Mandarin Has Degree Abstraction After All

Ying Gong & Elizabeth Coppock
Boston University

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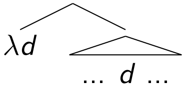
Degree abstraction

A configuration at LF in which there is a trace of type *d* that is bound by a lambda abstraction operator.



Degree abstraction as a parameter (Beck et al. 2010)

- Degree Semantics Parameter (DSP)
  whether or not the language has gradable predicates with degree slots
- Degree Abstraction Parameter (DAP)
  whether or not the language has degree abstraction

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	DSP	DAP	
Japanese	+	−	(*pace* Kennedy 2009, Shimoyama 2012, Sudo 2015)
Mandarin	+	−	(also Krasikova 2008, Erlewine 2018)
Yorùbá	+	−	(*pace* Howell 2013)
Samoan	+	−	
Mòoré	+	−	

Diagnostics for DAP in Mandarin

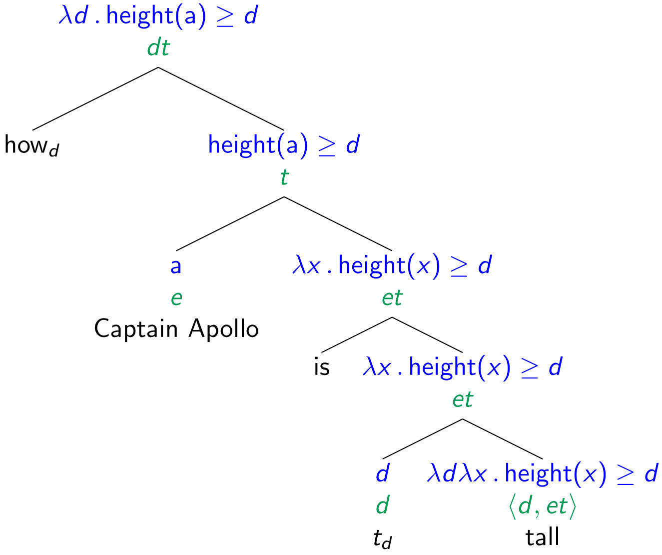
Putative diagnostics for determining whether a language has degree abstraction (Krasikova 2008, Beck et al. 2004, 2010):

1. Degree questions
2. Subcomparatives
3. Scope interactions between degree quantifiers and modals
4. Negative island effects

For Mandarin, Erlewine (2018) adds:

6. Attributive comparatives
7. Comparatives with embedding in standard clauses

Degree questions



Degree questions in Mandarin

Beck et al. (2010): Mandarin lacks degree questions ($\Rightarrow$ [$-$DAP]).

(1) *John shi duo gao?
John COP how tall
'How tall is John?'

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Erlewine (2018:23): "Mandarin Chinese is a *wh*-in-situ language and its degree questions are not subject to syntactic islands (Tsai 1994; Liao 2013), suggesting that movement is not involved."

Subcomparatives

(3) The tree is taller than the pool is deep.

$\max(\lambda d \,.\, \text{height(t)} \geq d) > \max(\lambda d' \,.\, \text{depth(p)} \geq d')$

t

$\lambda D_2 \,.\, \max(D_2) > \max(\lambda d' \,.\, \text{depth(p)} \geq d')$

$\langle dt, t\rangle$

$\lambda D_1 \lambda D_2 \,.\, \max(D_2) > \max(D_1)$

$\langle dt, \langle dt, t\rangle\rangle$

er

$\lambda d' \,.\, \text{depth(p)} \geq d'$

dt

than $\lambda d'$ the pool is d' deep

$\lambda d \,.\, \text{height(t)} \geq d$

dt

λd the tree is d tall

No subcomparatives in Mandarin

(4)
a. men bi zhuozi kuan.
door than table wide
'The door is wider than the table.'

b. *men kuan bi zhuozi chang.
door wide than table long
'The door is wider than the table is long.'

No subcomparatives in Mandarin

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Krasikova (2008) and Beck et al. (2010): $\Rightarrow$ [$-$DAP]

Erlewine's analysis

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(5) door [~~wide~~] [than table {wide, *long}].

Erlewine's analysis

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Erlewine's deletion constraint: In Mandarin *bi*-comparatives, a matching 'local predicate' must be deleted.

(5) door [~~wide~~] [than table {wide, *long}].

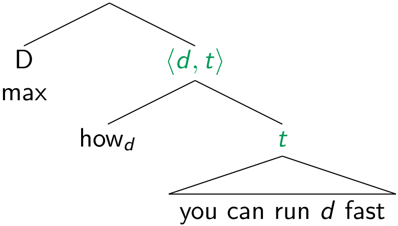
If this constraint holds, Mandarin might as well be [+DAP].

Subequatives in Mandarin

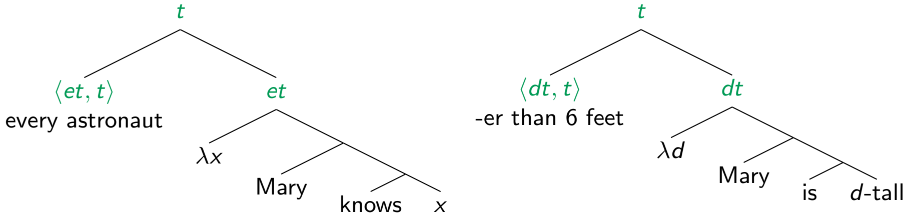
Although subcomparatives are not possible, 'subequatives' are:

(6) ni neng pao duo kuai, wo jiu neng pao duo kuai.
you can run how fast, I then can run how fast
'I can run as fast as you can.'

Analyzed as "*wh*-correlatives", with *wh*-movement (Chen 2019):



Degree quantifiers (Heim 2000)



Degree quantifiers (Heim 2000)

How would we tell? Scope ambiguities. Often missing (Kennedy 1997). Also, often the two scope readings collapse (Heim 2000).

Exceptions:

- *less* comparatives (e.g. *required to be 5pp less long than that*)
- *exactly* differentials (e.g. *required to be exactly 5pp longer than that*)
- comparative ellipsis (e.g. *Mary needs to drive faster than John*)

Comparative ellipsis

(7) Mary needs to drive faster than John. (Heim 2000)

need $>$ *-er*:
needs [er than λd John ~~drive *d*-fast~~] λd Mary to drive *d*-fast
'It is required that Mary drives faster than John drives'

-er $>$ *need*:
[er than λd ~~needs~~ John ~~drive *d*-fast~~] λd needs Mary drive *d*-fast
max(λd . j needs to drive *d*-fast) $<$ max(λd . m needs to drive *d*-fast)
'Mary's minimum required speed is above John's minimum required speed'

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Context for er $>$ need:
John and Mary need to get to Boston by 8.
Mary is in New Haven; John is in Providence.

Comparative ellipsis with negative antonyms

(8) a. John needs to drive less fast than Mary.
b. John needs to drive slower than Mary. (Heim 2006)

less $>$ *need*:
[less than λd ~~needs~~ Mary ~~drive *d*-fast~~] λd needs John drive *d*-fast
max(λd . j needs to drive *d*-fast) $<$ max(λd . m needs to drive *d*-fast)
'John's minimum required speed is below Mary's minimum required speed'

-er $>$ *need* $>$ *slow*:
[er than λd ~~needs~~ Mary ~~drive *d*-slow~~] λd needs John drive *d*-slow
min(λd . j needs to drive *d*-slow) $<$ min(λd . m needs to drive *d*-slow)
'John's maximum allowed speed is below Mary's maximum allowed speed'

Scope interactions in Mandarin

Krasikova (2008):

(9) John xuyao [bi Bill] shao mai yixie lazhu.
John must [than Bill] little buy some candles
'John must buy fewer candles than Bill.'

must $>$ *less*
It is required that John buys fewer candles than Bill.

less $>$ *must*
#John's minimally required amount is below Bill's.

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must > *less*
It is required that John buys fewer candles than Bill.

less > *must*
#John's minimally required amount is below Bill's.

-er > *must* > *little*
John's maximum amount allowed is below Bill's. (available?)

Comparison-of-maxima reading in Mandarin

Context:
The speed limit on I-90 is 60 mph; the speed limit on I-95 is 80 mph.

(10) ni zai I-90 xuyao [bi zai I-95] kai de man.
you on I-90 need [than on I-95] drive DE slow
'You need to drive more slowly on I-90 than on I-95.'

er $>$ *need* $>$ *slow*:
$\min(\lambda d\,.\,\Box$ you drive d-slow on I90$) < \min(\lambda d\,.\,\Box$ you drive d-slow on I95$)$
'The max OK speed on I-90 is below the max OK speed on I-95'

True even if driving 50 mph on I-90 but 40 mph on I-95 is OK.

Embedding in standard

(11) Mary is happier than Bill thinks she is ~~happy~~.
max(λd . Mary is d-happy) $>$ max($\lambda d'$. Bill thinks Mary is d'-happy)

(12) John thinks Mary is happier than Bill thinks she is ~~happy~~.
max(λd . John thinks Mary is d-happy) $>$ max($\lambda d'$. Bill thinks Mary is d'-happy)

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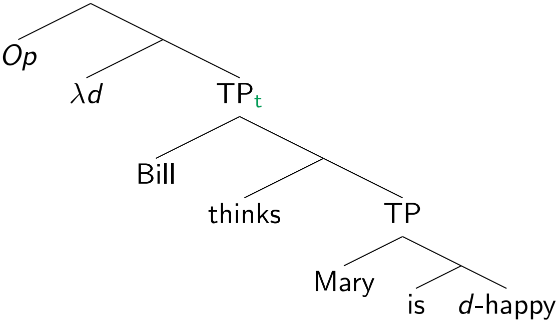

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Erlewine (2018):

(13) [$_{TP1}$ Mary ~~kaixin~~] bi [$_{TP2}$ John kaixin].
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(14) *[$_{TP1}$ Mary ~~kaixin~~] bi [$_{TP2}$ John juede [ta kaixin]].
Mary happy than John think she happy
'Mary is happier than John thinks she is.'

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(15) *[$_{\text{TP1}}$ John ~~juede Mary kaixin~~] bi [$_{\text{TP2}}$ Bill juede Mary kaixin].
John think Mary happy than Bill think Mary happy
'John thinks Mary is happier than Bill thinks she is.'

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John think Mary happy than Bill think Mary happy
'John thinks Mary is happier than Bill thinks she is.'

Erlewine (2018): (15) bad $\Rightarrow$ [$-$DAP]

A closer look

Contrast between *think* and *make*:

(16) * John bi Bill juede Mary kaixin.
John than Bill think Mary happy
'John thinks Mary is happier than Bill thinks she is.'

(17) John bi Bill ling Mary kaixin.
John than Bill make Mary happy
'John makes Mary happier than Bill does.'

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Revising the deletion requirement:

(18) a. *John [$_{VP}$ ~~think~~ [$_{TP}$ ~~Mary happy~~]] than Bill think Mary happy.
b. John [$_{VP}$ ~~make~~ [$_{SC}$ ~~Mary happy~~]] than Bill make Mary happy.

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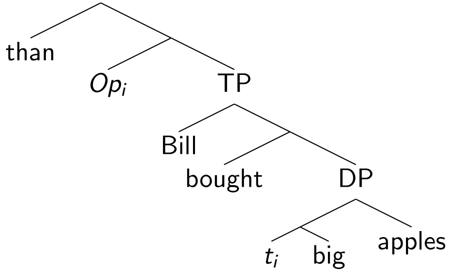
Same in English:

(19) a. *John thinks Mary is happier than Bill does ~~think Mary is happy~~.
b. John makes Mary happier than Bill does ~~make Mary happy~~.

Attributive comparatives

Attributive comparatives are derived through Comparative Deletion involving movement of a null *wh*-operator. (Bresnan 1973, Chomsky 1977, Kennedy 1997, Kennedy & Merchant 2000).

(20) John bought bigger apples than Bill.
than [Op_i [$_{\text{TP}}$ Bill ~~bought [$_{\text{DP}}$ t_i big apples]~~]]]
λd . Bill bought d-big apples



Attributive Comparatives in Mandarin

Erlewine (2018): Absent in Mandarin (⇒ [−DAP])

(21) *John bi Bill mai le [$_{DP}$ {duo, da} de pingguo].
John than Bill buy ASP {many, big} DE apple
'John bought more/bigger apples than Bill.'

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But! They can be rescued by the overt degree morpheme *geng* 'more':

(22) John bi Bill mai le **geng** {duo, da} de pingguo.
John than Bill buy ASP more {many, big} DE apple

T+[V] constraint (Grano 2012)

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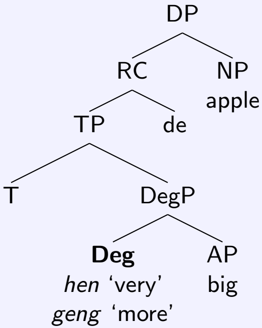
The structure of prenominal modifiers as RCs (Grano 2012):



Negative island effects

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The set of degrees formed through degree abstraction in the *than*-clause can be characterized as follows:

(25) $\lambda d\,.$ Bill didn't buy a d-expensive book

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Comparatives are thought to involve a maximization operation over this set of degrees:

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(25) λd . Bill didn't buy a d-expensive book

Comparatives are thought to involve a maximization operation over this set of degrees:

(26) max(λd . Bill didn't buy a d-expensive book)

Problem: there is no maximum degree d such that Bill didn't buy a d-expensive book.

Negative island effects in Mandarin

(27) [$_{DP}$[$_{RC}$ John mai de] shu] bi [$_{DP}$[$_{RC}$ Bill mei mai de] shu] gui.
John buy DE book than Bill NEG buy DE book expensive
'The book John bought is more expensive than the book Bill didn't buy.'

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- Krasikova (2008), Beck et al. (2010): $\Rightarrow$ [$-$DAP]
- This example involves a definite description of a book
  λd . the book which Bill didn't buy is d-expensive
- Negative island effects can be observed in Mandarin:

(28) John bi Bill (# mei) pao de kuai.
John than Bill NEG run DE fast
'John runs faster than Bill doesn't run.'

Reconsider negative island effects

Suppose ‘John bought a more expensive book than Bill didn’t buy’ can mean ‘John bought a more expensive book than the one Bill didn’t buy’.

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Could this reading be predicted from [$-$DAP]? No.

What sort of reading *would* give evidence for [$-$DAP]? Unclear.

Diagnostics for degree abstraction in Mandarin

1. Degree questions (yes $\not\Rightarrow$ DA)
2. Subcomparatives (or subequatives) (yes $\Rightarrow$ DA)
3. Scope interactions with modals (yes $\Rightarrow$ DA)
4. Embedding in standard (yes $\overset{?}{\Rightarrow}$ DA)
5. Attributive comparatives (yes $\Rightarrow$ DA)
6. Negative island effects (yes $\not\Rightarrow$ DA)

Is degree abstraction universal?

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These findings cast doubt on the Degree Abstraction Parameter.

But they raise an interesting possibility: Is degree abstraction universal (among languages that have gradable predicates with degree slots)?

Support: Evidence for degree abstraction has been found in

- P'urhepecha (Zyman 2015)
- Tswefap (Clem 2019)
- two Salish languages (Davis & Mellesmoen 2019)

Beck, Sigrid, Sveta Krasikova, Daniel Fleischer, Remus Gergel, Stefan Hofstetter, Christiane Svaelsberg, Johna Venderelst & Elisabeth Villalta. 2010. Crosslinguistic variation in comparison constructions. In Jeroen van Craenenbroeck & Johan Rooryck (eds.), *Linguistic variation yearbook*, 1–66. Amsterdam: John Benjamins.

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Island effects to show *wh*-movement in *wh*-correlatives

Coordinate Structure Constraint

(29) *zhuozi [$_{\text{ConjP}}$ **duo kuan** he 2 mi chang], men jiu **duo kuan**.
table how wide and 2 meter long door then how wide
Lit: 'The table is X wide and 2 meters wide, and the door is that wide.'

Left Branch Condition

(30) *ta you yi ge [$_{\text{NP}}$ **duo gao** de xiaohai], men jiu you **duo gao**.
he has one CL how tall DE child door then be how tall
Lit:'He has a X tall child, and the door is that tall.'

exactly-differentials

(31) lunwe yaoqiu bi zhe pian caogao duo qiahao 2 ye.
paper require than this CL draft more exactly 2 page
'The paper must be exactly 2 pages longer than this draft.'

exactly-differentials

(31) lunwe yaoqiu bi zhe pian caogao duo qiahao 2 ye.
paper require than this CL draft more exactly 2 page
'The paper must be exactly 2 pages longer than this draft.'

✓Context: The draft is 10pp. The paper must be = 12pp.
(need > -er)
[require [exactly 2pp -er than 10pp] [1 [the paper be t_1 long]]]
$\Box\, \text{max}(\lambda d\, .\, \text{length}(\text{the-paper}, d) = 12\text{pp})$

exactly-differentials

(31) lunwe yaoqiu bi zhe pian caogao duo qiahao 2 ye.
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[require [exactly 2pp -er than 10pp] [1 [the paper be t_1 long]]]
$\Box\, \mathsf{max}(\lambda d\,.\,\mathsf{length}(\mathsf{the\text{-}paper}, d)) = 12\mathsf{pp})$

✓Context: The draft is 10pp. The paper must be ≥ 12pp.
(-er > need)
[exactly 2pp -er than 10pp] [1 [need [the paper be t_1 long]]]
$\mathsf{max}(\lambda d\,.\,\Box\mathsf{length}(\mathsf{the\text{-}paper}, d)) = 12\mathsf{pp})$

Lexical entries

From (Heim 2006):

fast $\rightsquigarrow \lambda d \lambda x \,.\, \text{speed}(x) \geq d$
'the set of degrees x's speed reaches or exceeds'

slow $\rightsquigarrow \lambda d \lambda x \,.\, \text{speed}(x) < d$
'the set of degrees x's speed does NOT reach'

-er $\rightsquigarrow \lambda S_{dt} \lambda M_{dt} \,.\, S \subset M$
'max(M) > max(S) for positive; min(M) < min(S) for negative'

less $\rightsquigarrow \lambda S_{dt} \lambda M_{dt} \,.\, M \subset S$
'max(M) < max(S) for positive; min(M) > min(S) for negative'

less fast

(32) John needs to drive less fast than Mary.

$$\lambda d\,.\,\Box\text{speed}(j) \geq d \subset \lambda d'.\Box\text{speed}(m) \geq d'$$

$\lambda S_{dt}\lambda M_{dt}\,.\,M \subset S$

less

$\lambda d'.\Box\text{speed}(m) \geq d'$

than $\lambda d'$ Mary needs to drive d'-fast

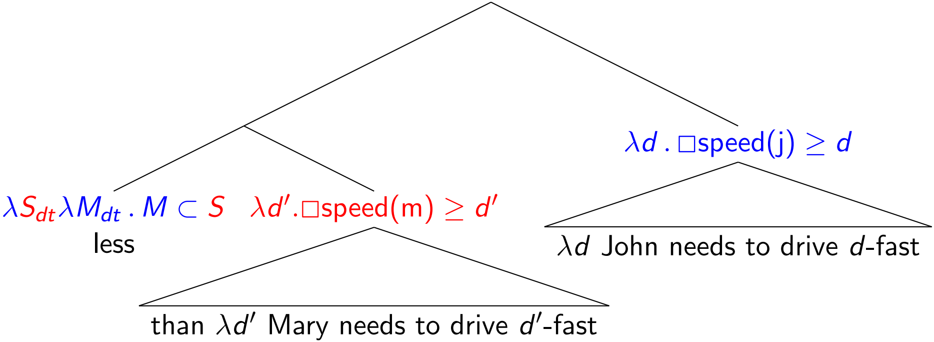
$\lambda d\,.\,\Box\text{speed}(j) \geq d$

λd John needs to drive d-fast

less fast

(32) John needs to drive less fast than Mary.

$$\lambda d\,.\,\Box\mathrm{speed(j)} \geq d \subset \lambda d'.\Box\mathrm{speed(m)} \geq d'$$
$$\equiv \max(\lambda d\,.\,\Box\mathrm{speed(j)} \geq d) < \max(\lambda d'.\Box\mathrm{speed(m)} \geq d')$$



less fast

(32) John needs to drive less fast than Mary.

$$\lambda d\,.\,\Box\text{speed}(j) \geq d \subset \lambda d'.\Box\text{speed}(m) \geq d'$$
$$\equiv \max(\lambda d\,.\,\Box\text{speed}(j) \geq d) < \max(\lambda d'.\Box\text{speed}(m) \geq d')$$

'John's minimum required speed is below Mary's'

$\lambda S_{dt} \lambda M_{dt}\,.\,M \subset S$

less

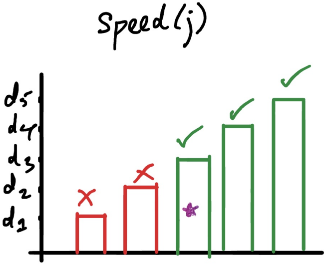
$\lambda d'.\Box\text{speed}(m) \geq d'$

than $\lambda d'$ Mary needs to drive d'-fast

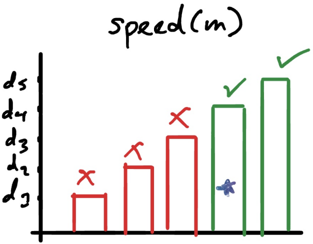
$\lambda d\,.\,\Box\text{speed}(j) \geq d$

λd John needs to drive d-fast

less fast: example



$\Box\, speed(j) \geq d_3$

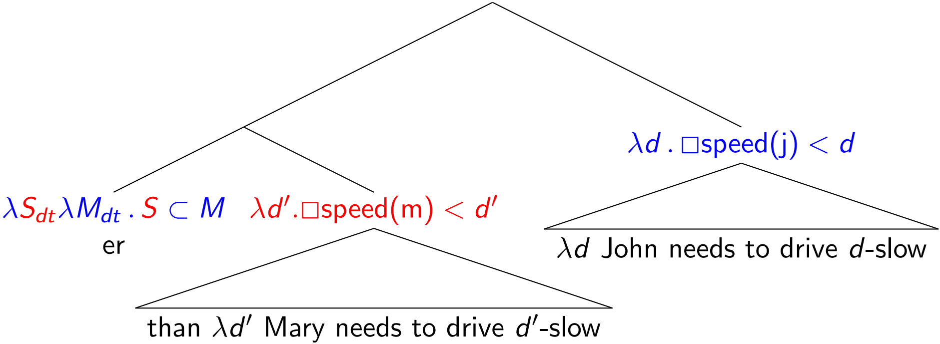


$\Box\, speed(m) \geq d_4$

more slowly

(33) John needs to drive more slowly than Mary.

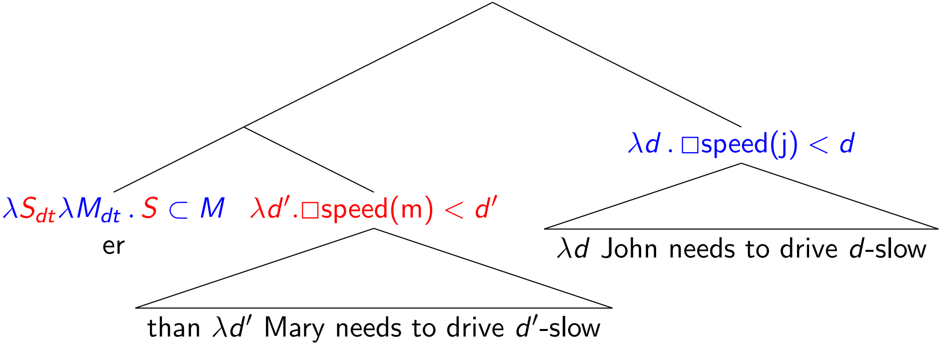
$$\lambda d'.\Box\text{speed}(\text{m}) < d' \subset \lambda d\,.\,\Box\text{speed}(\text{j}) < d$$



more slowly

(33) John needs to drive more slowly than Mary.

$$\lambda d'.\Box\text{speed}(\text{m}) < d' \subset \lambda d\,.\,\Box\text{speed}(\text{j}) < d$$
$$\equiv \min(\lambda d\,.\,\Box\text{speed}(\text{j}) < d) < \min(\lambda d'.\Box\text{speed}(\text{m}))$$



more slowly

(33) John needs to drive more slowly than Mary.

$$\lambda d'.\Box\text{speed}(\text{m}) < d' \subset \lambda d\,.\,\Box\text{speed}(\text{j}) < d$$
$$\equiv \min(\lambda d\,.\,\Box\text{speed}(\text{j}) < d) < \min(\lambda d'.\Box\text{speed}(\text{m}))$$

'John's maximum allowed speed is below Mary's'

$\lambda S_{dt}\lambda M_{dt}\,.\,S \subset M$

er

$\lambda d'.\Box\text{speed}(\text{m}) < d'$

than $\lambda d'$ Mary needs to drive d'-slow

$\lambda d\,.\,\Box\text{speed}(\text{j}) < d$

λd John needs to drive d-slow

more slowly: example