Slide 1

Darou as an entertain modal
with a shiftable deictic agent
an inquisitive approach

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Slide 2

Outline

Slide 3

Falling Declaratives: *darou↓*

- a sentence-final auxiliary that has a modal-flavor.
- *darou* in a plain declarative → the speaker's bias

(1) John-ga kuru darou↓.
     Jonn-NOM come DAROU
     'John is coming, I bet.'
     'Probably, John is coming.'

Slide 4
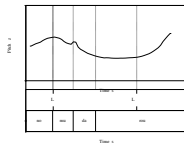
Rising Declaratives: *darou↑*

(2) Yurie-wa wain-o   nomu darou↑
     Yurie-TOP wine-ACC drink DAROU
     'Yurie drinks wine, right?'
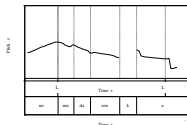

Play rising declarative

Figure: Rising Declarative

Falling Interrogatives: *darou ka↓*

(3) Yurie-wa wain-o nomu darou ka↓
     Yurie-TOP wine-ACC drink DAROU Q
     'I wonder if Yurie drinks wine.'
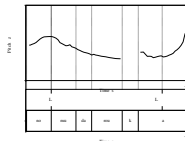

Figure: Falling Interrogative

Play falling interrogative

Rising Interrogatives: *darou ka↑*

(4) #Yurie-wa wain-o nomu darou ka↑
      Yurie-TOP wine-ACC drink DAROU Q

Figure: Rising Interrogative

Play rising interrogative

Summary

	Falling	Rising
Declarative	*darou↓* statement ('I bet')	*darou↑* tag/confirmation Q ('... right?')
Interrogative	*darou ka↓* self-addressing Q ('I wonder')	*darou ka↑* #

Table: Meaning of *darou* according to sentence type and intonation

- *Darou* can take an interrogative or declarative as its argument.
- *Darou* express either the speaker or the addressee's bias.

Proposal

Darou is a root-level modal operator $E_\odot$, which expresses epistemic issues associated to the deictic center, $\odot$.

Outline

Experiment I

Figure: Average Naturalness Ratings of Experiment I

Experiment II

Figure: Average Naturalness Ratings of Experiment II

	Falling	Rising
Declarative	*darou↓* statement ('I bet')	*darou↑* tag/confirmation Q ('... right?')
Interrogative	*darou ka↓* self-addressing Q ('I wonder')	*darou ka↑* #

Outline

1. Basic Paradigm

2. Experiments

3. Proposal: *Darou* as an Entertain Modality
   - Sub-Proposal 1: *darou* as a root-level modal
   - Sub-Proposal 2: ↑ as a deictic shifter
   - Sub-Proposal 3: *Darou* as an Entertain Modal

4. Deriving the interpretations

5. Conclusion

Proposal

Darou is a root-level modal operator $E_{\odot}$, which expresses epistemic issues associated to the deictic center, $\odot$.

Outline

Darou ka cannot be embedded

(5)　Emi-ga　igirisu-ni　itta　nichigainai/kamoshirenai ka douka
　　　Emi-NOM England-DAT went　must/may　　　　　Q　or.not
　　　kiite　mita.
　　　to.ask tried
　　　'I asked whether Emi must/may have left for England or not.'

(6)　*Emi-ga　igirisu-ni　itta　darou　ka douka kiite mita.
　　　Emi-NOM England-DAT went　DAROU Q or.not to.ask tried
　　　Intended: 'I asked whether Emi probably left for England or not.'

Speaker-orientation

(7)　Boku-wa ame-ga　furu darou　kara　kasa-o　　　mot-te
　　　I-TOP　　rain-NOM fall　DAROU because umbrella-ACC have-and
　　　it-ta.
　　　go-PAST
　　　'Because it will rain (I bet), I took an umbrella with me.'

(8)　#John-wa ame-ga　furu darou kara　kasa-o　　　mot-te
　　　John-TOP rain-NOM fall　DAROU because umbrella-ACC have-and
　　　it-ta.
　　　go-PAST
　　　'Because it will rain (I bet), John took an umbrella with him.'

Root phenomenon
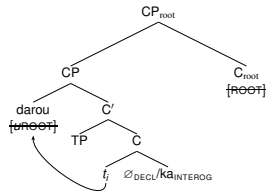
Sub-proposal 1:
Darou is a root-level operator, which moves to [Spec CP] to check off its uninterpretable feature, [uROOT].
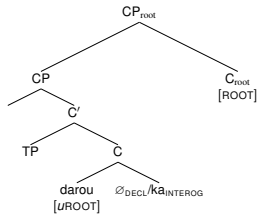
Surface form

CP_root
- CP
  - C′
    - TP
    - C
      - darou [uROOT]
      - $\varnothing_{DECL}$/ka$_{INTEROG}$
- C_root [ROOT]

LF

CP_root
- CP
  - darou [uROOT̶]
  - C′
    - TP
    - C
      - t_i
      - $\varnothing_{DECL}$/ka$_{INTEROG}$
- C_root [R̶O̶O̶T̶]

Outline

1. Basic Paradigm

2. Experiments

3. Proposal: *Darou* as an Entertain Modality
   - Sub-Proposal 1: *darou* as a root-level modal
   - Sub-Proposal 2: ↑ as a deictic shifter
   - Sub-Proposal 3: *Darou* as an Entertain Modal

4. Deriving the interpretations

5. Conclusion

- Speaker → Subject of the attitude predicate

(9)
 a. Mary-wa John-ga kuru darou to omot-teiru.
   Mary-TOP John-NOM come DAROU COMP think-PROG
   'Mary thinks that probably, John will come.'
 b. Boku-wa sou-wa omow-anai-kedo.
   I-TOP so-TOP think-NEG-though
   'I don't think so (that he will come), though.' (Hara, 2006, 128-129)

Deictic Projection

- Speaker → Addressee

(10) Marie-wa   wain-o   nomu darou↑
      Marie-TOP wine-ACC drink DAROU
      'Marie drinks wine, right?'

(11)   a.   Can I go to your office tomorrow?
       b.   Can I come to your office tomorrow?   (Huang, 2007)

↑ as a deictic shifter

Sub-proposal 2:
The rising intonation ↑ is a Kaplanian monster that shifts the deictic center from the speaker to the addressee.

(12) $g = [\odot \mapsto \text{SPKR}]$

(13)   Falling interrogative
       a.   LF: $p\text{-}darou\ ka{\downarrow} \rightsquigarrow E_{\odot}?p$
       b. $\llbracket E_{\odot}?p \rrbracket^g = E_{g(\odot)}?p = E_{\text{SPKR}}?p$

(14) $\llbracket \varphi \uparrow \rrbracket^g = \llbracket \varphi \rrbracket^{g[\odot \rightarrow \text{ADDR}]}$

(15)   Rising declarative
       a.   LF: $p\text{-}darou{\uparrow} \rightsquigarrow E_{\odot}p \uparrow$
       b. $\llbracket E_{\odot}p \uparrow \rrbracket^g = \llbracket E_{\odot}p \rrbracket^{g[\odot \rightarrow \text{ADDR}]} = E_{g^{\text{ADDR}}/\odot(\odot)}p = E_{\text{ADDR}}p$

	Falling	Rising
Declarative	$p\text{-}darou{\downarrow}$ $E_{\text{SPKR}}p$	$p\text{-}darou{\uparrow}$ $E_{\text{ADDR}}p$
Interrogative	$p\text{-}darou\ ka{\downarrow}$ $E_{\text{SPKR}}?p$	$p\text{-}darou\ ka{\uparrow}$ $E_{\text{ADDR}}?p$

Table: Translations of *darou*-sentences and interpretations of the deictic center

- *Darou* can take both a declarative and interrogative as its argument.
- The modal E can embed both p and $?p$.

Outline

Inquisitive dynamic epistemic logic (IDEL)

Ciardelli & Roelofsen (2015)

Inquisitive dynamic epistemic logic (IDEL) can model:
- the information available to a set of agents
- the issues that the agents entertain

(16)   a.   An information state s is a set of possible worlds ($s \subseteq \mathcal{W}$).

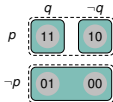   b.   An *issue* $I \subseteq \wp(\mathcal{W})$ is a non-empty, downward closed set of information states.

Information and Issue

- At w_{11} and w_{10}
  - the agent's information state: $\{w_{11}, w_{10}\}$
  - the agent knows that p.
  - the agent is interested in whether q or $\neg q$
- At w_{01} and w_0
  - the agent's information state: $\{w_{01}, w_{00}\}$
  - the agent knows that $\neg p$
  - the agent doesn't care whether q or $\neg p$

Knowledge and Entertain

- There are two modal operators

  Knowledge operator K an agent's information state

  Entertain operator E an agent's inquisitive state

                the issues that the agent entertain.

(17)   *darou* ⤳ $E_\odot$

Example 1: $\langle \mathcal{M}, s \rangle \models K_a p$
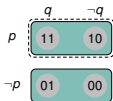
The speaker knows that p

Figure: $\langle \mathcal{M}, s \rangle \models K_a p$

Example 2: $\langle \mathcal{M}, s \rangle \models K_a ?p$

The speaker knows the answer to $?p$
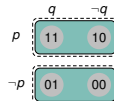
Figure: $\langle \mathcal{M}, s \rangle \models K_a ?p$

Example 3: $\langle \mathcal{M}, s \rangle \models E_a ?p$

- The agent doesn't know the answer to $?p$.
- The agent entertains an issue $?p$.

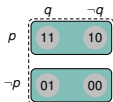Figure: $\langle \mathcal{M}, s \rangle \not\models K_a ?p$, $\langle \mathcal{M}, s \rangle \models E_a ?p$

Fact
For any declarative α, $K_a \alpha \equiv E_a \alpha$

(Ciardelli & Roelofsen, 2015, 1659)

Sub-proposal 3: Semantics of *darou*
For any sentence φ (i.e., a declarative α or an interrogative μ):
φ-*darou* $\rightsquigarrow E_{\odot}\varphi$

Outline

Proposals

Semantics of *darou*

For any sentence φ (i.e., a declarative α or an interrogative μ):
$\varphi\text{-}darou \rightsquigarrow E_\odot\varphi$

Semantics of the deictic center

$g = [\odot \mapsto \text{SPKR}]$

Semantics of rising intonation

$\llbracket\varphi\uparrow\rrbracket^g = \llbracket\varphi\rrbracket^{g[\odot\rightarrow\text{ADDR}]}$

Falling declarative: α-DAROU ↓

(18)   John-ga   kuru darou↓
       Jonn-NOM come DAROU
       'John is coming, I bet./Probably, John is coming.'

(19)   a.   *p-darou*↓ $\rightsquigarrow E_\odot p$
       b. $\llbracket E_\odot p\rrbracket^g = E_{g(\odot)}p = E_{\text{SPKR}}p \equiv K_{\text{SPKR}}p$

Falling interrogative: μ-DAROU ↓

(20)   Yurie-wa   wain-o   nomu darou   ka↓
       Yurie-TOP wine-ACC drink DAROU Q
       'I wonder if Yurie drinks wine.'

(21)   a.   *p-darou ka*↓ $\rightsquigarrow E_\odot ?p$
       b. $\llbracket E_\odot ?p\rrbracket^g = E_{g(\odot)}?p = E_{\text{SPKR}}?p$

Rising declarative: α-DAROU $\uparrow$

(23) Yurie-wa wain-o   nomu darou↑
      Yurie-TOP wine-ACC drink DAROU
      'Yurie drinks wine, right?'

(24) a. *p-darou*↑ $\rightsquigarrow E_{\odot}p \uparrow$
      b. $[\![E_{\odot}p \uparrow]\!]^g = [\![E_{\odot}p]\!]^{g[\odot \rightarrow \text{ADDR}]} = E_{g^{\text{ADDR}}/\odot(\odot)}p = E_{\text{ADDR}}p \equiv$
          $K_{\text{ADDR}}p$

- 'Am I right in saying that you know Yurie drinks wine?"

- The bias meaning disappears in falling interrogatives

(22) Ashita   hareru darou   ka. Zenzen wakar-anai.
      tomorrow sunny DAROU Q at.all   understand-not
      'I wonder if it will be sunny tomorrow. I have no idea.'

Rising interrogative: μ-DAROU $\uparrow$

(25) *Yurie-wa wain-o   nomu darou   ka↑
      Yurie-TOP wine-ACC drink DAROU Q

(26) a. *p-darou ka*↑ $\rightsquigarrow E_{\odot}?p \uparrow$
      b. $[\![E_{\odot}?p \uparrow]\!]^g = [\![E_{\odot}?p]\!]^{g[\odot \rightarrow \text{ADDR}]} = E_{g^{\text{ADDR}}/\odot(\odot)}?p = E_{\text{ADDR}}?p$

Rising interrogative: μ-DAROU $\uparrow$

- If we have an appropriate context, the rising interrogative
  μ-DAROU $\uparrow$ becomes possible.
- a quiz show or an instructive/Socratic questioning

(27) Doitsu-no   shuto-wa   doko deshou   ka↑
      Germany-GEN capital-TOP where DAROU.POLITE Q
      'Where is the capital of Germany?'

Summary

(28) Interpretations of *darou*-sentences

	Falling	Rising
Declarative p	*darou*↓ $E_{\mathrm{SPKR}}p \equiv K_{\mathrm{SPKR}}p$ ('I bet')	*darou*↑ $E_{\mathrm{ADDR}}p \equiv K_{\mathrm{ADDR}}p$ ('... right?')
Interrogative $?p$	*darou ka*↓ $E_{\mathrm{SPKR}}?p$ ('I wonder')	*darou ka*↑ $E_{\mathrm{ADDR}}?p$ (# or a quiz question)

Why IDEL?

- *darou* can embed both declaratives and interrogatives.
  - ▸ IDEL: the modal operator E can embed both p and $?p$
- The seat of knowledge is the speaker by default but it can be shifted to the addressee.
  - ▸ IDEL models the knowledge and inquisitive states of an agent a.
- *darou* appears to denote different modals,i.e., *bias* and *question*.
  - ▸ $E_\odot p \equiv K_\odot p$: a bias toward p
  - ▸ $E_\odot ?p$: entertaining an issue $?p$

Concluding Remarks

- *Darou* moves to [Spec CP]
- *Darou* can embed a declarative or an interrogative.
- φ-DAROU translates to $E_\odot\varphi$ in IDEL.
- φ can be a declarative or an interrogative.
- $\odot$ is a deictic center variable
- By default, $\odot$ is the speaker.
- Rising intonation ↑ shifts the deictic center $\odot$ to the addressee, i.e., $g^{[\odot \rightarrow \mathrm{ADDR}]}$.

declarative $E_\odot\alpha \equiv K_\odot\alpha$
    The speaker's or the hearer's bias
interrogative $E_\odot\alpha$
    The speaker's or the hearer's issue

References I

Ciardelli, Ivano A. & Floris Roelofsen. 2015. Inquisitive dynamic epistemic logic. *Synthese* 192(6). 1643–1687.

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Huang, Yan. 2007. *Pragmatics* Oxford Textbooks in Linguistics. New York: Oxford University Press.