War of `Words`

The Competitive Dynamics of Legislative Processes

Victor Kristof, Matthias Grossglauser, Patrick Thiran

`victor.kristof@epfl.ch`

EPFL

Introduction

Goal: Understand the **dynamics** of law-making processes.

Research questions:

RQ 1: Can we quantify the **controversy** of laws?

RQ 2: Can we quantify the **influence** of law-makers?

RQ 3: Can we **predict** the success of law amendments?

We answer our research questions by proposing:
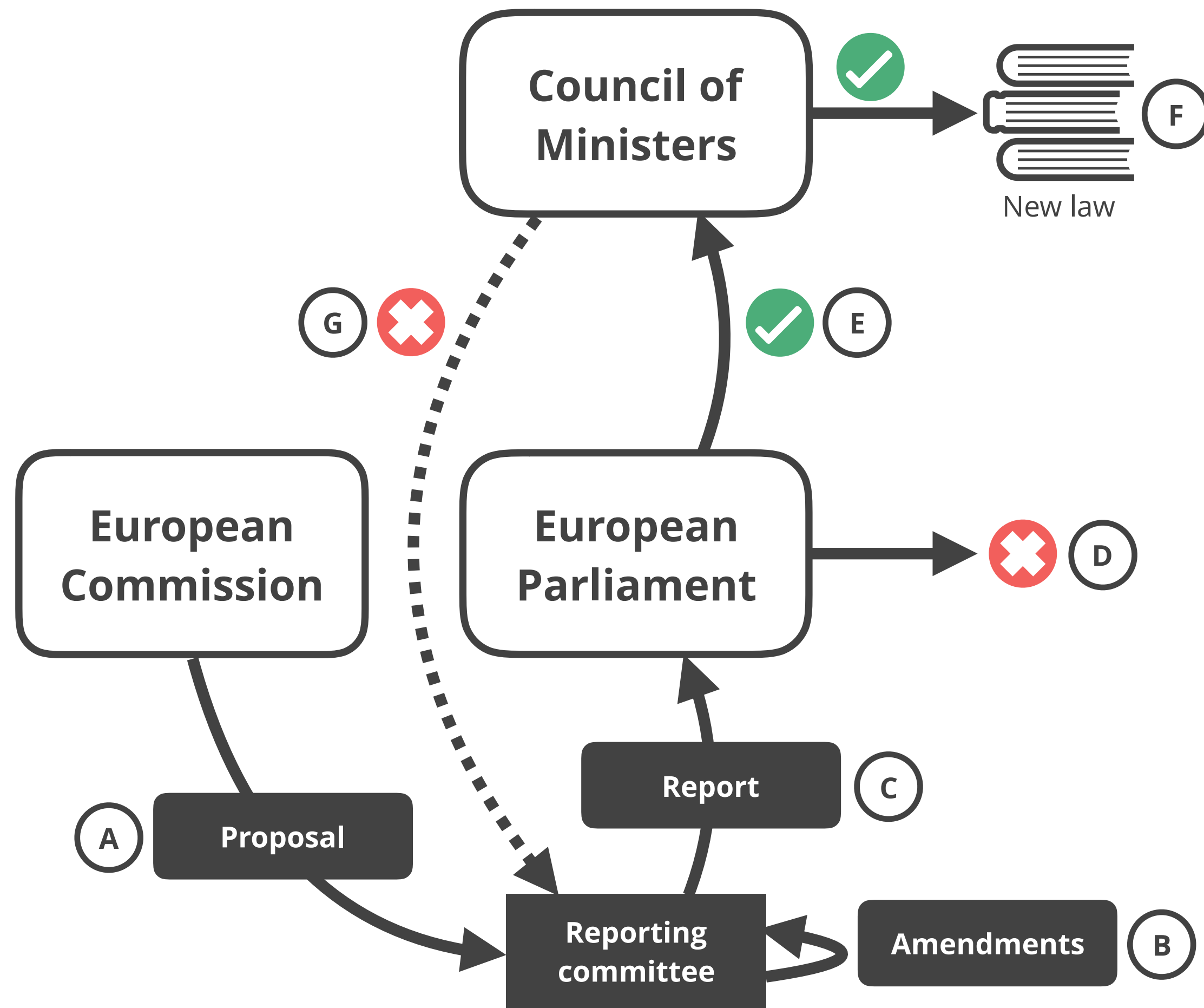
A new dataset of **450 000 legislative edits.**

A **statistical model of the success** of these edits.

European Union

We can trace back the **history** of each edit!

European Legislative Process

(A) The *Commission* submits a *proposal* to one of the *committees*.

(B) The proposal is *amended* and

(C) submitted to vote as a *report* to the whole *Parliament*.

(D) If it is *rejected*, the proposal is abandoned.

(E) If it is *accepted*, it is transferred to the *Council of Ministers*.

(F) If the Council *accepts* the (amended) proposal, a *new law* is adopted.

(G) If the Council *amends* it, it is *sent back* to the committee.

Setting of the problem:

A group of people with **shared** and **competing** interests...

...who can modify a **corpus of documents** through **textual edits.**

(Reminiscent of Wikipedia or GitHub.)

This process is described in **full details** in the paper!

Amendments

Amendment 5
Klaus-Heiner Lehne
Recital 16

Text proposed by the Commission	*Amendment*
(16) [...] The use of additives necessary for manufacturing of tobacco products *should be* allowed*, as long as they do not result in a characterising flavour*. The Commission should ensure uniform conditions for the implementation of the provision on characterising flavour. [...]	(16) [...] The use of additives necessary for manufacturing of tobacco products *is* allowed. The Commission should ensure uniform conditions for the implementation of the provision on characterising flavour. [...]

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Conflict

An amendment is composed of:
- one or several **authors**
- the **original** text
- the **amended** text

This one contains two **edits**:

1. **Replace** « *should be* » by « *is* »
2. **Delete** « *as long as… characterising flavour* »

This amendment:
- is proposed on the **same text**
- attempts to modify the **same passage**
- is proposed by **three other MEPs**
- contains **two edits**
    1. **Replace** « *should* » by « *shall* »
    2. **Delete** « *as long as… characterising flavour* »

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- one or several **authors**
- the **original** text
- the **amended** text

This one contains two **edits**:
1. **Replace** « *should be* » by « *is* »
2. **Delete** « *as long as... characterising flavour* »

Both edits were rejected.

(i.e., the initial text proposed by the Commission was kept)

This amendment:
- is proposed on the **same text**
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  1. **Replace** « *should* » by « *shall* »
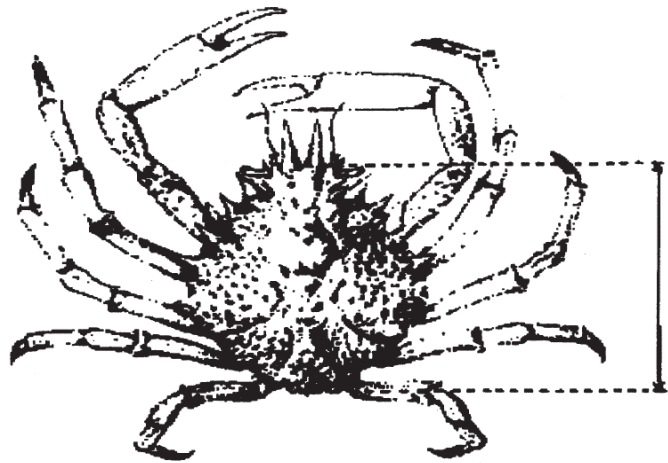 2. **Delete** « *as long as... characterising flavour* »

Amendments

Amendment 117

Proposal for a regulation
Annex IV – Figure 5 a (new)

Text proposed by the Commission   *Amendment*

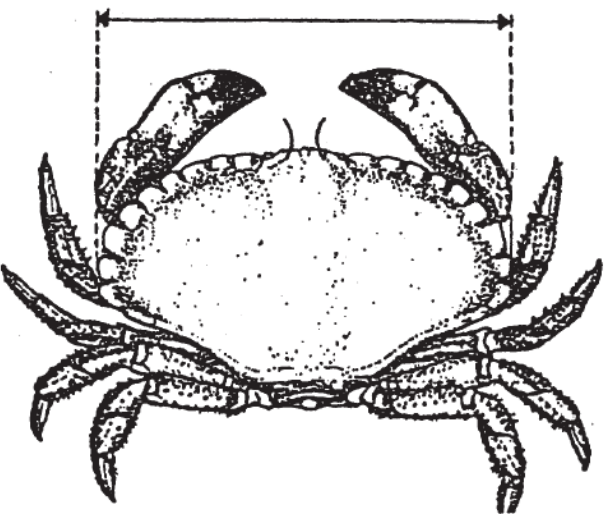*Figure 5a Spinous spider crab (Maia squinada)*

Amendment 118

Proposal for a regulation
Annex IV – Figure 5 b (new)

Text proposed by the Commission   *Amendment*
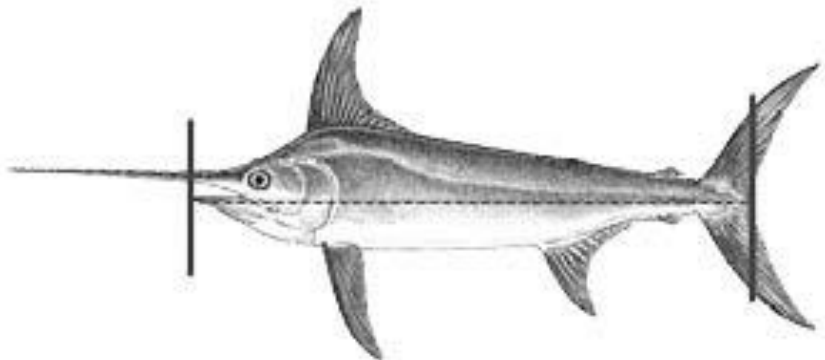
Figure 5b Edible crab (Cancer pagarus)

Amendment 119

Proposal for a regulation
Annex IV – Figure 5 c (new)

Text proposed by the Commission   *Amendment*

Figure 5c Whelk (Buccinum spp)

Amendment 120

Proposal for a regulation
Annex IV – Figure 5 d (new)

Text proposed by the Commission   *Amendment*
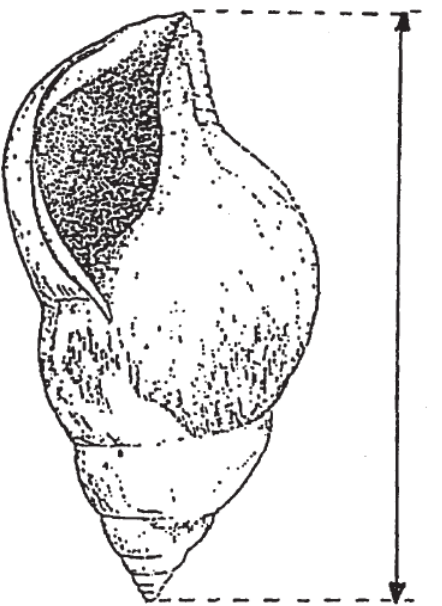
Figure 5d Swordfish (Xiphias gladius)

Dataset

We scraped raw data out of **thousands** of **DocX documents** from the EU website!

Legislature	# amendments	# edits	# conflicts	# MEPs	# dossiers	% accepted
EP7 (2009-14)	108 292	200 407	40 302	761	1 089	37.7%
EP8 (2014-19)	128 885	249 086	56 298	791	800	25.7%

This dataset was **tediously** obtained over **several months**...

...but it **very rich** and can be mined from **very different angles**!

Edit Graph

For each dossier, we construct the **edit graph** $G = (V_G, E_G)$, such that each *node* a in V_G is an **edit** and such that there is an *edge* (a, b) if edits a and b **overlap**.

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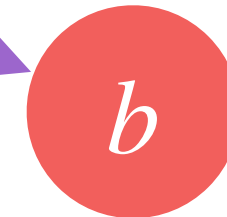| *Text proposed by the Commission*	*Amendment*
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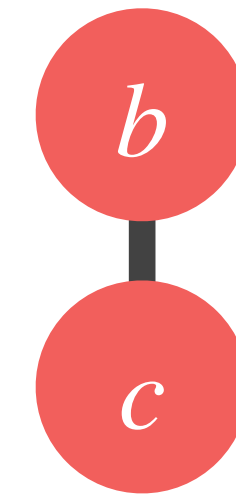**Recital 16**

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b

c

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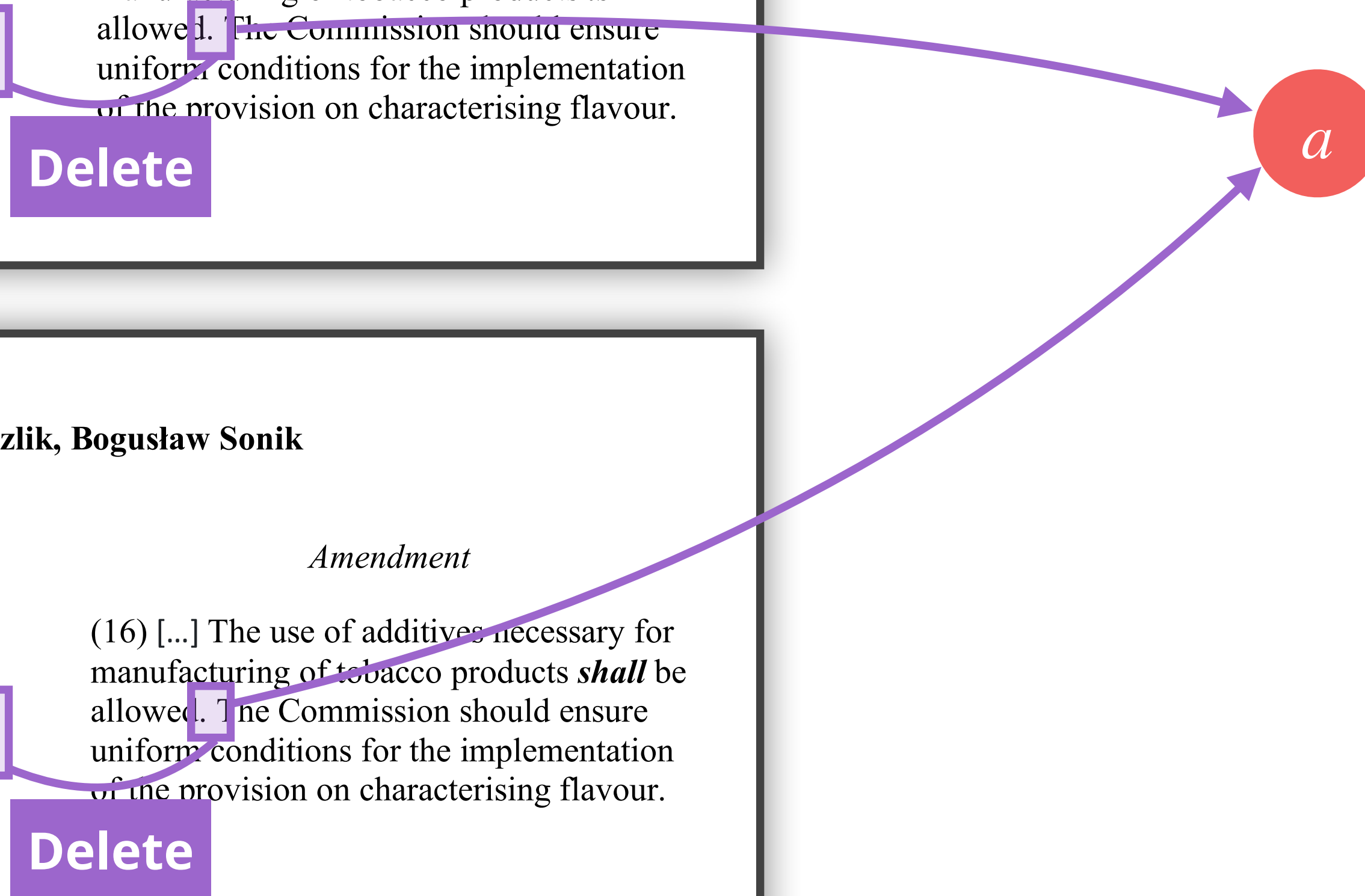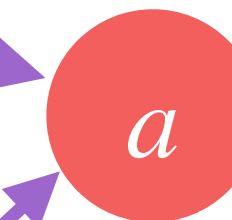| *Text proposed by the Commission*	*Amendment*
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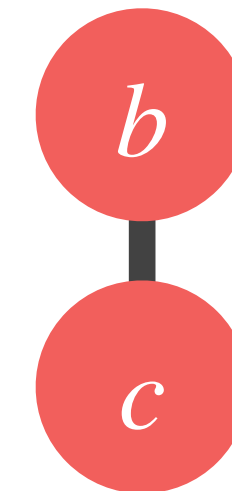
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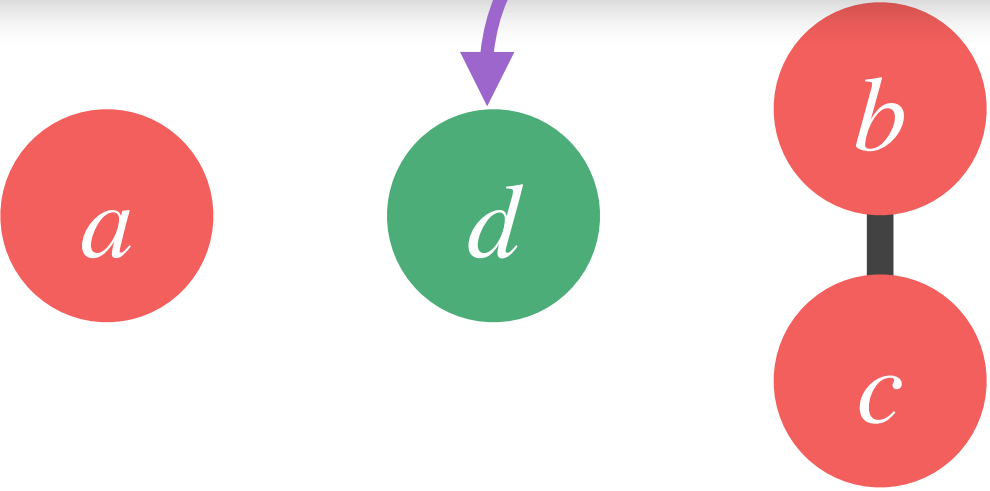**Amendment 757**
Nigel Farage
Recital 16

Delete

Text proposed by the Commission

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Amendment

deleted

a d b c

7

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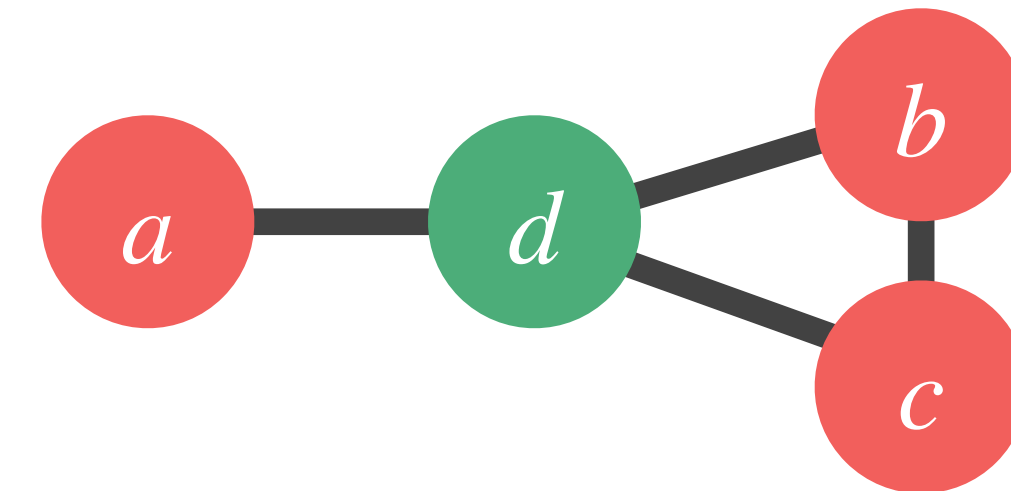| *Text proposed by the Commission*	*Amendment*
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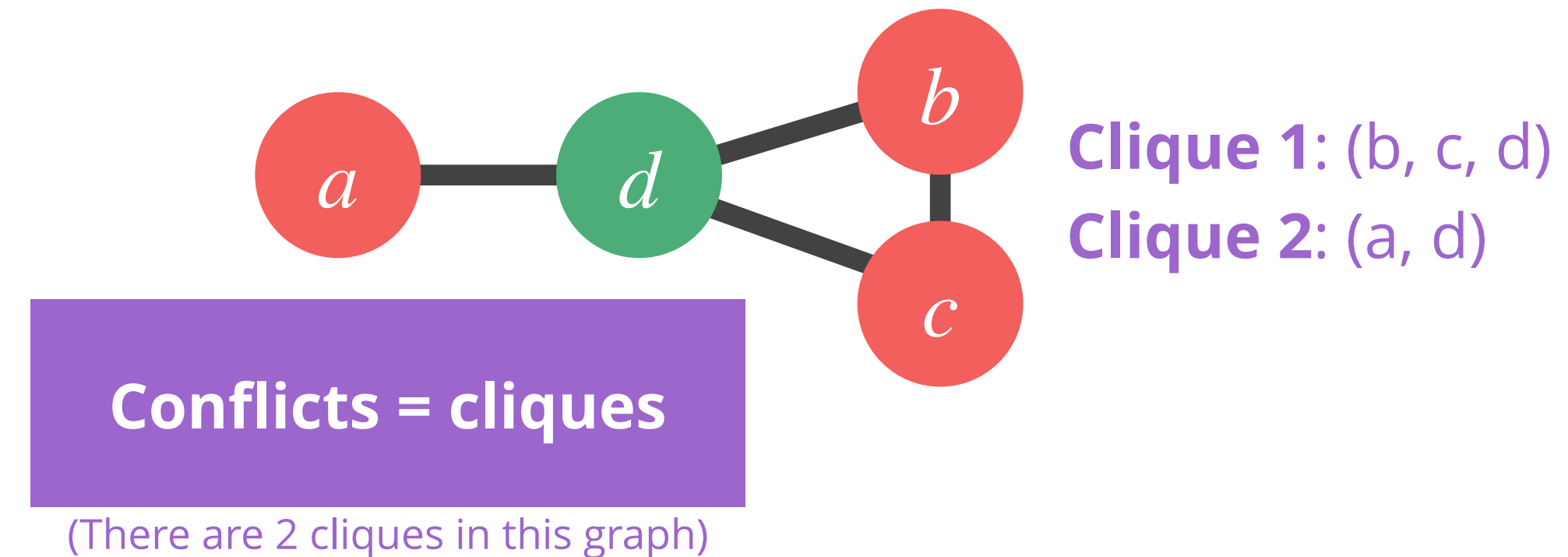
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Clique 1: (b, c, d)
Clique 2: (a, d)

Conflicts = cliques

(There are 2 cliques in this graph)

Two types of conflicts:

MEP-MEP conflicts

(Conflict between MEPs)

Components of size ***at least 2*** in edit graph G.
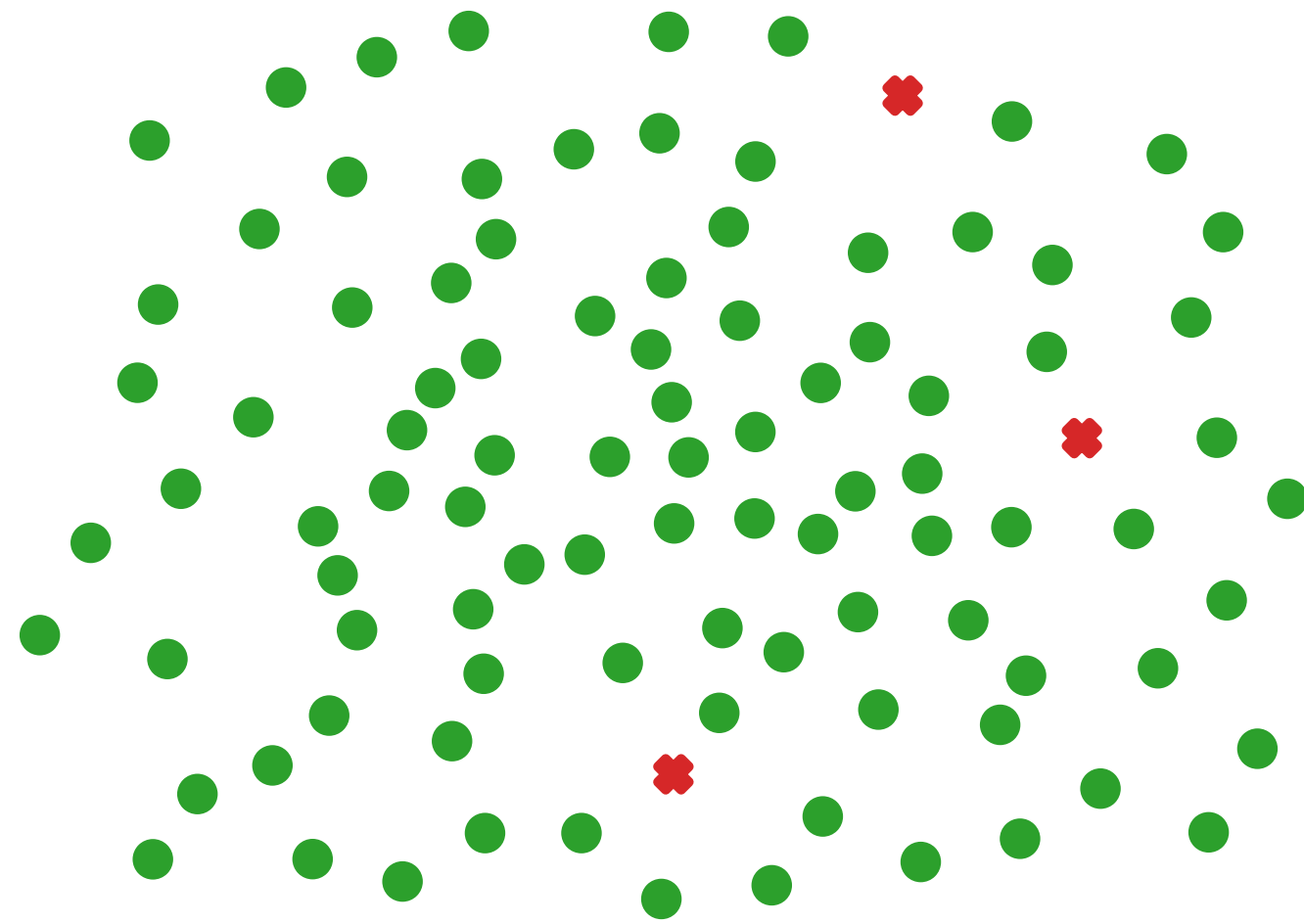
MEP-dossier conflicts

(Conflict with the status quo)

Components of **any size** in edit graph G.

Edit Graph

Transportable Pressure Equipment

European Capitals of Culture

GDPR
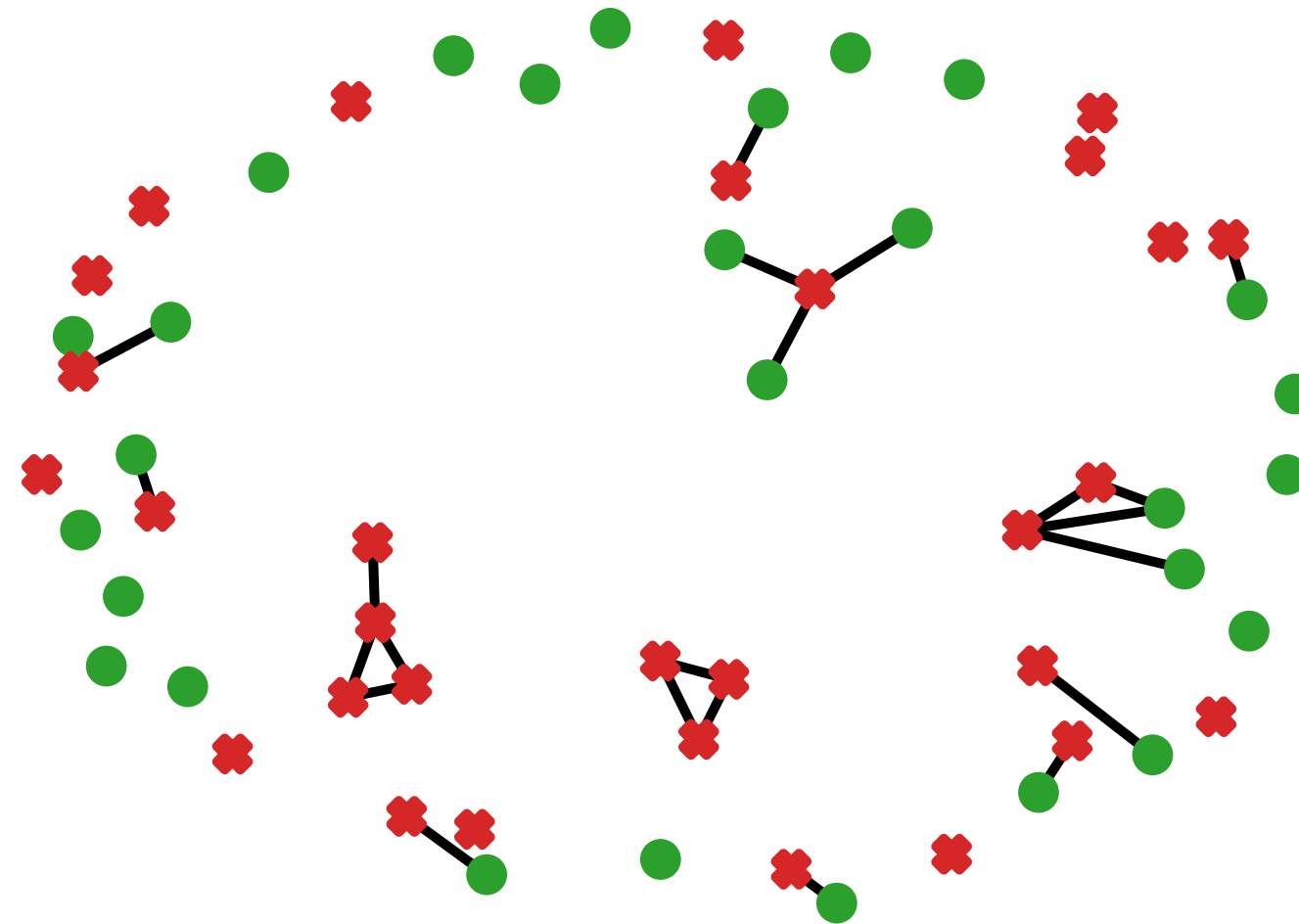

Very specific, low stake legislation
- 96 nodes (*edits*)
- 97% green (*% accepted*)
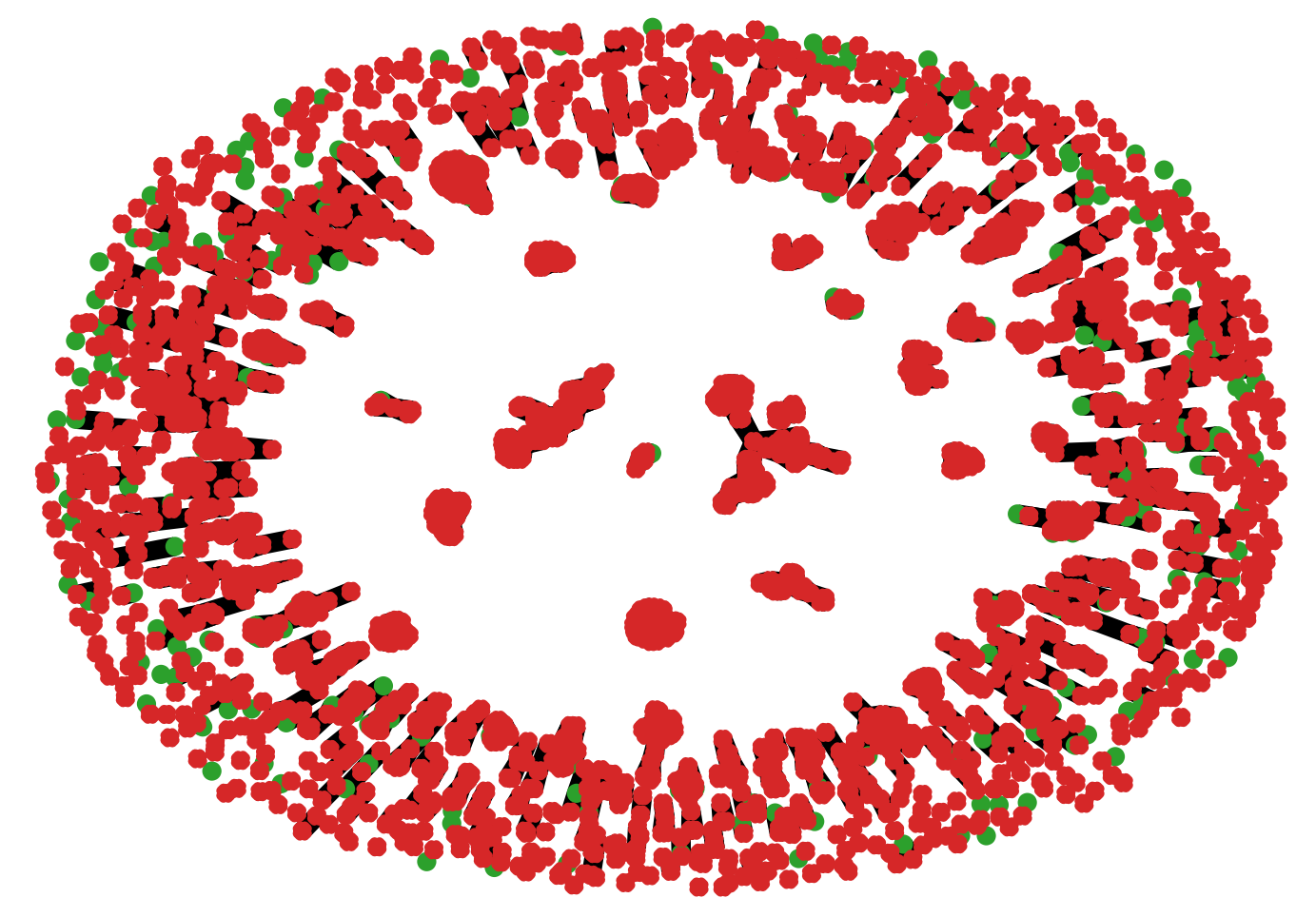- 0 clique (*conflict*)

Medium stake legislation
- 58 nodes (*edits*)
- 48% green (*% accepted*)
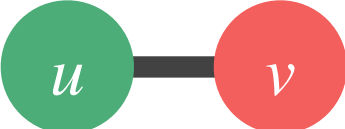- 16 cliques (*conflicts*)

Very high stake legislation
- 3154 nodes (*edits*)
- 9% green (*% accepted*)
- 1298 cliques (*conflicts*)

8

Statistical Models

We model the **probability** of the edit proposed by MEP u to be **accepted** over the edit proposed by MEP v on dossier i, i.e., the probability of MEP u "winning" over MEP v on dossier i as

$$p(u \succ_i v) = \frac{1}{1 + \exp[-(s_u - s_v)] + \exp[-(s_u - d_i) + b]} \cdot$$

Skill (*influence*) of MEP u

Inertia (*controversy*) of dossier i

Global **bias**

MEP-MEP conflict

MEP-dossier conflict

The **WoW** model

We model conflicts between **multiple edits** and edits proposed by **multiple authors** by observing that each *conflict* generates a new **MEP-MEP conflict**:

$$p(a \succ_i \mathbf{C} - \{a\}) = \frac{1}{1 + \sum_{c \in \mathbf{C} - \{a\}} \exp[-(s_a - s_c)] + \exp[-(s_a - d_i) + b]}, \quad \text{where } s_a = \sum_{u \in \mathbf{A}_a} s_u \cdot$$

Set of **conflicting** edits $\mathbf{C} = \{a, b, \dots\}$

Conflicts between a and all $c \in \mathbf{C} - \{a\}$

Set of (collaborating) **authors** of edit a

A **rapporteur** is a MEP with a special role in shaping a dossier, which plausibly confers additional influence:

Rapporteur advantage

$$s_a = \sum_{u \in \mathbf{A}_a} s_u + r \mathbf{1}_{\{u \text{ is rapporteur for } i\}} \cdot$$
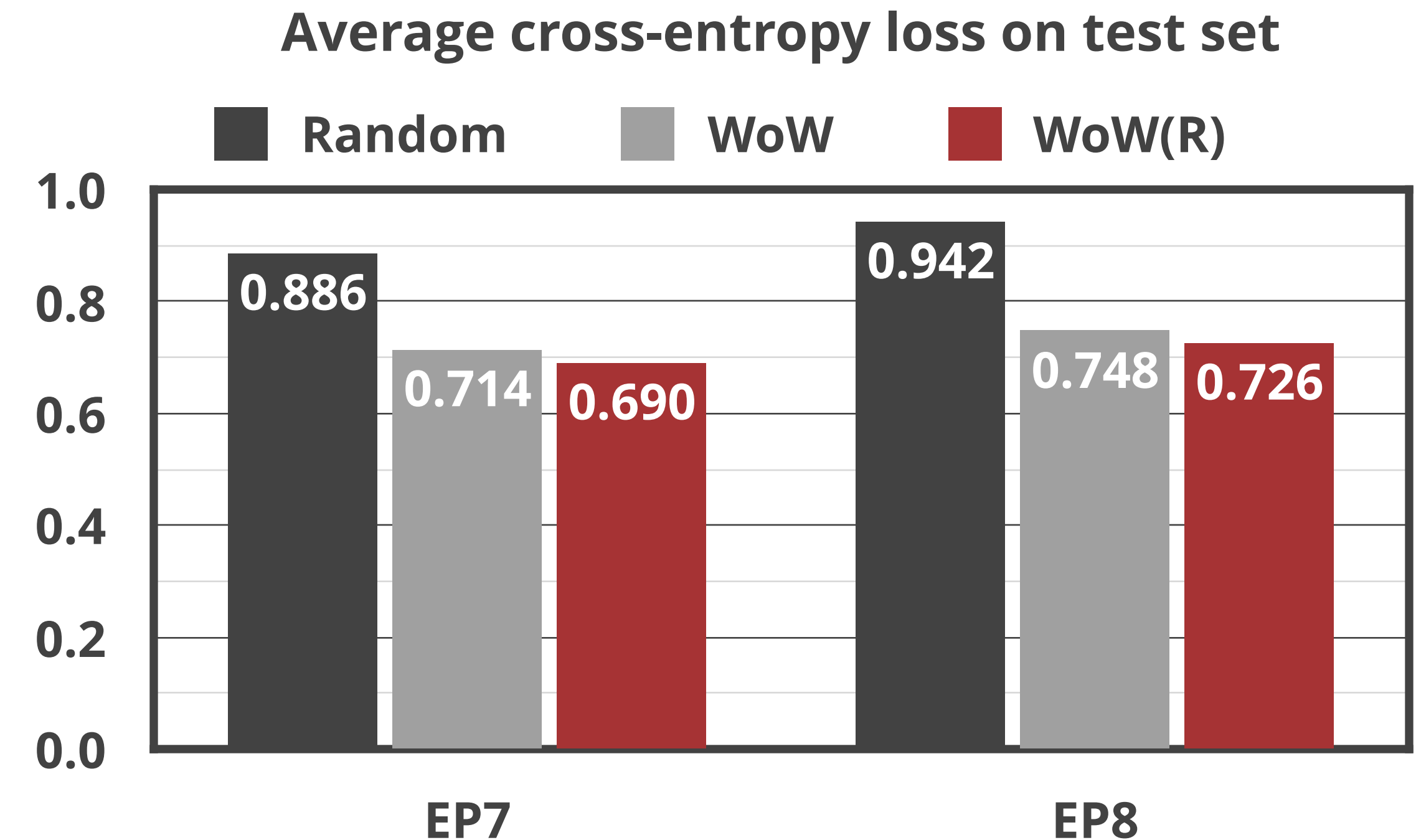
The **WoW(R)** model

9

Experimental Results

Given a dataset of K independent triplets $(\mathbf{C}_k, i_k, \ell_k)$, we learn the parameters $\boldsymbol{\theta}$ by maximizing their L_2-regularized log-likelihood.

Skills s_u, inertias d_i, and rap. adv. r

Hyperparameter $\lambda \in \mathbf{R}$

Experimental setting:

- Dataset size K: **125 733** (EP7) and **140 763** (EP8).

- Splits: **70%** for training/validation and **30%** for testing.

- Hyperparameter λ: **10**-fold cross-validation.

- Metric: average cross entropy.

Average cross-entropy loss on test set

	Random	WoW	WoW(R)
EP7	0.886	0.714	0.690
EP8	0.942	0.748	0.726

d_i	Title	# nodes	#cliques	avg. clique size	% accepted
3.304	Screening of foreign direct investments	1'040	272	3.1	2.6
3.204	Copyright in the Digital Single Market	2'657	577	4.3	2.6
3.106	Energy efficiency labelling	1'292	319	3.4	6.0
-2.611	Financial support for customs control equipment	60	1	2.0	90.0
-2.644	Establishing the supervisory authorities on financial markets	69	0	0.0	98.6
-2.849	Unfair trading practices in the food supply chain	63	6	2.0	84.1

Rapporteur advantage? Yes!

Legislature	r
EP7	1.18
EP8	**1.31**

Ongoing Work

1

A **cosmetic** edit is not equivalent to a **more substantial** change (« shall » versus « should »).

We plan to investigate this aspect more deeply from an **NLP point of view**.

2

The **rapporteur feature** improved the performance, but...

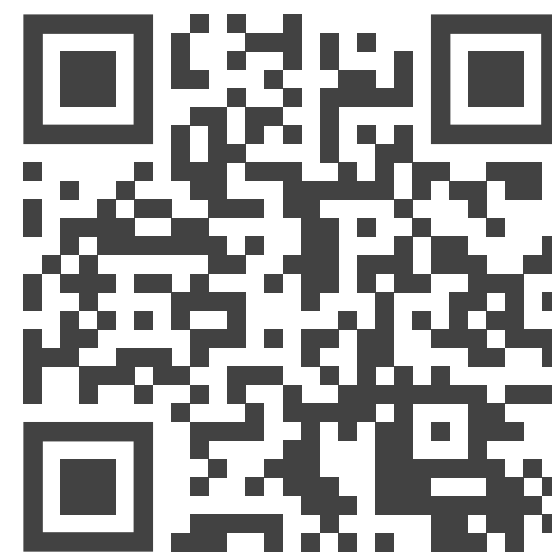...would **more features** improve it further, as well as enhancing **interpretation**?

3

Our model assumes that if MEP u is more influential than v, then $p(u \succ_i v) > p(v \succ_i u)$ for all dossiers i.

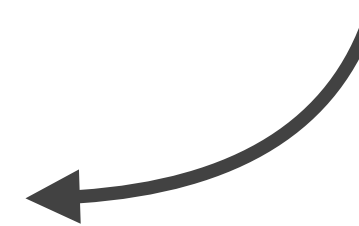A **strong assumption**, not always realistic: MEPs have their own **specializations and interests**!

Thank you!

Data and code are on GitHub:

/indy-lab/war-of-words

Or scan this code

Connect with me on Twitter!

@VictorKristof

Or reach out by email!

victor.kristof@epfl.ch