

# Artificial Intelligence as Law

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[www.ai.rug.nl/~verheij](http://www.ai.rug.nl/~verheij)



university of  
 groningen

faculty of science  
and engineering





Guillotine, Nieuwmarkt, Amsterdam, 1812 (Rijksmuseum RP-P-OB-87.033)

VRIJDAG 17 MEI 2019, 18:45

DEEL DIT ARTIKEL:



## Beschonken Meppeler rijdt slapend over de snelweg



Dankzij de automatische piloot in zijn Tesla kon de Meppeler gewoon rijden terwijl hij sliep (archieffoto RTV Drenthe/Andries Ophof)



FRIDAY, MAY 17, 2019, 6:45 PM

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## Drunken Meppeler sleeps on the highway



Thanks to the autopilot in his Tesla, the Meppeler was able to continue driving while he was asleep  
(RTV Drenthe / Andries Ophof archive photo)

ERIC NIILER BUSINESS 03.25.19 07:00 AM

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f



# CAN AI BE A FAIR JUDGE IN COURT? ESTONIA THINKS SO



WIRED STAFF; GETTY IMAGES

GOVERNMENT USUALLY ISN'T the place to look for innovation in IT or new technologies like artificial intelligence. But Ott Velsberg might



TV series Futurama, judge 723  
([futurama.fandom.com/wiki/Judge\\_723](http://futurama.fandom.com/wiki/Judge_723))

# LOI n° 2019-222 du 23 mars 2019 de programmation 2018-2022 et de réforme pour la justice (1) - Article 33

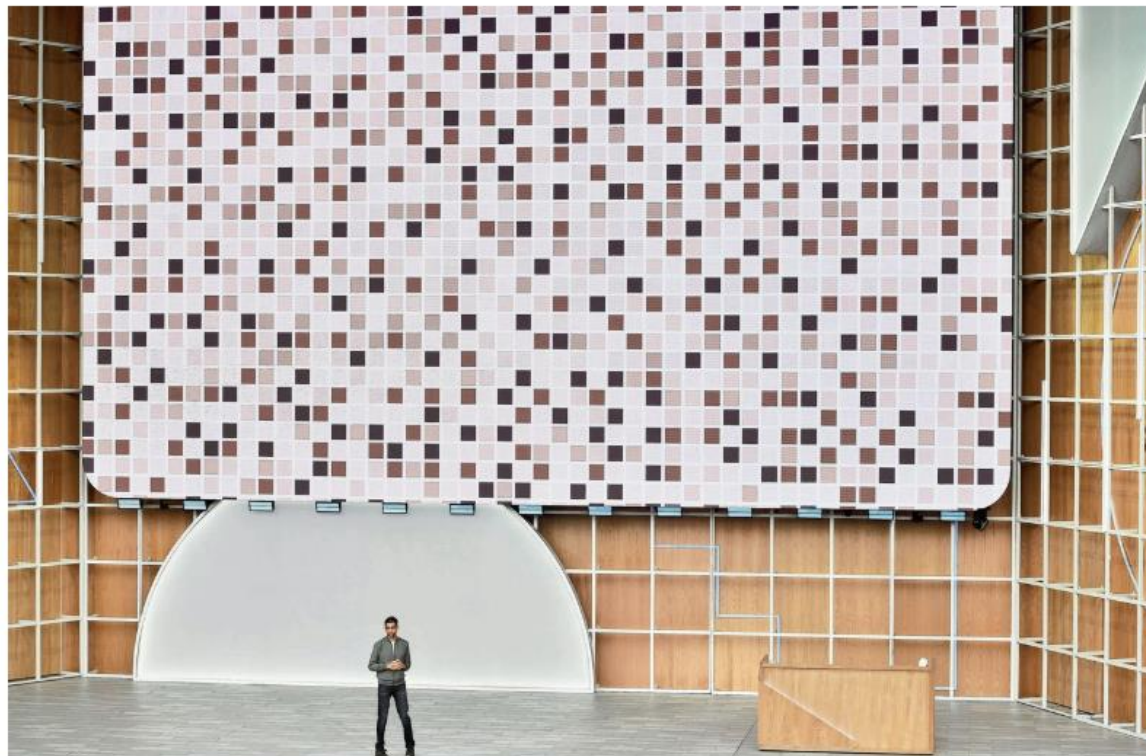
Les **données d'identité des magistrats** et des membres du greffe **ne peuvent** faire l'objet d'une **réutilisation** ayant pour objet ou pour effet **d'évaluer, d'analyser, de comparer ou de prédire** leurs pratiques professionnelles réelles ou supposées.

The **identity data of magistrates** and members of the registry **cannot be reused** with the purpose or effect of **evaluating, analyzing, comparing or predicting** their actual or alleged professional practices.

# The new data diet from Google and Facebook

**Tech companies** Google promises to collect less data, Facebook preaches 'privacy as the future'. Are both tech companies really going on a data diet or are they hoping to avoid stricter regulation?

✦ Marc HijlInk ⌚ 11 May 2019 ⌚ Reading time 4 minutes



At developer conference I / O, executive Sundar Pichai promises that Google can do more with less data.

Photo Josh Edelson / AFP

May 11, 2019



2017年09月20日 星期三 07:42:31



车道号:1 车牌号码:沪B9H295 车牌宽度:134

车道号:1 车牌号码:沪B9H295 状态:未礼让行人判定

样片



## Wees braaf, dat scoort

Hoe China met de nieuwste technieken de greep op zijn burgers vergroot.

WEEKEND 22-23

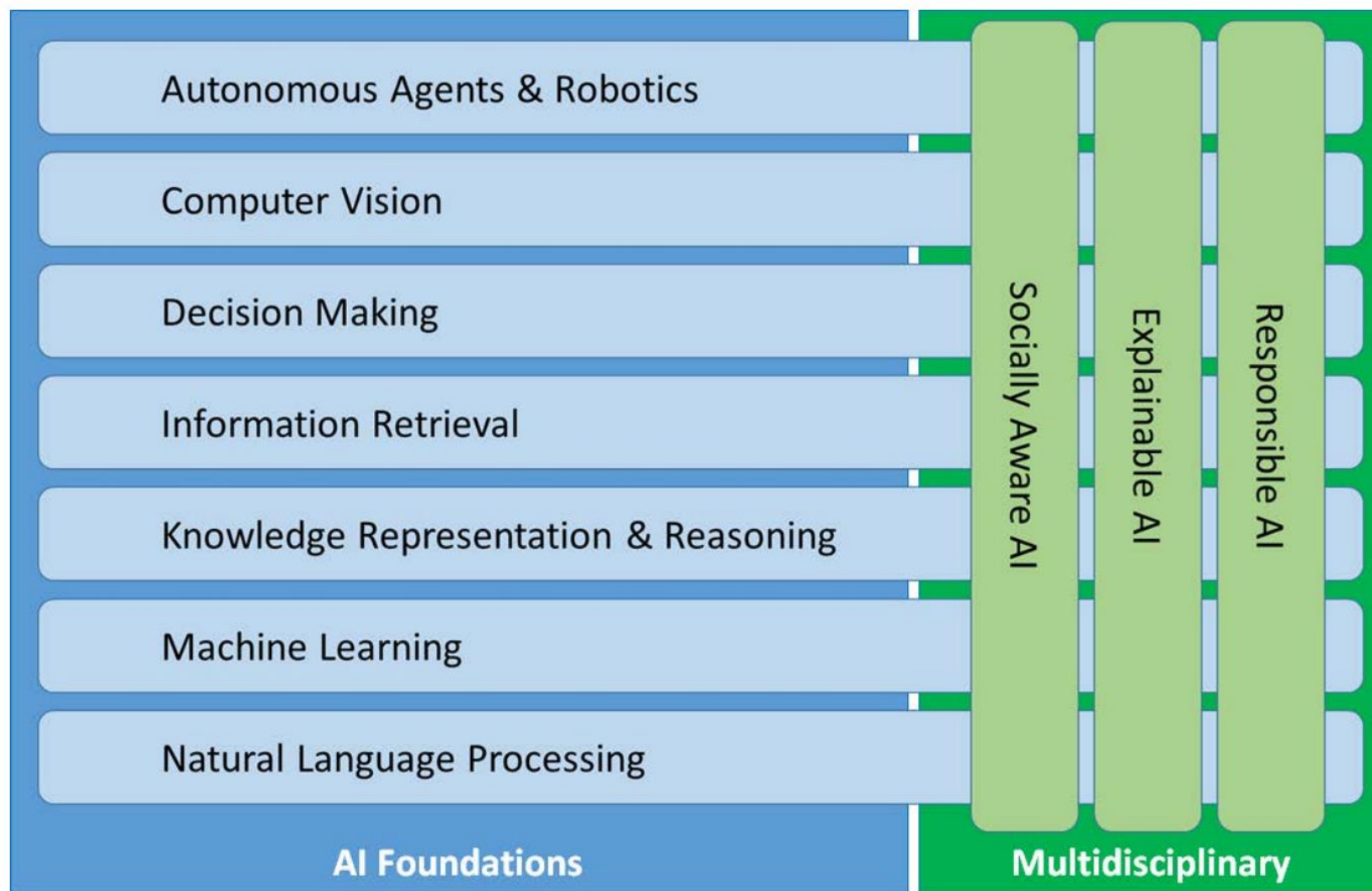


Figure 1: Artificial Intelligence Grid (AI Foundational Areas and Multidisciplinary Challenges).



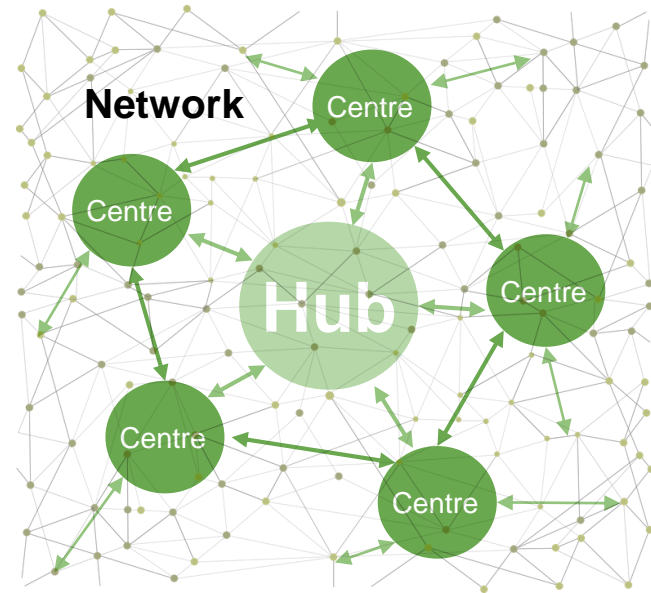
# CLAIRE

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**With a Human-Centred Focus.**



**I am a member of the CLAIRE Research Network.**



AI&Law  
has worked on the design of  
socially aware  
explainable  
responsible AI  
**for decades already**

# AI as Law



## Wet- en regelgeving

> [Instellingen \(nu: volledige regeling\)](#), opent een nieuw venster

**Eenvoudig zoeken**

[Uitgebreid zoeken](#)


### Kies soort regeling

☐ Alle soorten regelingen of:

☐ Verdragen

☒ Wetten

☒ AMvB's en andere Koninklijke Besluiten

☒ Ministeriële regelingen 

☐ Beleidsregels rijksdienst


☐ Circulaires rijksdienst

☐ Regelingen zelfstandige bestuursorganen (ZBO's)

☐ Regelingen publieke organisatie voor beroep en bedrijf

☐ Reglementen van de Staten-Generaal

☐ Ook zoeken in regelingen [BES](#)

☐ Alleen zoeken in regelingen [BES](#) 

[Regelingen van provincies, gemeenten, \[BES\]\(#\), waterschappen, en voormalige > Nederlandse Antillen \(voor 10-10-2010\)](#)


[Europese regelingen \(EUR-Lex\) >](#)



**Neem nu de wetten mee op uw e-Reader of iPad**




### Zoek op woord of zinsdeel

In de titel 

☒ Exact zoeken

☐ Afkorting of volledige titel

In de tekst 

☒ Exact zoeken


Artikelnummer

☒ Artikel ☐ Bijlage (niet voor verdragen)


### Zoek op datum

Geldend op

-  -  > Vandaag

☐ Ook zoeken in materieel uitgewerkte regelingen 

Wis scherm

Zoeken 

## Fine Base

In this section you will find the 2019 fines. The fines are for the most common minor offenses. This varies from offering garbage too early, fishing outside the fishing season, to speeding.

First select the topic you are looking for information about. You can then use the drop-down menus to continue searching for the violation for which you want to know the amount of the fine.

Pay attention! The stated amounts are exclusive of € 9 administration costs.

### [Drugs](#)

[More than 5 grams and less than 30 grams of soft drugs](#)

#### The amount of the fine will be:

€ 75

Note: Drugs are seized .

A higher fine is imposed in the event of a repeat offense. See [Guideline for criminal proceedings, Opium Act, soft drugs](#)

Under 18 years old? Work penalty 16-30 hours (fine 80 - 150 euros)

## Search by fact code

Many minor offenses have a fact code. Put the fact code in the search window and select the applicable vehicle category.

A fact code consists of one or two capital letters, three numbers and possibly a lowercase letter. For example S 005 a, A 934 or VA 004

### Search



## Also see

Are you looking for the fine for a violation committed before January 1, 2016? Then view the Text Bundle for crimes, offenses and Mulder behavior

→ Rates for speeding offenses

→ Facts and rates, Text bundle for crimes, violations and Mulder behavior

→ In appeal against fine

→ More about traffic enforcement



[Home](#) > [For lawyers and lawyers](#) > Digitalization of the Judiciary

## Digitization of justice

The Judiciary is working on a contemporary approach to the courts. Digitization makes it possible to litigate and communicate as paperlessly as possible.



### Digital litigation is mandatory for lawyers in:

- [Asylum and detention cases](#) at all courts
- [Civil action cases](#) in ..... Gelderland Court Central Netherlands

### Digital litigation and communication

The judiciary wants to be digitally accessible to parties. Submitting a case, exchanging documents, viewing the file and communicating about a case can become increasingly digital in the coming years. Step by step, digital litigation in administrative and civil matters becomes mandatory for legal professionals. The bankruptcy trustees and professional administrators already communicate digitally with the court about bankruptcies and protection governments. And in more and more criminal cases, lawyers receive digital files.

### Digitization per jurisdiction

[Civil rights](#) >

[Administrative law](#) >

[Criminal law](#) >

[Supervision](#) >



# tax authorities

How can we help you?

## Make a declaration at My Tax Authorities

[Log in to My Tax Office](#)

## How do I get an income statement?

> [Read how to download an income statement](#)

## Payment dates surcharges and provisional assessment

> [Check when you will receive your allowance or provisional assessment](#)

## A pearl of a declaration period

9.5 million Dutch people made a declaration before 1 May.

> [Read the blog of director Private Individuals Eline Spros](#)

## Important themes



Declaration 2018



Surcharges



Deductions and discounts



Provisional assessment



Future



Personal income

Gift tax



Inheritance tax



VAT



Car and transportation



Work and Income



Payroll taxes



Own house






Customs





# IT project basic registration totally failed

**Modernization of the population register** Minister Plasterk stops a large project for the modernization of the population register, after many warnings and advice from a committee. 90 million seems thrown away.

 Liza van Lonkhuyzen  July 7, 2017  Reading time 2 minutes



# Discover Legal Technology

Explore a curated list of 1164 companies changing the way legal is done.

**Marketplace**

[SEE COMPANIES](#)

**Document Automation**

[SEE COMPANIES](#)

**Practice Management**

[SEE COMPANIES](#)

**Legal Research**

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**Online Dispute Resolution**

[SEE COMPANIES](#)

**E-Discovery**

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**Analytics**

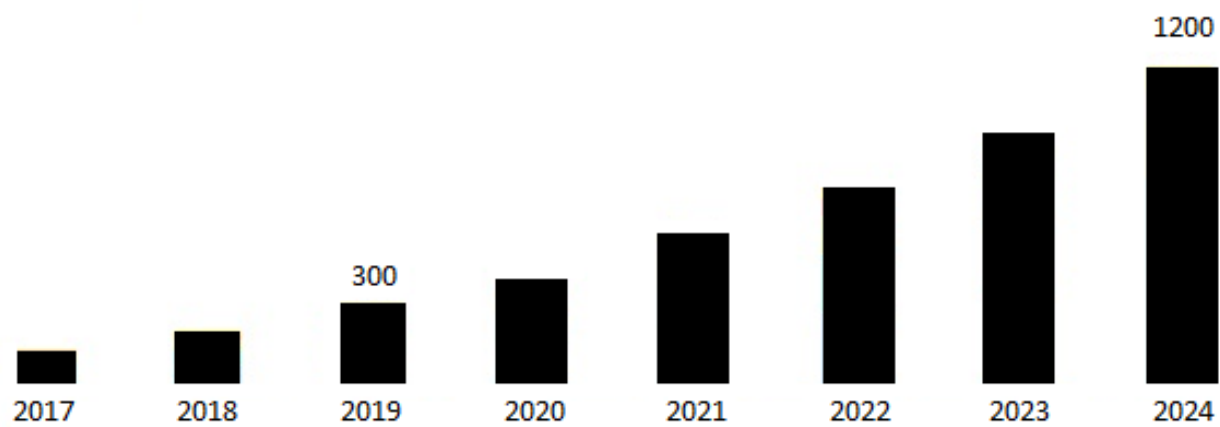
[SEE COMPANIES](#)

**Compliance**

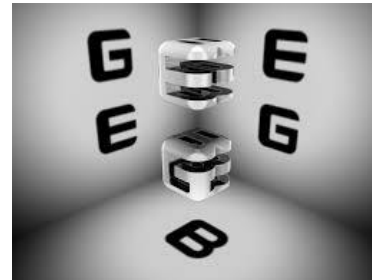
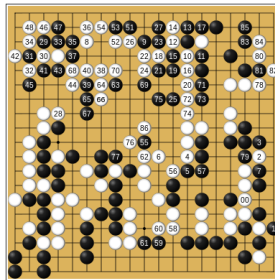
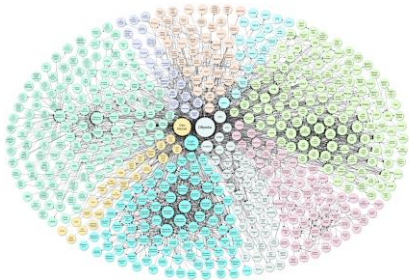
[SEE COMPANIES](#)

CodeX  
Techindex  
(Stanford)





# Legal tech exists, is it AI?





# tax authorities

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Declaration 2018



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Inheritance tax



VAT



Car and transportation



Work and Income



Payroll taxes



Own house



Customs



**AI & Law is hard**



# Nederland ontwapent



## The Netherlands disarm

# Hurdles

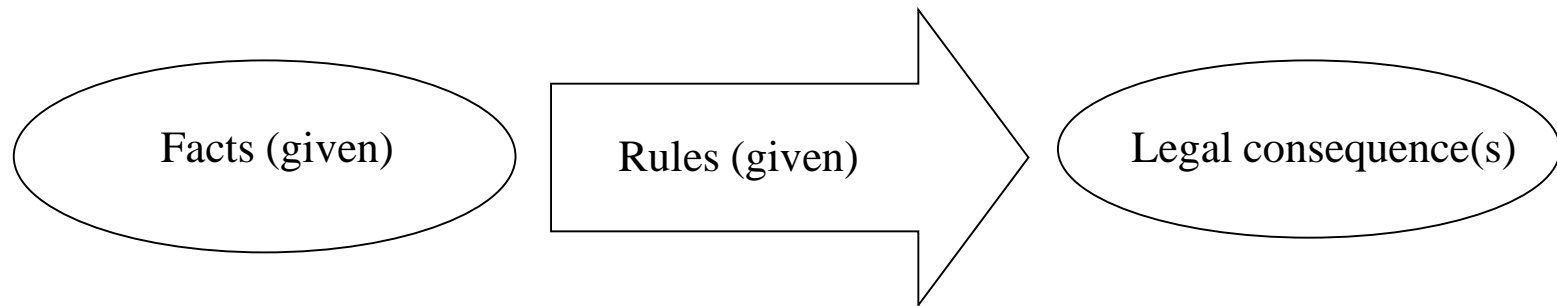
1. Legal reasoning is rule-guided, rather than rule-governed.
2. Legal terms are open textured.
3. Legal questions can have more than one answer, but a reasonable and timely answer must be given.
4. The answers to legal questions can change over time.



Rissland 1988 on Gardner 1987  
*Harvard Journal of Law and Technology*



# The subsumption model



Montesquieu (1689-1755):  
The judge as 'bouche de la loi'



# The theory construction model

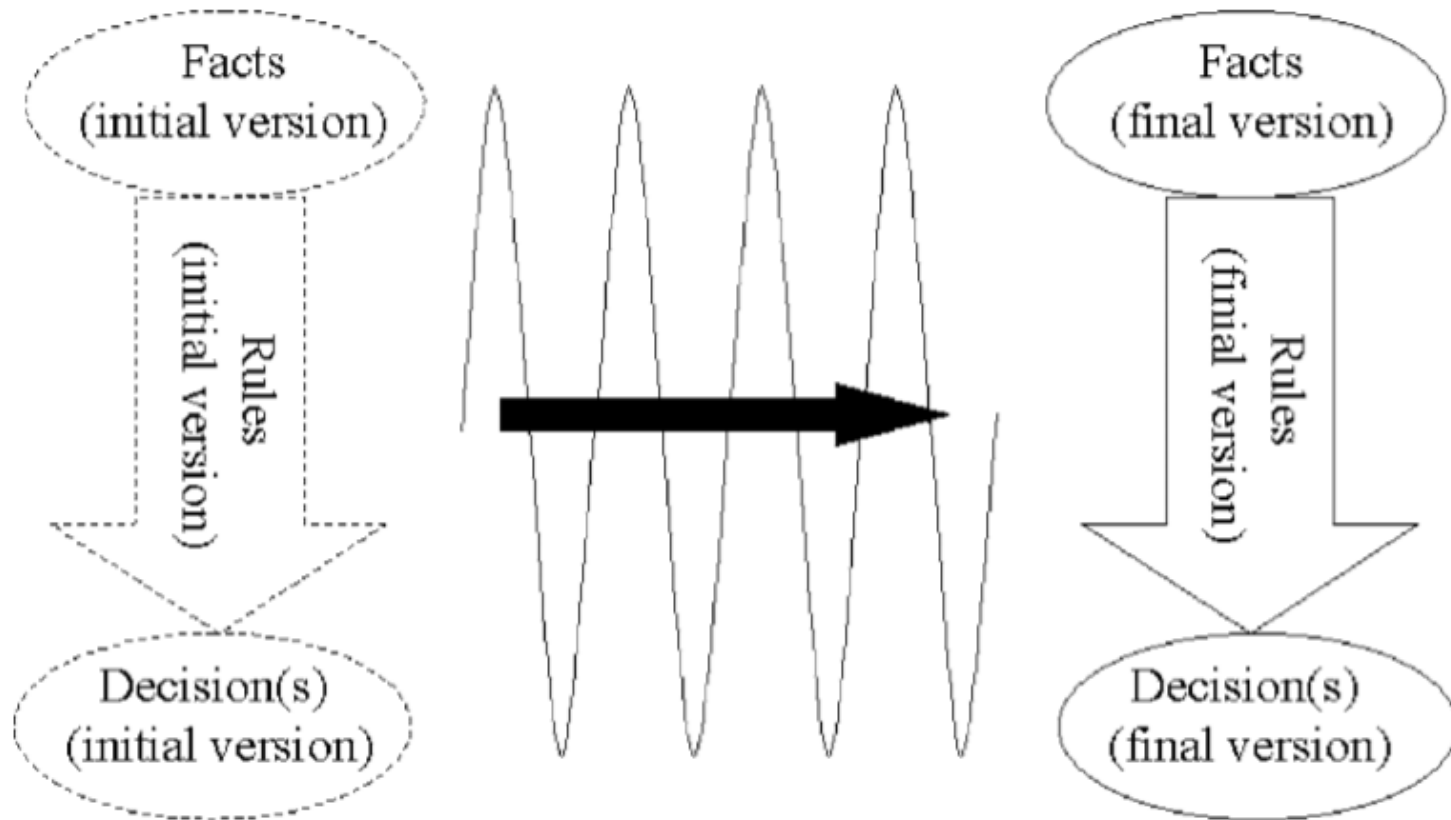
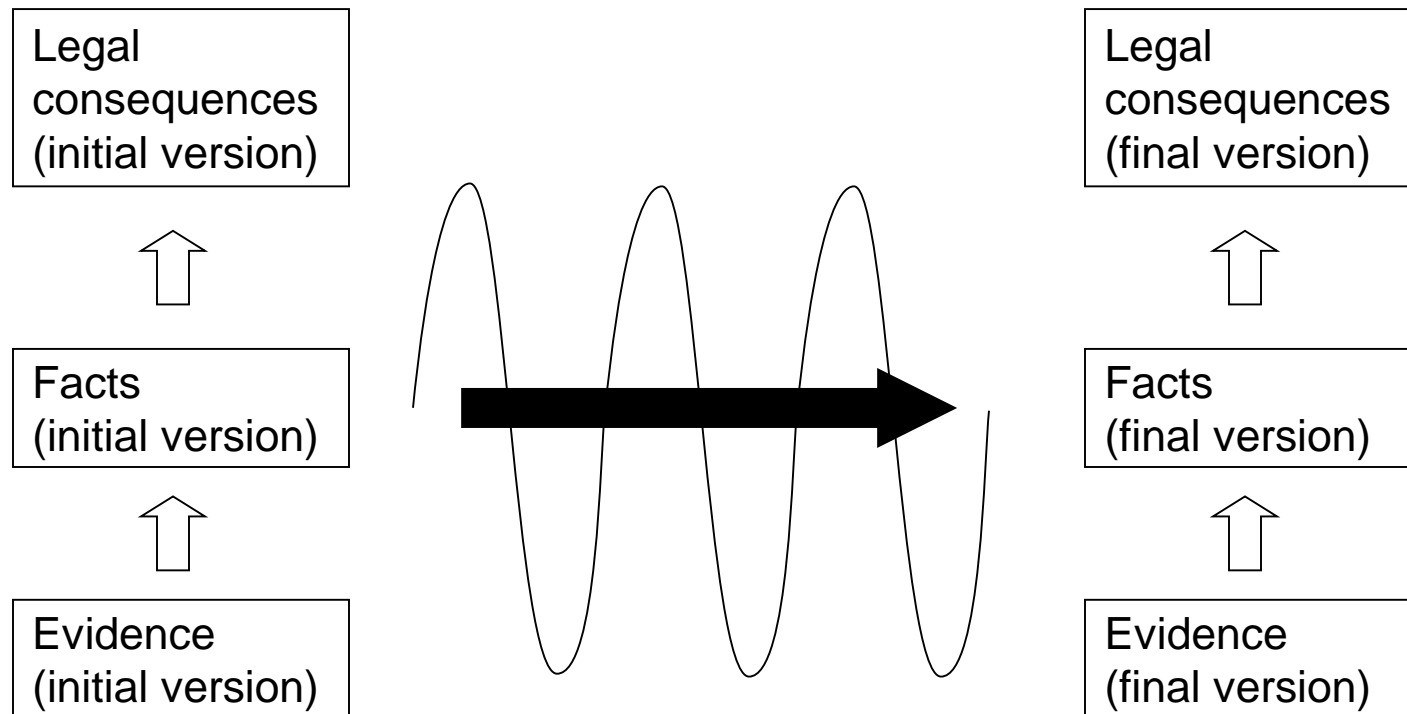


Fig. 2. Theory construction.

# The theory construction model



# AI as Law





# Artificial Intelligence

AI as mathematics

AI as technology

AI as psychology

AI as sociology

**AI as law**

# Artificial Intelligence

AI as mathematics

**Logic**

**Probability theory**

AI as technology

**Expert systems**

**Machine learning**

AI as psychology

**Cognitive modeling**

**Cognitive computing**

AI as sociology

**Multi-agent systems**

**Autonomous robots**

AI as law

...

# Toulmin on logic

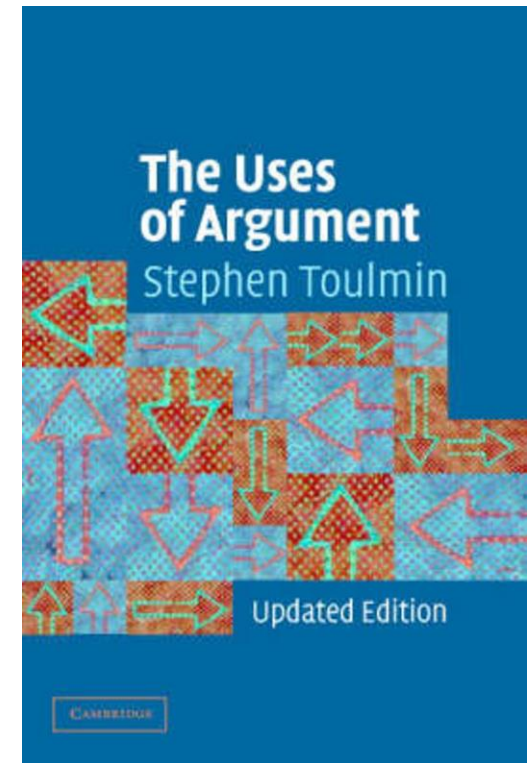
Logic as mathematics

Logic as technology

Logic as psychology

Logic as sociology

**Logic as law**



# Law

Law as mathematics

**Rule following**

**Stare decisis**

Law as technology

**Civil law**

**Common law**

Law as psychology

**Judicial reasoning**

**Judicial discretion**

Law as sociology

**Critical discussion**

**Societal regulation**

Law as law

**Rule of law**

**Justice**



# Artificial Intelligence

AI as mathematics

**Logic**

**Probability theory**

AI as technology

**Expert systems**

**Machine learning**

AI as psychology

**Cognitive modeling**

**Cognitive computing**

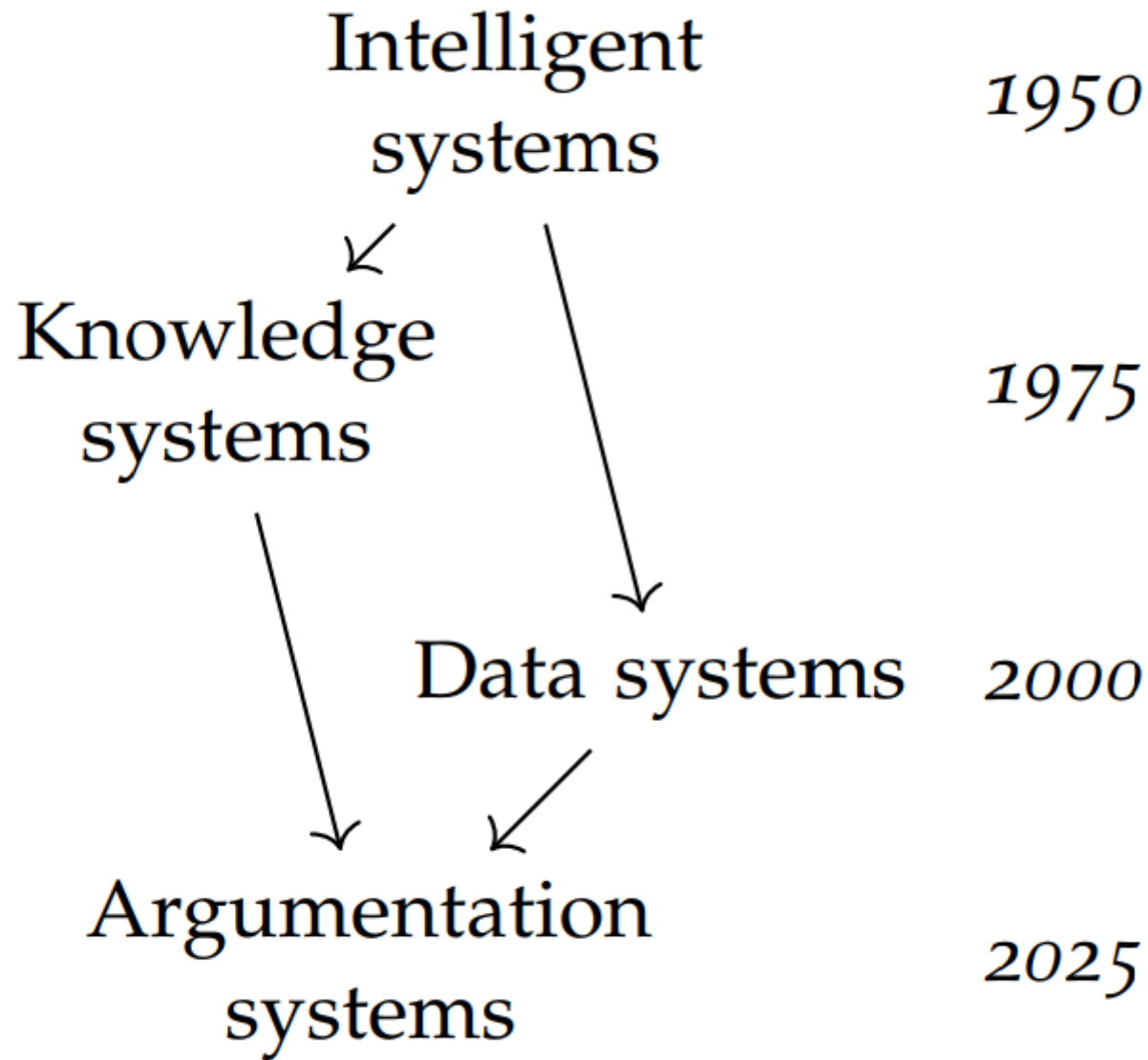
AI as sociology

**Multi-agent systems**

**Autonomous robots**

AI as law

**Hybrid critical discussion systems**



# Topics in AI

Reasoning  
Knowledge  
Learning  
Language

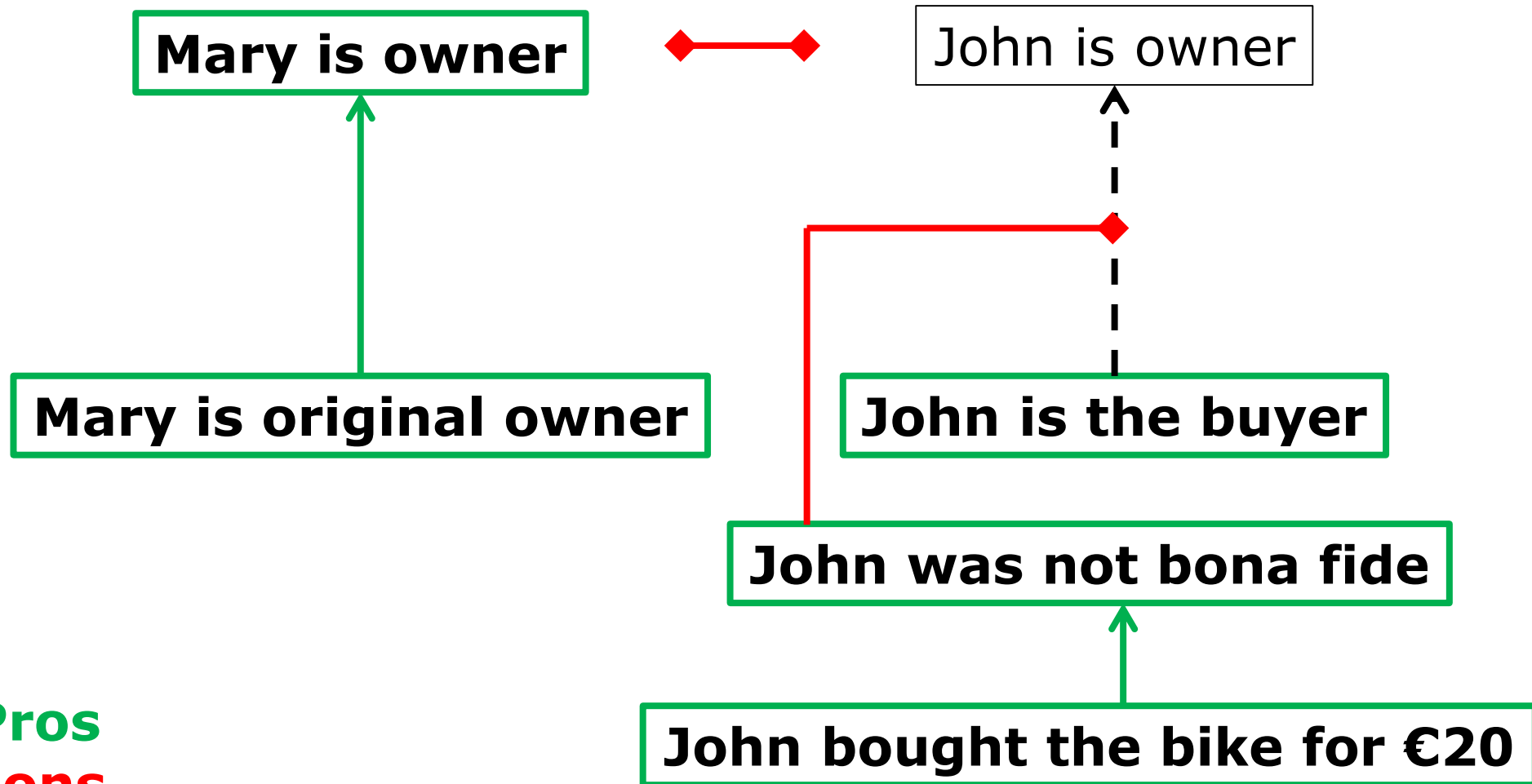
# Reasoning

Argumentation

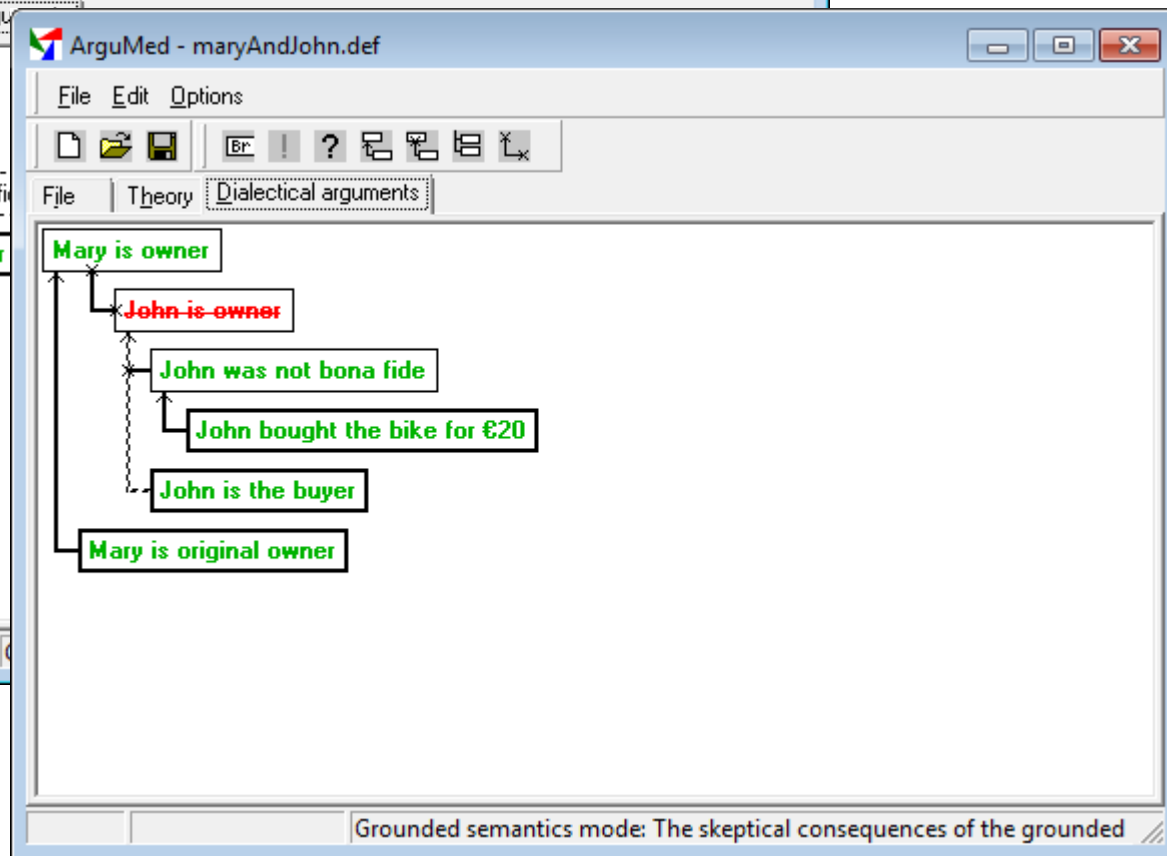
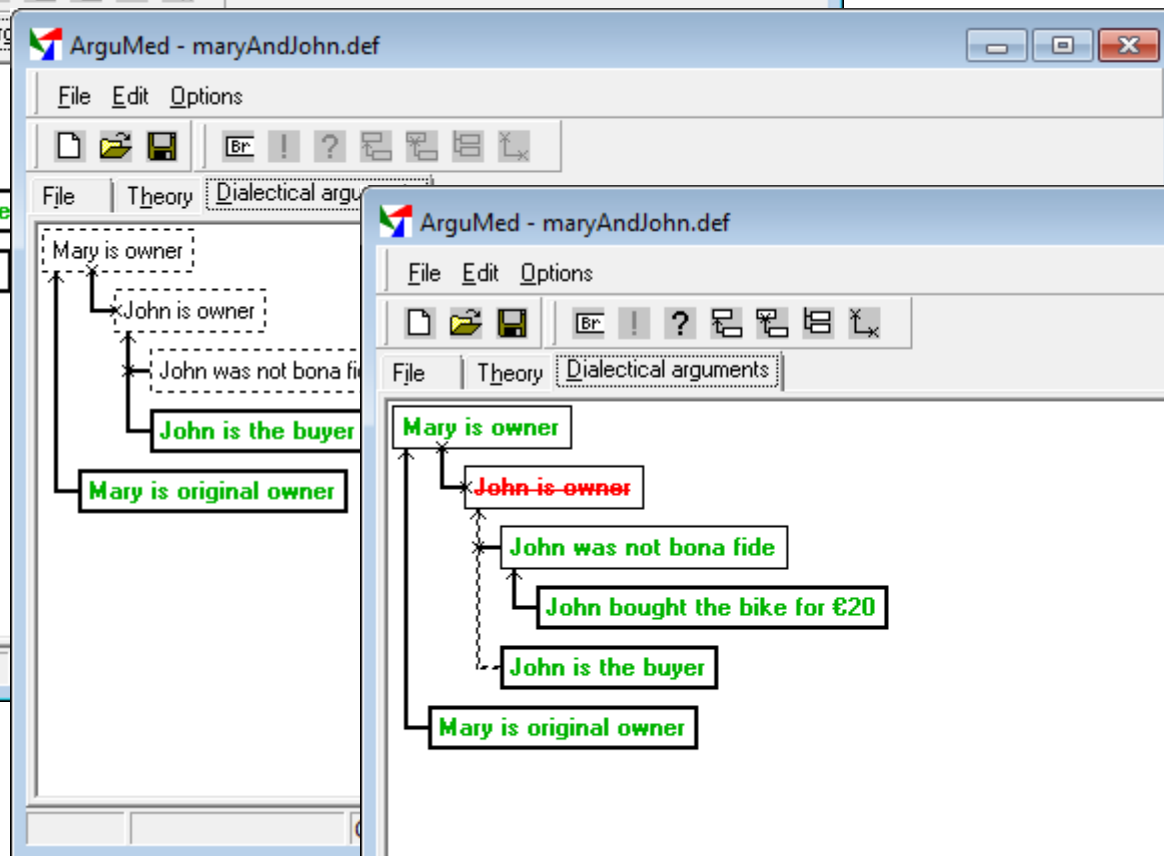
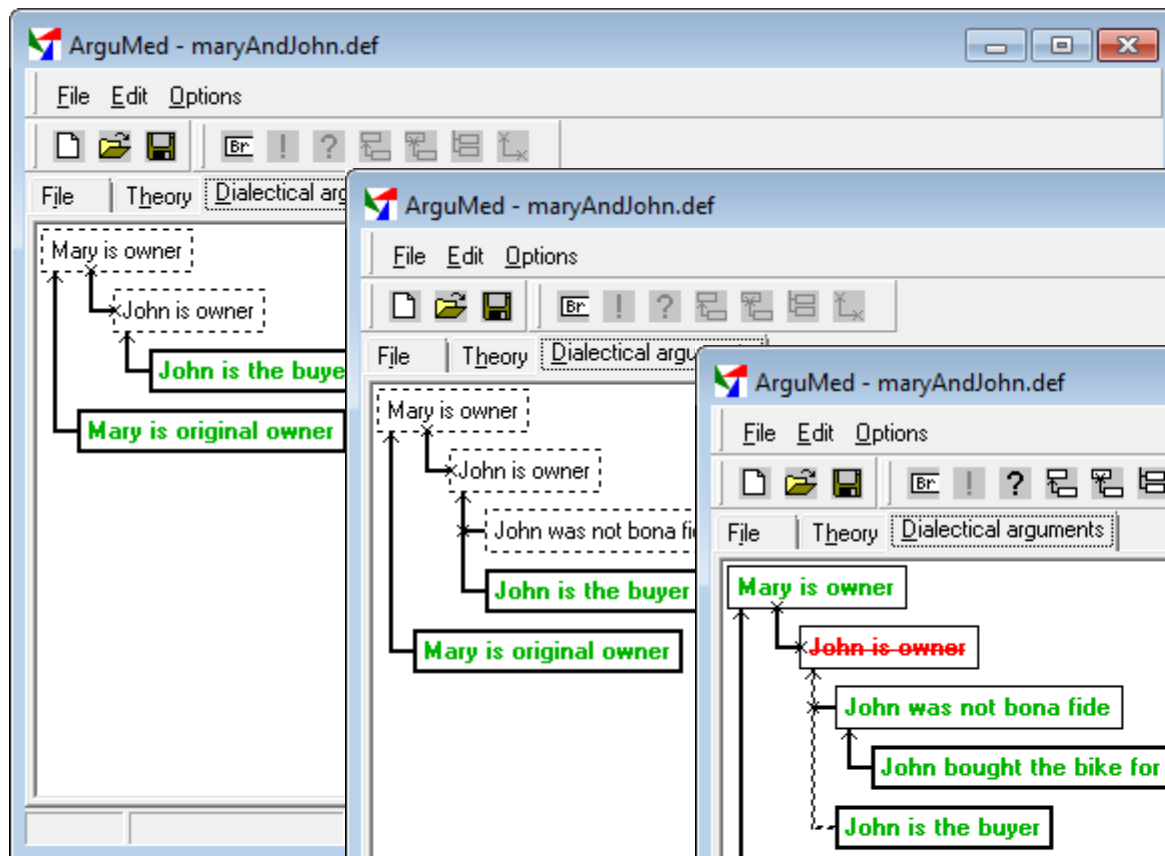
Defeasibility

Inconsistency, incompleteness, uncertainty

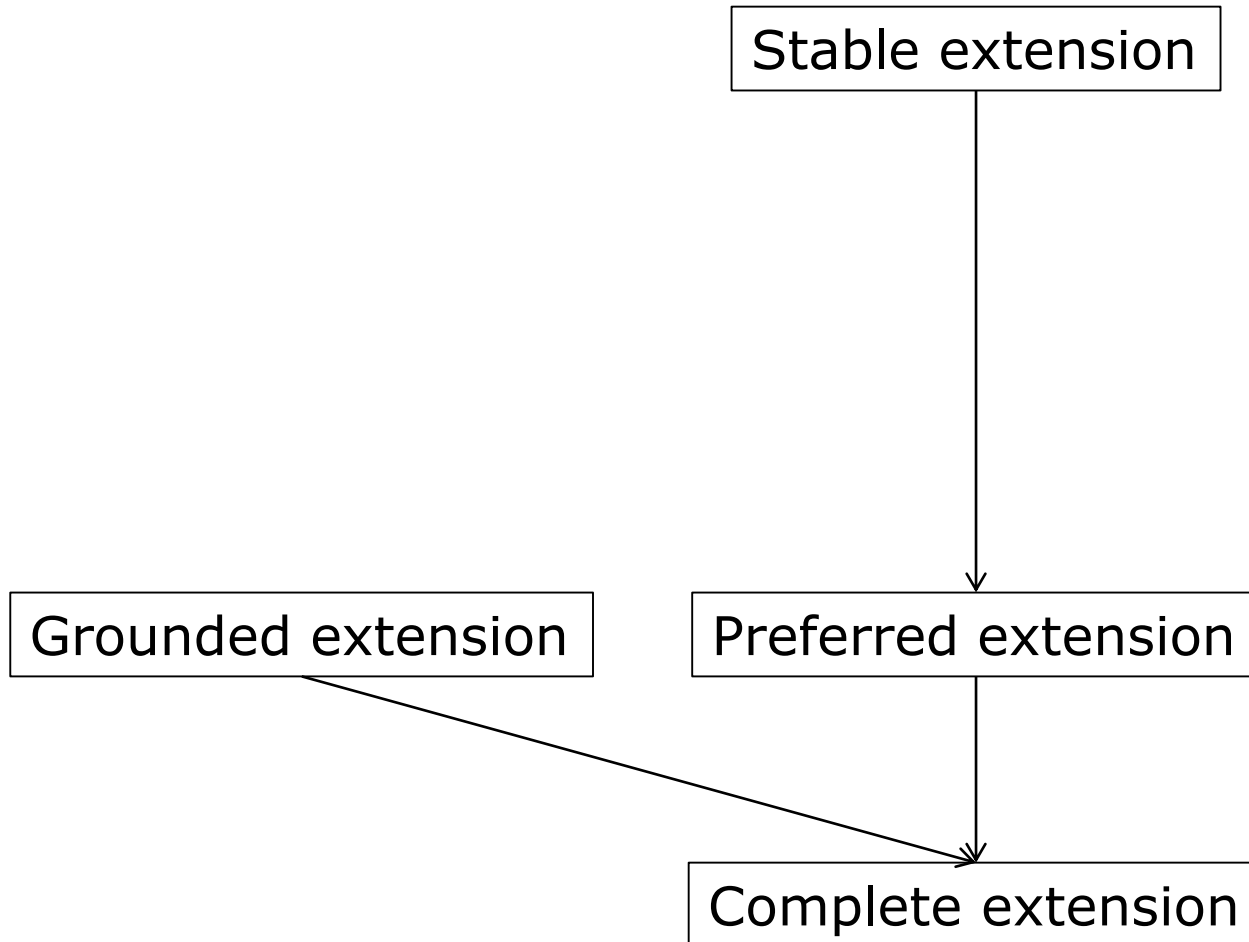




**Pros**  
**Cons**

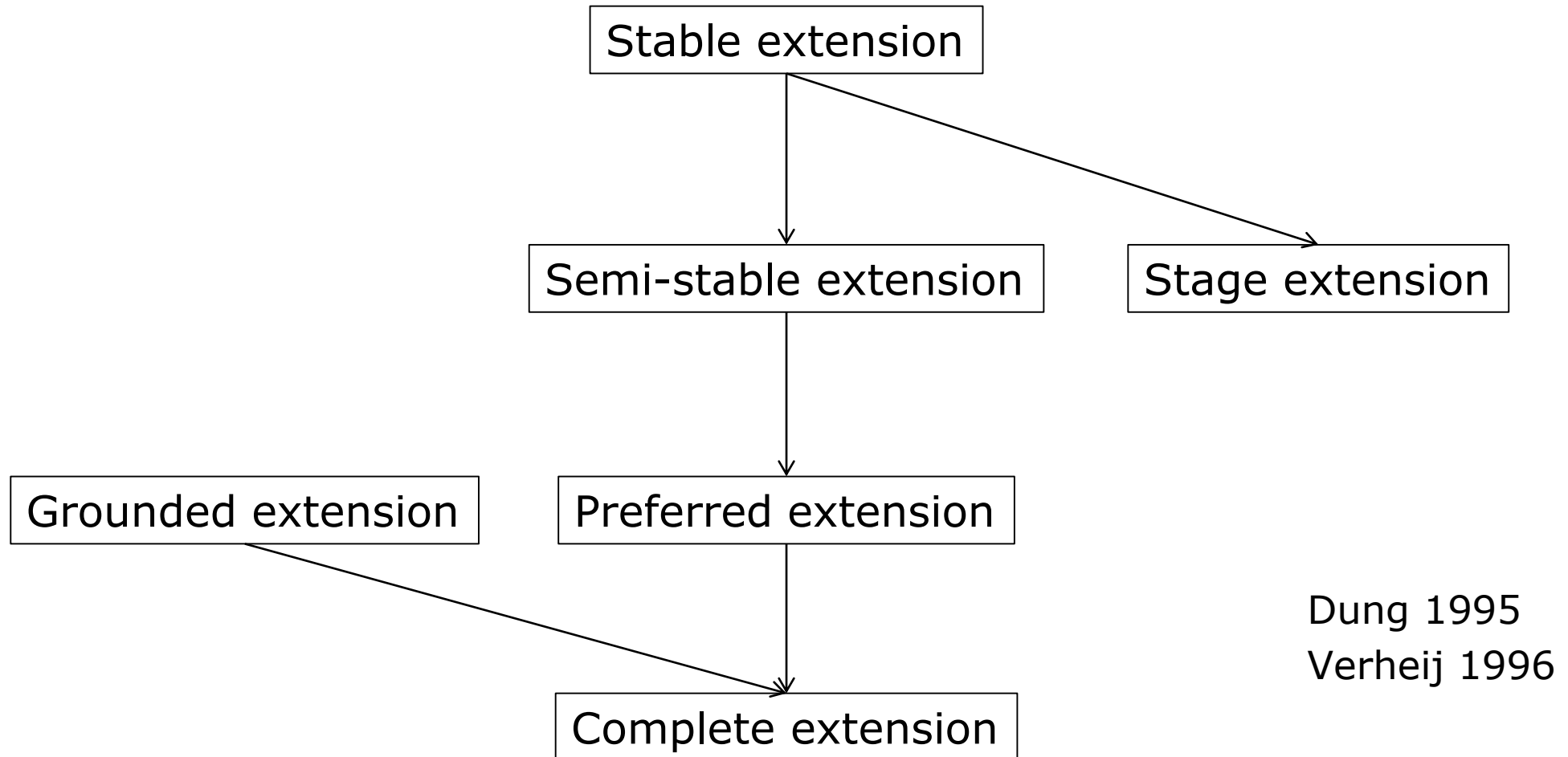


# Abstract argumentation semantics (1995)



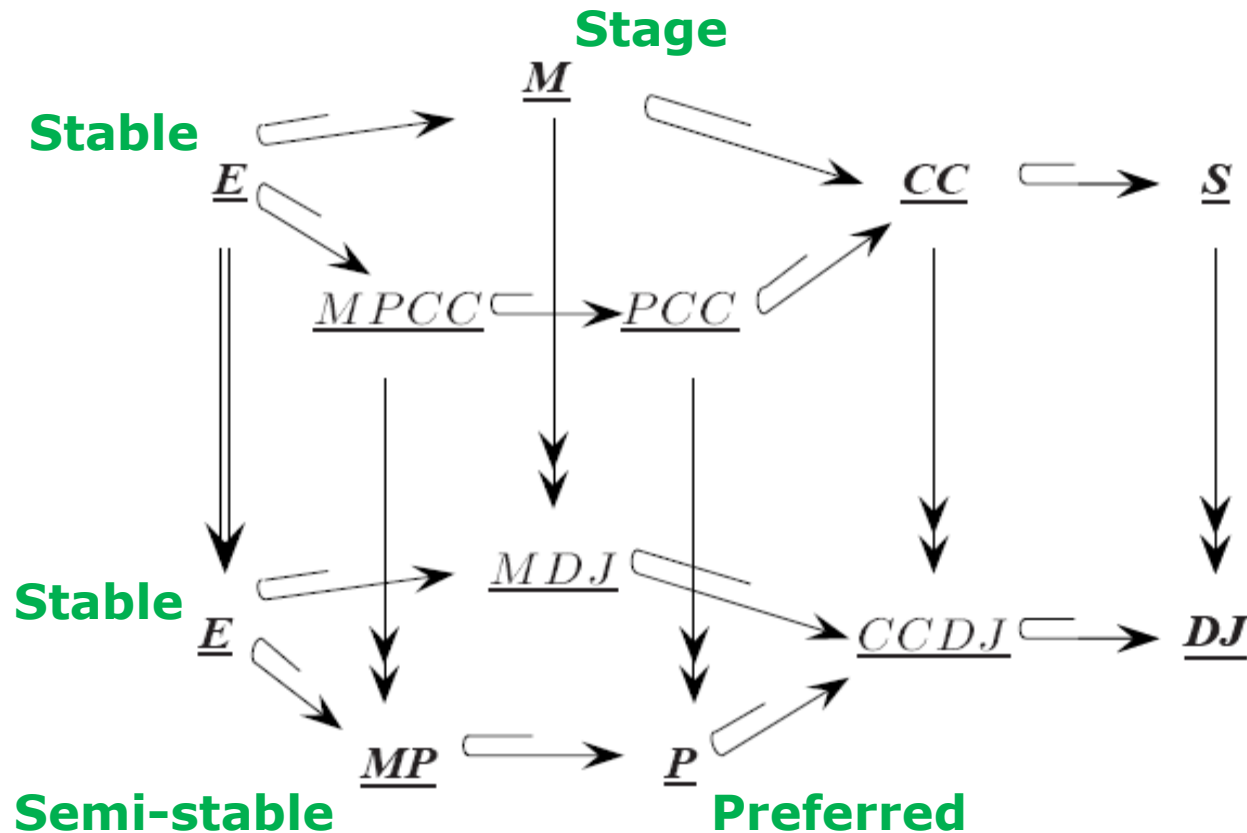
Dung 1995

# Abstract argumentation semantics (1996)



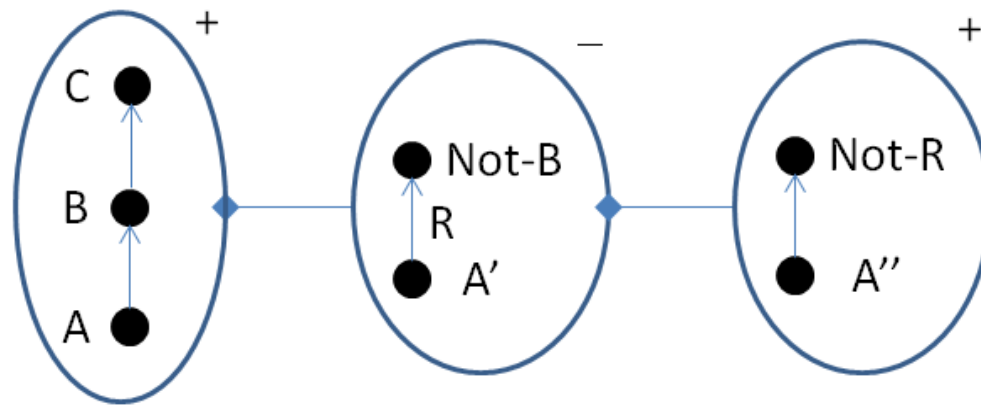


# Argumentation semantics (2003)



# Abstract argumentation (Dung 1995)

Dung's abstract arguments have internal structure representing support



Abstract version: ● ◆ — ● ◆ — ●

# Case models

**Definition 1.** A *case model* is a pair  $(C, \geq)$  with finite  $C \subseteq L$ , such that the following hold, for all  $\varphi, \psi$  and  $\chi \in C$ :

1.  $\not\models \neg\varphi$ ;
2. If  $\not\models \varphi \leftrightarrow \psi$ , then  $\models \neg(\varphi \wedge \psi)$ ;
3. If  $\models \varphi \leftrightarrow \psi$ , then  $\varphi = \psi$ ;
4.  $\varphi \geq \psi$  or  $\psi \geq \varphi$ ;
5. If  $\varphi \geq \psi$  and  $\psi \geq \chi$ , then  $\varphi \geq \chi$ .

# Knowledge

Argumentation schemes

Norms

Ontologies

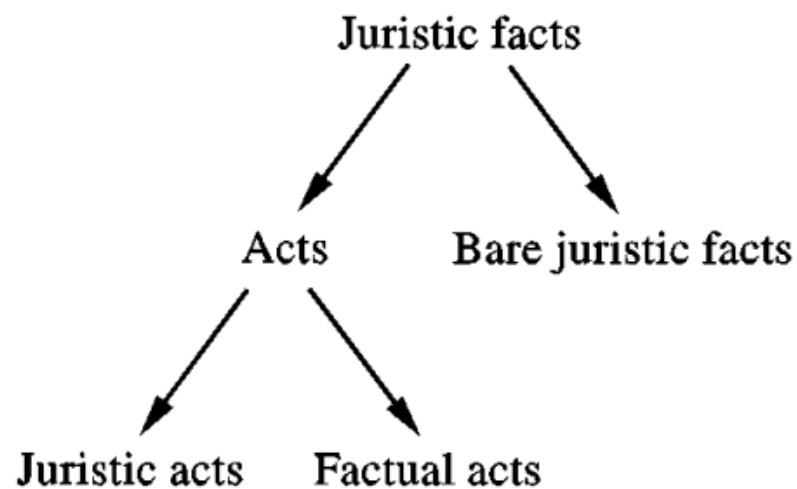


FIGURE 19. Traditional categories of juristic facts and their relations.

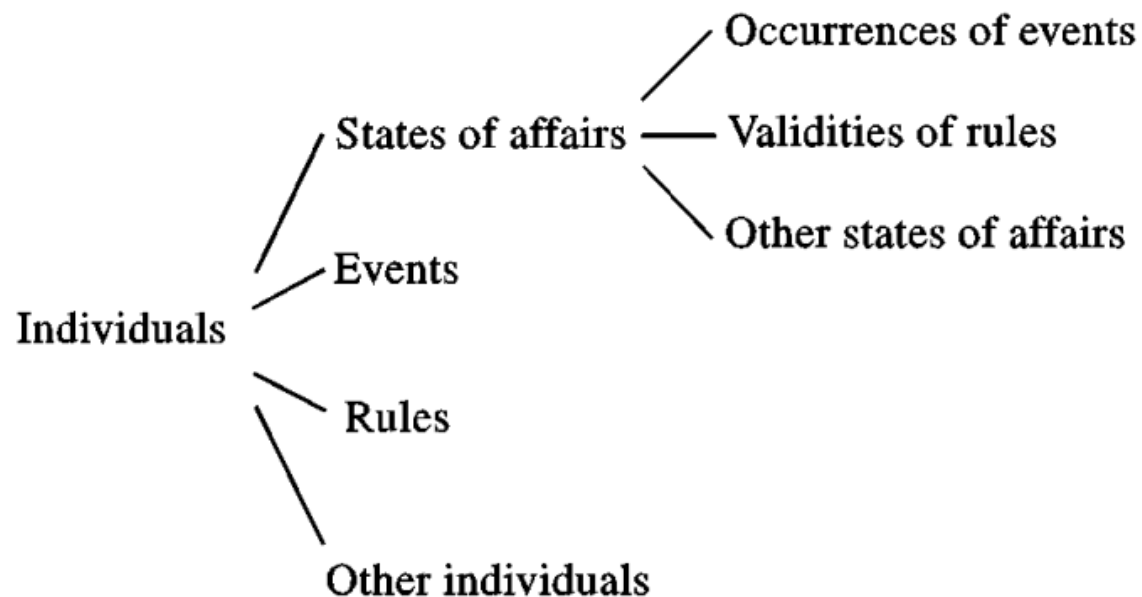


FIGURE 20. Tree of individuals.

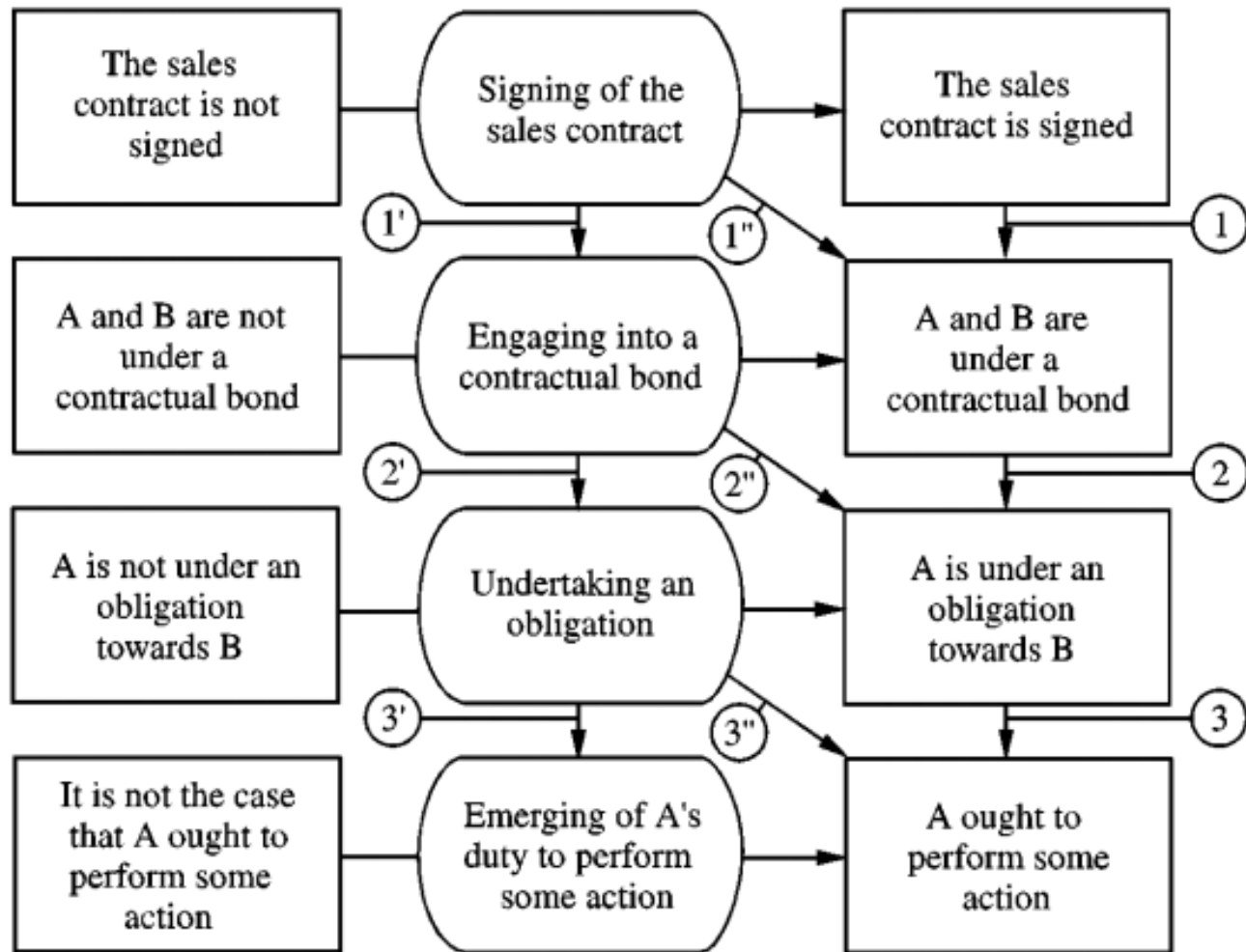


FIGURE 10. Signing a sales contract.





[HOME](#) → [MAGAZINE ARCHIVE](#) → [SEPTEMBER 2015 \(VOL. 58, NO. 9\)](#) → [COMMONSENSE REASONING AND COMMONSENSE KNOWLEDGE](#)  
[IN...](#) → [ABSTRACT](#)

# Commonsense Reasoning and Commonsense Knowledge in Artificial Intelligence

By Ernest Davis, Gary Marcus

Communications of the ACM, Vol. 58 No. 9, Pages 92-103

10.1145/2701413

- To achieve human-level performance in domains such as natural language processing, vision, and robotics, basic knowledge of the commonsense world—time, space, physical interactions, people, and so on—will be necessary.
- Although a few forms of commonsense reasoning, such as taxonomic reasoning and temporal reasoning are well understood, progress has been slow.
- Extant techniques for implementing commonsense include logical analysis, handcrafting large knowledge bases, Web mining, and crowdsourcing. Each of these is valuable, but none by itself is a full solution.
- Intelligent machines need not replicate human cognition directly, but a better understanding of human commonsense might be a good place to start.

# Scenario schemes

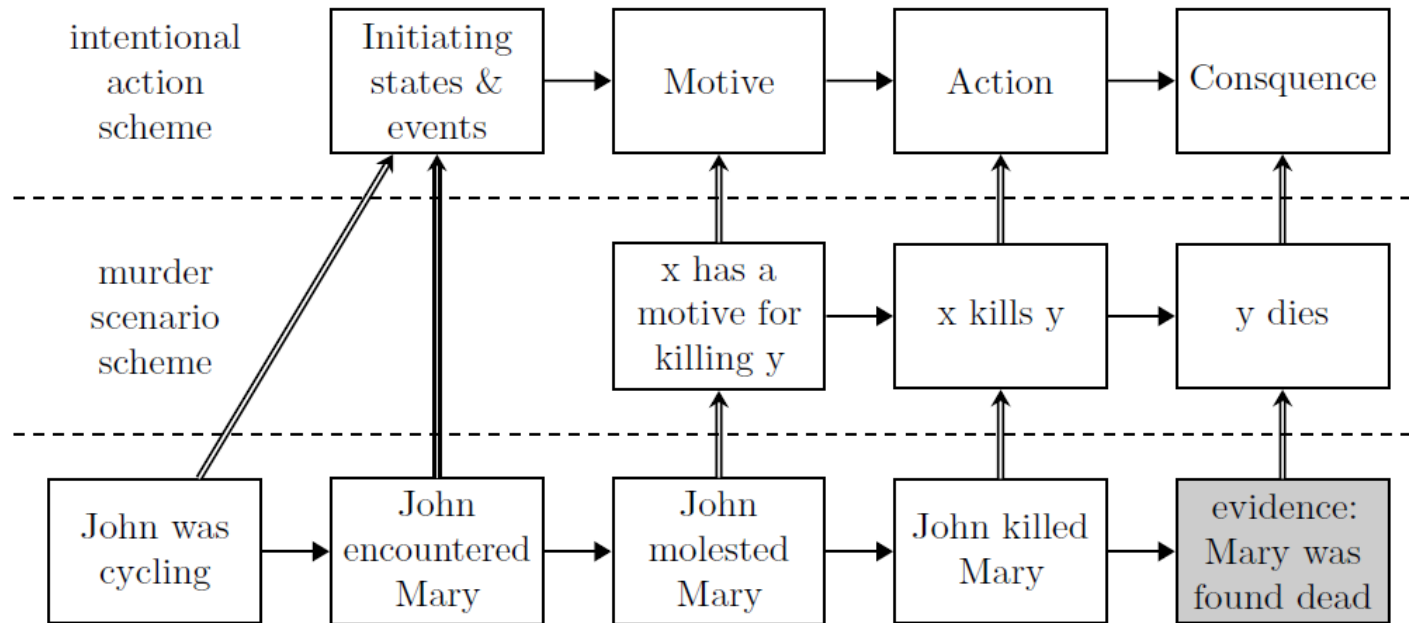


Figure 4: The scenario  $S_1$  as an instance of different scenario schemes

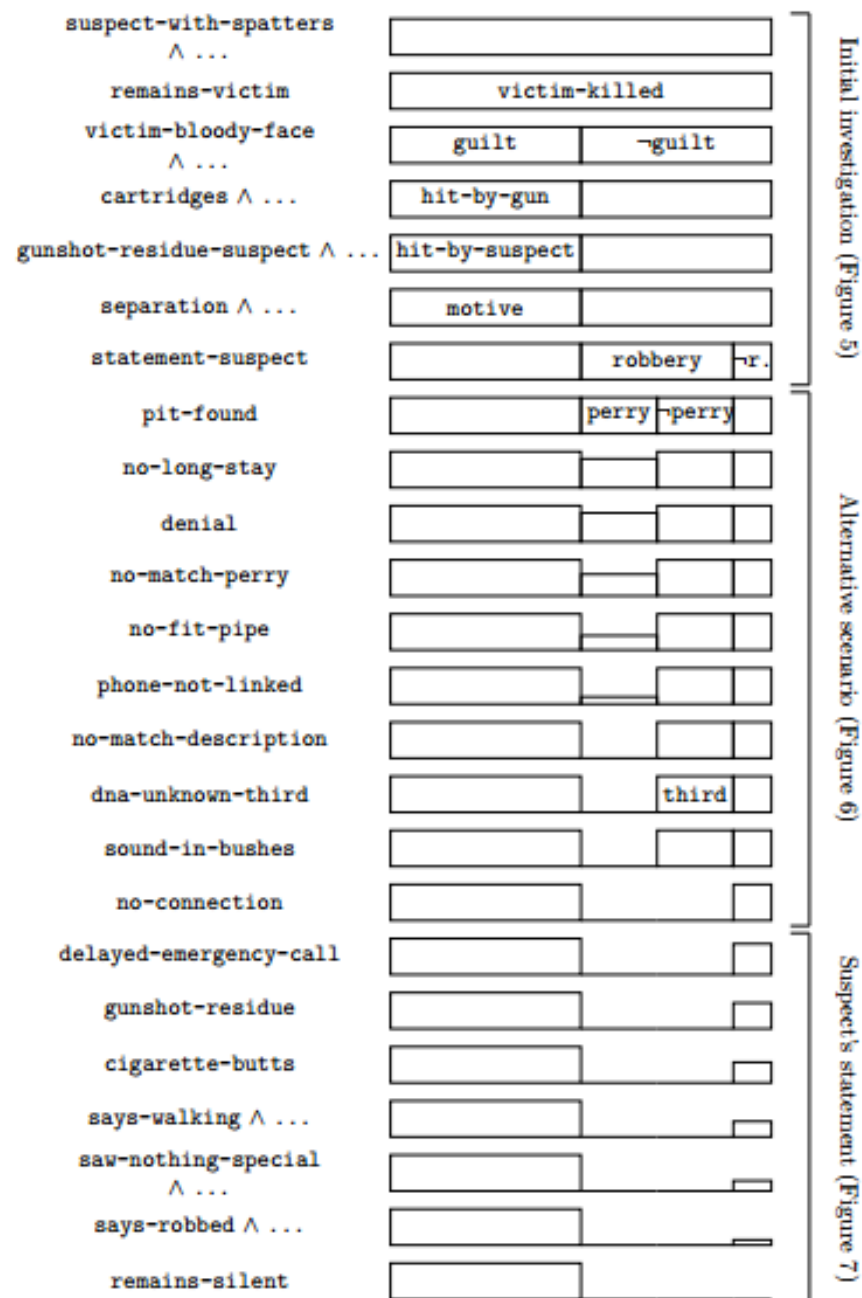


Figure 10: The Appellate Court's reasoning

# Learning

Statistical analysis

Open data

Neural networks

# Netherlands Criminal Courts Prediction Machine

**Predict**

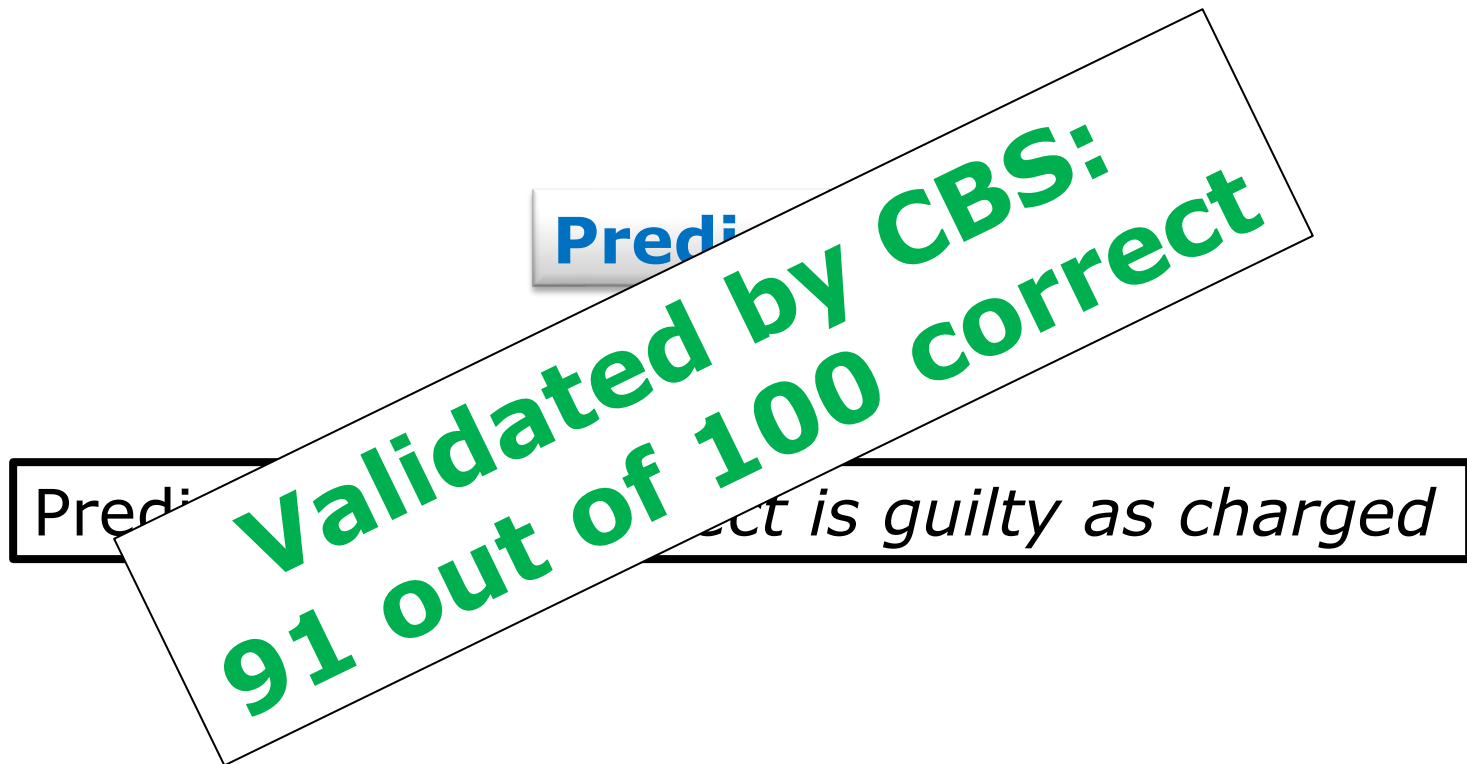
# Netherlands Criminal Courts Prediction Machine

**Predict**

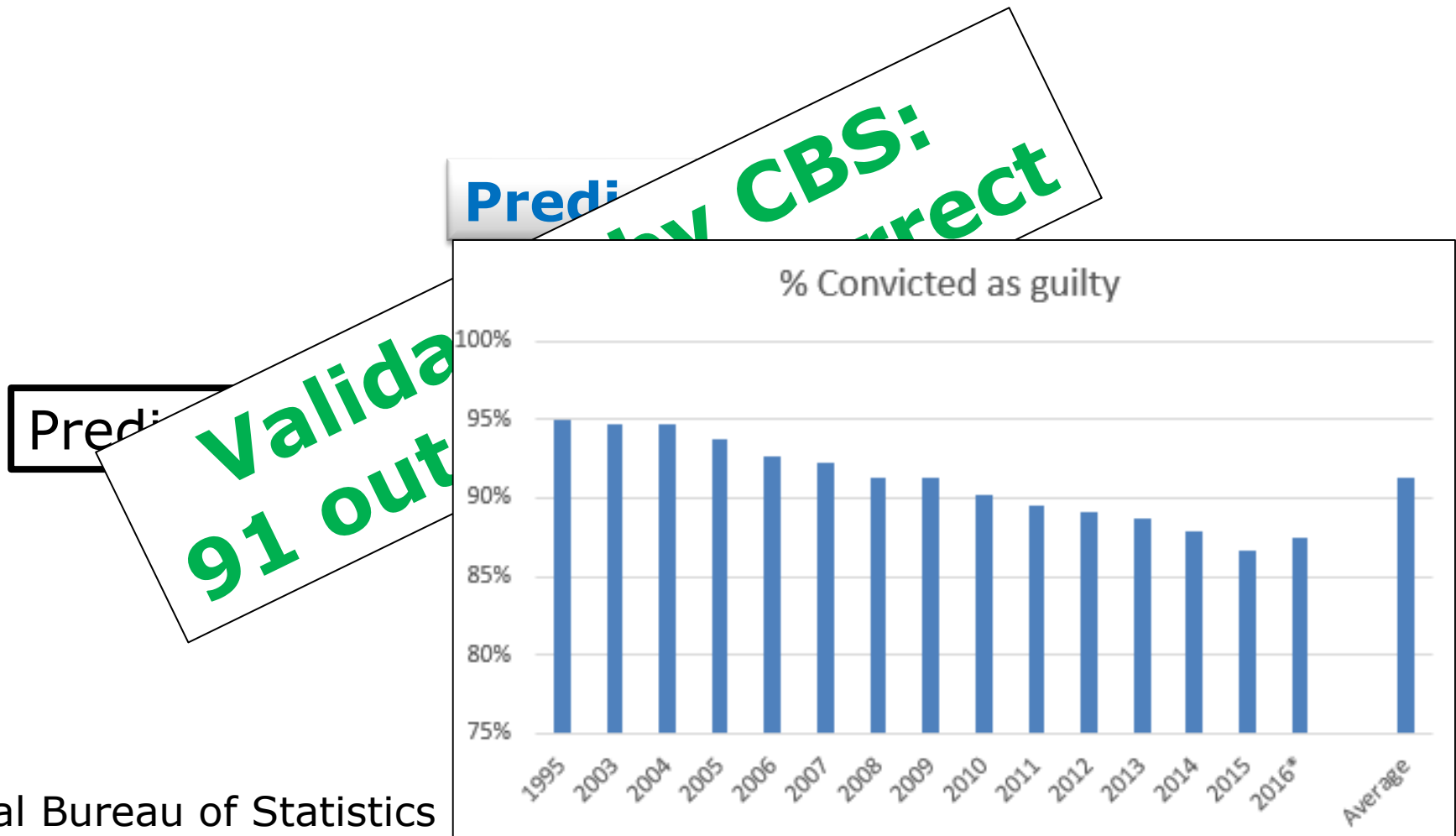
Prediction: *The suspect is guilty as charged*



# Netherlands Criminal Courts Prediction Machine



# Netherlands Criminal Courts Prediction Machine



# Judicial prediction

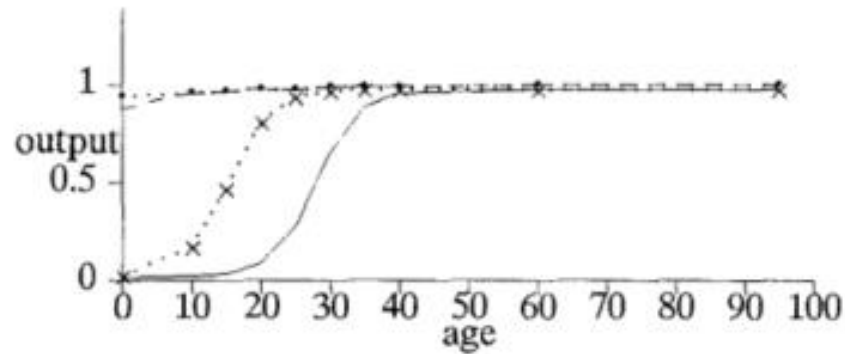
## US supreme court prediction

<i>Prediction method</i>	<i>Correct</i>
Majority outcome (= always affirm)	60%
Majority outcome in past 10 years	67%
AI model (Katz, Bommarito, Blackman 2017)	70%

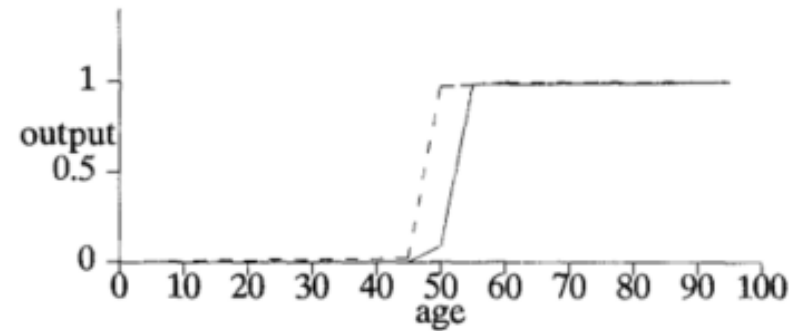
## European Court of Human Rights

<i>Prediction method</i>	<i>Correct</i>
Random guess (prepared dataset)	50%
AI model (Aletras et al 2016)	79%
AI model (Aletras et al 2016) only using circumstances	73%

# Neural networks



•....• 1 Hidden Layer  
 - - - - 2 Hidden Layers  
 ..... 3 Hidden Layers - men  
 x....x 3 Hidden Layers - women



----- Men  
 - - - - Women

Should be 60 for women,  
65 for men (difference 5)

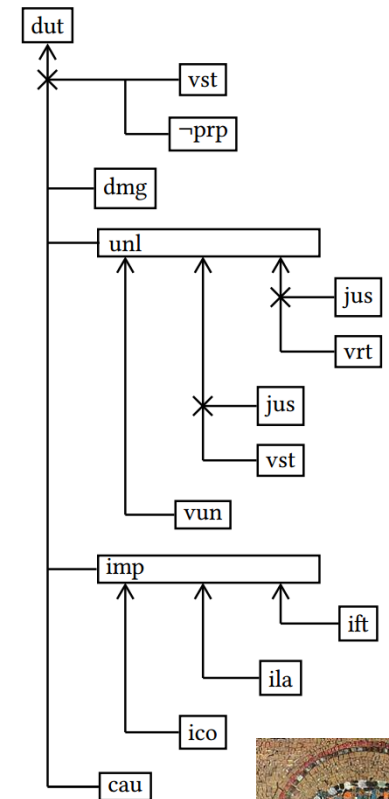
Bench-Capon ICAIL 1993

# Cases and rules

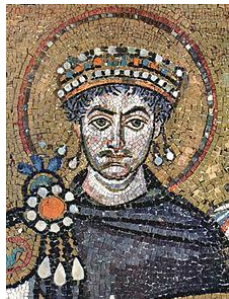
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
¬dmg	¬dut	¬dut	¬dut	dut	dut	dut	dut	dut	dut	dut	dut	dut	¬dut	¬dut	¬dut
	dmg	dmg	dmg	dmg	dmg	dmg	dmg	dmg	dmg	dmg	dmg	dmg	dmg	dmg	dmg
	¬unl	unl	unl	unl	unl	unl	unl	unl	unl	unl	unl	unl	¬unl	¬unl	unl
		¬imp	imp	imp	imp	imp	imp	imp	imp	imp	imp	imp			imp
			¬cau	cau	cau	cau	cau	cau	cau	cau	cau	cau			cau
	¬vrt			vrt	vrt	vrt	¬vrt	¬vrt	¬vrt	¬vrt	¬vrt	¬vrt	vrt	¬vrt	
	¬vst			¬vst	¬vst	¬vst	vst	vst	vst	¬vst	¬vst	¬vst	¬vst	vst	vst
	¬vun			¬vun	¬vun	¬vun	¬vun	¬vun	¬vun	vun	vun	vun			
		¬ift		ift	¬ift	¬ift	ift	¬ift	¬ift	ift	¬ift	¬ift			
		¬ila		¬ila	ila	¬ila	¬ila	ila	¬ila	¬ila	ila	¬ila			
		¬ico		¬ico	¬ico	ico	¬ico	¬ico	ico	¬ico	¬ico	ico			
			¬jus	¬jus	¬jus	¬jus	¬jus	¬jus	¬jus	¬jus	¬jus	¬jus	jus	jus	
			prp	prp	prp										¬prp

1 > 2 > 3 > 4 > 5 ~ 6 ~ 7 ~ 8 ~ 9 ~ 10 ~ 11 ~ 12 ~ 13 > 14 ~ 15 ~ 16

Data



Knowledge



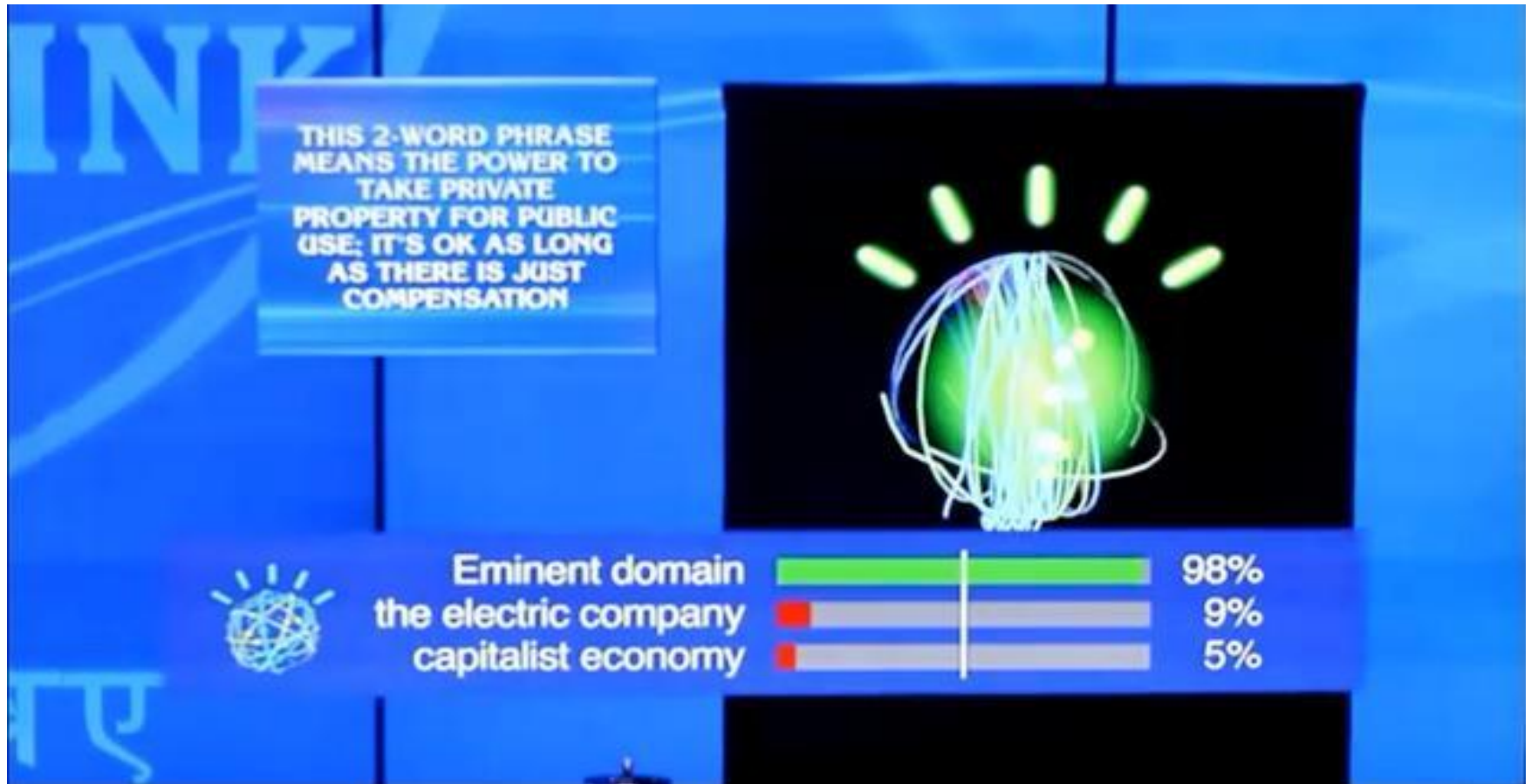
# Language

Labeled data

Prediction

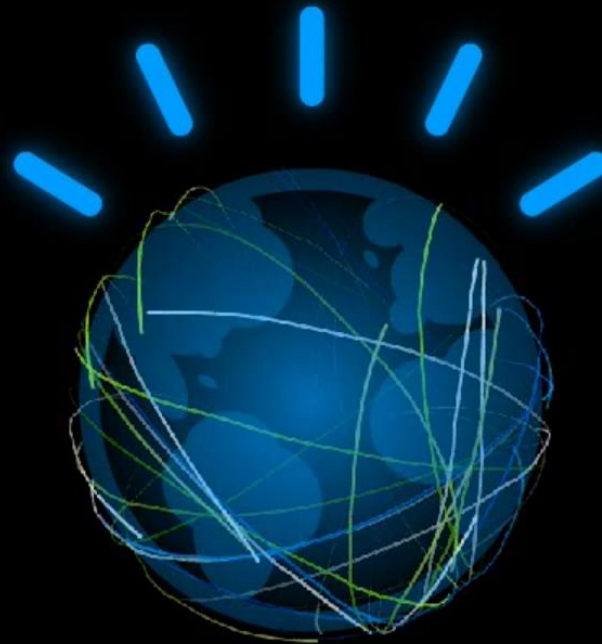
Argument mining





# IBM Debating Technologies

The sale of violent video games to minors should be banned



**CON**

# Argumentation Mining: The Detection, Classification and Structure of Arguments in Text

Raquel Mochales Palau  
Katholieke University Leuven  
Computer Science Dept.  
Leuven, Belgium

raquel.mochales@cs.kuleuven.be

Marie-Francine Moens  
Katholieke University Leuven  
Computer Science Dept.  
Leuven, Belgium

sien.moens@cs.kuleuven.be

## ABSTRACT

Argumentation is the process by which arguments are constructed and handled. Argumentation constitutes a major component of human intelligence. The ability to engage in argumentation is essential for humans to understand new problems, to perform scientific reasoning, to express, to clarify and to defend their opinions in their daily lives. Argumentation mining aims to detect the arguments presented in a text document, the relations between them and the internal structure of each individual argument. In this paper we analyse the main research questions when dealing with argumentation mining and the different methods we have studied and developed in order to successfully confront the challenges of argumentation mining in legal texts.

## 1. INTRODUCTION

Argumentation is the process whereby arguments are constructed, exchanged and evaluated in light of their inter-

goals, beliefs, and actions. Therefore, it is a crucial point to understand the characteristics and models of argumentation. Another example are question answering systems, which deal with finding the correct response to questions like “*Why was this decision taken?*” and therefore integrate the analysis of argumentation as a crucial part of identifying the answer to the questions as well as the pros and cons that make up the answer.

Argumentation mining is a new research area that moves between natural language processing, argumentation theory and information retrieval. The aim of argumentation mining is to automatically detect the argumentation of a document and its structure. This implies the detection of all the arguments involved in the argumentation process, their individual or local structure, i.e. rhetorical or argumentative relationships between their propositions, and the interactions between them, i.e. the global argumentation structure.

To achieve the aim of argumentation mining an adequate linguistic, formal, and computational study of argumentation is required.



## Poor Man's Watson

power to take private property for  
public use

Find

*Eminent domain*

More information:

[http://en.wikipedia.org/wiki/Eminent\\_domain](http://en.wikipedia.org/wiki/Eminent_domain)

[http://www.google.com/search?](http://www.google.com/search?hl=en&q=power%20to%20take%20private%20property%20for%20public%20use)

[hl=en&q=power%20to%20take%20private%20property%20for%20public%20use](http://www.google.com/search?hl=en&q=power%20to%20take%20private%20property%20for%20public%20use)


Examples: [author of Godel Escher Bach born in 1945](#) - [founder of mothers of invention born in Baltimore](#) - [Dutch director with a major in mathematics and physics](#)

Poor Man's Watson in another language: [English](#) [Nederlands](#)




Violent Video Games - ProCon.org


https://videogames.procon.org

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## Do Violent Video Games Contribute to Youth Violence?

<https://www.procon.org/education.php>

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https://videogames.procon.org

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Violent Video Games - ProCon.org

https://videogames.procon.org

## Do Violent Video Games Cause Aggression?

**Pro 1**  
**Playing violent video games causes more aggression, bullying, and fighting.**<sup>[60][61][80]</sup> 60% of middle school boys and 40% of middle school girls who played at least one Mature-rated (M-rated) game hit or beat up someone, compared with 39% of boys and 14% of girls who did not play M-rated games. <sup>[2]</sup> A 2014 peer-reviewed study in the *Journal of the American Medical Association* found that habitual violent video game playing had a causal link with increased, long-term, aggressive behavior. Several peer-reviewed studies have shown that children who play M-rated games are more likely to bully and cyberbully their peers, get into physical fights, be hostile, argue with teachers, and show aggression towards their peers throughout the school year. <sup>[73][76][2][67][31]</sup>

**Con 1**  
**Sales of violent video games have significantly increased while violent juvenile crime rates have significantly decreased.**  
Total US sales of video game hardware and software increased 204% from 1994 to 2014, reaching \$13.1 billion in 2014, while violent crimes decreased 37% and murders by juveniles acting alone fell 76% in that same period. <sup>[133][134][135][136][82][83]</sup> The juvenile Violent Crime Index arrest rate in 2012 was 38% below 1980 levels and 63% below 1994, the peak year. <sup>[83]</sup> The number of high school students who had been in at least one physical fight decreased from 43% in 1991 to 25% in 2013, and student reports of criminal victimization at school dropped by more than half from 1995 to 2011. <sup>[107][106]</sup> An Aug. 2014 peer-reviewed study found that: "Annual trends in video game sales for the past 33 years were unrelated to violent crime... Monthly sales of video games were related to concurrent decreases in aggravated assaults." <sup>[84]</sup>

**Pro 2**  
**There is broad consensus among medical associations, pediatricians, parents, and researchers that violent video games increase aggressive behavior.**<sup>[74]</sup> A 2014 study

**Con 2**  
**Studies showing a causal link between**

### Top Pro & Con Arguments

### Top Pro & Con Quotes

### RECOMMENDED to you...


- 1 Did You Know?
- 2 Readers' Comments
- 3 Videos
- 4 Video Games & Violence Infographics
- 5 Entertainment Software Rating Board Categories

+ DIG DEEPER...

CITE THIS PAGE

Violent video games should be b x

https://www.kialo.com/violent-video-games-should-be-banned-to-curb-school-shootings-10120



Violent video games should be banned to curb school shootings.

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PERSPECTIVE

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Violent video games should be banned to curb school shootings.

Pros

Cons

The measures currently in place to prevent children and teenagers from accessing violent games are ineffective.

School shootings are, primarily, the result of other factors that should be dealt with instead.

Video games depict killing and violence in a positive fashion, rewarding players for it. Suffering is usually absent, death never more than a nuisance.

School shootings are not a large enough problem to justify taking away violent video games - an activity which millions of people enjoy.

The link between violent games and violent actions [has been refuted repeatedly](#). There is some link to aggression but it's comparable to that of movies, and not all aggression leads to violence.

There are many other sources of violent media available for consumption on the wider Internet, on TV and even books. If it weren't video games it would be videos of



SCI-TECH

# IBM's AI loses debate to a human, but it's got worlds to conquer



Champion debater Harish Natarajan argues against IBM Debater, represented by a screen with a blue oval, in a competition at the IBM Think conference.

Stephen Shankland/CNET

Feb 11, 2019

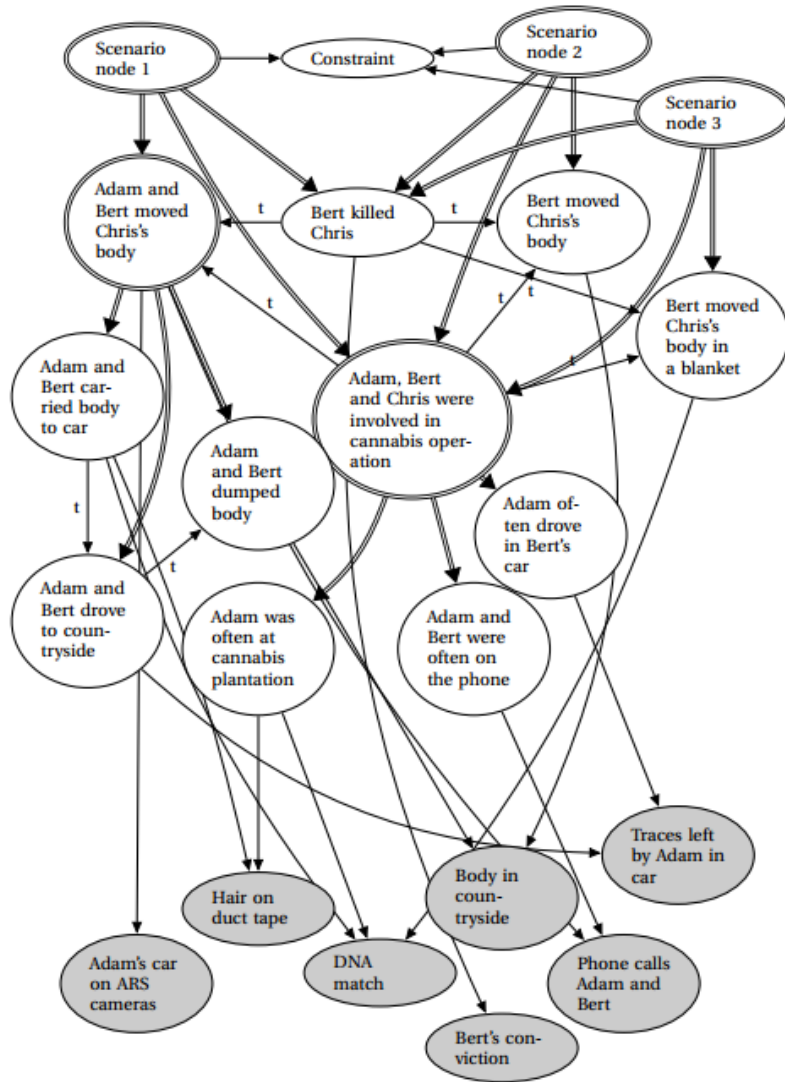


Figure 6.5: A network for the case study: The three scenarios with evidence. Evidential nodes are indicated as grey nodes.

### • Scenarios in the network:

- Scenario 1 (prior probability: 0.001, posterior probability: 0.5296):

**Scenario:** Bert killed Chris, and Adam, Bert and Chris were involved in cannabis operation. Then Adam and Bert moved Chris's body.

**Adam, Bert and Chris were involved in cannabis operation:** Adam was often at cannabis location and Adam and Bert were often on the phone and Adam often drove in Bert's car.

**Adam and Bert moved Chris's body:** Adam and Bert carried body to car. Then Adam and Bert drove to countryside. Then Adam and Bert dumped body.

- Scenario 2 (prior probability: 0.001, posterior probability: 0.1180):

**Scenario:** Bert killed Chris, and Adam, Bert and Chris were involved in cannabis operation. Then Bert moved Chris's body.

**Adam, Bert and Chris were involved in cannabis operation:** Adam was often at cannabis location and Adam and Bert were often on the phone and Adam often drove in Bert's car.

- Scenario 3 (prior probability: 0.001, posterior probability: 0.2913):

**Scenario:** Bert killed Chris, and Adam, Bert and Chris were involved in cannabis operation. Then Bert moved Chris's body in a blanket.

**Adam, Bert and Chris were involved in cannabis operation:** Adam was often at cannabis location and Adam and Bert were often on the phone and Adam often drove in Bert's car.

### • Scenario quality

- Scenario 1 is complete and consistent. It contains the supported implausible element Bert killed Chris.
- Scenario 2 is complete and consistent. It contains the supported implausible element Bert killed Chris.
- Scenario 3 is complete and consistent. It contains the supported implausible element Bert killed Chris.

### • Evidence related to each scenario

- Evidence for and against scenario 1:
  - \* Adam's car not on ARS cameras: weak evidence to attack scenario 1.
  - \* DNA match: moderate evidence to support scenario 1.
  - \* Hair on duct tape: moderate evidence to support scenario 1.
  - \* Bert's conviction: moderate evidence to support scenario 1.
  - \* Body in countryside: strong evidence to support scenario 1.
  - \* Phone calls Adam and Bert: weak evidence to support scenario 1.
  - \* Traces of Adam in car: weak evidence to support scenario 1.
  - \* All evidence combined: strong evidence to support scenario 1.
- Evidence for and against scenario 2:
  - \* Adam's car not on ARS cameras: weak evidence to attack scenario 2.
  - \* DNA match: moderate evidence to support scenario 2.



# AI as Law



# Artificial Intelligence

AI as mathematics

**Logic**

**Probability theory**

AI as technology

**Expert systems**

**Machine learning**

AI as psychology

**Cognitive modeling**

**Cognitive computing**

AI as sociology

**Multi-agent systems**

**Autonomous robots**

AI as law

**Hybrid critical discussion systems**

# Topics in AI

Reasoning

**Argumentation**

**Formal semantics**

Knowledge

**Schemes and norms**

**Commonsense**

Learning

**Rules and cases**

**Explainability, responsibility**

Language

**Interpretation**

**Understanding**

Bart Verheij

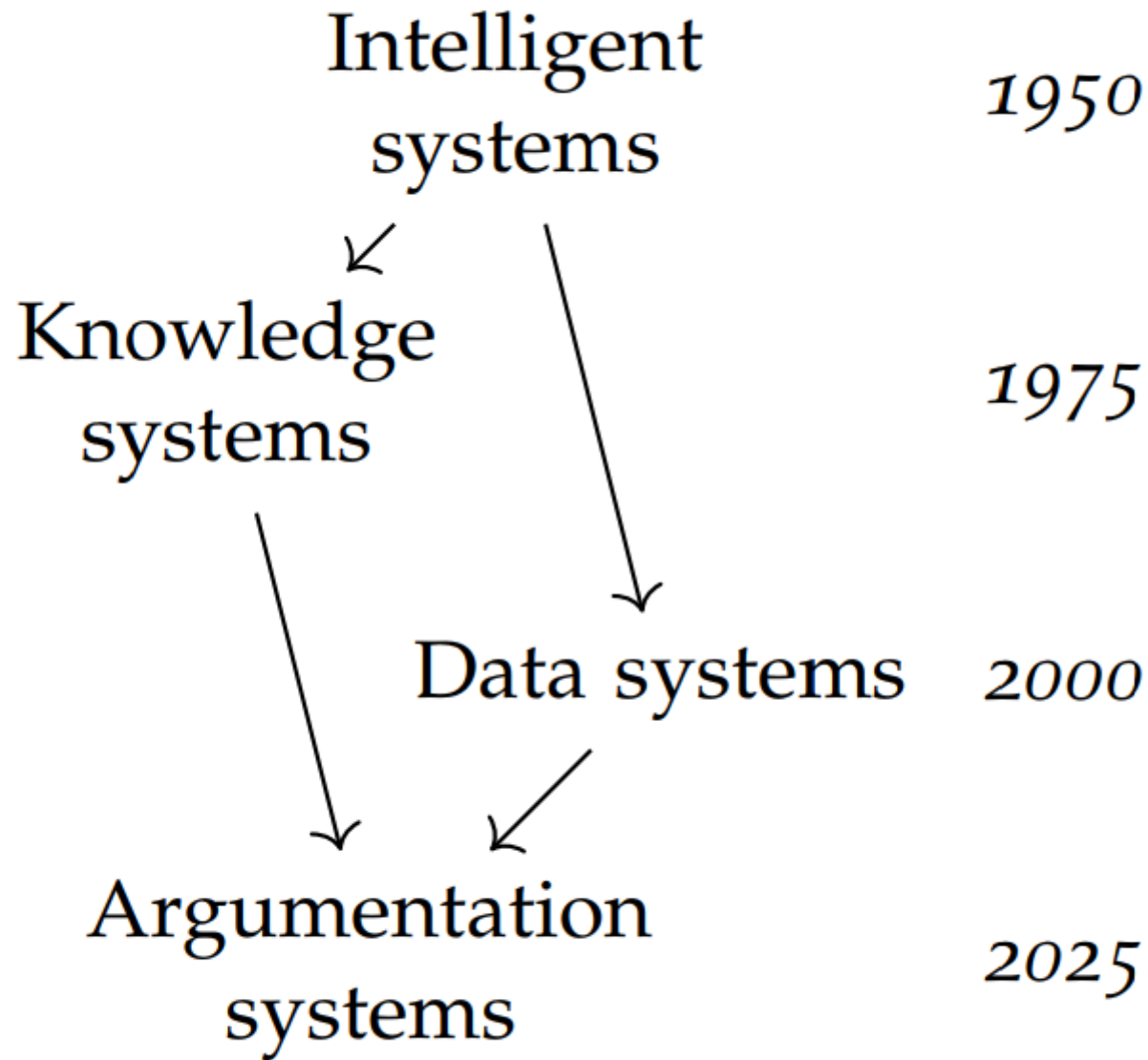
# Arguments

for good artificial intelligence



University of Groningen, Groningen

[www.ai.rug.nl/~verheij/oratie](http://www.ai.rug.nl/~verheij/oratie)

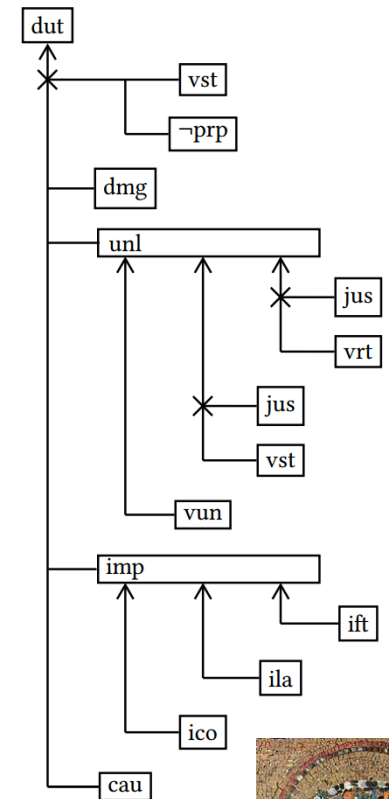


# Cases and rules

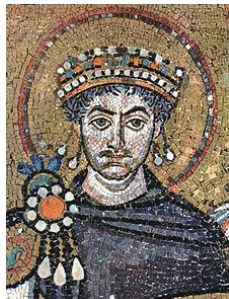
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
¬dmg	¬dut	¬dut	¬dut	dut	dut	dut	dut	dut	dut	dut	dut	dut	¬dut	¬dut	¬dut
	dmg	dmg	dmg	dmg	dmg	dmg	dmg	dmg	dmg	dmg	dmg	dmg	dmg	dmg	dmg
	¬unl	unl	unl	unl	unl	unl	unl	unl	unl	unl	unl	unl	¬unl	¬unl	unl
		¬imp	imp	imp	imp	imp	imp	imp	imp	imp	imp	imp			imp
			¬cau	cau	cau	cau	cau	cau	cau	cau	cau	cau			cau
	¬vrt			vrt	vrt	vrt	¬vrt	¬vrt	¬vrt	¬vrt	¬vrt	¬vrt	vrt	¬vrt	
	¬vst			¬vst	¬vst	¬vst	vst	vst	vst	¬vst	¬vst	¬vst	¬vst	vst	vst
	¬vun			¬vun	¬vun	¬vun	¬vun	¬vun	¬vun	vun	vun	vun			
		¬ift		ift	¬ift	¬ift	ift	¬ift	¬ift	ift	¬ift	¬ift			
		¬ila		¬ila	ila	¬ila	¬ila	ila	¬ila	¬ila	ila	¬ila			
		¬ico		¬ico	¬ico	ico	¬ico	¬ico	ico	¬ico	¬ico	ico			
			¬jus	¬jus	¬jus	¬jus	¬jus	¬jus	¬jus	¬jus	¬jus	¬jus	jus	jus	
			prp	prp	prp										¬prp

1 > 2 > 3 > 4 > 5 ~ 6 ~ 7 ~ 8 ~ 9 ~ 10 ~ 11 ~ 12 ~ 13 > 14 ~ 15 ~ 16

Data



Knowledge







TV series Futurama, judge 723  
([futurama.fandom.com/wiki/Judge\\_723](http://futurama.fandom.com/wiki/Judge_723))

# AI as Law



# Conclusion

AI&Law is more **relevant** than ever.

AI&Law has worked on the design of **socially aware, explainable, responsible** AI for decades already.

AI&Law addresses the **hardest problems** across the breadth of AI (reasoning, knowledge, learning, language).

AI&Law inspires **ideas for new solutions** (argumentation, schemes and norms, rules and cases, interpretation).

# Artificial Intelligence as Law

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university of  
 groningen

faculty of science  
and engineering



# Further reading

Verheij, B. (2018). *Arguments for Good Artificial Intelligence*. Groningen: University of Groningen. Inaugural lecture.  
<http://www.ai.rug.nl/~verheij/oratie/>. [details](#) [pdf](#)