

# Visualizing Nonlinear Narratives with Story Curves



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Disney



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Disney



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Harvard



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John A. Paulson  
School of Engineering  
and Applied Sciences



**THE UNIVERSITY  
of EDINBURGH**

# STORY

What is told

# NARRATIVE

How it is told

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# Pulp Fiction (1994)

R | 2h 34min | Crime, Drama | 14 October 1994 (USA)



8.9  
1,456,263



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1:21 | Tralier

7 VIDEOS | 135 IMAGES

# Narrative Order

#1



#2



#3



#4



#5



# Story Order

# Narrative Order

# Story Order

#2



#1



#5



#3



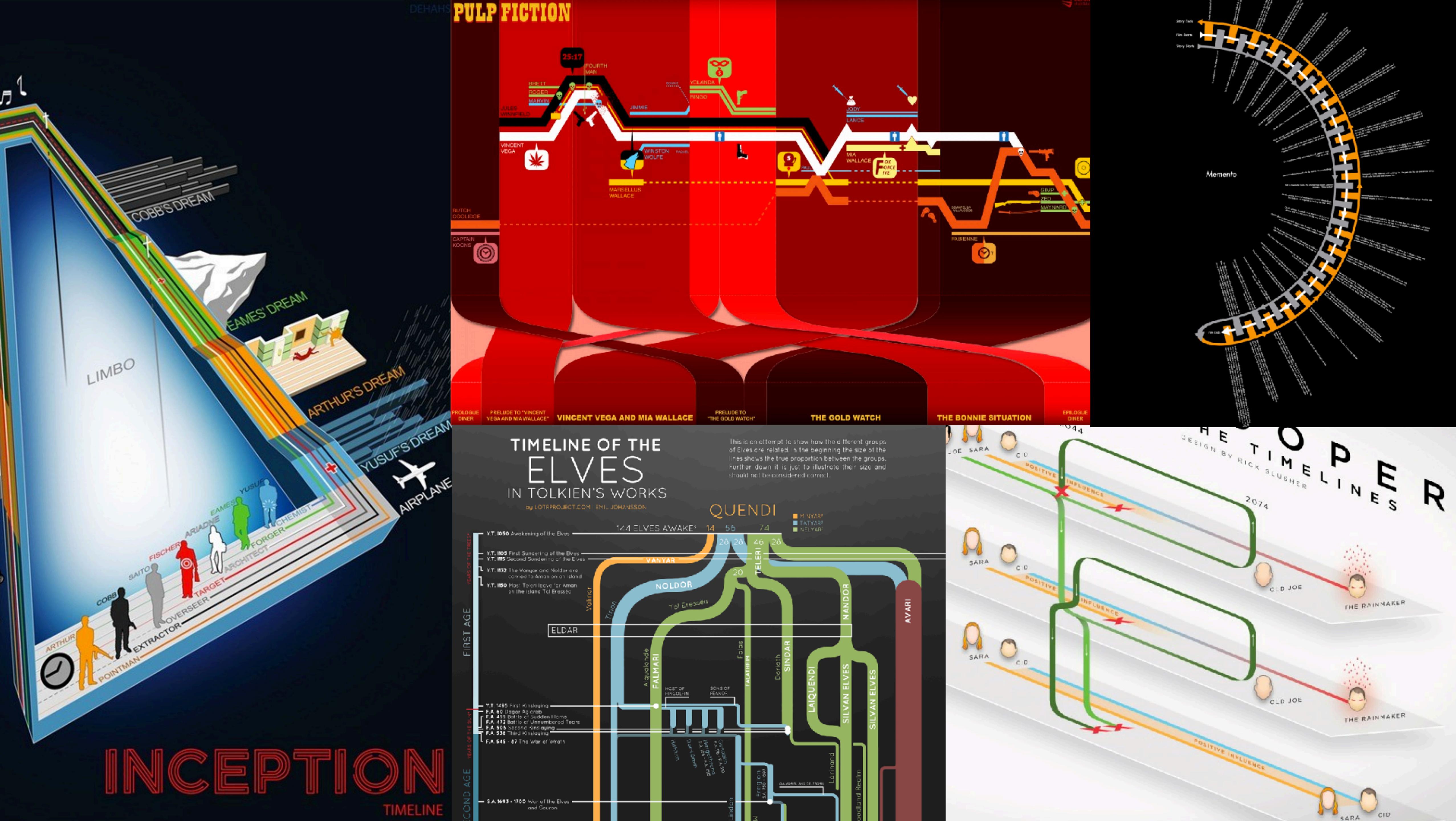
#4



# NONLINEAR NARRATIVE

Telling events out of chronological order





# GÉRARD GENETTE

French Literary Theorist (1930-)

Chronology

Retrograde

Flashback

Flash Forward

Zigzag

by GÉRARD GENETTE

How did Genette identify  
such basic nonlinear narrative patterns?

“

*Sometimes passing in front of the hotel he remembered the rainy days when he used to bring his nursemaid that far, on a pilgrimage. But he remembered them without the melancholy that he then thought he would surely some day savor on feeling that he no longer loved her. For this melancholy, projected in anticipation prior to the indifference that lay ahead, came from his love. And this love existed no more.* ”

p.38-40, ***Narrative Discourse: An Essay in Method***, Gérard Genette, 1980

- A** *Sometimes passing in front of the hotel he remembered*
- B** *the rainy days when he used to bring his nursemaid that far, on a pilgrimage.*
- C** *But he remembered them without*
- D** *the melancholy that he then thought*
- E** *he would surely some day savor on feeling that he no longer loved her.*
- F** *For this melancholy, projected in anticipation*
- G** *prior to the indifference that lay ahead,*
- H** *came from his love.*
- I** *And this love existed no more.*

A

B

C

D

E

F

G

H

I

A      B      C      D      E      F      G      H      I



A2 [B1] C2 [D1 (E2) F1 (G2) H1] I2

Flashforward

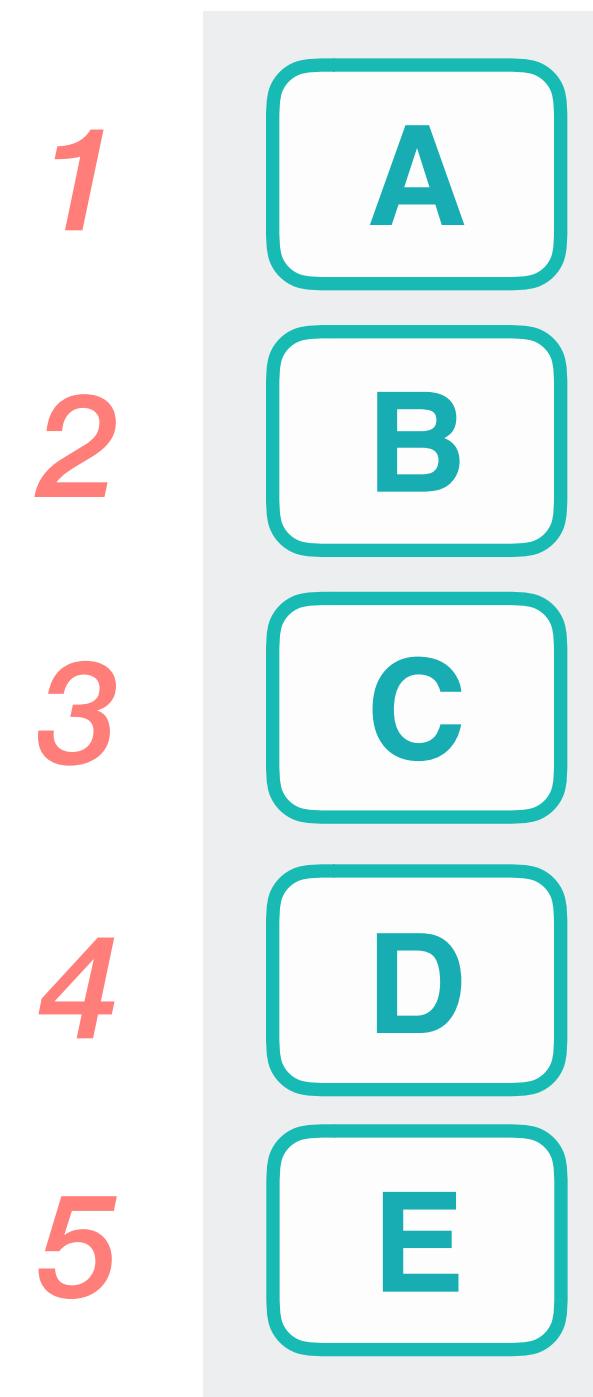
Flashback

Close reading of a text passage  
**does not scale** beyond a few sequences.

Develop a **distant reading technique** to  
reveal global narrative structures

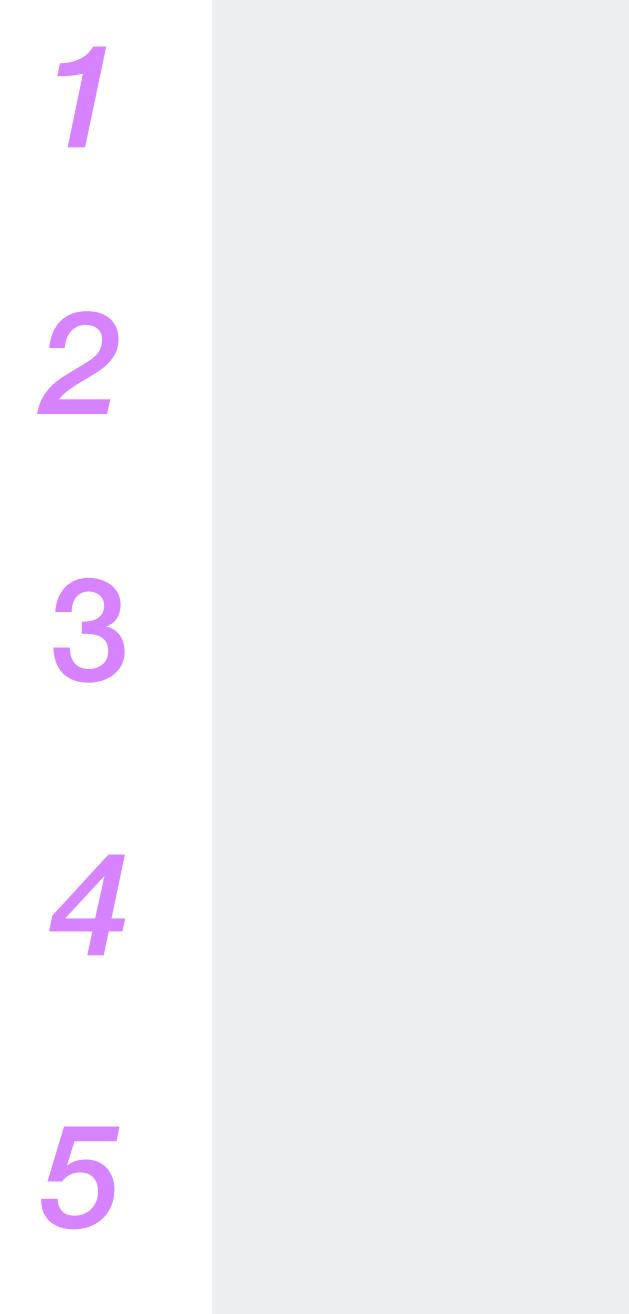
# STORY CURVES

## *Narrative Order*



*Events*

## *Story Order*



1 2 3 4 5



## *Narrative Order*

1  
2  
3  
4  
5

*Events*

## *Story Order*

1  
2  
3  
4  
5

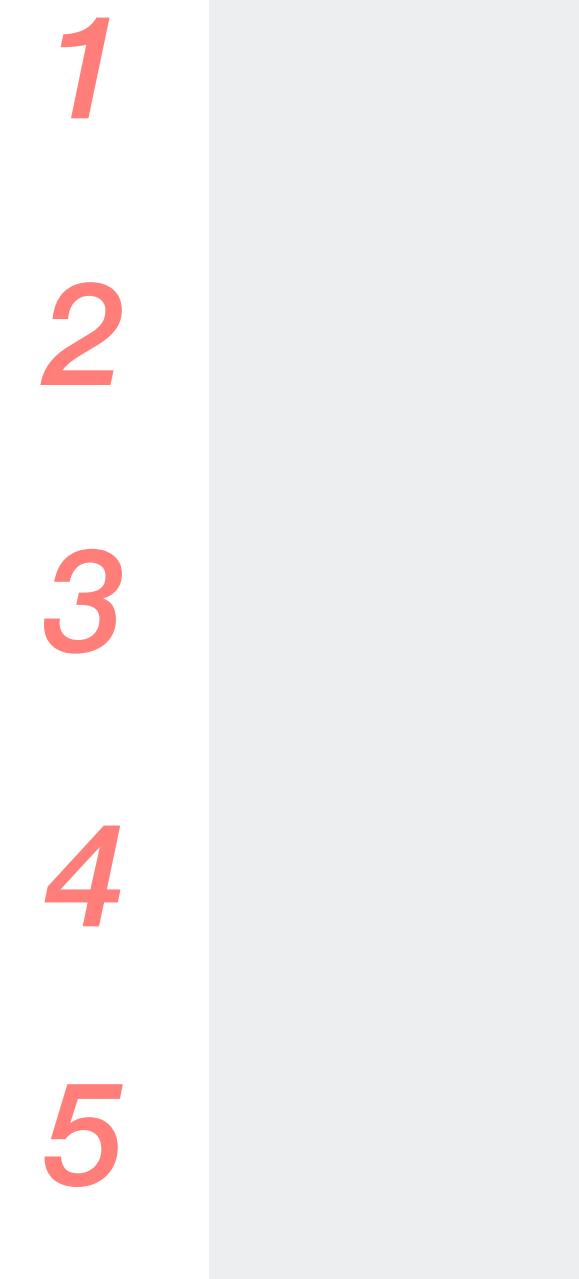
C  
D  
A  
B  
E

1  
2  
3  
4  
5

1  
2  
3  
4  
5

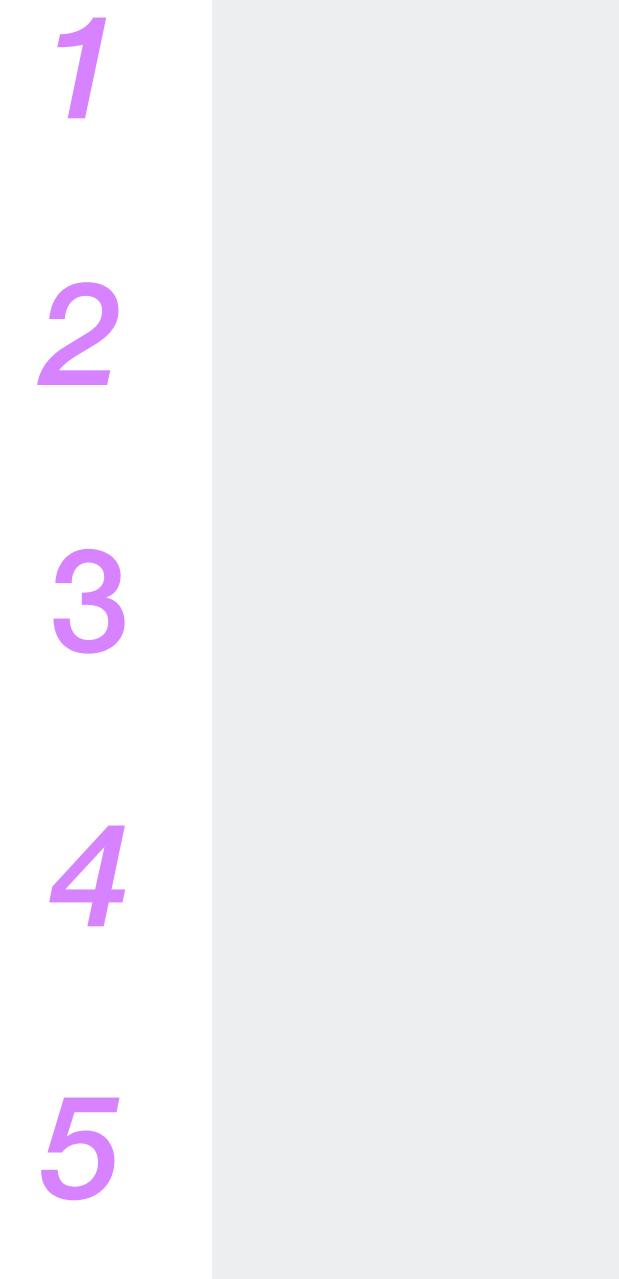


## *Narrative Order*

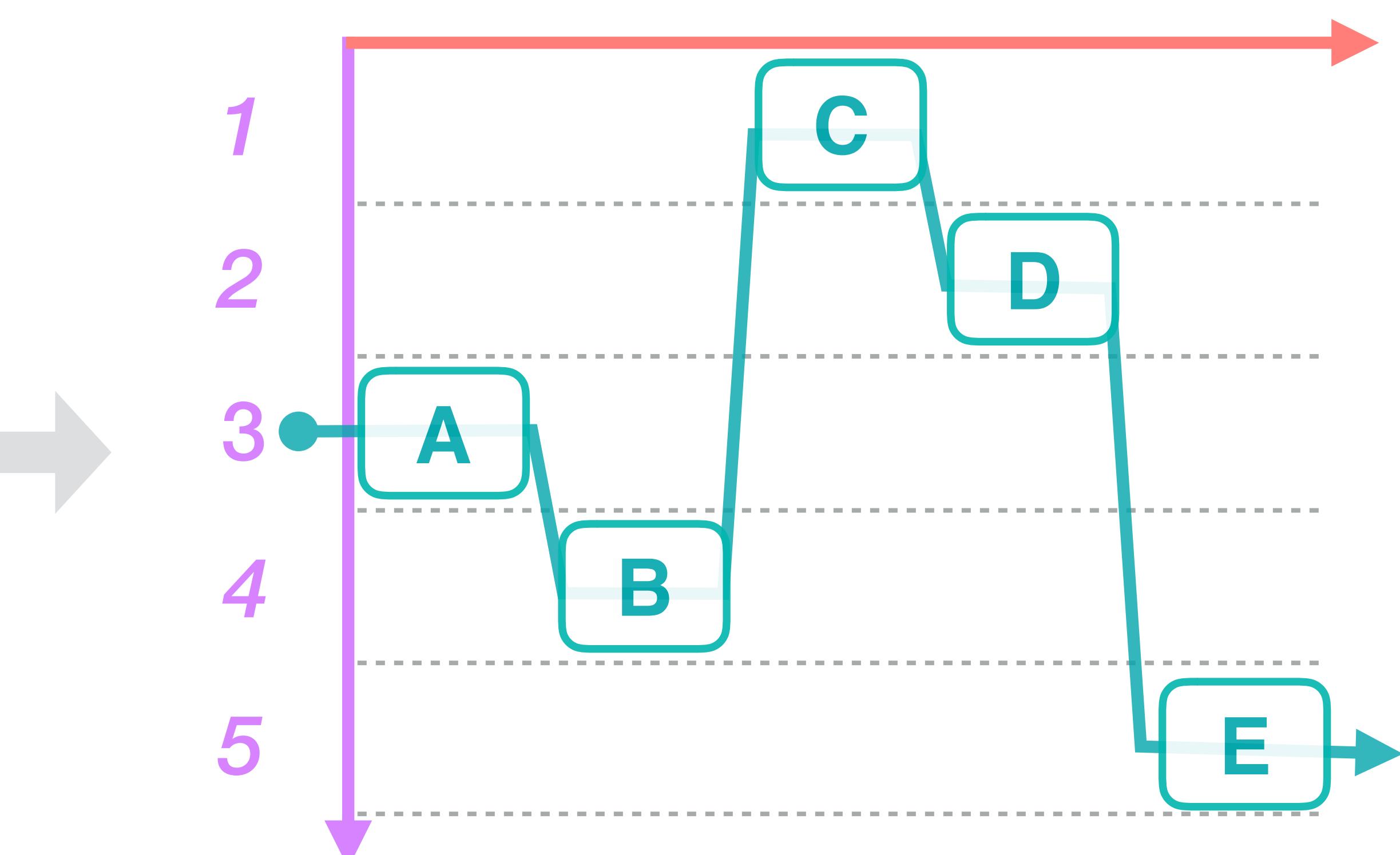


*Events*

## *Story Order*



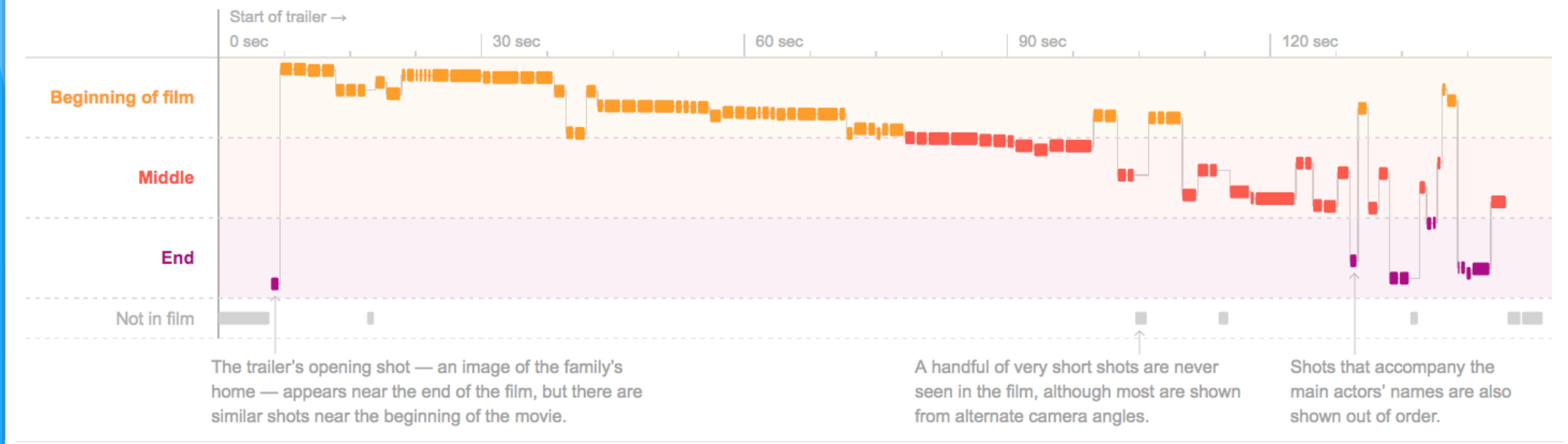
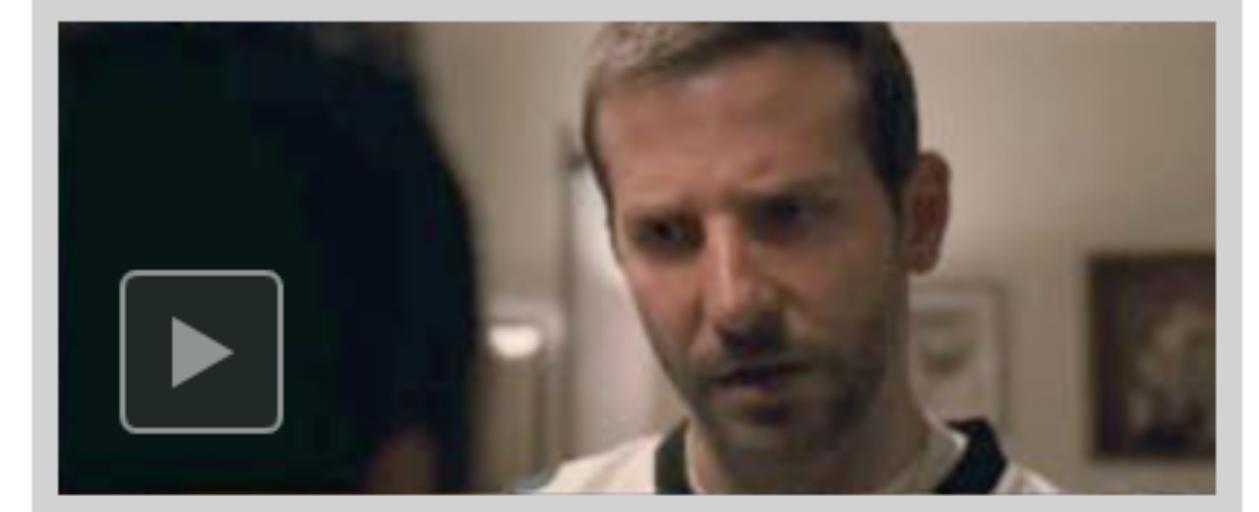
1      2      3      4      5



# INSPIRATION

## Silver Linings Playbook

“Silver Linings Playbook” follows the standard model for trailers, according to Bill Woolery, a trailer specialist in Los Angeles who once worked on trailers for movies like “The Usual Suspects” and “E.T. the Extra-Terrestrial.” While introducing the movie’s story and its characters, the trailer largely follows the order of the film itself.



*Dissecting a Trailer: The Parts of the Film That Make the Cut- New York Times, Feb 19, 2013*

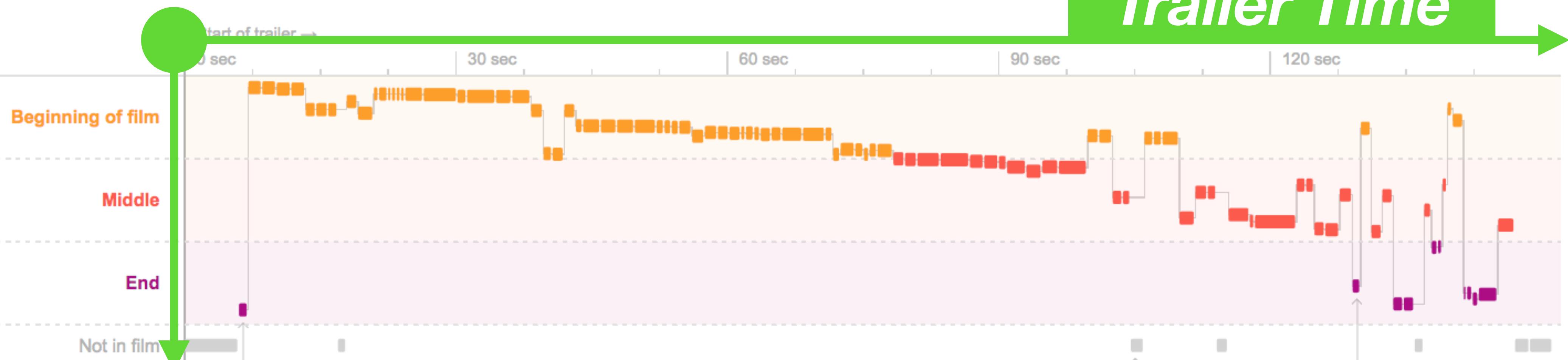
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## Trailer Time



## Movie Time

age of the family's  
the film, but there are  
the movie.

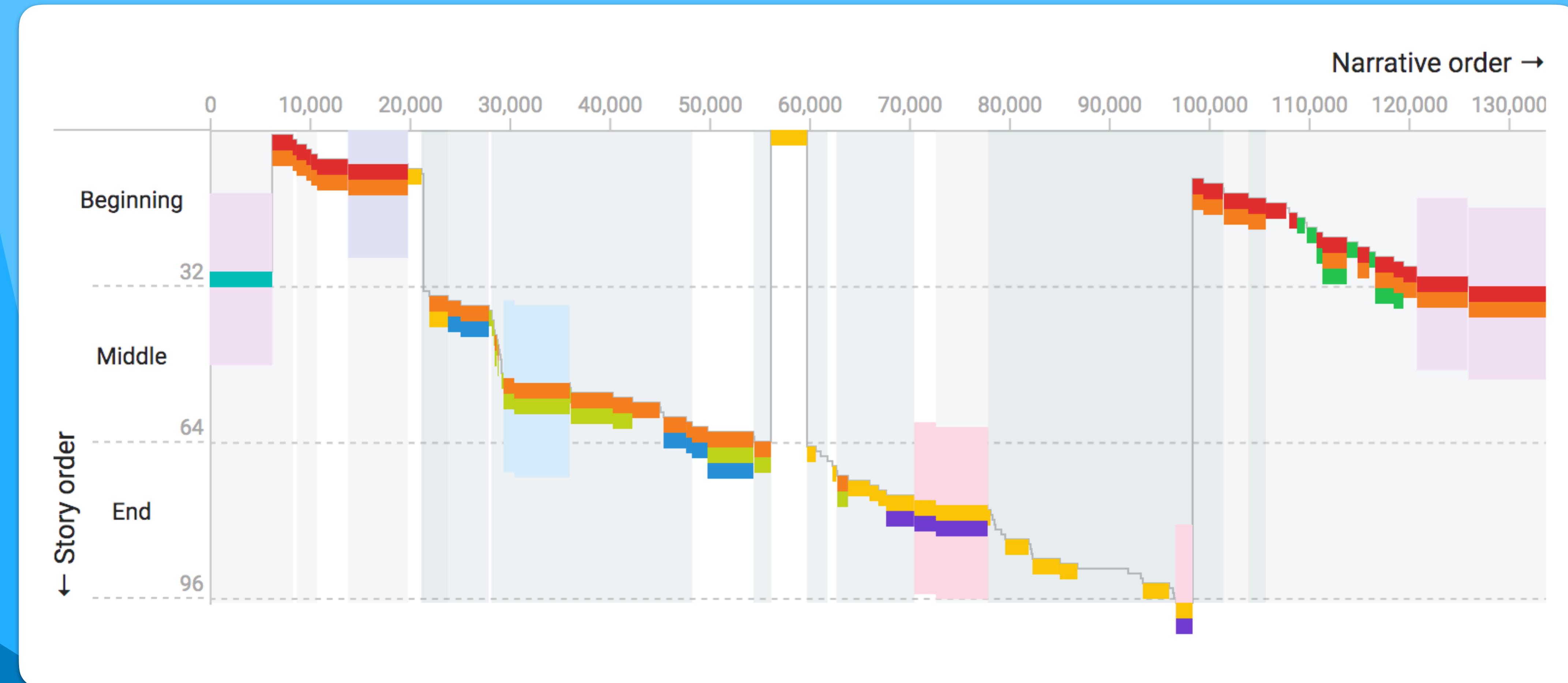
A handful of very short shots are never  
seen in the film, although most are shown  
from alternate camera angles.

Shots that accompany the  
main actors' names are also  
shown out of order.

*Dissecting a Trailer: The Parts of the Film That Make the Cut- New York Times, Feb 19, 2013*

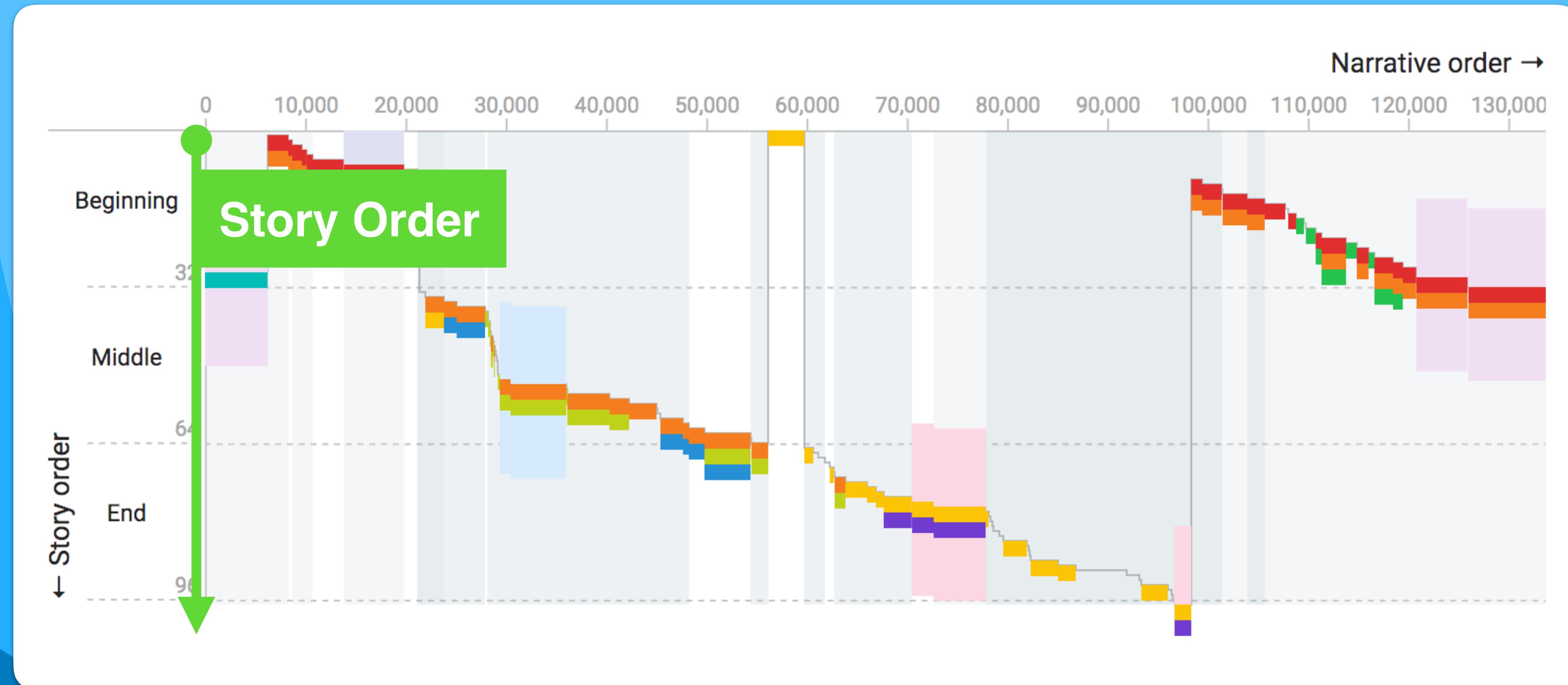
# PULP FICTION

Thriller, Crime | October 1994 | Directed by Quentin Tarantino



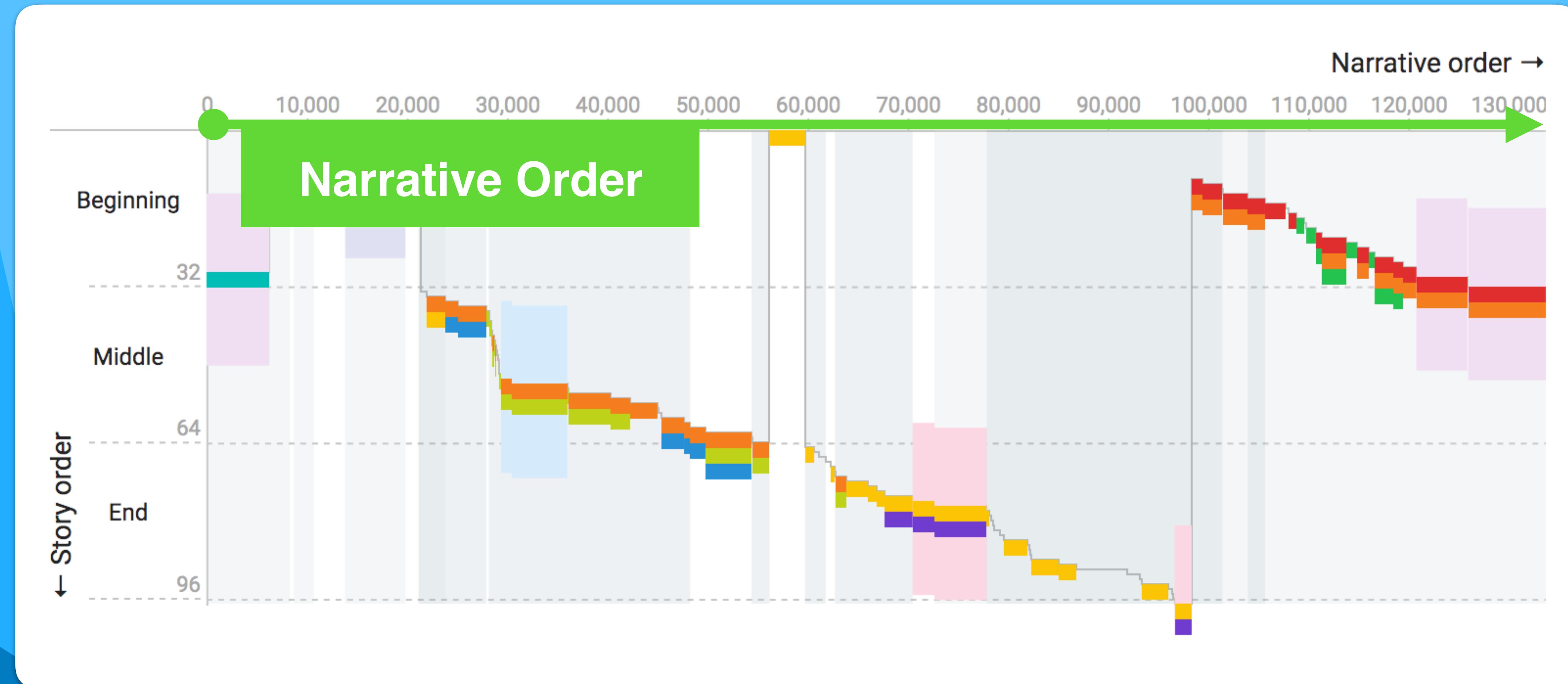
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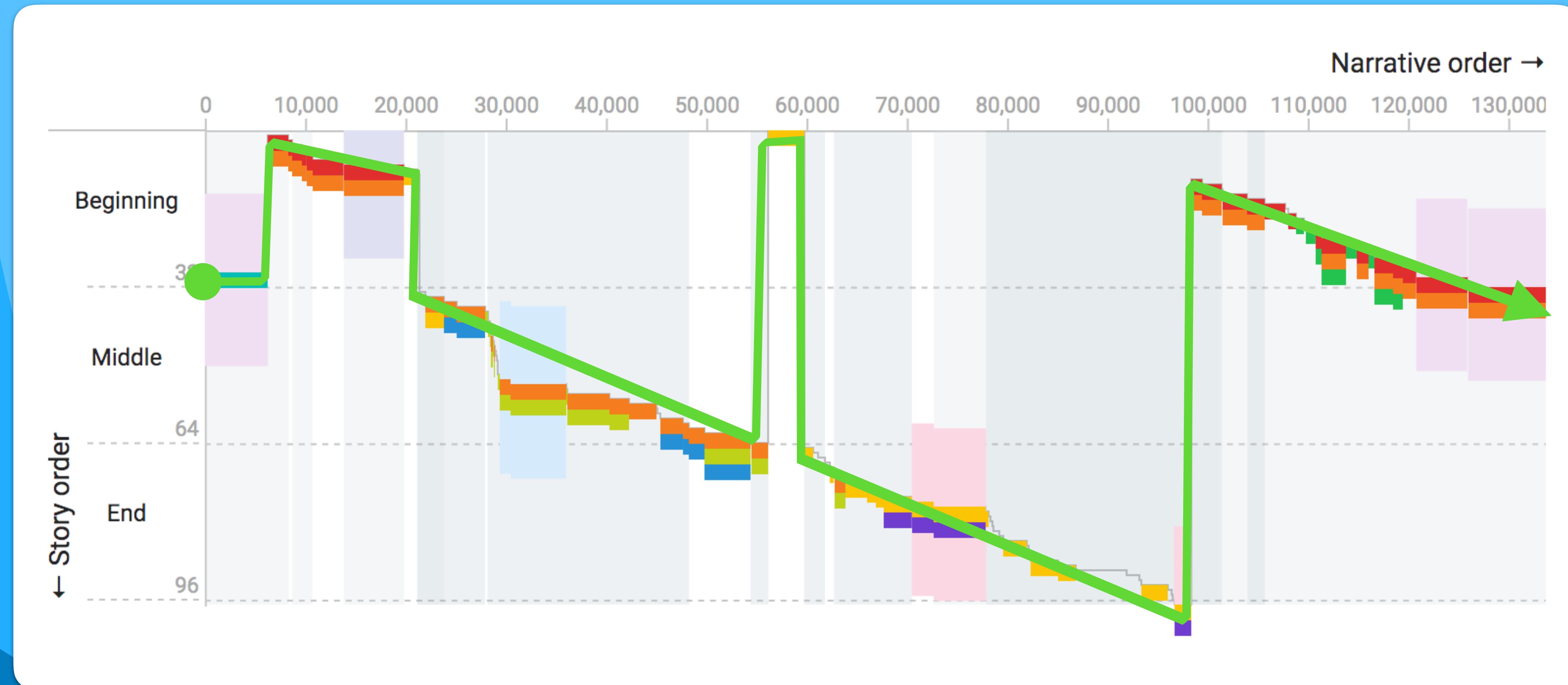
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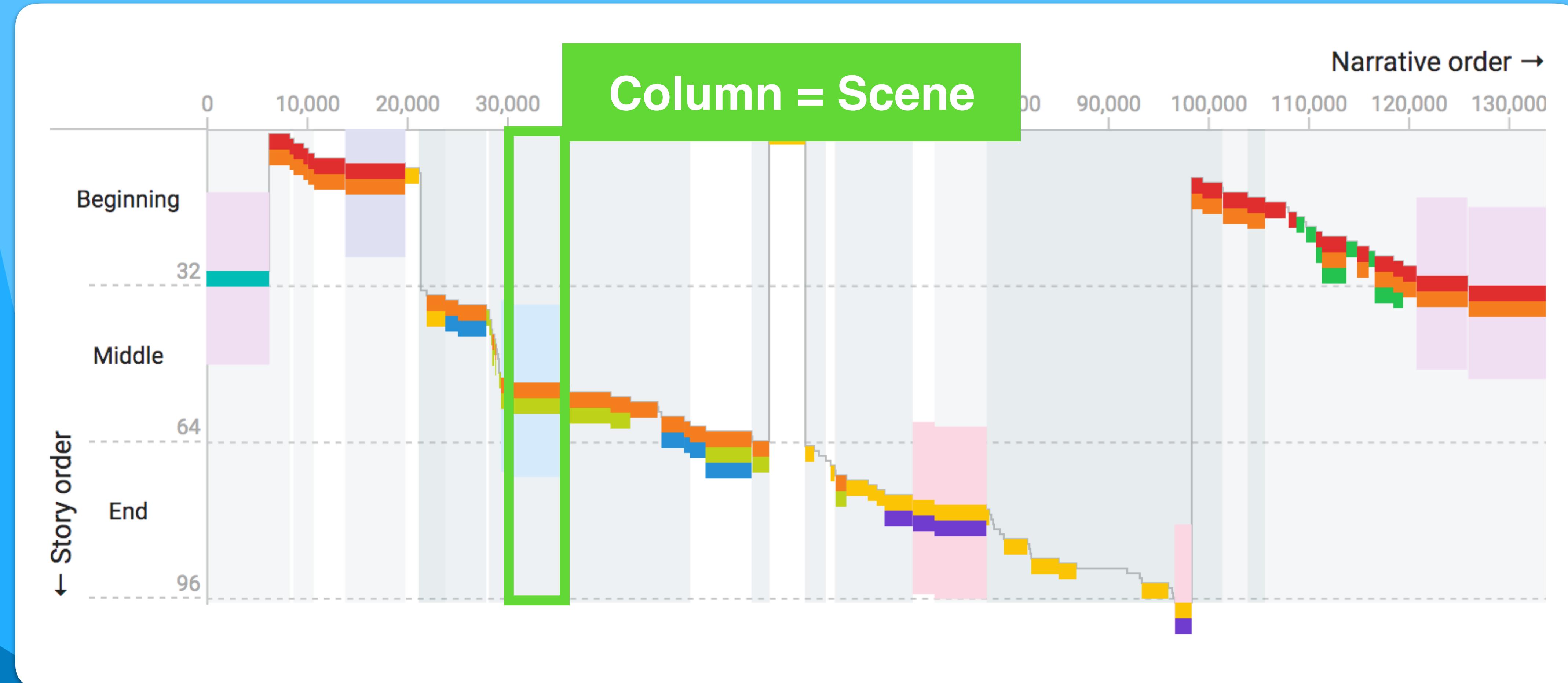
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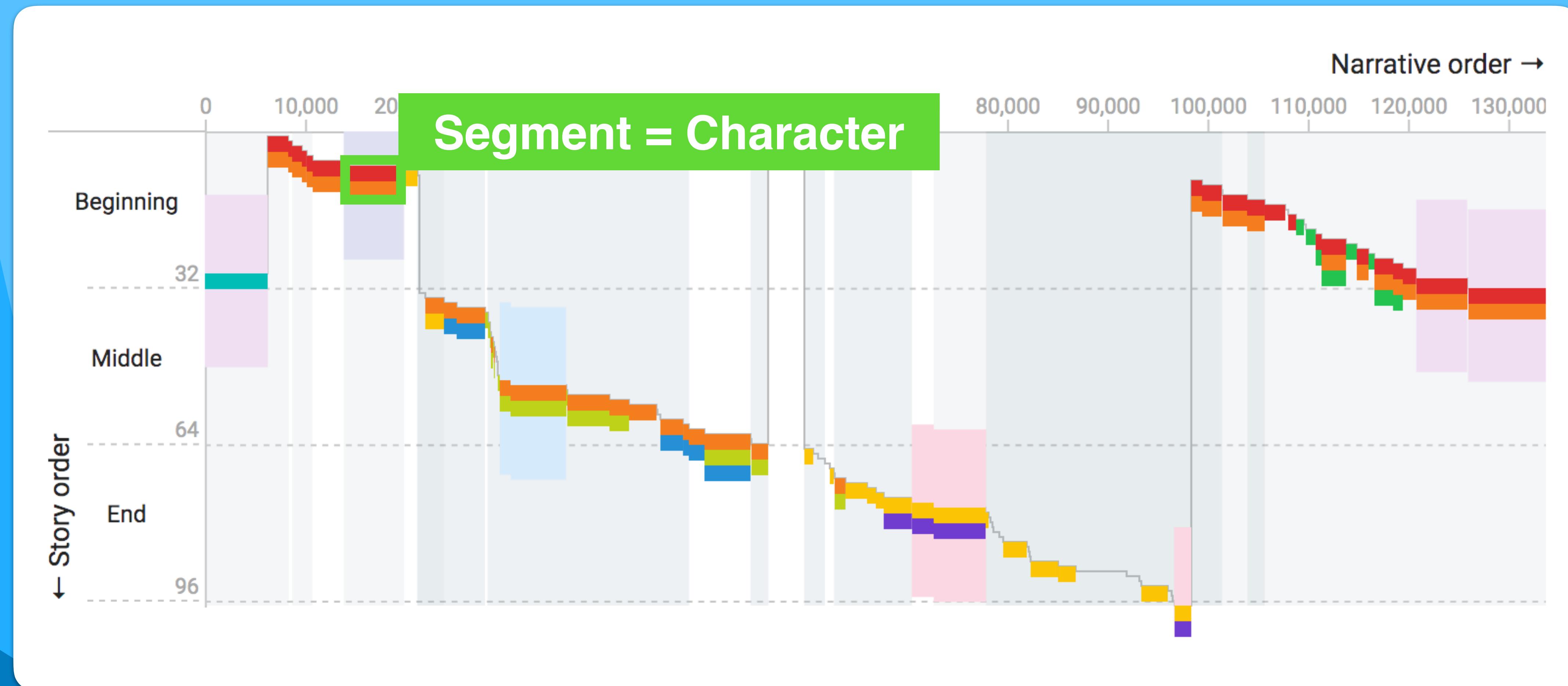
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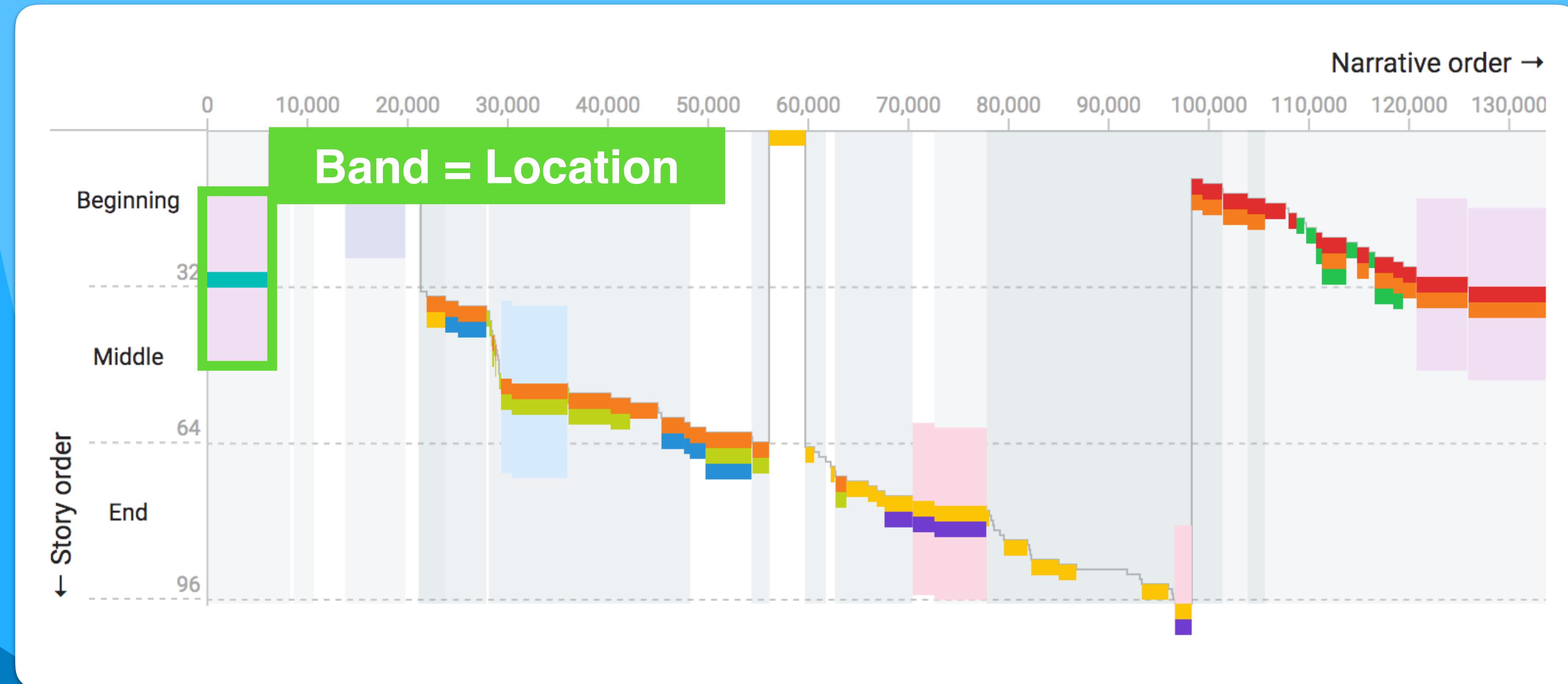
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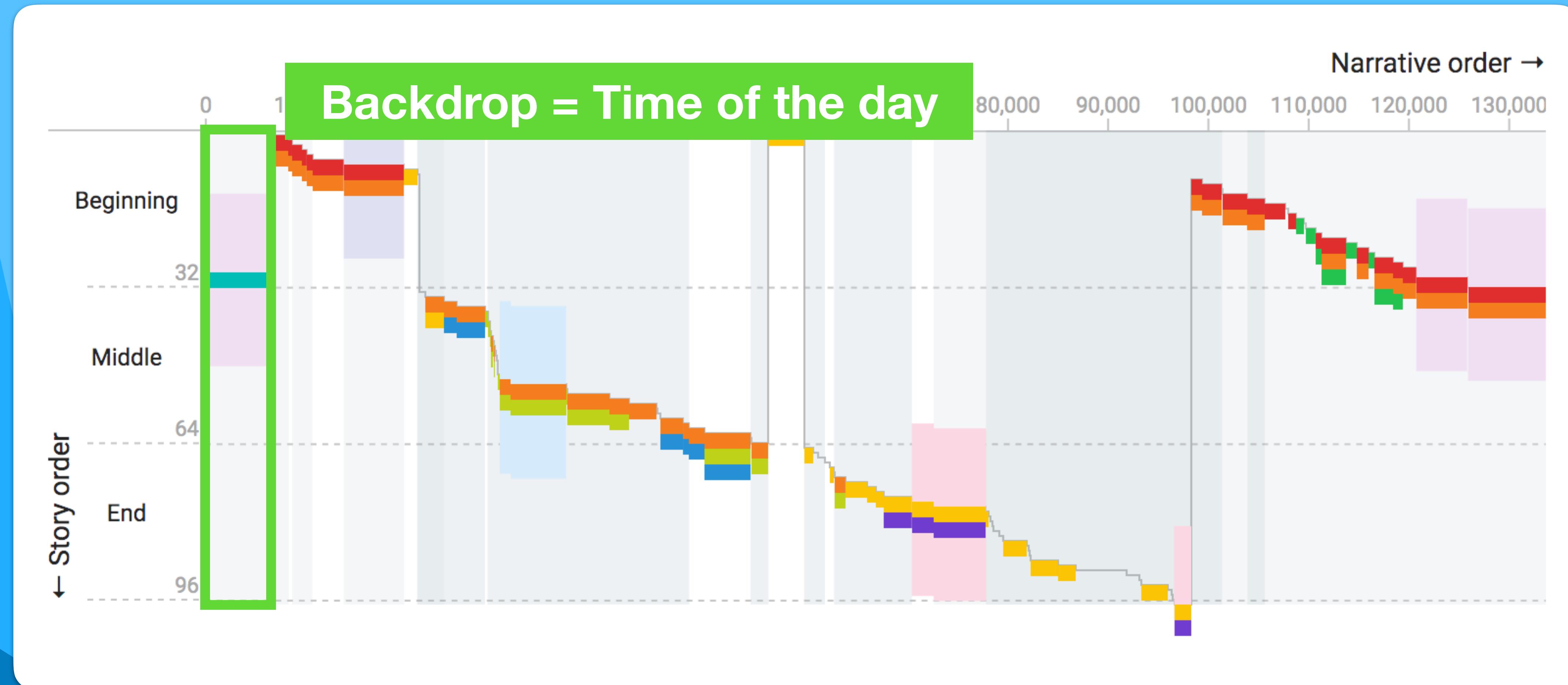
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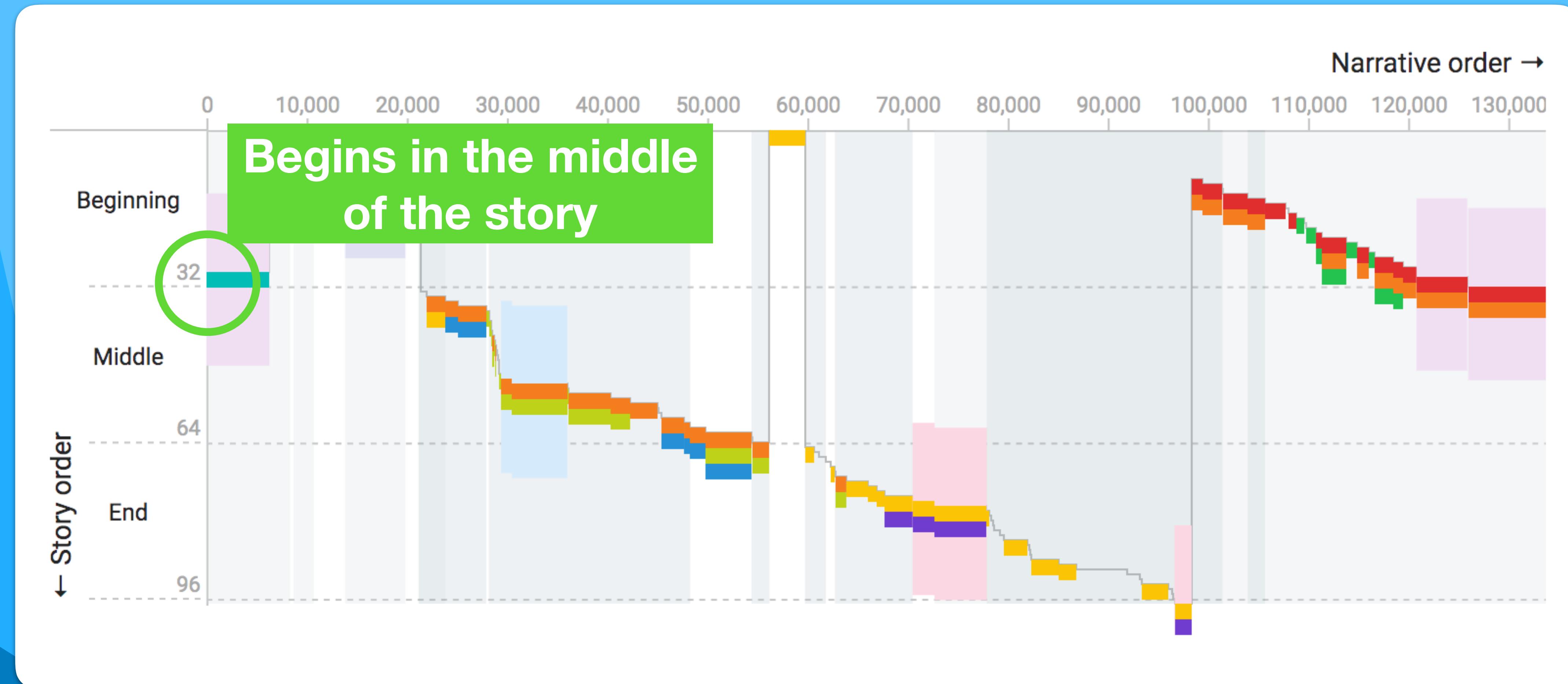
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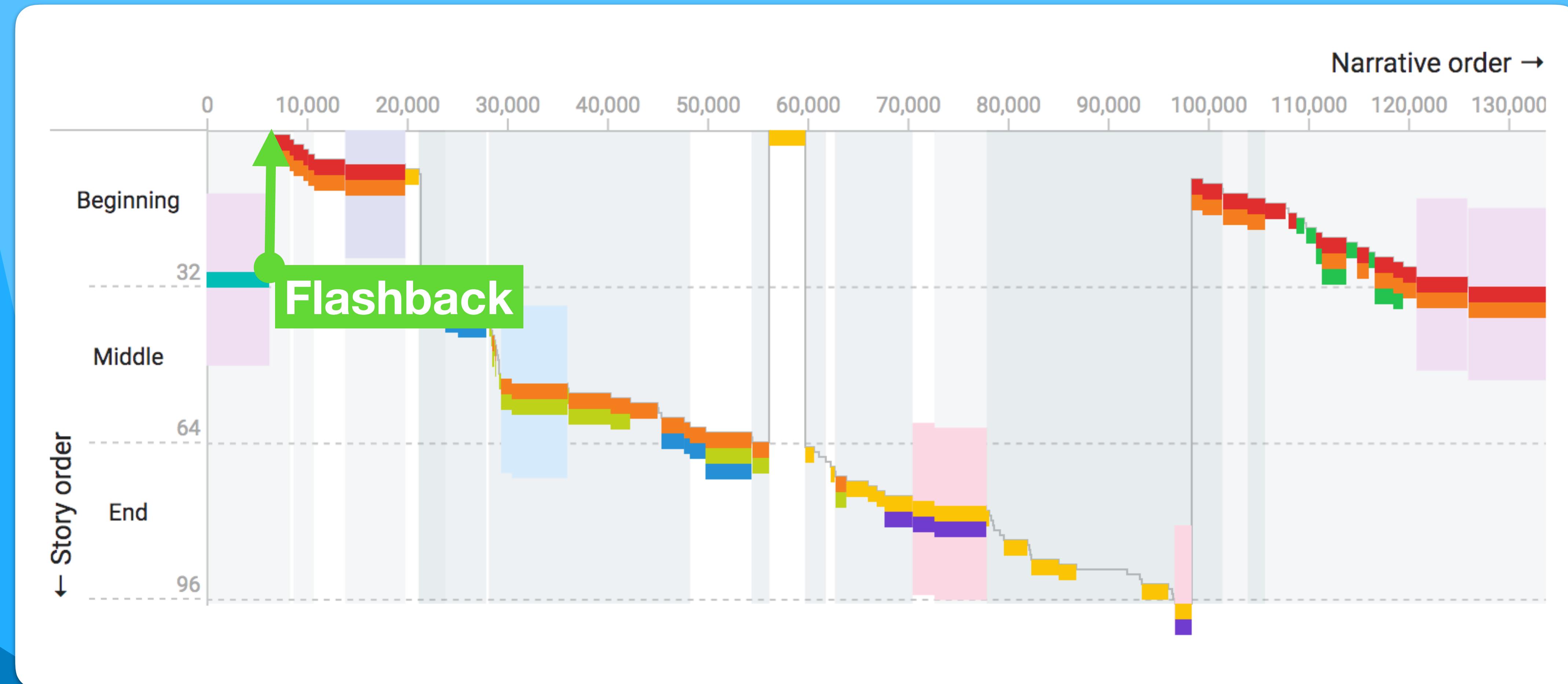
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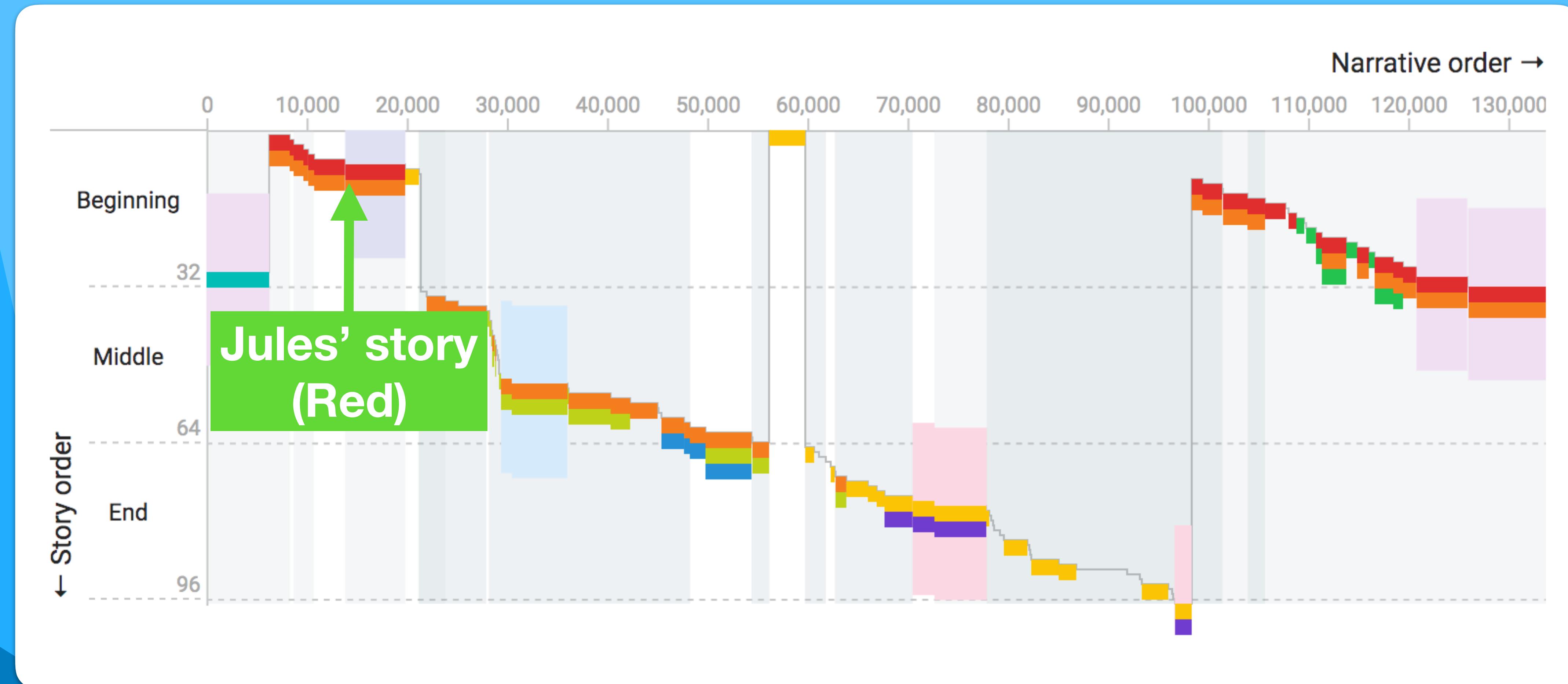
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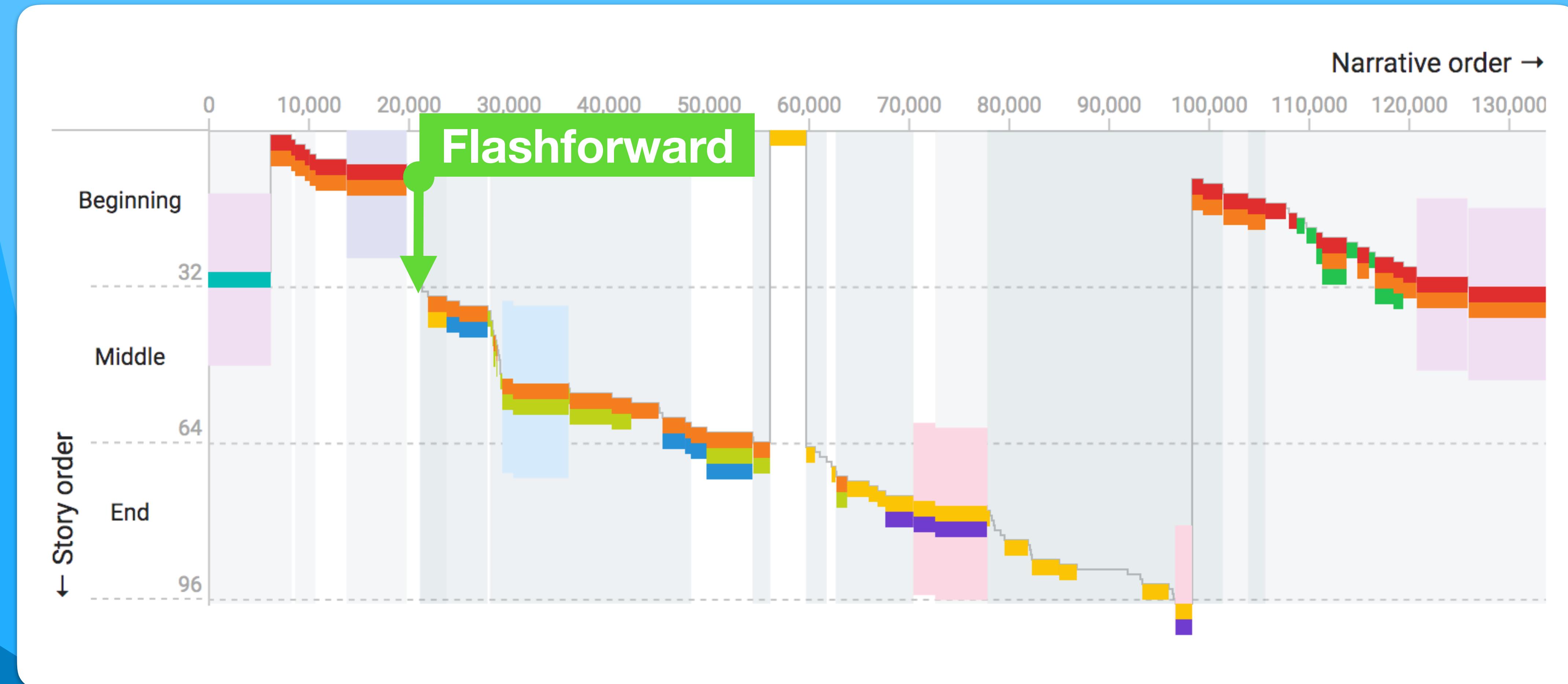
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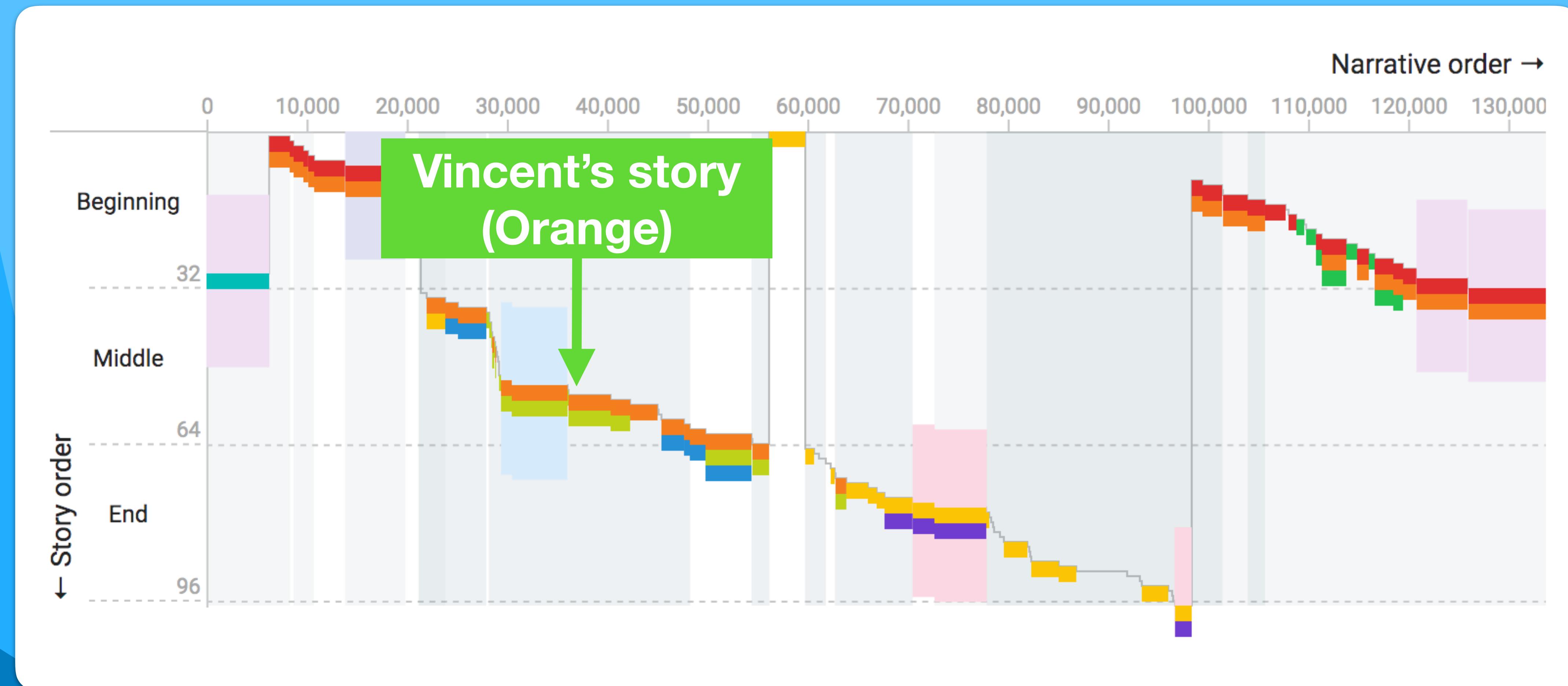
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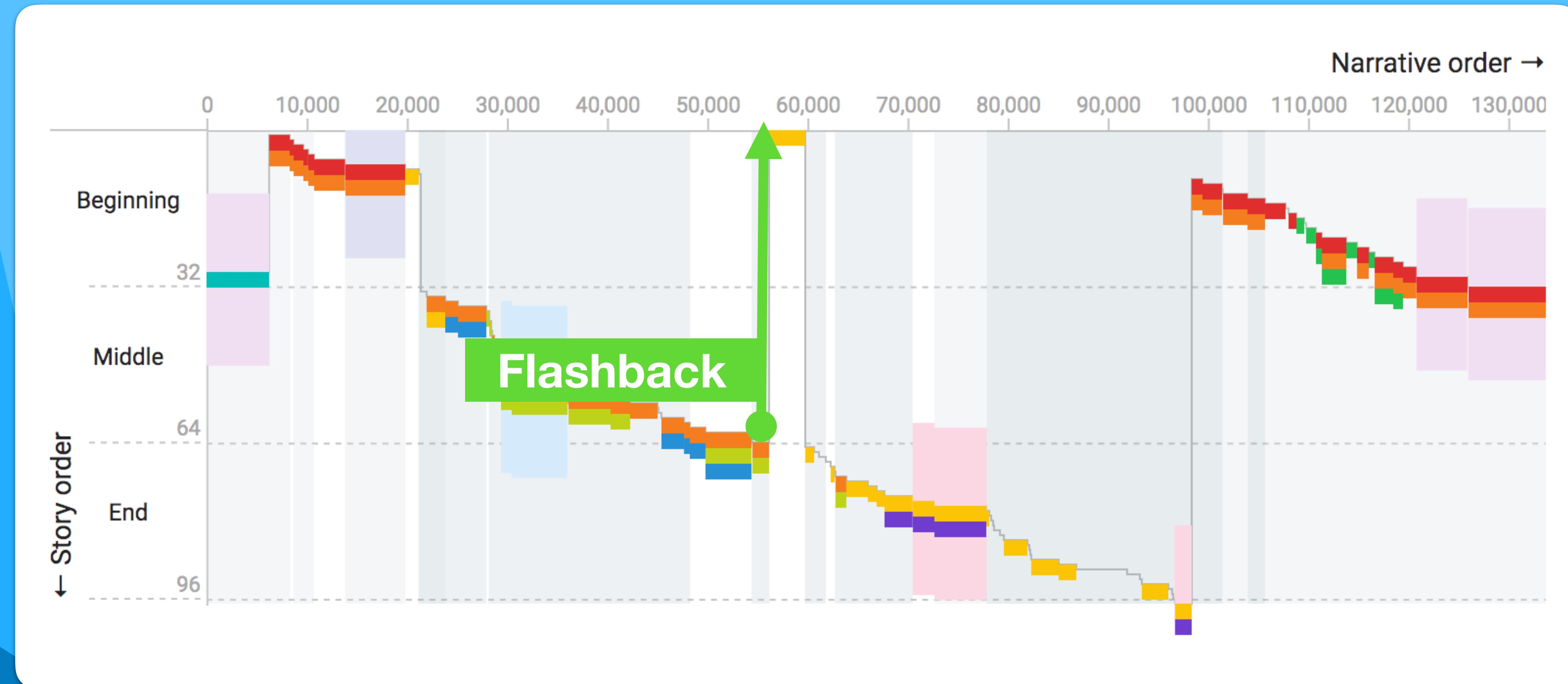
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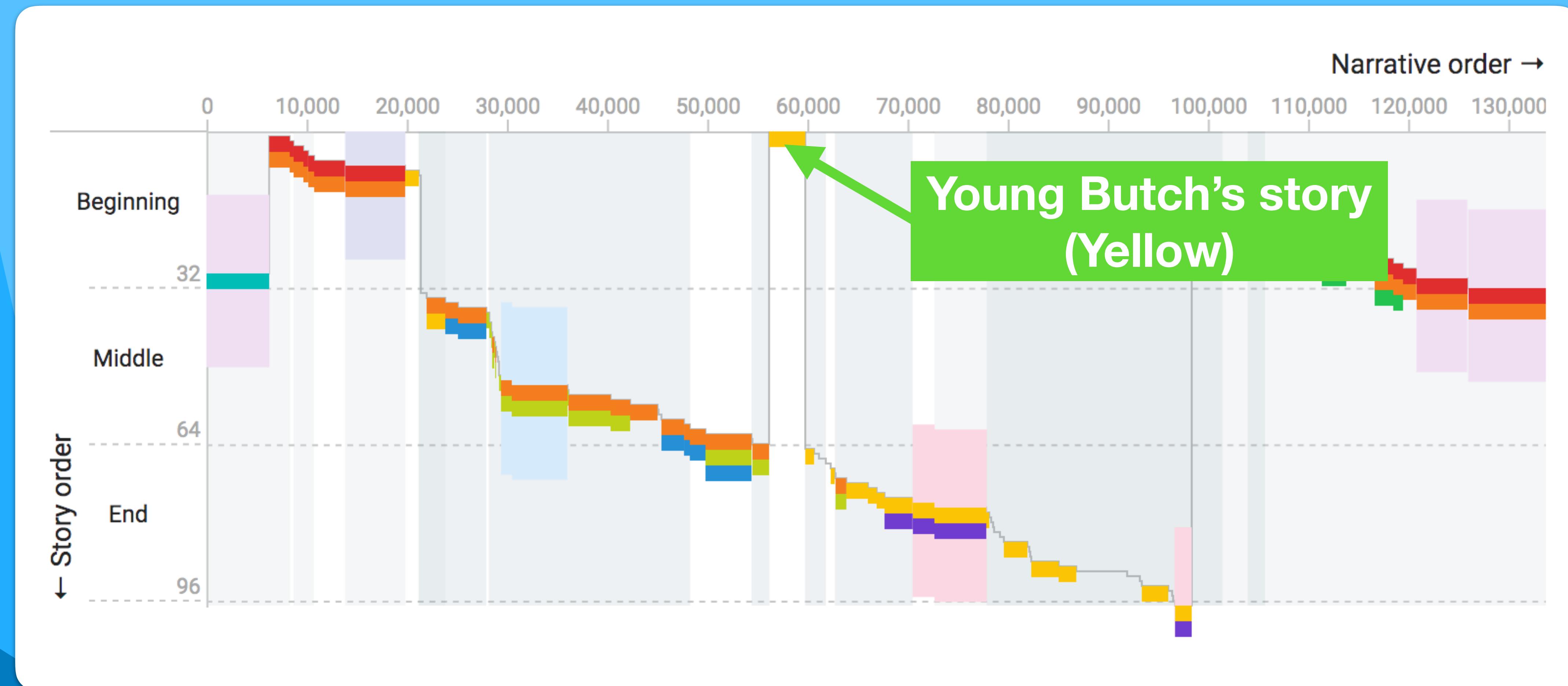
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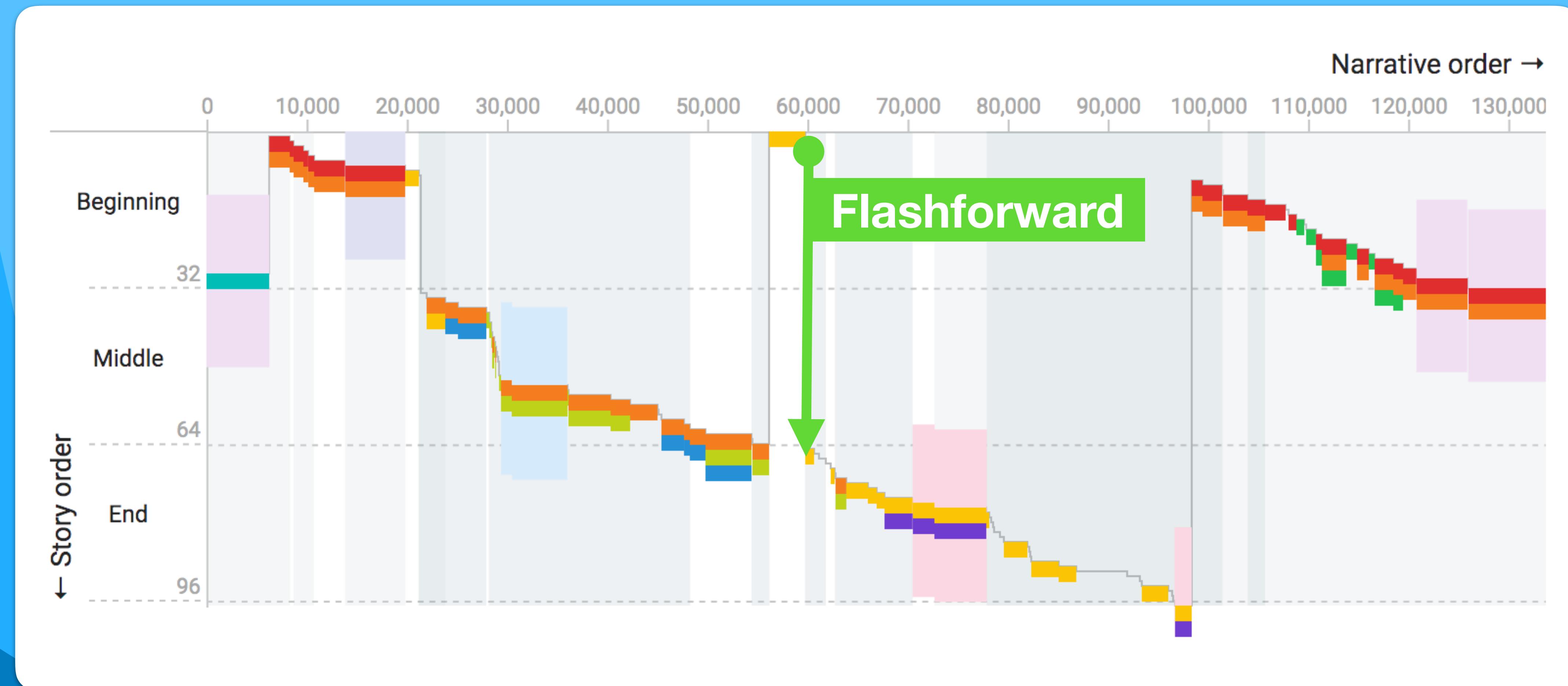
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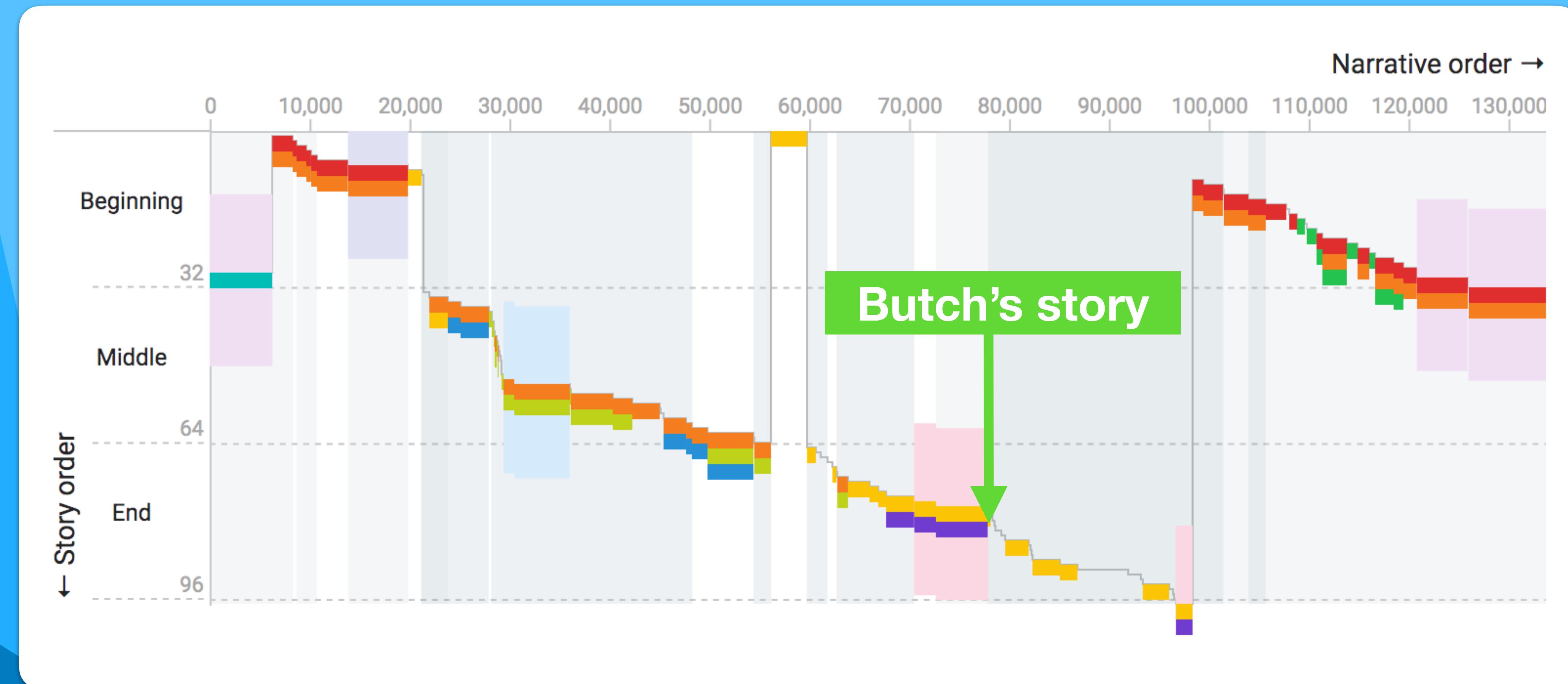
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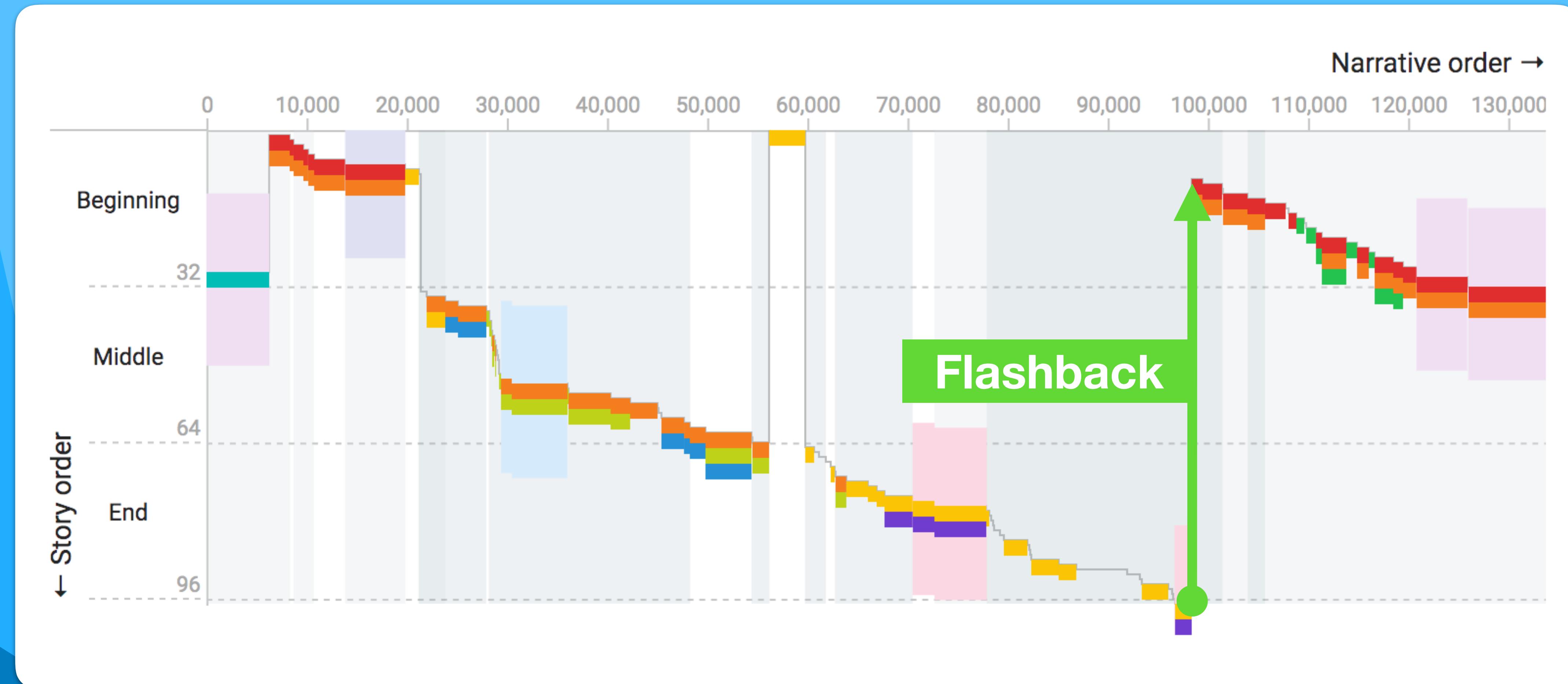
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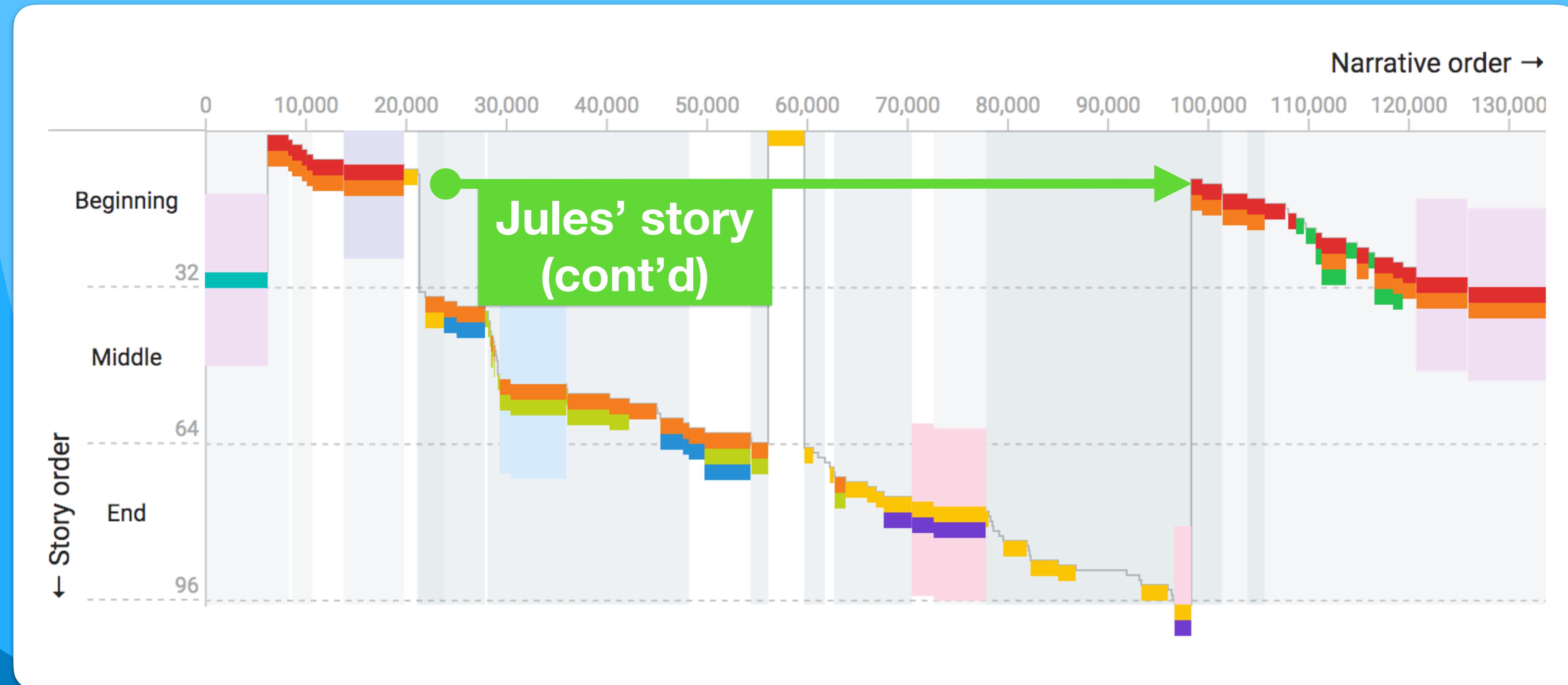
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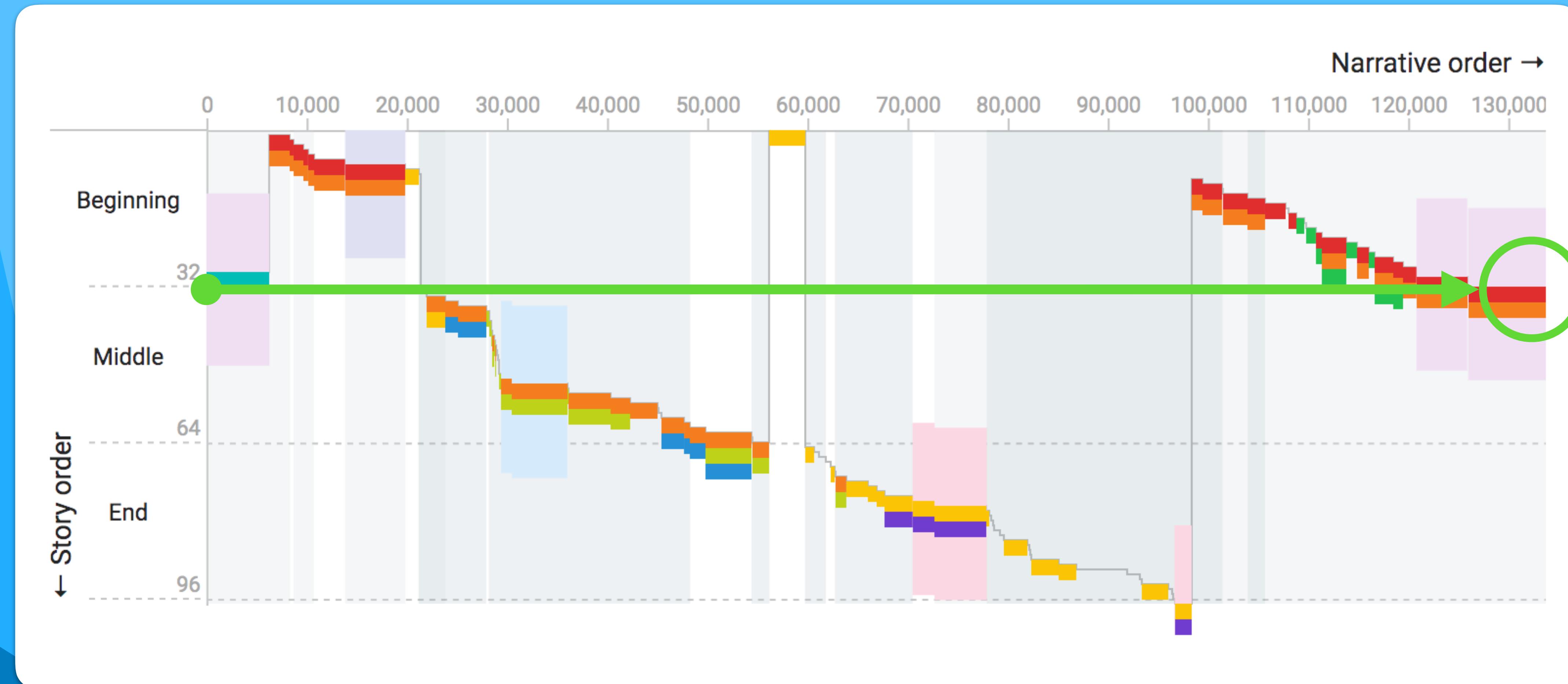
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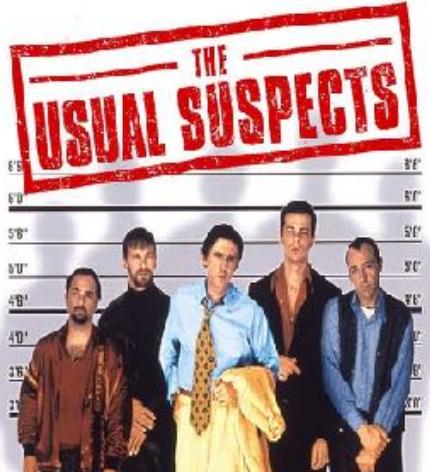
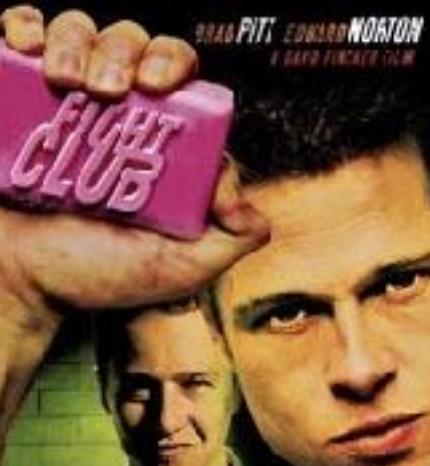
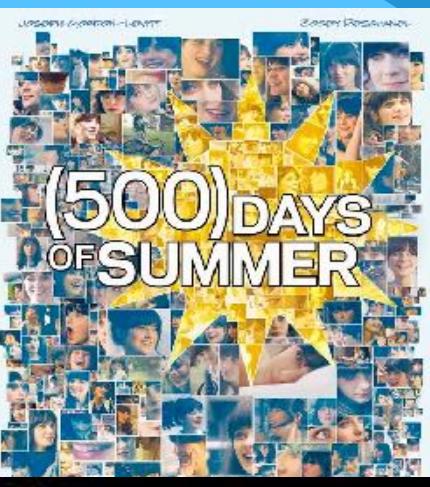
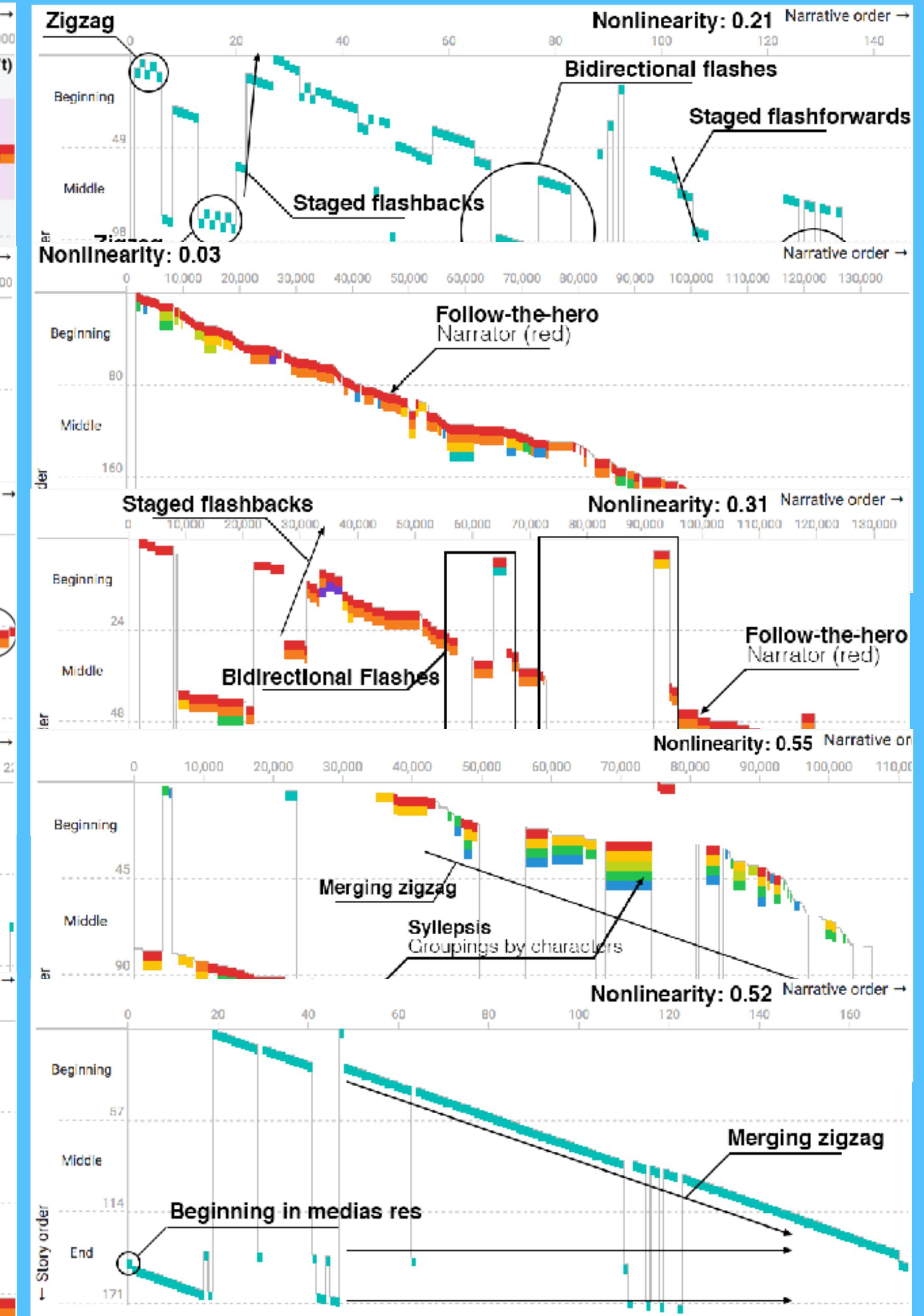
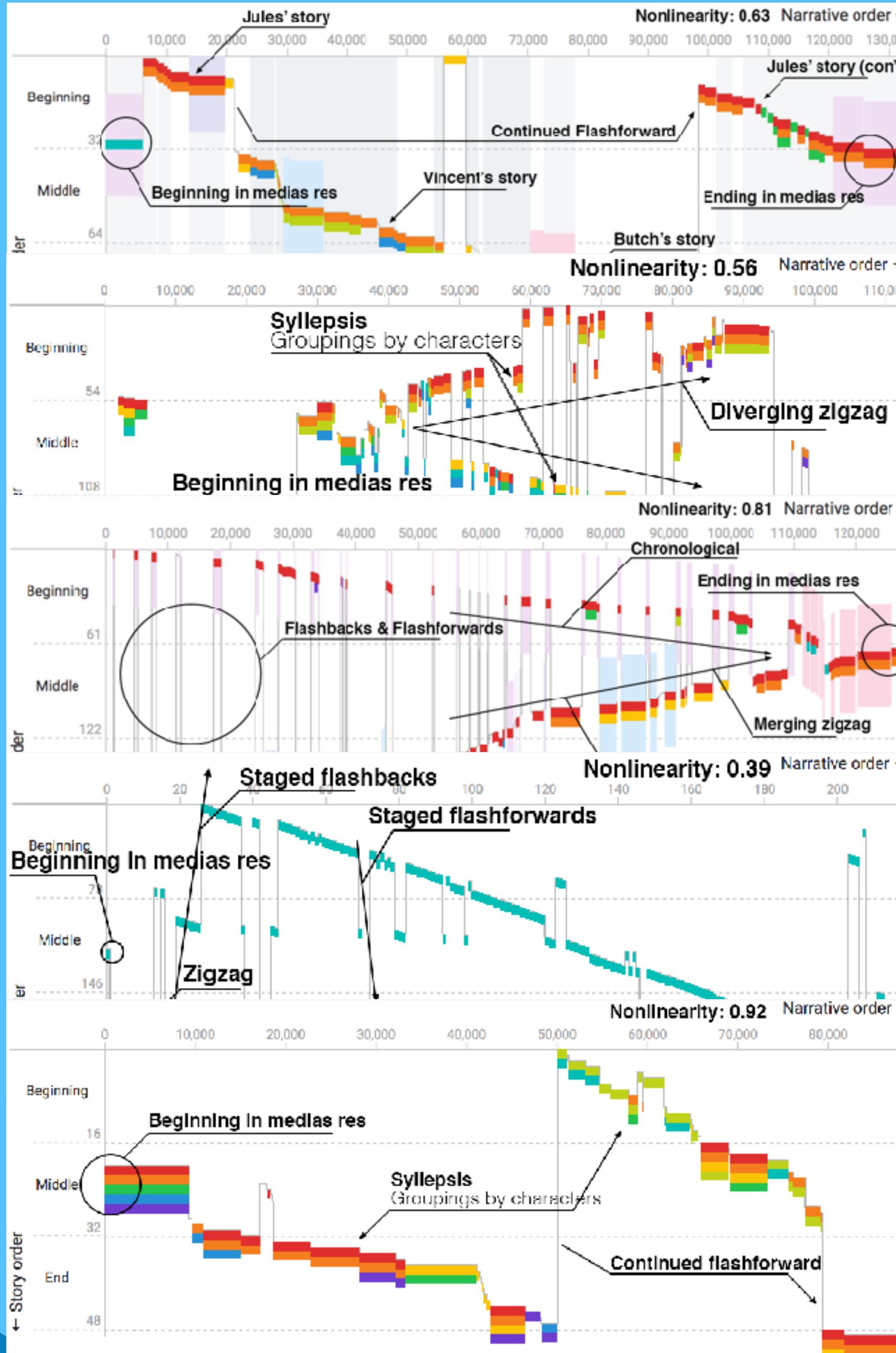
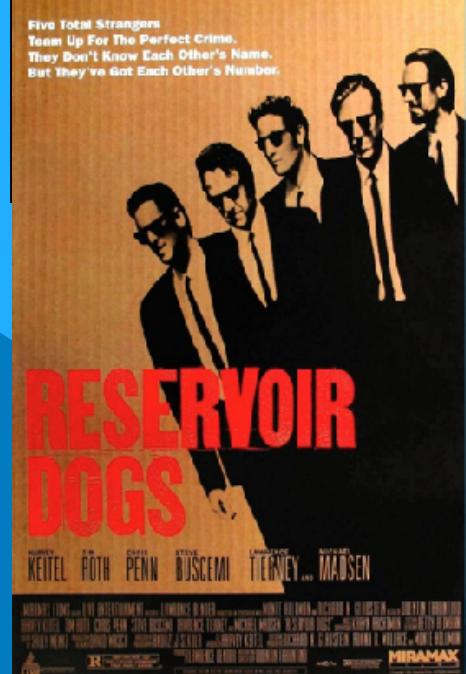
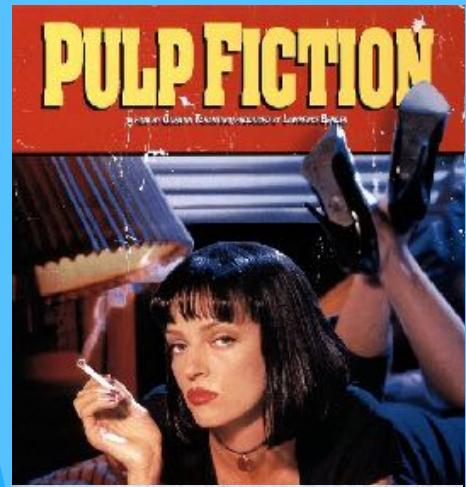
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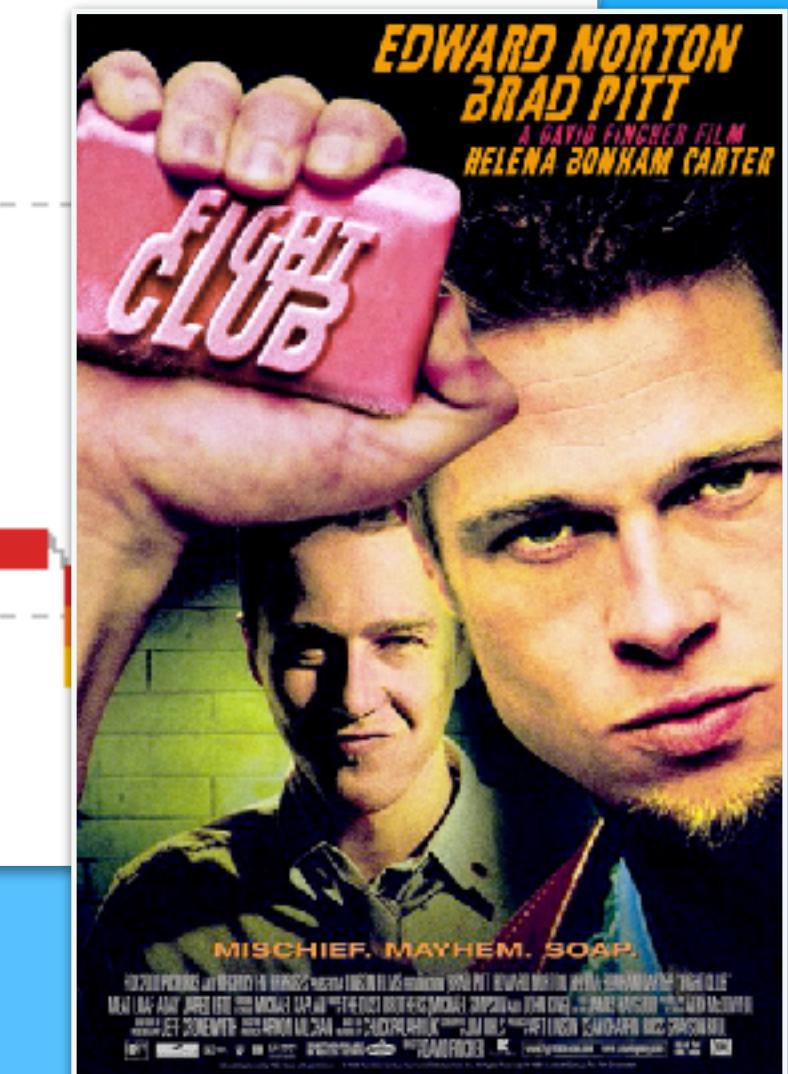
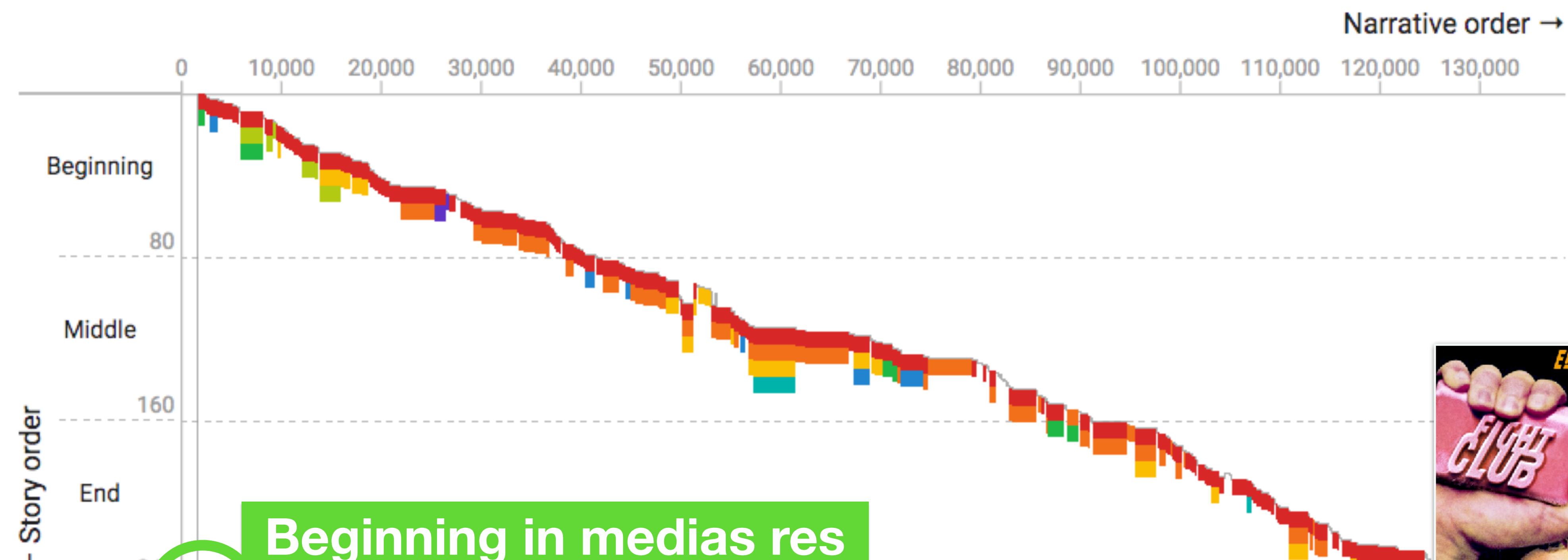
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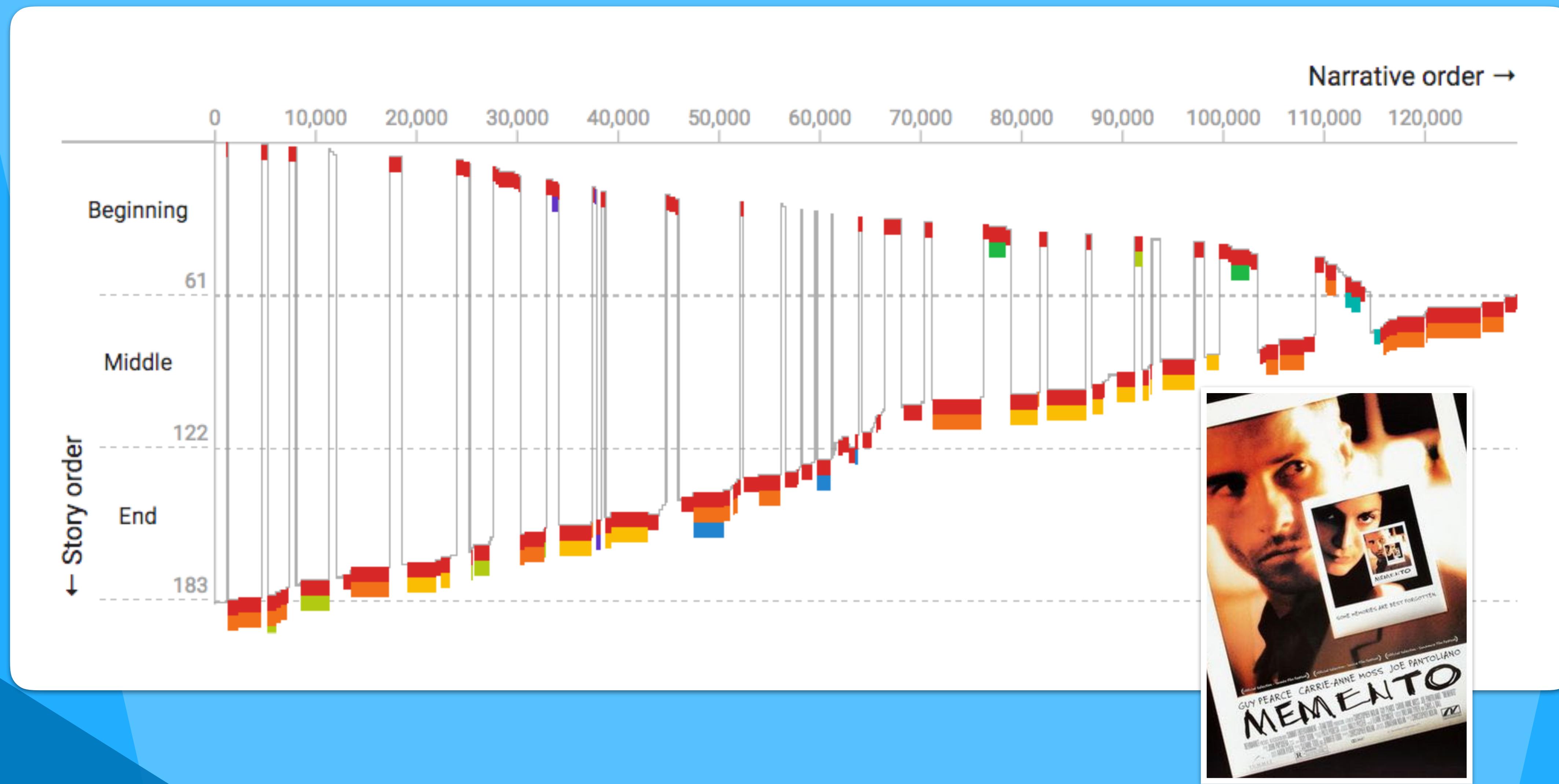




# FIGHT CLUB



# MEMENTO



# MEMENTO



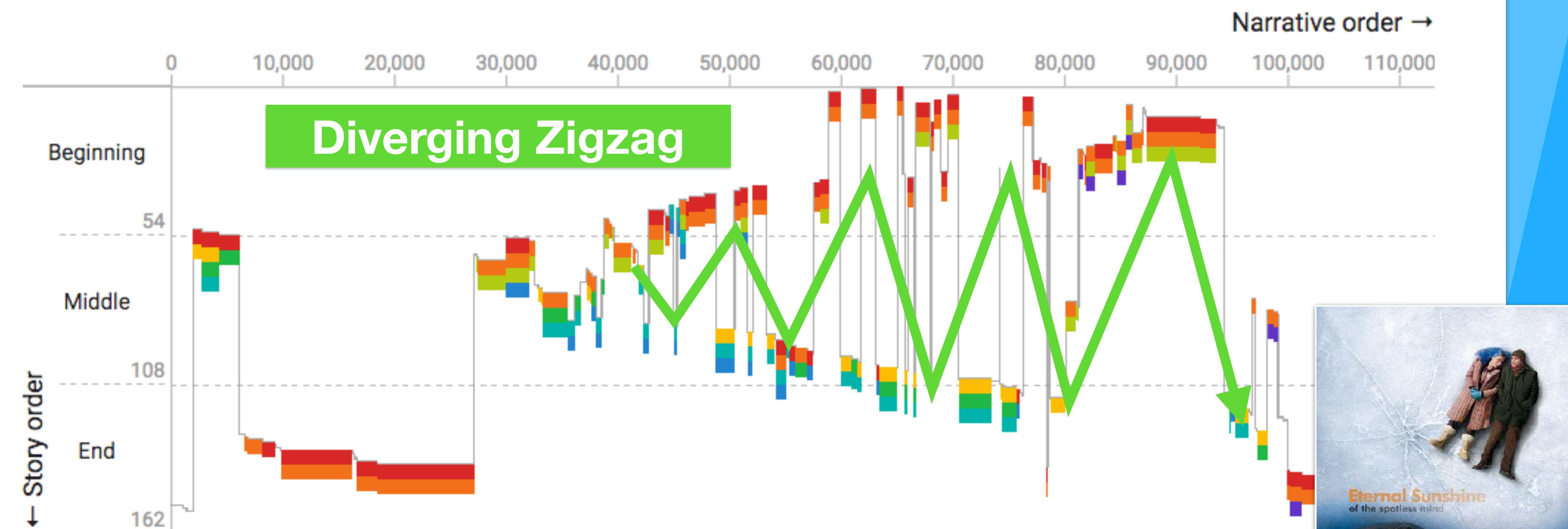
# MEMENTO



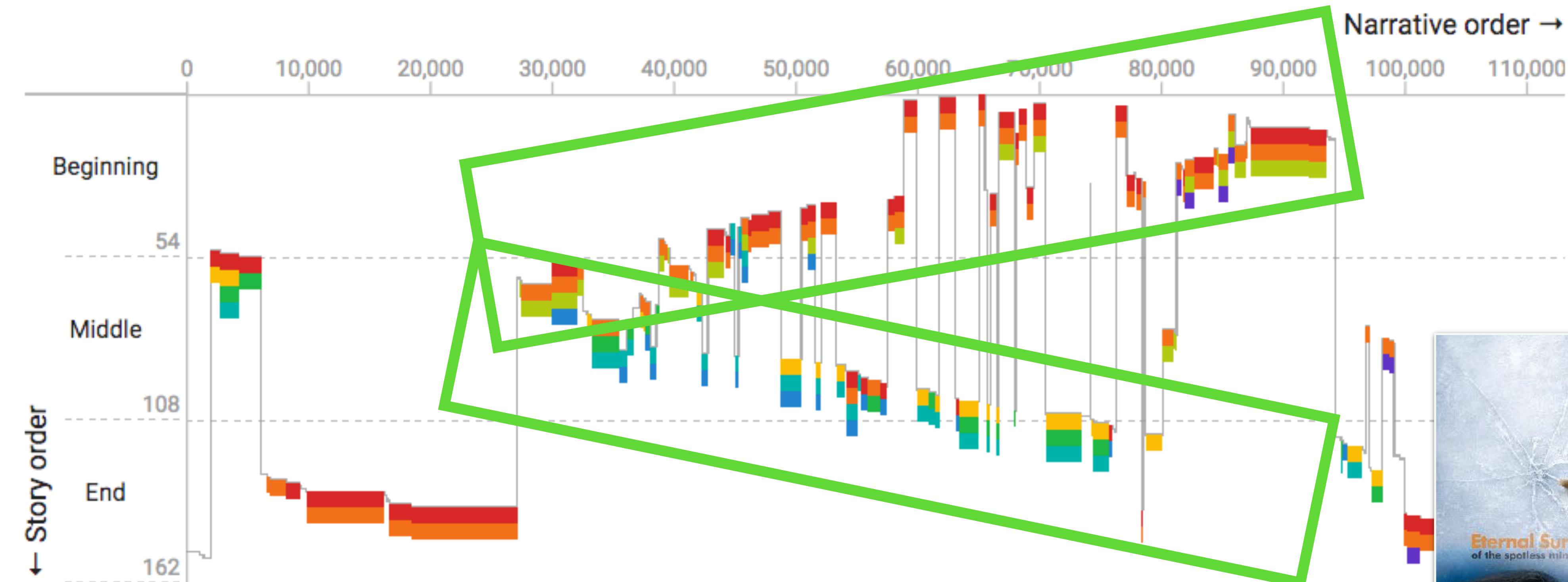
# MEMENTO



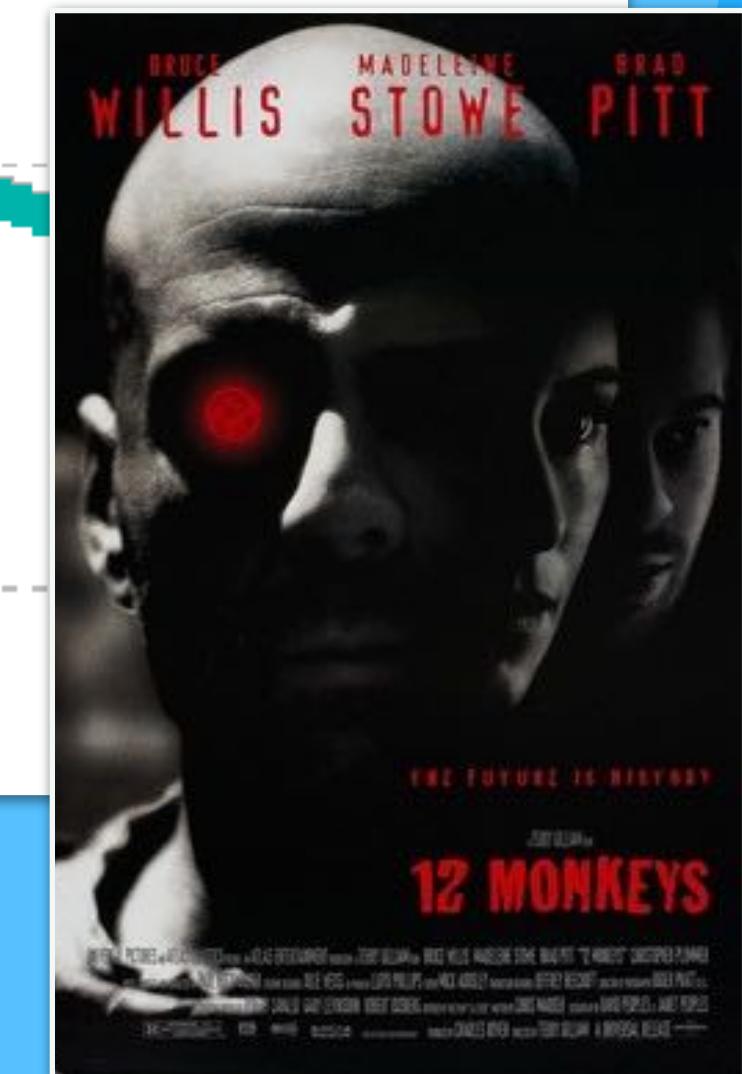
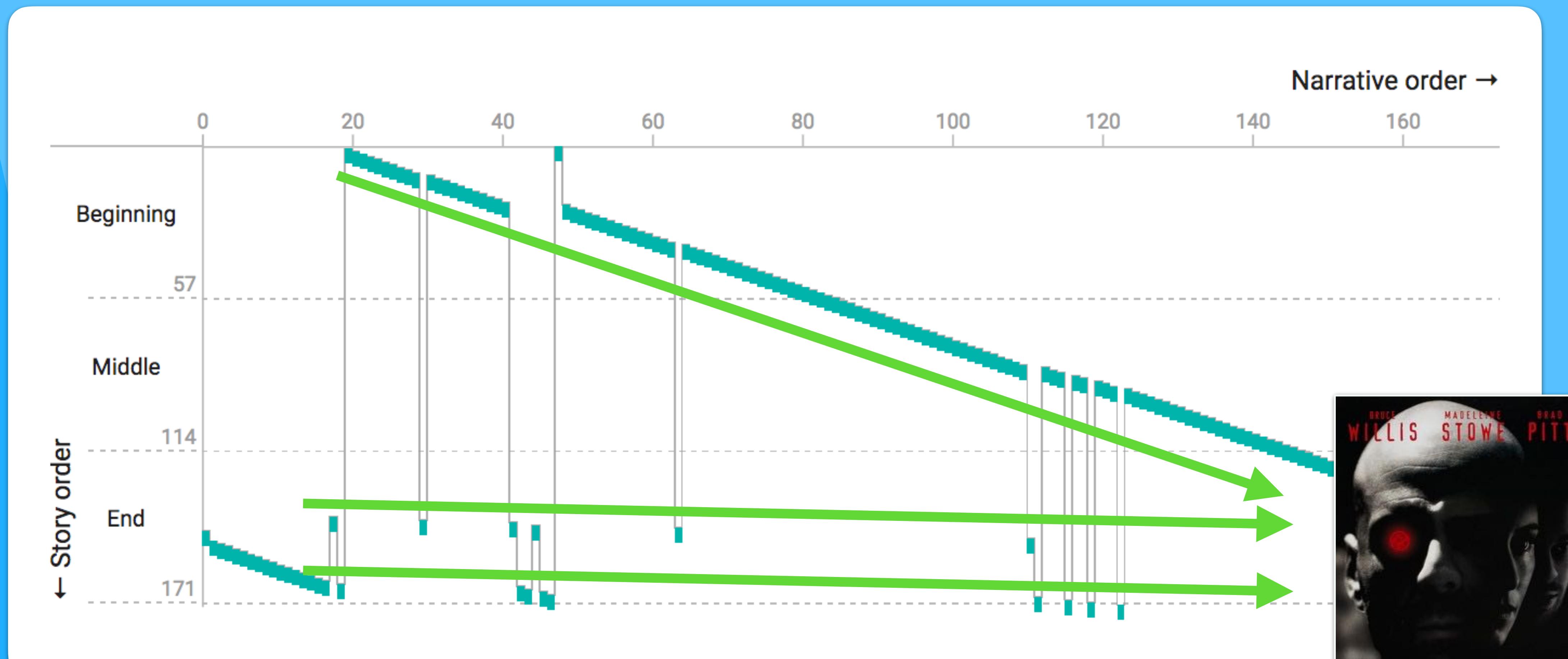
# ETERNAL SUNSHINE



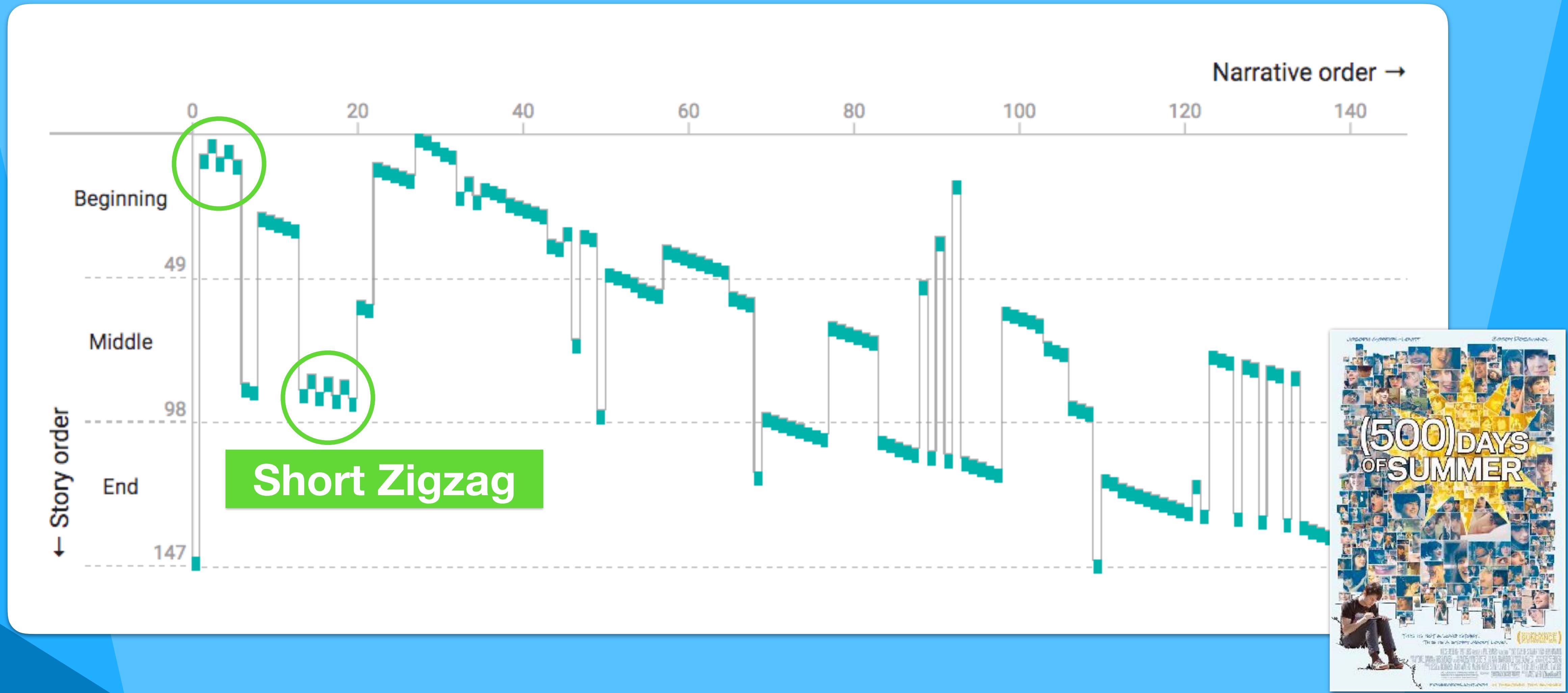
# ETERNAL SUNSHINE



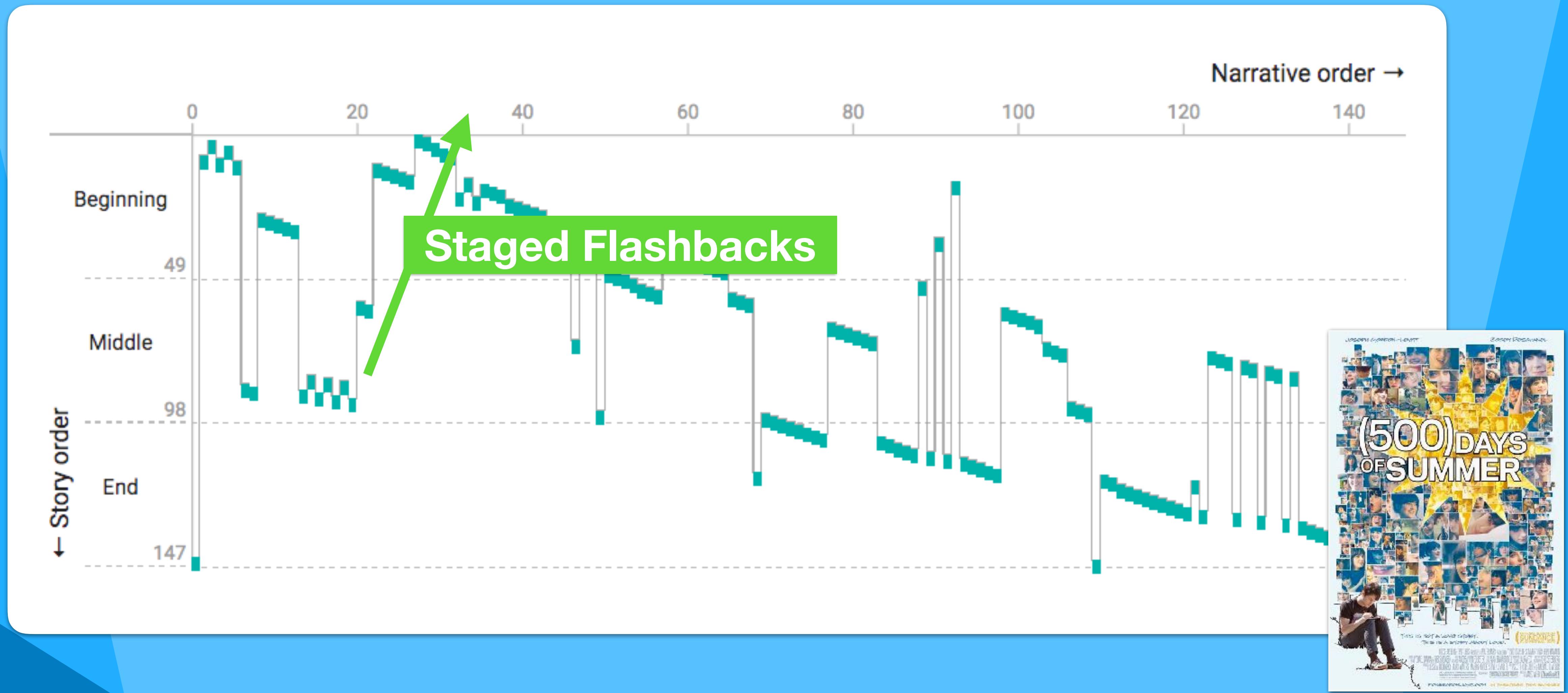
# 12 MONKEYS



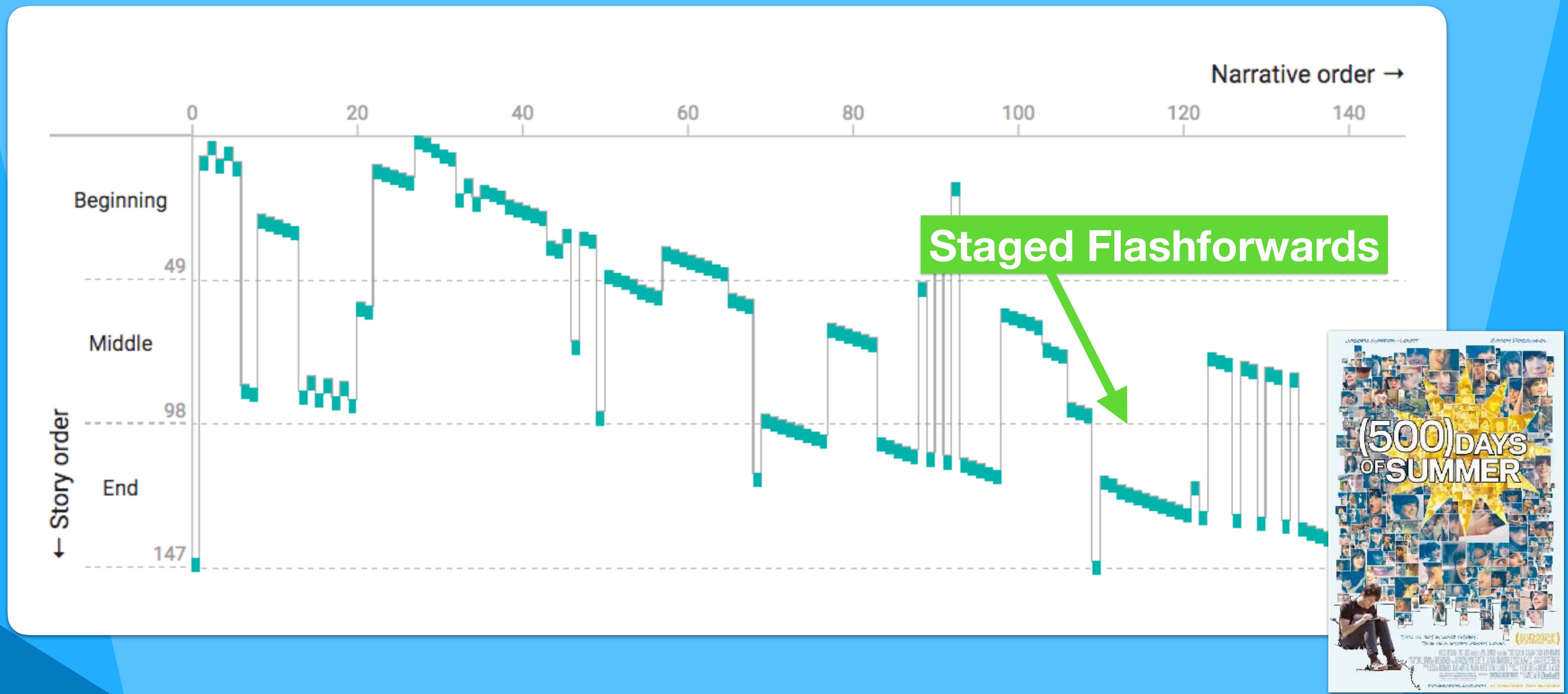
# 500 DAYS OF SUMMER



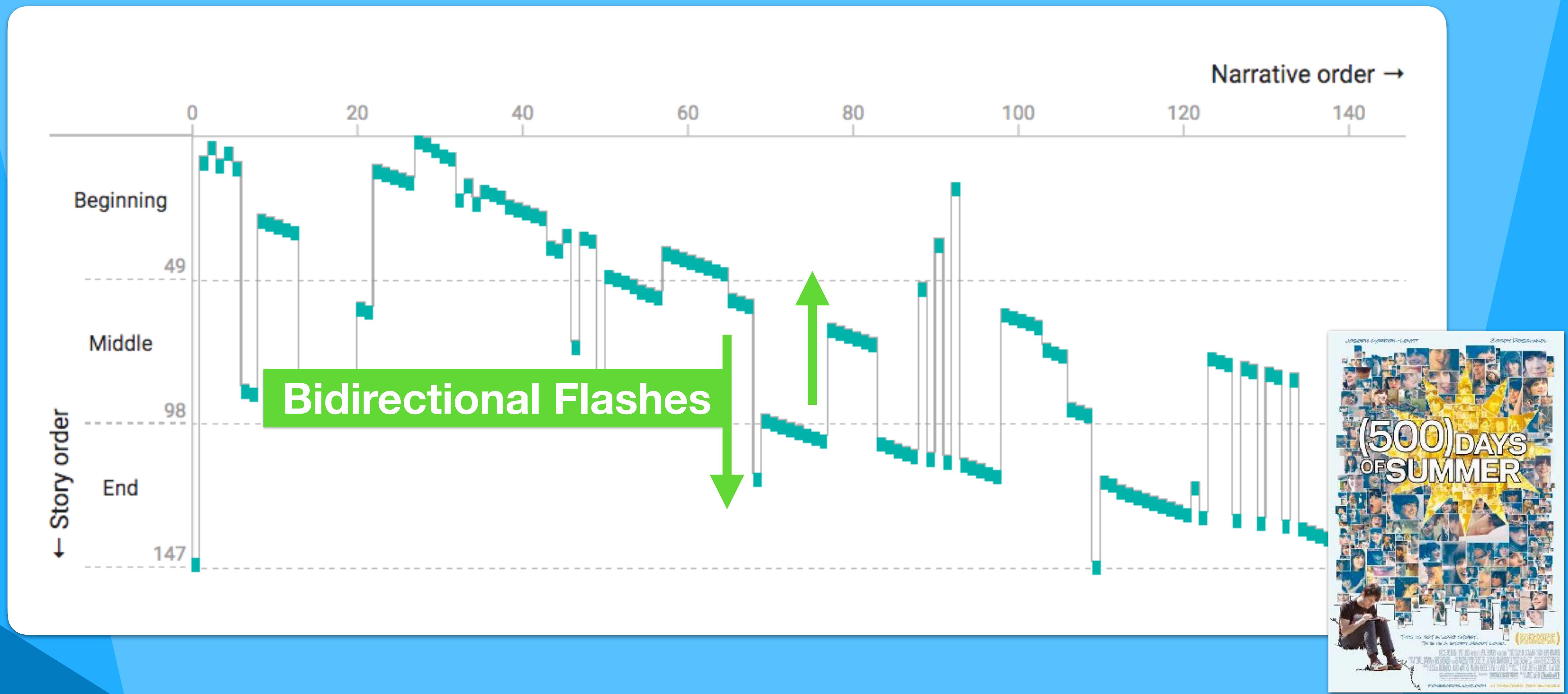
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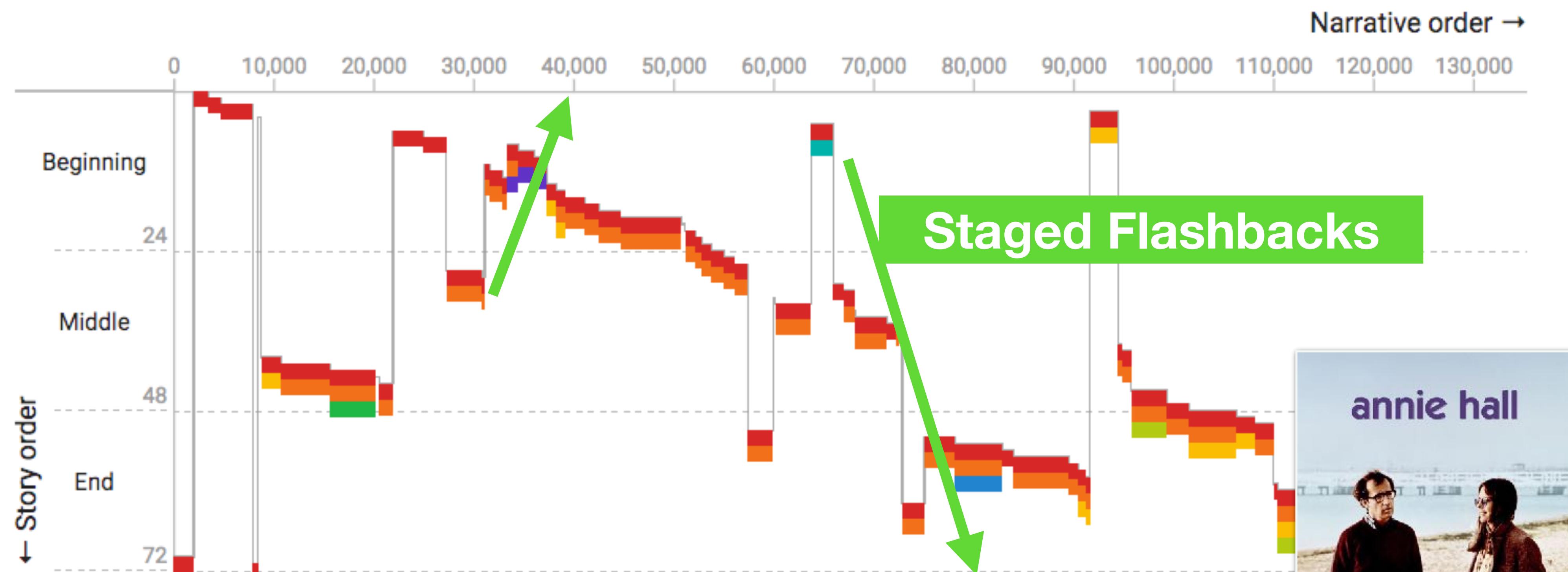
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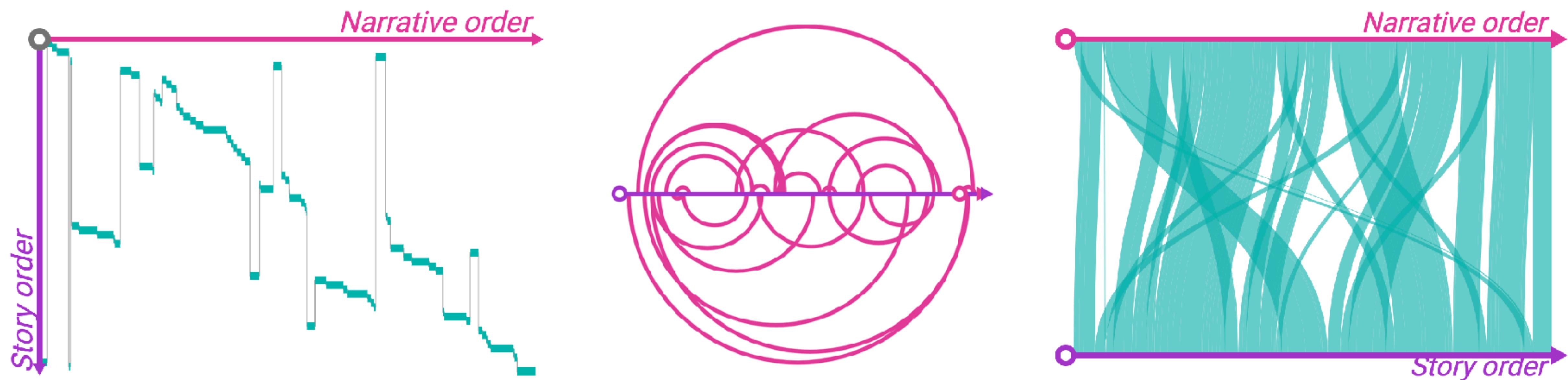
# ANNIE HALL



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# READABILITY STUDY

Can people read narrative patterns from story curves?

# READABILITY STUDY

## 13 Participants

- 8 female, 12 graduates
- no expertise in visualization or narrative theory

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## Procedure

- Introduced to basic nonlinear narrative patterns
- shown how they are represented in story curves

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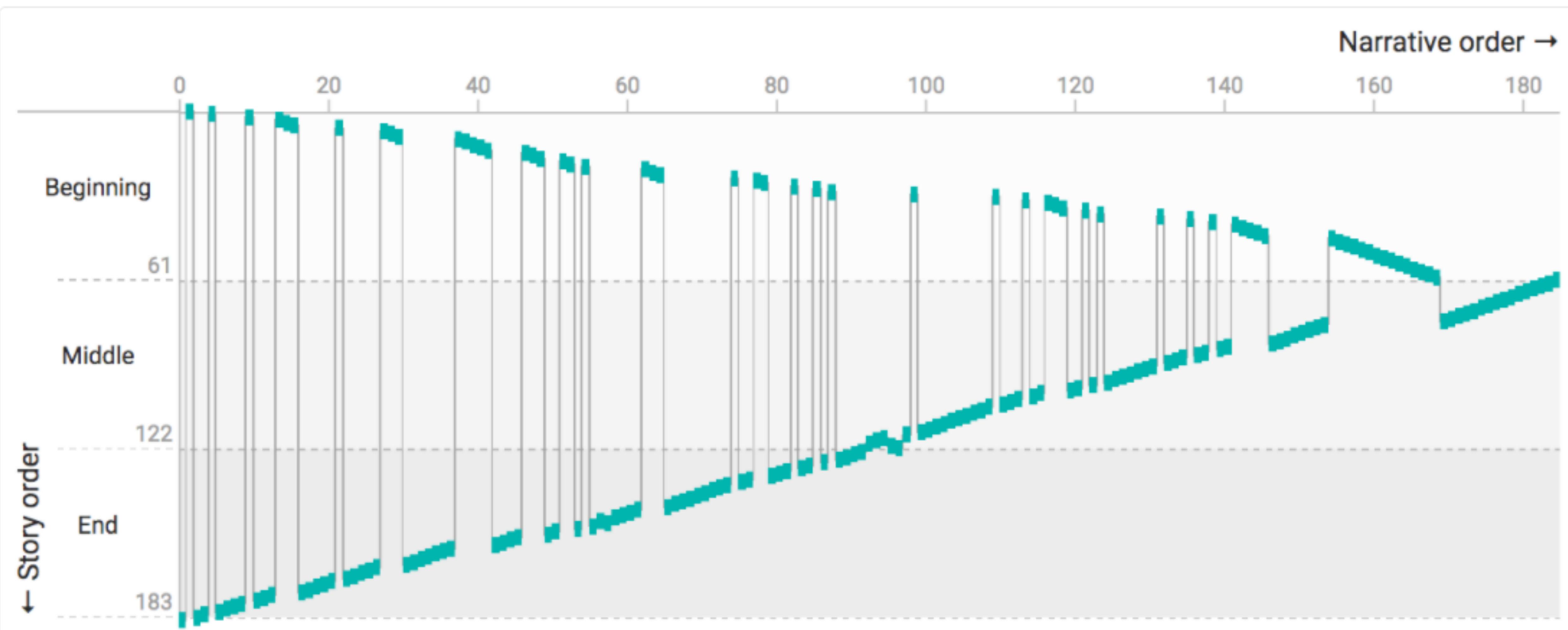
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## 20 multiple-choice pattern reading questions

## Q5. Among five basic patterns (Chronological, Retrograde, Flashback, Flashforward, Zigzag), how many of them do you see in this story curve?

Hint: Be careful and look at both overall patterns as well as sub-group patterns.

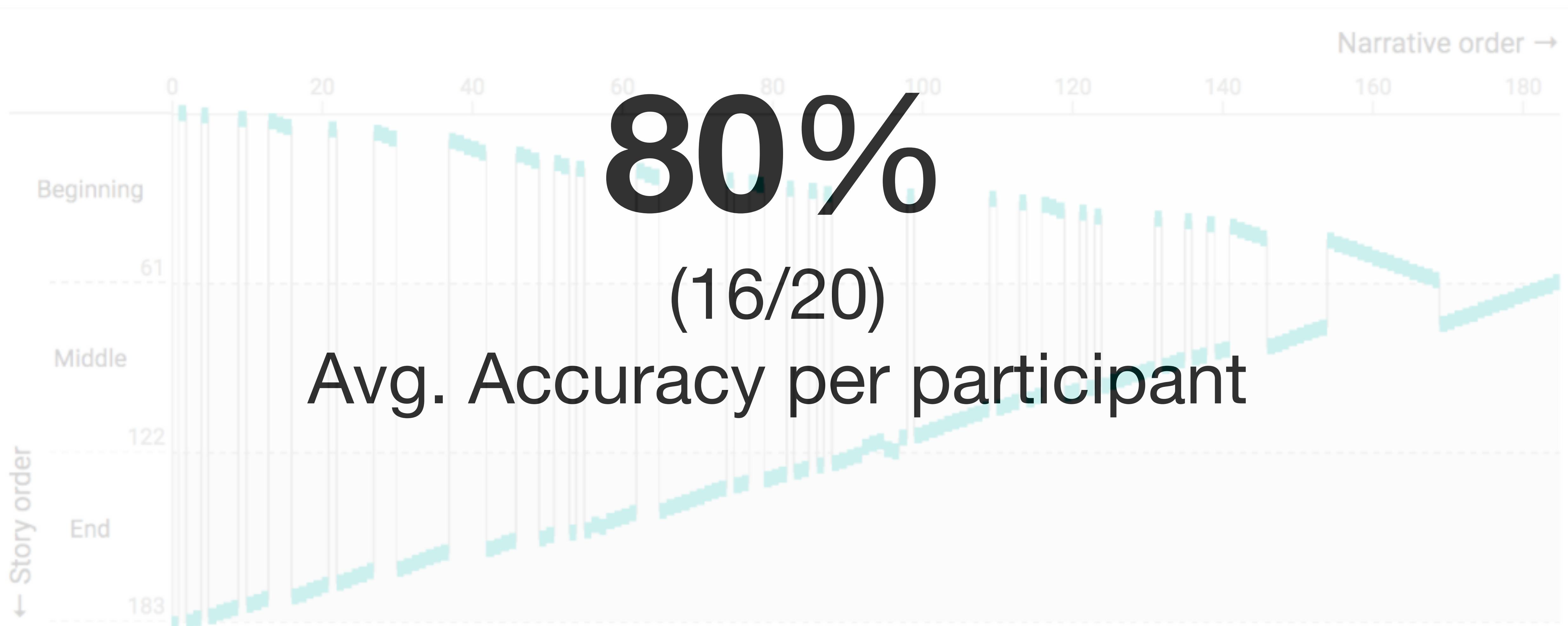
- One
- Two
- Three
- Four
- All Five



**Q5. Among five basic patterns (Chronological, Retrograde, Flashback, Flashforward, Zigzag), how many of them do you see in this story curve?**

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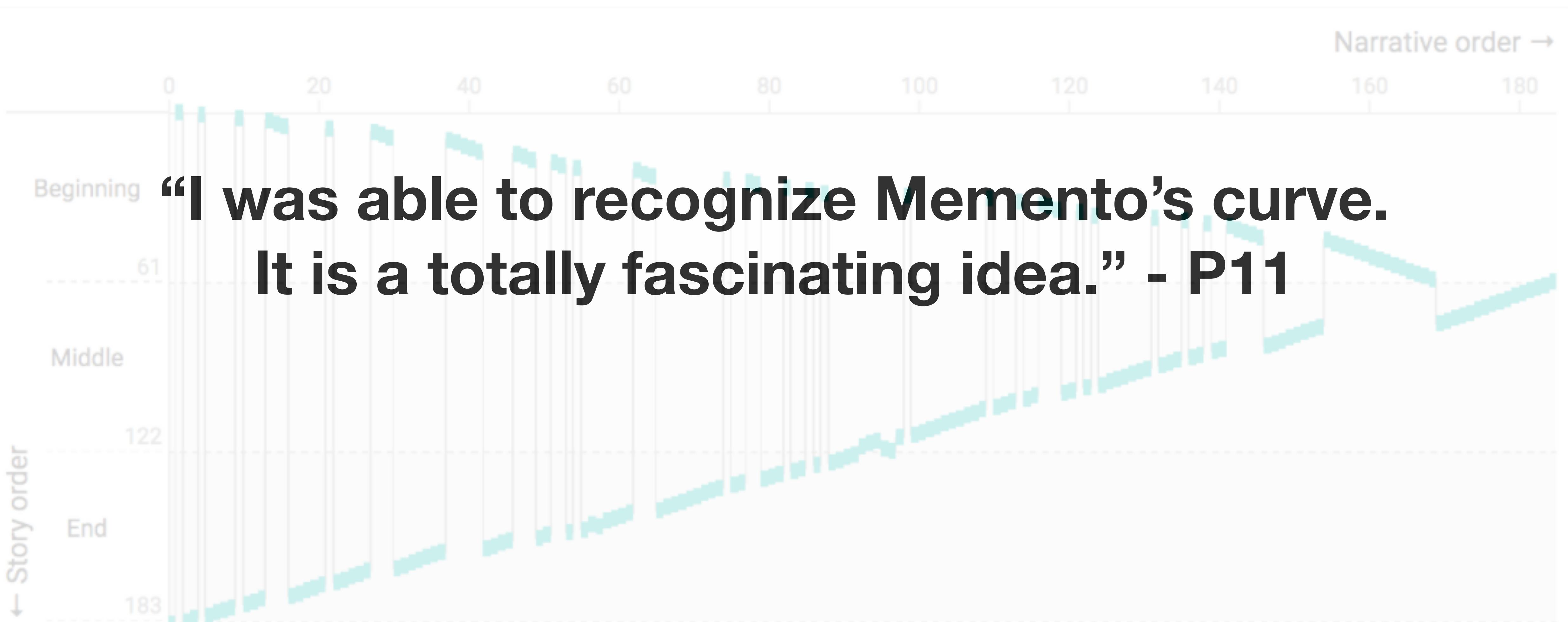


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**“I was able to recognize Memento’s curve.  
It is a totally fascinating idea.” - P11**



# How did we build story curves?

# **Eternal Sunshine of the Spotless Mind (2003)**

## **by Charlie Kaufman.**

### **INT. PUBLISHING HOUSE RECEPTION AREA - DAY**

It's grand and modern. Random House-Knopf-Taschen is etched on the wall in large gold letters. An old woman enters carrying a tattered manuscript, maybe a thousand pages. She seems haunted, hollow-eyed, sickly. The young receptionist, dressed in a shiny, stretchy one-piece pantsuit, looks up.

#### **RECEPTIONIST**

Oh, hi.

#### **OLD WOMAN**

(apologetically)

Hi, I was in the neighborhood and thought  
I'd see --

#### **RECEPTIONIST**

I think he's in a conference.  
Unfortunately. I'm really sorry.

#### **OLD WOMAN**

Would you just try him? You never know.  
As long as I'm here. You never know.

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## Features

- Left Margin
- Boldness
- Letter Case
- Parenthesis
- etc

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**Group1: Bold**

**Group2: Regular**

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## Group1: Bold

- Scene Heading
- Character Name

## Group2: Regular

- Action
- Dialogue
- Parenthetical

# Eternal Sunshine of the Spotless Mind -

[Tagging](#)[Metadata](#)

0.	INT. PUBLISHING HOUSE RECEPTION AREA - DAY	Scene Heading
1.	It's grand and modern. Random House-Knopf-Taschen is etched	Action
2.	on the wall in large gold letters. An old woman enters	Action
3.	carrying a tattered manuscript, maybe a thousand pages. She	Action
4.	seems haunted, hollow-eyed, sickly. The young receptionist,	Action
5.	dressed in a shiny, stretchy one-piece pantsuit, looks up.	Action
6.	<b>RECEPTIONIST</b>	I
7.	Oh, hi.	Character Name
8.	<b>OLD WOMAN</b>	Dialogue
9.	(apologetically)	Character Name
10.	Hi, I was in the neighborhood and thought	Parenthetical
11.	I'd see --	Dialogue
12.	<b>RECEPTIONIST</b>	Dialogue
13.	I think he's in a conference.	Character Name
14.	Unfortunately. I'm really sorry.	Dialogue
15.	<b>OLD WOMAN</b>	Dialogue
16.	Would you just try him? You never know.	Character Name
17.	As long as I'm here. You never know.	Dialogue

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Character Name

Dialogue

Character Name

Parenthetical

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Dialogue

Character Name

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## Scene

- Length
- Time of Day
- Location
- Interior/Exterior

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Dialogue

## Scene

- Length
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- Location
- Interior/Exterior

## Character

- Verbosity
- Sentiment



**PULP FICTION**

**Pulp Fiction** (1994)

User Score 83% Play Trailer

**Overview**

A burger-loving hit man, his philosophical partner, a drug-addled gangster's moll and a washed-up boxer converge in this sprawling, comedic crime caper. Their adventures unfurl in three stories that ingeniously trip back and forth in time.

**Featured Crew**

Quentin Tarantino Roger Avary  
Director/Cinematographer Screenplay

# MovieDB

([www.themoviedb.org](http://www.themoviedb.org))

**Top Billed Cast**

				
<b>John Travolta</b> Vincent Vega	<b>Samuel L. Jackson</b> Jules Winfield	<b>Uma Thurman</b> Mia Wallace	<b>Bruce Willis</b> Butch Coolidge	<b>Ving Rhames</b> Marsellus Wallace

Find out where to watch this on:  
**fan+TV**

**Facts**  
**Status**  
**Released**

**Release Information**

 September 23, 1994  
Premiere

 October 14, 1994  
Theatrical

## Scene

- Length
- Time of Day
- Location
- Interior/Exterior

## Character

- Verbosity
- Sentiment
- Gender

# Movie Script

## Eternal Sunshine of the Spotless Mind (2003) by Charlie Kaufman.

INT. PUBLISHING HOUSE RECEPTION AREA - DAY

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RECEPTIONIST

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OLD WOMAN  
(apologetically)

Hi, I was in the neighborhood and thought I'd see if he was here.

RECEPTIONIST

I think he's in a conference.  
Unfortunately. I'm really sorry.

OLD WOMAN

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As long as I'm here. You never know.



# Movie Info

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Discussions    Reviews    Videos    Images    Changes    Report    Share

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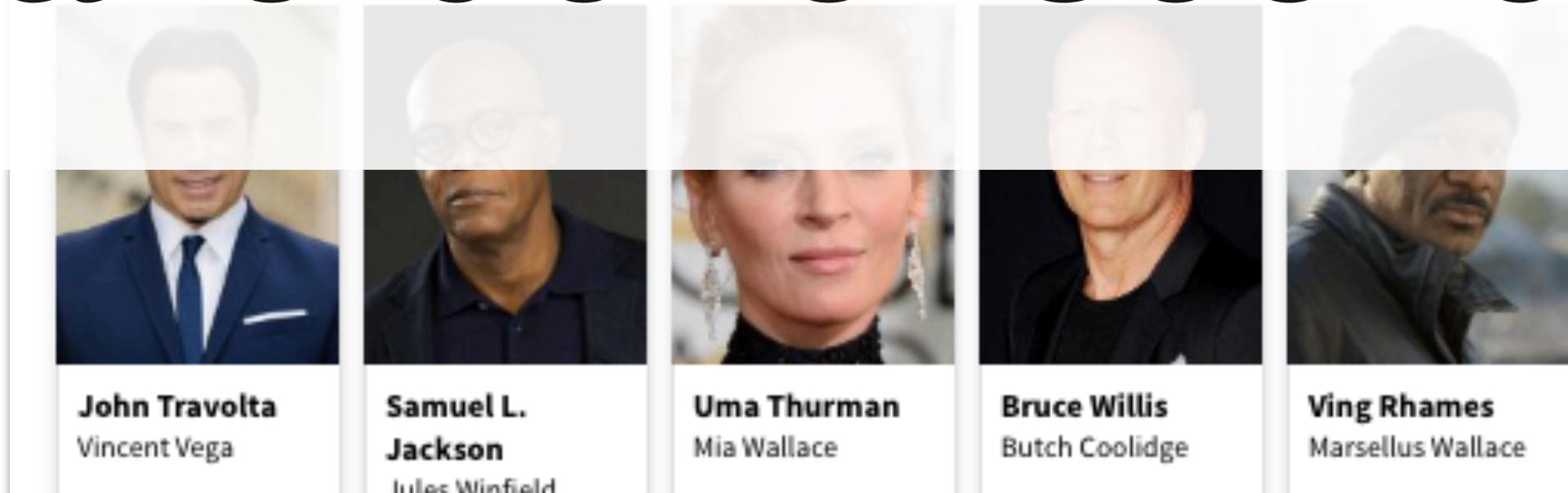
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R Theatrical



John Travolta  
Vincent Vega

Samuel L.  
Jackson  
Jules Winnfield

Uma Thurman  
Mia Wallace

Bruce Willis  
Butch Coolidge

Ving Rhames  
Marsellus Wallace

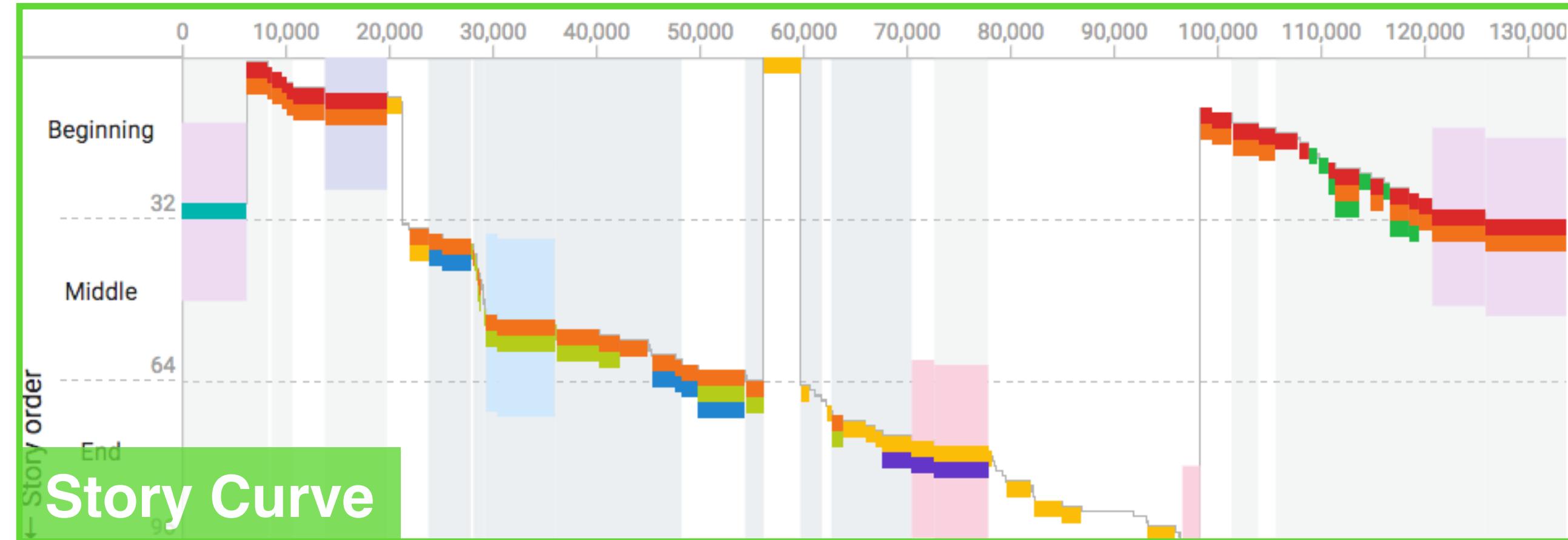
# STORY EXPLORER

# Pulp Fiction

Thriller, Crime | October 1994 | Directed by Quentin Tarantino | Nonlinearity 0.63 | [IMDB](#)



Narrative order →



## Story Curve

### Characters



### Location



### Time of Day



## Story Metadata



INT. COFFEE SHOP - MORNING

INT. '74 CHEVY (MOVING) - MORNING

INT. CHEVY (TRUNK) MORNING

EXT. APARTMENT BUILDING COURTYARD - MORNING

INT. RECEPTION AREA (APARTMENT BUILDING) - MORNING

INT. ELEVATOR - MORNING

INT. APARTMENT BUILDING HALLWAY MORNING

INT. APARTMENT (ROOM 49) - MORNING

MEDIUM SHOT BUTCH COOLIDGE

INT. CAR (MOVING) - DAY

EXT. SALLY LEROY'S - DAY

INT. SALLY LEROY'S - DAY

INT. LANCE'S HOUSE (KITCHEN) - NIGHT

INT. LANCE'S BEDROOM - NIGHT

EXT. MARSELLUS WALLACE'S HOUSE NIGHT

INT. MARCELLUS' HOUSE / LIVING ROOM - NIGHT

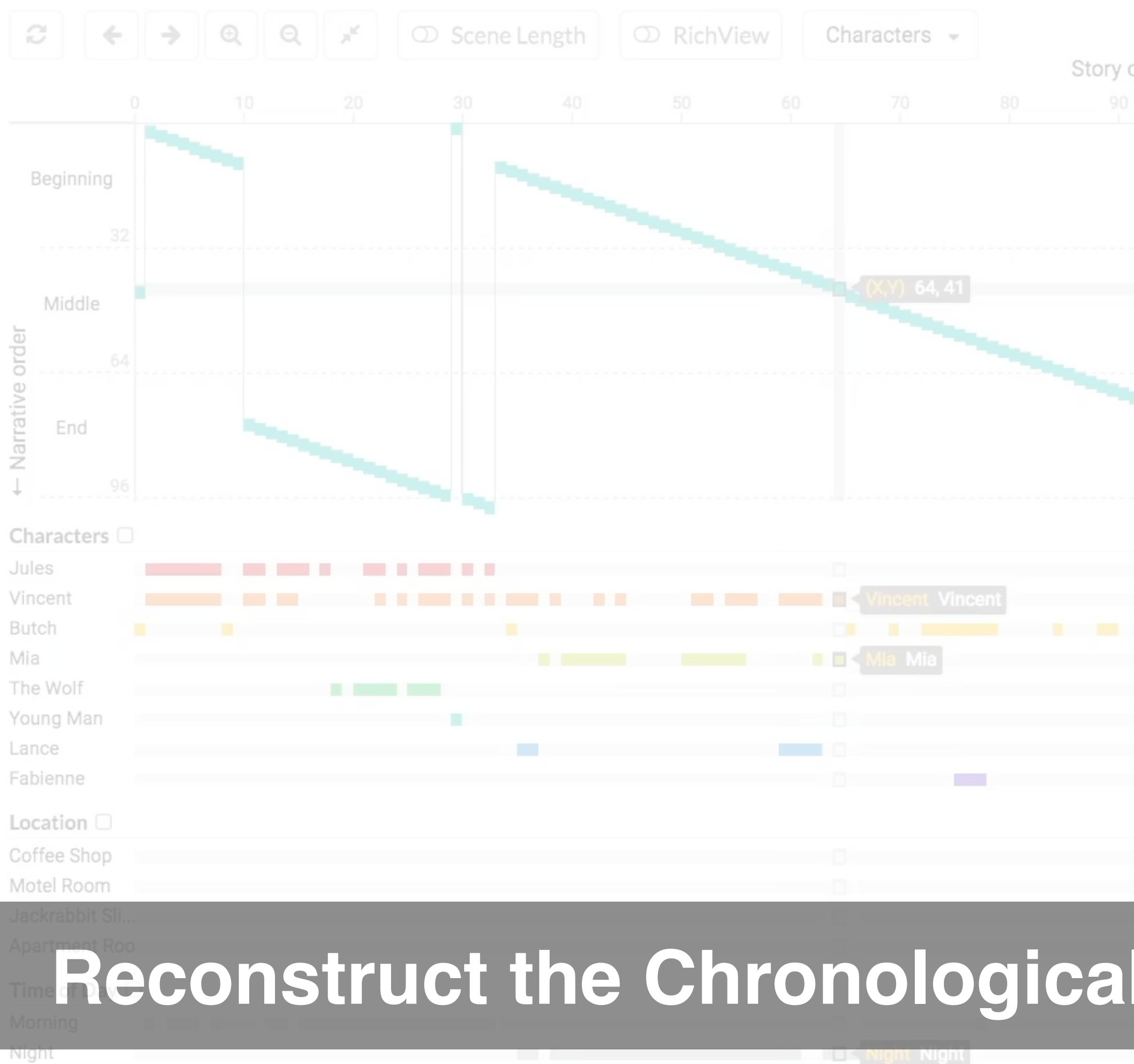
INT. MARCELLUS' HOUSE / DRESSING ROOM - NIGHT

INT. MARCELLUS' HOUSE / LIVING ROOM- NIGHT

## Movie Script

# Pulp Fiction

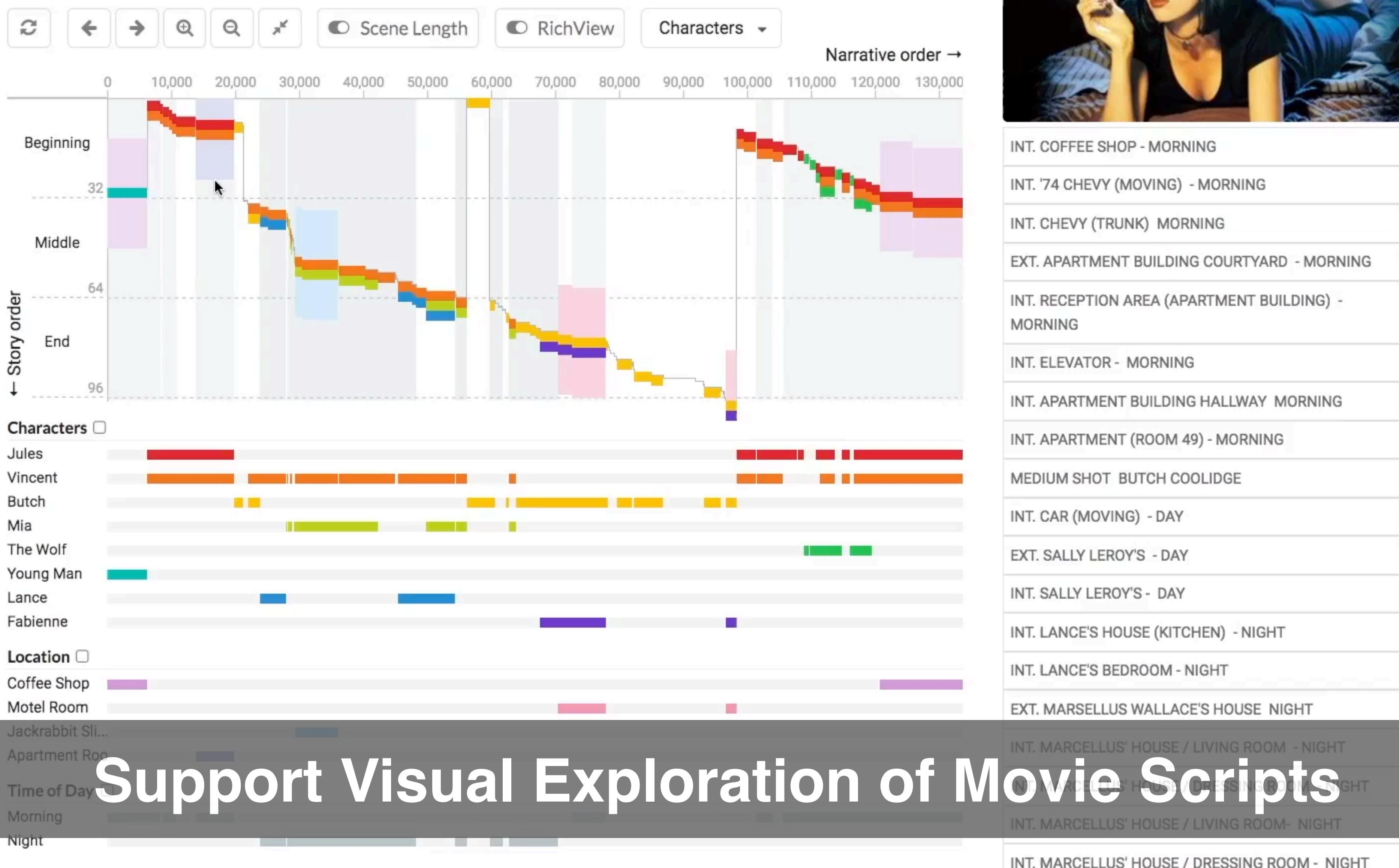
Thriller, Crime | October 1994 | Directed by Quentin Tarantino | Nonlinearity 0.63 | [IMDB](#)



## Reconstruct the Chronological Order of Scenes

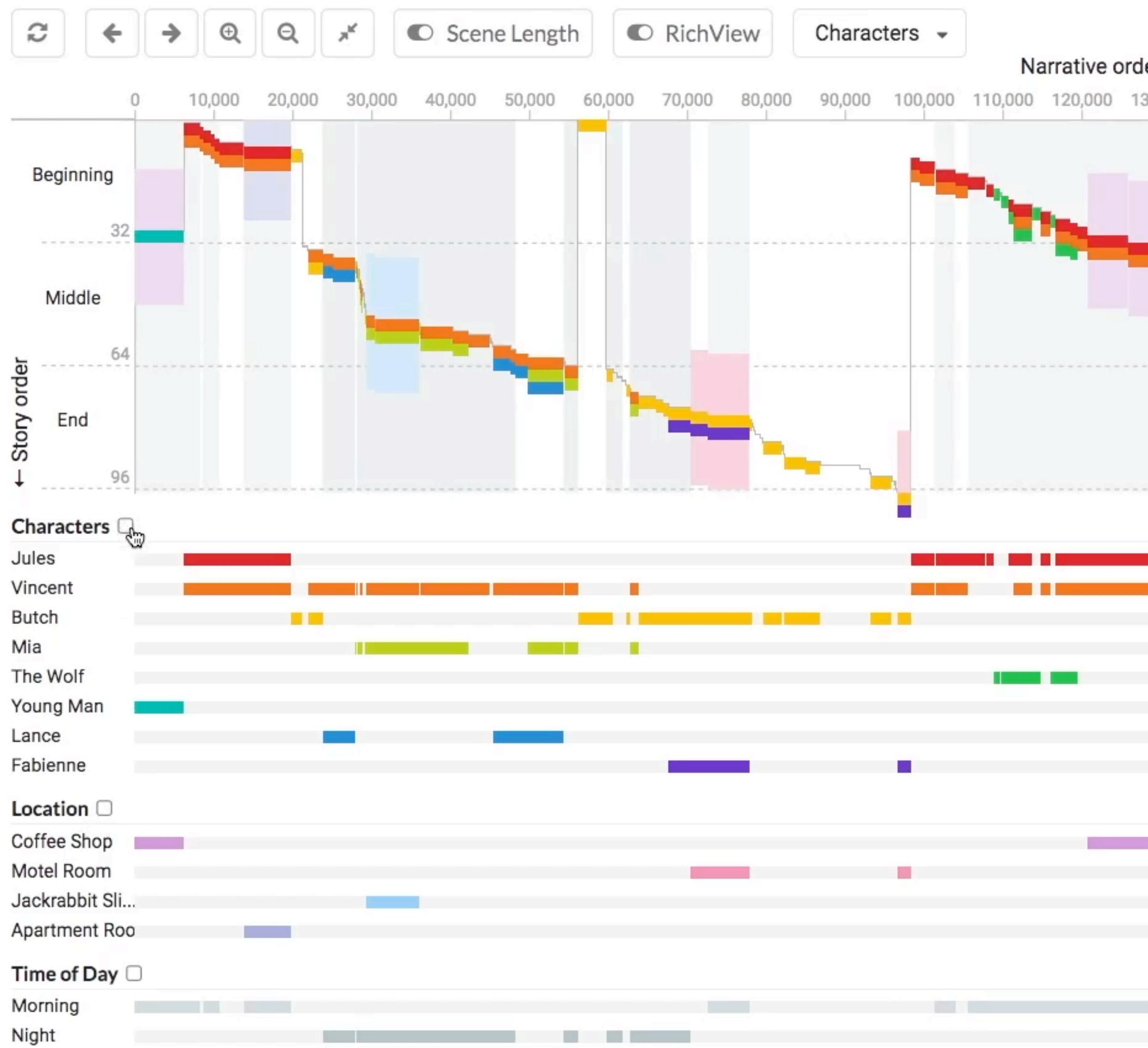
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Thriller, Crime | October 1994 | Directed by Quentin Tarantino | Nonlinearity 0.63 | [IMDB](#)



EXT. FRONT OF MARSELLUS WALLACE'S HOUSE -

NIGHT

 Vincent

*Well I'm of the opinion that Marsellus can live his whole life and never ever hear of this incident.*

The Malibu pulls up to the front. Mia gets out without saying a word (still in a daze) and begins walking down the walkway toward her front door.

 Mia

*Don't worry about it. If Marsellus ever heard of this, I'd be in as much trouble as you.*

Mia smiles.

She turns around. Vincent's out of the car, standing on the walkway, a big distance between the two.

 Mia

*What's yours?*

 Vincent

*What are your thoughts on how to handle this?*

 Vincent

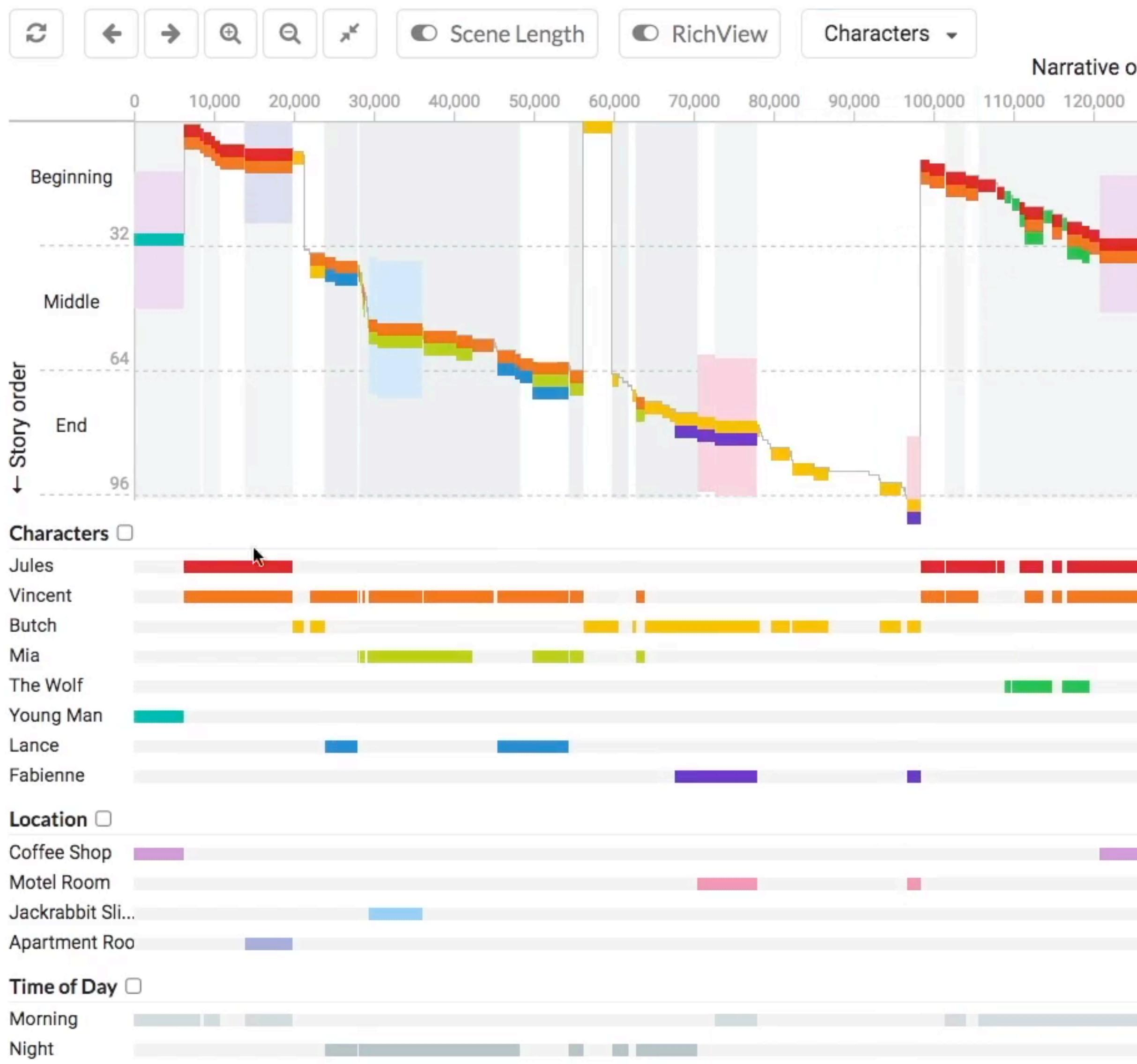
*Mia!*

 Vincent

*I let's shake on it.*

# Pulp Fiction

Thriller, Crime | October 1994 | Directed by Quentin Tarantino | Nonlinearity 0.63 | 

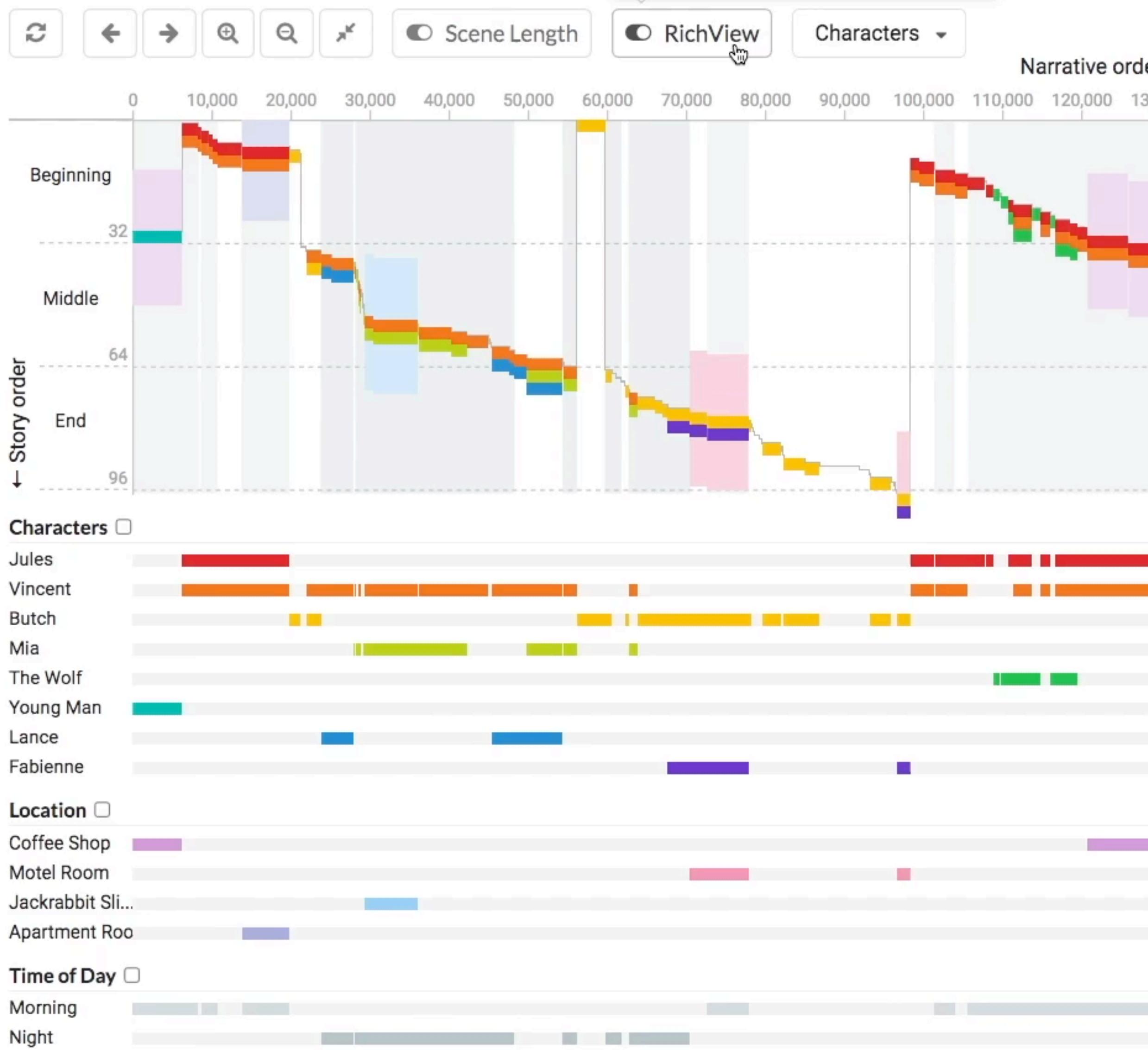


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- INT. MARCELLUS' HOUSE / DRESSING ROOM - NIGHT
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# Pulp Fiction

Thriller, Crime | October 1994 | Directed by Quentin Tarantino

Show all metadata on the story curve



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# EXPERT EVALUATION

What are potential use cases of Story Explorer?

# Participants

- 3 Professional writers (W)
- 1 Literary scholar (L)

## Participants

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- 1 Literary scholar (L)

## Procedure

- Introduced Story Explorer
- Presented narrative patterns discovered
- Discussed potential use cases

## Writer#1

*“The visuals look like **musical notes**. A literary work has also **rhythm**. It is fantastic to see the narrative structure in this way.”*

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*“Students often have a hard time writing **a good narrative** even if they have **a good story**. They especially **don’t know how to use time well and often overuse flashbacks**. This tool can visually teach how time is manipulated in a narrative”*

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Literary Scholar#1

*“In a TV series, people could use it to help **visualize the amount and type of nonlinearity** that is typical in early episodes. Similarly, it could help someone who rearrange the rendered scenes and **compare different arrangements of events**”*

# FUTURE WORK

## *Extensions to Different Aspects of Nonlinear Temporality*

- **Frequency:** repetitive descriptions of a single story event
- **Duration:** time taken to narrate a story event
- **Temporal paradoxes:** time loops & parallel timelines

# FUTURE WORK

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## *Generalizations to Other Domains*

- *Other genres: theater plays, novels, video games, etc*

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## *Generalizations to Other Domains*

- **Other genres:** theater plays, novels, video games, etc
- **Other data domains:**  
*comparison of two orderings for the same set of elements*
  1. Rankings in sports analytics
  2. Chromosome rearrangements in biology

# storycurve.namwkim.org

