

Semantic Supersenses for English Possessives

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Introduction

Possessor

John's car

John's house

John's computer

SocialRel

John's mother

John's sister

John's boss

Introduction

Possessor

John's car

John's house

John's computer

SocialRel

John's mother

John's sister

John's boss

... Polysemy!

Introduction

SocialRel

Kate's sister

the sister of Kate

Introduction

Possessor

Kate's dog

?the dog **of** Kate

Introduction

the boy's murder

the murder **of** the boy

Introduction



Agent

the boy's murder

Theme



the murder **of** the boy

Theme



Introduction



Agent

the boy's murder

Theme

≠

the murder **of** the boy

Theme



Introduction

English possessive constructions:

- $[NP_1]$'s $[NP_2]$ - **s-genitive**
 - $[my, your, \dots]$ $[NP_2]$ - possessive pronouns
- $[NP_2]$ of $[NP_1]$ - **of-genitive**

Introduction

English possessive constructions:

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Some relevant features: *animacy, givenness, and syntactic weight*
Stefanowitsch (2003)

Research Questions

- How can we annotate a corpus of English possessives with a common inventory of semantic relations?
- What does this tell us about the distribution of relations with respect to constructions?

Contributions

- We adopt a semantic annotation scheme designed for adpositions and apply to English possessives constructions.
- We show the semantic divergence of s-genitive and of-genitive
- Corpus release: <http://tiny.cc/streusle> (55,000 words)
 - **1,104 s-genitive** tokens annotated NEW
 - **509 of-genitive** tokens annotated
- Comprehensive annotation, no “other” category

The v2 hierarchy is a tree with 50 labels. They are organized into three major subhierarchies: **CIRCUMSTANCE** (18 labels), **PARTICIPANT** (14 labels), and **CONFIGURATION** (18 labels).



Adposition Supersenses

- Adposition supersense inventory designed with adpositions (including **of**) and grammatical case in mind.
- 50 general categories - thematic role labels (**Agent**, **Theme**, **Recipient**, etc.) and relations that hold between entities (**Possessor**, **Whole**, **SocialRel**, etc.)
- Applied to English, German, Korean, Hebrew, and Hindi thus far.

Related Work

- Previous work labeling semantics of possessives by Tratz and Hovy (2013) and Badulescu and Moldovan (2009).
- Badulescu & Moldovan contrast of-genitive and s-genitive semantics with a schema designed for nominal relations
- Previous semantic categories specific to relations between nominals (Badulescu and Moldovan) or s-genitives (Tratz and Hovy).

Related Work

- We start with categories designed for adpositions/case and apply them to possessives
- Schneider et al. schema's advantage: **Comparability!**

Corpus Annotation

- Annotation (by 2 Linguists) of all tokens of the genitive 's clitic and possessive pronouns (s-genitives) in a 55,000 word corpus of English web reviews.
- 28 attested supersense labels (out of 50 total).
- 1,104 s-genitives (509 of-genitives already annotated)

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- 1,104 s-genitives (509 of-genitives already annotated)
- annotators agree 72% of the time
- Cohen's κ is 0.66

I was able to cancel it but only after paying a \$ 50 fee (
 stative `i change RelativeTime possession POSSESSION
 which the staff person who signed me up stated I would not have to
 GROUP PERSON communicat communicat cognition
 pay if I had proof of moving) and being spoken
 possession stative COGNITION ACT `a communicat
 to in a very belittling
 Recipient Manner

I was able to cancel it but only
 who signed_me_up stated I would
 being spoken-to in a very belittling

fee (which the staff person
 I had proof of moving) and

- Quantity
- Possessor
- Whole
- Superset
- Topic
- Theme
- Patient
- Instance
- Agent
- Material
- Element
- Stimulus

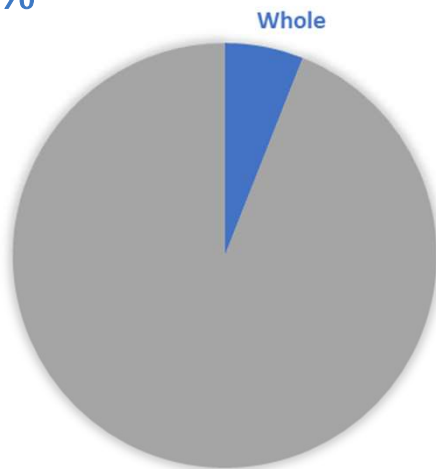
I am certain OF that. | Let bards sing now OF barbiturates as bright as violets .
 ((statement verbs)) | These she would learn OF only through other people .
 ((hearing/learning verbs)) | a photograph OF the bride | I don't know OF
 anything that would be suitable. | Hobbes conceived of what he called a state
 OF nature. | All three were convinced OF his innocence.
 Information content. {about, around, as regards, as to, concerning, for, in, into,
 of, on, over, re, regarding, round, towards, with}

« Previous

Note for sentence ewtb.r.071650

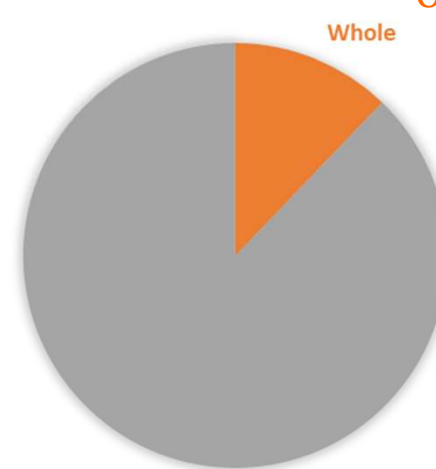
Whole

S-genitive 6%



my cars gears and brakes

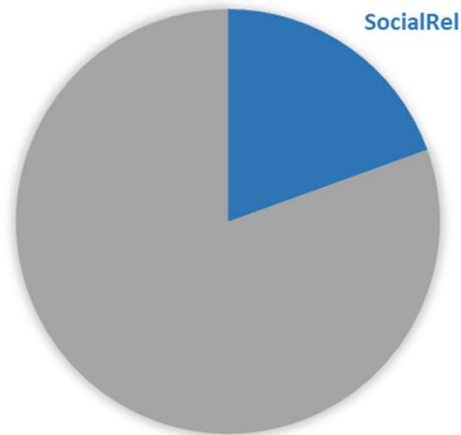
Of-genitive 12.2%



*the southeast side **of** Murfreesboro*

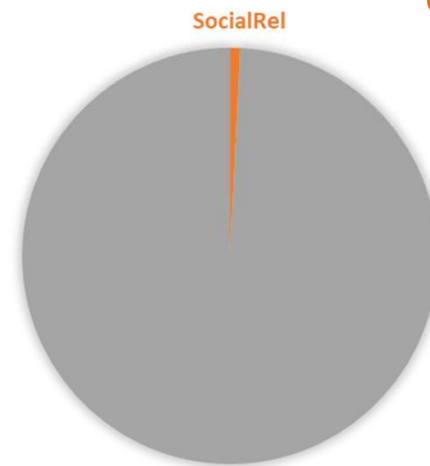
SocialRel

S-genitive 19.5%



***my** boyfriend's aunt*

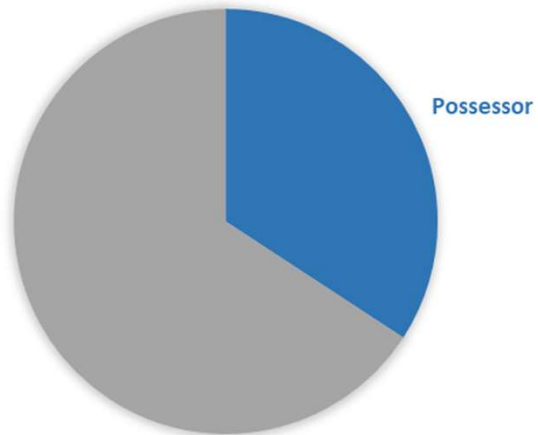
Of-genitive 0.8%



parents ***of*** ***my high school friends***

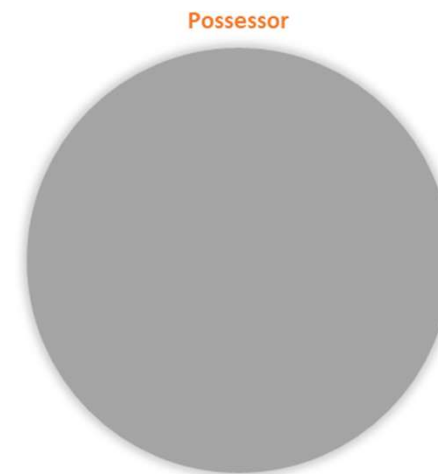
Possessor

S-genitive 34.2%



[he] even remembered her dog

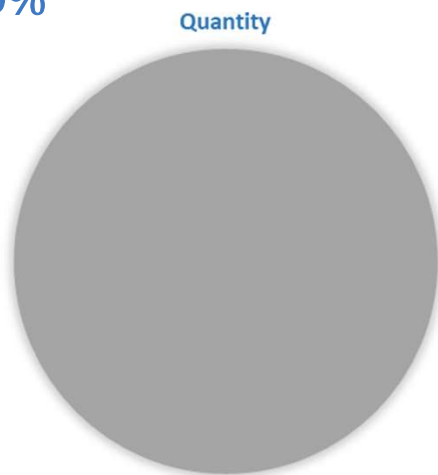
Of-genitive 0%



(COCA: the office of the Prime Minister)

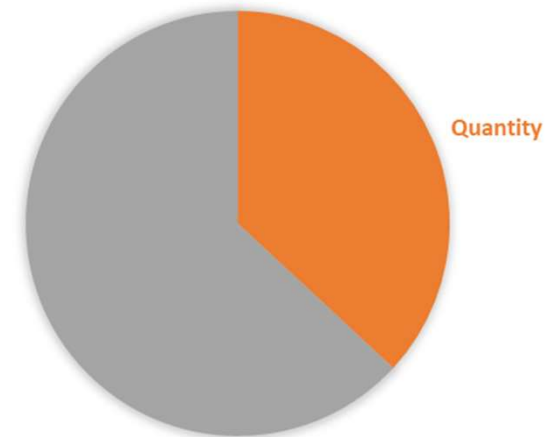
Quantity

S-genitive 0%



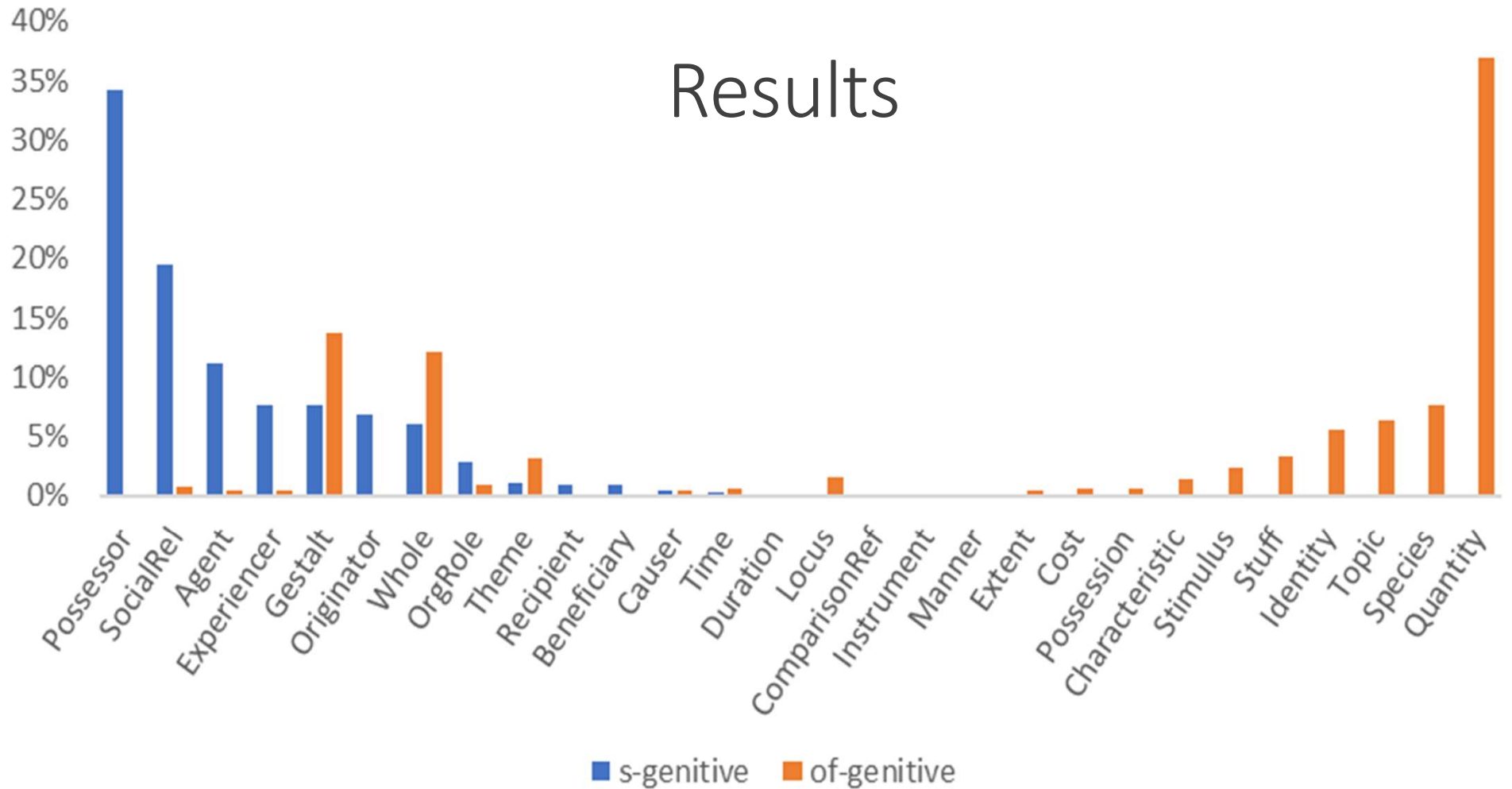
***parking's plenty

Of-genitive 36.9%



There's plenty **of** parking

Results



Results

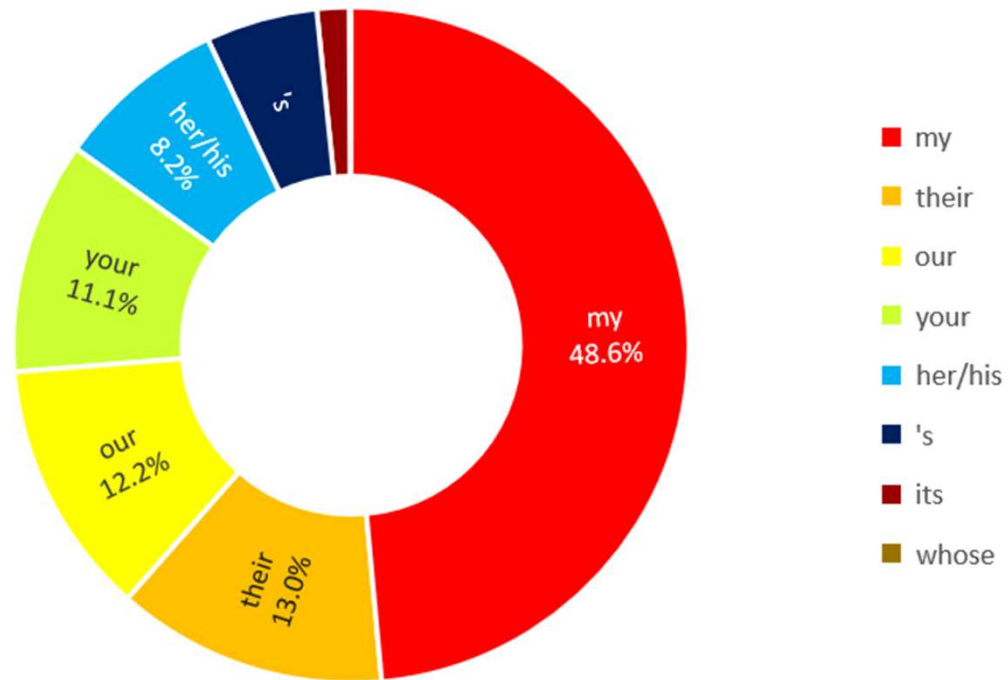
- Supersenses only attested for **of**:

Characteristic, ComparisonRef, Cost, Extent, Identity, Instrument, Manner, Possession, Quantity, Species, Stimulus, Stuff, and Topic.

- Supersenses only attested for 's and possessive prepositions:

Beneficiary, Duration, Recipient, and perhaps most interestingly Possessor.

Results



Supersense	(Tratz and Hovy, 2013)	(Badulescu and Moldovan, 2009)	example
Agent	Subjective	Agent	her help
Beneficiary	Recipient	Recipient	children's clothes
Causer	Producer's Product	Cause	victim of hard times
Characteristic		Property	a place of beauty
ComparisonRef			the opposite of QuikTrip
Cost	Extent	Measure	a price of \$160
⋮			⋮
Quantity		Measure	plenty of parking
Recipient	Recipient	Recipient	my delivery
SocialRel	Kinship, Member's Collection, Other Relational Noun	Kinship	her brother, her family her friend
Species			that kind of behavior
Stimulus		Stimulus	a fear of snakes
Stuff			the piece of metal
⋮			⋮

Some labels with no equivalent:

ComparisonRef, Manner, Species, Stuff

Possessive Multiword Expressions

s-genitive MWEs

try [one]'s best

be quick on [one]'s feet

be on [one]'s own

of-genitive MWEs

***of** course*

*out **of** business*

*time **of** need*

Agrees with subject (**I tried Mary's best*)

Conclusions & Future Work

Our ACL Paper:

Nathan Schneider, Jena D. Hwang, Vivek Srikumar, Jakob Prange, Austin Blodgett, Sarah R. Moeller, Aviram Stern, Adi Bitan and Omri Abend. 2018. **Comprehensive Supersense Disambiguation of English Prepositions and Possessives**. In Proc. of ACL.

Conclusions & Future Work

- Corpus release: <http://tiny.cc/streusle>
 - **1,104 s-genitive** tokens annotated NEW
 - **509 of-genitive** tokens annotated
 - Comprehensive annotation
- A semantic annotation scheme designed for adpositions can be applied to English possessive constructions.
- The semantic distributions of s-genitive and of-genitive diverge

Thank you

Corpus: <http://tiny.cc/streusle>

References

- Francis Bond, Jia Qian Ho, and Daniel Flickinger. 2015. **Feeling our way to an analysis of English possessed idioms**. In Proc. of HPSG. Singapore, pages 61–74.
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- Nathan Schneider, Vivek Srikumar, Jena D. Hwang, and Martha Palmer. 2015. **A hierarchy with, of, and for preposition supersenses**. In Proc. of The 9th Linguistic Annotation Workshop. Denver, Colorado, USA, pages 112–123.
- Stephanie Shih, Jason Grafmiller, Richard Futrell, and Joan Bresnan. 2012. **Rhythm’s role in genitive construction choice in spoken English**.
- Stefanowitsch, Anatol (2003). **Constructional semantics as a limit to grammatical alternation: The two genitives of English**. Topics in English Linguistics, 43:413–444.
- Stephen Tratz and Eduard Hovy. 2013. **Automatic interpretation of the English possessive**. In Proc. of ACL. Sofia, Bulgaria, pages 372–381.

A1 / A2	AGENT	BENEFICIARY	CHARACTERISTIC	EXPERIENCER	GESTALT	ORGRROLE	ORIGINATOR	PART/PORITION	POSSESSION	POSSESSOR	RECIPIENT	SOCIALREL	SOURCE	THEME	WHOLE
AGENT	9		1				3			2				1	
BENEFICIARY				1											
EXPERIENCER				4										1	
GESTALT					2							2			
ORIGINATOR					1		8								
POSSESSOR		1	2	1	2		1		2	22					
SOCIALREL	1				1	1	1	1		3	1	21			
THEME											1				
WHOLE															12

Table 3: Interannotator confusion matrix for s-genitives.

- I have many fond memories **of** my college evenings (Possessor vs. Experiencer)
- This one won't be getting **my** business (Originator vs. Agent)
- Jane 's knowledge of the subject matter (Possessor vs. Experiencer vs. Gestalt)