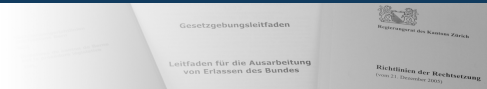


# Designing a Controlled Natural Language for the Representation of Legal Norms

Stefan Hoefler and Alexandra Bünzli

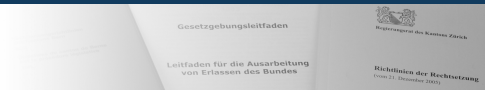
University of Zurich

# Overview



- ① Motivation
- ② Design Requirements
- ③ Design Decisions
- ④ State of Development
- ⑤ Conclusion

# Artificial intelligence & Law



## Tasks

- ① How can **legal reasoning** be formalised?
- ② How can **legal knowledge** be formalised?

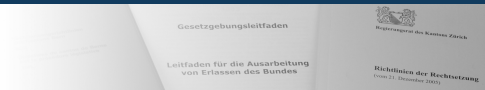
## Problem

*One of the main obstacles to progress in the field of artificial intelligence and law is the natural language barrier.*

*Since the raw materials of the law are embodied in natural language – cases, statutes, regulations, etc. – the designer of a knowledge-based legal information system today must translate them, by hand, into a formal language, just to get started.*

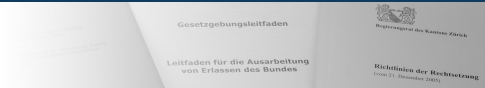
*(McCarty 2007:217)*

# Problem



Legal texts (statutes, regulations, etc.) must be translated manually into formal representations.

# Problem

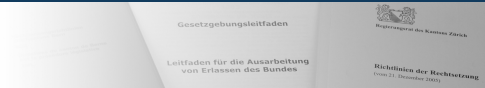


Legal texts (statutes, regulations, etc.) must be translated manually into formal representations.

## Knowledge engineer

- familiar with formal representations
- no legal expertise

# Problem



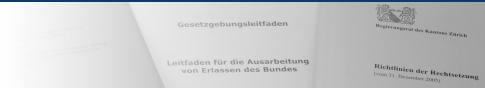
Legal texts (statutes, regulations, etc.) must be translated manually into formal representations.

## Knowledge engineer

- familiar with formal representations
- no legal expertise

→ Formal representations must be checked by a legal expert.

# Problem



Legal texts (statutes, regulations, etc.) must be translated manually into formal representations.

## Knowledge engineer

- familiar with formal representations
- no legal expertise

→ Formal representations must be checked by a legal expert.

## Legal expert (lawyer)

- legal expertise
- not familiar with formal representations

# Can controlled natural language bridge the gap?

Gesetzgebungsleitfaden  
Leitfaden für die Ausarbeitung  
von Erlassen des Bundes



Richtlinien der Rechtssetzung  
(vom 21. Dezember 2005)



# Can controlled natural language bridge the gap?

Gesetzgebungslitfadens  
Litfadens für die Ausarbeitung  
von Erlassen des Bundes



Richtlinien der Rechtssetzung  
(vom 21. Dezember 2001)

## Research question

Can we develop a controlled natural language that can serve as an **interlingua** between legal texts and formal representations?

# Can controlled natural language bridge the gap?

Gesetzgebungsleitfaden  
Leitfaden für die Ausarbeitung  
von Erlassen des Bundes



Richtlinien der Rechtssetzung  
(vom 21. Dezember 2001)

## Research question

Can we develop a controlled natural language that can serve as an **interlingua** between legal texts and formal representations?

## Controlled Legal German (CLG)

Can we design a controlled natural language for the representation of **legal norms codified in Swiss statutes and regulations**?

# Can controlled natural language bridge the gap?

Gesetzgebungsleitfaden  
Leitfaden für die Ausarbeitung  
von Erlässen des Bundes



Richtlinien der Rechtssetzung  
(vom 21. Dezember 2001)

## Research question

Can we develop a controlled natural language that can serve as an **interlingua** between legal texts and formal representations?

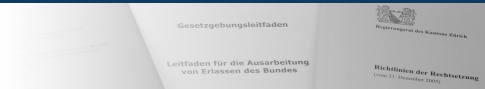
## Controlled Legal German (CLG)

Can we design a controlled natural language for the representation of **legal norms codified in Swiss statutes and regulations**?

## Requirements

- 1 CLG must be formal, i.e. have an unambiguous formal semantics.
- 2 Swiss legislative texts must be easy to translate into CLG.
- 3 CLG representations must be easy to verify for legal experts.

# What formal semantics?



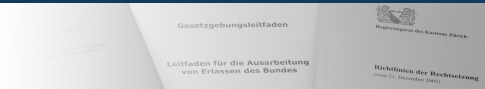
## Design requirement 1

CLG must be formal, i.e. have an unambiguous formal semantics.

**Question:** What form of logical representation shall CLG be mapped to?

**Problem:** Existing formats idiosyncratic; no standard available yet.

# What formal semantics?



## Design requirement 1

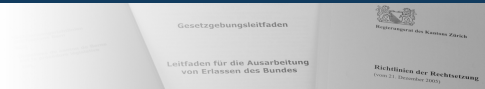
CLG must be formal, i.e. have an unambiguous formal semantics.

**Question:** What form of logical representation shall CLG be mapped to?

**Problem:** Existing formats idiosyncratic; no standard available yet.

Required inventory of logical concepts

# What formal semantics?



## Design requirement I

CLG must be formal, i.e. have an unambiguous formal semantics.

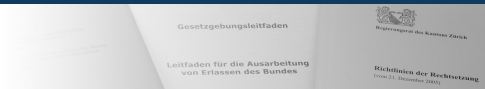
**Question:** What form of logical representation shall CLG be mapped to?

**Problem:** Existing formats idiosyncratic; no standard available yet.

## Required inventory of logical concepts

- FOL, intensional logic, temporal logic, ...

# What formal semantics?



## Design requirement I

CLG must be formal, i.e. have an unambiguous formal semantics.

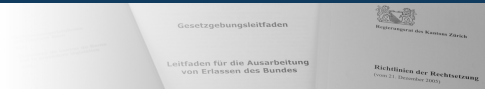
**Question:** What form of logical representation shall CLG be mapped to?

**Problem:** Existing formats idiosyncratic; no standard available yet.

## Required inventory of logical concepts

- FOL, intensional logic, temporal logic, ...
- deontic logic: obligation, permission, prohibition

# What formal semantics?



## Design requirement I

CLG must be formal, i.e. have an unambiguous formal semantics.

**Question:** What form of logical representation shall CLG be mapped to?

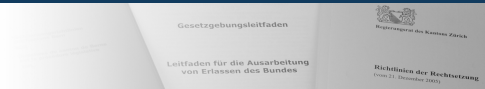
**Problem:** Existing formats idiosyncratic; no standard available yet.

## Required inventory of logical concepts

- FOL, intensional logic, temporal logic, ...
- deontic logic: obligation, permission, prohibition
- information required for defeasible reasoning:  
position of a rule in the text, status of the text, date, ...



# What formal semantics?



## Design requirement I

CLG must be formal, i.e. have an unambiguous formal semantics.

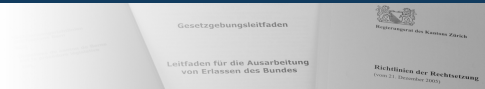
**Question:** What form of logical representation shall CLG be mapped to?

**Problem:** Existing formats idiosyncratic; no standard available yet.

## Required inventory of logical concepts

- FOL, intensional logic, temporal logic, ...
- deontic logic: obligation, permission, prohibition
- information required for defeasible reasoning:  
position of a rule in the text, status of the text, date, ...
- ...

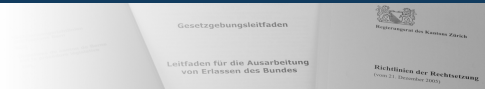
# An incremental approach



## Considerations

- Formal representations are always simplifications of some sort...
- ... but even with shallow representations, one can do useful stuff.

# An incremental approach



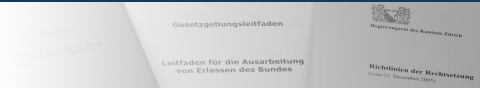
## Considerations

- Formal representations are always simplifications of some sort...
- ... but even with shallow representations, one can do useful stuff.

## Approach

- Map CLG onto a logical form that is
  - ① **generic** enough to be converted into other formats
  - ② “deep” enough to capture the **essential content** of a norm:  
*Who must do what under which circumstances?*

# An incremental approach



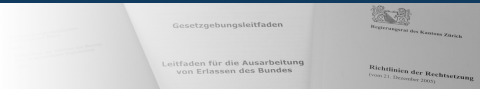
## Considerations

- Formal representations are always simplifications of some sort...
- ... but even with shallow representations, one can do useful stuff.

## Approach

- Map CLG onto a logical form that is
  - ① **generic** enough to be converted into other formats
  - ② “deep” enough to capture the **essential content** of a norm:  
*Who must do what under which circumstances?*
- Start with **individual sentences, representing individual norms.**

# An incremental approach



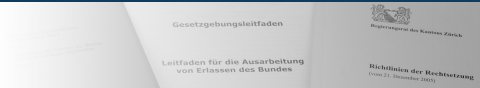
## Considerations

- Formal representations are always simplifications of some sort...
- ... but even with shallow representations, one can do useful stuff.

## Approach

- Map CLG onto a logical form that is
  - ① **generic** enough to be converted into other formats
  - ② “deep” enough to capture the **essential content** of a norm:  
*Who must do what under which circumstances?*
- Start with **individual sentences, representing individual norms.**
- Ignore superstructures (for the moment).

# An incremental approach



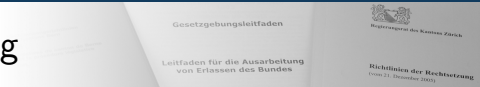
## Considerations

- Formal representations are always simplifications of some sort...
- ... but even with shallow representations, one can do useful stuff.

## Approach

- Map CLG onto a logical form that is
  - ① **generic** enough to be converted into other formats
  - ② “deep” enough to capture the **essential content** of a norm:  
*Who must do what under which circumstances?*
- Start with **individual sentences, representing individual norms.**
- Ignore superstructures (for the moment).
- Add logical concepts incrementally during development.

# Current semantic underpinning



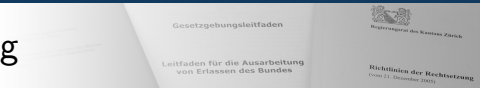
## Art. 1 Abs. 1 BGG

Das Bundesgericht ist die oberste rechtsprechende Behörde.

'The Federal Supreme Court is the supreme judicial authority.'

$$\exists!xy : \text{federal\_supreme\_court}(x) \wedge \text{supreme\_judicial\_authority}(y) \wedge$$
$$\emptyset \exists e : \text{is}(e, x, y)$$

# Current semantic underpinning



## Art. 1 Abs. 1 BGG

Das Bundesgericht ist die oberste rechtsprechende Behörde.

'The Federal Supreme Court is the supreme judicial authority.'

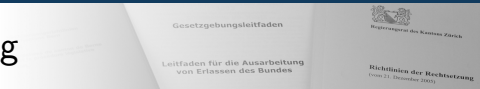
$\exists!xy : \text{federal\_supreme\_court}(x) \wedge \text{supreme\_judicial\_authority}(y) \wedge$   
 $\emptyset \exists e : \text{is}(e, x, y)$

## Logical concepts included so far

- FOL + deontic concepts (obligation, permission, prohibition)
- existential, universal and counting quantifiers
- some constituents (Adj+N, adverbial phrases) are not yet analysed
- reification/quantification of events
- no temporal or intensional concepts yet



# Current semantic underpinning



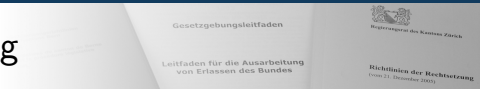
## Art. 1 Abs. 1 BGG

Das Bundesgericht ist die oberste rechtsprechende Behörde.

'The Federal Supreme Court is the supreme judicial authority.'

$$\exists!xy : \text{federal\_supreme\_court}(x) \wedge \text{supreme\_judicial\_authority}(y) \wedge$$
$$\emptyset \exists e : \text{is}(e, x, y)$$

# Current semantic underpinning



## Art. 1 Abs. 1 BGG

Das Bundesgericht ist die oberste rechtsprechende Behörde.

'The Federal Supreme Court is the supreme judicial authority.'

$$\exists!xy : \text{federal\_supreme\_court}(x) \wedge \text{supreme\_judicial\_authority}(y) \wedge \\ \emptyset \exists e : \text{is}(e, x, y)$$

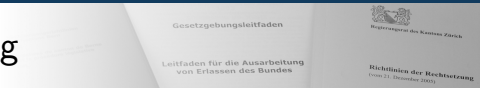
## Function words

- controlled semantics

## Content words

- user-defined semantics
- mapped onto atomic predicates  
→ essential in the context of legal rule systems:  
**open-texturedness/vagueness of the concepts** is maintained

# Current semantic underpinning



## Art. 1 Abs. 1 BGG

Das Bundesgericht ist die oberste rechtsprechende Behörde.

'The Federal Supreme Court is the supreme judicial authority.'

$\exists!xy : \textit{federal\_supreme\_court}(x) \wedge \textit{supreme\_judicial\_authority}(y) \wedge$   
 $\emptyset \exists e : \textit{is}(e, x, y)$

## Function words

- controlled semantics

## Content words

- user-defined semantics
- mapped onto atomic predicates  
→ essential in the context of legal rule systems:  
**open-texturedness/vagueness of the concepts** is maintained

# Designing the controlled natural language

Gesetzgebungseleitfad

leitfaden für die Ausarbeitung  
von Erlassen des Bundes



Regierungsrat des Kantons Zürich

Richtlinien der Rechtssetzung  
(vom 21. Dezember 2001)

## Main task

- Controlling **ambiguous constructions and function words**

## Methods

- ① prohibit their use
- ② assign them a default interpretation

## Design decisions

- which constructions shall be allowed/prohibited?
- which readings shall be defined as default interpretations?

# Designing the controlled natural language

Gesetzgebungsliteffaden

Leitfaden für die Ausarbeitung  
von Erlässen des Bundes



Regierungsrat des Kantons Zürich

Richtlinien der Rechtssetzung  
(vom 21. Dezember 2001)

## Main task

- Controlling **ambiguous constructions and function words**

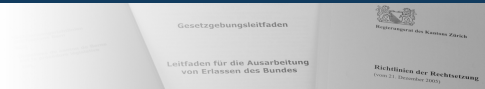
## Methods

- ① prohibit their use
- ② assign them a default interpretation

## Design decisions ←

- which constructions shall be allowed/prohibited?
- which readings shall be defined as default interpretations?

# Design requirements



## Requirements II+III

CLG must facilitate two operations:

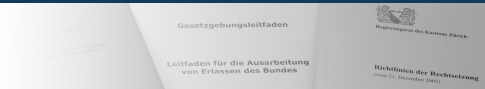
- 1 **translation**  
of legislative texts into CLG (by knowledge engineers)
- 2 **verification**  
of the CLG representation (by legal experts)

→ [Design requirements](#)

- 1 proximity to **conventional** legislative language
- 2 maximal **explicitness**

How can this be achieved?

# Methods I



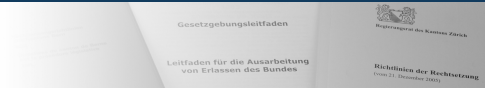
## Method I: simulating domain characteristics

CLG construction and interpretation rules must reflect the **conventions of legislative language.**

### Origins of these conventions

- ① pragmatics of the text domain
- ② historically grown frequency distributions
- ③ standards defined in official drafting guidelines
- ④ stylistic means artificially developed to improve readability

# Methods II

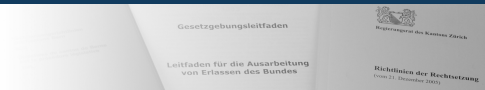


## Method II: providing syntactic sugar

CLG must provide ample **syntactic sugar**: constructions with default interpretations must have **explicit paraphrases**.



# Methods II



## Method II: providing syntactic sugar

CLG must provide ample **syntactic sugar**: constructions with default interpretations must have **explicit paraphrases**.

## Procedure

source text



conventional representation in CLG

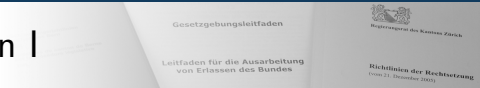


explicit representation in CLG

*easier if CLG resembles source lang.*

*deterministic*

# Pragmatics of the text domain I



Norms contain two basic types of modality:

- **obligation**: *müssen* ('must'), *haben zu* ('have to'), no modal verb
- **permission**: *dürfen* ('may'), *können* ('can')

In CLG semantically equivalent:

- Radfahrer **müssen** einen Helm tragen.  
'Cyclists **must** wear a helmet.'
- Radfahrer **haben** einen Helm **zu** tragen.  
'Cyclists **have to** wear a helmet.'
- Radfahrer tragen einen Helm.  
'Cyclists wear a helmet.'

$\circ \forall x : cyclist(x) \rightarrow \exists ey : helmet(y) \wedge wears(e, x, y)$

# Pragmatics of the text domain II

Gesetzgebungsleitfaden

Leitfaden für die Ausarbeitung  
von Erlässen des Bundes



Richtlinien der Rechtssetzung  
(vom 21. Dezember 2001)

## Example

Radfahrer **müssen** mindestens einen Rückstrahler tragen.

'Cyclists **must** wear at least one reflector.'

# Pragmatics of the text domain II

Gesetzgebungsleitfaden

Leitfaden für die Ausarbeitung  
von Erlässen des Bundes



Regierungsrat des Kantons Zürich

Richtlinien der Rechtssetzung  
(vom 21. Dezember 2005)

## Example

Radfahrer **müssen** mindestens einen Rückstrahler tragen.

'Cyclists **must** wear at least one reflector.'

$$\forall x : (\text{cyclist}(x) \rightarrow \text{O} \exists ey : (\text{reflector}(y) \wedge \text{wears}(e, x, y)))$$

# Pragmatics of the text domain II

Gesetzgebungsleitfaden

Leitfaden für die Ausarbeitung  
von Erlässen des Bundes



Richtlinien der Rechtssetzung  
(vom 21. Dezember 2001)

## Example

Radfahrer **müssen** mindestens einen Rückstrahler tragen.

'Cyclists **must** wear at least one reflector.'

$$\forall x : (\text{cyclist}(x) \rightarrow \text{O} \exists ey : (\text{reflector}(y) \wedge \text{wears}(e, x, y)))$$
$$\equiv \text{O} \forall x : (\text{cyclist}(x) \rightarrow \exists ey : (\text{reflector}(y) \wedge \text{wears}(e, x, y)))$$

# Pragmatics of the text domain II

Gesetzgebungsleitfaden

Leitfaden für die Ausarbeitung  
von Erlässen des BundesRichtlinien der Rechtssetzung  
(vom 21. Dezember 2001)

## Example

Radfahrer **müssen** mindestens einen Rückstrahler tragen.

'Cyclists **must** wear at least one reflector.'

$$\begin{aligned} & \forall x : (\text{cyclist}(x) \rightarrow \text{O} \exists ey : (\text{reflector}(y) \wedge \text{wears}(e, x, y))) \\ \equiv & \text{O} \forall x : (\text{cyclist}(x) \rightarrow \exists ey : (\text{reflector}(y) \wedge \text{wears}(e, x, y))) \end{aligned}$$

## Example

Mindestens eine Veranstaltung **muss** allen Personen offen stehen.

'At least one event **must** be open to all persons.'

# Pragmatics of the text domain II

Gesetzgebungsleitfaden

Leitfaden für die Ausarbeitung  
von Erlässen des BundesRichtlinien der Rechtssetzung  
(vom 21. Dezember 2001)

## Example

Radfahrer **müssen** mindestens einen Rückstrahler tragen.

'Cyclists **must** wear at least one reflector.'

$$\begin{aligned} & \forall x : (\text{cyclist}(x) \rightarrow \text{O} \exists ey : (\text{reflector}(y) \wedge \text{wears}(e, x, y))) \\ \equiv & \text{O} \forall x : (\text{cyclist}(x) \rightarrow \exists ey : (\text{reflector}(y) \wedge \text{wears}(e, x, y))) \end{aligned}$$

## Example

Mindestens eine Veranstaltung **muss** allen Personen offen stehen.

'At least one event **must** be open to all persons.'

$$\begin{aligned} & \exists x : (\text{event}(x) \wedge \text{O} \forall y : (\text{person}(y) \rightarrow \exists e : \text{is\_open\_to}(e, x, y))) \\ \neq & \text{O} \exists x : (\text{event}(x) \wedge \forall y : (\text{person}(y) \rightarrow \exists e : \text{is\_open\_to}(e, x, y))) \end{aligned}$$

# Pragmatics of the text domain II

Gesetzgebungsleitfaden

Leitfaden für die Ausarbeitung  
von Erlässen des BundesRichtlinien der Rechtssetzung  
(vom 21. Dezember 2001)

## Example

Radfahrer **müssen** mindestens einen Rückstrahler tragen.

'Cyclists **must** wear at least one reflector.'

$$\begin{aligned} & \forall x : (\text{cyclist}(x) \rightarrow \text{O} \exists ey : (\text{reflector}(y) \wedge \text{wears}(e, x, y))) \\ \equiv & \text{O} \forall x : (\text{cyclist}(x) \rightarrow \exists ey : (\text{reflector}(y) \wedge \text{wears}(e, x, y))) \end{aligned}$$

## Example

Mindestens eine Veranstaltung **muss** allen Personen offen stehen.

'At least one event **must** be open to all persons.'

$$\begin{aligned} & \exists x : (\text{event}(x) \wedge \text{O} \forall y : (\text{person}(y) \rightarrow \exists e : \text{is\_open\_to}(e, x, y))) \quad \text{!} \\ \neq & \text{O} \exists x : (\text{event}(x) \wedge \forall y : (\text{person}(y) \rightarrow \exists e : \text{is\_open\_to}(e, x, y))) \end{aligned}$$



# Pragmatics of the text domain II

Gesetzgebungsleitfaden

Leitfaden für die Ausarbeitung  
von Erlässen des BundesRichtlinien der Rechtssetzung  
(vom 21. Dezember 2001)

## Example

Radfahrer **müssen** mindestens einen Rückstrahler tragen.

'Cyclists **must** wear at least one reflector.'

$$\forall x : (\text{cyclist}(x) \rightarrow \text{O} \exists ey : (\text{reflector}(y) \wedge \text{wears}(e, x, y)))$$

$$\equiv \text{O} \forall x : (\text{cyclist}(x) \rightarrow \exists ey : (\text{reflector}(y) \wedge \text{wears}(e, x, y)))$$

## Example

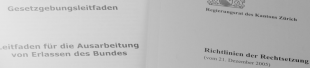
Mindestens eine Veranstaltung **muss** allen Personen offen stehen.

'At least one event **must** be open to all persons.'

$$\exists x : (\text{event}(x) \wedge \text{O} \forall y : (\text{person}(y) \rightarrow \exists e : \text{is\_open\_to}(e, x, y))) \quad \text{👎}$$

$$\neq \text{O} \exists x : (\text{event}(x) \wedge \forall y : (\text{person}(y) \rightarrow \exists e : \text{is\_open\_to}(e, x, y))) \quad \text{👍}$$

# Pragmatics of the text domain II



## Example

Radfahrer **müssen** mindestens einen Rückstrahler tragen.

'Cyclists **must** wear at least one reflector.'

$$\forall x : (\text{cyclist}(x) \rightarrow \bigcirc \exists ey : (\text{reflector}(y) \wedge \text{wears}(e, x, y)))$$

$$\equiv \bigcirc \forall x : (\text{cyclist}(x) \rightarrow \exists ey : (\text{reflector}(y) \wedge \text{wears}(e, x, y)))$$

## Example

Mindestens eine Veranstaltung **muss** allen Personen offen stehen.

'At least one event **must** be open to all persons.'

$$\exists x : (\text{event}(x) \wedge \bigcirc \forall y : (\text{person}(y) \rightarrow \exists e : \text{is\_open\_to}(e, x, y))) \quad \text{👎}$$

$$\neq \bigcirc \exists x : (\text{event}(x) \wedge \forall y : (\text{person}(y) \rightarrow \exists e : \text{is\_open\_to}(e, x, y))) \quad \text{👍}$$

## Interpretation rule

Modal verbs have wide scope over the whole sentence.

# Pragmatics of the text domain III

Gesetzgebungsleitfaden

Leitfaden für die Ausarbeitung  
von Erlassen des Bundes



Richtlinien der Rechtssetzung  
(vom 21. Dezember 2001)

## Interpretation rule

Modal verbs have wide scope over the whole sentence.

## Explicit paraphrase

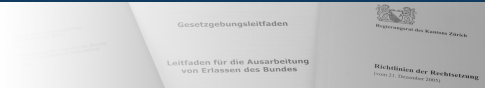
**Es ist obligatorisch, dass** Radfahrer mind. einen Rückstrahler tragen.

**'It is obligatory that** cyclists wear at least one reflector.'

## Alternatives

- *Es ist vorgeschrieben, dass* ('it is prescribed that')
- *Es ist zwingend, dass* ('it is coercive that')
- ...

# Frequency distributions I



## § 67 Abs. 2 Regulation of the University of Zurich

**Ein Mitglied** der Universitätsleitung führt den Vorsitz.

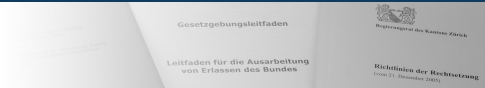
'**A member** of the university board takes the chair.'

## § 8 Abs. 7 Regulation of the University of Zurich

**Ein Titel** [...] kann [...] entzogen werden, wenn die Inhaberin oder der Inhaber die Interessen der Universität ernsthaft verletzt.

'**A title** can be revoked if the holder seriously violates the interests of the university.'

# Frequency distributions I



## § 67 Abs. 2 Regulation of the University of Zurich

**Ein Mitglied** der Universitätsleitung führt den Vorsitz.

'**A member** of the university board takes the chair.'

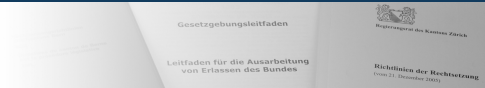
$\exists x : member(x) \wedge \dots$

## § 8 Abs. 7 Regulation of the University of Zurich

**Ein Titel** [...] kann [...] entzogen werden, wenn die Inhaberin oder der Inhaber die Interessen der Universität ernsthaft verletzt.

'**A title** can be revoked if the holder seriously violates the interests of the university.'

# Frequency distributions I



## § 67 Abs. 2 Regulation of the University of Zurich

**Ein Mitglied** der Universitätsleitung führt den Vorsitz.

'**A member** of the university board takes the chair.'

$\exists x : member(x) \wedge \dots$

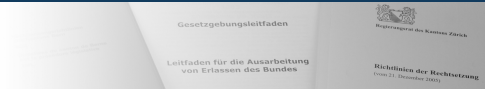
## § 8 Abs. 7 Regulation of the University of Zurich

**Ein Titel** [...] kann [...] entzogen werden, wenn die Inhaberin oder der Inhaber die Interessen der Universität ernsthaft verletzt.

'**A title** can be revoked if the holder seriously violates the interests of the university.'

$\forall x : title(x) \rightarrow \dots$

# Frequency distributions II

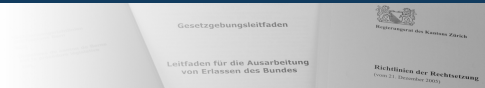


## § 3 Abs. 3 Regulation of the University of Zurich

**Dienstleistungen** sind [...] kostendeckend in Rechnung zu stellen.

'**Services** have to be charged so that the costs are covered.'

# Frequency distributions II



## § 3 Abs. 3 Regulation of the University of Zurich

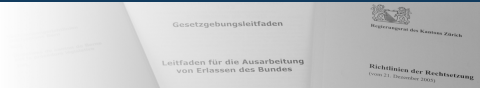
**Dienstleistungen** sind [...] kostendeckend in Rechnung zu stellen.

'**Services** have to be charged so that the costs are covered.'

$\forall x : \text{service}(x) \rightarrow \dots$



# Frequency distributions II



## § 3 Abs. 3 Regulation of the University of Zurich

**Dienstleistungen** sind [...] kostendeckend in Rechnung zu stellen.

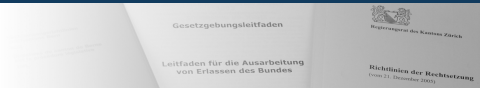
'**Services** have to be charged so that the costs are covered.'

$\forall x : \text{service}(x) \rightarrow \dots$

### Interpretation rule

Indefinite noun phrases are interpreted as universally quantified in vorfeld position and as existentially quantified elsewhere.

# Frequency distributions II



## § 3 Abs. 3 Regulation of the University of Zurich

**Dienstleistungen** sind [...] kostendeckend in Rechnung zu stellen.  
'**Services** have to be charged so that the costs are covered.'

$\forall x : \text{service}(x) \rightarrow \dots$

### Interpretation rule

Indefinite noun phrases are interpreted as universally quantified in vorfeld position and as existentially quantified elsewhere.

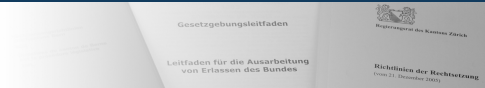
## § 2 Abs. 4 Regulation of the University of Zurich

**Besondere Veranstaltungen** können auch für eine breite Öffentlichkeit angeboten werden.

'**Specific events** can also be offered to a broader public.'

$\exists x : \text{event}(x) \wedge \dots$

# Frequency distributions III

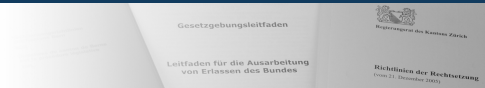


§ 67 Abs. 2 Regulation of the University of Zurich

**Ein Mitglied** der Universitätsleitung führt den Vorsitz.

**'A member** of the executive board of the university takes the chair.'

# Frequency distributions III



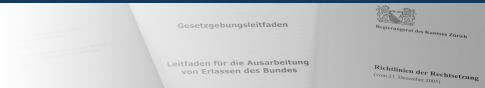
§ 67 Abs. 2 Regulation of the University of Zurich

**Ein Mitglied** der Universitätsleitung führt den Vorsitz.

'**A member** of the executive board of the university takes the chair.'

$\forall x : member(x) \rightarrow \dots$

# Frequency distributions III



§ 67 Abs. 2 Regulation of the University of Zurich

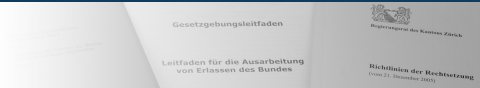
**Ein Mitglied** der Universitätsleitung führt den Vorsitz.

'**A member** of the executive board of the university takes the chair.'

$\forall x : member(x) \rightarrow \dots$



# Frequency distributions III



§ 67 Abs. 2 Regulation of the University of Zurich

**Ein Mitglied** der Universitätsleitung führt den Vorsitz.

'**A member** of the executive board of the university takes the chair.'

$\forall x : member(x) \rightarrow \dots$

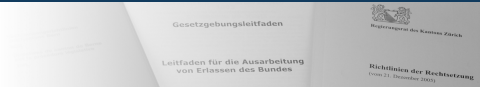


Rephrase (e.g. as a passive construction)

Der Vorsitz wird **von einem Mitglied** der Universitätsleitung geführt.

'The chair is taken **by a member** of the university board.'

# Frequency distributions III



§ 67 Abs. 2 Regulation of the University of Zurich

**Ein Mitglied** der Universitätsleitung führt den Vorsitz.

'**A member** of the executive board of the university takes the chair.'

$\forall x : member(x) \rightarrow \dots$



Rephrase (e.g. as a passive construction)

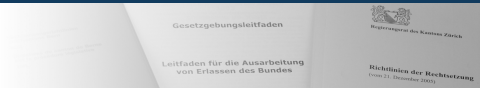
Der Vorsitz wird **von einem Mitglied** der Universitätsleitung geführt.

'The chair is taken **by a member** of the university board.'

$\dots \wedge \exists x : member(x) \wedge \dots$



# Frequency distributions III



§ 67 Abs. 2 Regulation of the University of Zurich

**Ein Mitglied** der Universitätsleitung führt den Vorsitz.

'**A member** of the executive board of the university takes the chair.'

$\forall x : member(x) \rightarrow \dots$



Rephrase (e.g. as a passive construction)

Der Vorsitz wird **von einem Mitglied** der Universitätsleitung geführt.

'The chair is taken **by a member** of the university board.'

$\dots \wedge \exists x : member(x) \wedge \dots$

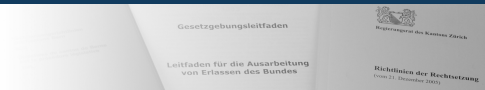


**Additional advantage:**

The subject now correctly designates what the norm is **about**.



# Drafting guidelines



## Example from the drafting guidelines of the canton of Zurich

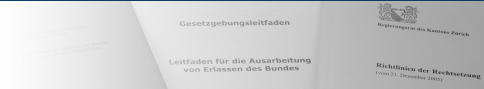
<sup>1</sup>Die Kantone können Fachhochschulen einrichten.

<sup>2</sup>**Sie** werden selbständig geleitet.

<sup>1</sup>The cantons may establish technical universities.

<sup>2</sup>**They** are governed autonomously.'

# Drafting guidelines



## Example from the drafting guidelines of the canton of Zurich

<sup>1</sup>Die Kantone können Fachhochschulen einrichten.

<sup>2</sup>**Sie** werden selbständig geleitet.

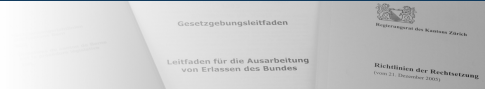
<sup>1</sup>The cantons may establish technical universities.

<sup>2</sup>**They** are governed autonomously.'

## Drafting guideline → interpretation rule

Pronouns should only refer to the subject of their own sentence or to the subject of the immediately preceding sentence.

# Drafting guidelines



## Example from the drafting guidelines of the canton of Zurich

<sup>1</sup>Die Kantone können Fachhochschulen einrichten.

<sup>2</sup>**Die Fachhochschulen** werden selbständig geleitet.

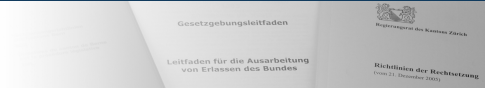
<sup>1</sup>The cantons may establish technical universities.

<sup>2</sup>**The technical universities** are governed autonomously.'

## Drafting guideline → interpretation rule

Pronouns should only refer to the subject of their own sentence or to the subject of the immediately preceding sentence.

# Stylistic conventions I

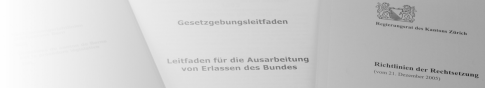


## Art. 20 Abs. 3 BGG

In Fünferbesetzung entscheiden sie ferner über Beschwerden gegen referendumpflichtige kantonale Erlasse und gegen kantonale Entscheide über die Zulässigkeit einer Initiative oder das Erfordernis eines Referendums.

'In a composition of five, they further decide on appeals against cantonal decrees that are subject to referendum and against cantonal decisions on the admissability of an initiative or the necessity of a referendum.'

# Stylistic conventions I



## Art. 20 Abs. 3 BGG

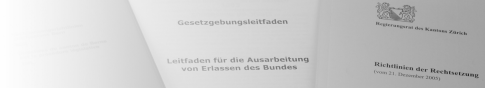
In Fünferbesetzung entscheiden sie ferner über Beschwerden gegen referendumpflichtige kantonale Erlasse und gegen kantonale Entscheide über die Zulässigkeit einer Initiative oder das Erfordernis eines Referendums.

'In a composition of five, they further decide on appeals against cantonal decrees that are subject to referendum and against cantonal decisions on the admissability of an initiative or the necessity of a referendum.'

## Interpretation rule

Constituents attach to the closest possible preceding constituent.

# Stylistic conventions I



## Art. 20 Abs. 3 BGG

In Fünferbesetzung entscheiden sie ferner über Beschwerden gegen referendumpflichtige kantonale Erlasse und gegen kantonale Entscheide über die Zulässigkeit einer Initiative oder das Erfordernis eines Referendums.

'In a composition of five, they further decide on appeals against cantonal decrees that are subject to referendum and against cantonal decisions on the admissability of an initiative or the necessity of a referendum.'

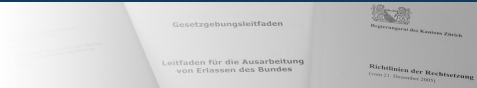
## Interpretation rule

Constituents attach to the closest possible preceding constituent.

## Explicit paraphrase?

→ exploit structures provided by conventional legislative language

# Stylistic conventions II



## Rephrase as an explicit enumeration

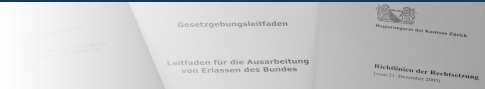
In Fünferbesetzung entscheiden sie ferner über Beschwerden gegen:

- referendumspflichtige kantonale Erlasse;
- kantonale Entscheide über die Zulässigkeit einer Initiative;
- kantonale Entscheide über das Erfordernis eines Referendums.

'In a composition of five, they further decide on appeals against:

- cantonal decrees that are subject to referendum;
- cantonal decisions on the admissability of an initiative;
- cantonal decisions on the necessity of a referendum.'

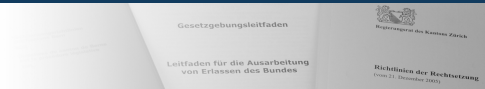
# State of development I



At the moment, CLG comprises about two dozen construction and interpretaton rules, addressing phenomna such as:



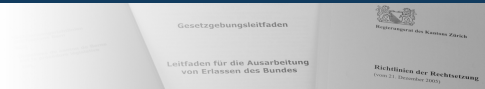
# State of development I



At the moment, CLG comprises about two dozen construction and interpretaton rules, addressing phenomna such as:

- **attachment ambiguities**  
(prepositional phrases, relative clauses)

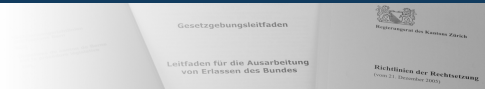
# State of development I



At the moment, CLG comprises about two dozen construction and interpretaton rules, addressing phenomona such as:

- **attachment ambiguities**  
(prepositional phrases, relative clauses)
- **plural ambiguities**  
(distributive/collective/cumulative readings)

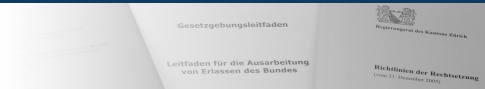
# State of development I



At the moment, CLG comprises about two dozen construction and interpretaton rules, addressing phenomna such as:

- **attachment ambiguities**  
(prepositional phrases, relative clauses)
- **plural ambiguities**  
(distributive/collective/cumulative readings)
- **scope ambiguities**  
(modal verb, subject, objects, adverbials)

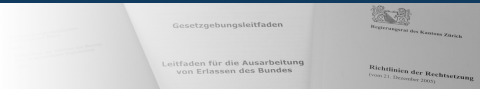
# State of development I



At the moment, CLG comprises about two dozen construction and interpretaton rules, addressing phenomna such as:

- **attachment ambiguities**  
(prepositional phrases, relative clauses)
- **plural ambiguities**  
(distributive/collective/cumulative readings)
- **scope ambiguities**  
(modal verb, subject, objects, adverbials)
- **lexical ambiguities**  
(articles, domain-specific function and content words)

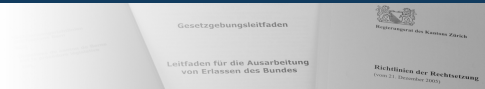
# State of development I



At the moment, CLG comprises about two dozen construction and interpretaton rules, addressing phenomona such as:

- **attachment ambiguities**  
(prepositional phrases, relative clauses)
- **plural ambiguities**  
(distributive/collective/cumulative readings)
- **scope ambiguities**  
(modal verb, subject, objects, adverbials)
- **lexical ambiguities**  
(articles, domain-specific function and content words)
- **referential ambiguities**  
(pronouns, relational nouns)

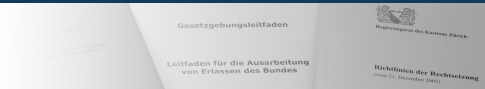
# State of development I



At the moment, CLG comprises about two dozen construction and interpretaton rules, addressing phenomona such as:

- **attachment ambiguities**  
(prepositional phrases, relative clauses)
- **plural ambiguities**  
(distributive/collective/cumulative readings)
- **scope ambiguities**  
(modal verb, subject, objects, adverbials)
- **lexical ambiguities**  
(articles, domain-specific function and content words)
- **referential ambiguities**  
(pronouns, relational nouns)
- **functional ambiguities**  
(arising from the relatively free German word order)

# State of development II



## Syntax

- sentence patterns for simple norms and for legal definitions
- only present tense
- only canonical word order
- active and passive voice
- prepositional phrases only attach to verbs
- subordinate clauses restricted to conditional and relative clauses
- no genitive attributes (exception: the agent of nominalised verbs)
- no particles (*dennoch, also, auch, nur, ...*)
- negation only permitted at specific positions

# Challenges ahead: e.g. bridging references

Gesetzgebungsleitfaden

Leitfaden für die Ausarbeitung  
von Erlässen des Bundes



Regierungsrat des Kantons Zürich

Richtlinien der Rechtssetzung  
(vom 21. Dezember 2001)

## Art. 55 Abs. 1 Employee Regulation ETH

Bei der Geburt eines Kindes hat der Angestellte Anspruch auf eine einmalige Zulage von 530 Franken.

'Upon the birth of a child, the employee is entitled to a one-time allowance of 530 francs.'



# Challenges ahead: e.g. bridging references

Gesetzgebungsleitfaden

Leitfaden für die Ausarbeitung  
von Erlässen des Bundes



Regierungsrat des Kantons Zürich

Richtlinien der Rechtssetzung  
(vom 21. Dezember 2001)

## Art. 55 Abs. 1 Employee Regulation ETH

Bei der Geburt eines Kindes hat der Angestellte Anspruch auf eine einmalige Zulage von 530 Franken.

'Upon the birth of a child, the employee is entitled to a one-time allowance of 530 francs.'

- Approximately 216,000 children are born every year.

# Challenges ahead: e.g. bridging references

Gesetzgebungsleitfaden

Leitfaden für die Ausarbeitung  
von Erlässen des Bundes



Richtlinien der Rechtssetzung  
(vom 21. Dezember 2001)

## Art. 55 Abs. 1 Employee Regulation ETH

Bei der Geburt eines Kindes hat der Angestellte Anspruch auf eine einmalige Zulage von 530 Franken.

'Upon the birth of a child, the employee is entitled to a one-time allowance of 530 francs.'

- Approximately 216,000 children are born every year.
- The employee is entitled to an allowance of 530 francs per child being born.

# Challenges ahead: e.g. bridging references

Gesetzgebungslitfad

Litfad für die Ausarbeitung  
von Erlässen des Bundes



Richtlinien der Rechtssetzung  
(vom 21. Dezember 2001)

## Art. 55 Abs. 1 Employee Regulation ETH

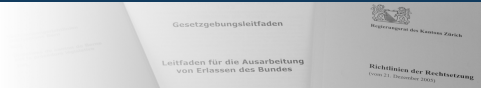
Bei der Geburt eines Kindes hat der Angestellte Anspruch auf eine einmalige Zulage von 530 Franken.

'Upon the birth of a child, the employee is entitled to a one-time allowance of 530 francs.'

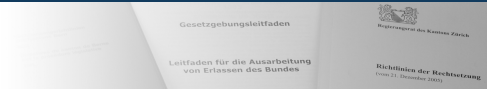
- Approximately 216,000 children are born every year.
- The employee is entitled to an allowance of 530 francs per child being born.
- Therefore, the employee is entitled to an annual allowance of 114,480,000 francs.

# Key points

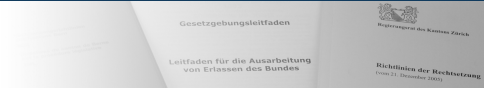
- We are exploring the potential of the employment of controlled natural language as an **interlingua** between legal texts and formal representations.
- To facilitate the translation of the source texts into the controlled language, the controlled language has to **resemble conventional legal language**.
- To facilitate its verification, **explicit paraphrases** for language constructs with default interpretations must be available.
- To fulfil these two requirements, we
  - ① ensure that our construction and interpretation **rules reflect conventions and frequency distributions** of legal language, and
  - ② endow our controlled natural language with ample **syntactic sugar**.



# Lessons to be learnt

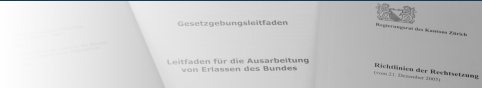


# Lessons to be learnt



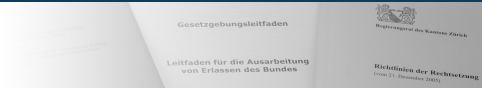
- 1 On the one hand, the requirement that our controlled language must resemble the language of legislative texts substantially increases the amount of work to be put into its **design**.

# Lessons to be learnt



- ① On the one hand, the requirement that our controlled language must resemble the language of legislative texts substantially increases the amount of work to be put into its **design**.
- ② On the other hand, the **conventions** of legal language often provide the very means needed to control certain ambiguous constructions.

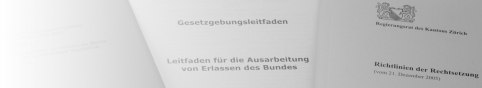
# Lessons to be learnt



- ① On the one hand, the requirement that our controlled language must resemble the language of legislative texts substantially increases the amount of work to be put into its **design**.
- ② On the other hand, the **conventions** of legal language often provide the very means needed to control certain ambiguous constructions.
- ③ However, our work would become a lot easier if the **linguistic peculiarities** of legal language had been studied more thoroughly.



# Lessons to be learnt



- ① On the one hand, the requirement that our controlled language must resemble the language of legislative texts substantially increases the amount of work to be put into its **design**.
- ② On the other hand, the **conventions** of legal language often provide the very means needed to control certain ambiguous constructions.
- ③ However, our work would become a lot easier if the **linguistic peculiarities** of legal language had been studied more thoroughly.
- ④ It is not always possible to provide explicit paraphrases without resorting to **extra-linguistic means** such as brackets etc.

# Lessons to be learnt

- ① On the one hand, the requirement that our controlled language must resemble the language of legislative texts substantially increases the amount of work to be put into its **design**.
- ② On the other hand, the **conventions** of legal language often provide the very means needed to control certain ambiguous constructions.
- ③ However, our work would become a lot easier if the **linguistic peculiarities** of legal language had been studied more thoroughly.
- ④ It is not always possible to provide explicit paraphrases without resorting to **extra-linguistic means** such as brackets etc.
- ⑤ Translating a legislative text into a controlled natural language helps understanding its meaning properly.  
→ Even if we cannot perform automated legal reasoning (yet), *a controlled legal language can serve as a **tool for clarification** in legislative drafting and/or legal training.*

