Hypermedia Discourse: Theory & Technology for the Pragmatic Web?

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web pragmatics?

the Pragmatic Web?

pragmatic webs?

“THE PRAGMATIC WEB CONFERENCE is a unique forum to envision and debate how the emerging social, semantic, multimedia Web mediates the ways in which we construct shared meaning. While there is much research and development into topics relevant to this challenge such as collaboration, usability, knowledge representation, and social informatics, the Pragmatic Web conference provides common ground for dialogue at the nexus of these topics.”
What is the interest in the “Pragmatic Web”? 

CONTEXT
When contexts change, meanings change in conversations, documents, and models of the world. How does this shape our use for formal semantics on the Web?

CONVERSATION
This is how trust is built, and things get done. How do we do this fluently over the web?

COMMITMENT / ACTION
How do we support the expression, and coordination, of commitments over the Web?
Pragmatic Web research challenges

—from the ICPW’07 CfP: www.PragmaticWeb.info

- How can we better understand the usefulness, and limitations, of a concept such as "Web Pragmatics”

- What pragmatic design principles improve websites where trust and commitment to action are central?

- What are the tradeoffs for users of more structured Web collaboration media? (e.g. in learnability, scaleability, intelligibility)

- How can participatory work practices and collaboration tools be orchestrated in the design of the standards, data models and ontologies that underpin data-driven Web applications?
Pragmatic Web research challenges

- What role does pragmatics play in the design of personalised information and personalised actions channelled through the Web?

- What impact (intended or unintended, productive or disruptive) do different levels of computational infrastructure have on Web pragmatics?

- How can we clarify our understandings of increasingly important concepts on the Web such as "social ties", "metadata", "knowledge representation", and "transaction"?

- If "context" is pivotal in making human interaction meaningful, how can we take context into account to improve Web applications?
The essence of this talk:

- Web
- Pragmatics
- Hypermedia
- Discourse
The essence of this talk:

Web

Pragmatics

Hypermedia

Discourse

:-)
Modelling ~ Discourse

The discourse of modelling:

How can we support the discourse that drives the development and contextualisation of the models underpinning interactive systems?

Modelling discourse:

Can we usefully model (structure) sensemaking discourse, without in the process obstructing it?
Discourse

- Verbal and written workplace communication
- Discourse communities: “making and taking perspectives”
- Dialogue
- Argumentation
- Claim making
- Analytical narrative
- Meetings
Hypermedia

- Modelling *discourse relations*
- Expressing *different perspectives* on a conceptual space
- Supporting the *incremental formalization* of ideas
- Rendering *structural visualizations*
- Connecting *heterogeneous content*
Characteristics of Hypermedia Discourse

- Discourse Ontology
- Notation(s)
- Intuitive User Interface
- Computational Services
- Literacy/Fluency
2 examples of Hypermedia Discourse
approach and tool support

Compendium

• personal or group
  concept mapping
• real time meeting capture
• participatory modelling
• discourse as semantic hypertext

Scholarly Ontologies Project

• Web publishing of scholarly claims and argumentation
• discourse as semantic hypertext
Compendium

- personal or group concept mapping
- real time meeting capture
- participatory modelling
- discourse as semantic hypertext
Key elements of Compendium

Knowledge Media

- Shared visual display
- Simple notation
- Template patterns
- Node transclusions
- Tagging
- Hypermedia
- Interoperability with other data, services and user interfaces

Modelling Frameworks

e.g.
- IBIS
- CommonKADS
- World Modelling
- Critical Systems Heuristics

Practitioner skills

e.g.
- Cognitive skills to chunk and link ideas (Buckingham Shum)
- Dialogue Mapping (Conklin)
- Conversational Modelling (Sierhuis & Selvin)
- Participatory Hypermedia Construction (Selvin)
Discourse grounded in Horst Rittel’s IBIS: Issue-Based Information System

```
     Issue
      ▼
generalises, specialises, replaces, questions
        ▼
      Issue
        ▼
    questions
  ▼  questions
Position  ▼  Argument
  ▼  responds to
  ▼  supports
```

is-suggested-by
Compendium: hypertext discourse mapping/conceptual modelling

This is an ISSUE. It could be driven by a methodology, or captured as it arises in a discussion.

This is an OPTION which responds to an Issue. The asterisk shows there is detail text inside the node.

Make an OPTION into a DECISION node to show commitment.

Use a CON to express a challenging argument.

Use an ARGUMENT to express an argument more formally as criterion to be satisfied, and which might have supporting, challenging or neutral relations to other nodes (e.g. "Cost").

Use a PRO to express a supporting argument.

MAPS contain other nodes, and show the network structure --

LISTS also contain other nodes, but display them in a list/table

This is a NOTE for misc. comments.
MAPS contain other nodes, and show the network structure -- such as this example.

LISTS also contain other nodes, but display them in a list/table.

This is a NOTE for misc. comments.

REFERENCES link to external documents; double-click to launch, e.g....

REFERENCE to a website

REFERENCE to a PowerPoint file

REFERENCE to an Acrobat PDF file

REFERENCE to a movie file
Structure management in Compendium

- **Associative linking**
  nodes in a shared context connected by graphical Map links

- **Categorical membership**
  nodes in different contexts connected by common attributes via metadata Tags

- **Hypertextual Transclusion**
  reuse of the same node in different views

- **Templates**
  reuse of the same structure in different views

- **HTML, XML and RDF data exports for interoperability**

- **Java and SQL interfaces to add services**
Compendium as the technical and intellectual 'glue'

Advanced Knowledge Technologies project: www.aktors.org
Compendium as sensemaking hub for emergency response semantic web tools

Advanced Knowledge Technologies project: www.aktors.org
Modelling using Issue-templates
Modelling organisational processes in Compendium using a Template
Completing a Compendium template
Collaborative Ontology Design and Merging with Compendium

Setup for collaborative ontology design and rationale capture
Result of initial requirements discussion

Example queries/inferences to support?

- what technologies has this group developed?
- what methods are relevant to K-Capture?
- what are this group's latest publications?
- what methods were presented at this event?
- What knowledge assets do Soton have?
- who works on K-Maintenance?
- Show me knowledge assets in this research area

AKTive Portal – KMi 23.11.01 – internal discussion
Dialogue Mapping informal discussion

Should a Document be a Publication?

No

KMi – doc is top level object then specialised

subtype in KMi

Sep class in Soton – doc has been through a pub/review process

InfoBearingObject with subclasses doc and pub?

classes should reflect important concepts even if overlapping

not good to have published_in as a slot -- minimal ontological commitment -- only have the essential slots in an object. Better to create a subtype. Enrico

Should subclasses overlap? (this much??)
‘Home window’ of the emerging ontology, linking to design discussions
Template-driven Conversational Modelling of ontology class/slot structure
Using Compendium for personnel recovery planning

Co-OPR Project (with Austin Tate):
http://www.aiai.ed.ac.uk/project/co-opr
Co-OPR – Sample Screens

Left screen: Compendium intelligence database and discussion/rationale capture.

Middle screen: I-X Process Panels showing current state of plan execution and situation map

Right screen: I-X Process Panels communicating with the external world, e.g. Isolated Personnel
Co-OPR: Operational Sensemaking

Operational Sensemaking support for JPRC

- Situation analysis
- COA generation
- COA comparison/evaluation
- COA refinement

Other Tools + Detailed Planning
PR Doctrine for Situation Analysis
extracted as an Issue Template

Link to the source doctrine document

CALICS Situation Analysis

Joint Doctrine for Personnel Recovery, (Draft 2, 10 July 2004).pdf

Issues that require attention (as specified in the doctrine document)

- COMMUNICATION: Are HRI personnel using agreed communications procedures, and are they updated in a timely manner?
- AUTHENTICATION: Can we confidently identify the IP and assess whether they are under duress?
- LOCATION: What is the IP Location/Course?
- INTENTIONS: Are the IP intentions known?
- CONDITION: IP Physical Condition?
- SITUATION: (e.g., adversary activity, OPSEC concerns, and terrain)

Relevant extract from doctrine publication inside the node for reference
**Completed Issue Template** (1/2)

**CALICO Situation Analysis**

1. **COMMUNICATION**: Are HRI personnel using agreed communications procedures, and are they updated in a timely manner?  
   - Responds to: JFR Comms protocol 3.1

2. **AUTHENTICATION**: Can we confidently identify the IP and assess whether they are under duress?  
   - Responds to: IPs are in satellite phone contact plus text messaging

3. **LOCATION**: What is the IP Location/Course?  
   - Responds to: UNESCO Team Members
   - Latitude: 39.379829°  
   - Longitude: 122.675332°

4. **INTENTIONS**: Are the IP intentions known?  
   - Responds to: IPs have been sent (via the satphone) the UNESCO code ER6 signalling that a rescue attempt will be made

5. **CONDITION**: IP Physical Condition?  
   - Responds to: All IPs physically sound
Compendium knowledge elements (nodes) can be overlaid on any image, and can point to any media file.
Example ONA database maps

- Maps of multimedia data from the ONA db

Response Mechanism

Force data converted to Issue template by drag+drop from Excel spreadsheet
Imported database on Blue Forces
Sensemaking workflow: Links start from JTFC Briefing, to use of ONA database, to initial COA exploration, to worksheet analysis, to a COA Comparison worksheet for final briefing back to JTFC
Issue Templates for JTFC Briefing

- The JTFC’s Briefing is captured in a set of issue templates
- For each category (menu item on left) there are a number of issues awaiting answers
JTFC Briefing: Intent template

Answers to template issues provided in the JTFC Briefing. Answers may be constrained by predefined options, as specified in the XML schema.
Following distribution of the Crisis Action Planning process which was to be followed, a CAP template was created at short notice to support the process.
COA Wargame Analysis Worksheet

Links to the Situation Analysis and COA Comparison worksheet

Key Issues from PR Doctrine are listed here

Constraints raised by the JTFC are ‘docked’ here as visual reminders

Actors

Rows for recording critical events which provoke discussion
The high level Issues can be expanded if required to see the sub-Issues raised by PR doctrine.
The discussion map ‘behind’ the cell is then built on the fly.

An argument map is dragged from the template when some aspect of the COA provokes discussion.

Input from PMESII analysts integrated into the discussion map.
COA-2.1 Wargaming Worksheet (2/2)

Dialogue Map capturing the planners’ discussion of this option
# COA Comparison Worksheet

## Summary of how COAs trade off against each other

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<td>5</td>
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<td></td>
</tr>
<tr>
<td>4</td>
<td>The tool helped me to identify potential COAs</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The tool enabled me to explore the consequences of different options</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>The tool made me aware of consequences I hadn’t thought of</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>The tool helped me choose a COA</td>
<td></td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>This tool would help JTF CMDs &amp; Staff and should be further developed</td>
<td></td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Evaluation ratings from six members of the planning cell who were supported by Co-OPR tools in the personnel recovery simulation. (Numbers indicate the number of planners assigning the rating.)
**Independent evaluation of Co-OPR**

<table>
<thead>
<tr>
<th>Which Features did you like best?</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-X planning feature allows for drill down into specifics of the COA</td>
</tr>
<tr>
<td><strong>[Compendium’s] graphic representation, organization, COA comparison information</strong></td>
</tr>
</tbody>
</table>

**List features you would add to the tool:**

- Expand the I-X tool to include response activities beyond Military operations, such as Diplomatic, Informational, and Economic.

**Automatic input feeds [to Compendium].**

**List Features you would remove from the tool:**

- Limit the operational planning level of the [I-X] tool – too detailed.
- Change some [Map View] icons [in I-X].

**Comments:**

Good [I-X] tool, ability to develop a COA, prompting for choices, and sequencing advice were outstanding.

*In the subsequent vignette of the scenario (in which Co-OPR was not due to participate) Compendium was requested to replace (the usual) PowerPoint as the information management tool.*
Large scale NASA e-science field trials:

Interoperability with other databases, software agents and collaboration tools

NASA e-science field trials (2004 and 2005)

Distributed Mars-Earth planning and data analysis tools for Mars Habitat field trial in Utah desert, supported from US+UK
Collaboration Configuration

Compendium used as a collaboration medium at all intersections: *humans+agents, reading+writing* maps
NASA testbed:
Compendium activity plans for surface exploration, constructed by scientists on 'Earth', interpreted by software agents on 'Mars'

The Compendium nodes and relationships in this plan were interpreted by Brahms software agents for monitoring and coordinating astronaut and robot activity during surface explorations.
CoAKTinG NASA testbed: Compendium science data map, generated by software agents, for interpretation by Mars+Earth scientists

The Compendium maps were autonomously created and populated with science data by Brahms software agents that use models of the mission plan, work process, data flow and science data relationships to create the maps.
CoAKTinG NASA testbed: Compendium-based photo analysis by *geologists* on ‘Mars’
NASA testbed: Compendium scientific feedback map from Earth scientists to Mars colleagues

This photo is very good - links Outcrop to the Rock perspective, and we are excited to incorporate it into the methodology :)

Each sample should have an in situ Rock Perspective

(In Abby's map) Which of these 4 samples came from the rock perspective photo in Brent's map?

No, Abby's samples are from the same unit as Brent's rock hammer, but not from this exact area in the photograph

This is my bad for not being clear that the sample that I took here is the broken fragments of the sandstone to the left side of the hammer, the arrow is not pointing to anything particular nor is this a photo of the location that Abby took

Not a good photo - sampling area is cut off

Do we have these photos available?

Not for these 4 images

To be clear these 4 images are all from the same sample
Importing an Argumentation Scheme as an IBIS template

compendium.open.ac.uk/openlearn
Importing an Argumentation Scheme as an IBIS template
Using Compendium to map and automatically index replayable video conferences

CoAKTinG Project: www.aktors.org/coakting

Memetic Project: www.memetic-vre.net
Collaborative sensemaking in e-Science: Meeting Replay tool for Earth scientists, synchronising video of Mars crew’s discussion as they annotate their mission plans.
Memetic Meeting Replay
The CoAKTinG project’s results are now mainstreamed in the Access Grid by the JISC Memetic VRE project
Compendium ‘literacy’?

...understanding how to write, read, talk and think in hypermedia IBIS

...approaches from consultancy in the field, and video analysis in the lab...
Literacy: significant user community

www.CompendiumInstitute.org
Literacy: Cognitive task analysis

- Cognitive tasks involved in using a graphical argumentation scheme (Buckingham Shum 1996)

- Affordances of graphical DR for coordinating group design (Buckingham Shum et al 1997)
Literacy: the craft skill of IBIS mapping in meetings: “Dialogue Mapping”

Jeff Conklin: CogNexus Institute: www.CogNexus.org
Literacy: expertise analysis
(Albert Selvin)

- What is the nature of expert human performance in creating and modifying real time conceptual structures for groups?

- The NASA knowledge mapper role:
  - Listening and interpreting
  - Intervening in ‘normal’ conversation flow
  - Getting validation for captured material

- Building hypertext representations on the fly
- Interrelating data and objects
- Adding metadata
- Software-specific skills

Aesthetic and Ethical Implications of Participatory Hypermedia Practice: First Year Report
Selvin, A. (2005), Technical Report KMI-05-17, Knowledge Media Institute, Open University, UK
Practitioner stances

- The position of the practitioner with regard to the current activity:
  - Knowledge Navigator
  - Facilitator
  - Participant
  - Technical Expert
  - Editor
Will scientific publishing in 2020 still depend solely on the reading, writing, and discovery of written texts?

What might a more network-centric complement look like?

Scholarly Ontologies Project

- Web publishing of scholarly claims and argumentation
- Discourse as semantic hypertext
In Gutenberg’s shadow
(or standing on his shoulders)

Newspapers + Invisible Colleges = Scholarly Journals

Le Journal des Scavans
January 1665

Philosophical Transactions of the Royal Society of London
March 1665
What if we could get search results like this... 
"What is the Turing Debate?"
Can Physical Symbol Systems Think
The History and Status of the Debate — Map 3 of 7

Start Here

1. Alan Turing, 1950
   Yes, machines can (or will be able to) think. A computational system can possess all important elements of human thinking or understanding.

Can the elements of thinking be represented in discrete symbolic form?

Is the relation between hardware and software similar to that between human brains and minds?

Can physical symbol systems learn as humans do?

MacroVU Press, www.macrovu.com
Going beyond citations...

People try to maximise their rate of gaining information.

Web User Flow by Information Scent (WUFIS)

Information scent models

Information foraging theory

"The Scent of a Site: A System for Analyzing and Predicting Information Scent, Usage, and Usability of a Web Site"

"Information foraging"
Combining formal relations with the expressive freedom of ‘folksonomies’
Relational classes and dialects (KMi Scholarly Ontologies project)
If we model concepts in a literature as concept maps... (KMi’s ClaiMapper, built on Compendium)
“Semantic del.icio.us”: KMi’s ClaimSpotter assigning and linking freeform tags

INTRODUCTION

The Semantic Web can be described as a substrate to support advanced functions for collaboration (human-human, computer-human, computer-computer), sharing of Web resources, and reasoning about their content. The markup languages that are being proposed for the Semantic Web will be the basis to develop reasoners, proof checking and derivation tools, and many other functions such as Web services. The Semantic Web will also be the basis for the Web of Trust, which will provide mechanisms to handle authentication, permission, and validation of attribution in a Web where, by design, anyone can contribute content, links, and services.

A lot of current emphasis on the Web of Trust is in accessing resources, specifically authentication and permission issues. Digital signatures and public keys support authentication. Proofs are another important technology in the Web of Trust, since permission schemes are often described with rules and statements (e.g., anyone working for company C should be allowed to access D) and will need to rely on proofs that can reason about the rules and conclude whether access should be granted. An important issue with respect to both authentication and permission checking is that a document can be attributed to the source specified. For example, if Joe Doe writes an article and publishes it claiming Henry Kissinger as the author, it should be possible to check the truth about the document’s authorship.

“Semantic Google Scholar”
KMi’s ClaimFinder

machine learning

Perspective in contrast agree

Neural network text categorizer
Depth 10 Lineage

machine learning
Depth 10 Descendants
When multiple analysts annotate web documents via a server, they can generate a shared view of how they see the field, and where they agree/disagree.
“What papers contrast with this paper?”

1. Extract concepts for this document
2. Trace concepts on which they build
3. Trace concepts challenging this set
4. Show root documents

<table>
<thead>
<tr>
<th>The key issues you are concerned with:</th>
</tr>
</thead>
<tbody>
<tr>
<td>445</td>
</tr>
<tr>
<td>446</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The related issues you may be concerned with:</th>
</tr>
</thead>
<tbody>
<tr>
<td>446</td>
</tr>
<tr>
<td>515</td>
</tr>
<tr>
<td>511</td>
</tr>
<tr>
<td>277</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The following claims disagree ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimised rules outperform Naive Bayes and decision trees</td>
</tr>
</tbody>
</table>
# Focusing on a concept
incoming+outgoing links

<table>
<thead>
<tr>
<th>Left Neighbouring Concepts</th>
<th>Inward Link</th>
<th>Focal Concepts</th>
<th>Outward Link</th>
<th>Right Neighbouring Concepts</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESC learner improves on the performance of other rule learners</td>
<td>shares issues with</td>
<td>Optimised rules outperform Naive Bayes and decision trees</td>
<td>uses/applies/is enabled by</td>
<td>Bayesian learning</td>
</tr>
<tr>
<td>Rules made with CHARADE outperform Naive Bayes and decision trees</td>
<td>is analogous to</td>
<td></td>
<td>uses/applies/is enabled by</td>
<td>Rule learning</td>
</tr>
<tr>
<td>CDM performs moderately better than Naive Bayes and decision trees</td>
<td>shares issues with</td>
<td></td>
<td>is consistent with</td>
<td>Naive Bayes underperforms other classifiers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>disagrees with</td>
<td>decision trees and naive Bayes perform well for text categorization</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>part of</td>
<td>Advantages of rules for text categorization</td>
</tr>
</tbody>
</table>
“Semantic Google Scholar”
KMi’s ClaimFinder

search for:
machine learning
Perspective in contrast agree

search for:
Neural network text categorizer
Depth 10 Lineage

search for:
machine learning
Depth 10 Descendants

About - ClaiMaker - Problems - Help
Lineage tree (the roots of a concept)

2D spatial visualization of topics in database collections

- uses-applies-isEnabledBy
  - Probabilistic LSI
    - improvesOn
      - Latent Semantic Indexing (LSI)
        - uses-applies-isEnabledBy
          - Singular value decomposition (SVD)

EM Algorithm (Expectation Maximisation)

- isIdenticalTo
  - Expectation Maximisation (EM) algorithm
    - solves
      - Algorithm to probabilistically label documents
        - solves
          - Labeled training data is expensive
Indicators of ClaiMaker literacy?

expert user makes more extensive use of Claimaker’s semantic structures in interrogating the network than novices

Figure 19: Breakdown of search actions by type (totals for Claim Network)

Figure 20: Breakdown of expert user search actions

Some answers to our questions...

The discourse of modelling:

Compendium+IBIS can support many forms of discourse and rationale capture throughout the design lifecycle, from early requirements through to maintenance.

Modelling discourse:

It is possible to co-evolve discourse schemes, tools and literacy to mediate sensemaking discourse. Strong evidence for Compendium, emerging evidence for ClaiMaker.
Hypermedia Discourse tools:

- Discourse Ontology
- Notation(s)
- Intuitive User Interface
- Computational Services
- Literacy/Fluency
Common Ground between Pragmatic Web and Hypermedia Discourse perspectives

- 
  - Discourse Ontology
  - supporting human-human & human-agent communication
  - Intuitive User Interface
  - Empowering stakeholders to negotiate meaning
  - Computational Services
    - augmenting collective sensemaking
  - Literacy/Fluency
    - co-evolving new skillsets with new tools

- negotiating meaning
Ongoing work...
Social bookmarking as semiosis

Fig. 1. The components of a sign system.

Annotation as semiosis in the Scholarly Ontologies project

Fig. 4. Semiotic analysis of a ClaiMaker’s primary claim.

Making primary and secondary claims as semiotic and discourse moves

Figure 5. An example of different and even contradictory claims anchored in the same sources (referents).

Combining formal relations with the expressive freedom of ‘folksonomies’
Relational classes and dialects (KMi Scholarly Ontologies project)
Using CCR-based Coherence Patterns to detect candidate “schools of thought”
Doctoral work by Neil Benn, KMi

Contemporary philosophical literature contains two kinds of arguments concerning the morality of abortion. One family of arguments (see the following three sections) relates to the moral status of the fetus—the question of whether the fetus has a right to life, is the sort of being it would be seriously wrong to kill, or in other words is a ‘person’ in the moral sense. An affirmative answer would support claim (1) in the central pro-life argument, while a negative answer would support claim (2) in the central pro-choice argument.

Another family of arguments (see the section on Thomson, below) relates to bodily rights—the question of whether the woman’s bodily rights justify abortion even if the fetus has a right to life. A negative answer would support claim (2) in the central pro-life argument, while an affirmative answer would support claim (2) in the central pro-choice argument.
Using CCR-based Coherence Patterns to detect candidate “schools of thought”

Doctoral work by Neil Benn, KMi
Using CCR-based Coherence Patterns to detect candidate “schools of thought”

Doctoral work by Neil Benn, KMi

Code Listing 6-4 - This code listing shows the representation of the expanded argumentation in the debate.

(def-instance AD_ISS10 Issue
  ((display-text "Is the fetus a person in the moral sense?")))  

(def-instance AD_P13 Proposition
  ((display-text "Yes the fetus is a person in the moral sense")))  

(def-instance AD_P14 Proposition
  ((display-text "No the fetus is not a person in the moral sense")))

(def-relation-instances
  (addresses AD_P13 AD_ISS10)
  (addresses AD_P14 AD_ISS10)
  (disputes AD_P13 AD_P14)
  (disputes AD_P14 AD_P13)
  (supports AD_P13 AD_P7)
  (supports AD_P14 AD_P11))

(def-instance AD_ISS11 Issue
  ((display-text "Do a woman's bodily rights justify abortion even if the fetus has a right to life?")))  

(def-instance AD_P15 Proposition
  ((display-text "No, a woman's bodily rights do not justify abortion even if the fetus has a right to life")))  

(def-instance AD_P16 Proposition
  ((display-text "Yes, a woman's bodily rights justify abortion even if the fetus has a right to life")))

(def-relation-instances
  (addresses AD_P15 AD_ISS11)
  (addresses AD_P16 AD_ISS11)
  (disputes AD_P15 AD_P16)
  (disputes AD_P16 AD_P15)
  (supports AD_P15 AD_P8)
  (supports AD_P16 AD_P11))
Using CCR-based Coherence Patterns to detect candidate “schools of thought”

Doctoral work by Neil Benn, KMi
Hypermedia Discourse Project:
http://kmi.open.ac.uk/projects/hyperdiscourse