New Information in WikiTalk – Story Telling for Information Presentation

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Structure of the Talk

Practise

1. WikiTalk Open-Domain Dialogues

Theory

2. Dialogue Coherence and Information Structure
3. Constructive Dialogue Modelling

Future

4. Multimodal Discourse Structure Marking

Structure of the Talk

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Background

- Discourse outside the sentence and outside the text, to the three-dimensional world: situated dialogues
- Human-human communication, human-robot interactions

Video about WikiTalk

Open-Domain Dialogues

- Example: Talking about Shakespeare
  - Using information from the web
  - Wikipedia articles on any topic
- If the topic can be identified:
  - Get Wikipedia article about Shakespeare
  - Start reading out the first paragraph
- Questions:
  - How to continue the conversation?
  - How to switch topics?

Structure of the Talk

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Discourse vs. information structure: terminology

- Theme vs. Rheme
- Topic vs. Comment
- Topic vs. Focus
- Ground vs. Focus
- Presuppostion vs. Focus
- Background vs. Focus
- Contextually bound vs. nonbound
- Given vs. New

Relations and developments, see Steedman and Kruijff-Korbayová 2001

Coherence

Grosz & Sidner (1986)

- Global coherence:
  - Constrains the whole dialogue structure
  - Discourse segment purposes: dominance hierarchy, satisfaction precedence
- Local coherence:
  - Speaker's center of attention shifts over two consecutive utterances
  - Centering: anaphoric references (Grosz, Joshi & Weinstein 1983,1995; Walker et al. 1994; Strube & Hahn 1999)

Coherence and more…

- Coherence relations
  - RST (Mann & Thompson 1988)
  - Discourse relations (PDTB, Prasad et al. 2008)
- Coherence is a deeper notion than discourse just being a set of entities (Hobbs 1979)

  ?? John goes to Istanbul. He likes spinach.
  - Speaker's need to be understood
- Topical coherence not based on shared reference across utterances (Levinson 1983)
  - Overall topic of a dialogue is agreed as the conversation goes on: "constructed across turns by the collaboration of participants"

Information Structure

- Halliday, The Prague School, Vallduví, …
- Topic and comment
  - What is talked about *vs.* what is said about it
  - Already grounded
- NewInfo (focus) and background
  - Newsy, informative *vs.* old, known or expected
  - Related to accentuation of words
    - Old ≈ deaccentuated
    - New ≈ sentential nuclear stress
- Focus
  - John only introduced Mary to Sue
  - John only introduced Mary to Sue

Topic and NewInfo in Questions

• What about Shakespeare? What can you tell about him?

Shakespeare	*was born and raised in Stratford-upon-Avon*
Topic	Comment
Old (background)	NewInfo

• What about Shakespeare? Where was he born and raised?

Shakespeare	*was born and raised*	*in Stratford-upon-Avon*
Topic	Comment	
Old (background)		NewInfo

Other Approaches

- Prosody and Information Structure
  - Hirschberg, Nakatani, Swerts, Krahmer, Steedman,...
- Multimodal structuring using gestures an gaze
  - Story telling using all modality channels

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Information Flow in Dialogues

- Question-answering – what is new
  S: Please select a topic. What would you like to hear about?
  U: [I'd like to hear about] Shakespeare.
- Information giving in context = topic introduction
  – There are a few favorites I can talk about, for instance, I can talk about Metz, France, Finland, Manchester United, Rablais,...
- Implicit Confirmations – continue dialogue
  – Please select from: Elephant, Elephant Video, Elephant & Castle,...?
- Explicit Confirmations – make sure topic is understood
  – Did you mean "enough"?
- Acknowledgements of presentation and interruptions
  N: Shakespeare was an English poet and playwright, widely regarded as the greatest...
  S: uhuh yeah

  S: Stop [tap on the head to interrupt the presentation]
  N: oh, sorry, what would you like to do?
  S: alphabet...

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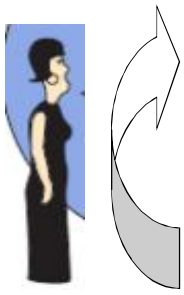
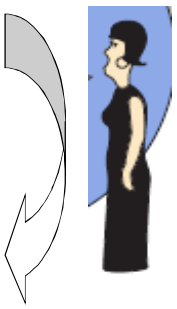
Constructive Dialogue Modelling

- Rational agents coordinate their actions, monitor each other and the environment
- React to the situation according their beliefs, intentions, and understanding
- Construct shared knowledge to achieve a goal, maintain social bonds (Allwood, 1976; Jokinen 1996, 2009)
- Multimodal signalling of basic enablements: gesturing, eye gaze, body posture
- Cooperation, synchrony



Contact
Hearing/seeing/touching distance
Perception
Recognition of communicative signals (symbols)
Understanding
Meaning creation for the symbols in the context
Reaction
Production of one's own action



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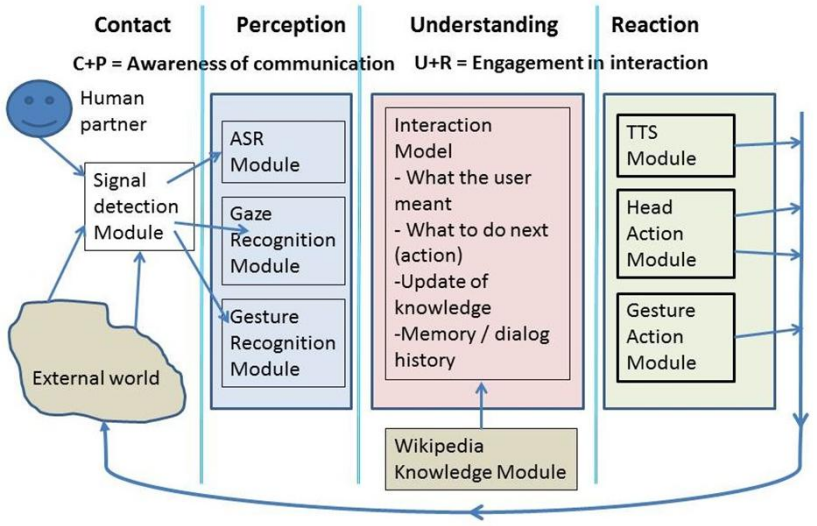
Constructive Dialogue Modelling and Nao



CDM: Coherence and Communication

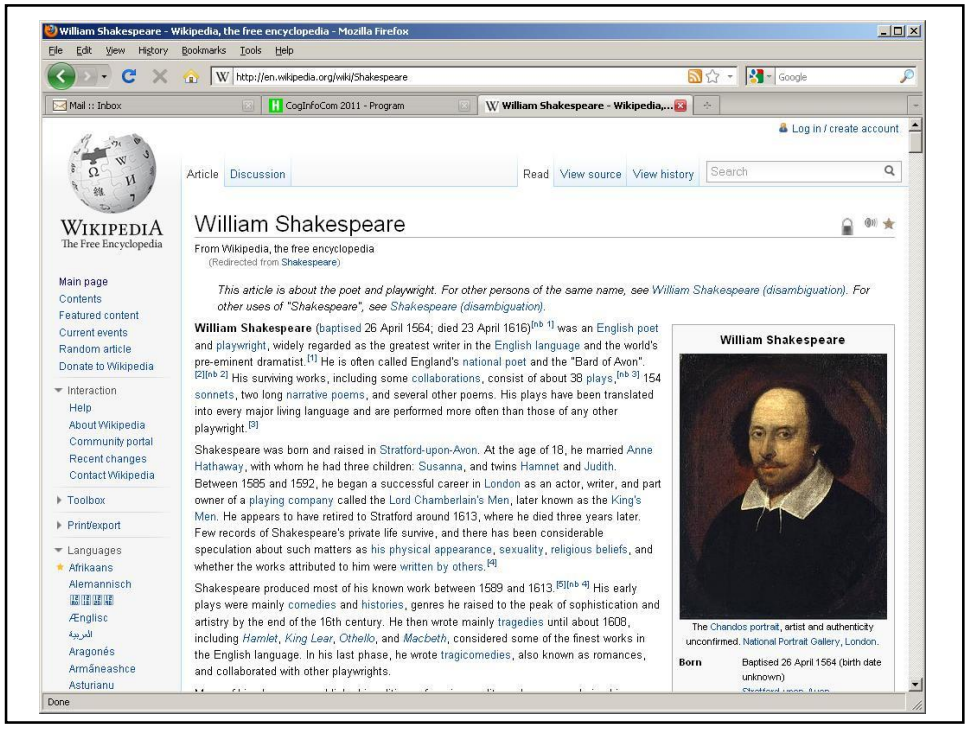
- Dialogue coherence is a sign of the speakers' cooperation with each other:
  - Discourse topics are co-created in the interaction
  - Difference between the processes of identification and recognition of topics operating on local vs. global coherence
- Distinction between
  - Thematic information structure "aboutness"
    - topical vs. non-topical discourse referents, or `what the contribution is about' vs. `what is in the background',
  - Attentional structure "newness"
    - influential status of discourse referents on the hearer's cognition, or `what is new' vs. `what is old information'

WikiTalk: Coherent Continuation

- Split text into chunks
  - Speak a chunk, pause for feedback
- Is the human interested or not?
  - If human seems interested, continue same topic, next chunk
- Discourse coherence already taken care of by the Wikipedia article writers!

How to continue?

- After each sentence
  - pause a while
  - small nod to elicit feedback from the user
  - If no reaction, continue
- After each paragraph
  - Longer pause
  - Possibly explicit feedback elicitation
- Feedback may be non-verbal
  - Eye gaze (looking at robot)
  - Facial expression
  - Body language (coming closer)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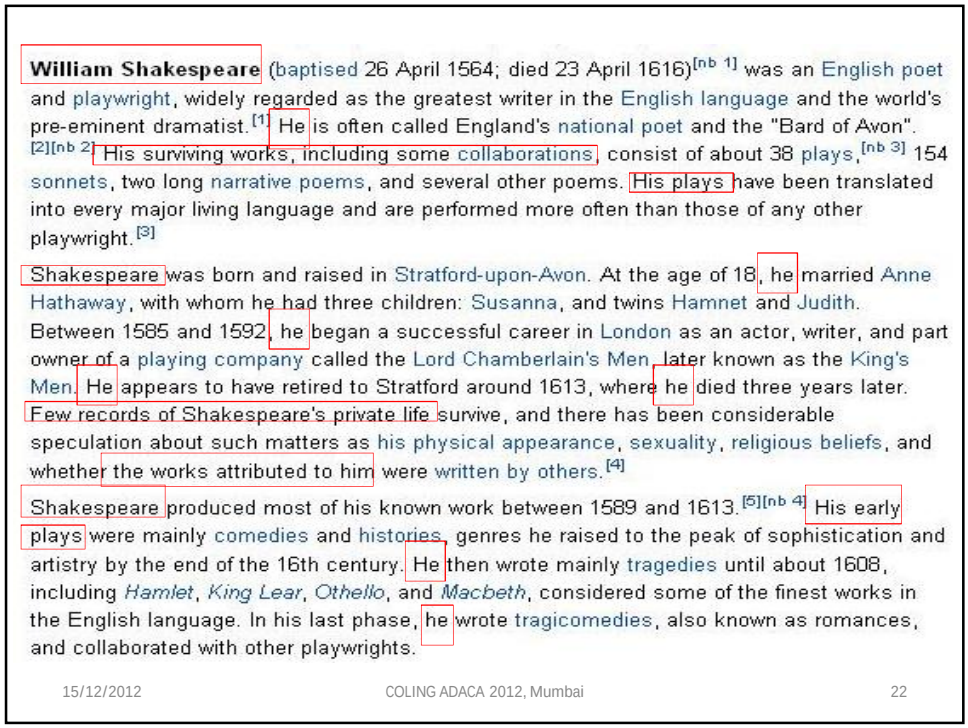
William Shakespeare
From Wikipedia, the free encyclopedia
(Redirected from Shakespeare)
This article is about the poet and playwright. For other persons of the same name, see William Shakespeare (disambiguation). For other uses of "Shakespeare", see Shakespeare (disambiguation).
William Shakespeare (baptised 26 April 1564; died 23 April 1616)[nb 1] was an English poet and playwright, widely regarded as the greatest writer in the English language and the world's pre-eminent dramatist.[1] He is often called England's national poet and the "Bard of Avon".[2][nb 2] His surviving works, including some collaborations, consist of about 38 plays,[nb 3] 154 sonnets, two long narrative poems, and several other poems. His plays have been translated into every major living language and are performed more often than those of any other playwright.[3]
Shakespeare was born and raised in Stratford-upon-Avon. At the age of 18, he married Anne Hathaway, with whom he had three children: Susanna, and twins Hamnet and Judith. Between 1585 and 1592, he began a successful career in London as an actor, writer, and part owner of a playing company called the Lord Chamberlain's Men, later known as the King's Men. He appears to have retired to Stratford around 1613, where he died three years later. Few records of Shakespeare's private life survive, and there has been considerable speculation about such matters as his physical appearance, sexuality, religious beliefs, and whether the works attributed to him were written by others.[4]
Shakespeare produced most of his known work between 1589 and 1613.[5][nb 4] His early plays were mainly comedies and histories, genres he raised to the peak of sophistication and artistry by the end of the 16th century. He then wrote mainly tragedies until about 1608, including Hamlet, King Lear, Othello, and Macbeth, considered some of the finest works in the English language. In his last phase, he wrote tragicomedies, also known as romances, and collaborated with other playwrights.
William Shakespeare
The Chandos portrait, artist and authenticity unconfirmed. National Portrait Gallery, London.
Born
Baptised 26 April 1564 (birth date unknown)
Done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Sentential Subjects as Recurrent Topics

- Sentential subjects encode the recurrent topic either directly or indirectly (lexical reiteration, etc.)
- Occur in the discourse thematic position to start the text
- Other sentential topics are presented as hierarchically subordinate to it

⇒ Co-construction of the global discourse topic through the discourse

Lexico-referential Topic Construction

- William Shakespeare – an English poet and playwright – English language
- He – national poet
- His surviving works – 38 plays, 154 sonnets, two long narrative poems
- His plays – [translated, performed]
- Shakespeare – Stratford-on-Avon
- He – Anne Hathaway, Susanna, Hamnet, Judith
- He – London, playing company, Lord Chamberlain's Men, King's Men
- He – [retired]
- He – [died]
- Few records of Shakespeare's private life – [survive]
- There – his physical appearance, sexuality, religious beliefs,
- The works attributed to him – written by others
- Shakespeare – [produced]
- His early plays – comedies, histories
- He – tragedies, Hamlet, King Lear, Othello, Macbeth
- He – tragicomedies

Switching Topics

- Dialogue, not monologue
  - Don't read out entire article
  - Would be irritating (need "talk less!")
- Hypertext links
  - Links identify possible topic shifts
  - Topic navigation by clicking on links
  - Clicking shows human's positive interest

Topic Chains

- Hyperlinks -> NewInfos -> topic shifts
  - Robot: "Shakespeare was born and raised in Stratford-upon-Avon" (NewInfo)
  - Human: "Stratford-upon-Avon?" (topic shift)
  - Robot: "Stratford-upon-Avon is a market town and civil parish in Warwickshire, England"
  - Human: "Warwickshire?" (topic shift)

How to Switch Topics

- Echoing
  - May show human didn't hear clearly
  - "Hamnet?" (... or was it "Hamlet"?)
- Topic shift anyway
  - Download new article
  - "Hamnet Shakespeare"
  - Start speaking first chunk

Topic trees

- McCoy & Cheng (1991), Jokinen & al. (1998), Jokinen & Wilcock (2003)
- Originally "focus trees", to trace foci in NLG systems
- Branches describe what sort of shifts are cognitively easy to process, and can be expected to occur
  - Constrain possible continuations ("what can be said next")
  - Narrow down the relevant facts, i.e. the part of the knowledge that is to e included in the response
- Random jumps are not very likely, incoherent continuations to be marked with a special marker (*by the way, and then, to go back to*)

Topic shifts

- Topics are not changed arbitrarily
  - Continue: direct link between NewInfo and current Topic
  - Shift: inference link between NewInfo and Topic
  - Change: no obvious link between NewInfo and Topic
- Smooth shifts
  - Based on World model –relations (e.g. from actors to event, from objects to properties, etc.)
- Awkward shift
  - To be marked appropriately

How to Introduce a Brand-New Topic?

- Quite Difficult!
  - Open vocabulary speech recognition?
  - Basically, this doesn't work
- User spells the Topic
  - "S", "H", "A", "K", ...
  - "Sierra", "Hotel", "Alpha", "Kilo", ...
  - Wikipedia helps if first few letters known

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Multimodal Discourse Marking

- How to express the discourse relations in spoken presentation?
- Holistic communication view
  - Synchrony and coordination of modalities
  - Used in an unintrusive way
- Modality = refers to senses employed to process incoming information (vision, audition, olfaction, touch, taste)
- Human „embodied“ communication
  - Interpersonal relationship
  - Affective information
  - Coordination of interaction

Technologies	WikiTalk Behaviour (demo video)
WikiTalk	– Knowledge from Wikipedia – Segmentation of articles into paragraphs, sentences, and NewInfos
Face recognition	– Recognition of an object in the vision field – If human face, start to follow – Recognition of human contact and interest
Gesturing	1) User command gestures ("Stop!") 2) Nao's communicative gestures: – Presentation of information with palm-up – Elicit of user feedback with nod down – Surprise at interruption with nod up – Emphasis of NewInfo by a beat
Dialogue management	– Start a conversation – Continue with the same topic – Change to a new topic – Stop a conversation

Gesture families

- Form – function
- Kendon (1980): Similar gesture forms have their own *semantic theme* -> Gesture families
- Open Hand Prone (Palm vertical)
  - express in general stopping or halting of an action (own or other
- Open Hand Supine (Palm horizontal)
  - express general offering and giving of ideas and concepts
- Index Finger Extended (pointing gestures)
  - same as those in the Open Hand families but the gestures are precise and explicit

Fig. A: Standing key pose

Fig. B: Speaking key pose

Fig. C: Open-hand Palm-up key pose

Fig. D: Open-hand Palm-vertical key pose

Fig. E: Head down key pose

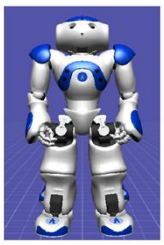


Fig. F: Head up key pose

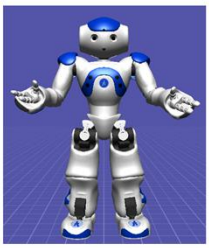
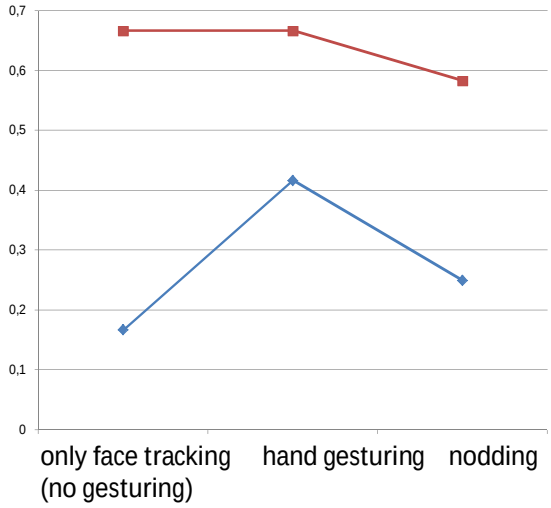


Fig. G: Open arms open hand palm up key pose

Other gesturing

- Head Movement
  - Head-Repetition: single or repeated movement
  - Nod-up, nod-down, jerks
  - Head forward/backward,
  - Tilt sideways, turn to partner, side-turn, shake, waggle, other
  - Feedback, turn management, sequencing
- Body Movement
  - Body-Direction w r t partner: Forward, backward, sideways
  - Body and feet movement
  - Movement up, down, partnerside, towardsPartner
- See the COLING-2012 paper

Evaluation: Interaction Style



Open domain conversations gain from small and big gesturing: presentation becomes more expressive, even with nodding.

Information seeking dialogues seem to gain less from multimodality

Conclusions and Future work

- Presentation of Wikipedia articles in an interactive manner
  - Navigation and reference to articles
  - Topic management: continuation of a topic, shifting to a new one
  - Co-construction of the global topic (recurrent topics)
- Multimodal Discourse Marking by gestures and body movement
  - Story telling in literary studies
  - Expressive gesturing
- Further studies
  - Multimodal relations, iconic verbs, timing, etc.
  - Presenting and tailoring information to the user
  - Cultural differences

Thank you!