Content Planning for Neural Story Generation with Aristotelian Rescoring

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Motivation

Prompt: *Earth has gained a new season, unlike anything currently known.*

Human Written Story:
Giant concrete monoliths peaking as high as mountains across the desert plains. Fire and sand whipping across night and day, day and night.
You can't sleep there. Every night, the sound of fire etching away at the walls like some schizophrenic in a jail cell. Getting closer, and closer, and closer.
Waking up in cold sweats. The light from the fire is too bright. Can't breathe on the tops of the walls. The air is too hot. It'll fry your lungs, scorch your skin, and melt your hair. We found that out the hard way.
We're not scientists. Just slaves. Trapped in concrete cells, lined with lead to keep the radiation out, to keep them out.

Motivation

Prompt: *Earth has gained a new season, unlike anything currently known.*

Generated (BART) Story*:

I was in my bed, in my own room, in the middle of a forest, when the world stopped.

It was the first time in my life that I had felt I had a sense of peace. My family and me, myself, were gone, we had all been taken from us. The only thing our family had left were the three children and my world, but my wife and I were the only survivors. There were we, the three of us. But ourselves, our children were all gone. And the only reason why me and our family survived was because ours had become ourselves..... No longer were you and I to be each other. Now we were just two. All our memories of us, all ours. Nothingness. Only all of us, and my children, each of us...

*Lewis et al (2019)

It was the first time in my life
that I had felt I had a sense of peace.

my wife and I were the only survivors.

The only thing our family had left were
the three children and my world

There were we, the three of us

Now we were just two

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It was the first time in my life
that I had felt I had a sense of peace.

X

The only thing our family had left were
the three children and my world

X

my wife and I were the only survivors.

X

There were we, the three of us

X

Now we were just two

my wife and I were the only survivors.

There were we, the three of us

my wife and I were the only survivors.

There were we, the three of us

Now we were just two

Now we were just two

in my own room

in the middle of the forest

It was the first time in my life
that I had felt I had a sense of peace.

my wife and I were the only survivors.

in my own room

✗

in the middle of the forest

It was the first time in my life
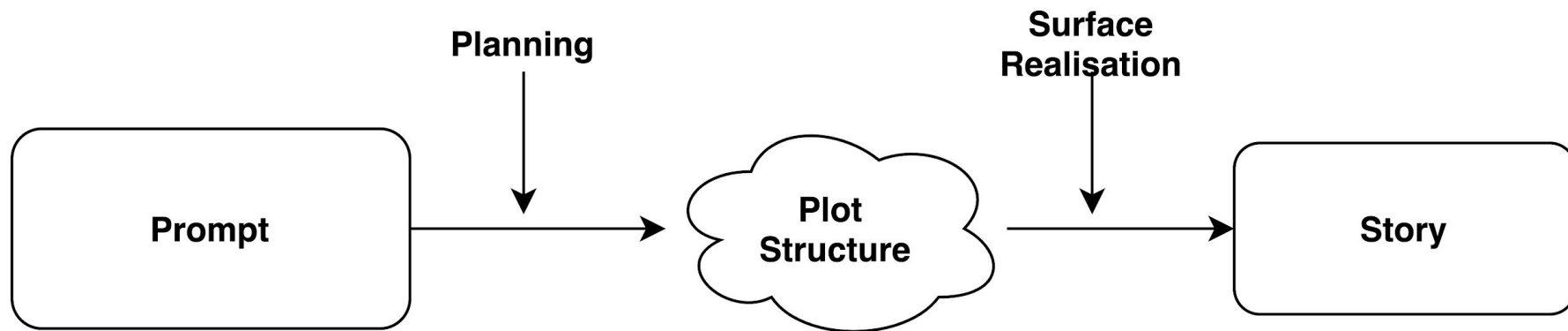that I had felt I had a sense of peace.

✗

my wife and I were the only survivors.

Structuring Story Generation

Fan et al (2019)

Story Structure

Yao et al. (2019), Martin et al. (2017), Fan et al. (2019)

Plot Structure Representations

```
<V> opened <A0> ent0 <A1> ent0 eyes
<V> looking <A0> to ent0 ent1
<V> found <A0> ent0
<V> clipped <A1> ent1
<V> flopped <A0> ent0 ears
<V> was <A0> the hunger <A1> gone
<V> clouded <A0> Confusion <A1> ent1 mind
<V> tilted <A0> ent0 <A1> ent2
<V> approached <A1> ent0 <A2> a nearby puddle
<V> looked <A0> ent0
```

I opened my eyes. Looking to my razor-sharp claws, I found that they were now neatly clipped. My ears flopped on either side of my head lazily, too soft and formless to hunt properly. Most of all, the hunger was gone. Confusion clouded my mind and I tilted my head instinctively. I approached a nearby puddle and looked in.

Fan et al. (2019)

Storyline (Extracted)	Carrie → bike → sneak → nervous → leg
Story (Human Written)	Carrie had just learned how to ride a bike. She didn't have a bike of her own. Carrie would sneak rides on her sister's bike. She got nervous on a hill and crashed into a wall. The bike frame bent and Carrie got a deep gash on her leg.

Yao et al. (2019)

Input (Previously Unseen)	Extracted Event(s)
He reaches out to Remus Lupin, a Defence Against the Dark Arts teacher who is eventually revealed to be a werewolf.	$\langle male.n.02$ get-13.5.1 $\emptyset$ $<NE>0\rangle$, $\langle ORGANIZATION$ say-37.7-1 monster.n.01 $\emptyset\rangle$

Martin et al. (2017)

Human Written Story

Giant concrete monoliths peaking as high as mountains across the desert plans. Fire and sand whipping across night and day, day and night.

You ca n't sleep there. Every night, the sound of fire etching away at the walls like some schizophrenic in a jail cell. Getting closer, and closer, and closer.

Waking up in cold sweats. The light from the fire is too bright. Ca n't breathe on the tops of the walls. The air is too hot. It'll fry your lungs, scorch your skin, and melt your hair. We found that out the hard way.

We're not scientists. Just slaves. Trapped in concrete cells, lined with lead to keep the radiation out, to keep them out

Extracted Plot

<A1> ent 1 and sand <V> whipping </s> <A0> You <V> sleep </s> <A1> the sound of fire <V> etching </s> [...] </s> <A0> ent 2 <V> fry <A1> your lungs # <A0> ent 2 <V> scorch <A1> your skin # <A0> ent 2 <V> melt <A1> your hair </s> <A0> ent 3 <V> found <A1> that </s> </s> </s> <V> Trapped <A2> lined with lead to # <V> lined <A2> with lead # <V> keep <A1> the radiation <A2> out # <V> keep <A1> them <A2> out

Human Written Story

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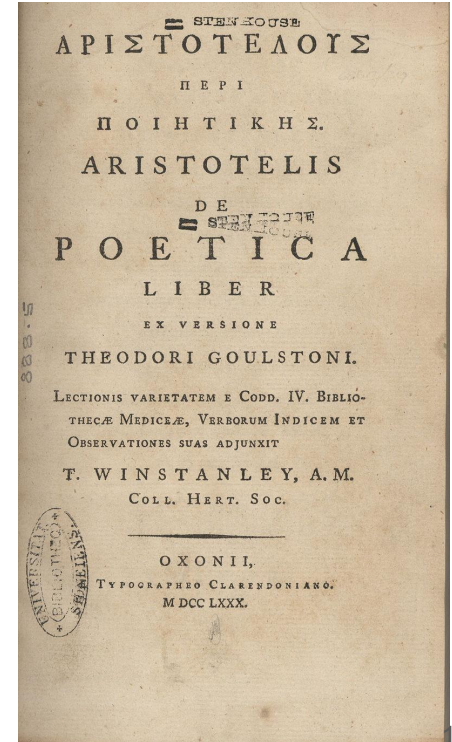We're not scientists. Just slaves. Trapped in concrete cells, lined with lead to keep the radiation out, to keep them out

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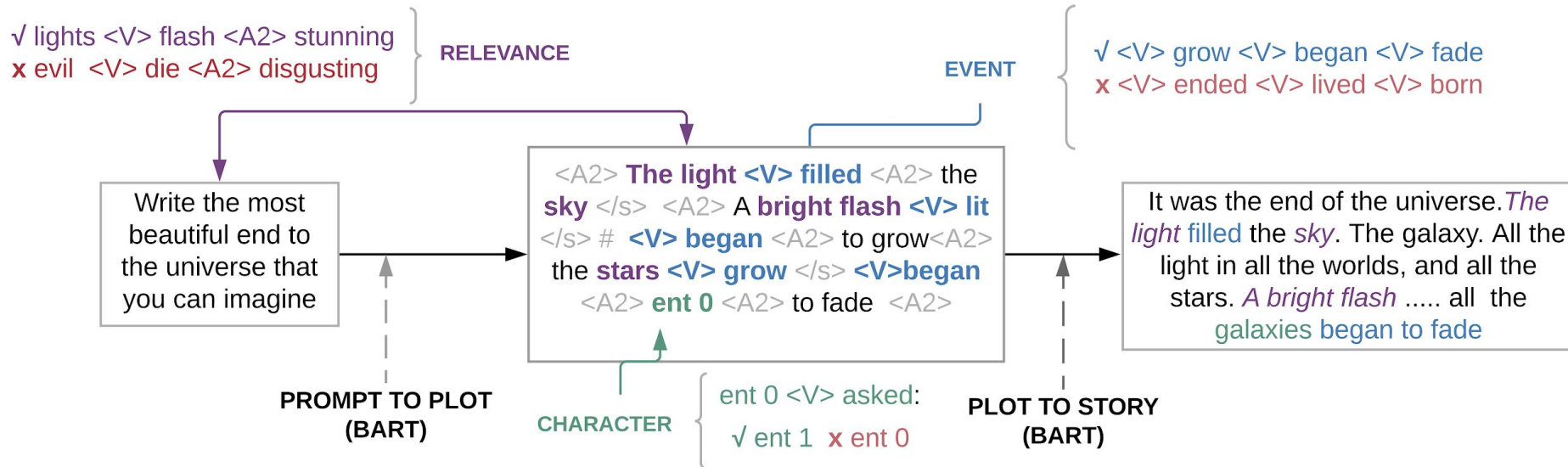
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Aristotelian Principles (from *Poetics*)

1. event choice and event arrangement
2. character
3. relevant content
4. diction

System Diagram

ARISTOTELIAN RESCORERS (RoBERTa)

√ lights <V> flash <A2> stunning
x evil <V> die <A2> disgusting

RELEVANCE

EVENT

√ <V> grow <V> began <V> fade
x <V> ended <V> lived <V> born

Write the most beautiful end to the universe that you can imagine

<A2> **The light <V> filled** <A2> the **sky** </s> <A2> A **bright flash <V> lit** </s> # **<V> began** <A2> to grow<A2> the **stars <V> grow** </s> **<V>began** <A2> **ent 0** <A2> to fade <A2>

It was the end of the universe.*The light* filled the *sky*. The galaxy. All the light in all the worlds, and all the stars. *A bright flash* ..... all the galaxies began to fade

PROMPT TO PLOT (BART)

CHARACTER

ent 0 <V> asked:
√ ent 1 x ent 0

PLOT TO STORY (BART)

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Training Rescorers: Event - Inter Shuffle

Prompt: *People gather around a campfire to tell the story of a legend ,who actually sits among them*

Positive

<A1> ent 0 orange glow <V> stood <A2> ent 6 night </s>
<A1> ent 3 <V> emanating <A2> ent 3 </s> <A0> ent 2 <V> felt <A1> the cold <A2> ent 2 their backs # <A0> ent 2 <V> faced <A1> ent 3 </s> <A1> ent 2 eyes <V> stayed <A2> upon the saving light # <A0> ent 4 <V> stared </s>...

Negative

<A1> ent 3 <V> emanating <A2> ent 3 </s>
 <A1> ent 8 <V> grew <A2> quieter , darker </s>
 <A2> ent 5 some <A1> ent 5 <V> came # <A0> a bearded , old man <V> drawing <A1> ent 11 <A2> close # <A1> ent 13 <V> burn </s>
 <A0> orange <V> glow # <A1> ent 1 <V> sat # <A1> ent 1 <V> paralyzed </s> ...

Training Rescorers: Event - Intra Shuffle

Prompt: *People gather around a campfire to tell the story of a legend ,who actually sits among them*

Positive

<A0> ent 2 <V> felt <A1> the cold <A2> ent 2 their backs # <A0> ent 2 <V> faced <A1> ent 3 </s> <A1> ent 2 eyes <V> stayed <A2> upon the saving light # <A0> ent 4 <V> stared </s>...

Negative

<A0> ent 2 <V> faced <A1> ent 3 # <A0> ent 2 <V> felt <A1> the cold <A2> ent 2 their backs </s> <A0> ent 4 <V> stared # <A1> ent 2 eyes <V> stayed <A2> upon the saving light </s>...

Training Rescorers: Event - Verb Shuffle

Prompt: *People gather around a campfire to tell the story of a legend ,who actually sits among them*

Positive

<A0> ent 9 <V> roamed <A1> the woods # <A0> ent 9 <V> consumed <A1> ent 6 of the night </s> <A0> The wind <V> began <A1> to blow with cold intention # <A1> The wind <V> blow # <A0> ent 7 <V> danced # <A1> ent 7 <V> shimmered # <A1> moonlight <V> began ...

Negative

<A0> ent 9 <V> consumed <A1> the woods # <A0> ent 9 <V> roamed <A1> ent 6 of the night </s> <A0> The wind <V> shimmered <A1> to blow with cold intention # <A1> The wind <V> began # <A0> ent 7 <V> danced # <A1> ent 7 <V> <V> blow # <A1> moonlight <V> began ...

Training Rescorers: Character (Entity)

Prompt: *People gather around a campfire to tell the story of a legend ,who actually sits among them*

Context:

<A0> ent 0 <V> saw <A1> the light of a campfire </s> <A1> ent 2 <V> laying <A2> there </s> <A1> horses <V> surrounding <A2> ent 2 # <A1> light <V> bouncing </s> <A0> ent

Positive	Negative
0	3

Training Rescorers: Relevance

Prompt: *People gather around a campfire to tell the story of a legend ,who actually sits among them*

Positive

\<A0> ent 0 \<V> saw \<A1> the light of a campfire \</s> \<A1> ent 2 \<V> laying \<A2> there \</s> \<A1> horses \<V> surrounding \<A2> ent 2 # \<A1> light \<V> bouncing \</s> \<A0> ...

Negative

\<A0> ent 2 \<V> asks \<A2> ent 0 \</s> \<A1> I \<V> ' \<A2> sorry # \<A0> I \<V> think \<A1> ent 0 can help you # \<A0> I \<V> help \<A1> ent 0 \</s> \</s> \<V> colored \<A1> toys \</s>...

Important Background Work:

Rescorer Performance

Plot Elements		XGB	CNN	RoBERTa
Relevance		55.2	56.0	**89.3**
Entity		64.1	76.0	**92.3**
Event	Inter-Shuffled	55.4	53.0	**96.6**
	Intra-Shuffled	58.5	75.0	**97.3**
	Verb-Shuffled	76.1	75.0	**95.8**

Table 2: Accuracy for training Rescorers using three different architectures.

Important Background Work:

Mixture Weight Training & Ranking Accuracy*

Rescorer	RA ↑	V:T ↑	E ↑
All 5	**0.43**	**2.07**	7.15
All 4 (-intra)	0.35	1.72	8.78
Inter-event	0.37	1.76	8.87
Intra-event	0.16	2.01	6.58
Verb-event	0.15	1.66	8.89
Entity	0.17	1.68	**9.18**
Relevance	0.17	1.71	8.89

Table 3: Ranking accuracy (RA) and generated plot metrics i.e Verb:Token ratio (V:T), Entities(E) for rescorer ablations

*Details and math for rescorer implementation and mixture weight training in the paper!

Evaluation Setup:

Train Prompts

An alien invasion happens during an alien invasion .

You are defending your home world from the alien invasion . The aliens are from Planet Earth . You are not .

Write an alien invasion story as us as the aliens .

Tell the story of how a baby stopped an alien invasion.

You are taken prisoner in an alien invasion of Earth

Test Prompts

A reverse alien invasion . Humanity invades a alien planet from the point of view the aliens .

An alien invasion occurs , but the alien technology and weaponry is ... different to what we would expect .

A alien invasion somehow managed to cripple the younger generations preventing them from fighting back . Now it is up to the forgotten , old and infirm to fight back .

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Test Prompts

A reverse alien invasion . Human invades a alien planet from the aliens view

An alien invasion technology and weaponry is we would expect .

A alien invasion cripple the younger g fighting back . Now the forg and infirm to fight back .

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Train Prompts

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Evaluation Setup:

Test Prompts

Write about a villain who goes through trauma and becomes an insane hero.

You are stranded on a desert island with a zombie. You decide you need to work together if you are going to escape.

You are a detective whose olfactory nerves are displaced in time - you smell the environment you're in as it was exactly 24 hours ago.

Death accidently kills the wrong person. That person files a lawsuit.

Attention Checks

The protagonist should be a villain → True

The protagonist should start out happy → False

The protagonist has some special powers or skills → True

The story is about death → True

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Test Prompts

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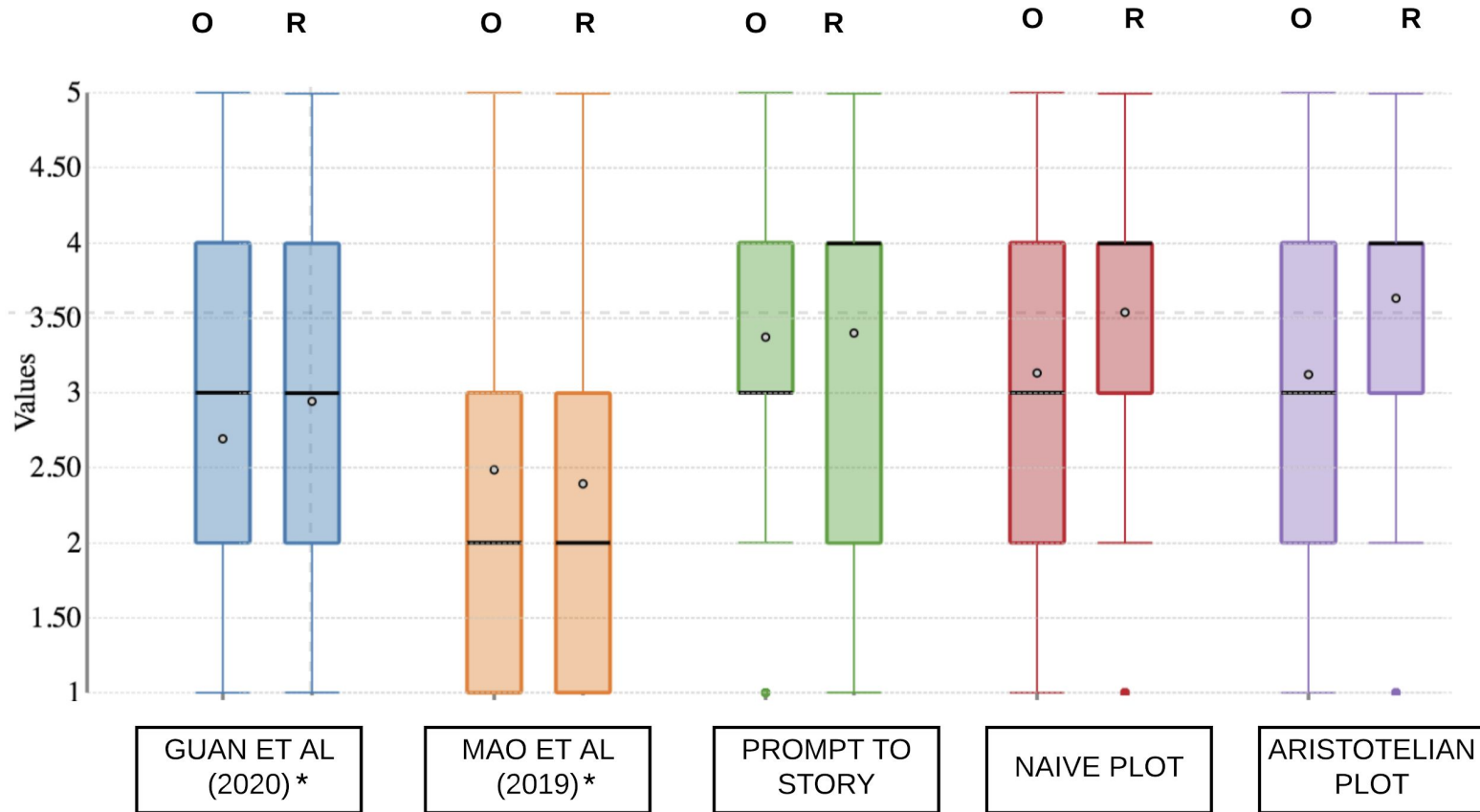Death accidently kills the wrong person. That person files a lawsuit.

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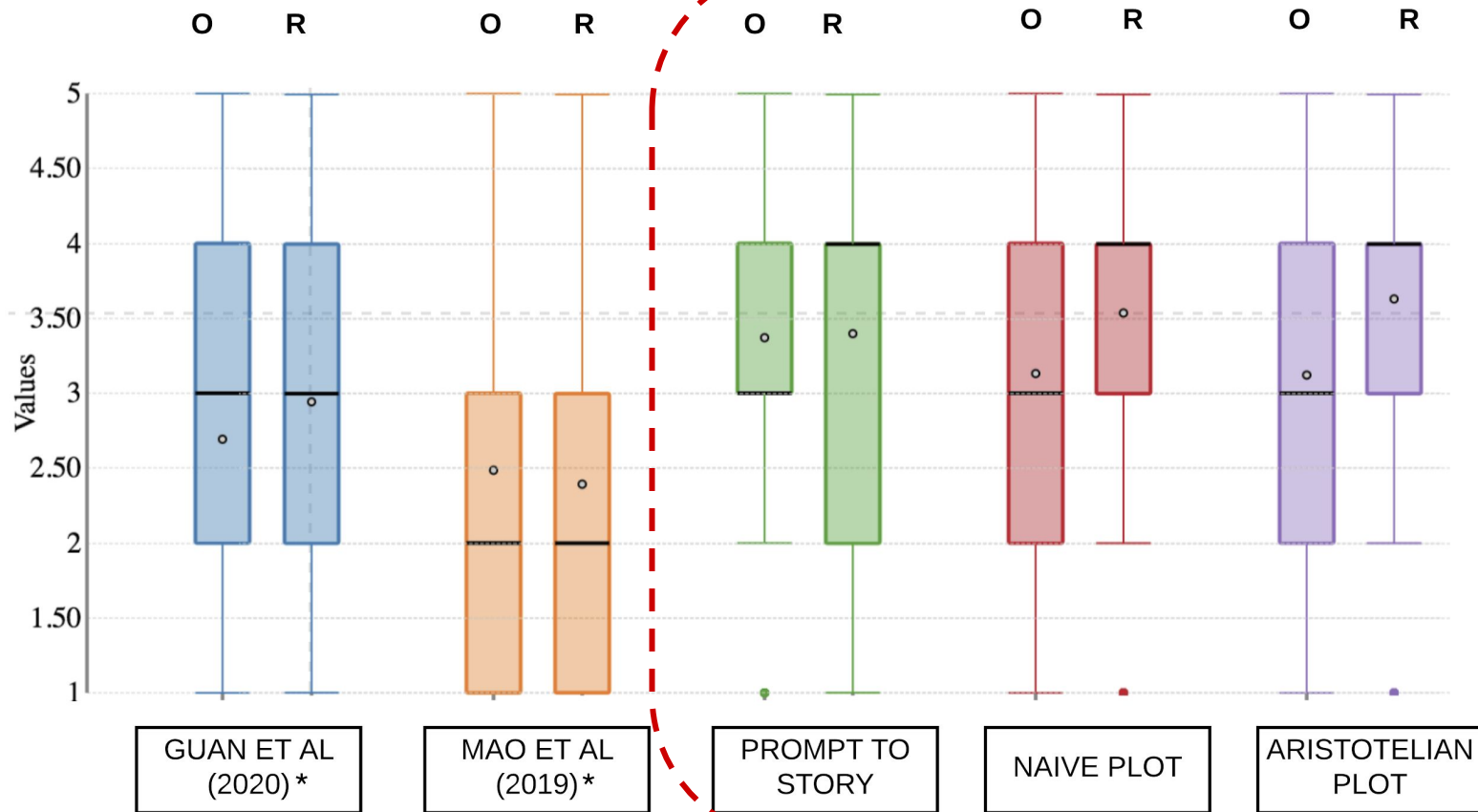
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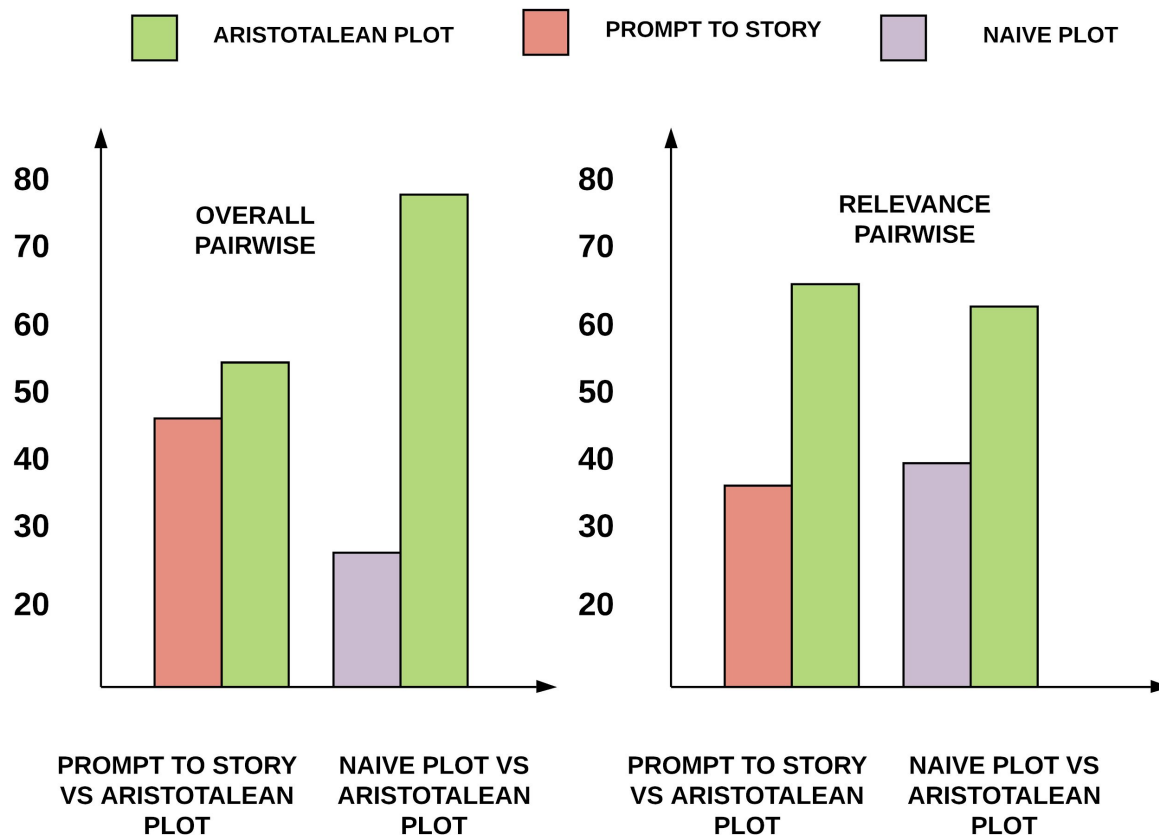# Results: Likert Evaluation (5 systems, 110 stories)

Results: Inconclusive!

Results: Pairwise Evaluation

Thank You!