295"
  - Research on references to (in decisions, literature)
  - Registration of decisions in a list

- **Result:**
  - 172 court rulings on sign 295
  - 45 court rulings relevant
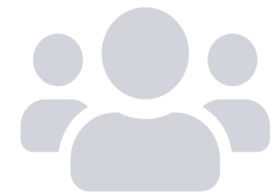
Approach by the Example of Sign 295

Step 2: Extraction of pertinent fragments of a judgment

- Currently: Manual screening of decisions and extraction of pertinent fragments by experts

- Ongoing project (with NII, Japan): automatic annotation through machine learning

- Result: approx. **65 statements** with normative content

Approach by the Example of Sign 295

Step 3: Testing or establishing knowledge of the rule

- Classification of court statements as normative statements
  - Test: Possibility of formulating a pertinent fragment as a rule following the scheme of a conditional sentence ("if...then") by expert team (2 to 5 experts)
  - Result: approx. **55 known normative statements** (rules)
- Example:

  "If head markings are unclear and look like a broken line, the driver cannot be accused of crossing the line." (Definition of "solid line"; source: *König* in: Hentschel/König/Dauer Straßenverkehrsrecht, 45th ed. 2019, § 41 StVO mn. 248l)

Approach by the Example of Sign 295

Step 4: Classification of the normative statement

- **Goal:** Identifying and classification of (new) rules in normative statements

- **Biggest challenge:** Determining of differences in content in divergent wording.

- **Example:**

  - *"If a driver is travelling on a road with an uninterrupted lane line, he may not overtake if he would have to cross the lane boundary to do so."*
  (OLG Oldenburg 28.1.1958 – Ss 484/57)

  - *"If a driver is driving on a road with a solid white line, then he must not use the oncoming lane when overtaking."*
  (OLG München 15.3.2019 – 10 U 2655/18)

Approach by the Example of Sign 295

Step 4: Classification of the normative statement

- Approach: Classification of normative statements into 5 categories

  (1) New rule

  (2) Specification in rule

  (3) Specification in fact/condition

  (4) Variation in wording

  (5) Different rule

Approach by the Example of Sign 295

Step 4: Classification of the normative statement

- Approach: Classification of normative statements into 5 categories

  - New rule = norm with different content

  - Variation in new rule, main cases

  - Exceptions

    Example: *"If a driver is travelling on a road with a continuous line, he may exceptionally cross the continuous line if an obstacle is blocking the carriageway and cannot be expected to be removed immediately and it is not possible to continue driving in any other way and there is no danger to oncoming traffic."* (*König* in: Hentschel/König/Dauer Straßenverkehrsrecht, 45th ed. 2019, § 41 StVO mn. 248l)

  - Consequences

    Example: *"If a driver drives along a carriageway with an unbroken line, he may rely on not being overtaken by a following driver if this is only possible by driving over the unbroken line."* (OLG München 15.3.2019 – 10 U 2655/18)

Approach by the Example of Sign 295

Step 4: Classification of the normative statement

- Approach: Classification of normative statements into 5 categories

  - Specification in rule

    = Rule with additional conditions

  - Example:

    - **Rule**: *"If a driver is travelling on a road with an uninterrupted lane line, he may not overtake if he would have to cross the lane boundary to do so."* (OLG Hamm 13.7.2021 – 7 U 66/20)

    - **Specification**: *"If a driver is driving on a carriageway with a continuous line and the carriageway is so narrow that overtaking is not possible without crossing the line, then the driver may not overtake."* (OLG Hamm 29.7.1957 – 2 Ss 893/57)

Approach by the Example of Sign 295

Step 4: Classification of the normative statement

- Approach: Classification of normative statements into 5 categories

  - Specification in fact/condition

    = Rule specifying one condition, e.g. in fact

- Example:

"If a driver is driving on a carriageway with an unbroken line on his left-hand side and there is another broken line to the left of the unbroken line pointing towards the neighbouring carriageway, he must not cross the unbroken line in combination with the broken line."
(OLG Oldenburg 19.12.1967 – Ss 317/67)

Approach by the Example of Sign 295

Step 4: Classification of the normative statement

- Approach: Classification of normative statements into 5 categories
  - Variation in wording

    = Description of identical content by different words
  - Example:
    - **Rule**: *"If a driver drives along a carriageway with an unbroken line, he may rely on not being overtaken by a following driver if this is only possible by driving over the unbroken line."* (OLG München 15.3.2019 – 10 U 2655/18)
    - **Variant**: *"If a driver is driving on a carriageway with a continuous line and the carriageway is so narrow that the driver behind him can only overtake by driving over the continuous line, then he may rely on not being overtaken."* (BGH 28.4.1987 – VI ZR 66/86)

Approach by the Example of Sign 295

Step 4: Classification of the normative statement

- Approach: Classification of normative statements into 5 categories
  - Different rule

    = the rule belongs to another rule as a specification
    to that other rule
  - Example:

    "If a driver is travelling on a lane with a solid line separating another lane in the same direction, a normal overtaking distance must be maintained when overtaking."
    (*Kettler* in: Münchener Kommentar Straßenverkehrsrecht Volume 1, 1st ed. 2016, § 41 StVO mn. 86)

Approach by the Example of Sign 295

Step 4: Classification of the normative statement

- Result for Sign 295

  - 8 new rules

  - 16 specification in rule

  - 8 specification in fact/condition

  - 13 variations in wording

  - 10 different norms

Approach by the Example of Sign 295

Step 5: Checking the recognition of the rule

- **Concept:** A rule is generally recognized if
  - It is confirmed by a judgment of the Federal Supreme Court (Bundesgerichtshof, BGH)
  - It is not contested and confirmed by
    - At least two judgments of lower courts
    - At least one judgments and another source (literature)
  - It is contested and confirmed by
    - A clear majority of judgments of lower courts
    - A majority of judgments and other statements (literature)
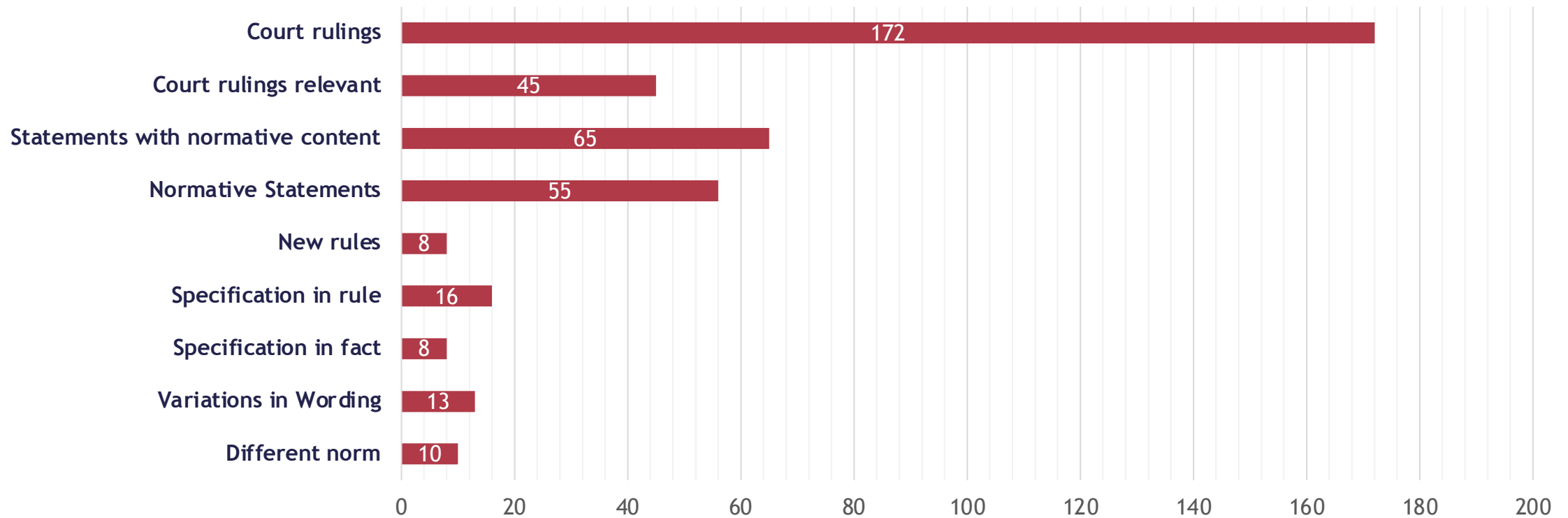- **Result:** Acceptance of almost all standards from case law

Approach by the Example of Sign 295

2. Case Law

Interim Result

Category	Value
Court rulings	172
Court rulings relevant	45
Statements with normative content	65
Normative Statements	55
New rules	8
Specification in rule	16
Specification in fact	8
Variations in Wording	13
Different norm	10

Approach by the Example of Sign 295

3. Literature

- **Literature**

    = all written statements which neither belong to law nor case law

- **Task:** Collection of pertinent sources

  - Analysis of classical legal literature

  - Main source: commentaries = explanation of the content of laws

    (= specific genre of legal literature in the DACH region)

Approach by the Example of Sign 295

3. Literature

- **Few commentaries on sign 295**
  - Analysis of 12 commentaries

- **Results:**
  - Almost all rules from case-law analysis included
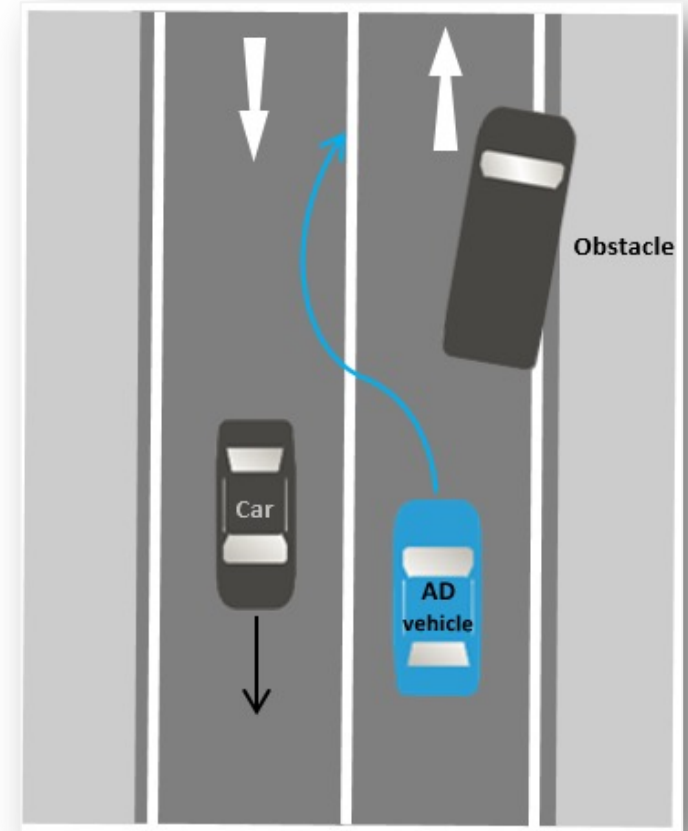 - Identification of additional rules

Approach by the Example of Sign 295

4. Qualitative Analysis of the Results on Sign 295

- **Results**
  - Exceptions to the legal rule
    - In certain cases, crossing the line is permissible
      - Obstacle on the road
  - Additional rules/Implicit rules
  - Prohibition of overtaking

3

Conclusion

Conclusion

The normative corpus of traffic rules

- **Considerable expansion of the normative corpus through rule mining from case law and literature**
  - *Quantitatively*
    - 2 rules in the law
    - 55 rules in case law/literature
  - *Qualitatively*
    - Exceptions to rules not mentioned in the wording of the law
    - Specification to the statutory rules

- new rules
- specification in rule
- specification in fact/condition
- variations in wording
- different norm

(pie chart values: 8, 16, 8, 13, 10)

- **Assumption:** Design of highly automated vehicles not possible without rule mining in the sense of systematic compilation of traffic rules not explicitly mentioned in the law.
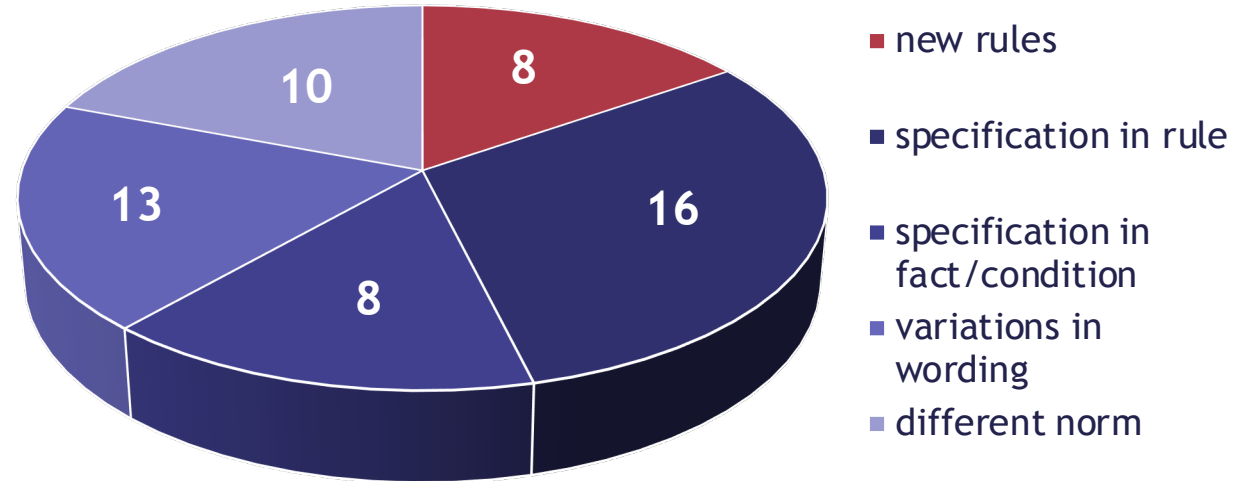
Conclusion

The vagueness of legal norms

- Thesis: General clauses can be split up in a set of more precise rules able to be formalised

Normative Conflicts

- Thesis: Most normative conflicts can be avoided by understanding conflicting norms as exceptions and counter-exceptions to rules

Question/next steps

- How can traffic rules be used for vehicle control?
- Potential for sufficient knowledge of traffic rules through systematic mining of the rules being not explicitly mentioned in the wording of the law?
- Comparison of explicit programming of traffic rules with machine learning approaches

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