

Discourse in Customer Service Dialogues

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Motivation

Joint discourse analysis of

- Topic transitions
- Rhetorical discourse relation
- Dialogue acts

Address a question: What makes a dialogue coherent?

Utility

Analytics: examine styles of dialogues; pair agents and customers;

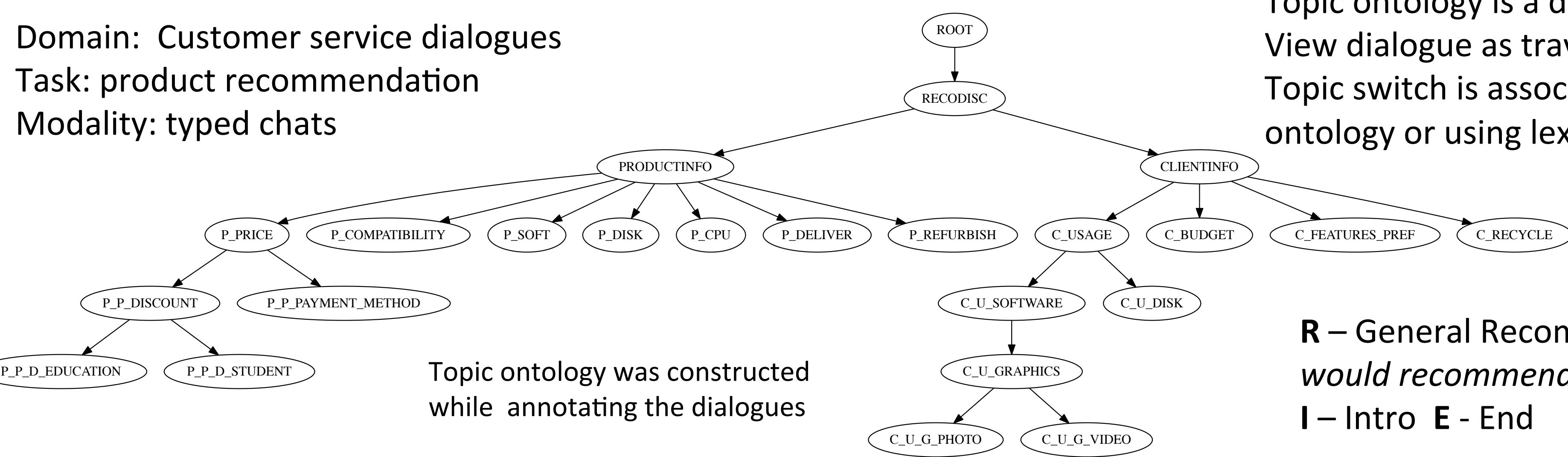
determine personal characteristics from dialog style;

Dialogue/interaction management: online chatbot agent for retailer;

Statistical policy decisions in problem solving dialogue system

Topic Ontology

Domain: Customer service dialogues
Task: product recommendation
Modality: typed chats



Topic ontology was constructed while annotating the dialogues

Topic ontology is a discretization of a continuous topic space
View dialogue as traversal of an ontology structure (or a topic space)
Topic switch is associated with a distance that can be measured in an ontology or using lexical/semantic similarity between utterances

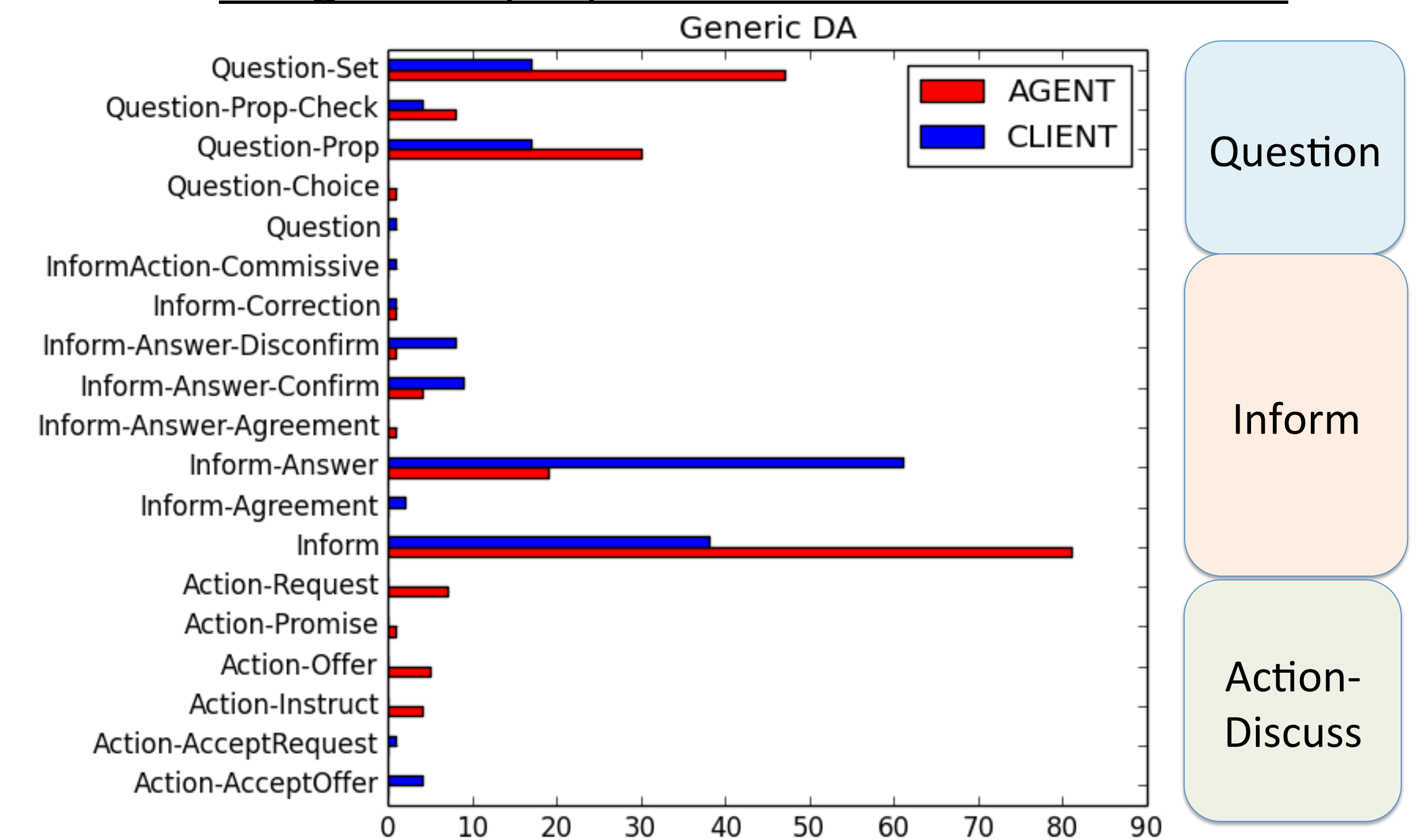
R – General Recommendation discussion: “Cool, in this case I would recommend you to purchase ...”
I – Intro E – End

Dialogue Act Statistics

10 dialogues; 315 Turns; manually segmented

Total DA segments: Agent 315; Client 237

DIT general purpose communicative function



Annotated 10 typed customer service dialogues

- 1) Segment utterances into clauses
- 2) Annotate each clause with
- 3) Ontology Topic
- 4) Dialogue Act (according to DIT)
- 5) Discourse relation (PDTB)

Analyze Topics, Dialogue Acts, Discourse Relations, and Topic Switches

Observed Topic Sequences

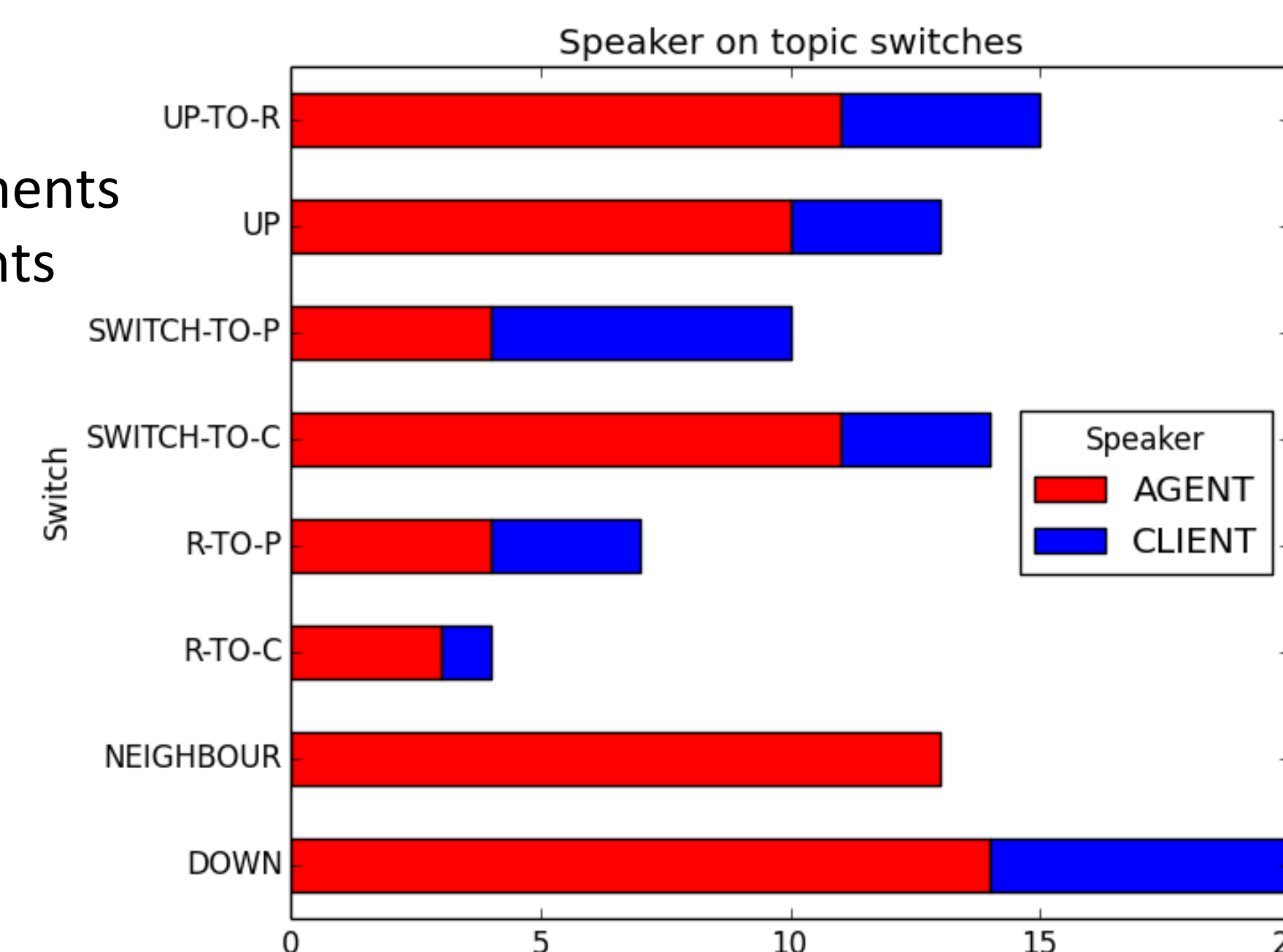
- | | |
|----------------------------|--|
| 1: I C R P R E | 1: I C B C R P C R E |
| 2: I C P C R E | 2: I C U C U S C U S G P S C U R E |
| 3: I C R P C P C P C R P E | 3: I C U S C U C U G C F R P C U D P C U B P P C B R P D E |
| 4: I C R P R P E | 4: I C U C S C C U S C U S G C U S G V R P S R P S P P D P P D S P P D E P P P E |
| 5: I R C R P R C E | 5: I R C U C C U C D R P P D S R C U C D E |
| 6: I P C R E | 6: I P C C U C S C F R E |
| 7: I C P R E | 7: I C U P P S P D P A P P P A P D R E |
| 8: I R C R P E | 8: I R C C U C U S C U D C F R P P P P D P R E |
| 9: I C P R C E | 9: I C C U C U S C C U C U P C U D P D P R C R E |
| 10: I P C P C P C P E | 10: I P D P C C D P P D P P A C O P A C O P P P E |

Observed behaviors: zooming in on the topic, zooming out of the topic, switch between neighboring nodes

Topic sequences reflect the dialogue style

Transitions Between Topics

Agent switches in 23 % of segments
Client switches 18 % of segments

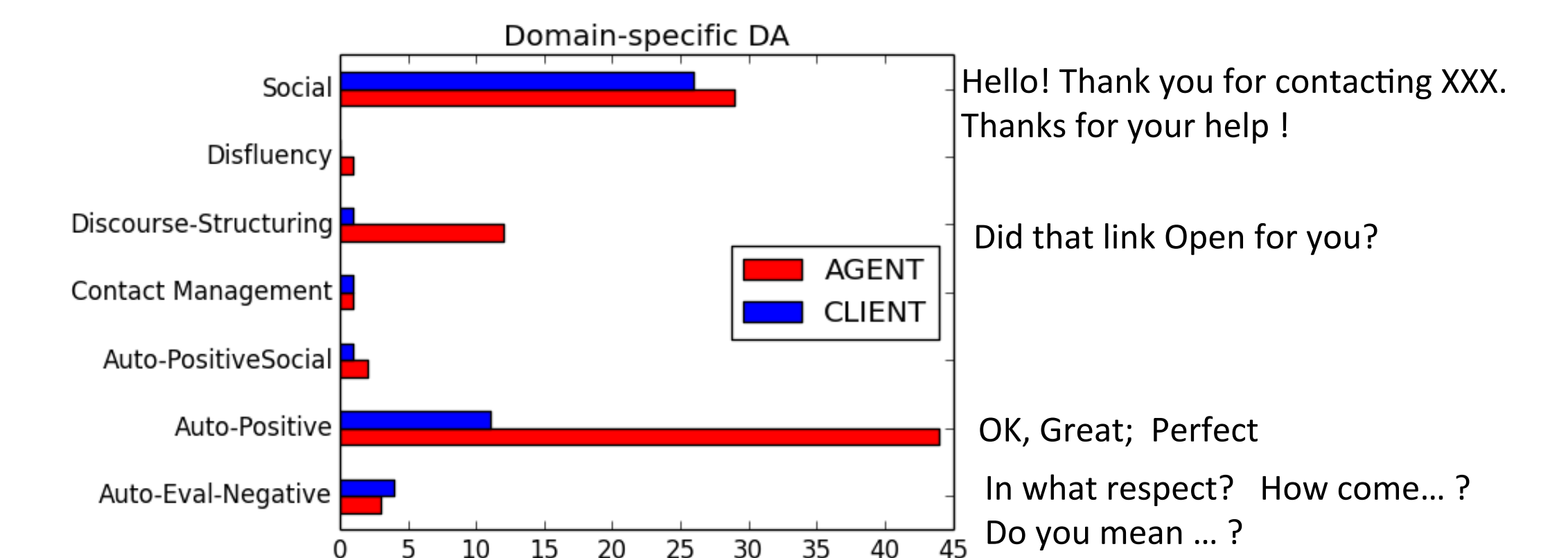


Discourse Relation: Result (segment-independent)

Annotated Dialogue Excerpt

Spkr	Utterance	Topic	DIT
A	What kind of software programs would you be running on your new COMPUTER?	C_U_SOFT	Question-Set
C	I would probably be mainly running Photoshop and Illustrator	C_U_SOFT	Inform-Answer
A	Ok great.	C_U_SOFT	Auto-Positive
A	Would you be purchasing for for a business?	C_USAGE	Question-Prop
...			
A	and what would be important to you when choosing a new COMPUTER?	C_FEATURE	Question-Set
C	in what respect?	C_FEATURE	Question-Set
A	For example is it screen size or weight or portability, etc?	C_FEATURE	Inform-Answer
C	a large screen size definitely. I'm not really bothered too much about the weight but portability would be good.	C_FEATURE	Inform-Answer
A	Perfect	C_FEATURE	Auto-Positive
A	so for what you plan to use the PRODUCT would be best.	RECODISC	Inform
A	It is the perfect machine for creative professionals such as film makers, graphic designers and photographers.	RECODISC	Inform
A	It also features all the latest technologies ...	PRODUCT INFO	Inform

DIT domain-specific communicative function



Dialogue Acts of Topic Transitions

Topic switch on **Question**: 53 (44% of Question DA)

Topic switch on **Inform**: 32 (15% of Inform DA)

Topic switch on **Action**: 8 (36 % of Action DA)

Discourse relation (PDTB)

Discourse Relation Types Observed

- Intra-turn (not annotated)
- Between turns
- **Segment-independent discourse (not linked to a specific segment)**

Most frequent are Segment-independent Discourse relations:

Result, Justification on Inform DA

Future work

- Analyze how topic switching affects dialogue coherence
- Describe dialogue style based on its discourse
- Infer the topic ontology from human-human conversations
- Use topic switching feature for
 - success of interaction
 - pair up dialogue partners based on past dialogue styles
 - recommendation selection
 - predicting situational power