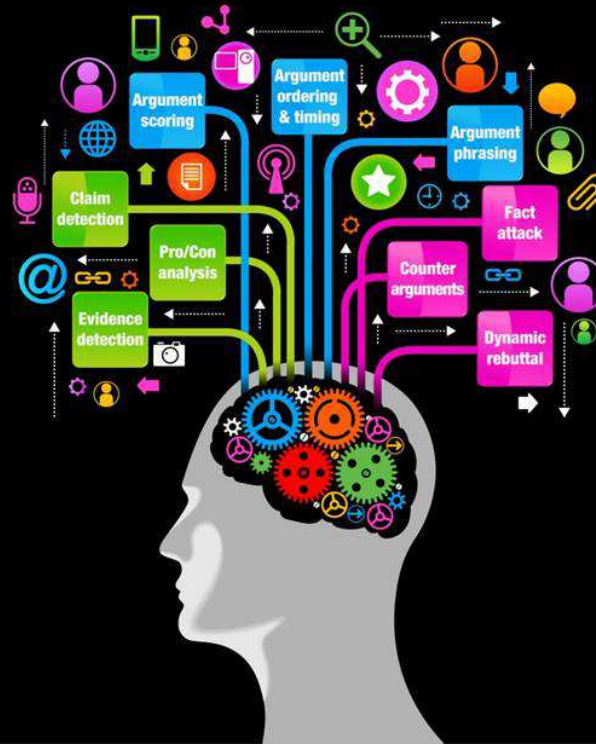


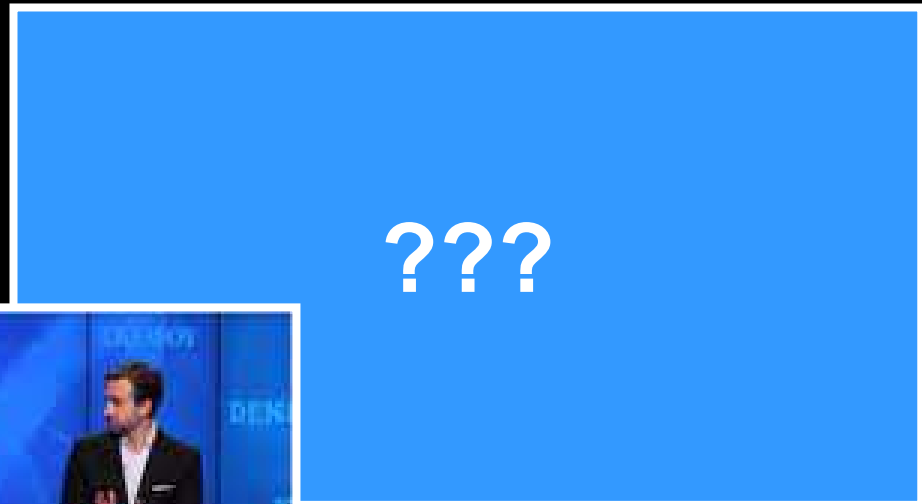
# IBM Debating Technologies

Noam Slonim, IBM Haifa Research Lab

Feb 26, 2015, Rethinking the role of Social Sciences and Humanities (SSH) in Horizon 2020



# IBM Research Grand Challenges



What's next?



2011

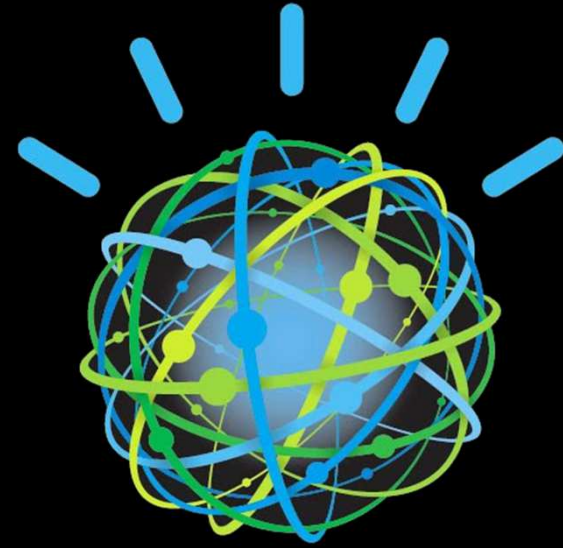


1997

# Debating is an important and common human activity



# How can technology help?



## Looking for a new paradigm?

- **Most of the questions we encounter do not have a simple answer**
  - Shall IBM make a strategic partnership with Apple?
  - Should I buy a house? rent an apartment? Stay with my parents?
  - What about banning the sale of violent video games to minors?
- **Existing technologies are not enough**
  - Question answering is not the answer
  - Search engines will take you half way, at best
- **A new paradigm - mine massive corpora to generate relevant arguments**



**From Search Engine to Research Engine ?**

# Basic Argument Model

- **Topic**

A short phrase that frames the discussion

**The sale of violent video games to minors should be banned**

- **Claim – a.k.a. Context Dependent Claim (CDC)**

A general, concise statement that directly supports/contests the given Topic

**Violent video games increase children's aggression**

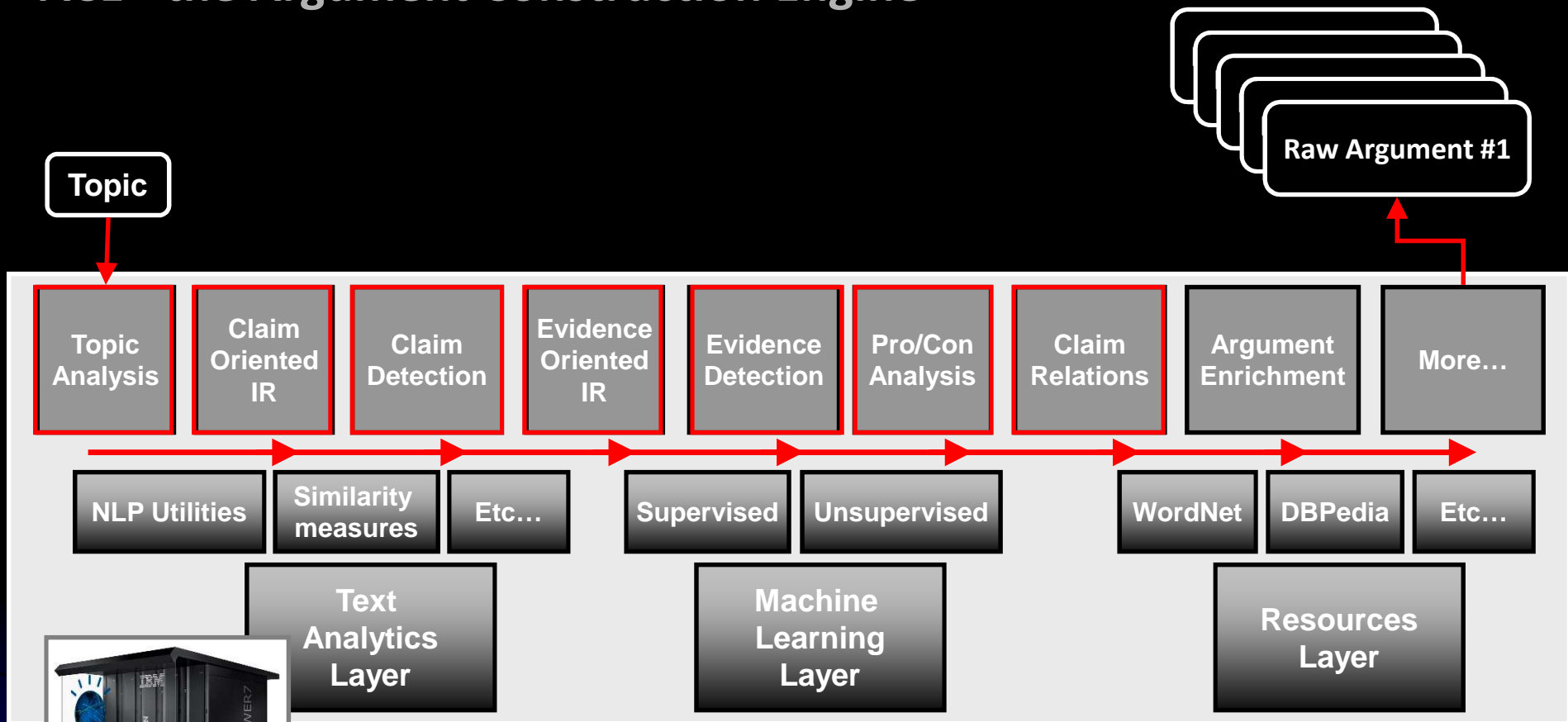
- **Evidence – a.k.a. Context Dependent Evidence (CDE)**

A text segment that directly supports/contests a CDC in the context of a given Topic

- **A large scale meta-analysis, examining 130 studies with over 130,000 subjects worldwide, concluded that exposure to violent video games causes long term aggression in players.**

Study  
Expert  
Story  
Event  
More...

# ACE - the Argument Construction Engine



 **A set of new problems to pursue?**

## Why is this challenging?

### The example of automatic claim detection

- We start with ~4M Wikipedia articles
- In these articles we have a total of ~500M sentences
- In each sentence we typically have ~200 possible claim candidates
- So we end up with ~100,000,000,000 candidates
- Of which, typically only a few dozens represent good and relevant claims

Finding a needle in a haystack?



No... **It is worse...**



# Identifying a Claim involves quite subtle considerations

## Topic: the sale of VVG to minors should be banned

- VVG should not be sold to children
- VVG are significantly associated with: increased aggressive behavior
- “Doom” has been blamed for school shooting
- Only children predisposed to aggression are affected by VVG
- TV shows just mirror the violence that goes on in the real world
- VG publishers unethically train children in the use of weapons
- VG addiction is excessive or compulsive use of VG that interferes with daily life

# Identifying a Claim involves quite subtle considerations

## Topic: the sale of VVG to minors should be banned

- VVG should not be sold to children
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# Identifying a Claim involves quite subtle considerations

## Topic: the sale of VVG to minors should be banned

- VVG should not be sold to children (Repeats the Topic)
- VVG are significantly associated with increased aggressive behavior
- “Doom” has been blamed for school shooting (Too specific)
- Only children predisposed to aggression are affected by VVG (Ambivalent)
- TV shows just mirror the violence that goes on in the real world (Not relevant)
- VG publishers unethically train children in the use of weapons
- VG addiction is excessive or compulsive use of VG that interferes with daily life (Definition)

# Identifying a Claim involves quite subtle considerations

## Topic: the sale of VVG to minors should be banned

- VVG should not be sold to children
- VVG are significantly associated with increased aggressive behavior (Factual Claim)
- “Doom” has been blamed for school shooting
- Only children predisposed to aggression are affected by VVG
- TV shows just mirror the violence that goes on in the real world
- VG publishers unethically train children in the use of weapons (Opinion Claim)
- VG addiction is excessive or compulsive use of VG that interferes with daily life

## Identifying Claim boundaries is also far from trivial

**Topic: the sale of VVG to minors should be banned**

**Because violence in video games is interactive and not passive, critics such as Dave Grossman and Jack Thompson argue that violence in games hardens children to unethical acts, calling first-person shooter games "murder simulators", although no conclusive evidence has supported this belief.**

## Identifying Claim boundaries is also far from trivial

**Topic: the sale of VVG to minors should be banned**

**Because violence in video games is interactive and not passive, critics such as Dave Grossman and Jack Thompson argue that violence in games hardens children to unethical acts, **calling first-person shooter games "murder simulators"**, although no conclusive evidence has supported this belief.**

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## Identifying Claim boundaries is also far from trivial

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**Because violence in video games is interactive and not passive, critics such as Dave Grossman and Jack Thompson argue that **violence in games hardens children to unethical acts**, calling first-person shooter games "murder simulators", although no conclusive evidence has supported this belief.**

- **So it is not easy...**
- **But it is important for the user...**
- **And it is also important to enable downstream tasks -**
  - Evidence Detection, Pro/Con Analysis, Claim Relations, etc.

Why is this challenging?

It is more like finding a **straw** in a **haystack**



And this is only claim detection...

Next we need -

**Pro/Con analysis**  
**Evidence detection**  
**Claim relations**  
**More...**

## The fundamental supervised ML paradigm – learning from humans

- Define the concept of a “Claim” and provide examples
- Train humans to detect Claims → ground-truth data
- Develop analytics to capture Claims’ statistical signature
- Assess analytics over ground-truth data in new topics



And the same for learning Evidences, Pro/Con polarity, Claim relations, etc

- Labeling is quite challenging
  - Concepts like Claim and Evidence are inherently elusive
  - Does a corpus such as Wikipedia contain Claims and Evidences?



Recruited a team of ~20 in-house labelers

## Main Labeling Stages - 5 Labelers per stage

- Select Topic – e.g., at random from Debatabase
- Search - Detect relevant articles
- Claim Detection – For each article → detect candidate Claims
- Claim Confirmation – For each candidate Claim → Accept/Reject
- Evidence Detection – For each Claim → Detect candidate Evidences
  - For now, in the Claim's article
- Evidence Confirmation – For each candidate Evidence → Accept/Reject
  - And also determine Evidence type(s)

# AceLab – main labeling infrastructure

**AceLab**

Logged in as rutyrt [\[Logout\]](#)

Tasks  
Time reports

Admin Home  
Users  
Browse  
Find Tasks  
Reports  
Bulk upload

E-Tasks

Special ops  
Old reports

## Assigned tasks

Topic: [803] This House would build high rises for housing  
Article: [2731-wiki12] Single-family detached home

EVIDENCE DETECTION assigned to rutyrt at 17/06/2014 16:44 [id=6635/21304]

## Open tasks

Topic: [803] This House would build high rises for housing  
Article: [2734-wiki12] Council house

EVIDENCE CONFIRMATION 22/06/2014 07:52 3/5 [id=6663]

Topic: [982] This House would remove the requirement for Catholic Priests to take a vow of celibacy  
Article: [3303-wiki12] Clerical celibacy (Catholic Church)

CLAIM DETECTION 22/06/2014 07:14 1/5 [id=6647]

# AceLab Performance Report Examples

## Performance evaluation: Claim detection

Labeler	Tasks	Duration	Anns	C-Tasks	Unq	Unq-b	C-Hist						C-Ratio	P	T	Prec	Rec	F1
* [redacted]	2	1:25 (-)	12.5 (12.5)	2	0.0	0.0	0%	18%	29%	12%	6%	35%	75% (50%)	17	29	53%	31%	39%
* [redacted]	2	1:15 (1:05)	22.0 (24.0)	2	0.0	0.0	0%	12%	17%	31%	26%	14%	61% (47%)	42	45	71%	67%	69%
* [redacted]	2	2:00 (1:05)	26.5 (24.0)	2	0.0	0.0	17%	12%	12%	21%	26%	12%	50% (47%)	42	45	60%	56%	57%
* [redacted]	2	1:17 (1:05)	30.5 (24.0)	2	0.0	0.0	12%	12%	14%	28%	21%	14%	53% (47%)	43	45	63%	60%	61%
[redacted]	425	0:18 (0:26)	1.9 (2.1)	406	31.0	32.0	25%	20%	13%	12%	12%	18%	46% (45%)	758	802	42%	39%	40%
[redacted]	163	0:30 (0:29)	2.2 (2.2)	161	9.0	26.0	25%	19%	15%	13%	17%	11%	41% (39%)	352	276	42%	53%	47%
[redacted]	486	0:19 (0:30)	2.6 (2.7)	372	51.0	61.0	6%	12%	22%	16%	22%	22%	63% (52%)	796	936	60%	51%	55%
[redacted]	103	0:57 (0:42)	6.2 (4.6)	26	7.0	15.0	14%	15%	14%	16%	21%	20%	54% (49%)	147	154	57%	55%	56%
[redacted]	409	0:33 (0:30)	2.9 (2.6)	318	72.0	33.0	8%	18%	19%	17%	19%	20%	55% (49%)	781	826	55%	52%	54%

[Details \(open>>\)](#)

## Performance evaluation: Claim confirmation

Labeler	Tasks	Duration	Reviewed	%Conf	C-Tasks	R	Agreement					P	T	Prec	Rec	F1
* [redacted]	2	0:47 (0:37)	63	46%	2	63	10%	5%	11%	10%	21%	29	21	59%	81%	68%
* [redacted]	3	0:10 (0:08)	32	34%	3	32	3%	6%	0%	25%	28%	11	12	91%	83%	87%
* [redacted]	2	1:10 (1:03)	128	53%	2	128	2%	9%	13%	16%	20%	68	45	60%	91%	73%
* [redacted]	2	1:45 (1:03)	128	43%	2	128	2%	5%	10%	18%	24%	55	45	71%	87%	78%
* [redacted]	2	1:22 (1:03)	128	52%	2	128	4%	5%	10%	18%	24%	66	45	65%	96%	77%
[redacted]	257	0:16 (0:14)	2874	25%	257	2874	4%	7%	15%	27%	46%	721	723	77%	77%	77%
[redacted]	195	0:09 (0:16)	2226	25%	195	2226	4%	7%	12%	24%	52%	553	484	71%	81%	76%
[redacted]	322	0:06 (0:12)	3506	33%	322	3506	5%	10%	16%	26%	43%	1163	1031	71%	80%	75%
[redacted]	54	0:19 (0:12)	557	32%	54	557	4%	13%	21%	27%	36%	177	177	73%	73%	73%
[redacted]	394	0:12 (0:12)	4088	35%	394	4088	5%	11%	16%	26%	42%	1437	1236	70%	81%	75%

[Details \(open>>\)](#)

## Zoom-in on Context Dependent Claim Detection (CDCD)

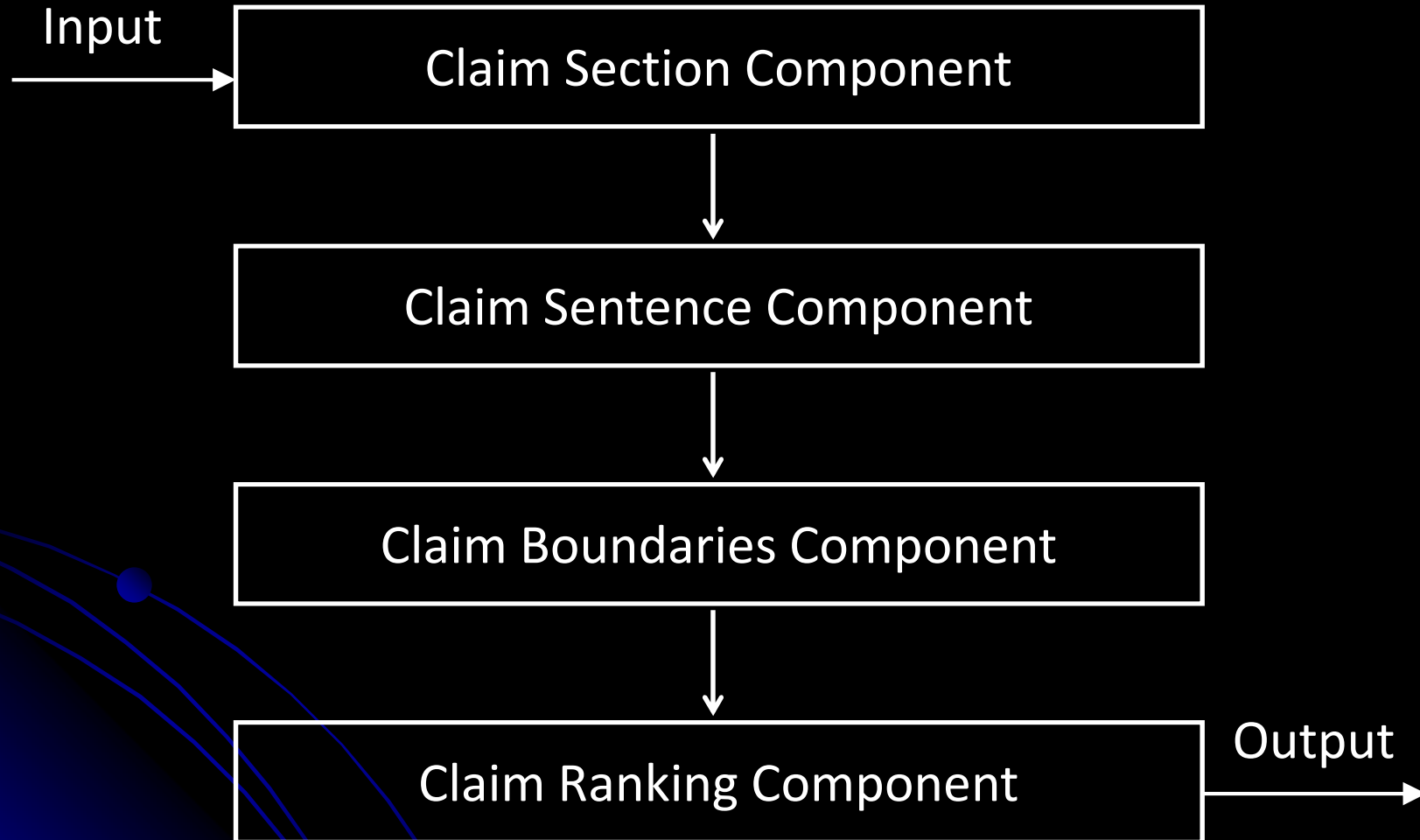
Levy, Bilu, Hershcovich, Aharoni, and Slonim, COLING 2014

**Goal – Given a Topic and a set of relevant free-text documents, automatically pinpoint Claims within these documents.**

### Challenges

- Highly skewed data – only ~2% of sentences include Claims
- Variance in the characteristics of articles associated with different topics
- Relevant articles will often include Claims for other – possibly related -- topics
- Relevant articles will often include related statements that are not Claims
- The distinction between a Claim and a non-Claim is often not a clear-cut

## CDCD – Inner Architecture





## CDCD Section Component - Example

### Topic: the sale of VVG to minors should be banned

#### Article – Video games controversies

#### Section – first section

Controversies over video games often center on topics such as video game graphic violence, sex and sexism, violent and gory scenes, partial or full nudity, portrayal of criminal behavior, racism, and other provocative and objectionable material.

Video games have been studied for links to addiction and aggression. Earlier meta-analyses (an analysis of several studies) were conflicting. A 2001 study found that exposure to violent video games causes at least a temporary increase in aggression and that this exposure correlates with aggression in the real world. A decrease in prosocial behavior (caring about the welfare and rights of others) was also noted [REF]. Another 2001 meta-analyses using similar methods[REF] and a more recent 2009 study focusing specifically on serious aggressive behavior[REF] concluded that video game violence is not related to serious aggressive behavior in real life.

Many potential positive effects have been proposed [REF]. Recent research has suggested that some violent video games may actually have a prosocial effect in some contexts, for example, team play [REF].

It has been argued there is generally a lack of quality studies which can be relied upon and that the video game industry has become an easy target for the media to blame for many modern day problems [REF]. The most recent large scale meta-analysis-- examining 130 studies with over 130,000 subjects worldwide-- concluded that exposure to violent video games causes both short term and long term aggression in players and decreases empathy and prosocial behavior. However, this meta-analysis was severely criticized in the same issue of the same journal for a number of methodological flaws, including failure to distinguish clinically valid from unstandardized aggression measures and for failing to solicit studies from researchers who have questioned whether causal links exist, thus biasing the sample of included studies [REF]

## Context Free Features

Context-free features - A Claim might be characterized by attributes unrelated to the Topic, for example -

- Phrases leading to a Claim (e.g., **argues that**)
- Phrases inside the Claim (e.g., **right to**)
- Sentiment words (e.g., **unethically**)
- Wiki information (e.g., **reference/citation**)
- More...

## Section Component Example cont. - Phrases leading to a Claim

### Article – Video games controversies

#### Section – first

Controversies over video games often center on topics such as video game graphic violence, sex and sexism, violent and gory scenes, partial or full nudity, portrayal of criminal behavior, racism, and other provocative and objectionable material.

Video games have been studied for links to addiction and aggression. Earlier meta-analyses (an analysis of several studies) were conflicting. A 2001 study **found that** exposure to violent video games causes at least a temporary increase in aggression and **that** this exposure correlates with aggression in the real world. A decrease in prosocial behavior (caring about the welfare and rights of others) was also noted [REF]. Another 2001 meta-analyses using similar methods[REF] and a more recent 2009 study focusing specifically on serious aggressive behavior[REF] **concluded that** video game violence is not related to serious aggressive behavior in real life.

Many potential positive effects have been proposed [REF]. Recent research has **suggested that** some violent video games may actually have a prosocial effect in some contexts, for example, team play [REF].

It has been **argued** there is generally a lack of quality studies which can be relied upon and **that** the video game industry has become an easy target for the media to blame for many modern day problems [REF]. The most recent large scale meta-analysis-- examining 130 studies with over 130,000 subjects worldwide-- **concluded that** exposure to violent video games causes both short term and long term aggression in players and decreases empathy and prosocial behavior. However, this meta-analysis was severely criticized in the same issue of the same journal for a number of methodological flaws, including failure to distinguish clinically valid from unstandardized aggression measures and for failing to solicit studies from researchers who have questioned whether causal links exist, thus biasing the sample of included studies [REF]

## Section Component Example cont. - Phrases inside a Claim

### Article – Video games controversies

#### Section – first

Controversies over video games often center on topics such as video game graphic violence, sex and sexism, violent and gory scenes, partial or full nudity, portrayal of criminal behavior, racism, and other provocative and objectionable material.

Video games have been studied for links to addiction and aggression. Earlier meta-analyses (an analysis of several studies) were conflicting. A 2001 study found that exposure to violent video games causes at least a temporary increase in aggression and that this exposure correlates with aggression in the real world. A decrease in prosocial behavior (caring about the welfare and rights of others) was also noted [REF]. Another 2001 meta-analyses using similar methods[REF] and a more recent 2009 study focusing specifically on serious aggressive behavior[REF] concluded that video game violence is not related to serious aggressive behavior in real life.

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## Section Component Example cont. – Sentiment words

### Article – Video games controversies

#### Section – first

**Controversies** over video games often center on topics such as video game graphic **violence**, sex and sexism, **violent** and gory scenes, partial or full nudity, portrayal of **criminal** behavior, **racism**, and other **provocative** and **objectionable** material.

Video games have been studied for links to addiction and **aggression**. Earlier meta-analyses (an analysis of several studies) were **conflicting**. A 2001 study found that exposure to **violent** video games causes at least temporary increase in **aggression** and that this exposure correlates with **aggression** in the real world. decrease in prosocial behavior (caring about the welfare and **rights** of others) was also noted [REF]. Another 2001 meta-analyses using similar methods[REF] and a more recent 2009 study focusing specifically on serious **aggressive** behavior[REF] concluded that video game **violence** is not related to serious **aggressive** behavior in real life.

Many potential **positive** effects have been proposed [REF]. Recent research has suggested that some **violent** video games may actually have a prosocial effect in some contexts, for example, team play [REF].

It has been argued there is generally a **lack** of quality studies which can be relied upon and that the video game industry has become an easy target for the media to **blame** for many modern day **problems** [REF]. The most recent large scale meta-analysis-- examining 130 studies with over 130,000 subjects worldwide— concluded that exposure to **violent** video games causes both short term and long term **aggression** in players and decreases **empathy** and prosocial behavior. However, this meta-analysis was severely **criticized** in the same issue of the same journal for a number of methodological **flaws**, including **failure** to distinguish clinically valid from unstandardized **aggression** measures and for **failing** to solicit studies from researchers who have questioned whether causal links exist, thus **biasing** the sample of included studies [REF]

## Section Component Example cont. – Wiki information

### Article – Video games controversies

#### Section – first

Controversies over video games often center on topics such as video game graphic violence, sex and sexism, violent and gory scenes, partial or full nudity, portrayal of criminal behavior, racism, and other provocative and objectionable material.

Video games have been studied for links to addiction and aggression. Earlier meta-analyses (an analysis of several studies) were conflicting. A 2001 study found that exposure to violent video games causes at least a temporary increase in aggression and that this exposure correlates with aggression in the real world. A decrease in prosocial behavior (caring about the welfare and rights of others) was also noted [REF]. Another 2001 meta-analyses using similar methods [REF] and a more recent 2009 study focusing specifically on serious aggressive behavior [REF] concluded that video game violence is not related to serious aggressive behavior in real life.

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## Context Dependent Features

Context features – features that measure the relatedness of the Claim candidate to the Topic

- Topic matches w/o WordNet expansions
- Cosine similarity w/o WordNet expansions
- Cosine similarity restricted to the subject of the candidate
- Cosine similarity restricted to candidate's noun phrases
- More...

## Section Component Example cont. – Topic matches

### Topic: the sale of VVG to minors should be banned

#### Article – Video games controversies

#### Section – first

Controversies over **video games** often center on topics such as **video game** graphic **violence**, sex and sexism, **violent** and gory scenes, partial or full nudity, portrayal of criminal behavior, racism, and other provocative and objectionable material.

**Video games** have been studied for links to addiction and aggression. Earlier meta-analyses (an analysis of several studies) were conflicting. A 2001 study found that exposure to **violent video games** causes at least a temporary increase in aggression and that this exposure correlates with aggression in the real world. A decrease in prosocial behavior (caring about the welfare and rights of others) was also noted [REF]. Another 2001 meta-analyses using similar methods[REF] and a more recent 2009 study focusing specifically on serious aggressive behavior[REF] concluded that **video game violence** is not related to serious aggressive behavior in real life.

Many potential positive effects have been proposed [REF]. Recent research has suggested that some **violent video games** may actually have a prosocial effect in some contexts, for example, team play [REF].

It has been argued there is generally a lack of quality studies which can be relied upon and that the **video game** industry has become an easy target for the media to blame for many modern day problems [REF]. The most recent large scale meta-analysis-- examining 130 studies with over 130,000 subjects worldwide-- concluded that exposure to **violent video games** causes both short term and long term aggression in players and decreases empathy and prosocial behavior. However, this meta-analysis was severely criticized in the same issue of the same journal for a number of methodological flaws, including failure to distinguish clinically valid from unstandardized aggression measures and for failing to solicit studies from researchers who have questioned whether causal links exist, thus biasing the sample of included studies [REF]



## Section Component Example cont. – Topic expansions

### Topic: the sale of VVG to minors should be banned

#### Article – Video games controversies

##### Section – first

Controversies over video games often center on topics such as video game graphic violence, sex and sexism, violent and gory scenes, partial or full nudity, portrayal of criminal behavior, racism, and other provocative and objectionable material.

Video games have been studied for links to addiction and **aggression**. Earlier meta-analyses (an analysis of several studies) were conflicting. A 2001 study found that exposure to violent video games causes at least a temporary increase in **aggression** and that this exposure correlates with **aggression** in the real world. A decrease in prosocial behavior (caring about the welfare and rights of others) was also noted [REF]. Another 2001 meta-analyses using similar methods[REF] and a more recent 2009 study focusing specifically on serious **aggressive** behavior[REF] concluded that video game violence is not related to serious **aggressive** behavior in real life.

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## Section Component Example – Putting it all together

### Topic: the sale of VVG to minors should be banned

#### Article – Video games controversies

##### Section – first

Controversies over video games often center on topics such as video game graphic violence, sex and sexism, violent and gory scenes, partial or full nudity, portrayal of criminal behavior, racism, and other provocative and objectionable material.

Video games have been studied for links to addiction and aggression. Earlier meta-analyses (an analysis of several studies) were conflicting. A 2001 study found that exposure to violent video games causes at least a temporary increase in aggression and that this exposure correlates with aggression in the real world. A decrease in prosocial behavior (caring about the welfare and rights of others) was also noted [REF]. Another 2001 meta-analyses using similar methods [REF] and a more recent 2009 study focusing specifically on serious aggressive behavior [REF] concluded that video game violence is not related to serious aggressive behavior in real life.

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## Claim Sentence Component - Example

**Topic: the sale of VVG to minors should be banned**

**Article – Video games controversies**

Recent research has suggested that some violent video games may actually have a prosocial effect in some contexts, for example, team play [REF].

## Claim Sentence Component - Example

**Topic: the sale of VVG to minors should be banned**

**Article – Video games controversies**

Recent research has suggested that some violent video games may actually have a prosocial effect in some contexts, for example, team play [REF].

## Combined features – work in progress

Combined features – features that combine context and context-free aspects

Sequential patterns – sequences of context and context-free indicators in close proximity  
(e.g. **[verb],[that, conjunction],[topic, noun]**)

## Combined features – cont.

### Article – Video games controversies

Recent research has **suggested** that some violent video games may actually have a prosocial effect in some contexts, for example, team play [REF].



Sequential Pattern:

**[verb]**

## Combined features – cont.

### Article – Video games controversies

Recent research has suggested that some violent video games may actually have a prosocial effect in some contexts, for example, team play [REF].

Sequential Pattern:

[verb] -> [that, conjunction]

## Combined features – cont.

### Article – Video games controversies

Recent research has suggested that some violent video games may actually have a prosocial effect in some contexts, for example, team play [REF].

Sequential Pattern:

[verb] -> [that, conjunction] -> [topic, noun]



## Results – Full Claim Detection task

- Leave one Topic out on 42 Topics
- 10 articles x 150 sentences x 200 sub-sentences → 300K candidates

	<b>Prec. @ 5</b>	<b>Prec. @ 10</b>	<b>Prec. @ 20</b>	<b>Prec. @ 50</b>
<b>mean</b>	0.24	0.21	0.16	0.12
<b>std</b>	0.21	0.20	0.11	0.07
<b>min</b>	0.00	0.00	0.00	0.00
<b>max</b>	0.80	0.60	0.50	0.32
<b>random</b>	0.0001	0.0001	0.0001	0.0001

## Results – Full CDCD task

- Leave one Topic out on 42 Topics
- 10 articles x 150 sentences x 200 sub-sentences → 300K candidates
- Restricting to Topics with  $\geq 20$  confirmed Claims

	Prec. @ 5	Prec. @ 10	Prec. @ 20	Prec. @ 50
mean	0.24 → 0.31	0.21 → 0.27	0.16 → 0.21	0.12
std	0.21	0.20	0.11	0.07
min	0.00	0.00	0.00	0.00
max	0.80	0.60	0.50	0.32
random	0.0001	0.0001	0.0001	0.0001

## An example – The Research Engine prototype

- **The Problem: given a topic, swiftly generate high quality content, allowing to take more informed decisions.**
- **An example – shall smoking be banned?**



## An example – The Research Engine prototype – cont.

Type in new topic

Shall smoking be banned?

Start Research!

**The Research Engine is an interactive system, powered by IBM debating technology, where human and machine are working together to swiftly generate personalized, high quality content...**

# An example – The Research Engine prototype – cont.

Related concepts and background | **Smoking should be banned** Prev Next

- Definition
- Smoking bans (or smoke-free laws) are public policies, including criminal laws and occupational safety and health regulations, that prohibit tobacco smoking in workplaces and other public spaces.
- Smoking is a practice in which a substance is burned and the resulting smoke breathed in to be tasted or inhaled. Most commonly the substance is the dried leaves of the tobacco plant which has been rolled into rice paper into a small, round cylinder called a "cigarette". This is primarily practiced as a route of administration for what has come to be termed "recreational drug use" because the combustion of the dried plant leaves releases active substances into the body.
- The history of smoking dates back to as early as 5026 BC in shamanistic rituals. With the arrivals of the Europeans in the 16th century, the consumption, cultivation, and trading of tobacco quickly spread.
- Smoking in China is prevalent, as China is the world's largest consumer and producer of tobacco:[REF] there are 350 million Chinese smokers,[REF] and China produces 42% of the world's cigarettes [REF]. The China National Tobacco Corporation is by sales the largest single manufacturer of tobacco products in the world and boasts a monopoly in Mainland China generating between 7 and 10% of government revenue [REF]. Within the Chinese guanxi system, tobacco is still a ubi
- Rel

**We are essentially modeling the content-generation process and providing the user most relevant content at the right timing – for example, relevant Background and Definitions...**

Go

## An example – The Research Engine prototype – cont.

Related concepts and background | **Smoking should be banned** Prev Next

- Definition
- Smoking bans (or smoke-free laws) are public policies, including criminal laws and occupational safety and health regulations, that prohibit tobacco smoking in workplaces and other public spaces.
- Smoking is a practice in which a substance is burned and the resulting smoke breathed in to be tasted or inhaled. Most commonly the substance is the dried leaves of the tobacco plant which has been rolled into rice paper into a small, round cylinder called a "cigarette". This is primarily practiced as a route of administration for what has come to be termed "recreational drug use" because the combustion of the dried plant leaves releases active substances into the body.
- The history of smoking dates back to as early as 5026 BC in shamanistic rituals. With the arrivals of the Europeans in the 16th century, the consumption, cultivation, and trading of tobacco quickly spread.
- Smoking in China is prevalent, as China is the world's largest consumer and producer of tobacco:[REF] there are 350 million Chinese smokers [REF] and China produces 42% of the world's cigarettes [REF]. The China National Tobacco Corporation is by far the largest producer of tobacco in the world. In China, tobacco is still a ubiquitous gift accepted by all.
- Religious views on smoking vary widely.

**The system constantly learns from a structured dialog with (millions of?) users...**

Go

# An example – The Research Engine prototype – cont.

Claims | Smoking should be banned Prev Next

Supporting Claims	Relevance	Opposing Claims	Relevance
<input checked="" type="checkbox"/> A true breakthrough came in 1948, when the British physiologist Richard Doll published the first major studies that proved that <b>smoking could cause serious health damage</b> [REF]. <span>Select</span>	<input type="checkbox"/>	<input checked="" type="checkbox"/> Some also argue that <b>smoking works to reduce the side effects of antipsychotics</b> .	<input type="checkbox"/>
<input type="checkbox"/> More recently, rabbinic responsa tend to argue that <b>smoking is prohibited as self-endangerment under Jewish law and that smoking in indoor spaces should be restricted as a type of damage to others</b> .	<input type="checkbox"/>	<input type="checkbox"/> The prominent scholar Yusuf al Qaradawi argues that <b>smoking is no longer an issue of dispute among Islamic scholars due to the knowledge of health risks</b> . <span>Ignore</span>	<input type="checkbox"/>
<input checked="" type="checkbox"/> However, the research in this area is limited and the results are conflicting; some studies show that <b>smoking increases the risk of Alzheimer's disease</b> .	<input type="checkbox"/>	<input checked="" type="checkbox"/> Though <b>smoking may help relieve symptoms of schizophrenia</b> , smoking also counteracts the effects of antipsychotic medication.	<input type="checkbox"/>
<input checked="" type="checkbox"/> Other research demonstrates that <b>premature death caused by smoking may redistribute Social Security income in unexpected ways that affect behavior and reduce the economic well-being of smokers and their dependents</b> [REF]. <span>Select</span>	<input type="checkbox"/>	<input type="checkbox"/> Some rulings suggest that <b>smoking is permitted insofar as it may enhance the fulfillment of one's (religiously-ordained) duties</b> .	<input type="checkbox"/>
<input checked="" type="checkbox"/> It is believed that <b>smoking increases the risk of these and other pulmonary and respiratory tract infections both through structural damage and through effects on the immune system</b> .	<input type="checkbox"/>	<input checked="" type="checkbox"/> It is argued that <b>smoking provides structure and activity, both of which may be lacking in the lives of those with serious mental illness</b> [REF].	<input type="checkbox"/>
<input type="checkbox"/> The socioeconomic/environmental hypothesis proposed that <b>smoking results because many people with schizophrenia are unemployed and inactive, so smoking relieves boredom</b> .	<input type="checkbox"/>	<input checked="" type="checkbox"/> The cognitive effects hypothesis suggests that <b>nicotine has positive effects on cognition, so smoking is used to improve neurocognitive dysfunction</b> [REF].	<input type="checkbox"/>
<input type="checkbox"/> There is some evidence for decreased rates of endometriosis in infertile smoking women,[REF] although other studies have found that <b>smoking increases the risk in infertile women</b> [REF].	<input type="checkbox"/>	<input checked="" type="checkbox"/> Nicotine increases release of dopamine, so it is hypothesized that <b>smoking helps correct dopamine deficiency</b> in the prefrontal cortex and thus relieve negative symptoms [REF]. <span>Select</span>	<input type="checkbox"/>
<input type="checkbox"/> One theory argues that <b>the beneficial effects of nicotine on negative symptoms outweigh possible exacerbation of positive symptoms</b> . <span>Flip</span>	<input type="checkbox"/>	<input checked="" type="checkbox"/> Following the observation that <b>smoking improves condition of people with schizophrenia</b> , in particular working memory deficit, nicotine patches had been proposed as a way to treat schizophrenia [REF].	<input type="checkbox"/>
<input checked="" type="checkbox"/> The causation model argues that <b>smoking is a primary influence on future drug use</b> ,[REF] with smoking and other drug use factors [REF].	<input type="checkbox"/>	<input checked="" type="checkbox"/> The rationale for smoking bans posits that <b>smoking is optional</b> , whereas breathing is not.	<input type="checkbox"/>

Relevant pro/con claims are instantly presented, and the user can personalize the output...

# An example – The Research Engine prototype – cont.

Evidence | Smoking should be banned Prev Next

<input type="checkbox"/> Supporting Evidence	Relevance	<input type="checkbox"/> Opposing Evidence	Relevance
<input checked="" type="checkbox"/> <b>Study</b> In 2009, the Public Health Law Research Program, a national program of the Robert Wood Johnson Foundation, published an evidence summarising the research assessing the effect of a specific law or policy on public health. They stated that "There is strong evidence supporting smoking bans and restrictions as effective public health interventions aimed at decreasing exposure to secondhand smoke." (1 related claim)		<input type="checkbox"/> The prominent scholar Yusuf al Qaradawi argues that smoking is no longer an issue of dispute among Islamic scholars due to the knowledge of health risks.	
<input checked="" type="checkbox"/> Smoking increases the risk of symptoms associated with Crohn's disease (a dose-dependent effect with use of greater than 15 cigarettes per day) [REF]. There is some evidence for decreased rates of endometriosis in infertile smoking women,[REF] although other studies have found that smoking increases the risk in infertile women [RFF]. There is little or no evidence of a protective effect in fertile women. (4 related claims)		<input checked="" type="checkbox"/> <b>Expert</b> The former British Secretary of State for Health John Reid claimed that res on smoking in public places may lead to more smoking at home (1 related claim)	
<input checked="" type="checkbox"/> <b>Event</b> In the US state of Indiana, the economic development agency include encourage cities and towns to adopt local smoking bans as a means of promoting job growth in communities. (1 related claim)		<input type="checkbox"/> In a study done by Jennifer O' Loughlin and her colleagues, the first smoking experiences of seventh-grade students were studied [REF]. They found out that the most common factor leading students to smoke is cigarette advertisements. (1 related claim)	
<input type="checkbox"/> There is some evidence for decreased rates of endometriosis in infertile smoking women,[REF] although other studies have found that smoking increases the risk in infertile women [REF]. (3 related claims)			

Prev Claim (1/4) Next

link to claim  pro evidence  con evidence

smoking could cause serious health damage

Go

Relevant pro/con evidence – of different types - are presented for the user to consider...



# An example – The Research Engine prototype – cont.

Evidence | Smoking should be banned Prev Next

<input type="checkbox"/> Supporting Evidence	Relevance	<input type="checkbox"/> Opposing Evidence	Relevance
<input checked="" type="checkbox"/> In 2009, the Public Health Law Research Program, a national program office of the Robert Wood Johnson Foundation, published an evidence brief summarising the research assessing the effect of a specific law or policy on public health. They stated that "There is strong evidence supporting smoking bans and restrictions as effective public health interventions aimed at decreasing exposure to secondhand smoke." (1 related claim)	<div style="width: 50%; background-color: #90EE90;"></div>	<input type="checkbox"/> The prominent scholar Yusuf al Qaradawi argues that smoking is no longer an issue of dispute among Islamic scholars due to the knowledge of health risks.	<div style="width: 10%; background-color: #90EE90;"></div>
<input checked="" type="checkbox"/> Smoking increases the risk of symptoms associated with Crohn's disease (a dose-dependent effect with use of greater than 15 cigarettes per day) [REF]. There is some evidence for decreased rates of endometriosis in infertile smoking women,[REF] although other studies have found that smoking increases the risk in infertile women [RFF]. There is little or no evidence of a protective effect in fertile women. (4 related claims)	<div style="width: 50%; background-color: #90EE90;"></div>	<input checked="" type="checkbox"/> The former British Secretary of State for Health John Reid claimed that restrictions upon smoking in public places may lead to more smoking at home [REF]. (1 related claim)	<div style="width: 20%; background-color: #90EE90;"></div>
<input checked="" type="checkbox"/> There is some evidence for decreased rates of endometriosis in infertile smoking women,[REF] although other studies have found that smoking increases the risk in infertile women [REF]. (3 related claims)	<div style="width: 50%; background-color: #90EE90;"></div>	<input type="checkbox"/> In a study done by Jennifer O' Loughlin and her colleagues, the first smoking experiences of seventh-grade students were studied [REF]. They found out that the most common factor leading students to smoke is cigarette advertisements. (1 related claim)	<div style="width: 10%; background-color: #90EE90;"></div>
<input checked="" type="checkbox"/> In the US state of Indiana, the economic development agency included in its 2006 plan for acceleration of economic growth encouragement for cities and towns to adopt local smoking bans as a means of promoting job growth in communities. (1 related claim)	<div style="width: 10%; background-color: #90EE90;"></div>	<input checked="" type="checkbox"/> In the US state of Indiana, the economic development agency included in its 2006 plan for acceleration of economic growth encouragement for cities and towns to adopt local smoking bans as a means of promoting job growth in communities. (1 related claim)	<div style="width: 10%; background-color: #90EE90;"></div>

Prev Next Go

**Claim (1/4)**

link to claim  pro evidence  con evidence

**smoking could cause serious health damage**

**Fine grain relations of evidence to a particular claim are highlighted...**

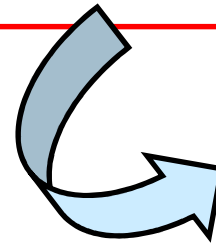
## An example – The Research Engine prototype – cont.

Type in new topic

Shall smoking be banned?

Start Research!

**In a couple of minutes, the user obtains high quality and personalized output, that can be instantly exported into various applications...**



Generate as PDF

Generate as PPT

Generate as ETTS

More...

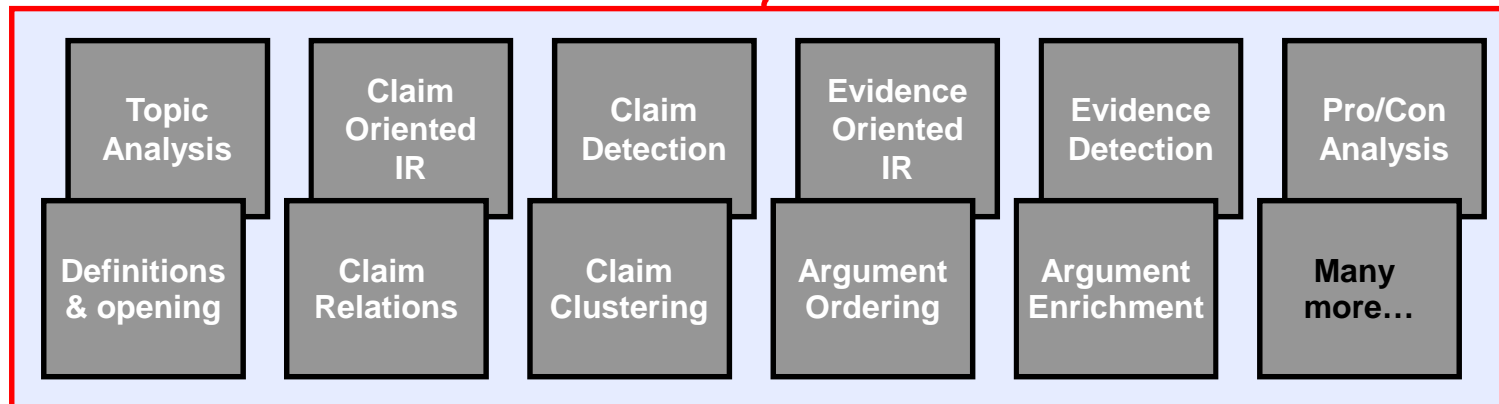
## An example – The Research Engine prototype – cont.

Type in new topic

Shall smoking be banned?

Start Research!

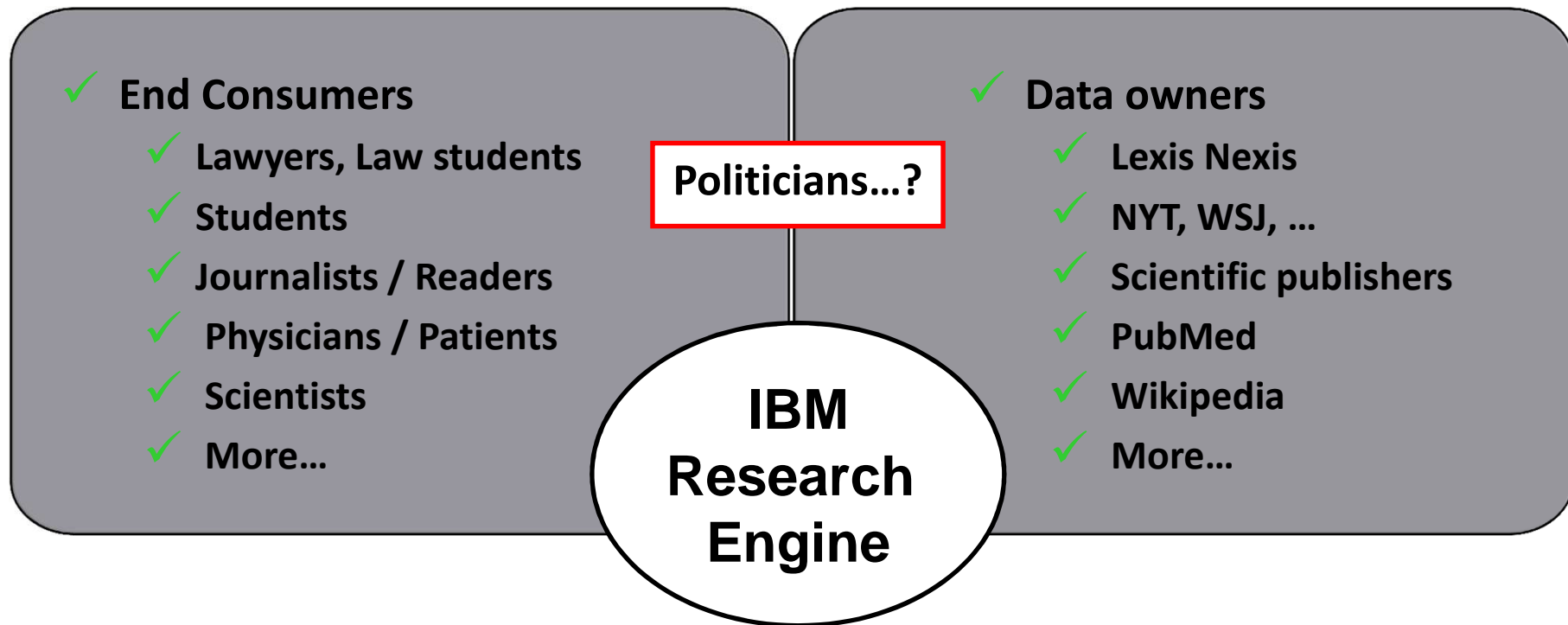
**Underlying Debating Technologies engines can be leveraged into real world applications of great practical value...**



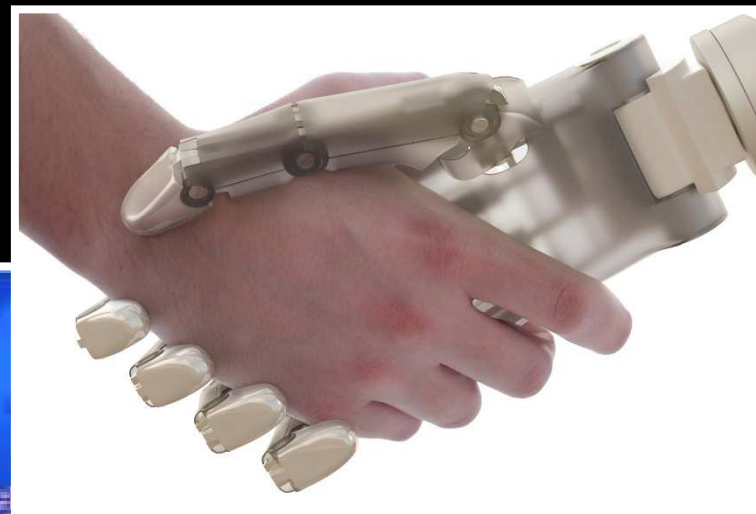
# An example – The Research Engine prototype

Type in new topic

**Target audience** Start Research!



# The Emergence of Cognitive Computing



2014 → ...



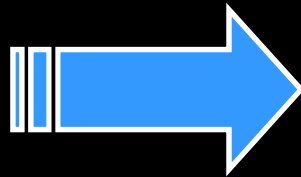
2011

1997

# IBM Debating Technologies Demo

Topic

+



Top Claim and Evidence predictions



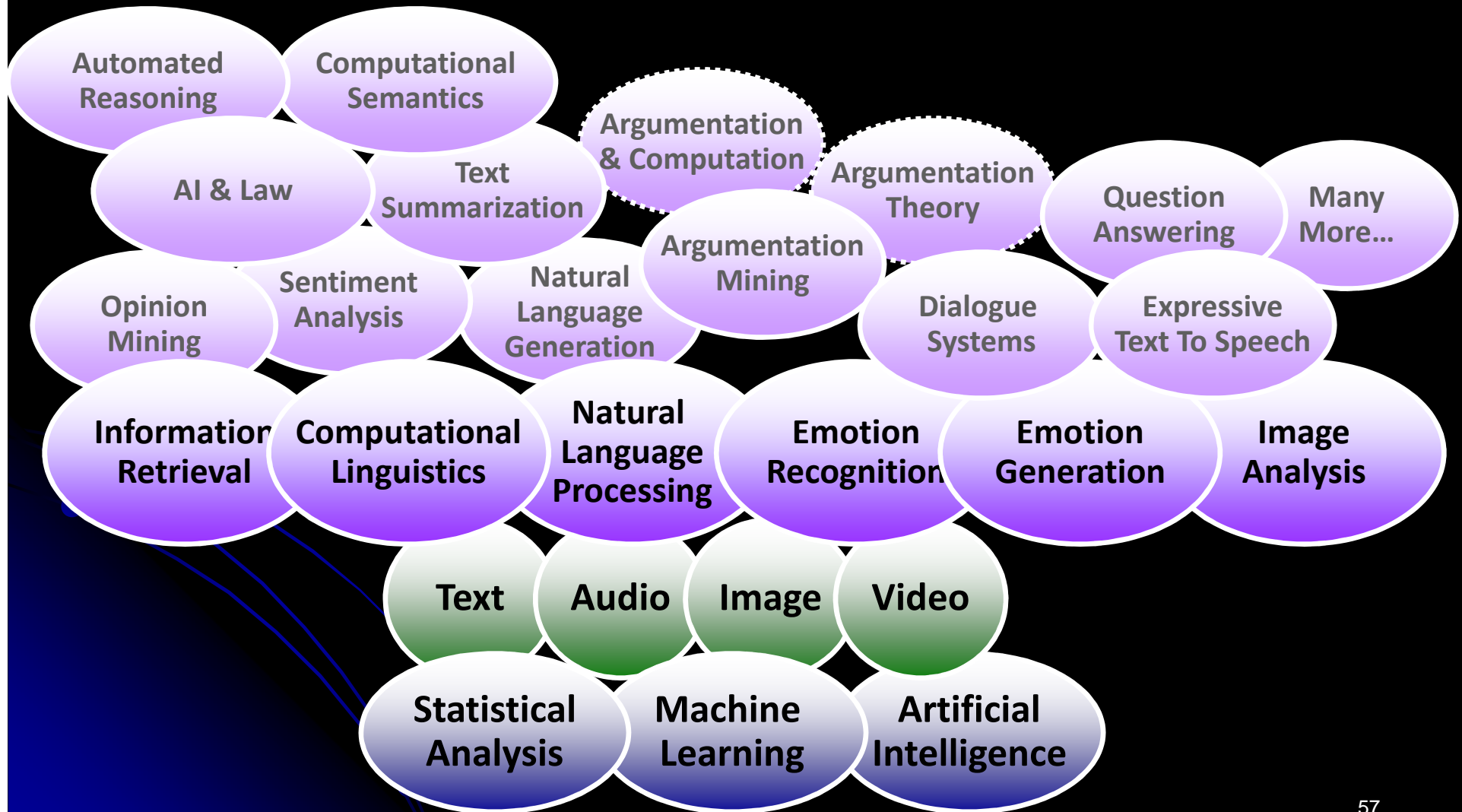
# IBM Debating Technologies Team



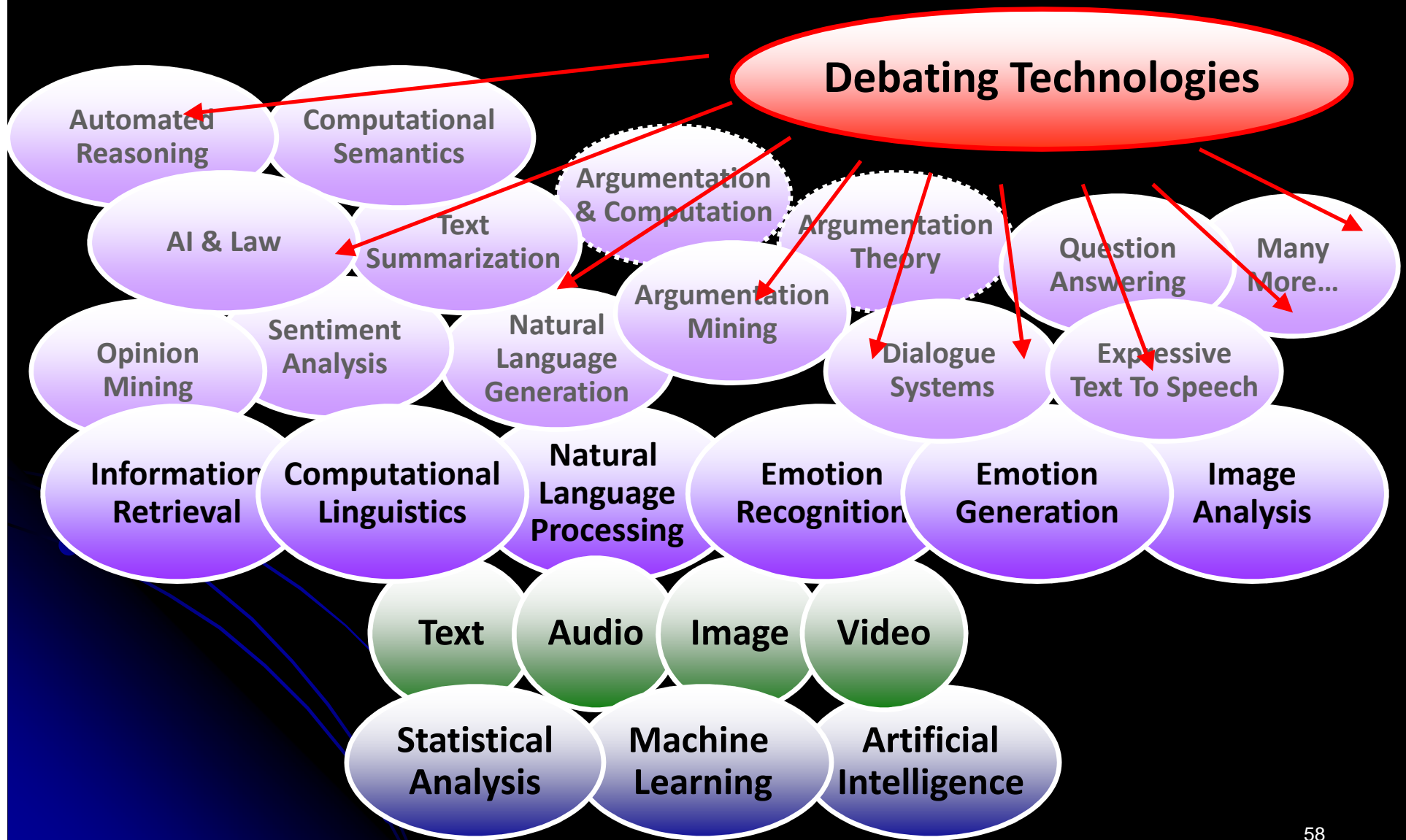
# Backup Slides



# Debating technologies – an emerging new discipline



# Debating technologies – computational technologies developed directly to enhance, support, and engage with human debating



## The US Drone Program should be supported – top 15 Claim predictions

Sept 5, 2014 – over Wikipedia-14

1. **drones are tactically savvy**
  2. **drones are more humane and more accurate than manned vehicles**
  3. **drones have inflicted real damage upon al Qaeda**
  4. **the drone attacks may be justified under the right to self-defense**
  5. **the drone attacks have addled and confused the Taliban**
  6. the US sends the faxes primarily to support legal justification for the drone attacks
  7. **existing journalistic ethics codes can apply to drones**
  8. **the method of attack is precise and effective**
  9. civilians won't be harmed
  10. **non-battlefield drone strikes are reconciled with broader foreign policy objectives**
1. **drone strikes encourage terrorism**
  2. Washington must clarify its policies behind extrajudicial and extraterritorial killings
  3. **civilian killings constitute a humanitarian tragedy and create dangerous political problems**
  4. the US government uses drones to kill selected members of al-Qaeda
  5. **The use of drones is not only a continual violation of our territorial integrity**

## Science refutes God – top 15 Claim predictions

Sept 5, 2014 – over Wikipedia-14

1. **creation science is religious rather than scientific because it stems from faith in a religious text rather than by the application of the scientific method**
  2. **natural selection should suffice as an explanation of biological complexity without recourse to divine provenance**
  3. such a god should not permit the existence of evil or suffering
  4. **reason is inevitably accompanied by doubt**
  5. **the use of biblical literalism in creation science is self-contradictory**
  6. such a god would do a better job of gathering believers
  7. **science alone can give us complete and reliable knowledge of reality**
  8. **belief in the existence of God may not be amenable to demonstration or refutation**
  9. **the burden of proof for the existence of God lies with the theist rather than the atheist**
1. **evolution is controversial**
  2. **evolutionary science must be wrong**
  3. **science and religion are not in conflict**
  4. a science can succeed only if it can fail
  5. **evolution is wrong**
  6. **evolution relies on faith**

# We should legalize drugs – top 15 Claim predictions

Sept 5, 2014 – over Wikipedia-14

1. **drug prohibition inevitably leads to police corruption**
  2. **prohibition of drugs creates many negative externalities like increased incarceration rates**
  3. **many illicit drugs pose comparatively fewer health dangers than certain legal drugs**
  4. **illegal drugs are "far more deadly than alcohol"**
  5. there is a distinction between hard and soft drugs
  6. **the War on Drugs has lowered the evidentiary burden required for a legal search of a suspect's dwelling or vehicle**
  7. **prohibitionist laws criminalize people for suffering from a disease and cause harm**
  8. A drug policy is a government's attempt to combat the negative effects of drug addiction and misuse in its society
  9. **most drug offenders are non-violent**
  10. addiction is defined as compulsive
  11. Drug laws are currently
  12. **drug use is a victimless crime and as such the government has no right to prohibit it or punish drug consumers**
- 
1. criminalizing drug use is draconian can be seen as overstatement
  2. **laws should penalize morally wrong or deviant behavior**
  3. delays in the approval process have cost lives

# We should abolish obesity – top 15 Claim predictions

Sept 5, 2014 – over Wikipedia-14

1. **Obesity is one of the leading preventable causes of death worldwide**
2. **Obesity can lead to social stigmatization and disadvantages in employment**
3. **Overweight and obesity are rising medical problems**
4. **Obese children often suffer from teasing by their peers**
5. **race itself may have an impact on the way obesity presents itself in individuals**
6. a 0.7 to 3.4% wage depression and obese women were expected to see a wage depression between 2.3 to 6.1%
7. **Obesity increases the risk of many physical and mental conditions**
8. **reducing obesity may improve the public's health**
9. **low metabolism is unlikely to cause obesity**
10. tackling childhood obesity will not necessarily lead to eating disorders later in life

1. **some obese people eat little yet gain weight due to a slow metabolism** is limited
2. Why these studies did not bring about the desired effect of curbing childhood obesity has been attributed to the interventions not being sufficient enough
3. the potential public health costs exceed the benefits of extending this anti-discrimination law to cover obesity
4. The effects of eating habits on childhood obesity are difficult to determine
5. **race may be a key indicator in determining disparities of obesity risk**

## We support gun control – top 15 Claim predictions

Sept 5, 2014 – over Wikipedia-14

1. **gun control laws are effective in reducing gun-related accidents and crime**
  2. the gaps in our knowledge on the efficacy of gun control policies are due primarily to inadequate data and not to weak research methods
  3. gun shows are a more likely choice for criminal gun trafficking operations
  4. **Proponents of gun control generally argue the dangers of widespread gun ownership**
  5. **the correlation between the presence of guns in the home and suicide and homicide of females is best explained as causal**
- 
1. **gun control leads to authoritarian regimes**
  2. **gun control laws are ineffective in reducing gun-related accidents and crime**
  3. the specific gun control measures proposed in the Columbine aftermath are largely irrelevant
  4. **gun ownership has no effect on violent crime**
  5. **gun control is not strictly a partisan issue**
  6. gun rights advocates disagree about the relationship between Nazi gun control and the Holocaust
  7. **civilian gun ownership is seen as a right or a privilege**
  8. **the rate of gun availability is associated with less gun violence**
  9. **One aspect of the gun control debate is the conflict between gun control laws and the right to rebel against unjust governments**
  10. **genocide is linked to gun control**

# We should prohibit genetically engineered babies– top 15 Claim predictions

Sept 5, 2014 – over Wikipedia-14

1. advanced science and technology bring as much risk of disaster as opportunity for progress
2. designer babies may have an important role as counter-acting an argued dysgenic trend
3. the products of genetic engineering may well ameliorate rather than exacerbate human inequality
4. eating genetically modified food is harmful
5. harmful changes could be missed
6. high technology development should be completely relinquished since it inevitably serves corporate interests with devastating consequences on society and the environment
7. every fetus has an inherent right to remain genetically unmodified
8. eating genetically modified food may be harmful
9. the cloning and germline genetic engineering of animals are error-prone and inherently disruptive of embryonic development
10. life would be experienced as meaningless if some human limitations are overcome with enhancement technologies
1. advanced technology is used responsibly
2. human enhancement is a positive value
3. conventional food is not risk-free
4. independent researchers have unfettered access to genetically modified products for testing
5. Genetic engineering has shown promise for treating certain forms of cancer