AUTOMATED TEXT TO PRESENTATION
for better understanding clinical information

easier to be found

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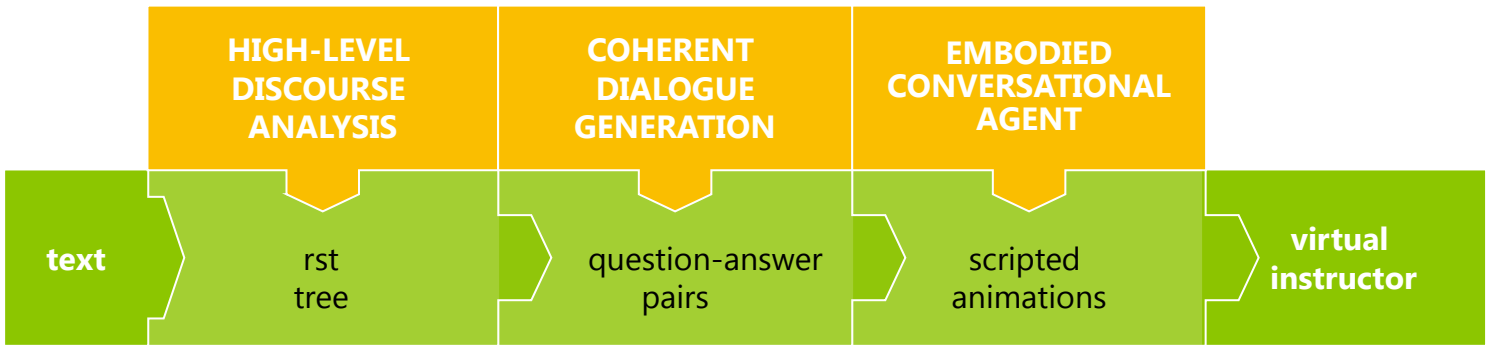
NOVEL APPROACH FOR AUTOMATICALLY GENERATING A VIRTUAL INSTRUCTOR FROM TEXTUAL INPUT ONLY
Our proposed system is capable of creating virtual instruction from textual input only into fully automated generation of agent animation scripts from text.

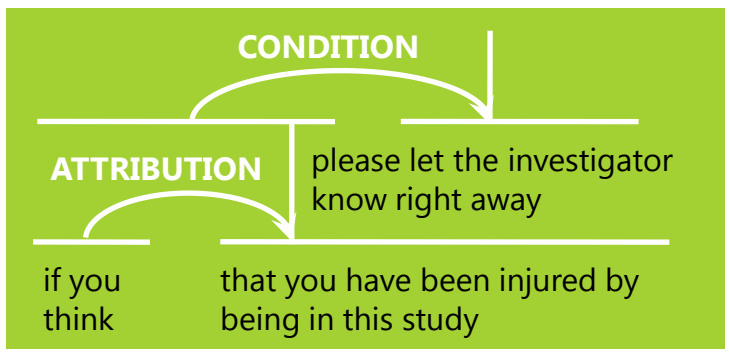


SYSTEM DESIGN
First text is translated into rhetorical structure theory (RST) trees by annotating discourse relations using high-level discourse analysis. RST trees are then translated into question-answer pairs, by matching patters on the relations and structure of RST trees. Answers are compiled into an animated virtual instructor, using animation scripts.

TEXT
"if you think that you have been injured by being in this study please let the investigator know right away"

HYPOTHESIS
We hypothesized that if a user conducts a question-asking dialogue with an agent about a text, in addition to reading the text, that they will be more cognitively engaged in the material, understand more about it, and be more satisfied with the experience, compared to simply reading the text by itself.

HIGH-LEVEL DISCOURSE ANALYSIS
RST trees are generated by the system using a high-level discourse analyzer, called HILDA. The discourse analyzer first segments text into EDUs. Then, (typically) binary discourse relations are identified between EDUs. HILDA is using three classifiers: 1) for EDU segmentation, 2) for discourse labeling and 3) for RST tree construction.



THEORY OF TEXT ORGANIZATION
Text can segmented into non-overlapping, semantically independent units (EDUs). Between EDUs rhetorical (discourse) relations describe how the more important part (nucleus) and less important part (satellite) relate. Text organization can be represented using rhetorical structure theory (RST) trees. Leaves represent EDUs, arrows point from satellite to nucleus, and arrows are labeled with a discourse relation.

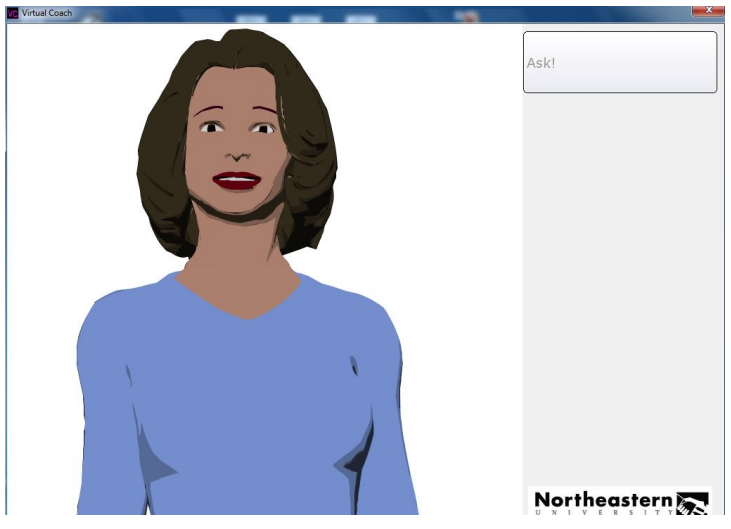
COHERENT DIALOGUE GENERATION
Input for the CODA system is a sequence of one-level RST trees. It maps this to alternative (ranked) sequences of dialogue acts, and verbalizes the top-ranked sequence. The final output is an XML representation of a dialogue act sequence (usually consisting mostly of question-answer pairs).

QUESTION
What if I think that I have been injured by being in this study?

ANSWER
Please let the investigator know right away.

THE CODA PROJECT
A parallel corpus of annotated monologues and dialogues was constructed, where the dialogues express the same information as the aligned monologues. From this, a mapping was inferred from RST structures in monologue to the dialogue act sequences in dialogue. These mapping are used by the system (CODA) to map an RST tree to a sequence of dialogue acts.

EMBODIED CONVERSATIONAL AGENT
Dialogue between a single agent and a user is scripted using a custom hierarchical transition network-based scripting language. Agent nonverbal conversational behavior is generated using BEAT, and includes beat (baton) hand gestures and eyebrow raises for emphasis, gaze away behavior for signaling turn-taking, and posture shifts to mark topic boundaries, synchronized with synthesized speech.



EVALUATION
Our end-to-end system was evaluated with a group of twenty-four subjects. The evaluation was conducted using three informed consent documents of clinical trials from the domain of colon cancer. Each of the documents was explained by a virtual instructor using 1) text, 2) text and agent monologue, and 3) text and agent performing question-answering.

VIRTUAL INSTRUCTOR
Hi, I am Karen. I am going to explain an informed consent document to you for a clinical trial.

QUESTION SHOWN
What if I think that I have been injured by being in this study?

KAREN RESPONCE
Please let the investigator know right away.

RESULTS
Results show that an agent explaining an informed consent document did not provide significantly better comprehension scores, but did score higher on satisfaction, compared to two control conditions