Linguistics 575:
Semantic Representations

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Overview

- Koller & Thater 2005

- Koller et al 2008

- Evang & Bos 2013

Reading questions: Koller & Thater 2005

- How can example (1) could have so many readings?

(1) Myrdal is the mountain terminus of the Flåm rail line (or Flåmsbana) which makes its way down the lovely Flåm Valley (Flåmsdalen) to its sea-level terminus at Flåm. (Rondane 650)

- For the description that has 2.4 trillion readings, what would we do with this knowledge? If we did want some readings to be enumerated, what would be returned? The ones with the highest probability? The ones that meet some selected constraints?

- How is real world knowledge used to eliminate readings? especially readings that have not been enumerated?

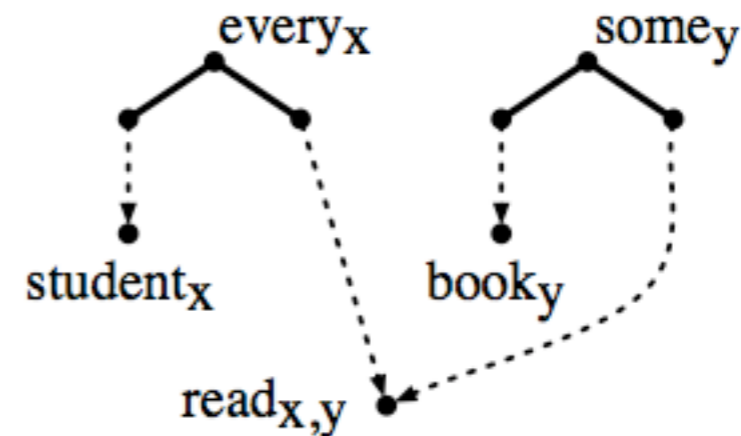- How does elimination of readings normally happen?

Reading questions: Koller & Thater 2005

- What is an MRS net? When is an MRS not a net?

- Flickinger et al 2005:

  1. There is exactly one node without outgoing dominance edges. All other nodes in the fragment have at least one outgoing dominance edge.

  2. If a node X has two (or more) outgoing dominance edges, say, to Y and Z, then Y and Z are connected by a *hypernormal path* (see below) that does not visit the node X itself.

- Legitimate non-net example: *A woman the manager of whom fell ran.*

Reading questions: Koller & Thater 2005

- I'm a little confused as to where the dominance graph comes from? Could we see a simple MRS example and how the dominance graph is derived from it?

TOP   h1
INDEX   e3

RELS {
_every_q⟨0:5⟩		_student_n_of⟨6:13⟩		_read_v_1⟨14:18⟩		_some_q_indiv⟨19:23⟩	
LBL	h4	LBL	h8	LBL	h2	LBL	h11
ARG0	x6	ARG0	x6	ARG0	e3	ARG0	x10
RSTR	h7	ARG1	i9	ARG1	x6	RSTR	h13
BODY	h5			ARG2	x10	BODY	h12

_book_n_of⟨24:29⟩	
LBL	h14
ARG0	x10
ARG1	i15
}

HCONS { h1=qh2, h7=qh8, h13=qh14 }

Reading questions: Koller & Thater 2005

- Also, I am wondering: How big of a problem is this explosion of scope readings? Do you think it is something that needs to be dealt with in the grammar, or afterwords? Finally, if it is not too difficult to quickly explain: How is the ``best parse'' picked?

- In the paper, Utool is compared to the LKB Solver. What approach or algorithm does the LKB solver use? Has a more recent version of the LKB solver incorported the approach of Koller and Thater?

- Has there been much work on developing applications that use lexical semantics and world knowledge to choose the correct scope from these well pruned options? It seems that this is not a difficult task, but what might be some complications with doing this?

Reading questions: Koller & Thater 2005

- What are the axes in Figure 2? number of nets vs sentence length?
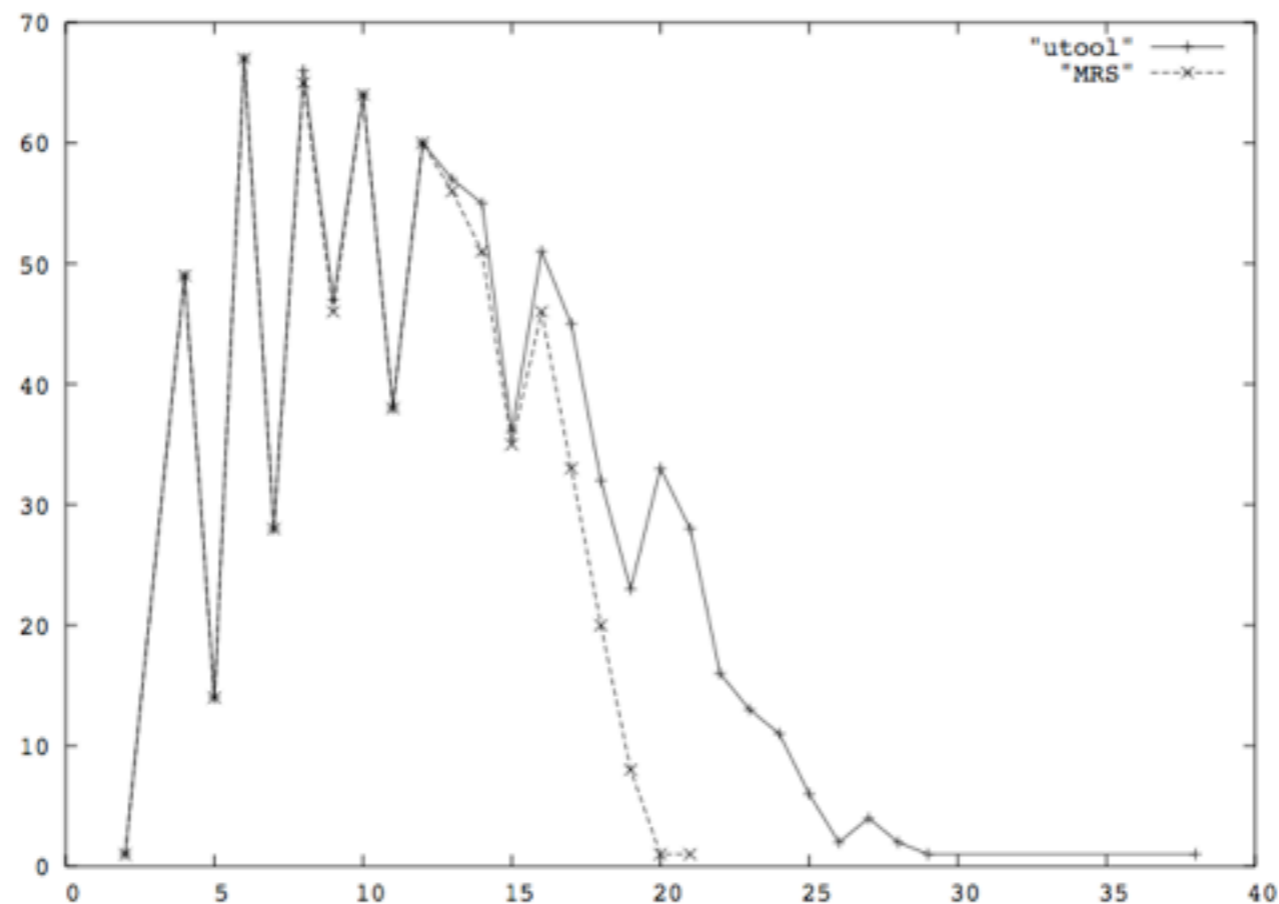

Figure 2: Distribution of constraints in Rondane over different sizes. The solid line shows the constraints in the data set, and the dashed line shows the constraints that the LKB solver could solve.

Reading questions: Koller et al 2008

- I was confused by the soft edges. Why did az have a weight of 1?

- I am confused as to how the numbers for weight assignment for the edges are done. Where are those numbers coming from?
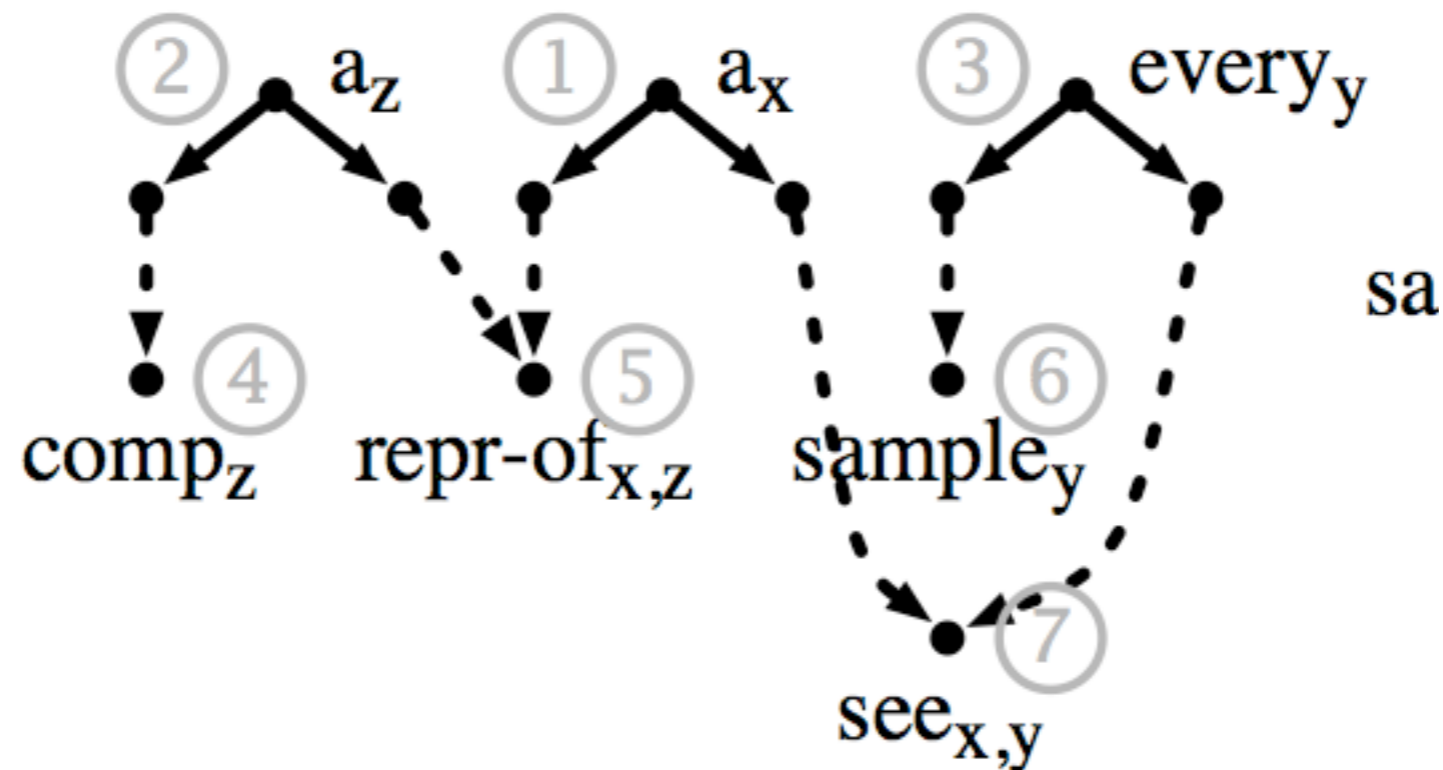
Reading questions: Koller et al 2008

- How were the rewrite rules for semantic equivalence used in KT06 derived? Were they manually written? How can two different readings be semantically equivalent (and thus redundant)?

  - In the case of the semantic representations generated by the ERG, we don't have access to an underlying interpretation. But we can capture linguistic intuitions about the equivalence of readings in permutation rules. For instance, proper names and pronouns (which the ERG analyses as scope bearers, although they can be reduced to constants without scope) can be permuted with anything. Indefinites and definites permute with each other if they occur in each other's scope, but not if they occur in each other's restriction; and so on. (Koller & Thater 2006)

Reading questions: Koller et al 2008

- I am somewhat confused how they would know if they overly-reduced the possible scope readings. There wasn't any mention of a gold-standard human-annotated set of semantically distinct readings for the sentences in the Rondane treebank: How do they know that they have retained all possible distict readings? Perhaps their 2006 paper addresses this concern.

- I was confused by this statement in the introduction: "Ebert (2005) has shown that none of the major underspecification formalisms are expressively complete, i.e. supports the description of an arbitrary subset of readings"

- I was confused by the tree constructor described in 3.1. What do f, g, a, etc represent?

Reading questions: Koller et al 2008

- Will being able to find the most likely scope help in picking out the best overall parse of the sentence and how?

- Does it calculate when one graph is a more specified version of another? (e.g. "Every boy reads a book." could be that every boy reads the same book, which is just a more specific version of every boy reads some book, not necessarily the same book.)

Reading questions: Evang & Bos 2013

- I was confused about the difference between narrow scope and wide scope. Can somebody explain that in simpler terms?

- What is a non-universal argument?

- I am not sure I understand the scoping in example (1). Any insight on that example?

    - *Members of an Islamic alliance and other parties took to the streets Saturday* **in** *all major cities and towns*, where speakers denounced General Musharraf for breaking his promise.

Reading questions: Evang & Bos 2013

- I don't understand how the notation works in figure 1 to express 'a member' and 'every member'. What is p@x telling us?

Figure 1: Generalized quantifiers denoted by the NPs *a member* and *every member*

Reading questions: Evang & Bos 2013

- I am confused about how the scope can be specified by different lexical entries for a verb. When and how do the scope tags come into the picture? Does this mean that scope cannot be left underspecified, because the verb's argument structure must already be chosen by its tag and subsequent lexical entry?

$$\lambda io.\lambda do.\lambda su.\lambda mp.(su@\lambda x.(io@\lambda y.(do@\lambda z.(\boxed{\begin{array}{c} e \\ \hline give(e) \\ Agent(e,x) \\ Recipient(e,y) \\ Theme(e,z) \end{array}}; (mp@e)))))$$
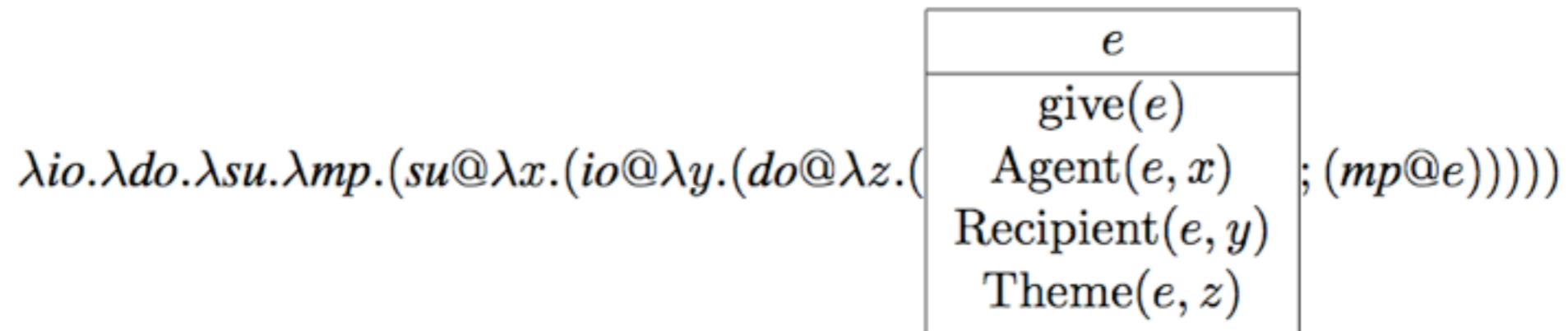
Figure 2: Semantics of the verb *give*, ignoring tense. The core consists of a DRS introducing an event discourse referent e and relating it to the arguments using thematic role relations. The modifier semantics is applied to e, the result is combined with the core DRS using merge reduction (;). The rest is largely for dealing with NP arguments.

- I might have missed where it was explained but what does the count column in Table 1 represent?

	att	∀ in	∀ scope	example	count
(a)	NP	obj	wide	Finally the gorgeous jewel of the order, gleaming upon *the breast **of** every member*, suggested "your Badgesty," which was adopted, and the order became popularly known as the Kings of Catarrh. [72/0696]	115
(b)	NP	att	wide	*All such attacks **by** drone aircraft* are believed to be carried out by U.S. forces. [76/0357]	32
(c)	VP	obj	wide	Jobs *grew **in** every sector except manufacturing*, with much of the growth due to hurricane clean-up efforts in Florida. [97/0059]	57
(d)	VP	att	wide	NATO says militants surrounded the outpost, *firing from all directions **with** rocket-propelled grenades, small arms and mortars*. [92/0311]	25
(e)	NP	obj	narrow	He is the former director of national intelligence, *the head **of** all U.S. intelligence agencies*. [59/0286]	44
(f)	NP	att	narrow	The official Xinhua news agency says *all 28 workers **in** a mine in northwestern Shaanxi province* died when an underground cable caught fire on Saturday night. [40/0608]	16
(g)	VP	obj	narrow	Responsibility for Africa is *currently fractured **under** all three*. [90/0450]	11
(h)	VP	att	narrow	Opening batsman Jamie How *led all scorers **with** 88 runs* as New Zealand reached 203-4 in 42.1 overs. [13/0199]	17

				New Zealand reached 205-4 in 42.1 overs. [15/0199]
NP	obj	neutral		He said methods such as abortion do not fight poverty or help a country's development but actually constitute *"the destruction* **of** *the poorest of all human beings."* [13/0428]
NP	att	neutral	8	It tacitly encouraged Iraq's minority Sunni Muslims to vote, saying *all segments* **of** *the Iraqi people* must go to the polls. [52/0038]
VP	obj	neutral		The preferred stock, which would have a dividend rate of $ 1.76 a year, would *be convertible into Heritage common* **at** *a rate of four common shares for each preferred.* [38/0686]
VP	att	neutral	5	The program airs in 40 countries worldwide, and *every Idolwinner records* **through** *Sony BMG.* [75/0494]

Reading questions: Evang & Bos 2013

- The evaluation section seemed non-existent. The 96% figure is just cited, and that's that. Is this 96% of the 456 annotated instances? What a small sample size. Were some held out for testing, or how did that work?

  - "Nevertheless, our approach is empirically successful at accounting for 96% of all cases in some of the most common syntactic configurations giving rise to scope ambiguities involving universal quantifiers, namely modification of NPs and VPs by preposition phrases."

- I had trouble following their argument on why they believe tagging scopes will help in an automated disambiguation task.

  - "In future work, we plan to provide this layer automatically by adapting techniques for the statistical resolution of scope, such as that of Manshadi and Allen(2011)."

Reading questions: Evang & Bos 2013

- In their Discussion section, the authors state that they have yet to contend with the scope interaction for universals and negation. Has this phenomena been addressed by other CCG-based approaches?

- I wonder what advantage the MRS has, and if that advantage outweighs the disadvantage of being relatively opaque.