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Deductive reasoning with a simulated information extraction pipeline

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Introduction

- Information extraction (IE) pipelines aim to point human decision makers toward relevant information
- Output of the pipeline should be designed for optimal human comprehension
- This project aims to establish a method for testing comprehension of text documents with and without markup from an IE pipeline

Methods

- 100 participants were presented with sets of 68 sentences
- Each set of sentences reveals a hypothetical terrorist attack
- Sentences were presented with or without markup from an IE pipeline [1-2]
- Speed and accuracy with which participants identify the attack were recorded, along with preference and workload

Example sentences: Plain vs. Markup

All the military bases in Perchland are heavily protected.
There is no new information about Raven group operations in Bassland.
Perchland is land locked.
Locals in Sharkland are being recruited.
The Turtle lost his right eye in an accident.
The Bronco group does not attack on its Sabbath.
Members of the Charger, Titan, Steeler, Raider, and Bronco groups have experience with chemical weapons.
The shopping malls in the coalition area are not well defended.
Charger and Titan group members have entered Perchland and Salmonland.
The Panther, Charger, Titan, and Raven groups prefer to attack in daylight.

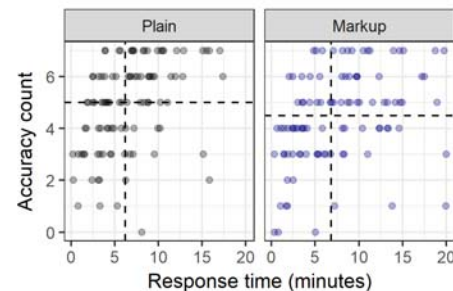
All the [ORG **military**] [FAC **bases**] in [CPE **Perchland**] are heavily protected.
There is no new information about Raven group operations in Bassland.
Perchland is land locked.
[PER **Locals**] in [CPE **Sharkland**] are being recruited.
The [PER **Turtle**] <lost> [PER **his**] right eye in an accident.
The Bronco [ORG **group**] does not <attack> on its Sabbath.
[PER **Members**] of the [ORG **Charger**], [ORG **Titan**], [ORG **Steeler**], [ORG **Raider**], and [ORG **Bronco**] [ORG **groups**] have experience with chemical weapons.
The shopping [FAC **malls**] in the [CPE **coalition area**] are not well defended.
Charger and Titan [ORG **group**] [PER **members**] have <entered> Perchland and [LOC **Salmonland**].
The [PER **Panther**], [PER **Charger**], [ORG **Titan**] and Raven [ORG **groups**] prefer to <attack> in daylight.

Event ID: EV32
Trigger: entered
Event Type: Movement
Event Subtype: Transport
Generativity: Specific
Modality: Asserted
Polarity: Positive
Tense: Past
Arguments:
Artifact members Destination Salmonland

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Results

- Participant responses were more accurate and faster without markup
- Participants tended to prefer text without markup, associated it with lower workload
- But those who preferred text with markup tended to perform better on text with markup



Question	Percent of participants that chose this version of the task		
	Plain	Markup	Even
Which version of the task felt more mentally demanding ?	29	64	7
Which version of the task felt more physically demanding ?	22	45	33
Which version of the task felt more hurried or rushed ?	21	49	30
On which version of the task do you think you performed better ?	57	34	9
On which version of the task did you feel you had to work harder ?	25	64	11
Which version of the task lead you to feel more insecure, discouraged, irritated, stressed, or annoyed ?	26	62	12
Overall, which version of the task you do you prefer?	66	30	4

Discussion

- Results suggest further steps that can be taken toward developing more human-usable IE pipeline outputs
 - Ability to toggle markup on and off
 - More accurate, more relevant markup [3-4]

References

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