Narrative Transportation for Natural Language Processing

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Driven to Discover℠

Motivation

Possible applications of out study:

- Analyze what the most transporting (fiction or non-fiction) narratives are saying – since there may be a correlation between being transported and agreeing with the beliefs of the narrative (Green & Brock 2000)
- Help writers identify the most transporting areas of their stories

Problem Definition & Contribution

Question:

- What are the most important textual features that contribute to the transportingness of narratives?

Contribution:

- Fanfiction reader transportation data set
- Exploratory analysis of results
- Proposal + code for how to use this data to predict how transporting a text is

Data - Selected Stories

Fandom	Kudos
Harry Potter	High
Harry Potter	Low
My Hero Academia	High
My Hero Academia	Low

Methods

1: Proposed Feature Extractions:

- Cognition words (BookNLP pipeline – using Wordnet)
- Perception words (LIWC dictionary)
- Sentiment score by sentence
- POS tag & distributions among types of stories

2: Analysis & Classification with Extracted Features

3: Analysis of Correlations Between Level of Transportation and Extracted Features & Embedding space

Survey Designs

supersense_category	text	sentence
verb.cognition	dreaming of	0
verb.cognition	dreamed	3
verb.cognition	recall	25
verb.cognition	know	29
verb.cognition	assumed	30
verb.cognition	know	31

supersense_category	text	sentence
noun.cognition	truth	4

Perception

above	fullest	outlying	sways
aboveground	fullness	outpost*	sweep
absent minded	fumbl*	outside	sweeping
absent-minded	further	outsides	sweeps
absentmindedness	furthermost	outskirt*	sweet
abyss	furthest	outta	sweeter
accelerat*	furtive*	outward*	sweetest
accomodation*	gallop*	over	sweetness*
ache*	gap	overhear*	swerve
aching	gape	overlap*	swerved
achoo	gaped	overlook*	swerves
acre*	gapes	oversaw	swerving
across	gaping	oversee*	swim*
action	gaps	oversight*	swing
adjacent	gate*	paddled	swinging
adjacent*	gaze	pain	swings
adjoining	get* ahead	pained	swipe
admittanc*	gibber*	painful	swiped
advisories	glanc*	painful*	swipes
advisory	glare*	pains	swiping
afk	glaring*	pale	swirl*
alarm*	glaucoma	paled	swivel*
alarmed	gleam*	pales	swoop*
alarming*	glide	paling	swoosh*
alarms	glided	pang	swung
alert*	glides	pangs	symphon*
altitude*	gliding	panting	tackle
amid	glimmer*	parallel	tackled
amidst	glint*	pass	tackles
among*	glisten*	passed	tackling
angle	glitter	passes	tart
angled	glitter*	passing	tartly
angles	global	path	tartness
angling	global*	paths	tarts
anterior	globe*	pathway*	taste
anywhere*	glow	peek*	tasted
apart	glowed	peered	tastes

Pre-survey Questions

What is your favorite genre of fiction?

On average, how much do you read for pleasure per week?

- ○ 0-1 hours
- ○ 2-4 hours
- ○ 5-7 hours
- ○ 8+ hours

Have you read Harry Potter or seen the movies?

- ○ Yes
- ○ No

Have you read My Hero Academia (Boku no Hero Academia) manga series or seen the anime?

- ○ Yes
- ○ No

Close your eyes and picture a horse. Then go to the next page.

Which image above is closest to how well you were able to picture a horse?

- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6

Select and highlight phrases that increase your sense of presence or connection to the story [blue] *or decrease it* [red]

He'd been dreaming of it since the defeat of Voldemort. The Veil, that is. The one that Sirius had fallen behind.
The last time he'd dreamed about the Department of Mysteries, Sirius had died.
The world had also finally woken up to the truth about Voldemort, but the price had been too high for him to be grateful.
And once the truth was out, the attacks had gotten worse.
He wondered, briefly, why he was there. Ginny was at home, she was pregnant, she needed him.
Yet he could not seem to stay away. Voldemort was gone, true.
But then, so were so many other people, good people, who should not have died.
He counted the steps until he was standing right in front of where Sirius had fallen through.
Cedric. Sirius. Dumbledore. Hedwig. Moody. Dobby. Tonks father. Remus. Colin Creevy. Tonks. Snape. Fred.
Hell, even Crabbe didn't deserve to die then. There were more, many more, but none of them close to him.
They were close to somebody, though. Maybe that was why he couldn't stay away. Why he couldn't look away.
Why, even at that very moment, he couldn't walk away.

Harry awoke with a start. He was lying on a floor, covered by a poor excuse for a blanket, and someone-
appeared to be attempting to break the door down.
"Where's the cannon?" Dudley asked. Dudley? Where had the Veil sent him?
Could this be when Hagrid first told him about Hogwarts?
It must be, because he couldn't recall any other time where he-
and Dudley had been sleeping in what appeared to be a shack.
There was a crash behind them and Uncle Vernon came skidding into the room, holding a rifle. Harry snorted.
Like that would do any good against HAG[Increase] [Decrease]
His uncle didn't seem to know that, though, and shouted "Who's there? I warn you-I'm armed!"
Although it did occur to Harry that when people were trying to break in, it can generally be assumed-
that they are probably armed as well. And as if they didn't know that a wizard had come for Harry.
Who else COULD even get across in this weather, not to mention who else would even bother?
SMASH! The door flew clean off its hinges and landed on the floor with a thunderous crash.
Hagrid stood in the doorway, looking very impressive.

Please rate your experience of the passage

	Strongly disagree	Slightly disagree	Neutral	Slightly agree	Strongly agree
The story affected me emotionally.	○	○	○	○	○
While reading my body was in the room, but my mind was inside the world created by the story.	○	○	○	○	○
I had a hard time keeping my mind on the story.	○	○	○	○	○
The characters were alive in my imagination.	○	○	○	○	○
I could picture myself in the scene of the events described in the story.	○	○	○	○	○

Survey Results

Highlights for hero_high
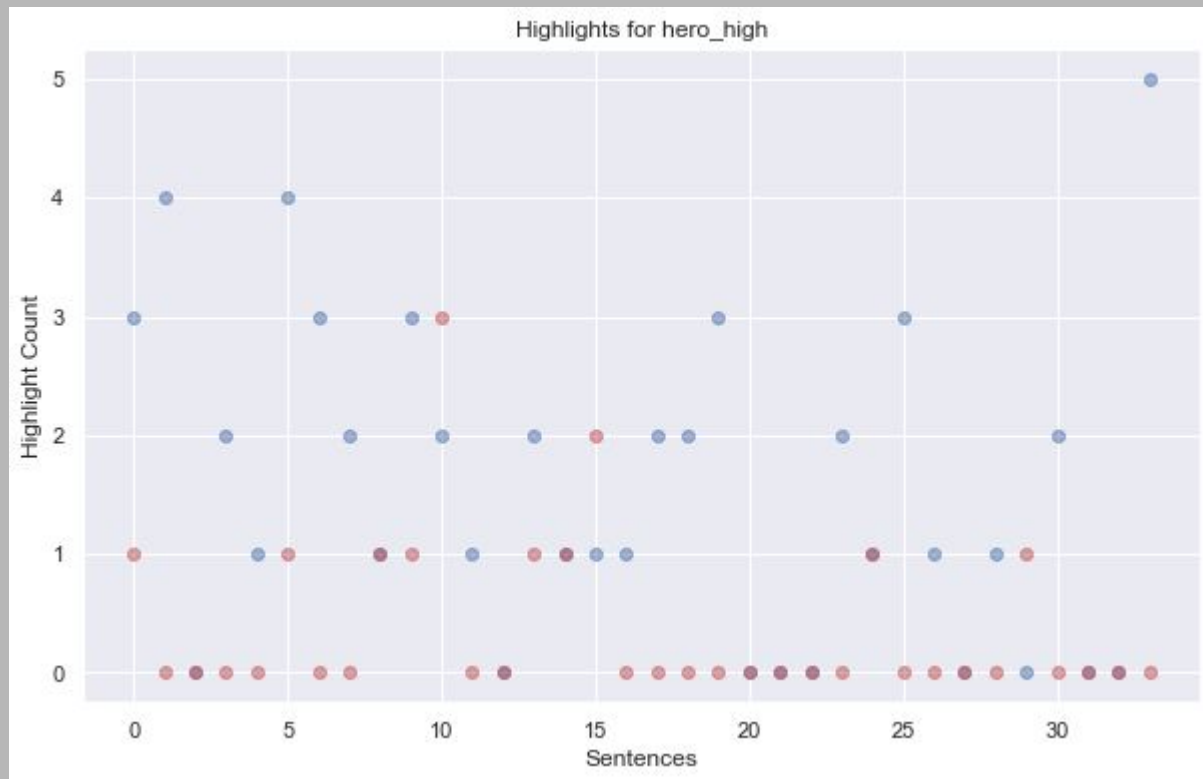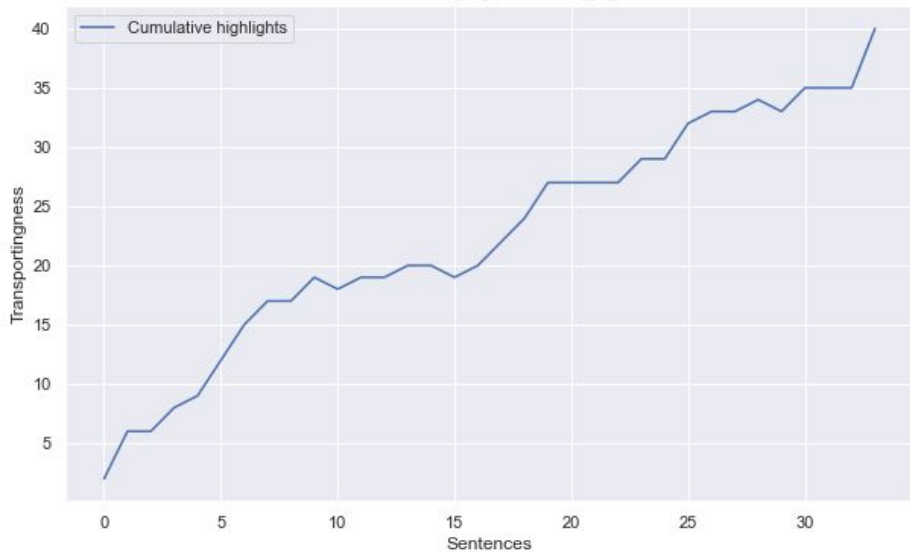
- 8 responses
- High kudos My Hero Academia fanfiction from Archive of Our Own
- Most popular sentence:
"Do you analyze villains?"

Survey Results

High kudos My Hero Academia fanfiction
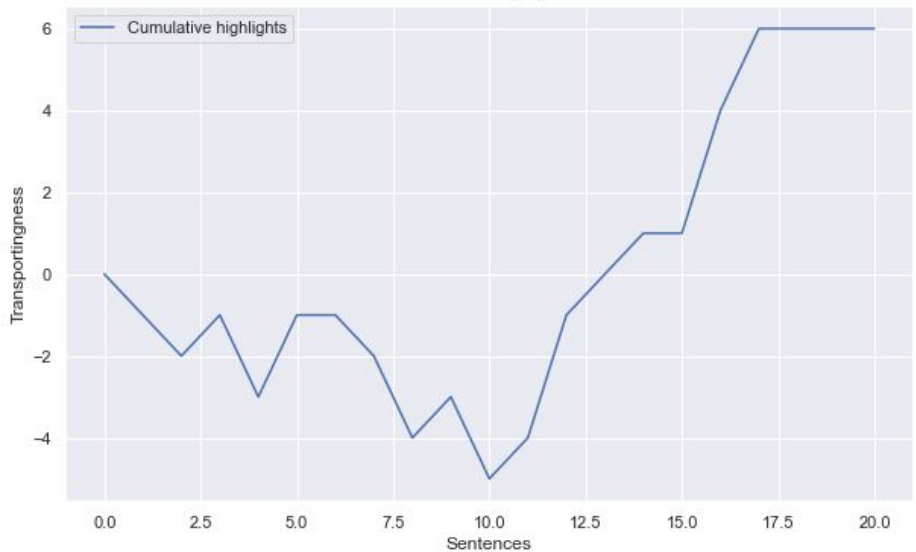
Low kudos My Hero Academia fanfiction

Survey Results : **Correlations**

- Sentiment & Cognition
  - Perception words - strongly correlated with increase and decrease
  - Cognition words - positively correlated with inc & dec (need more data to verify)
  - Sentiment - negatively correlated inc & dec (need more data to verify)
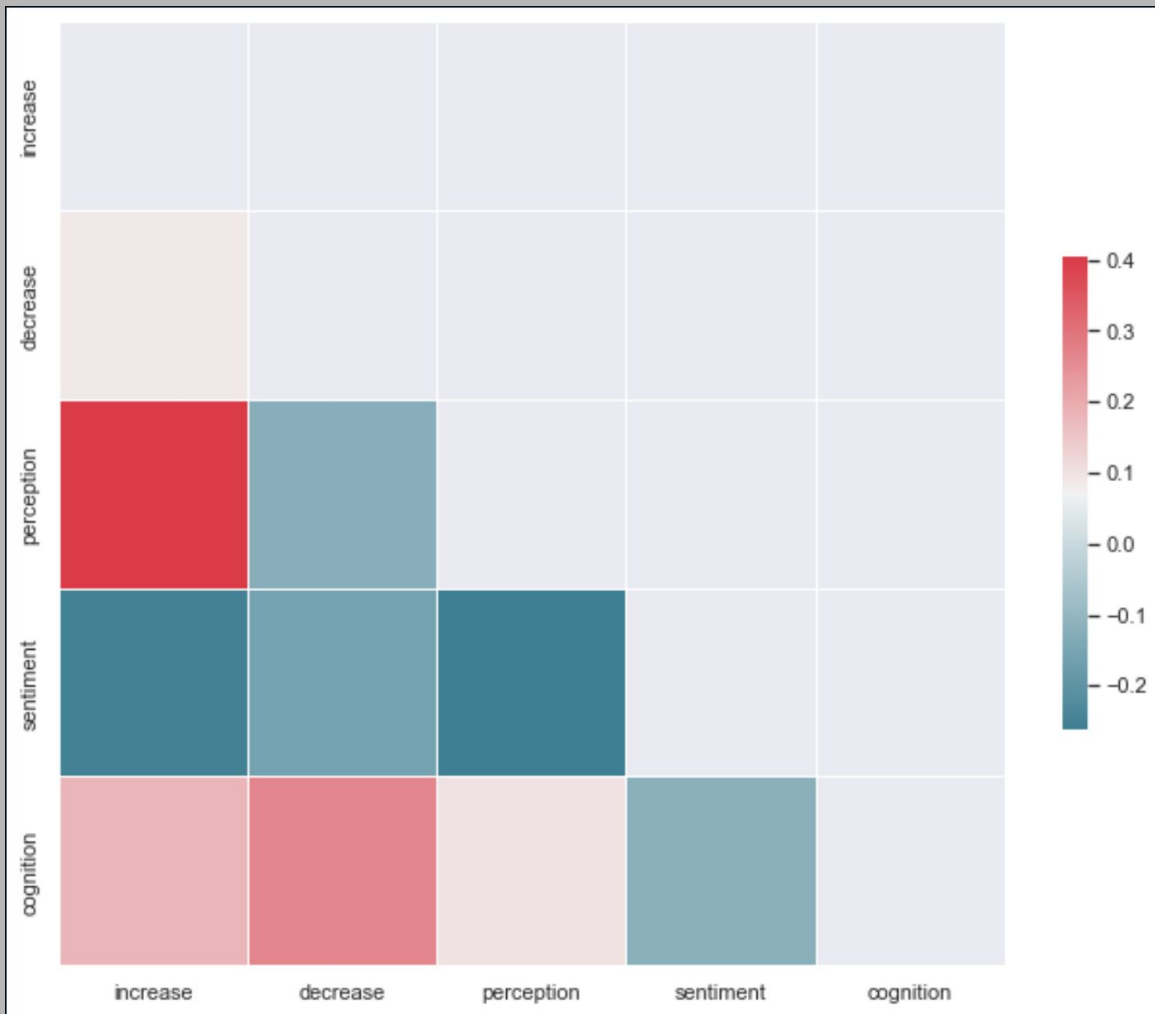
High-Kudo Stories

Low-Kudo Stories

Postive Label Sentences
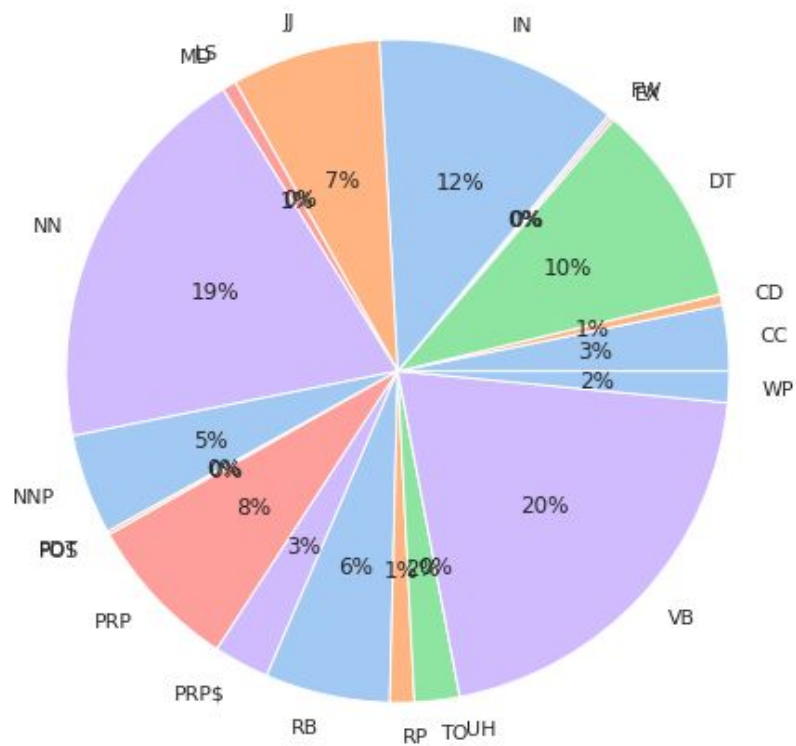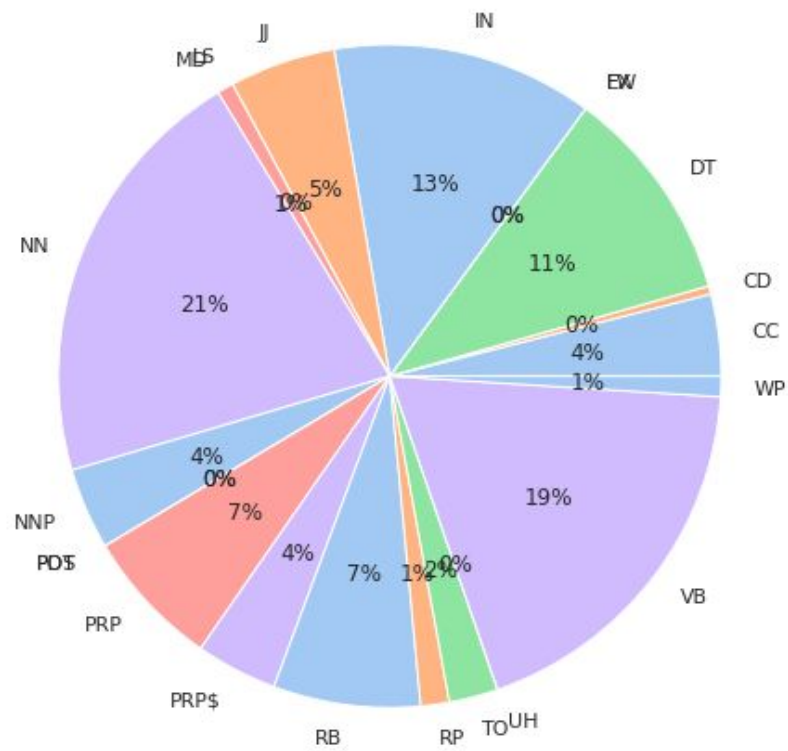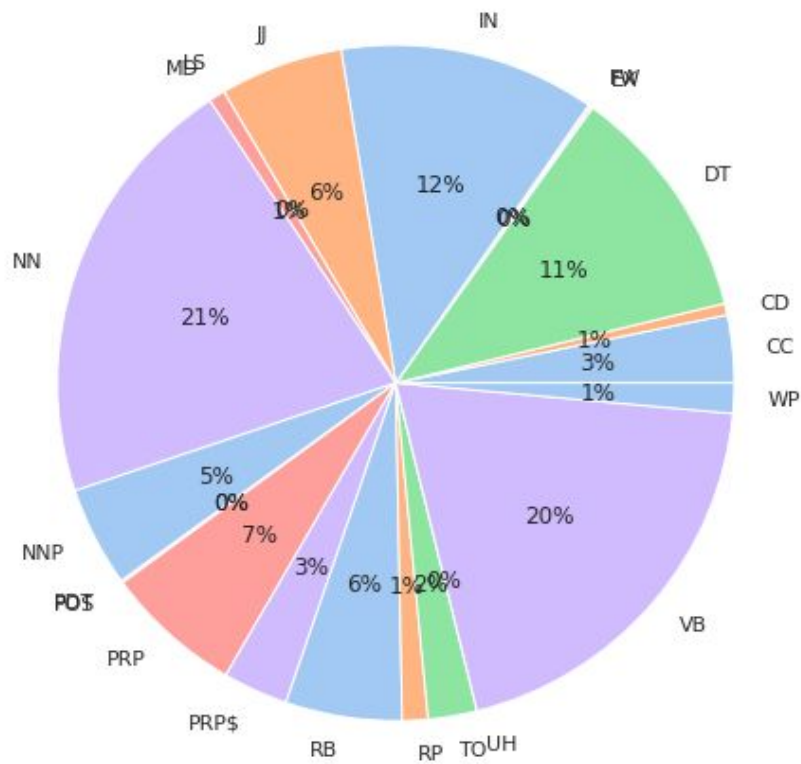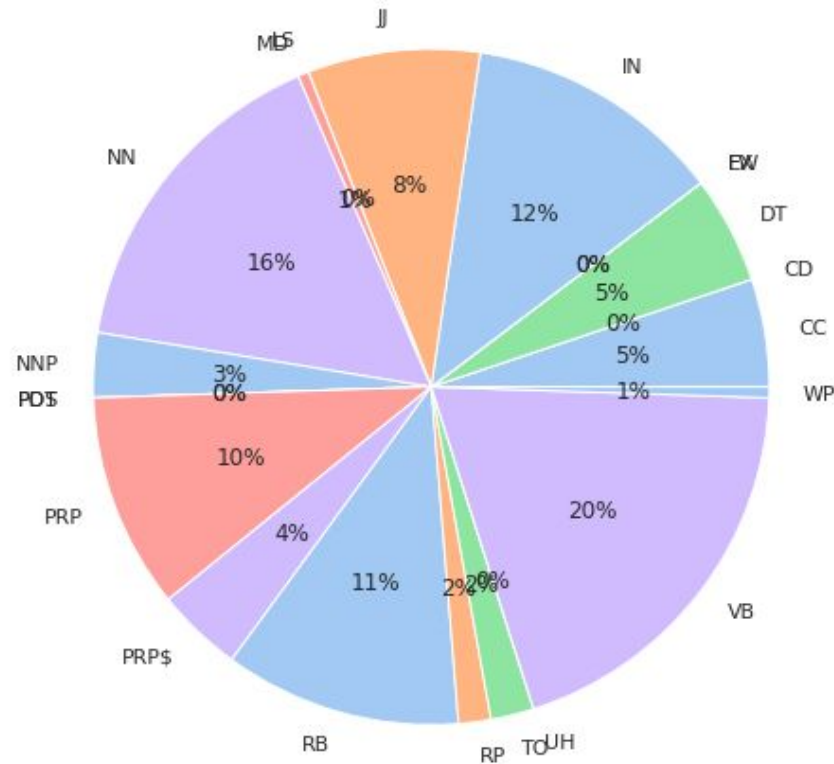
Negative Label Sentences

Classification (SVM)

Highs

Accuracy: 0.9696969696969697

Lows

Accuracy: 0.9166666666666666

	CC	CD	DT	EX	FW	IN	JJ	LS	MD	NN	...	POS	PRP	PRP$	RB	RP	TO	UH	VB	WP	label
0	0.0	1.0	3.0	0.0	0.0	2.0	1.0	0.0	0.0	5.0	...	0.0	0.0	1.0	3.0	0.0	1.0	0.0	2.0	0.0	1
1	0.0	0.0	2.0	0.0	0.0	4.0	1.0	0.0	0.0	4.0	...	0.0	1.0	2.0	1.0	0.0	0.0	0.0	3.0	0.0	1
3	0.0	0.0	1.0	0.0	0.0	1.0	0.0	0.0	0.0	1.0	...	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1
4	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1
5	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	1.0	...	0.0	0.0	1.0	0.0	0.0	1.0	0.0	3.0	0.0	1
6	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	2.0	...	0.0	0.0	2.0	0.0	0.0	0.0	0.0	1.0	0.0	1
7	0.0	0.0	6.0	0.0	0.0	2.0	0.0	0.0	2.0	4.0	...	0.0	5.0	0.0	2.0	0.0	0.0	0.0	9.0	0.0	1
9	1.0	0.0	5.0	0.0	0.0	5.0	5.0	0.0	0.0	9.0	...	0.0	3.0	2.0	1.0	1.0	1.0	0.0	7.0	0.0	1
10	1.0	0.0	0.0	0.0	0.0	1.0	2.0	0.0	0.0	1.0	...	0.0	2.0	0.0	1.0	0.0	0.0	0.0	2.0	0.0	0
11	2.0	0.0	4.0	0.0	1.0	2.0	2.0	0.0	0.0	7.0	...	0.0	2.0	1.0	1.0	2.0	1.0	0.0	7.0	0.0	1
13	2.0	0.0	2.0	0.0	0.0	5.0	3.0	0.0	1.0	7.0	...	0.0	5.0	2.0	1.0	0.0	0.0	0.0	7.0	0.0	1
15	2.0	0.0	2.0	0.0	0.0	6.0	5.0	0.0	0.0	7.0	...	0.0	4.0	0.0	4.0	1.0	1.0	0.0	8.0	0.0	0
16	1.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	3.0	...	0.0	3.0	0.0	3.0	1.0	1.0	0.0	6.0	2.0	1
17	0.0	0.0	1.0	0.0	0.0	2.0	2.0	0.0	0.0	2.0	...	0.0	1.0	0.0	1.0	0.0	1.0	0.0	2.0	0.0	1
18	0.0	0.0	2.0	0.0	0.0	1.0	2.0	0.0	0.0	4.0	...	0.0	3.0	0.0	1.0	0.0	0.0	0.0	4.0	1.0	1
19	3.0	1.0	3.0	0.0	0.0	9.0	5.0	0.0	0.0	13.0	...	0.0	2.0	1.0	2.0	0.0	0.0	0.0	5.0	0.0	1
23	1.0	0.0	2.0	0.0	0.0	2.0	1.0	0.0	0.0	7.0	...	0.0	1.0	1.0	1.0	0.0	2.0	0.0	3.0	0.0	1

Current Observations

- ## POS tag & distributions:
  - ○ **Highs**: more NN (noun) + DT("this", "those"), NNP ("Harry")
  - ○ **Lows**: more PRP("He"), RB ("very", "more")

- ## Sentiment & Cognition
  - ○ <u>Perception words</u> - strongly correlated with increase and decrease
  - ○ <u>Cognition words</u> - positively correlated with inc & dec (need more data to verify)
  - ○ <u>Sentiment</u> - negatively correlated inc & dec (need more data to verify)

- ## LM embeddings (On-going…)

Limitations and Ethics

- Small data set
- Limitation + ethical concern: Some aspects of transportation depend on cultural context, personal experience, and outlook of the reader
- Varies by genre – for example, here we found correlations between perception words and transportation, which may be more common in fantasy, but more emotive works might have correlations with strong sentiment scores
- Connection between transportation and persuasion
- Annotator agreement not necessarily the goal

On-going work & Future Directions

- Taking a closer look at the embedding space (BERT-base) for our "labeled" data
- Metaphor Detection

- Waiting on more survey responses
- "Does punctuation matters?"
- …

We need your feedback!

- What are good methods for interpreting annotations that have a lot of variation?
  - Ex: some sentences have both positive and negative highlights