Tense and Aspect in Distributional Semantic Vector Space Models

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based on joint work with Nathanael Chambers and Mark Steedman

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Outline

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- Towards a Form-Independent Semantics with Entailment Graphs

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- WTH is Aspect?

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The verbs are all of a different form, however share a substantial amount of meaning.

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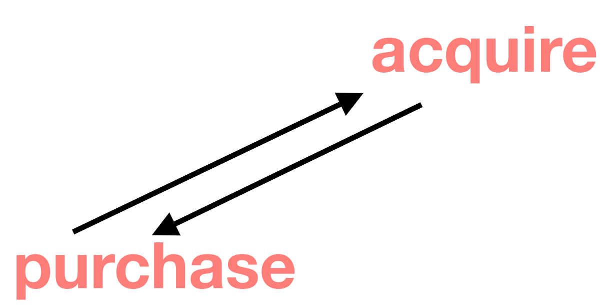

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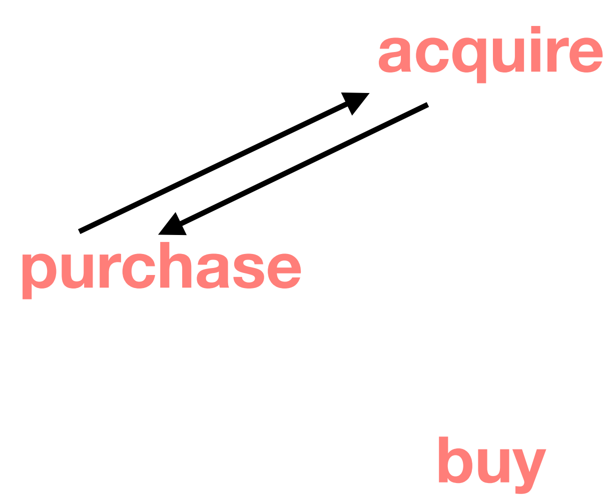

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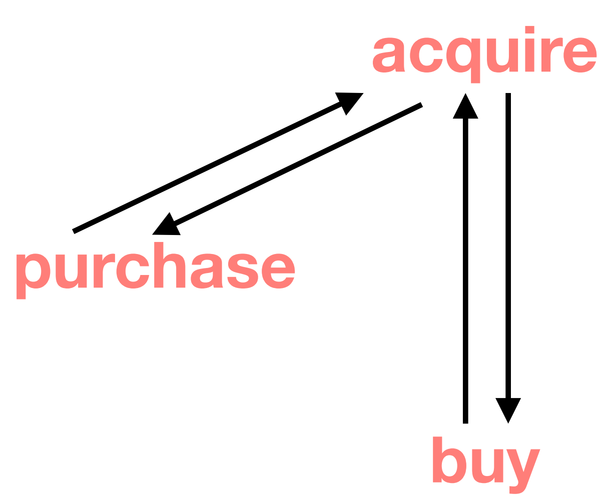

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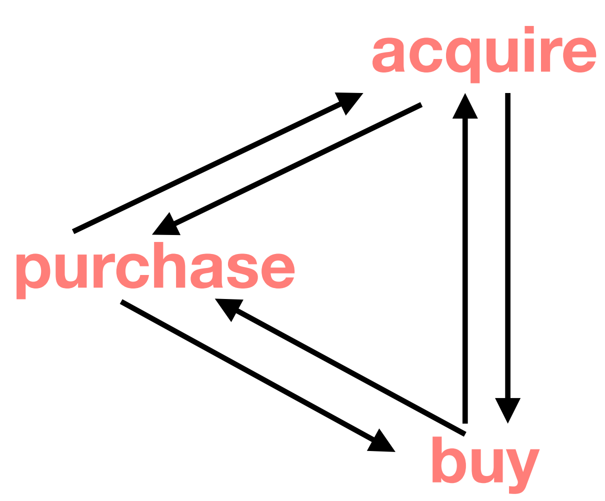

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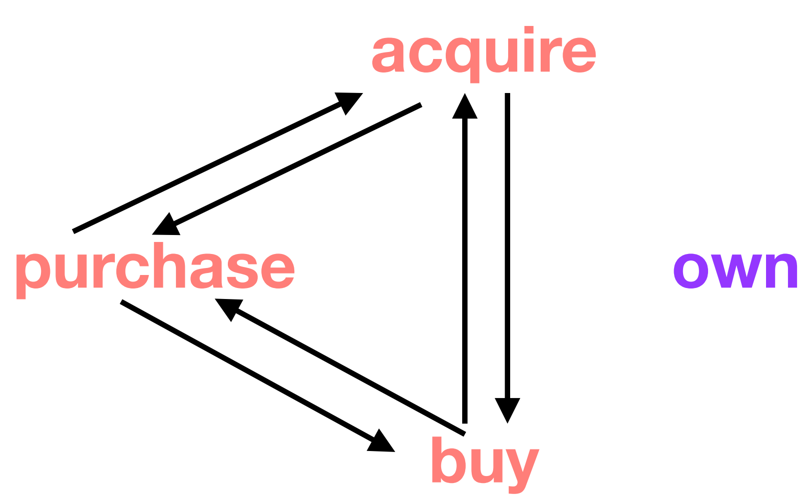

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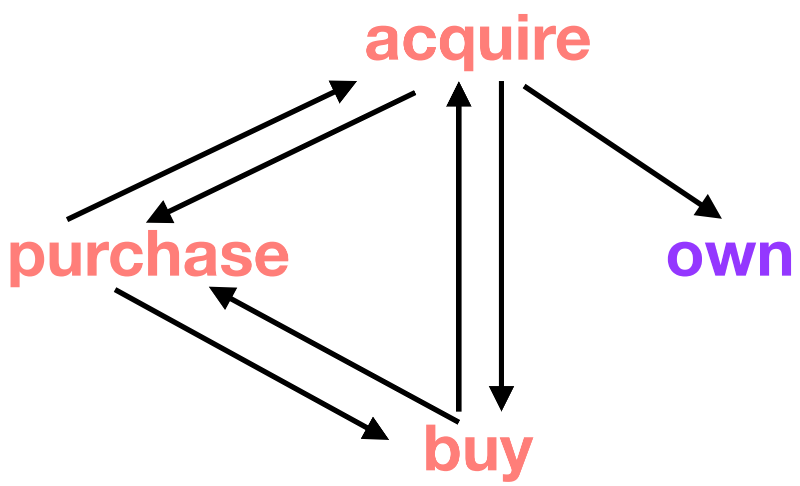

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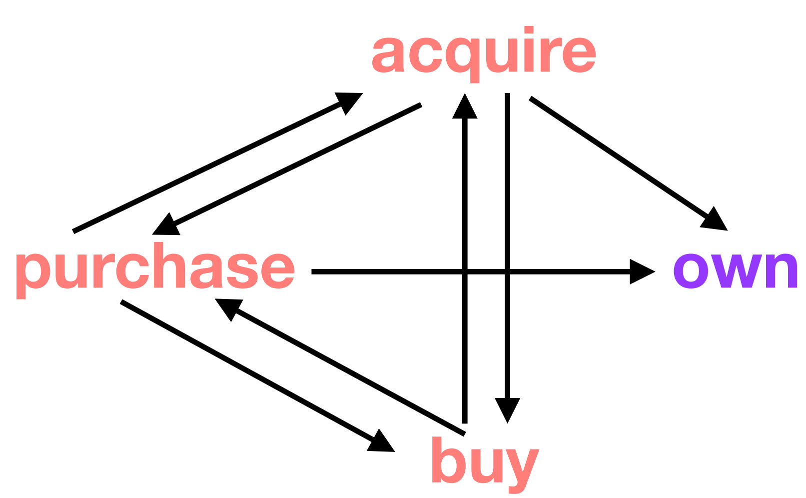

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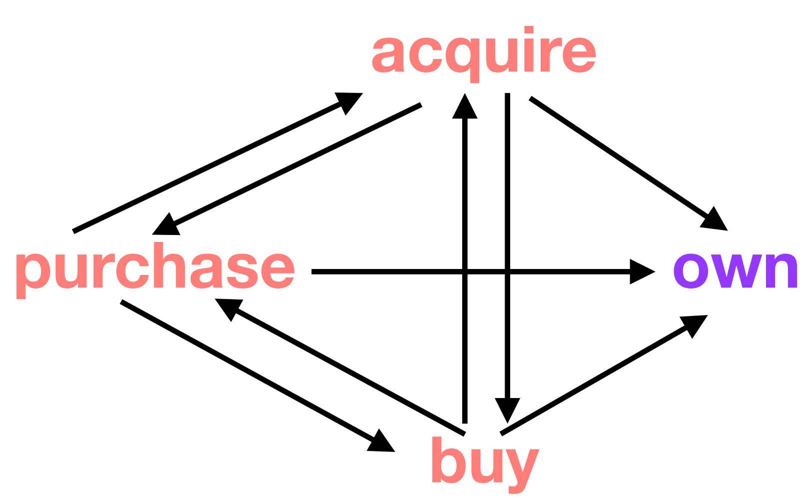

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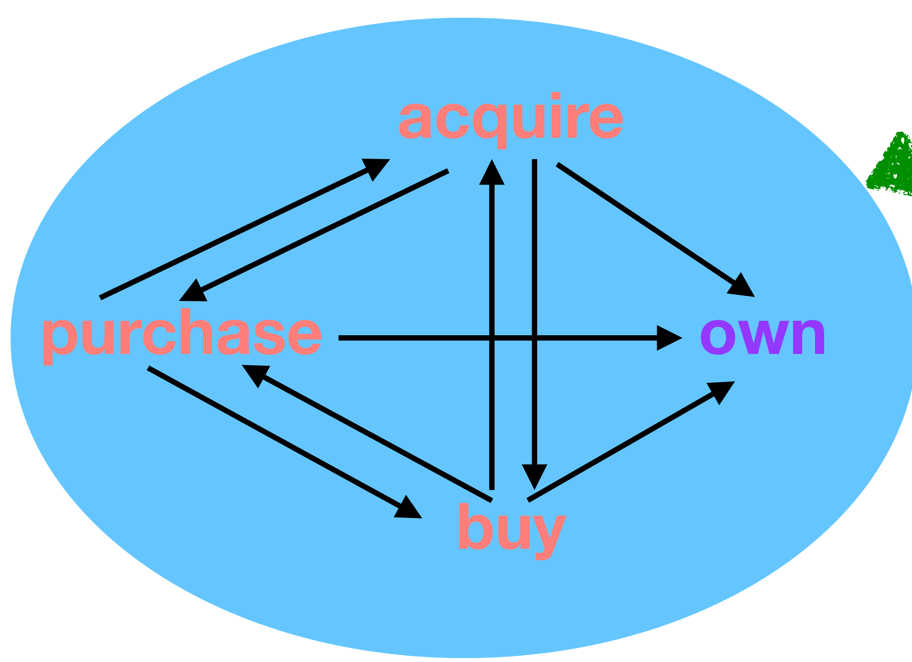
Entailment Graph



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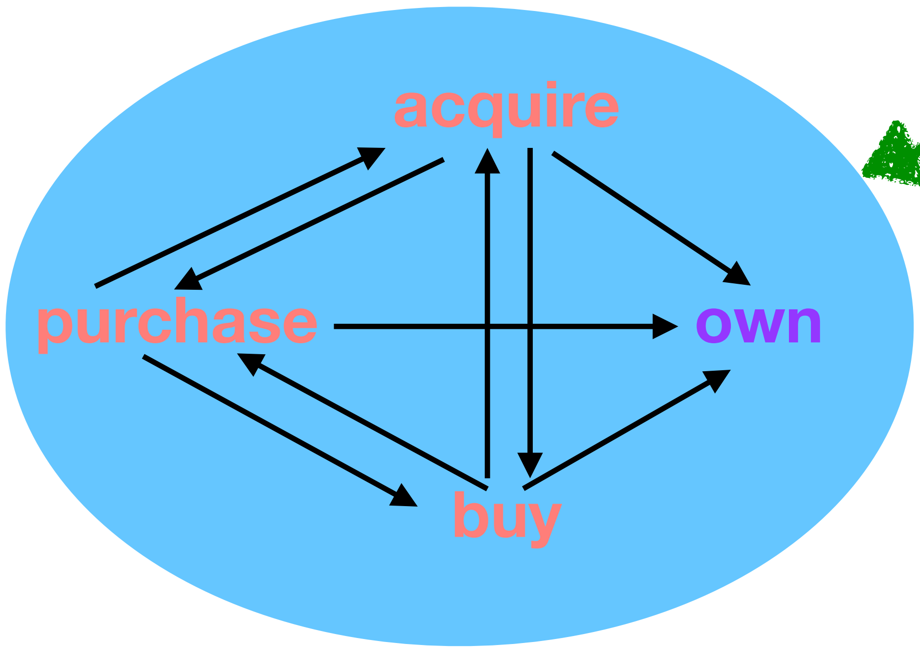

see e.g. Berant et al. (2010);
Lewis & Steedman (2013, 2014)

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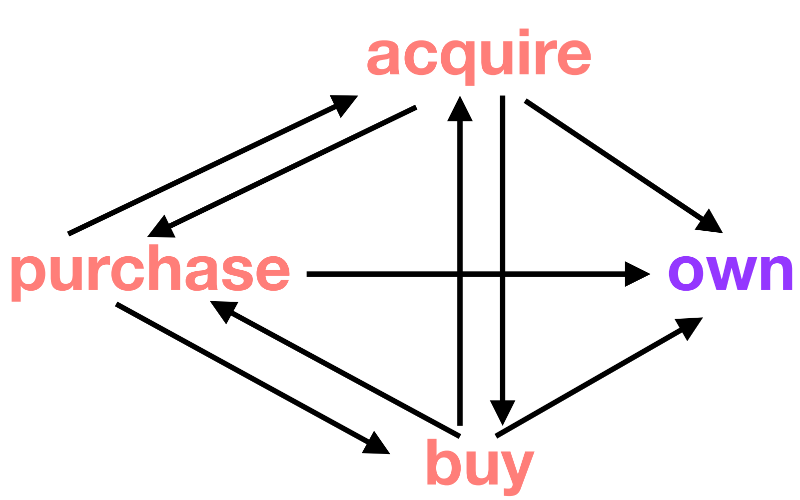

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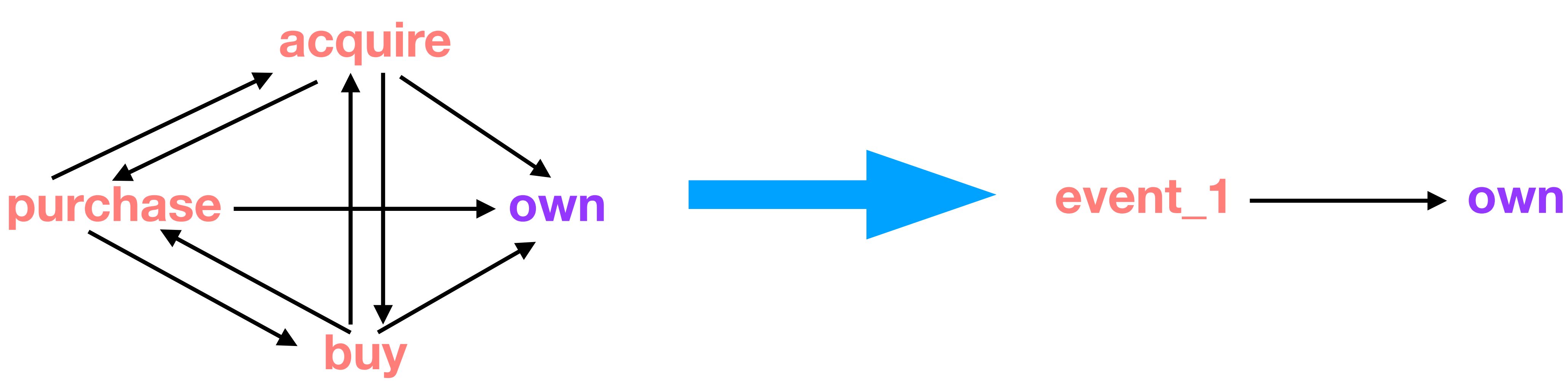

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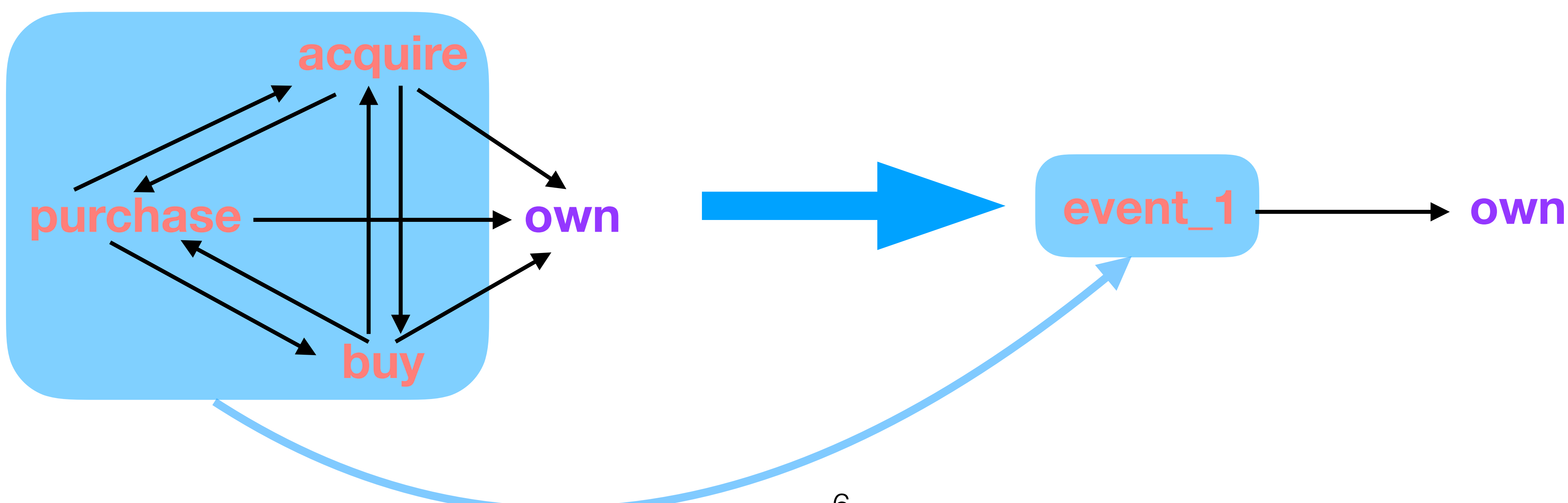

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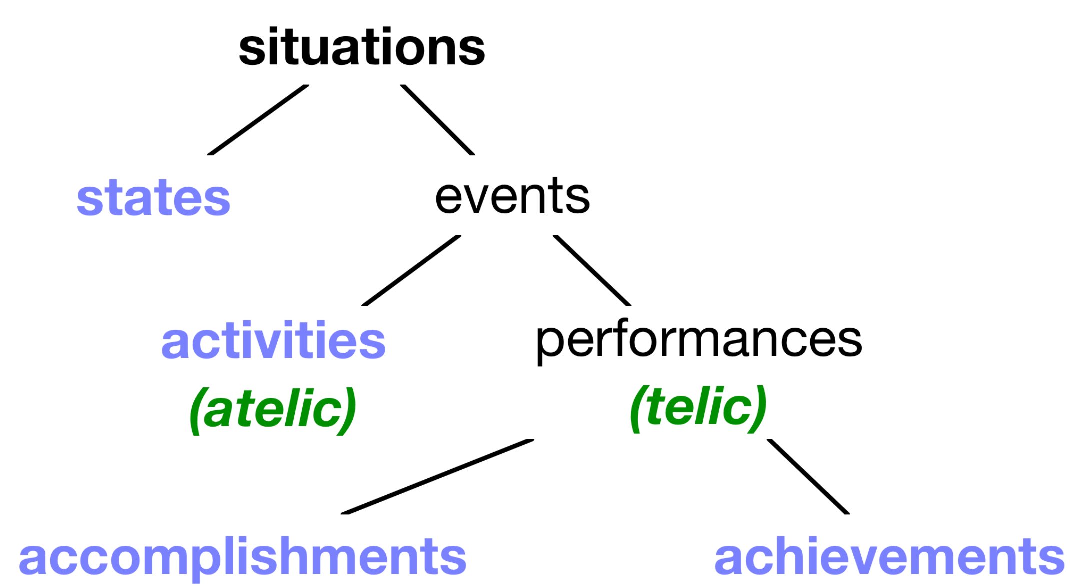

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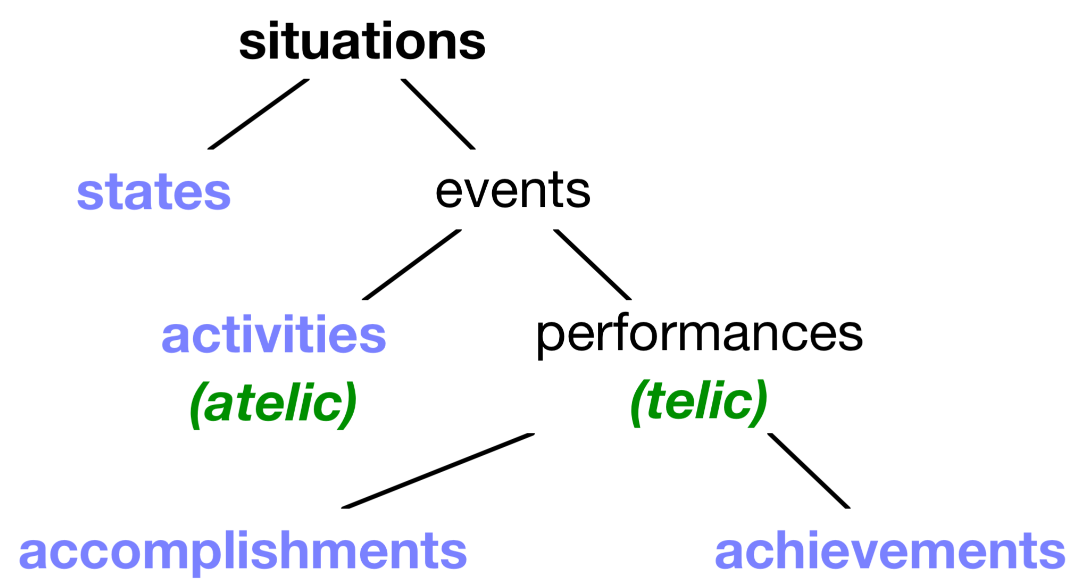

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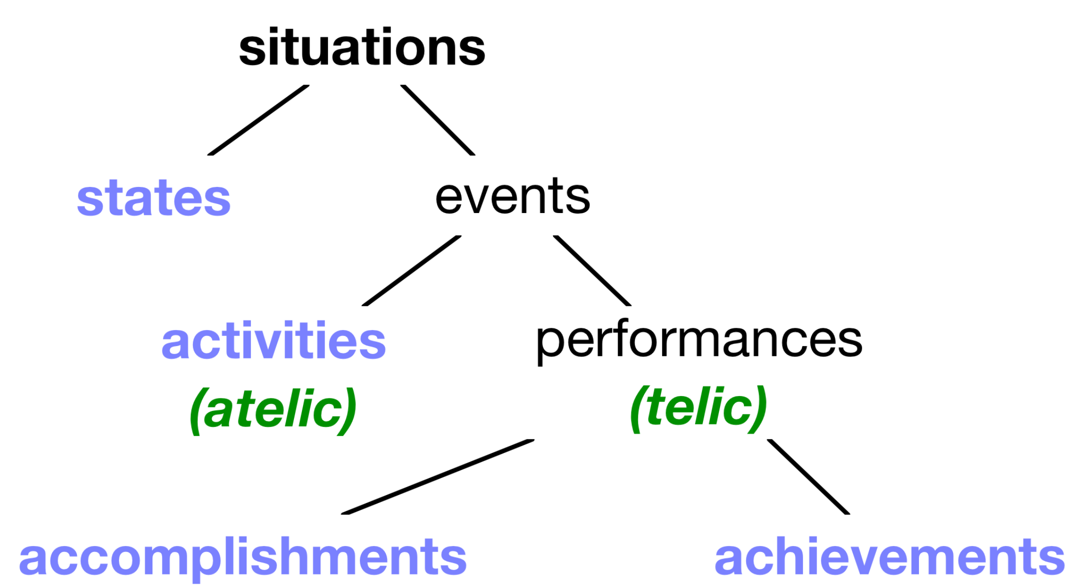

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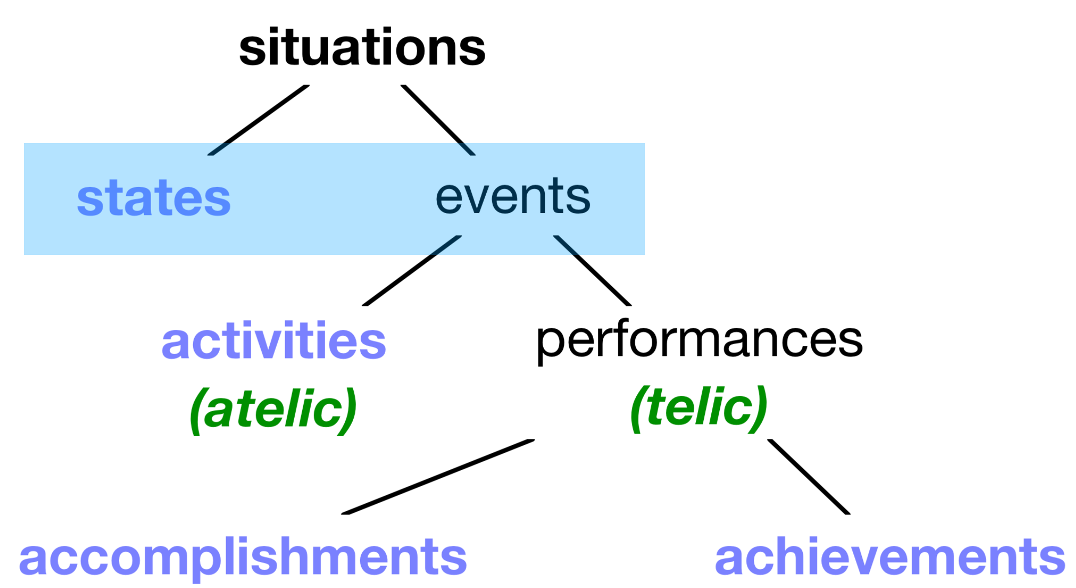

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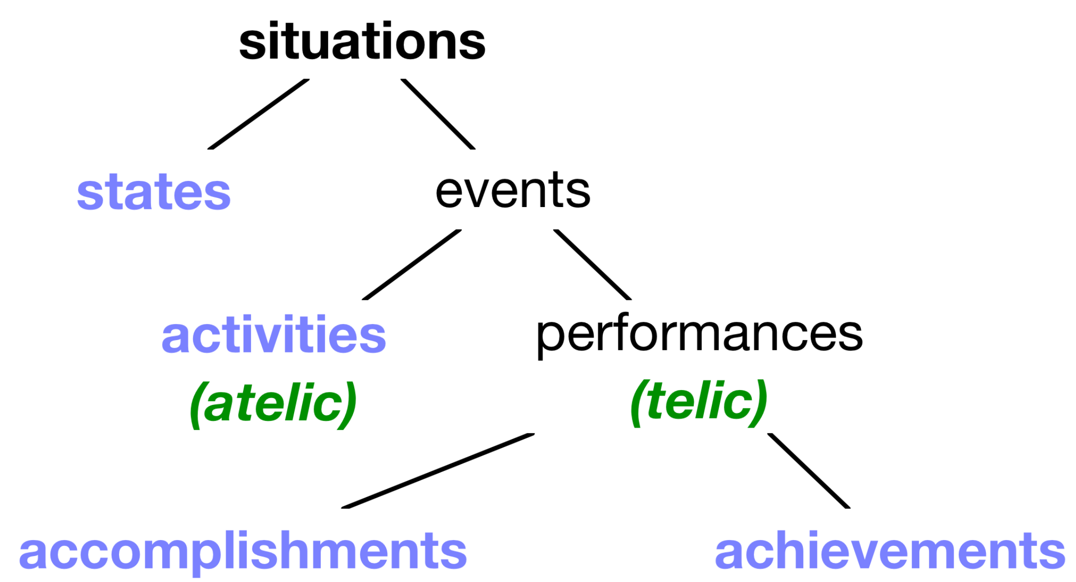

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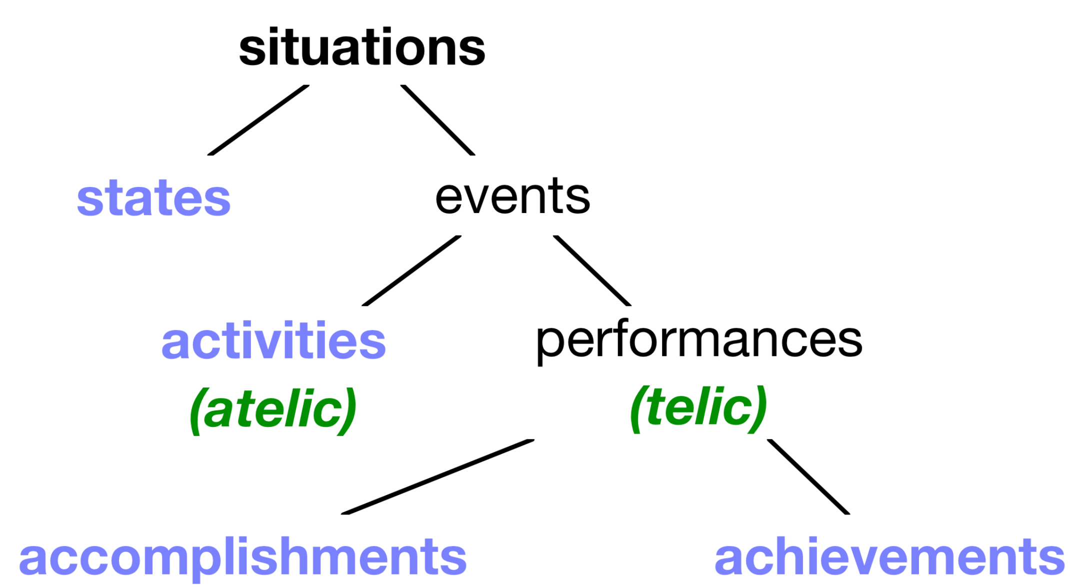

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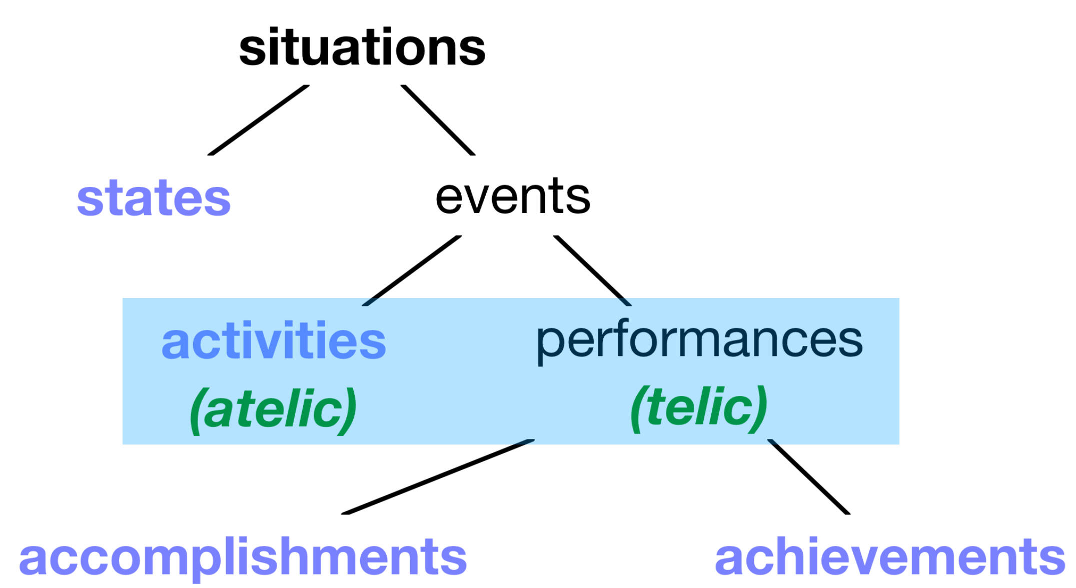

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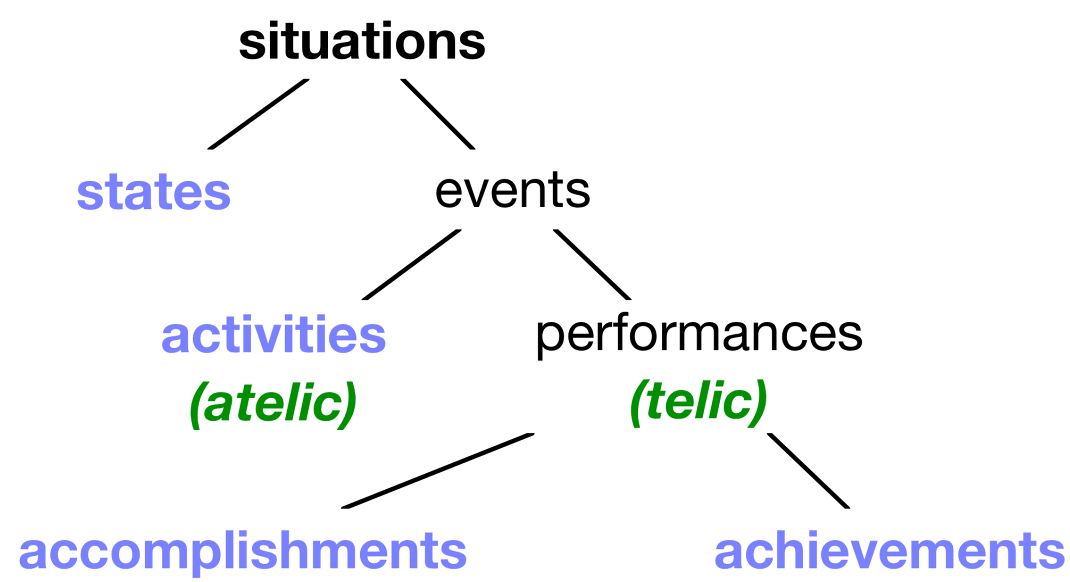

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    - i.e. you would use a different inflected form for "***ate***" in "***ate*** *a bar of chocolate*" vs. "***ate*** *chocolate*"

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*The carpet **covers** the whole room.* **(state)**

*Alice **covers** her eyes with her hands.* **(event)**

*Bob **ate** a bar of chocolate.* **(telic)**

*Bob **ate** chocolate.* **(atelic)**

- In other languages (e.g. the Slavic language family) these distinctions are part of the morphology of verbs
    - i.e. you would use a different inflected form for "***ate***" in "***ate** a bar of chocolate*" vs. "***ate** chocolate*"
- In English, we need to rely on **contextual cues** co-occurring with a given verb

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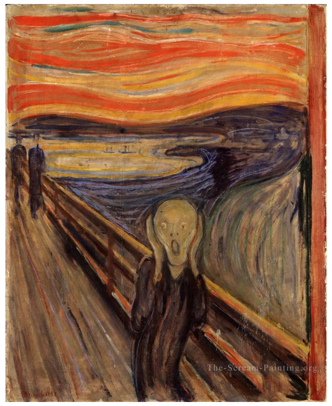

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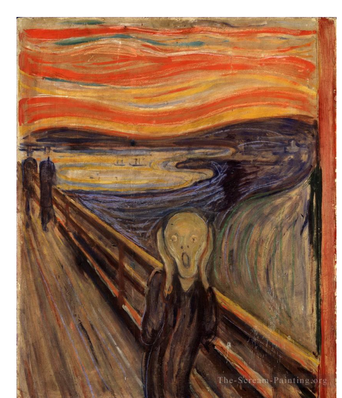

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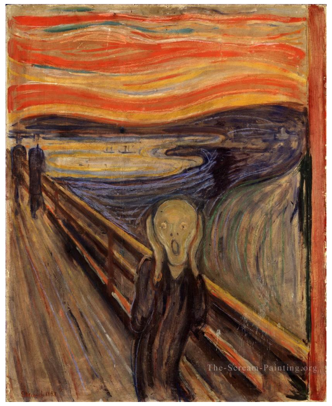

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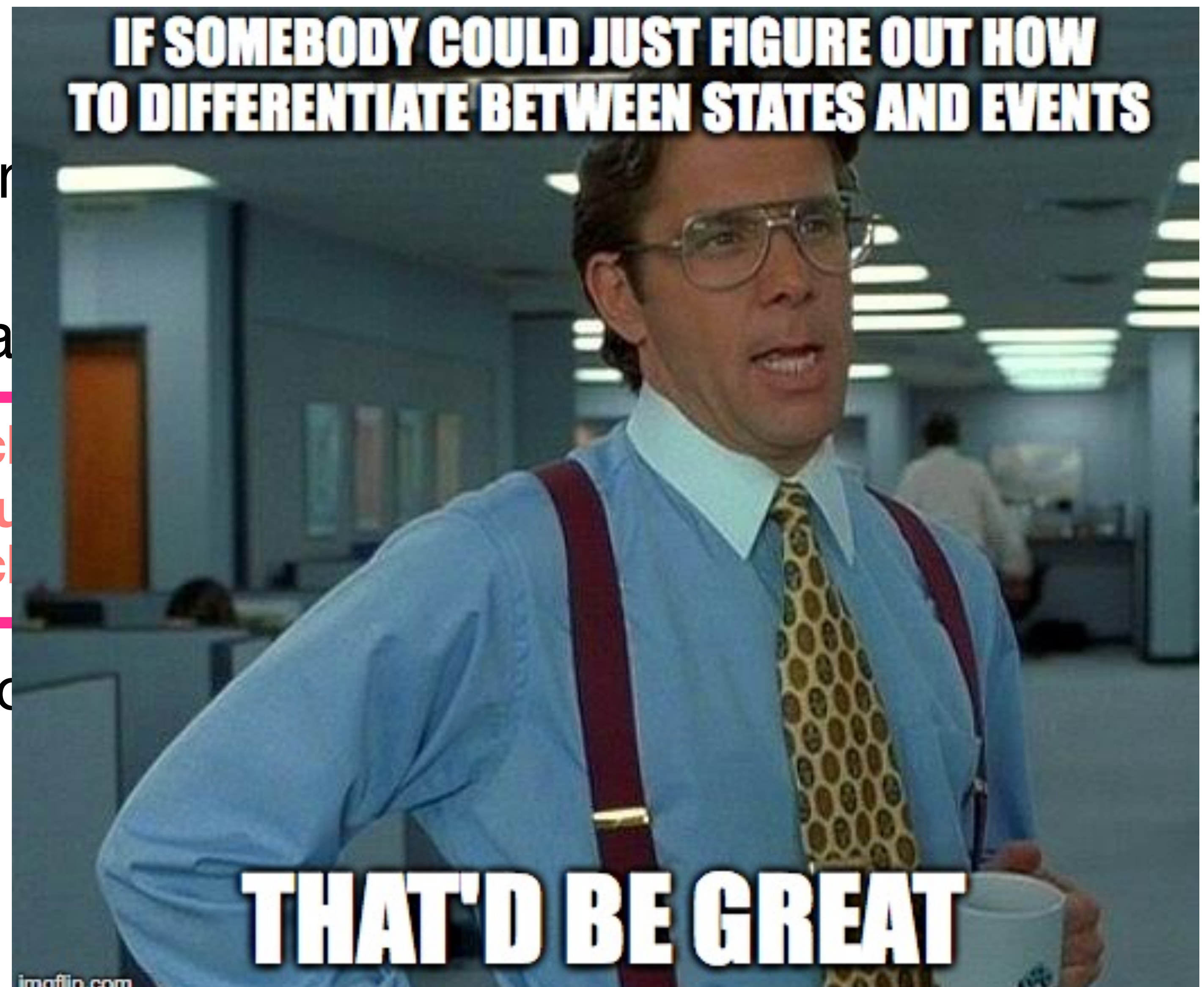

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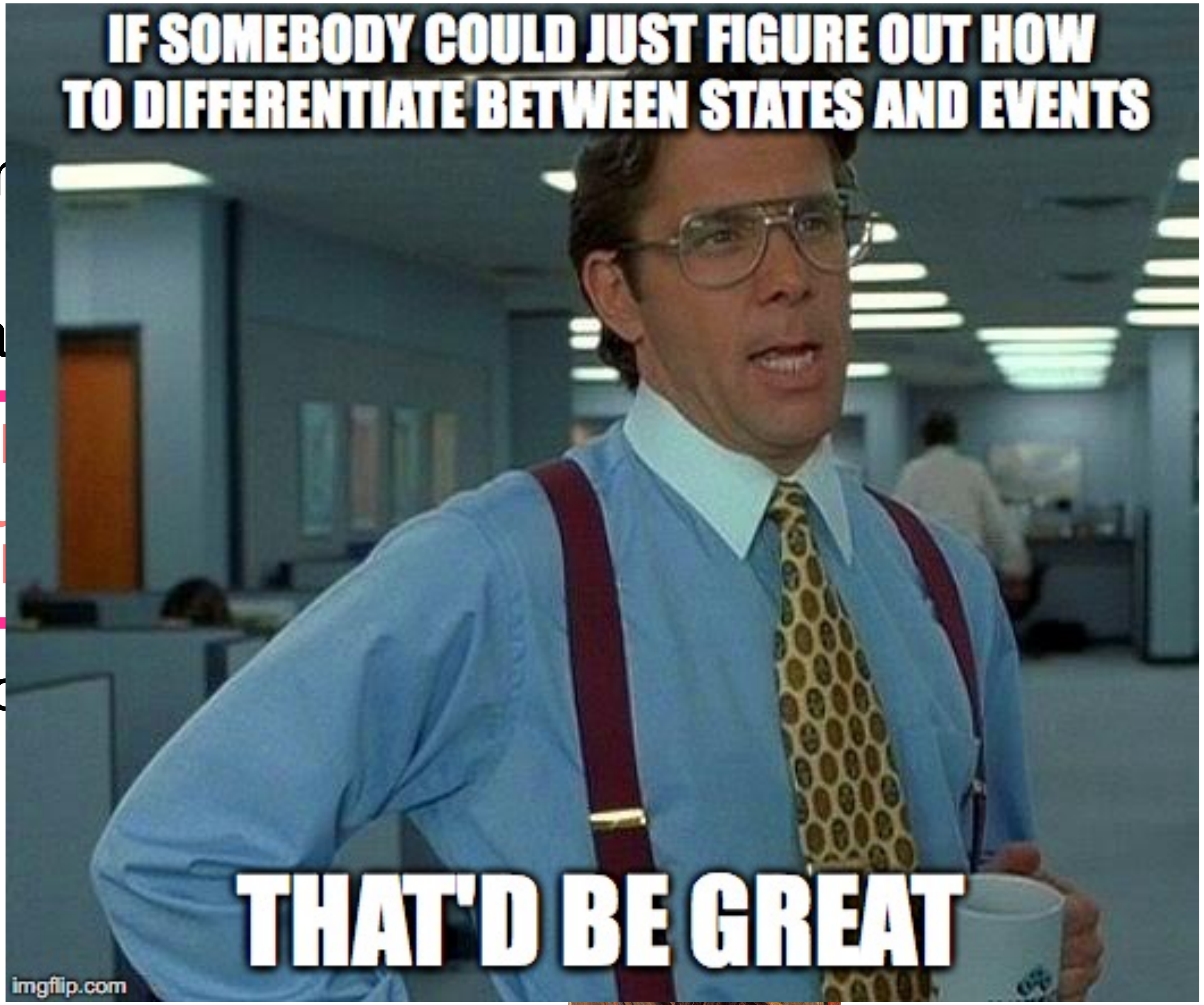

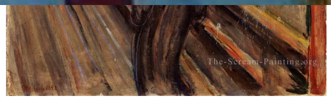

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    - Each verb is annotated within the scope of a sentence, so some **real-world context** for the verb is available.
- We are only relying on **distributional representations** for words (e.g. from `word2vec` [Mikolov et al., 2013])

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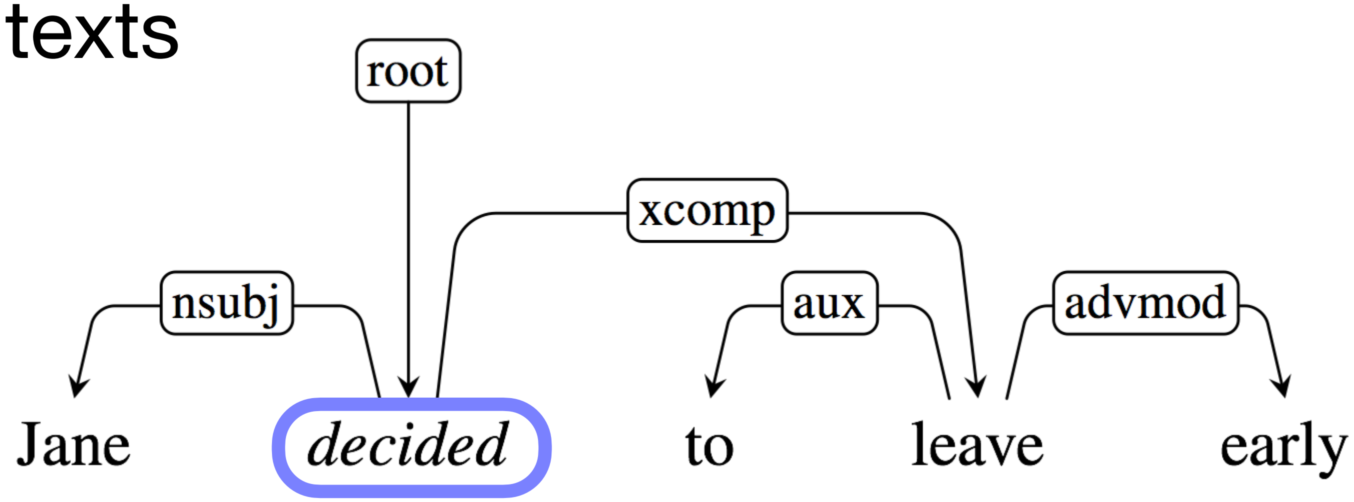

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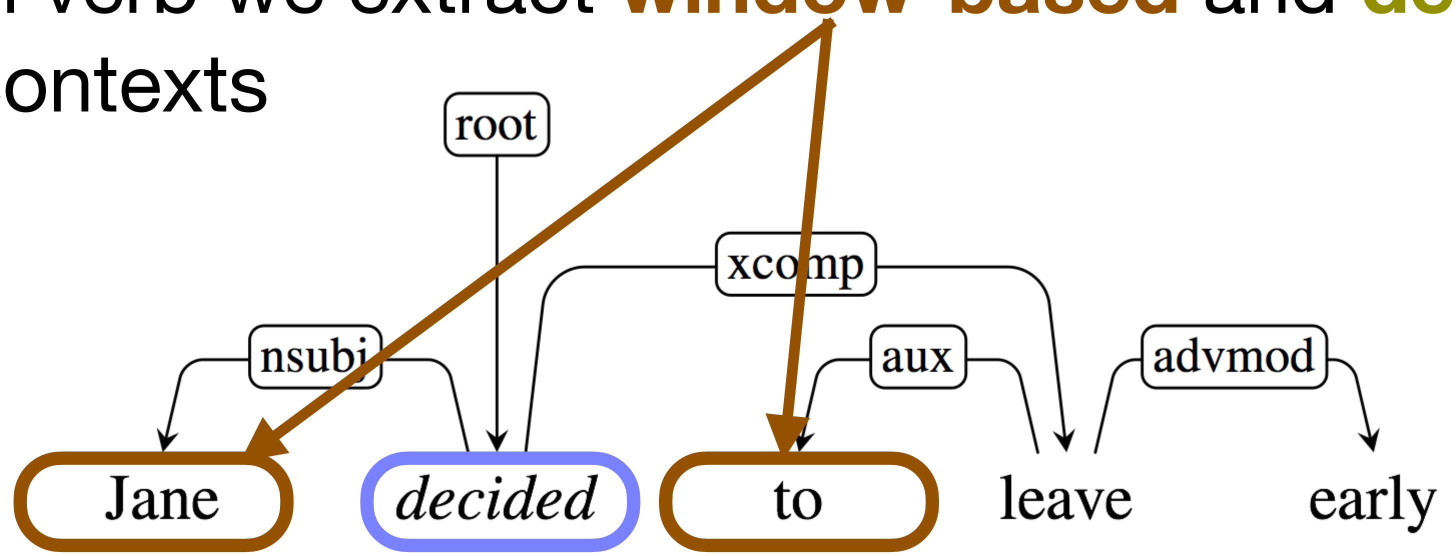

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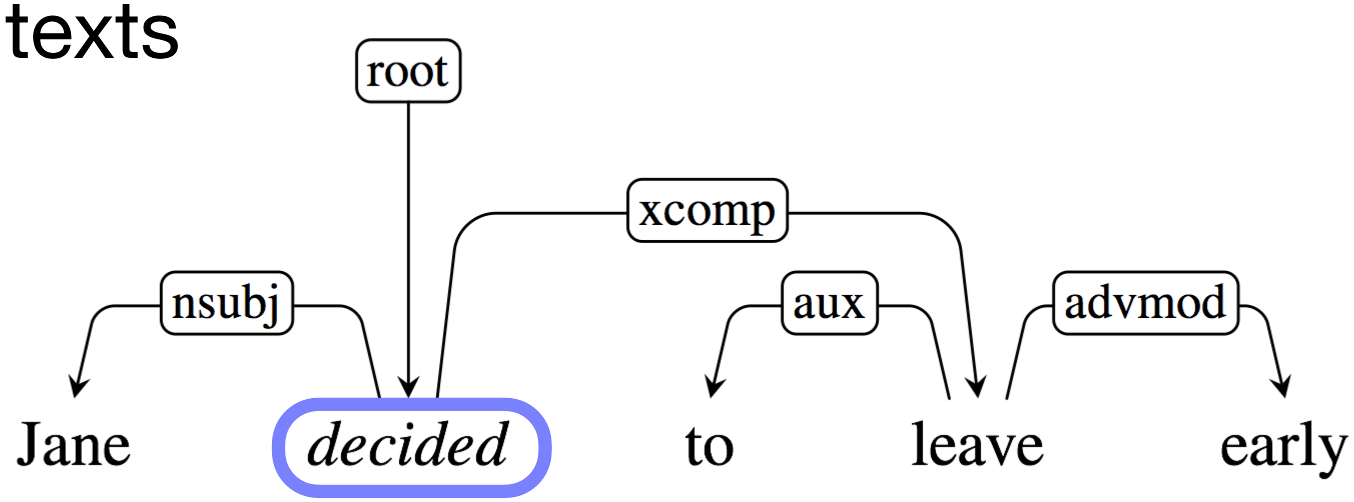

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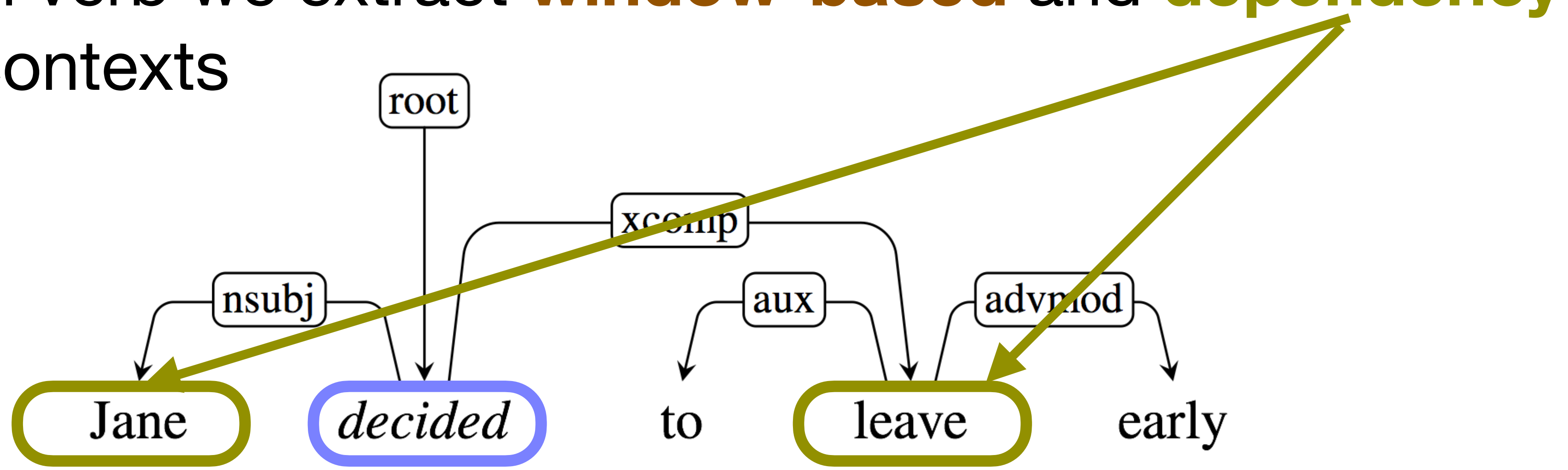

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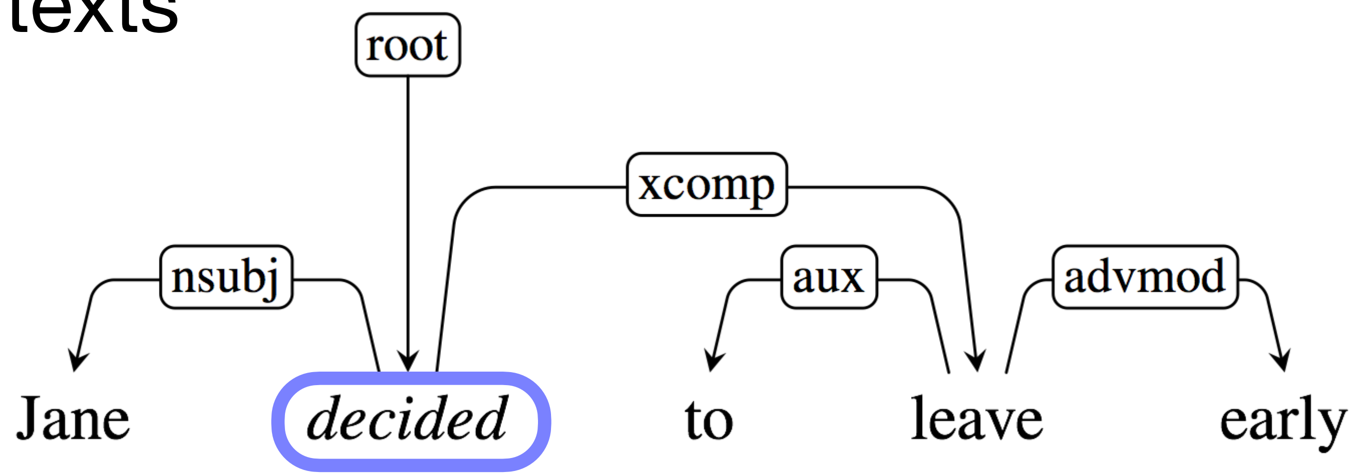

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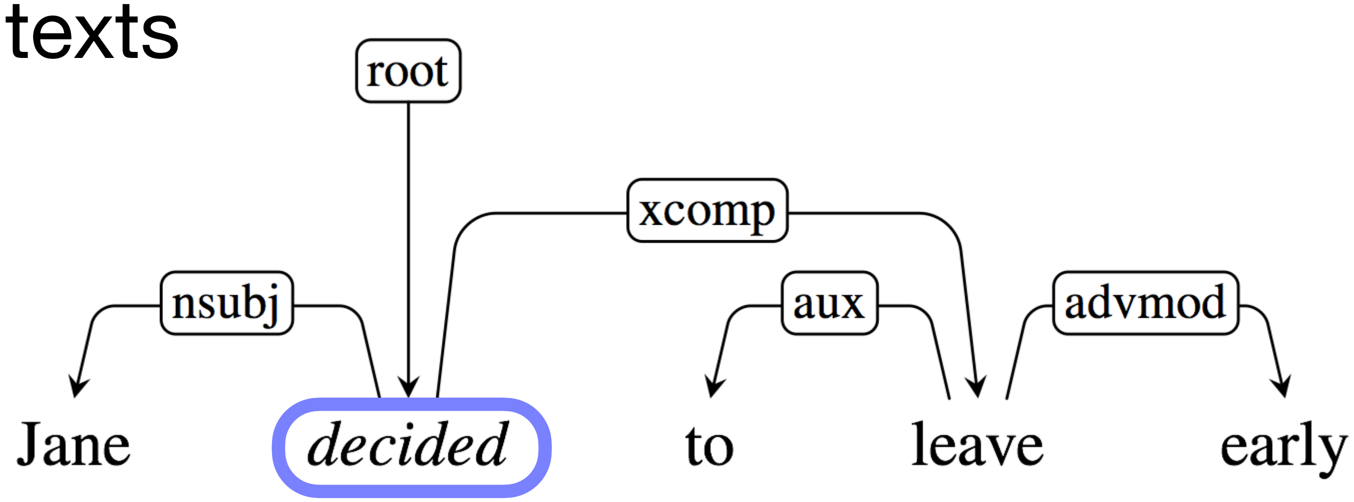

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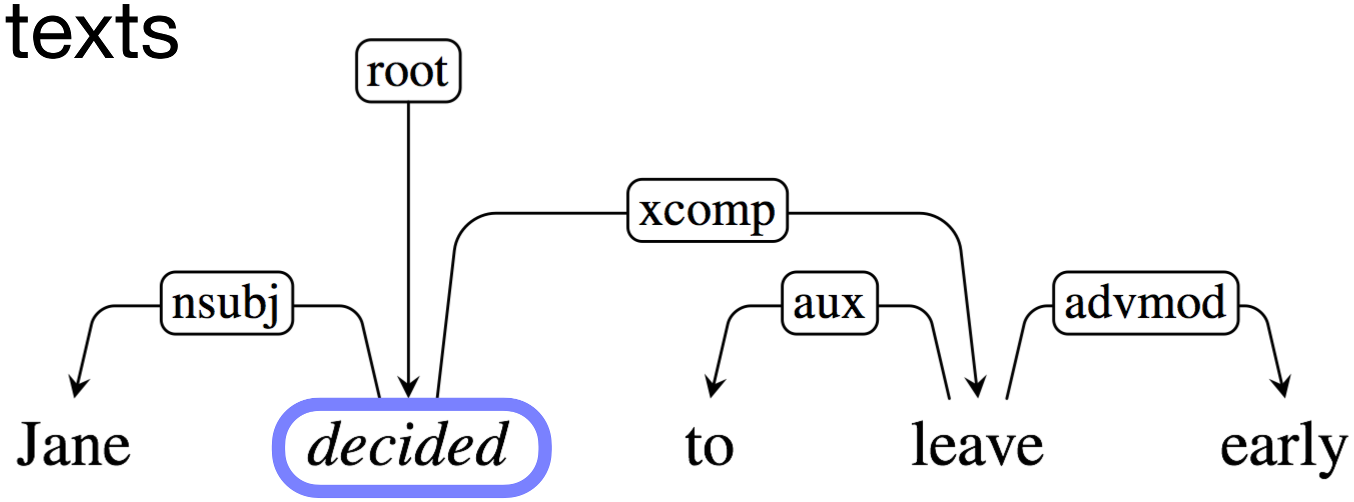

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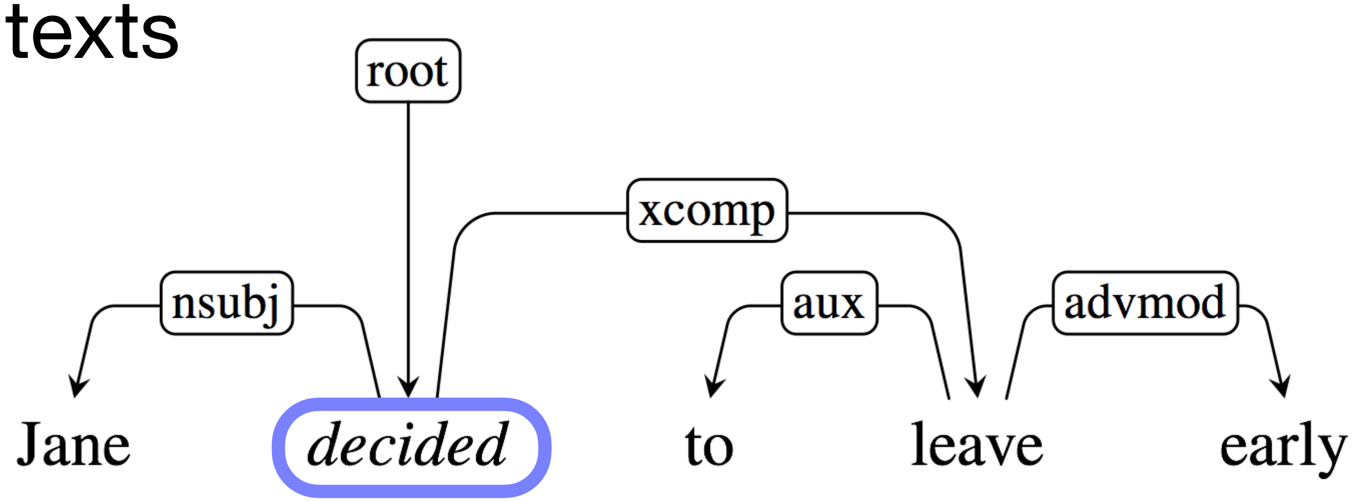

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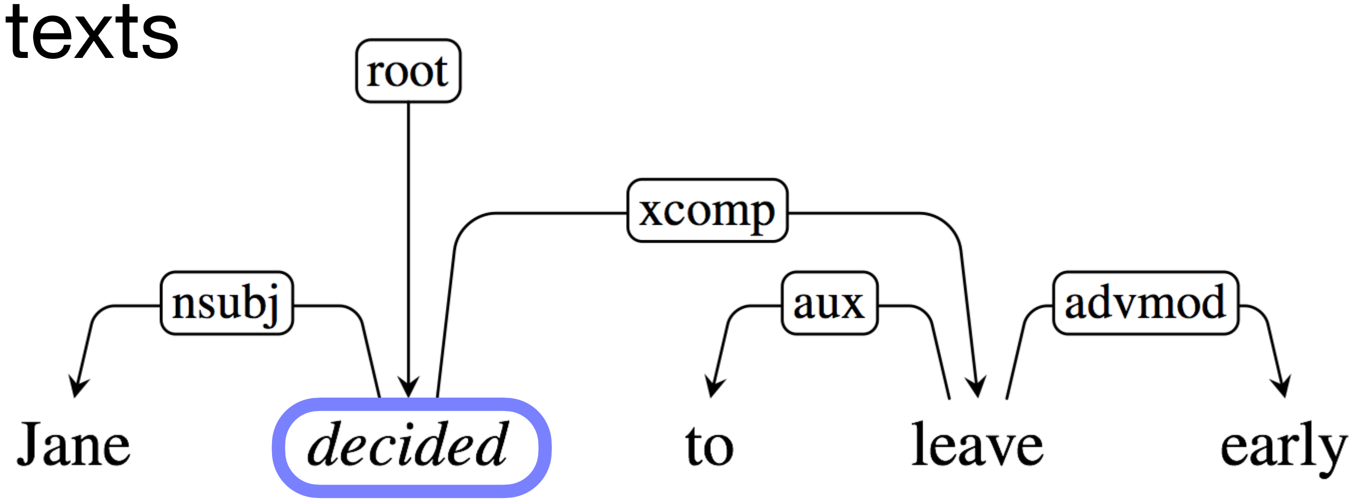

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    - v(**phrase-win**) = v(**decided**) + v(**Jane**) + v(**to**)
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- Subsequently use the resulting phrase vector as input to a classifier to predict whether ***decided*** is a **state** or an **event** (or alternatively a **telic** or an **atelic** event)

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- Thus, we created two new variants of the SitEnt and Telicity datasets, keeping only verbs that **occur with both labels**

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- Whereas common or proper nouns as subject and pronouns as objects is very ambiguous:

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- So in conclusion, closed class words are really strong indicators of aspect, but they also need to occur in the "right" position (i.e. as preposition, verb particles or subjects)

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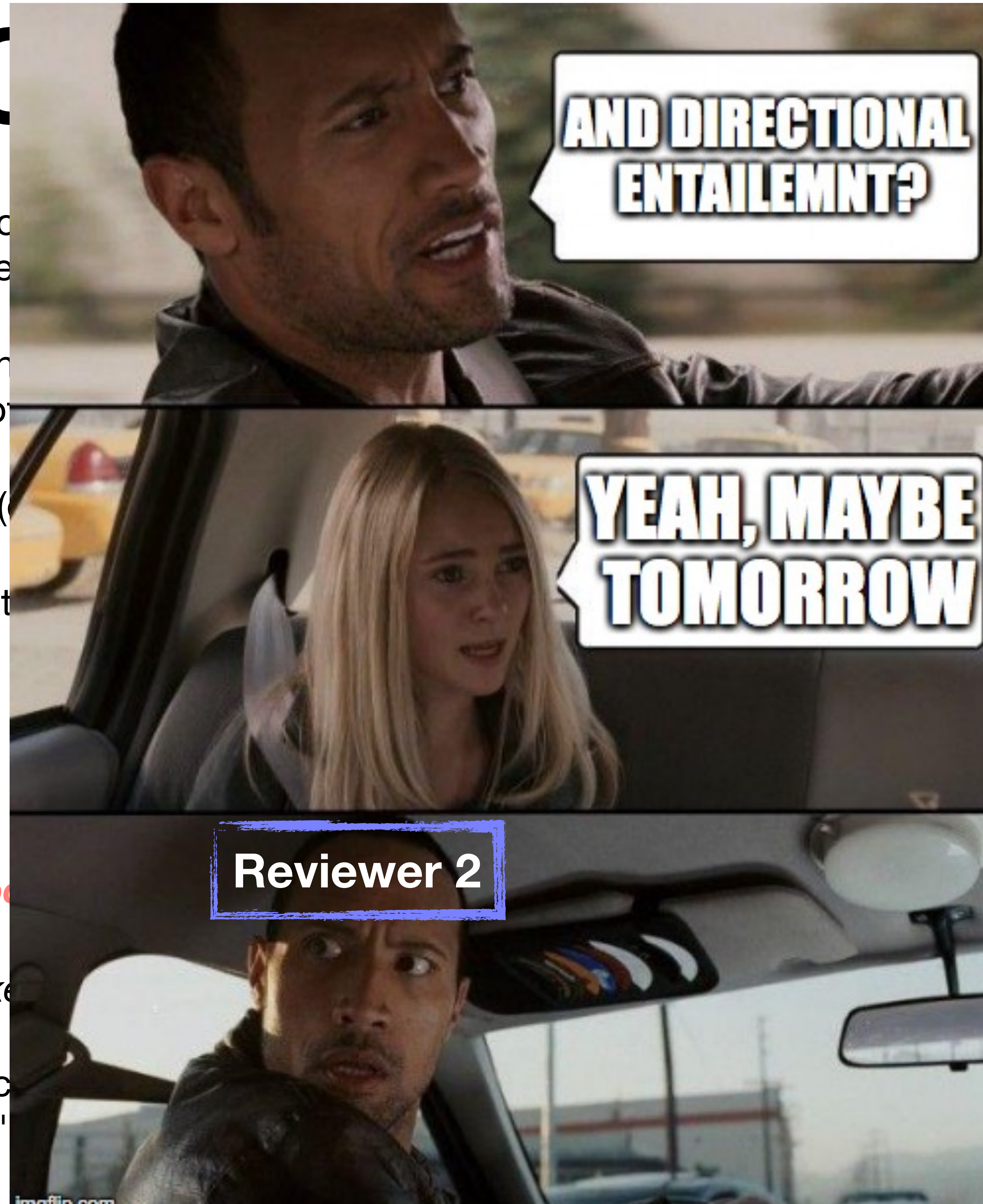

Outline

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- Towards a Form-Independent Semantics with Entailment Graphs
- WTH is Aspect?
- **Tensing up Entailments**
- Conclusion

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    - The second baseline tests whether information about **tense is captured by the distributional model** *per se*

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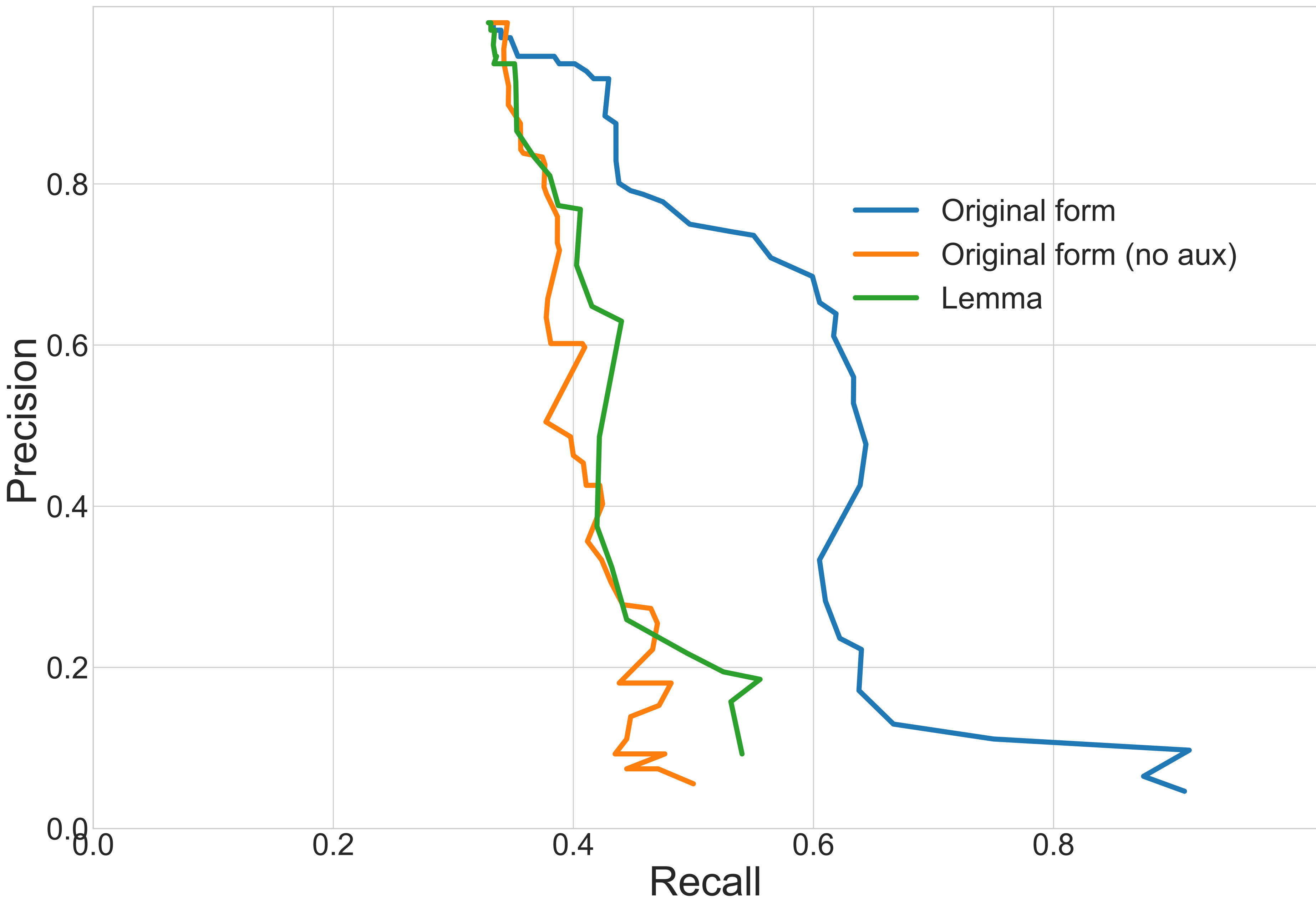

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    - And thats ***pretty cool***, actually

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- **Distributional Composition** can be leveraged to recover even more information

Thats it, I’m done!

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Q & (maybe) A

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References

References

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