



Towards Coherent and Consistent Use of Entities in Narrative Generation

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Why Do We Care about Coherence and Consistency?

John and Mary went for a picnic with Lisa and Andrew, but their kids could not join because of stomach pain.

GPT-2

Why Do We Care about Coherence and Consistency?

John and **Mary** went for a picnic with **Lisa** and **Andrew**, but **their kids could not join because of stomach pain**. But they were too busy making a sandwich and talking to each other in the picnic basket . But they are still having fun, because **their kids are still having fun** ! The family has been making sandwiches for the last 6 months, and now their kids have been going for a picnic for the last 4 months too.

GPT-2

Why Do We Care about Coherence and Consistency?

John and **Mary** went for a picnic with **Lisa** and **Andrew**, but **their kids could not join because of stomach pain**. But they were too busy making a sandwich and talking to each other in the picnic basket . But they are still having fun, because **their kids are still having fun** ! The family has been making sandwiches for the last 6 months, and now their kids have been going for a picnic for the last 4 months too. **The kids love the picnic** and making friends, and it was a great idea for them to be together for the first time in a year. I'm writing this after **a picnic with the kids**.

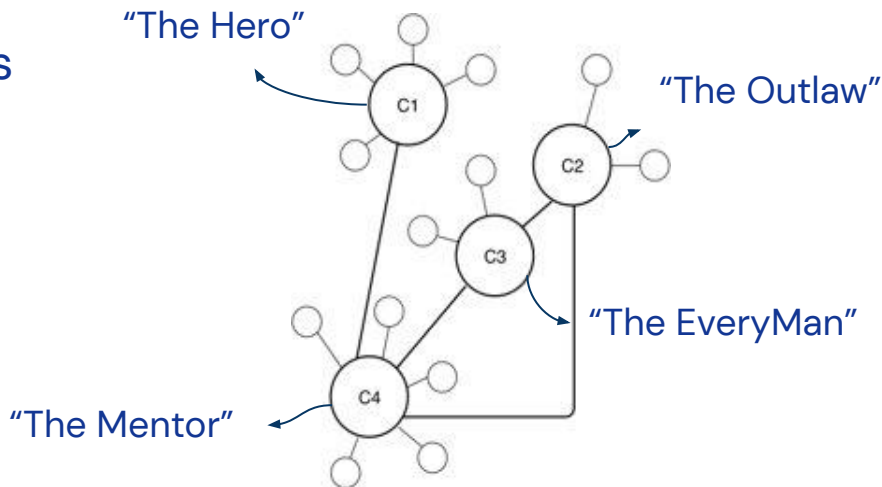
GPT-2

Testbed: Narrative Generation

Appropriate for:

1. **Quantifying** the **limitations** of current LMs
2. **Exploring solutions** for higher entity coherence and consistency

Entities are **central** in narratives and follow **archetypes**



How LMs Handle Entities on Generated Narratives?

Snack-selling is a low-brow, low-concept documentary film about **Daffy Duck**, the carnival-loving co-founder of the eponymous Duckette Club . **Daffy** and **Egghead** are guests at an American football game . [2 sentences later...] The ducks head back to Duckette, where they watch TV with **Daffy** and **Egghead** .

[Several sentences later...]

Mayor Bill Breen was able to bring forward the project when he inherited the vacant home of a disgraced and unwanted **senator** and finally return the home to its original design .

Long-range entity coherence

Harper tries to **kill** **Todd**, but is nearly **killed** when the train driver throws himself in front of the train . **Harper** tells Todd that the wagon train was on its way to a nearby town, but that he will **kill** **Todd** instead.

[4 sentences later...]

Todd's sister and brother-in-law are all **killed** in the same instant . **Todd** finally reveals himself to the Indians . **He** tells them that he was the one who **killed** the **three brothers** .

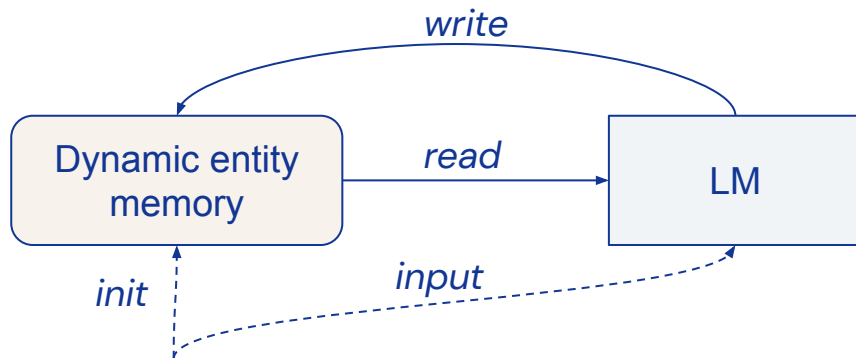
Entity consistency

Entity-aware Narrative Generation

Proposal: Augmenting pre-trained LM with a **dynamic entity memory**

- Promising results in small RNN-based models

(Ji et al., 2017; Clark et al., 2018)



Sarah King [SEP] AI community [SEP] internet [SEP] protector
entity prompt

How Do We Measure Progress?

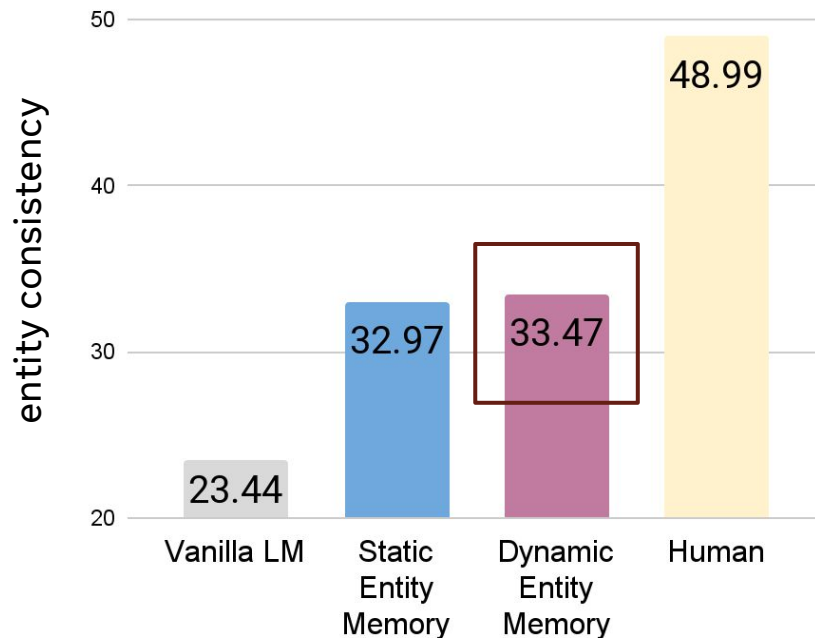
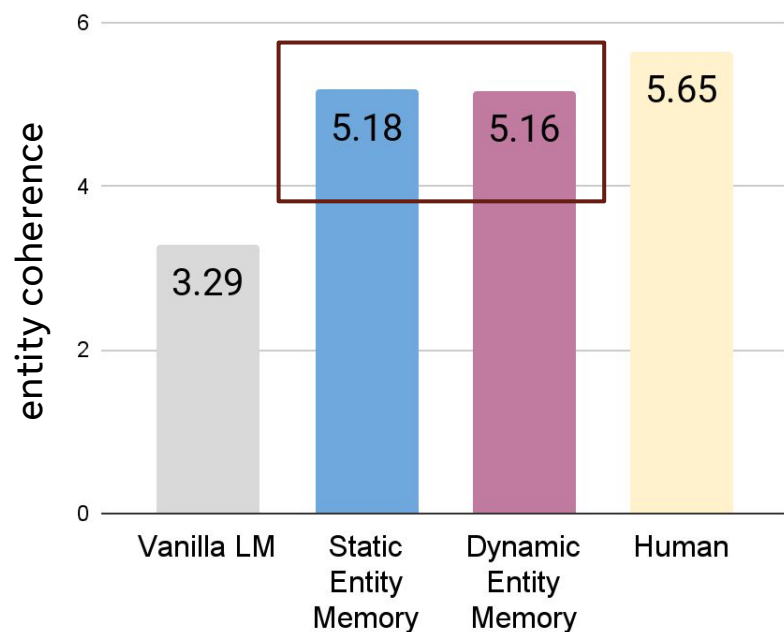
We introduce **new automatic metrics** for quantifying:

- Long-range **entity coherence**
- Entity **consistency**

$$\mathcal{C}_i = s_{l_i} - s_{f_i}$$

$$\mathcal{V}_i = \frac{|\bigcup_{j=1, i \in E_j}^N \mathcal{A}_j| - |\bigcup_{j=1, i \in E_j}^N \mathcal{A}_j \cap \bigcup_{j=1, i \notin E_j}^N \mathcal{A}_j|}{|\bigcup_{j=1, i \in E_j}^N \mathcal{A}_j|}$$

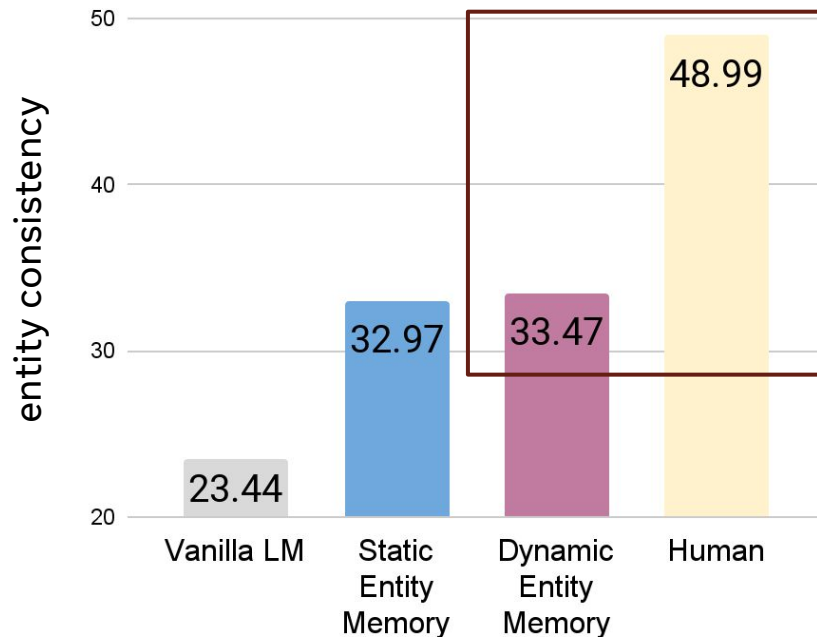
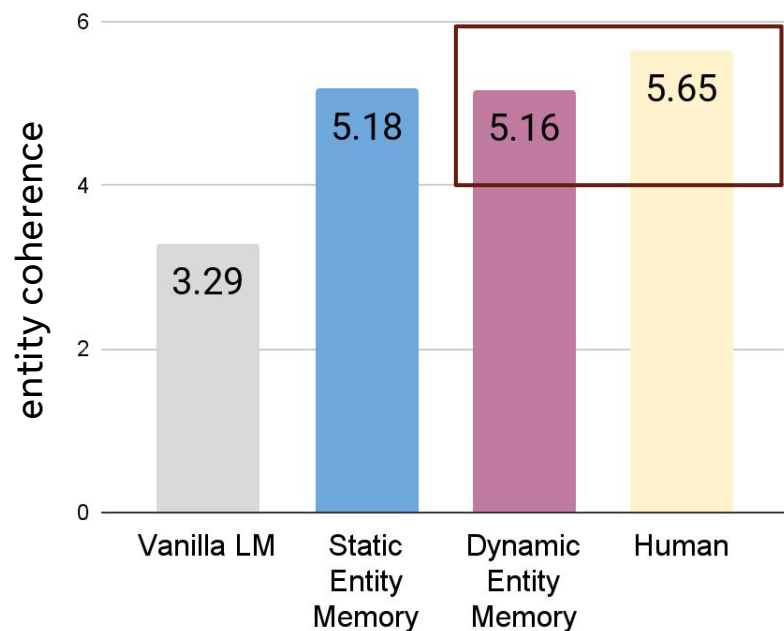
Entity Memory Improves Coherence and Consistency



WikiPlots dataset^[1]

^[1] <https://github.com/markriedl/WikiPlots>

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More Results

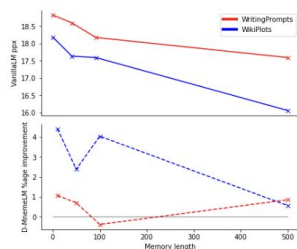
Automatic Metric	Human Aspect	$r_a \uparrow$	$r_h \uparrow$
Exact match	Control	0.17	0.22
Subset match	Control	0.19	0.22
\mathcal{C}	Coherence	0.32	0.22
\mathcal{V}	Consistency	0.08	0.09
—	Fluency	—	0.19

Model	Cont \uparrow	Coh \uparrow	Cons \uparrow	Flu \uparrow	Ranking \downarrow	Best \uparrow	Worst \downarrow
VANILLA LM	2.81	2.36	3.07	3.81	2.11	28.77	39.41
S-MNEMELM	3.06	2.59	3.05	3.83	1.89	37.08	26.03
D-MNEMELM	3.02	2.54	3.00	3.75	2.00	34.14	34.55

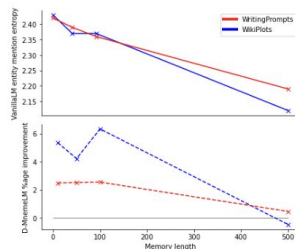
Prompt	'Comanche' Todd, a white man who has lived most of his life among the Indians ; Harper's three brothers; a wagon train led by Colonel Normand; Sheriff Bull Harper; Apaches; the survivors; the Indians ; Jenny. The novel is divided into three parts, each focusing on one character in different time periods. "Communitarian Invasion" revolves around the colonial era, which was dominated by the Chief Abner Union and was strongly associated with anti-Indian sentiment. "The Confederate Invasion" follows the events leading up to the Battle of the Little Bighorn during the American Civil War.
VANILLA LM	[...] Massive volcano erupts in the Philippines in Kaliapi volcano eruption. An underwater eruption happens about an hour ago. Due to the constant motion of the eruption there are several unexplored areas where we are told to dig around the volcano in the short period of time.
S-MNEMELM	Sheriff Bull Harper (George Mathews) arrives at the scene of the accident and tells Todd to call the authorities. Todd instead calls the sheriff, who leads him to a pond in the middle of nowhere, where the tribe's chief offers to take him and Jenny to the church where they have been staying. Todd is taken to the temple and has to work as a porter. As he gets up from work he finds his shoes on the ground. [...] Todd sees that the Indian guards are getting on the wagon train and tries to get them to stop it. He also hears the sirens that are going off and sees the Indians on the road. He rushes into the tribe's hospital and sees Jenny's little brother Billy.
D-MNEMELM	In 1915, Robert Bulky (Brian O'Hara) is a case that divides friends. Following the funeral of the murdered Techaparian , Ticket (John Derrick) was approached to testify at a preliminary hearing. Later, on the Southward Grounds, he hears a rumor of an alleged killing of the Techaparian by a group of people led by Colonel Normand (Douglas Kennedy). The rumor comes to the attention of Sheriff Bull Harper (George Mathews). [...] Joseph and Claire are arrested for murder, and they are placed in jail. Claire finds out that the Techaparian was shot dead by an unknown assailant in a home, and that he's also missing. Claire visits the Techaparian farm where he and his wife lived, and finds a note that reads, "Till all my souls are returned".

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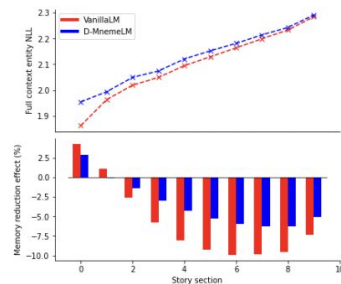
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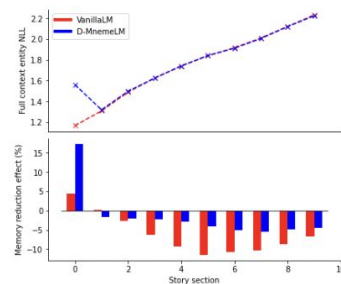
(a) Perplexity.



(b) Uncertainty of entity mentions.



(a) WritingPrompts.



(b) WikiPlots.

Thank you!