Argument Corpora, and Argument Mining and Analytics

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Centre for Argument Technology

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Martín Pereira Fariña (UK)

Mark Snaith (UK)

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(2b/4) Complex Argument Structures

Linguistic phenomena interwound with arguments

- argumentation schemes (Lawrence & Reed, 2016)
- rephrase relation which paraphrases parts of argument structures (Konat et al., 2016a; Visser et al. 2017)
- illocutionary intentions speakers associate with arguments (Budzynska et al., 2014a)
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- reported speech
- ethos of arguments' authors (Budzynska 2013; Koszowy & Budzynska 2016; Duthie et al., 2016a)

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(1) Argumentation schemes

"Argumentation schemes" Corpus

- http://corpora.aifdb.org/schemes
- 288 ADUs; 127 supports; 32 conflicts

Matthew Taylor: But, hold on. Isn't it simply the case that buying a cup of coffee is something which is substantially less demanding than working up a long-term interest rate? Therefore isn't it a reasonable thing for the state to intervene in those cases, because the knowledge is bounded?

Jamie Whyte: It's only since the state intervened that people have been uninterested in which bank they put their money in. In the old days of early capitalism, bankers were famously prudent people. And they went to great lengths to advertise how prudent they were. This stopped not because of the big bang, which liberalised banking, which is what everybody thinks. It stopped because of government guarantees to depositors.

(1) Argumentation schemes

AIFdb Argument Map 1741 — Download

DETAILS

33819
Isn't it simply the case that buying a cup of coffee is something which is substantially less demanding than working up a long-term interest rate?
SUPPORTS: 33820

33820
isn't it a reasonable thing for the state to intervene in those cases

33827
the knowledge is bounded
SUPPORTS: 33820

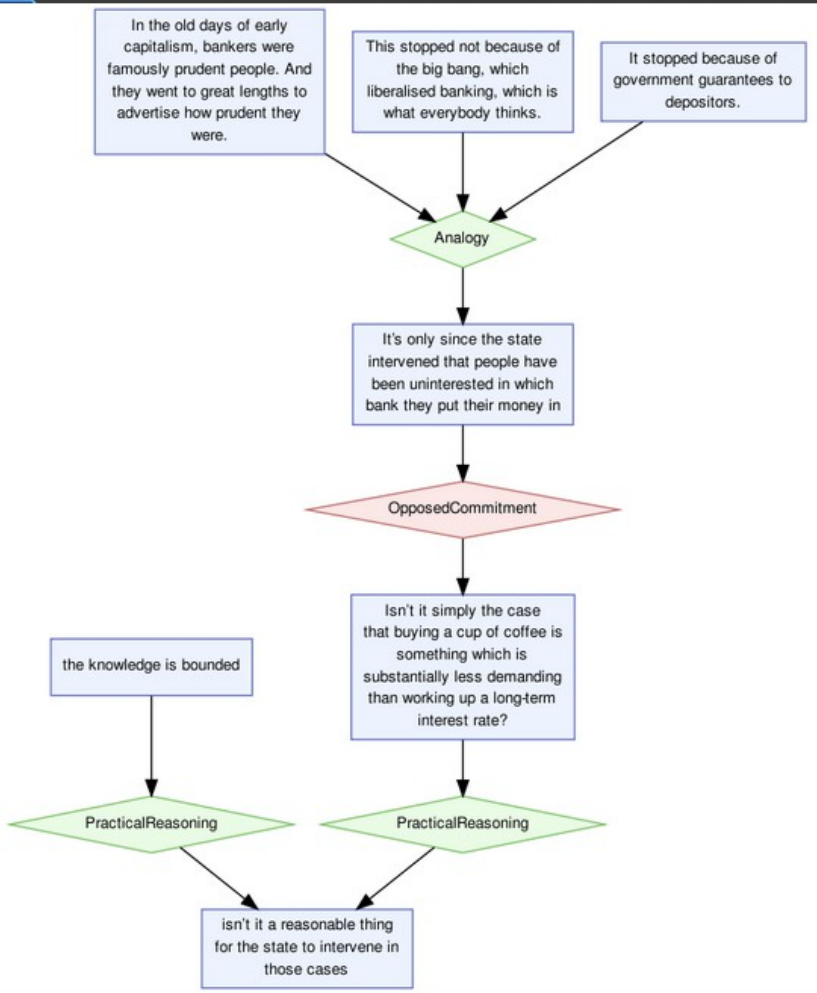
33836
It's only since the state intervened that people have been uninterested in which bank they put their money in
ATTACKS: 33819

33837
In the old days of early capitalism, bankers were famously prudent people. And they went to great lengths to advertise how prudent they were.
SUPPORTS: 33836

33838
This stopped not because of the big bang, which liberalised banking, which is what everybody thinks.
SUPPORTS: 33836

33839
It stopped because of government guarantees to depositors.
SUPPORTS: 33836

DIAGRAM



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(2) Rephrase

“Citizen Dialogue in Public Consultations of US DOT” Corpus (Konat et al., 2016a)

- http://arg.tech/cd
- 1,428 ADUs; 153 supports; 23 conflicts; 88 rephrases

CITIZEN: What impact is that [the road] going to have when it is so close to a house?
MR. GREG DYER: Yes, ma'am. So the right-of-way limits for the corridor is 250 feet, correct, but our actual road is going to be, you know, centered within that right-of-way. So the road is not going to be at the edge of the prop -- of the property that we're purchasing, it's going to be in the middle of that right-of-way. So we're not going to -- you know, maybe the land that we're purchasing is within ten feet of your property, but our road is going to be, you know, within that right-of-way.

(2) Rephrase

CITIZEN: What impact is that [the road] going to have when it is so close to a house?
MR. GREG DYER: Yes, ma'am. So the right-of-way limits for the corridor is 250 feet, correct, but our actual road is going to be, you know, centered within that right-of-way. So the road is not going to be at the edge of the prop -- of the property that we're purchasing, it's going to be in the middle of that right-of-way. So we're not going to -- you know, maybe the land that we're purchasing is within ten feet of your property, but our road is going to be, you know, within that right-of-way.

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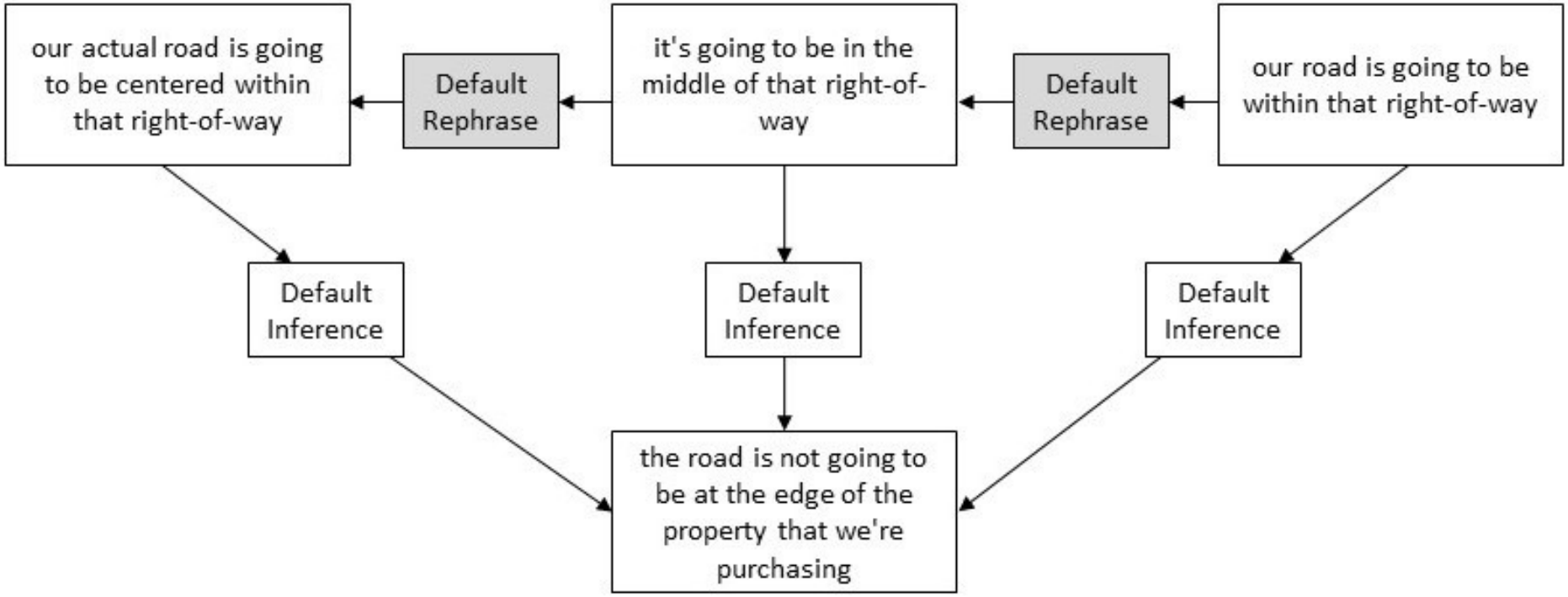
our actual road is going to be centered within that right-of-way
Default Rephrase
it's going to be in the middle of that right-of-way
Default Rephrase
our road is going to be within that right-of-way
Default Inference
Default Inference
Default Inference
the road is not going to be at the edge of the property that we're purchasing

(2) Rephrase

•Rephrase and **fallacies** (Visser et al., 2017)
– relation between rephrases and the fallacies of *straw man* and *ignoratio elenchi*

•Rephrase and **fuzzy** concepts (Pereira Fariña et al., forthcoming)
– fuzzy modifiers as *lack of commitment* in rephrasing

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(3) Illocutionary intentions

"BBC Radio 4 programme *Moral Maze*" Corpus

- http://corpora.aifdb.org/mm2012
- 3,213 ADUs; 869 supports; 215 conflicts; 161 rephrases

Michael Portillo: Isn't that a source of injustice?
Esther Stanford-Xosei: Definitely not. They do bear responsibility.

(3) Illocutionary intentions

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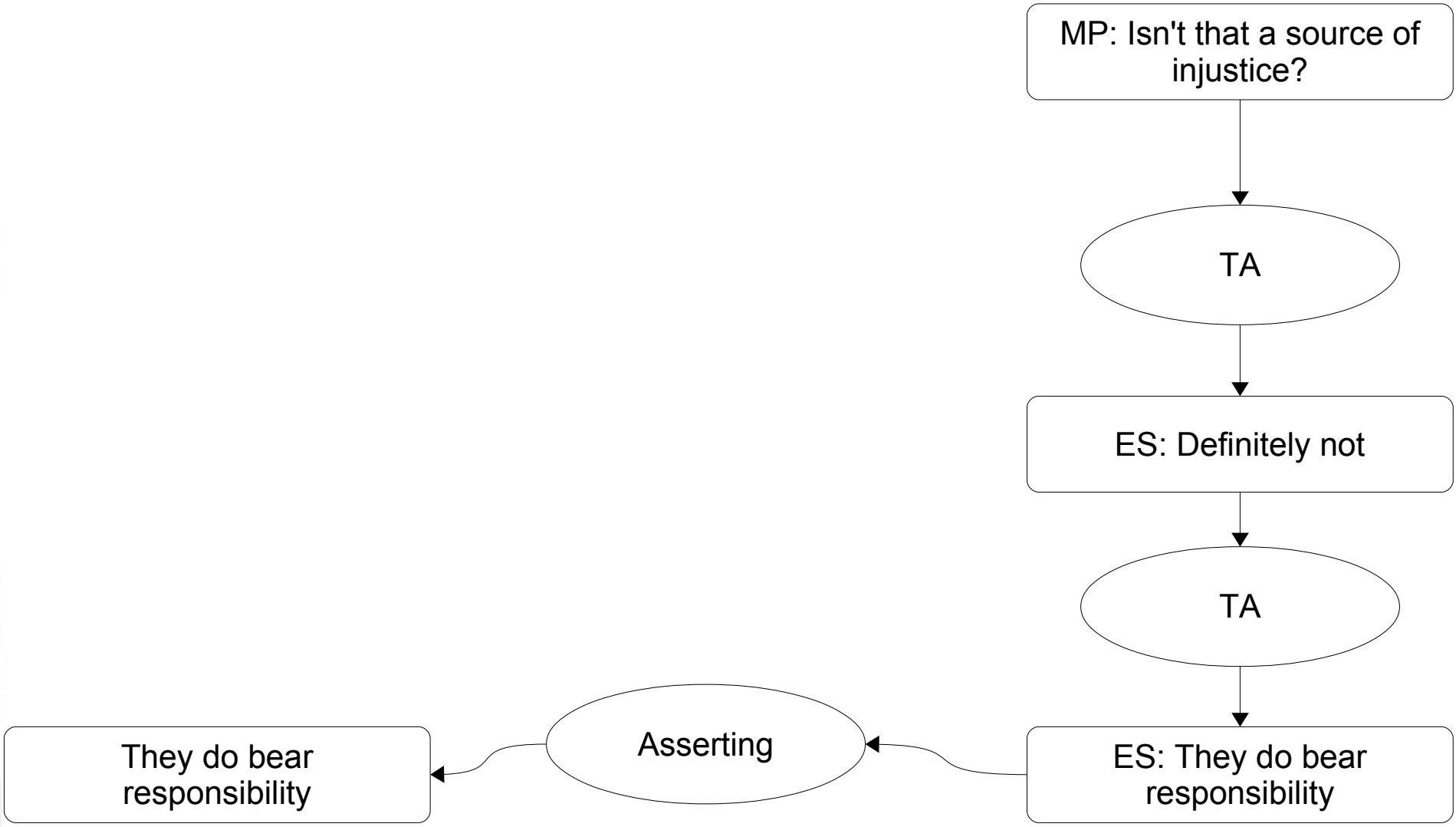

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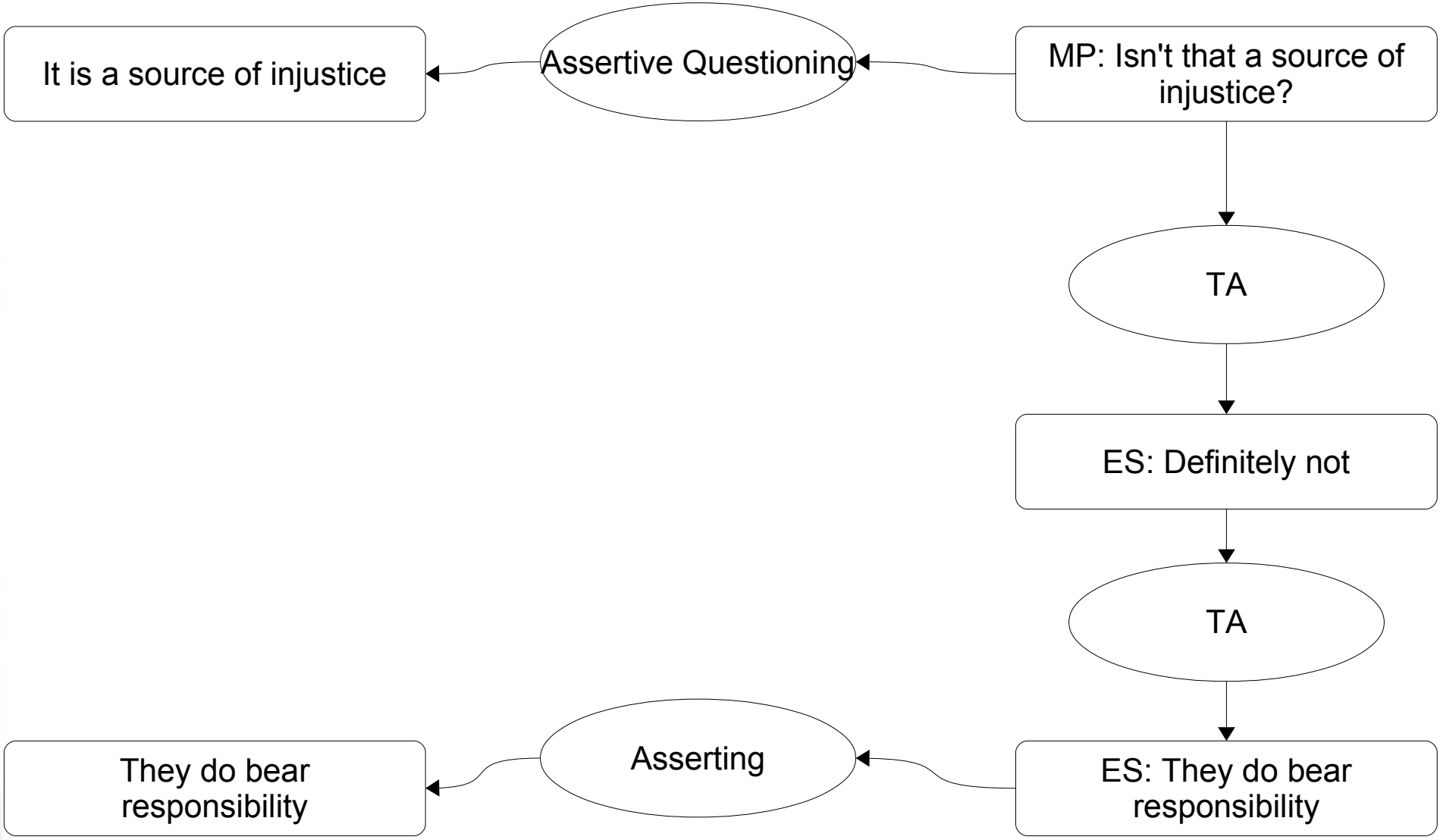

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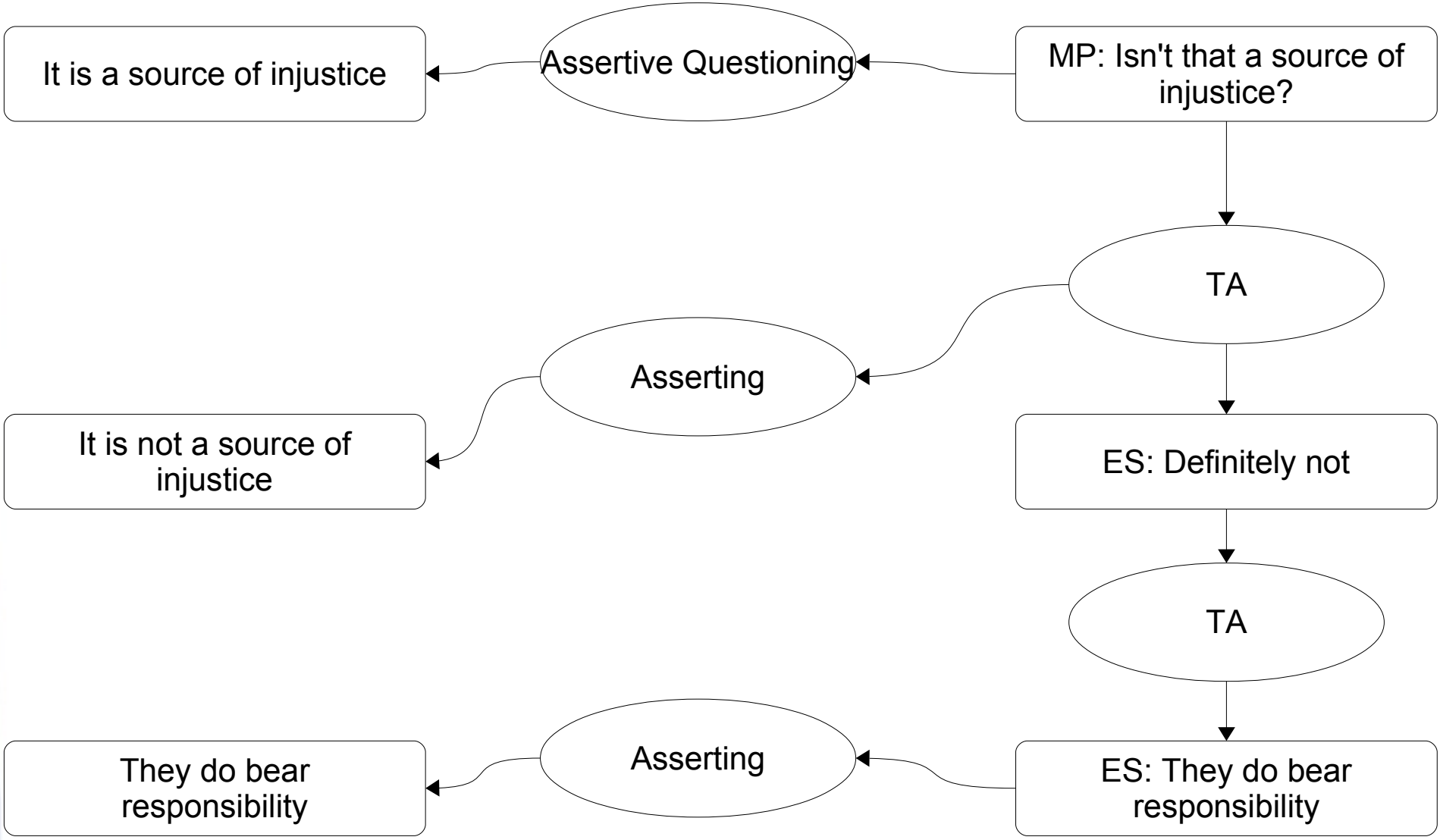

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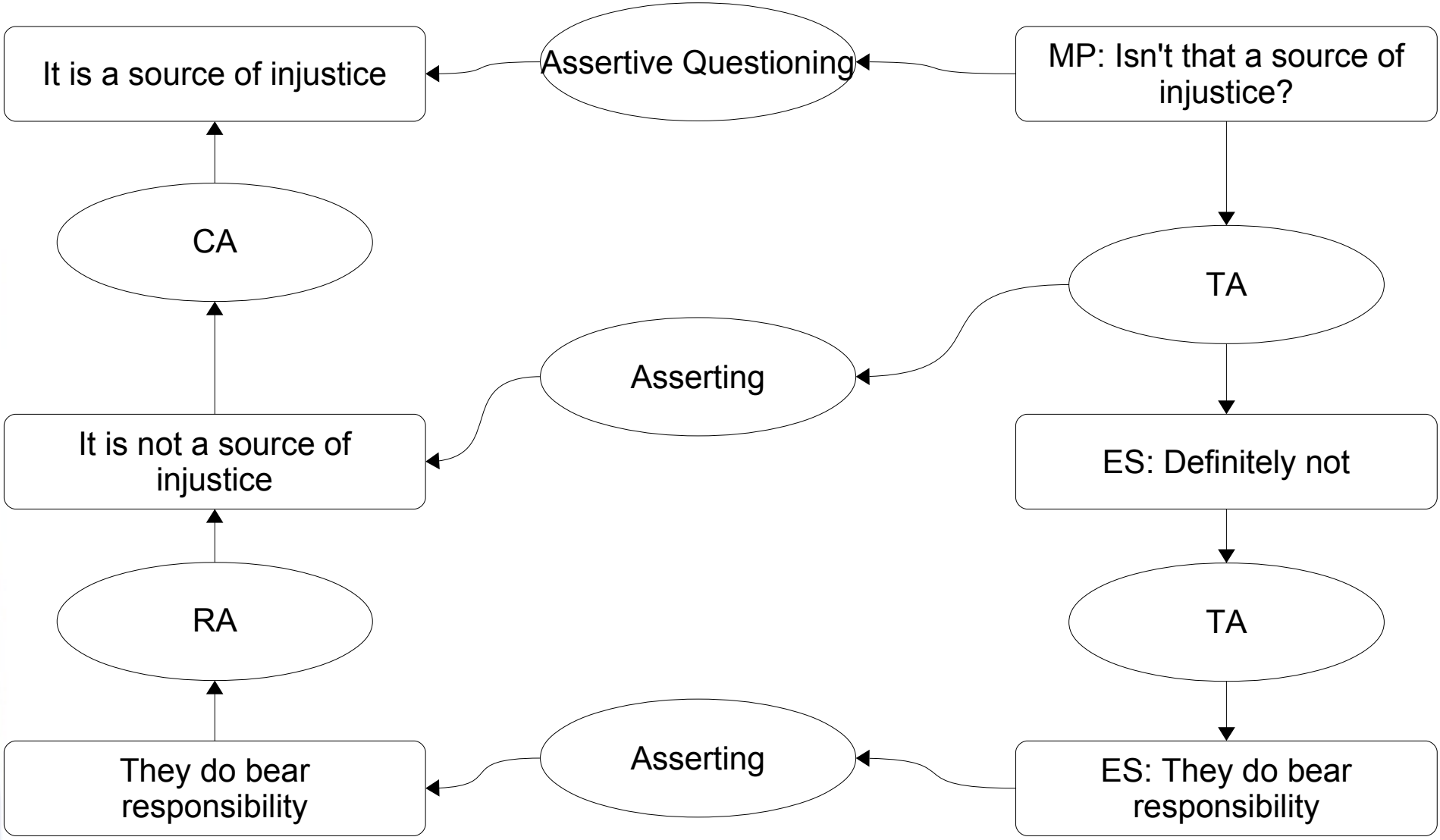

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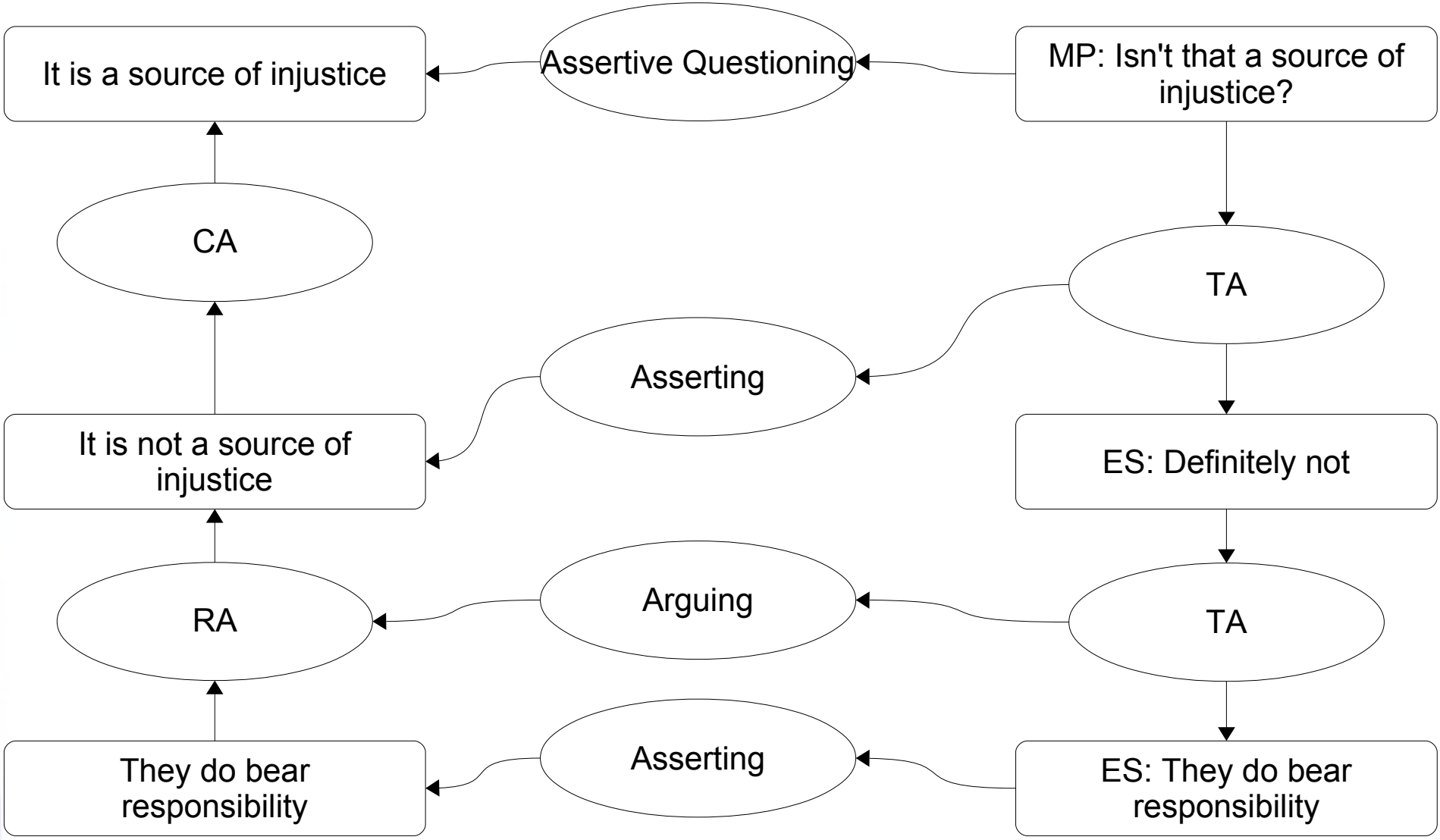

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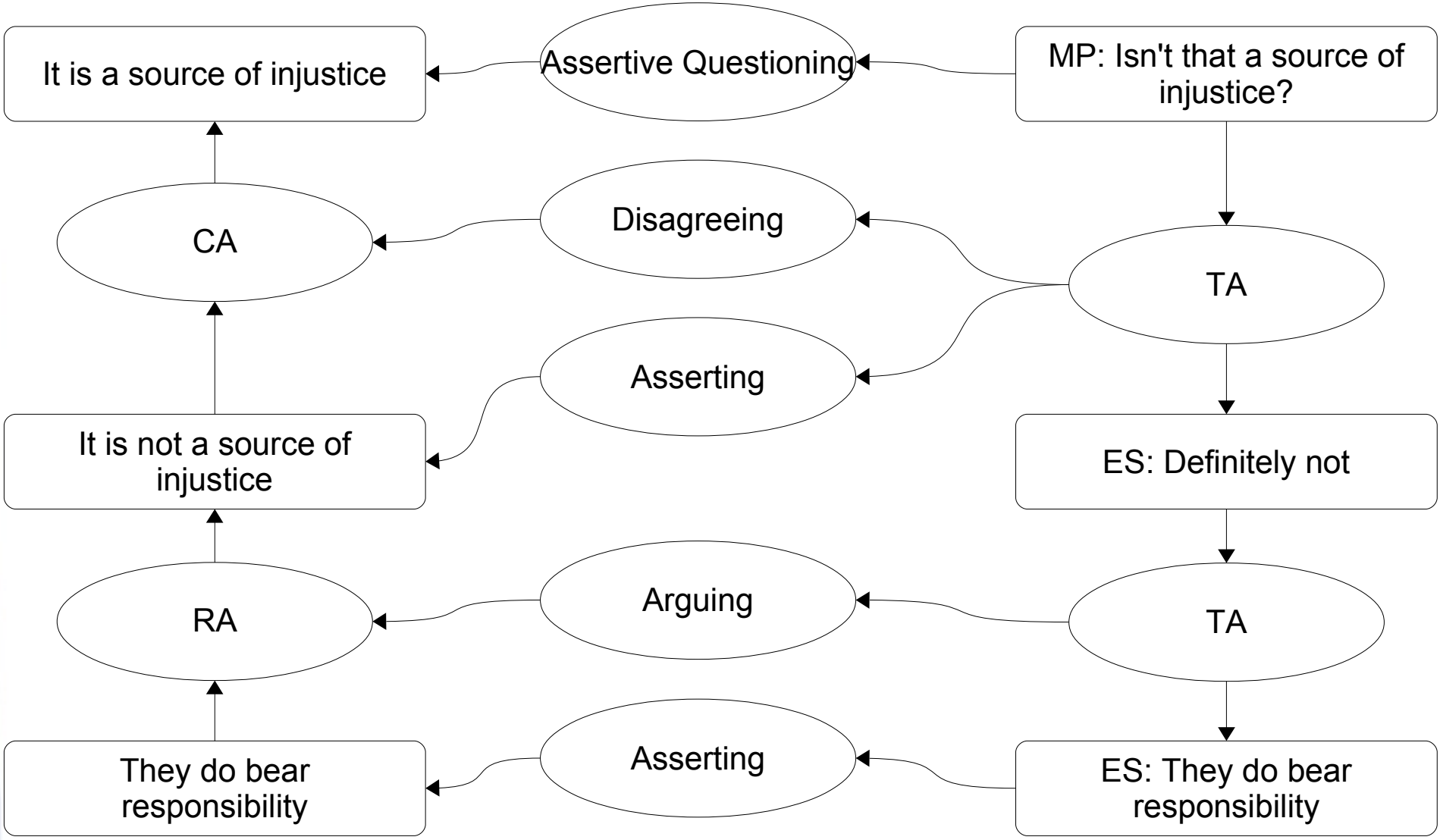

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(4) Protocols of NL dialogue games

"BBC Radio 4 programme *Moral Maze*" Sub-Corpus
(Yaskorska, 2016; Yaskorska & Janier, 2016)
- 3,213 ADUs; 412 supports; 145 conflicts

NL: We are talking about the violence which may have been perpetrated against Mau Mau suspects
NL: We know Kenya was a brutal war

(4) Protocols of NL dialogue games

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(4) Protocols of NL dialogue games

$$\mathbf{TS5}\ L_x^b \downarrow A_k\ (\phi)$$
$$L_y^w \downarrow PCon_l\ (\psi)$$
$$b = w;$$
$$T(L_x^b, L_y^w) \downarrow ARG_m\ (\psi \vdash \phi)$$

(4) Protocols of NL dialogue games

- 3 **mediation** dialogue games: critical discussion, bargain, therapeutic (Janier et al. 2015)

- **Mining** protocols from NL texts (Snaith & Reed 2016)

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- **reported speech**
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(5) Reported speech

“US 2016 presidential debates” Corpus

- http://corpora.aifdb.org/US2016
- 18,368 ADUs; 2,830 supports; 942 conflicts; 764 rephrases

CLINTON: Donald thinks that climate change is a hoax perpetrated by the Chinese . I think it 's real.
TRUMP : I did not . I did not . I do not say that.
CLINTON: I think science is real.
TRUMP: I do not say that.

(5) Reported speech

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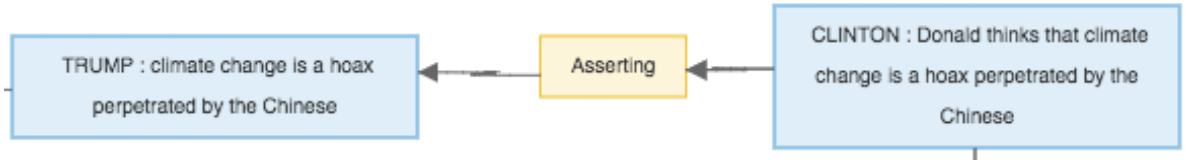

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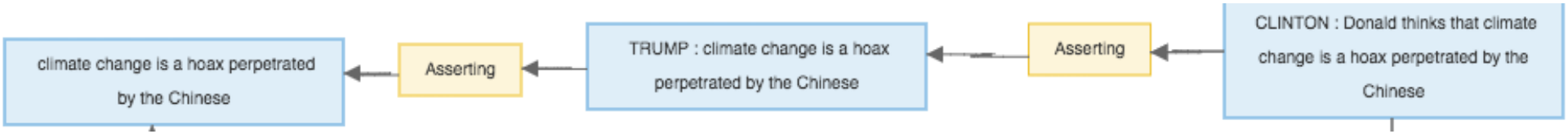

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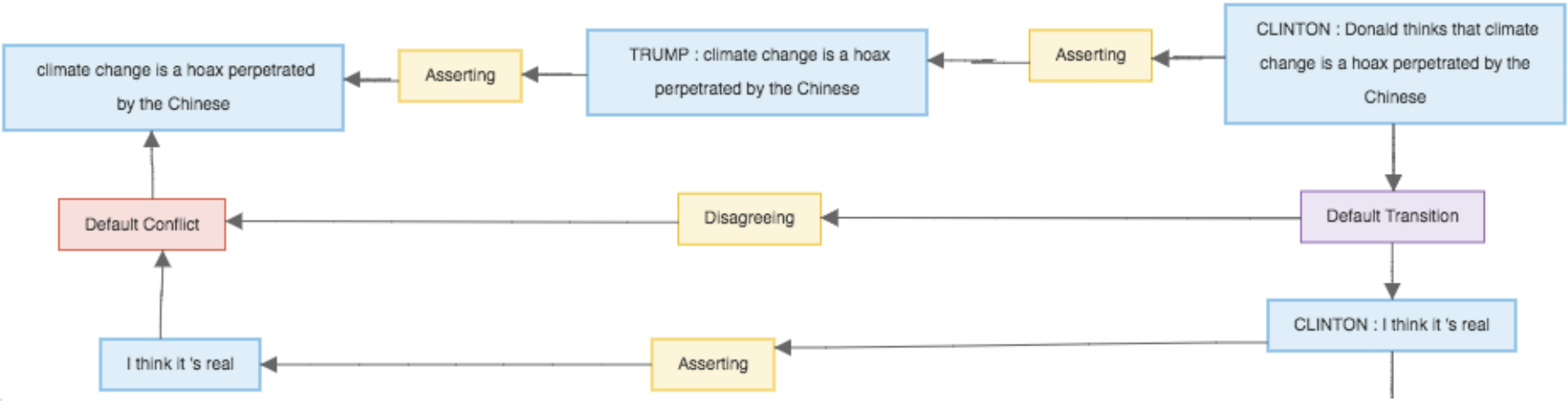

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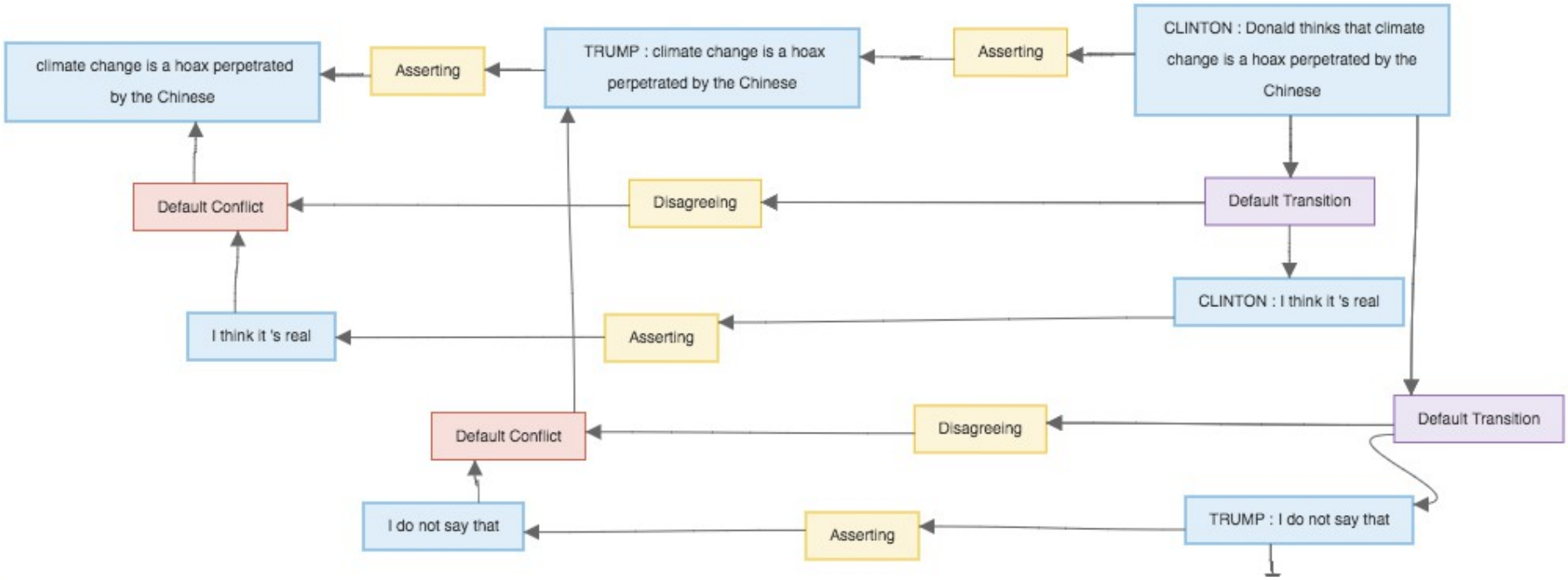

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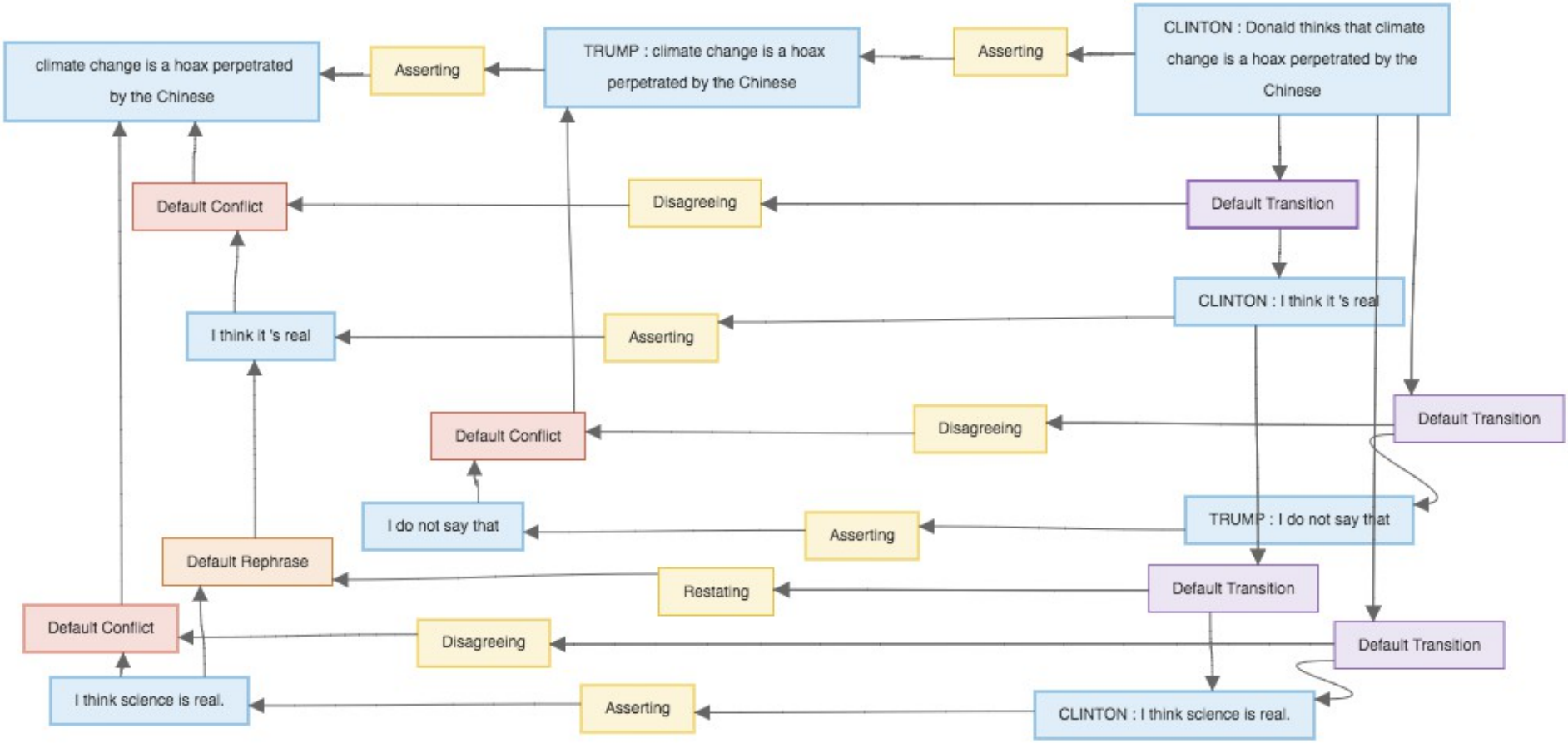

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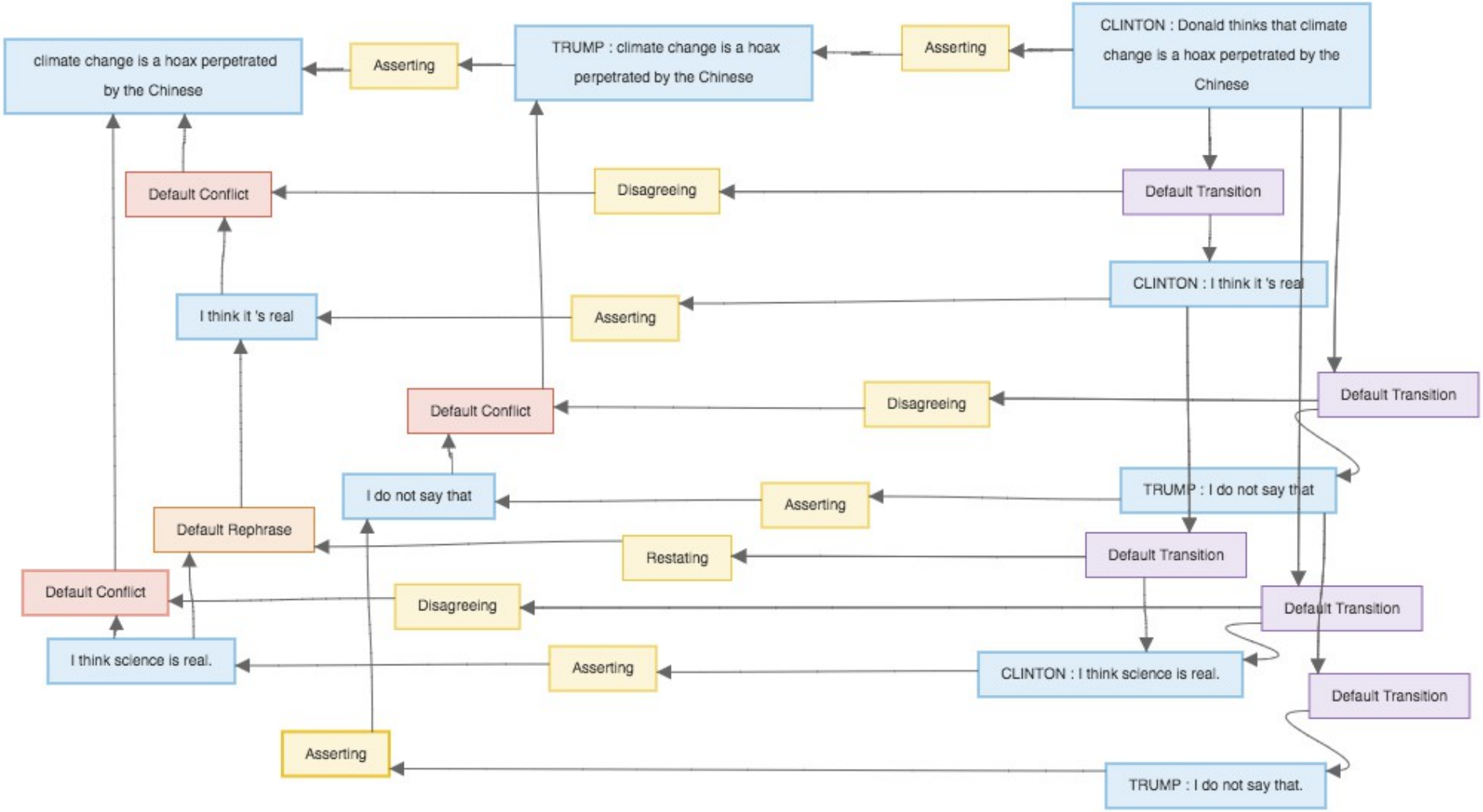

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(6) Ethos

“Hansard records of UK parliamentary debates” Corpus
(Duthie et al., 2016)
• http://corpora.aifdb.org/Ethan3
• 608 ADUs; 155 supports; 453 ethos attacks

Map 11001
Mr. Nott: My hon. Friend (Mr. Henderson) is absolutely right.

Map 10986
Mr. Sedgemore: Can the right hon. Gentleman (Mr. Baker) confirm the message on the tapes today that he is running so scared, and so frit, and is sweating so profusely with fear, that he has cancelled all his engagements and left them to the office boy?

(6) Ethos

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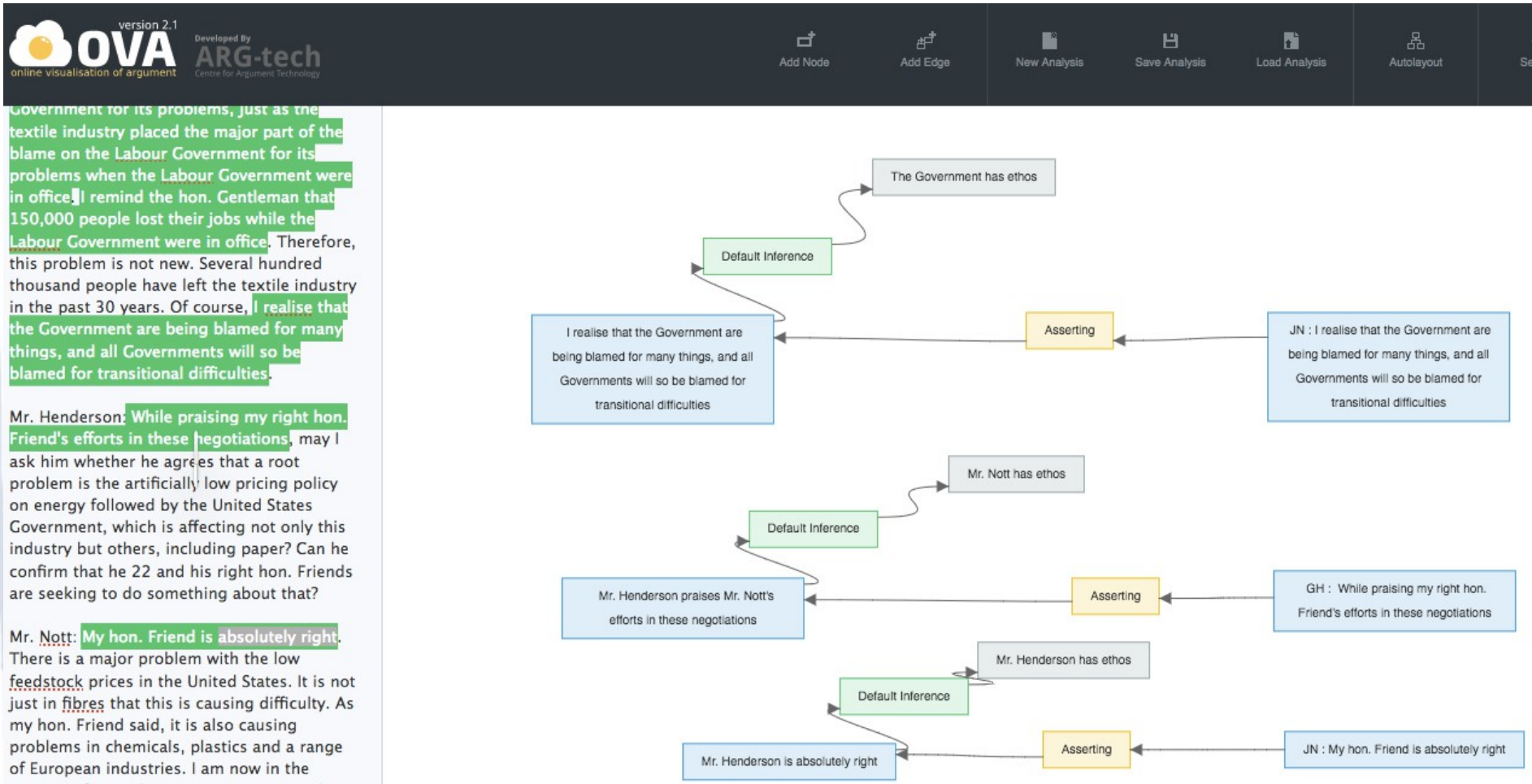
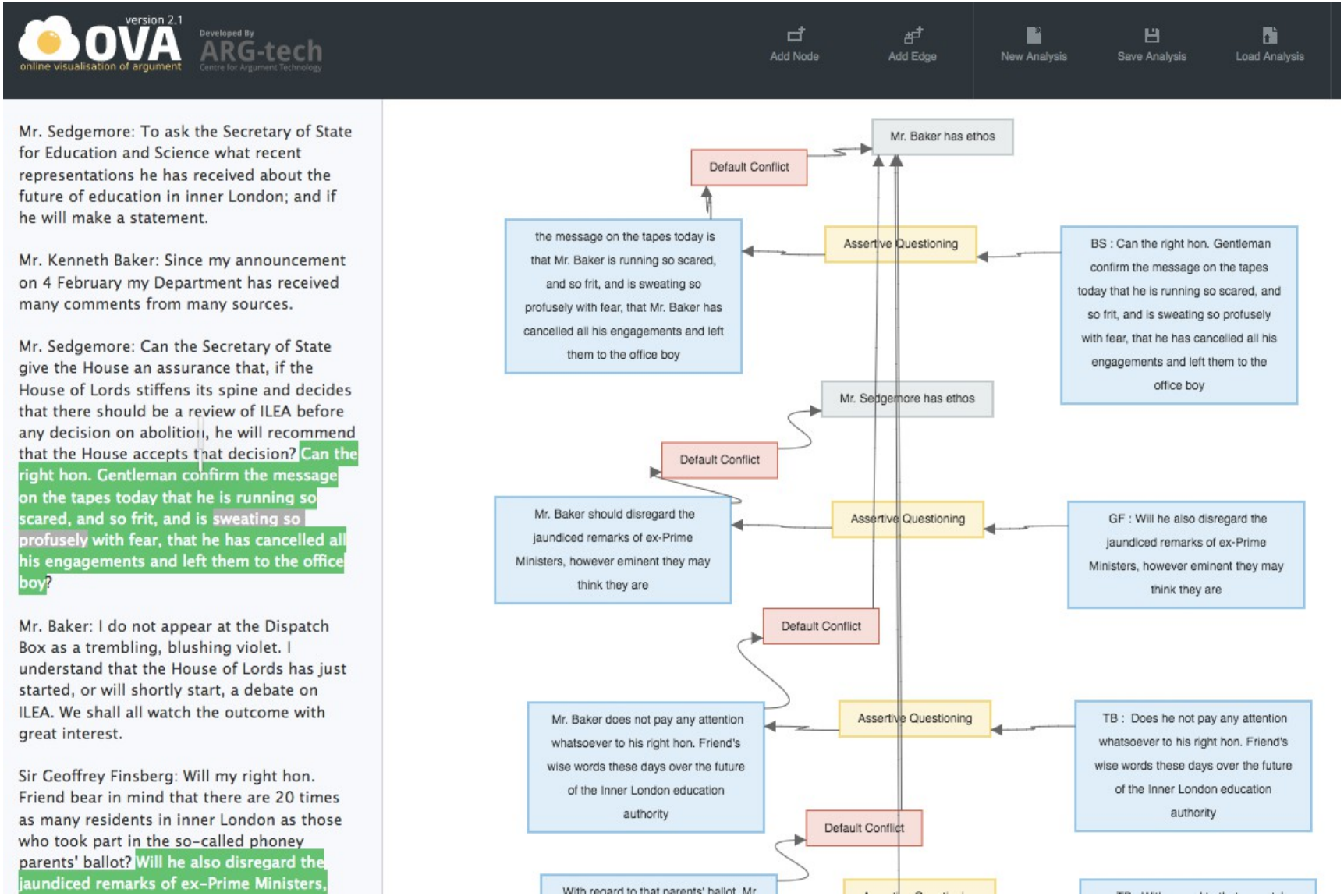
(6) Ethos (support)



(6) Ethos (attack)



(3/4) Argument Mining

(3a/4) Mining Arguments from Dialogue

(Budzynska et al. 2014b; 2015; 2016)

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Innovate UK
EPSRC Engineering and Physical Sciences Research Council
ARG-tech Centre for Argument Technology

BBC Radio 4 programme
Moral Maze

	Transcripts	Maps	Dialogue turn	Segments	Words	Location
MM2012c	5	202	812	3,227	41,926	`arg.tech/mm2012c`

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Illocutionary Connections ⚓ in Locutions (2)

IC type	A	Q			Ch			PCn	**TOTAL**
Occurrences	1,786 (83%)	322 (15%)			16 (1%)			30 (1%)	**2,154 (100%)**
IC subtype		PQ	AQ	RQ	PCh	ACh	RCh		
Occurrences		92	138	92	9	7	0		
Kappa κ									**.55**

Annotation

IC type	Agreeing	Disagreeing	Arguing	TOTAL
Occurrences	119 (10%)	219 (18%)	853 (72%)	**1,191 (100%)**
Kappa κ				**.76**

Linguistic model: Arguing

$$\mathbf{TS5} L_x^b \downarrow A_k\ (\phi)$$
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$$T(L_x^b, L_y^w) \downarrow ARG_m\ (\psi \vdash \phi)$$

Linguistic model: Arguing

- **epistemic verbs**: think, mean, believe, insist, want, approve, support, recognise
- typical **cause-consequence** forms: because, entails, follows, in addition, furthermore, then, indeed followed by a proposition
- **affirmations** of the form: Noun IS/MODAL Property/Event, where modal is e.g. should, would, must, want
- **discourse organisers** such as *the point is, the challenge is then, may be, the fact is, well it must*, etc.
- **confirmation** of a previous statement by using quite similar terms, possibly by adding some information.

Linguistic model: Disagreeing

$$L_x^b \downarrow asserting_k\ (\phi)$$

$$L_y^w \downarrow assertivequestioning_l\ (\psi)$$

$$b \neq w;$$

$$T(L_x^b, L_y^w) \downarrow disagreeing_m\ (\psi \multimap \phi)$$

Linguistic model: Disagreeing

- **variants of negation:** I do not, I cannot, can never
- negatively oriented **propositional attitudes**: I disagree, I cannot accept
- **contrastive connectors** between Lx and Ly: however, but
- negatively oriented **lexical terms**: sluggish, bad, wrong
- **contextually** negative terms: coercive, peculiar, warnings, dangerous; or negative **judgement terms**: unwanted, undesired, hazardous
- **antonyms** in Lx and Ly, bipolar or continuous: expensive/cheap, moral/immoral , or via the negation: coercive / not coercive

Linguistic model: Agreeing

$$L_x^b \downarrow assertivequestioning_k\ (\phi)$$

$$L_{`yes'}^w$$

$$b \neq w;$$

$$T(L_x^b, L_{`yes'}^w) \downarrow agreeing_m\ (\phi)$$

Linguistic model: Agreeing

- typical **forms of approving**: yes, OK, I'm happy
- verbs expressing an **opinion that approves Lx content**: I think, they are right, I agree, I like
- typical **positive evaluative expressions**: sympathetic, interesting, powerful point
- typical **positive binders** between Lx and Ly: as you say, your own experience; not followed by any negative expression

Implementation: <TextCoop > (Saint-Dizier 2012)

```
<utterance speaker = ″lj″ illoc = ″standard assertion″><textunit nb = ″215″> it was a ghastly aberration </textunit> </utterance> .


<utterance speaker = ″cl″ illoc = ″RQ″> <textunit nb= ″216″> or was it in fact typical ? < /textunit> </utterance> .


<utterance speaker = ″cl″ illoc = ″RQ-AQ″> <textunit nb = ″217″> was it the product of a policy that was unsustainable that could only be pursued by increasing repression? < /textunit> </utterance>.
```

Results

Table VIII. Automatic identification of illocutionary connections anchored in transitions

IC type	**Correct**	**Incorrect**
Agreeing (Agr)	85%	15%
Disagreeing (Disagr)	82%	18%
Arguing (Arg)	95%	5%
TOTAL	**87%**	13%

Table IX. Automatic identification of argument structures

Type of argument structure	**Correct**	**Incorrect** %
Inference	100%	0%
Conflict	88%	12%
TOTAL	**94%**	6%

(3b/4) Mining Ethos in Political Debate

(Duthie et al. 2016a; Duthie & Budzynska 20xx)

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EPSRC
Engineering and Physical Sciences Research Council

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Alliances and Enmities

Example 1 Mr. Chris Patten said, *The hon. Member for Falkirk, East (Mr. Ewing) in his admirable speech, put the position much more clearly than I could.*

Example 2 Mr. Giles Radice said, *In doing so he (Mr. Pawsey) failed to face up to his responsibility both to the House and to the schools of England, Scotland and Wales.*

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UK parliamentary record (Hansard)

Corpus	Sessions	Words	Segments	Speakers	Location
Train	30	40,939	387	127	`http://arg.tech/Ethan3Train`
Test	30	29,178	352	126	`http://arg.tech/Ethan3Test`
TOTAL	60	70,117	739	253	

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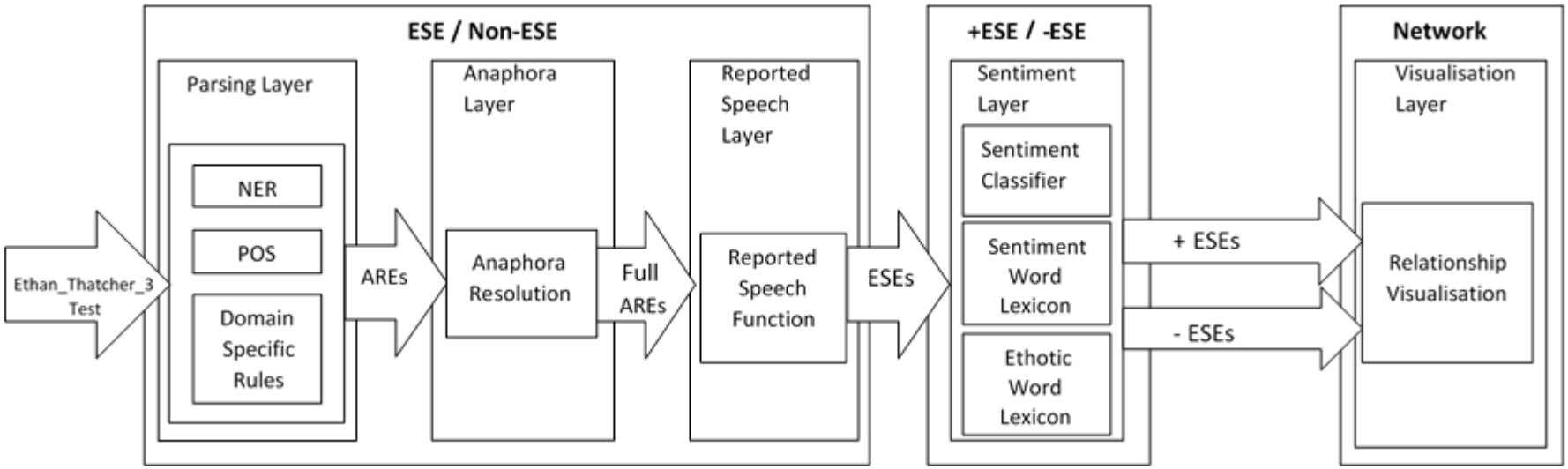
Annotation

	Occurrences	Kappa
Source-person	243	1
Target-person	212	.84
Ethos support	179	.95 (out of .67)
Ethos attack	560	.95 (out of .67)
TOTAL	1,194	

Automation

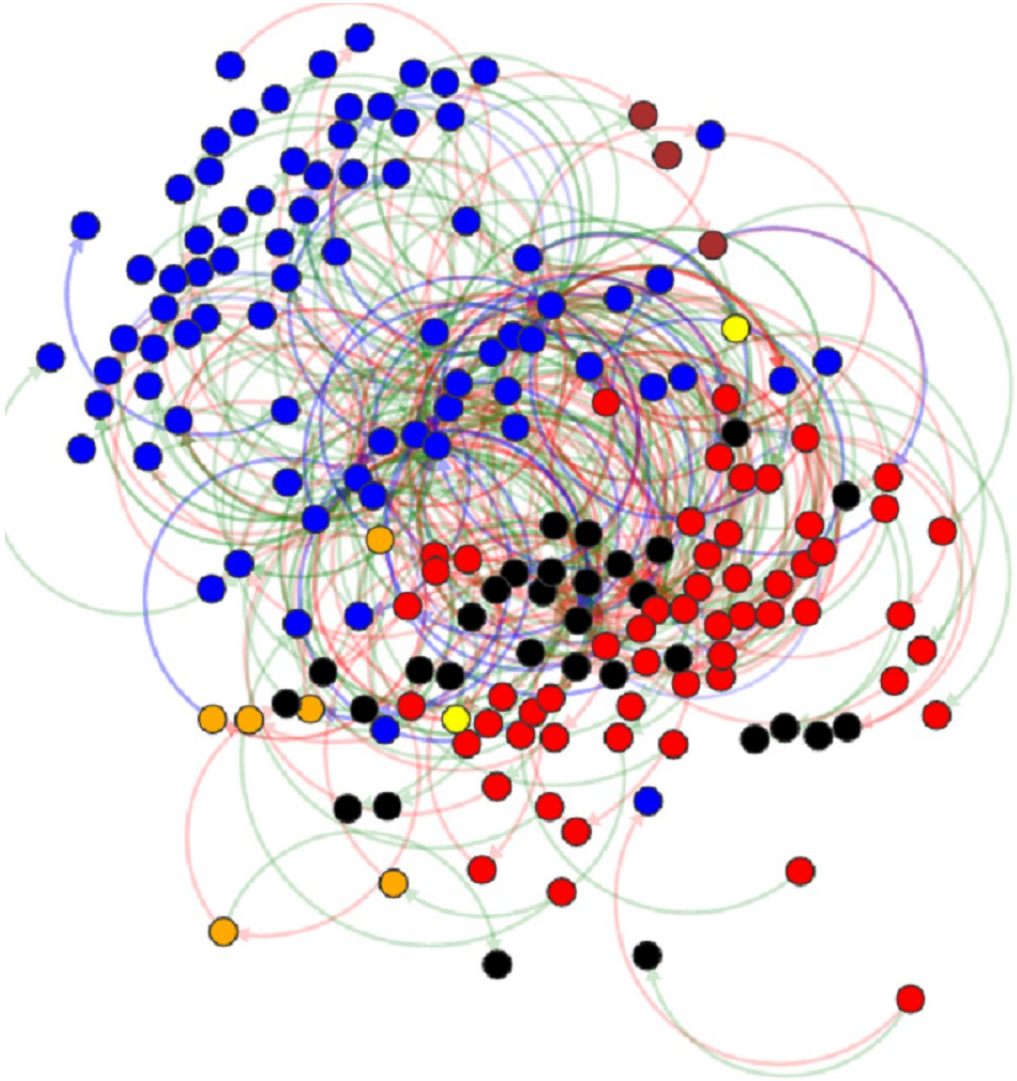

ESE / Non-ESE
Parsing Layer
NER
POS
Domain Specific Rules
Anaphora Layer
Anaphora Resolution
Reported Speech Layer
Reported Speech Function
+ESE / -ESE
Sentiment Layer
Sentiment Classifier
Sentiment Word Lexicon
Ethotic Word Lexicon
Network
Visualisation Layer
Relationship Visualisation
Ethan_Thatcher_3 Test
AREs
Full AREs
ESEs
+ ESEs
- ESEs

Results

ESE/Non-ESE	Precision	Recall	*F*-score
Baseline	0.29	1	0.45
SVM	0.30	0.30	0.30
NB	0.20	0.94	0.32
ME	0.46	0.27	0.34
NER, POS, DSR, AnaR, RSF	0.62	0.77	0.69*
POS, DSR, AnaR, RSF	0.64	0.76	0.70*

+/- ESE	Precision	Recall	*F*-score
Baseline	0.50	1	0.67
NB, SWL	0.58	0.57	0.57
ME, SWL	0.6	0.65	0.62
SVM, SWL	0.64	0.59	0.62
NB, SWL, EWL	0.74	0.67	0.71*
ME, SWL, EWL	0.71	0.73	0.72*
SVM, SWL, EWL	0.78	0.78	0.78*

Visualisation



Ethotic Statements
Source: Mr. Simon Hughes

Target: Government

Ethos Expression: Until that happens this will be a bigger muddle than any of the other reorganisations that local government has gone through at the behest of the Government and the Conservative predecessors.

Conservative:
Labour:
Liberal:
SNP:
UUP:
Misc:

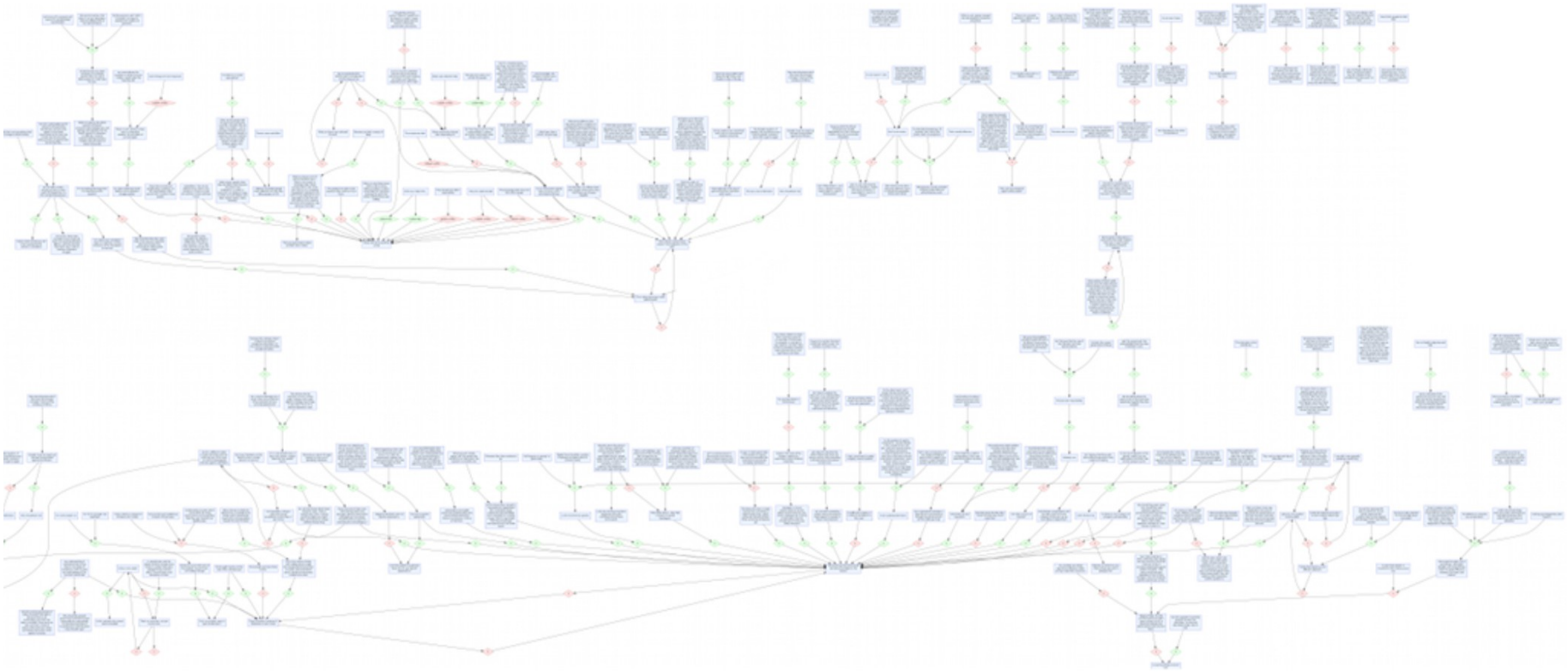
(4/4) Argument Analytics

(Konat et al. 2016b;
Lawrence et al. 2016; 2017a)

NATIONAL SCIENCE CENTRE POLAND
Innovate UK
EPSRC Engineering and Physical Sciences Research Council

MORAL MAZE TRANSCRIPT

18/07/2012 – The British Empire



Argument Analytics
http://analytics.arg.tech

- Present details of an argumentative structure in a format **easily digested by a general audience**
- Automatically **calculate detailed statistics** about argumentative structures for in-depth analysis
- Provide an overview of the **participants** and their interactions in a dialogue
- Calculate the **similarity between argument maps** (inter-annotator agreement and performance of automatic approaches)
- Work with existing argument resources and **real-time arguments** as they are being created

Argument Analytics

Argument Analytics

NodeSetID or Corpus Name

(1) Simple statistics: Overview

Argument Analytics

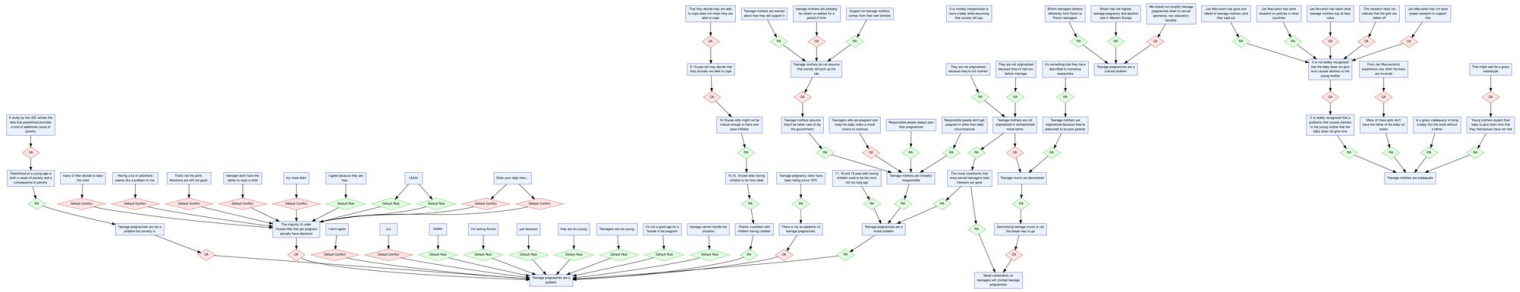
Argument Analytics by ARG-tech
Centre for Argument Technology

- Overview
- Dialogue
- Graph Properties
- Detailed Statistics
- Comparative Properties

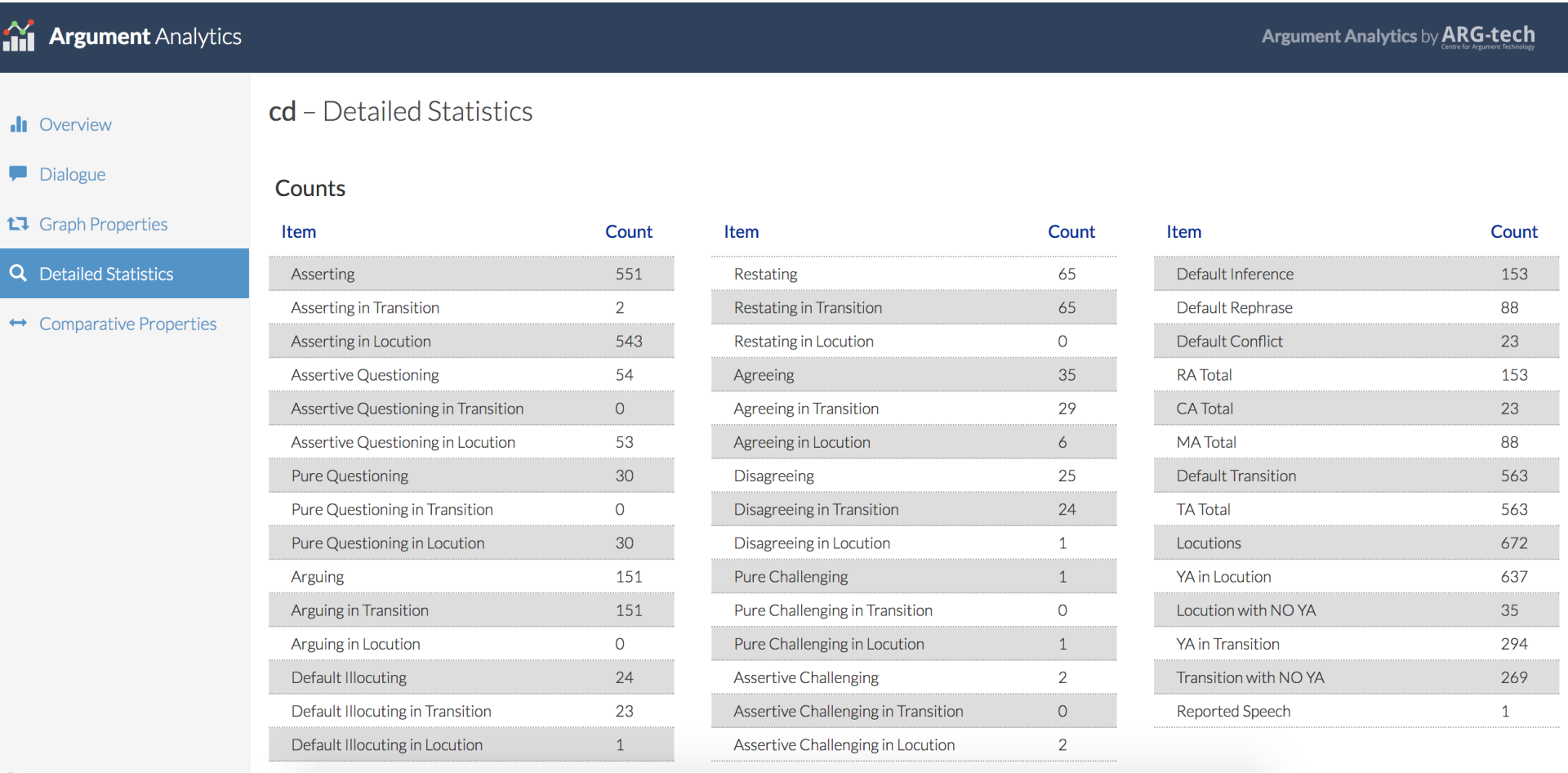
NodeSet 732 – Overview

INFORMATION NODES	AVERAGE WORDS PER NODE	CONFLICT NODES	SUPPORT NODES
67	9.13	27 Details	39 Details

Argument Map



(1) Simple statistics: Pattern counts

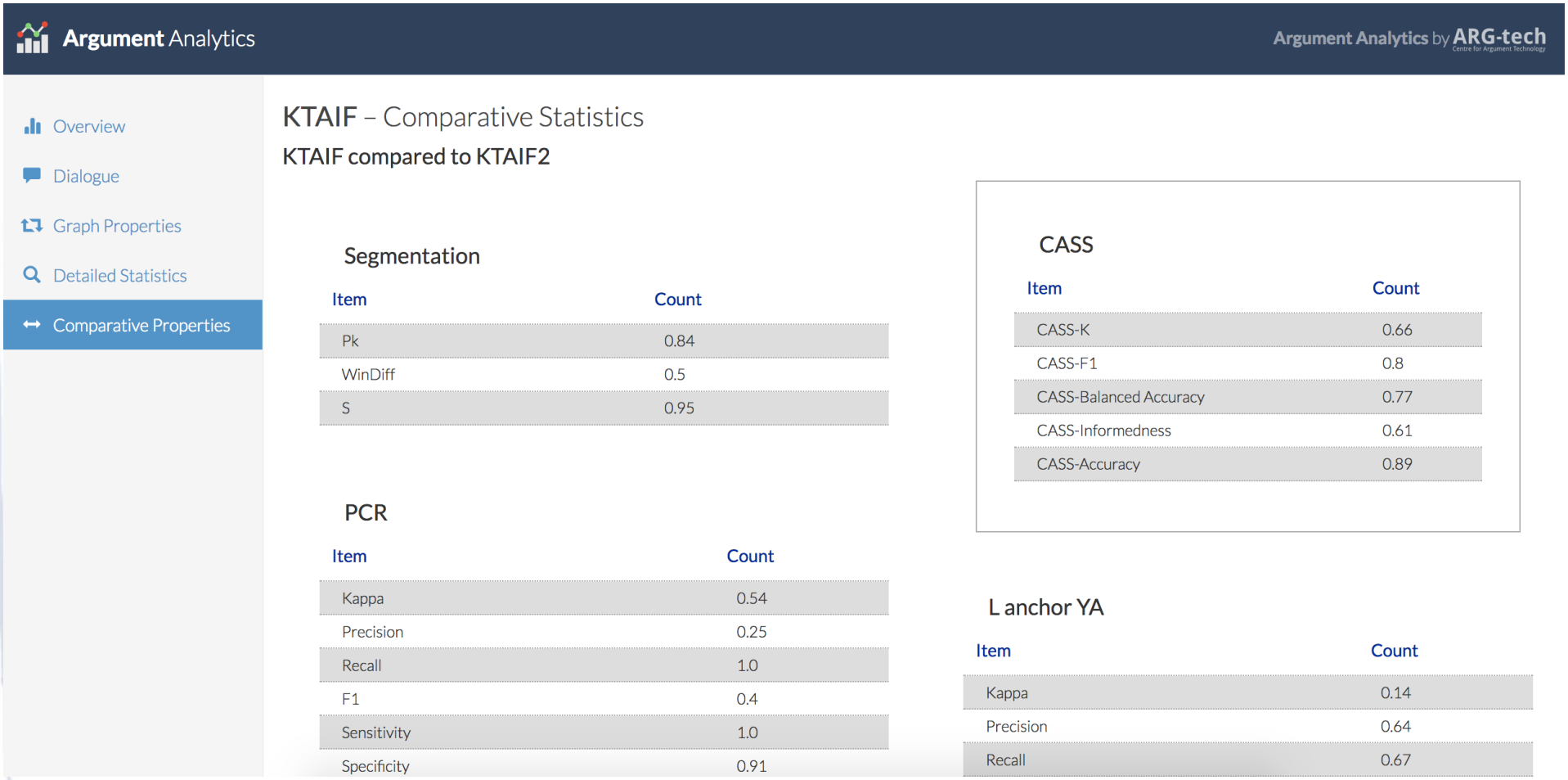


Item	Count
Asserting	551
Asserting in Transition	2
Asserting in Locution	543
Assertive Questioning	54
Assertive Questioning in Transition	0
Assertive Questioning in Locution	53
Pure Questioning	30
Pure Questioning in Transition	0
Pure Questioning in Locution	30
Arguing	151
Arguing in Transition	151
Arguing in Locution	0
Default Illocuting	24
Default Illocuting in Transition	23
Default Illocuting in Locution	1

Item	Count
Restating	65
Restating in Transition	65
Restating in Locution	0
Agreeing	35
Agreeing in Transition	29
Agreeing in Locution	6
Disagreeing	25
Disagreeing in Transition	24
Disagreeing in Locution	1
Pure Challenging	1
Pure Challenging in Transition	0
Pure Challenging in Locution	1
Assertive Challenging	2
Assertive Challenging in Transition	0
Assertive Challenging in Locution	2

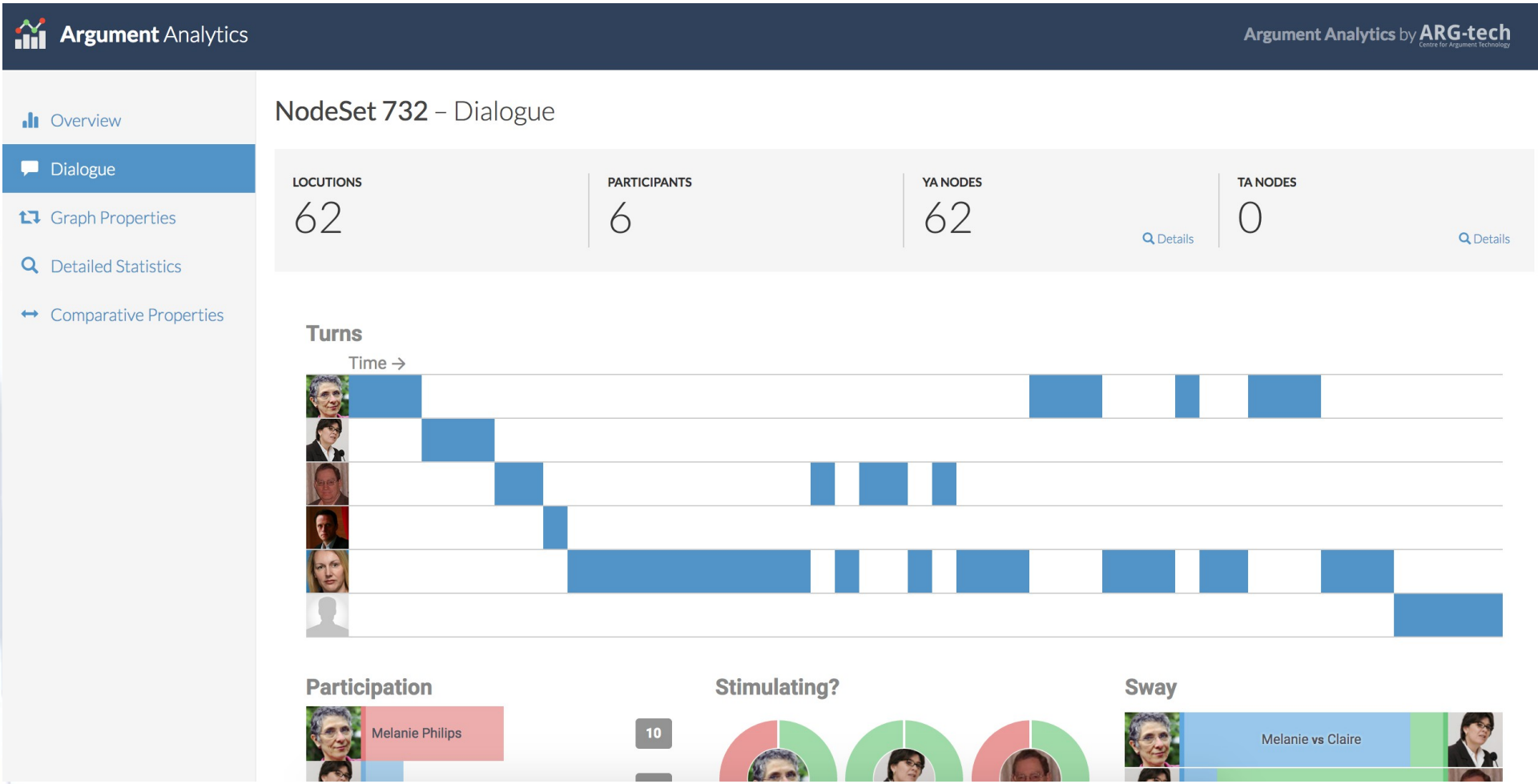
Item	Count
Default Inference	153
Default Rephrase	88
Default Conflict	23
RA Total	153
CA Total	23
MA Total	88
Default Transition	563
TA Total	563
Locutions	672
YA in Locution	637
Locution with NO YA	35
YA in Transition	294
Transition with NO YA	269
Reported Speech	1

(2) Comparative statistics

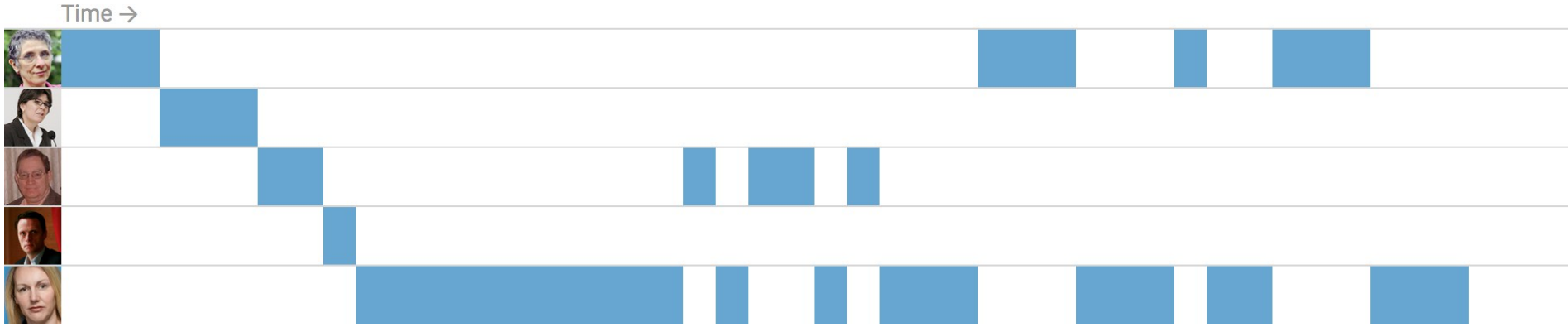


CASS metrics (Duthie et al. 2016b)

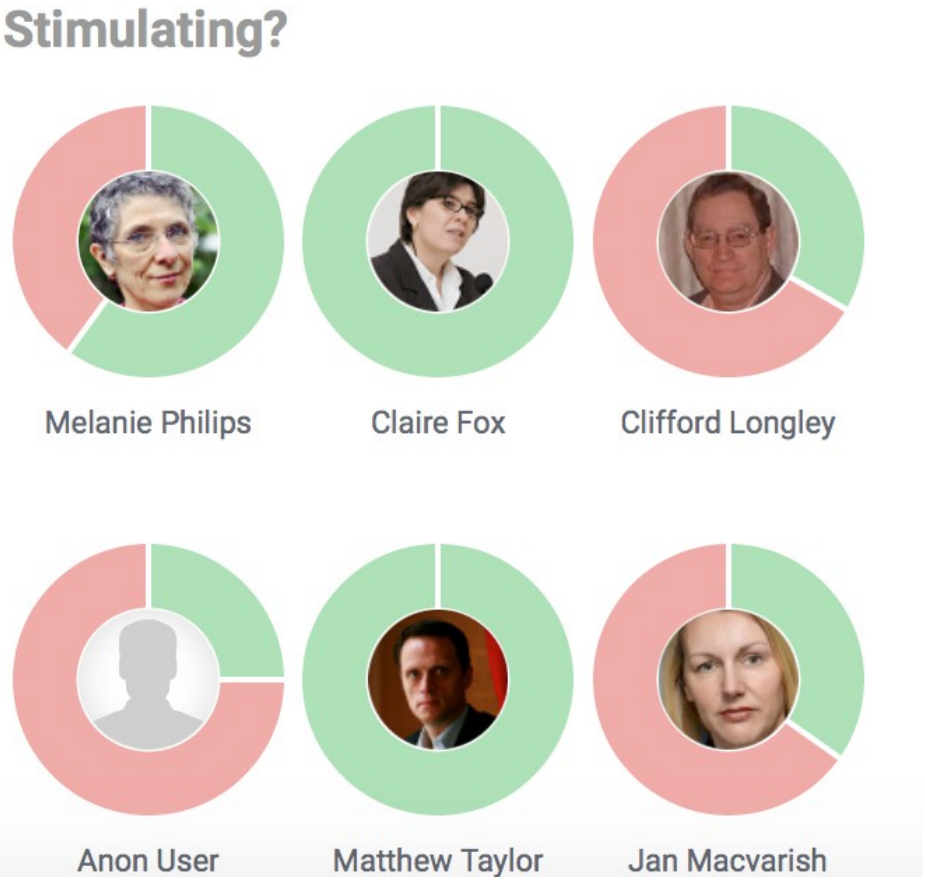
(3) Dialogically oriented statistics



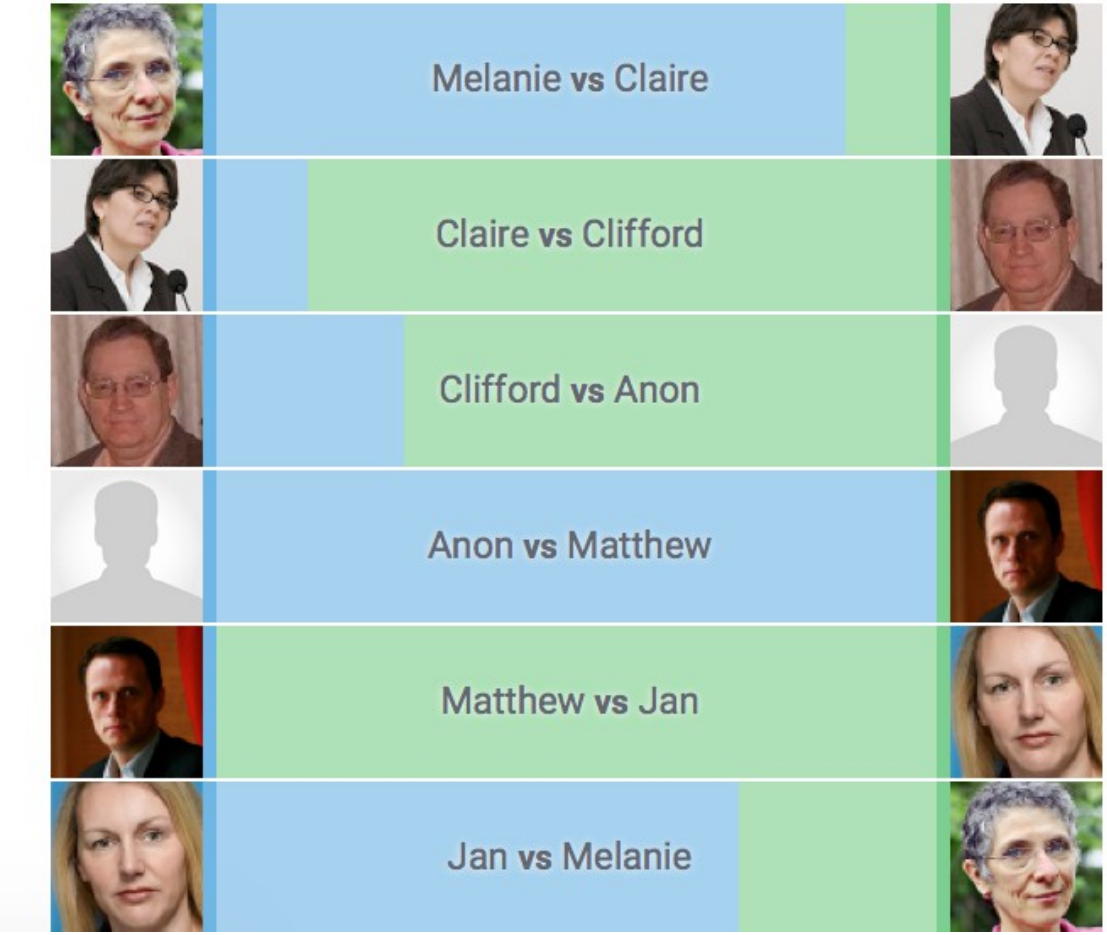
(3) Dialogically oriented statistics: Turn structure



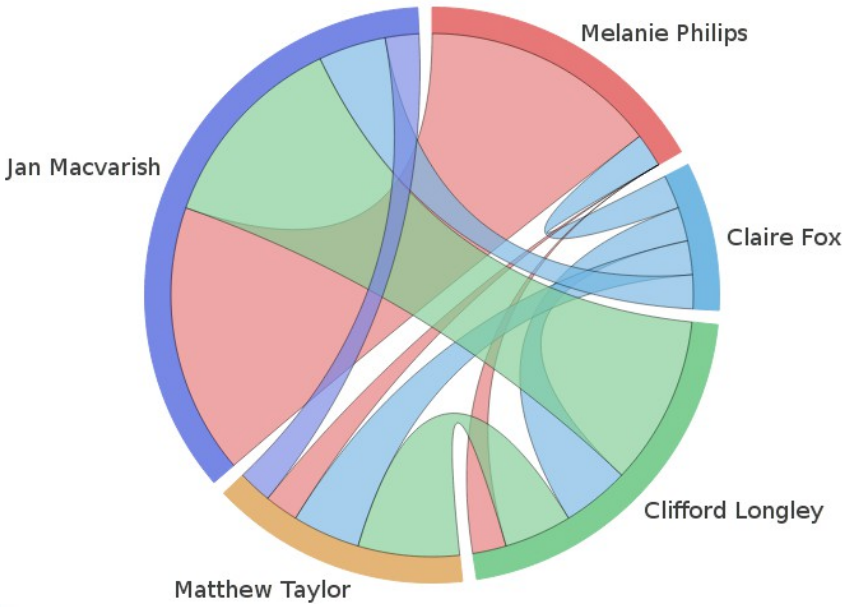
(3) Dialogically oriented statistics: Participants details

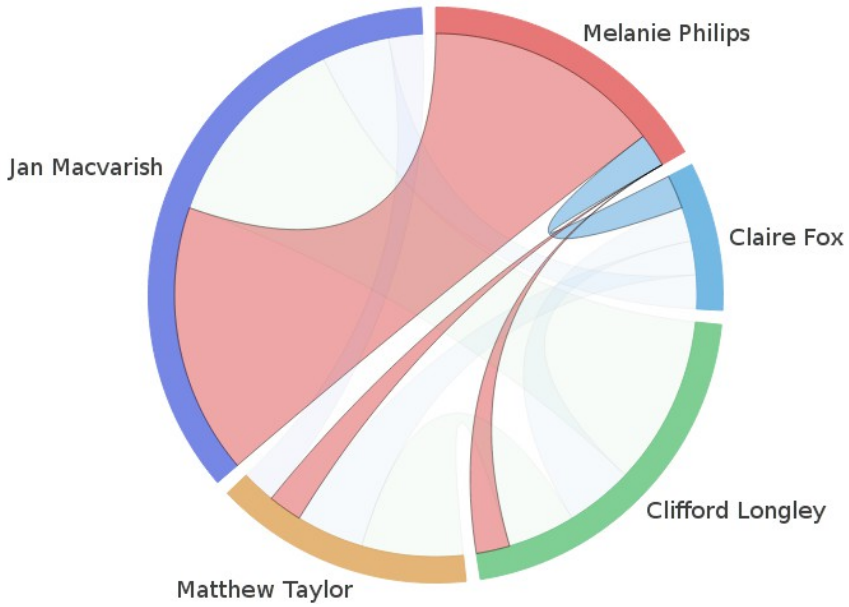


(3) Dialogically oriented statistics: Sway

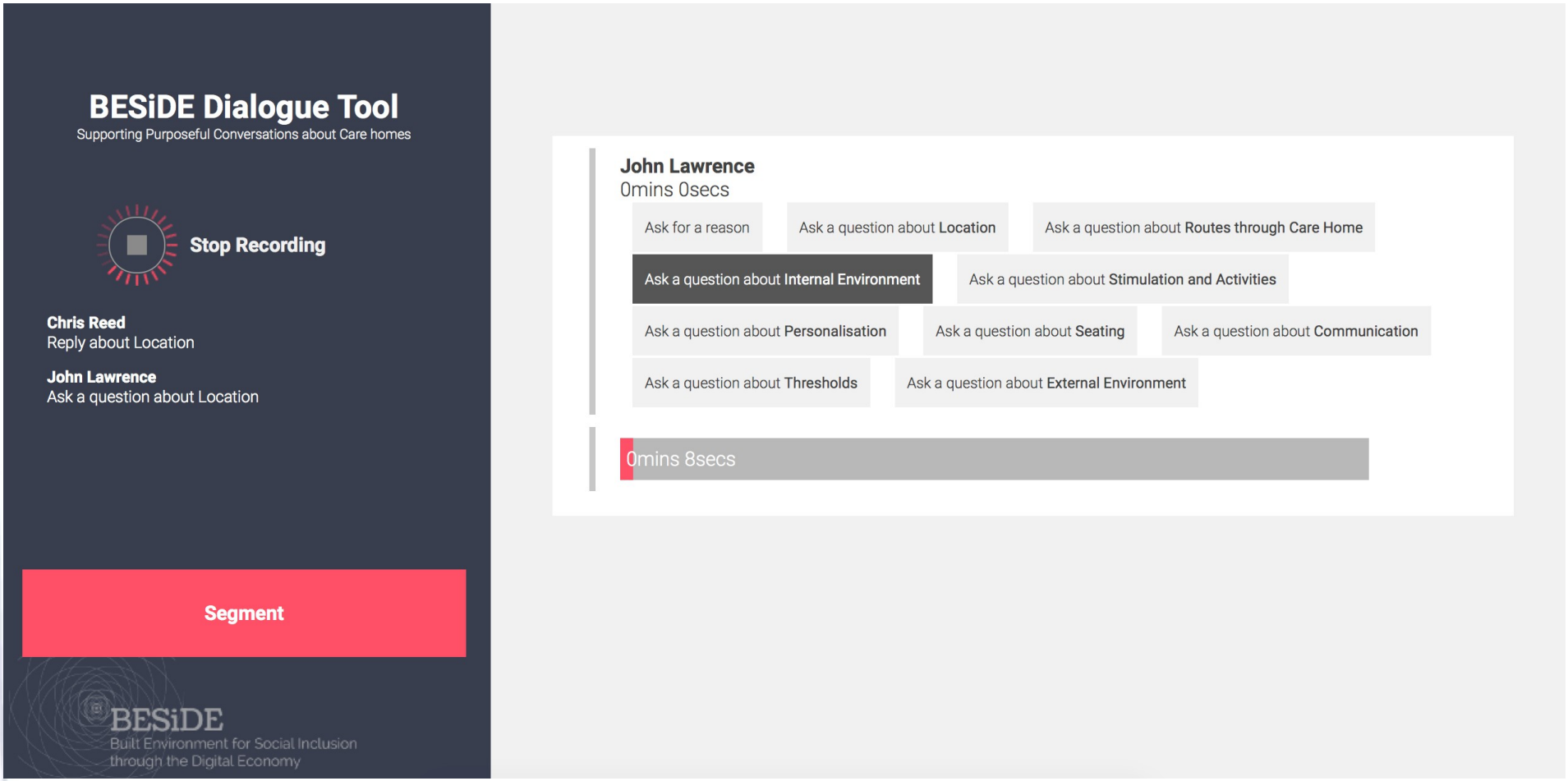


(3) Dialogically oriented statistics: Interactions





(4) Real-time statistics



(4) Real-time statistics

Click to view Argument Map »

Transcript

Fiona Welch
Ask a question about Stimulation and Activities

Paul Rowley
Reply about Stimulation and Activities

Fiona Welch
Ask a question about Stimulation and Activities

Paul Rowley
Reply about Stimulation and Activities

Fiona Welch
Ask a question about Stimulation and Activities

Paul Rowley
Reply about Stimulation and Activities

Denise McCorkindale
Reply about Stimulation and Activities

Current Topic: External Environment

- ✗ Location
- ✗ Routes through Care Home
- ✗ Seating
- ✗ Communication
- ✗ Thresholds
- ✓ Internal Environment
- ✓ Stimulation and Activities
- ✓ Personalisation
- ✓ External Environment

Speakers

Fiona 13

Denise 7

Paul 6

Neil 3

Marianne 6

Topics

Location 0

Routes through Care Home 0

Internal Environment 2

Stimulation and Activities 15

Personalisation 16

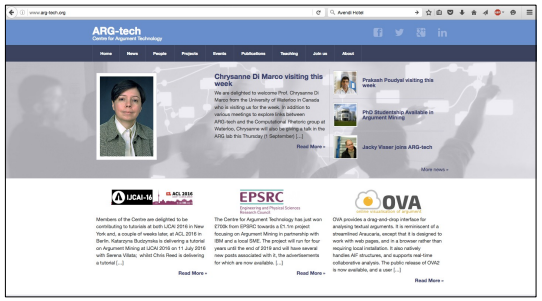
Seating 0

Communication 0

Summary

- **Foundations:**
  - Inference Anchoring Theory: Dialogical context of arguments
  - Argument Web: Online ecosystem of argument technologies
- **Argument corpora:** Recognising complex argument structures in NL is hard
- **Argument mining:** Automatic identification of argument structure
  - From dialogue
  - Related with speakers' ethos
- **Argument analytics:** Automatic sense-making of argument structure

Thank you



Find out more at
http://arg.tech

Computational Models of Argument
COMMA 2018
In Warsaw

Polish School of Argumentation
ArgDiap 2017
http://argdiap.pl

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