

You can't depend on your eyes when
your imagination is out of focus.

Mark Twain

Focus binding: The interpretation of GIVEN pronouns

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Download slides: ezk.me/papers/focustalk.pdf
full paper: ezk.me/papers/focusbinding.pdf

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Pronouns in Classic Focus Environments

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1 Q: What instrument does **Sherlock** play?

A: **He** plays the violin.

2 **Sherlock's** intellect exceeds **his** patience.

- The **green** items above strongly prefer to co-refer.

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1 Q: What instrument does **Sherlock** play?

A: **He** plays the violin.

2 **Sherlock's** INtellect exceeds **his** PATience.

- The **green** items above strongly prefer to co-refer.
- And when the correct name replaces such a pronoun, it is unaccented:

4 **Sherlock's** INtellect exceeds
Sherlock's / #**SHERlock's** PATience.

5 **Sherlock's** INtellect exceeds
#**Watson's** / **WATson's** PATience.

Focus Binding Hypothesis

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- Pronoun interpretation may be set specifically to satisfy the rules of focus structure.

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- Pronoun interpretation may be set specifically to satisfy the rules of focus structure.
- Corollary: An unaccented pronoun (in English) can denote whatever more explicit material would be unaccented in the same position.

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- Pronoun interpretation may be set specifically to satisfy the rules of focus structure.
- Corollary: An unaccented pronoun (in English) can denote whatever more explicit material would be unaccented in the same position.
- For instance, *his* = *Sherlock's* below simply because *his* is unaccented, and *Sherlock's* is the appropriate unaccented item in this position:
 - 1 *Sherlock's* INtellect exceeds *his* PATience.
 - 2 *Sherlock's* INtellect exceeds *Sherlock's*/**SHERlock's* PATience.

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Focus Theory (Schwarzschild 1999, Féry and Samek-Lodovici 2006)

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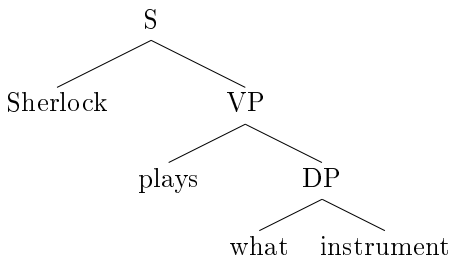
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- 1 G-marking: An LF phrase may optionally bear a G feature. Such a phrase is typically pronounced less prominently.
 - 2 GIVENness (version 1 of 3): For every G-marked phrase α_G , there must be an antecedent phrase β such that $[[\beta]] = [[\alpha]]$ modulo any non-G-marked material within α .
- These conditions establish the syntactic G feature, which marks old or **GIVEN** material.
 - Material that is not **GIVEN** is often called **NEW**.
 - Every **GIVEN** phrase must find a matching **focus antecedent** (usually a phrase previously spoken in the same discourse).

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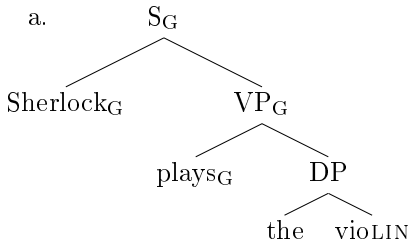
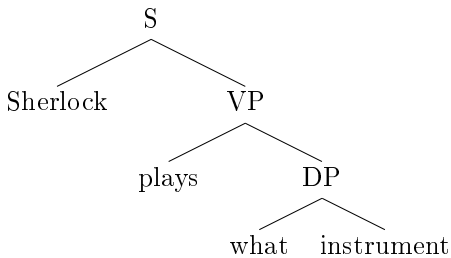
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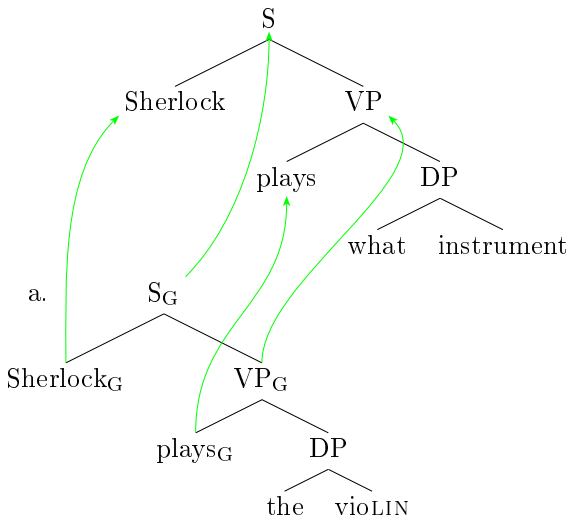
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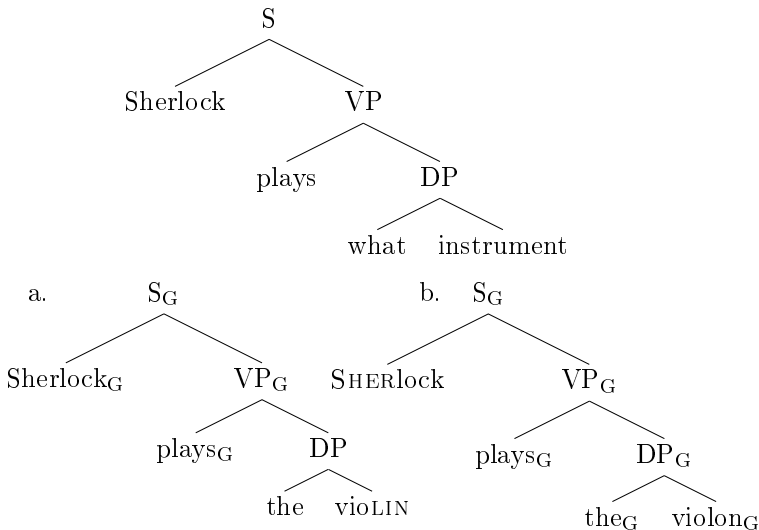
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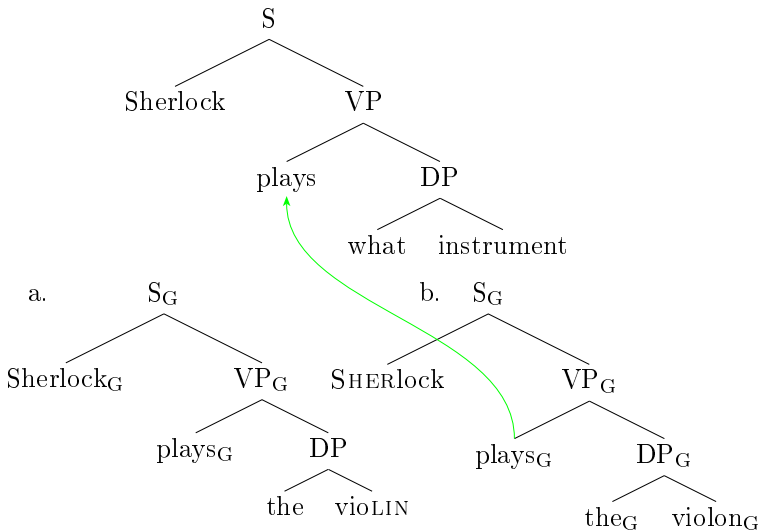
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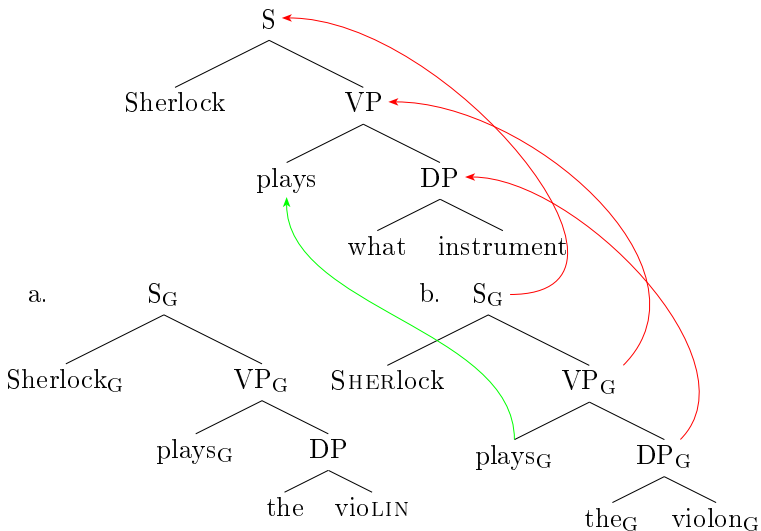
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- Pronouns get their meanings via an **assignment function**, a parameter of the interpretation function $\llbracket \cdot \rrbracket$:
 $\llbracket \text{his}_i \rrbracket^g = g(i) = \text{Sherlock/Watson/etc/}$

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- Pronouns get their meanings via an **assignment function**, a parameter of the interpretation function $\llbracket \cdot \rrbracket$:
 $\llbracket \text{his}_i \rrbracket^g = g(i) = \text{Sherlock/Watson/etc/}$
- The (canonical) version of GIVENness below requires a GIVEN pronoun pron_i under an assignment g to find an antecedent β such that $\llbracket \beta \rrbracket^g = \llbracket \text{pron}_i \rrbracket^g = g(i)$.
- 1 GIVENness (version 2 of 3): For every G-marked phrase α interpreted using an assignment g , there must be an antecedent phrase β such that $\llbracket \beta \rrbracket^g = \llbracket \alpha \rrbracket^g$ modulo any non-G-marked material within α .

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- Pronouns get their meanings via an **assignment function**, a parameter of the interpretation function $\llbracket \cdot \rrbracket$:
 $\llbracket \text{his}_i \rrbracket^g = g(i) = \text{Sherlock/Watson/etc/}$
- The (canonical) version of GIVENNESS below requires a GIVEN pronoun pron_i under an assignment g to find an antecedent β such that $\llbracket \beta \rrbracket^g = \llbracket \text{pron}_i \rrbracket^g = g(i)$.
- 1 GIVENNESS (version 2 of 3): For every G-marked phrase α interpreted using an assignment g , there must be an antecedent phrase β such that $\llbracket \beta \rrbracket^g = \llbracket \alpha \rrbracket^g$ modulo any non-G-marked material within α .
- I will argue against this view.

Strict & Sloppy Identity (Ross 1967)

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- 1 Sherlock saw his hat. Watson did, too.
 - (a) ... Watson saw Sherlock's hat. [strict identity]
 - (b) ... Watson saw his own hat. [sloppy identity]
- In (1a), the owner of the hat is maintained as Sherlock; this is called the **strict identity** reading.
- In (1b), however, the hat's owner shifts to Watson instead of Sherlock; this is the **sloppy identity** reading.

Free vs. Bound Pronouns (Keenan 1971, Sag 1976)

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References

- 1 Predicate Abstraction: $[[\lambda_i \phi]]^g = \lambda x . [[\phi]]^{g^{x/i}}$
(creates a local, **modified** assignment $g^{x/i}$, which
returns a variable x for index i)

Free vs. Bound Pronouns (Keenan 1971, Sag 1976)

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(creates a local, **modified** assignment $g^{x/i}$, which
returns a variable x for index i)

2 Structures for Strict/Sloppy

(a) Sherlock $[\text{VP saw his}_i \text{ hat}]$.

Watson did ~~$[\text{VP saw his}_i \text{ hat}]$~~ , too. [*his* is **free**]

(b) Sherlock $\lambda_i [\text{VP saw his}_i \text{ hat}]$.

Watson did ~~$\lambda_i [\text{VP saw his}_i \text{ hat}]$~~ , too. [*his* is **bound**]

Sloppy Identity Unbound

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- 1 Sherlock's intellect exceeds his_i patience.
Watson's intellect does not ~~exceed his_i patience.~~

Sloppy Identity Unbound

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- 1 Sherlock's intellect exceeds his_i patience.
Watson's intellect does not ~~exceed his_i patience~~.

- 2 Only Sherlock's intellect exceeds his patience (not
Watson's intellect).
 - (a) ... Watson's intellect does not exceed Sherlock's
patience. [strict]
 - (b) ... Watson's intellect does not exceed his own patience.
[sloppy]

Sloppy Identity Unbound

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References

- 1 Sherlock's intellect exceeds his_i patience.
Watson's intellect does not ~~exceed his_i patience~~.

- 2 Only Sherlock's intellect exceeds his patience (not
Watson's intellect).
 - (a) ... Watson's intellect does not exceed Sherlock's
patience. [strict]
 - (b) ... Watson's intellect does not exceed his own patience.
[sloppy]

- 3 Kennedy looked good. People voted for him.
Nixon looked bad. People didn't.

Pronouns and Focus Revisited

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1 Assignment Modification

Let a, m be assignment functions. Then, the modified assignment a^m is the smallest function such that (1) for every $i \in \text{domain}(m)$, $a^m(i) = m(i)$, and (2) for every $j \in \text{domain}(a)$ such that $j \notin \text{domain}(m)$, $a^m(j) = a(j)$.

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- 2 GIVENNESS (version 3 of 3): For every G-marked phrase α interpreted using an assignment g , there must be an antecedent phrase β and a modified assignment g^m such that $\llbracket \beta \rrbracket^{g^m} = \llbracket \alpha \rrbracket^{g^m}$ modulo any non-G-marked material within α . If so, $\llbracket \alpha \rrbracket^g = \llbracket \alpha \rrbracket^{g^m}$.

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The modified assignment g^m can, e.g., return *Sherlock* for $g^m(i)$ so that *his_i* has the same denotation as *Sherlock's*:

- 2 *Sherlock's* INtellect exceeds his PATience.

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Focus Alternatives (Rooth 1985, 1992)

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References

- Each LF node α has an **ordinary semantic value**, written $\llbracket \alpha \rrbracket^o$ or simply $\llbracket \alpha \rrbracket$, calculated normally (e.g., as described in Heim and Kratzer 1998).

Focus Alternatives (Rooth 1985, 1992)

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- Each LF node α has an **ordinary semantic value**, written $[\alpha]^o$ or simply $[\alpha]$, calculated normally (e.g., as described in Heim and Kratzer 1998).
- But α also has a **focus semantic value**, written $[\alpha]^f$, a set containing **focus alternatives** identical to α modulo any NEW items.

Focus Alternatives (Rooth 1985, 1992)

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- Each LF node α has an **ordinary semantic value**, written $[\alpha]^o$ or simply $[\alpha]$, calculated normally (e.g., as described in Heim and Kratzer 1998).
- But α also has a **focus semantic value**, written $[\alpha]^f$, a set containing **focus alternatives** identical to α modulo any NEW items.
- Consider: $[VP_G [V_G \text{ plays }] [DP \text{ the violin }]]$
 - $[V]^f = \{\{\mathbf{plays}\}\}$.
 - $[DP]^f = \{\{\mathbf{the violin}\}, \{\mathbf{the cello}\}, \{\mathbf{the sackbut}\}, \{\mathbf{the krummhorn}\}, \dots\}$.
 - $[VP]^f = \{\{\mathbf{plays the violin}\}, \{\mathbf{plays the cello}\}, \{\mathbf{plays the sackbut}\}, \{\mathbf{plays the krummhorn}\}, \dots\}$.

Focus Antecedents

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1 Interpretation of GIVEN Nodes (to be revised)

For any GIVEN node α_G and assignment g , $\llbracket \alpha \rrbracket^g$ returns a value iff there is a salient node β and an assignment modification m such that $\llbracket \beta \rrbracket^{g^m} \in \llbracket \alpha \rrbracket^{f.g^m}$. If so, $\llbracket \alpha \rrbracket^g = \llbracket \alpha \rrbracket^{g^m}$.

- I assume that speakers keep track of discourse utterances.

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- I assume that speakers keep track of discourse utterances.
- A node has an antecedent iff one of its focus alternatives has been uttered.

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- I assume that speakers keep track of discourse utterances.
- A node has an antecedent iff one of its focus alternatives has been uttered.
- Each GIVEN node must be interpreted under a modified assignment that gives it such an antecedent.

Example

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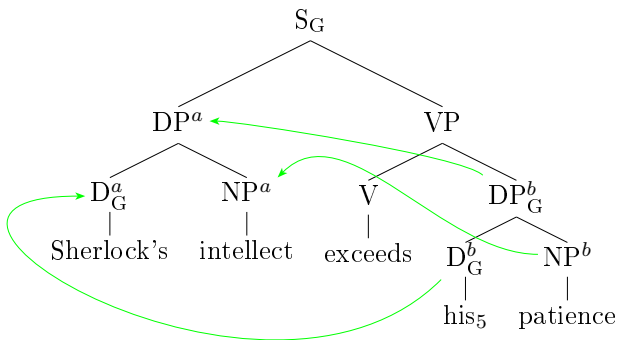
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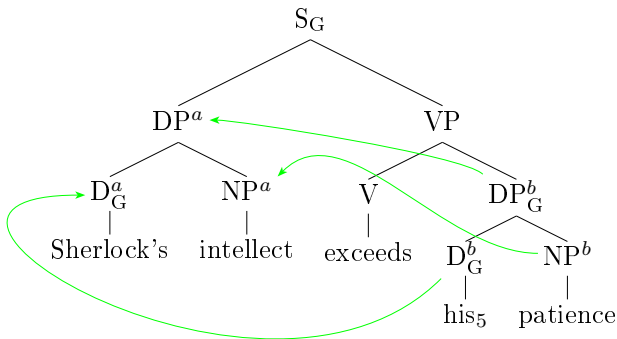
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- Under the global assignment g , $\llbracket DP^b \rrbracket^{f,g} = \{ \llbracket \text{his}_5 \text{ patience} \rrbracket^g, \llbracket \text{his}_5 \text{ intellect} \rrbracket^g, \llbracket \text{his}_5 \text{ courage} \rrbracket^g, \dots \}$
- Under the modified assignment $g^m = g^{\text{Sherlock}/5}$, $\llbracket DP^b \rrbracket^{f,g^m} = \{ \llbracket \text{Sherlock's patience} \rrbracket, \llbracket \text{Sherlock's intellect} \rrbracket, \llbracket \text{Sherlock's courage} \rrbracket, \dots \}$

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Karttunen (1969), Partee (1970, 1975), Jacobson (1977, 2000), Cooper (1979), Engdahl (1986), Heim (1990), and Elbourne (2005).

- 1 The woman who deposited her paycheck was wiser than the woman who spent it. (cf. Karttunen 1969, Ex. (18))
- 2 The woman who deposited her paycheck was wiser than [the woman]_{*i*} who spent her_{*i*} paycheck.

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References

Karttunen (1969), Partee (1970, 1975), Jacobson (1977, 2000), Cooper (1979), Engdahl (1986), Heim (1990), and Elbourne (2005).

- 1 The woman who deposited her paycheck was wiser than the woman who spent it. (cf. Karttunen 1969, Ex. (18))
- 2 The woman who deposited her paycheck was wiser than [the woman]_{*i*} who spent her_{*i*} paycheck.
- 3 Philip deposited his paycheck. Everyone else spent it. (cf. Cooper 1979, Ex. (48), p. 77)
- 4 Philip deposited his paycheck. [Everyone else]_{*i*} spent their_{*i*} paycheck.

Explication

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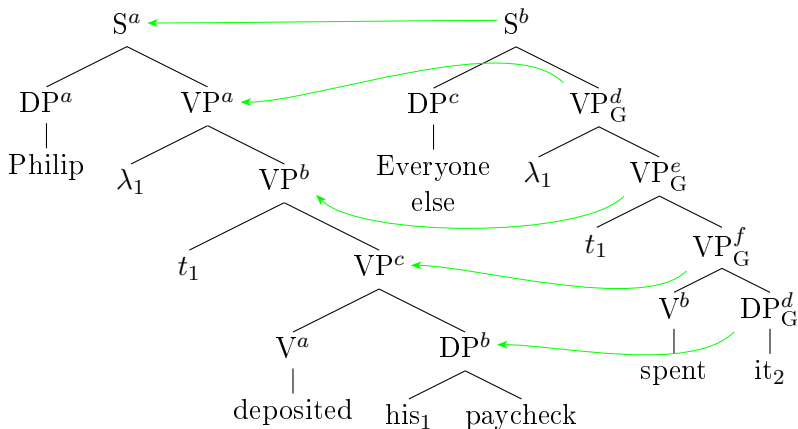
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Crucial Step

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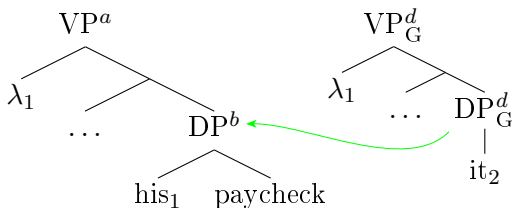
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- The λ_1 operator sets the assignment used to interpret DP^d to return a variable, call it x , for the index 1.
- Under any such assignment g , $\llbracket DP^d \rrbracket^{f,g} = \{g(2)\}$
- In particular, under $g^m = g^{g(1)\text{'s paycheck}/2}$, $\llbracket DP^d \rrbracket^{f,g^m} = \{g(1)\text{'s paycheck}\} = \{x\text{'s paycheck}\}$
- $\llbracket DP^b \rrbracket^{g^m} = g(1)\text{'s paycheck} = x\text{'s paycheck}$, too

Complex Examples (cf. Cooper 1979, p. 79)

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- 1 (a) The new ruling requires [each professor]₁ to make public to [each student of theirs]₁₂ the semester report which they₁ wrote about them₂.
- (b) However, [each professor we interviewed]₁ told us that [not every student]₂ would want to see it₃.

Complex Examples (cf. Cooper 1979, p. 79)

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- (a) The new ruling requires [each professor]₁ to make public to [each student of theirs]₁₂ the semester report which they₁ wrote about them₂.
- (b) However, [each professor we interviewed]₁ told us that [not every student]₂ would want to see it₃.
- The pronoun *it*₃ above can be interpreted like the definite description *the semester report which they₁ wrote about them₂*.

Complex Examples (cf. Cooper 1979, p. 79)

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- 1 (a) The new ruling requires [each professor]₁ to make public to [each student of theirs]₁₂ the semester report which they₁ wrote about them₂.
 - (b) However, [each professor we interviewed]₁ told us that [not every student]₂ would want to see it₃.
- The pronoun *it*₃ above can be interpreted like the definite description *the semester report which they₁ wrote about them₂*.
 - Since the pronoun is GIVEN, it is interpreted under a modification g^m of the original assignment g such that $g^m(3)$ returns the report that $g(1)$ wrote about $g(2)$.

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Higher Type Antecedents

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Many antecedents are not names:

- 1 Who was John talking to at the party? I liked her.
- 2 I met a woman at the party. I liked her.
- 3 I saw Sherlock or Watson from afar. I wasn't close enough to recognize him.

Higher Type Antecedents

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References

Many antecedents are not names:

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- 2 I met a woman at the party. I liked her.
- 3 I saw Sherlock or Watson from afar. I wasn't close enough to recognize him.

But they still allow (unbound) sloppy identity readings:

- 1 Who_i was John talking to at the party? I liked her_i.
Who_j was BILL talking to? I sure DIDN'T ~~like her_j~~.
- 2 I met a woman_i at the party. I liked her_i.
I met a woman_j onLINE. I DIDN'T ~~like her_j~~.
- 3 When I see [Holmes or Watson]_i, I recognize him_i.
When I see [Hopkins or LeSTRADE]_j, I DON'T ~~recognize him_j~~.

Alternative Set Denotations

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$$\mathbb{1} \left[\left[\text{Who was John talking to?} \right] \right] = \left\{ \begin{array}{l} \text{John was talking to Sally,} \\ \text{John was talking to Jill,} \\ \text{John was talking to Dara,} \\ \dots \end{array} \right\}$$

(Hamblin 1973)

Alternative Set Denotations

Focus
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$$1 \quad \left[\left[\text{Who was John talking to?} \right] \right] = \left\{ \begin{array}{l} \text{John was talking to Sally,} \\ \text{John was talking to Jill,} \\ \text{John was talking to Dara,} \\ \dots \end{array} \right\}$$

(Hamblin 1973)

$$2 \quad \left[\left[\text{I met a woman} \right] \right] = \exists \left\{ \begin{array}{l} \text{I met Sally,} \\ \text{I met Jill,} \\ \text{I met Dara,} \\ \dots \end{array} \right\}$$

(Kratzer and Shimoyama 2002)

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$$1 \quad \llbracket \text{Who was John talking to?} \rrbracket = \left\{ \begin{array}{l} \text{John was talking to Sally,} \\ \text{John was talking to Jill,} \\ \text{John was talking to Dara,} \\ \dots \end{array} \right\}$$

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(Kratzer and Shimoyama 2002)

$$3 \quad \llbracket \text{I saw Sherlock or Watson} \rrbracket = \exists \left\{ \begin{array}{l} \text{I saw Sherlock,} \\ \text{I saw Watson} \end{array} \right\}$$

(Alonso-Ovalle 2006)

Alternative Set Denotations & Focus

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Independent of pronouns, alternative sets affect which DPs are GIVEN:

- 1 I saw Sherlock or Watson from afar but didn't recognize him.
 - (a) #Sherlock_G/ #Watson_G had his back turned to me.
 - (b) [The gentleman]_G had his back turned to me.

Proposal

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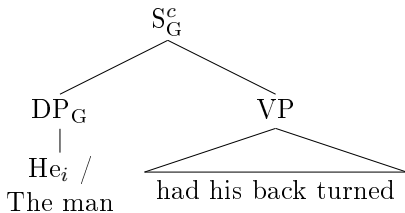
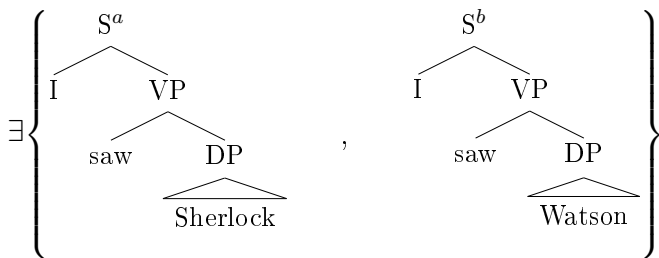
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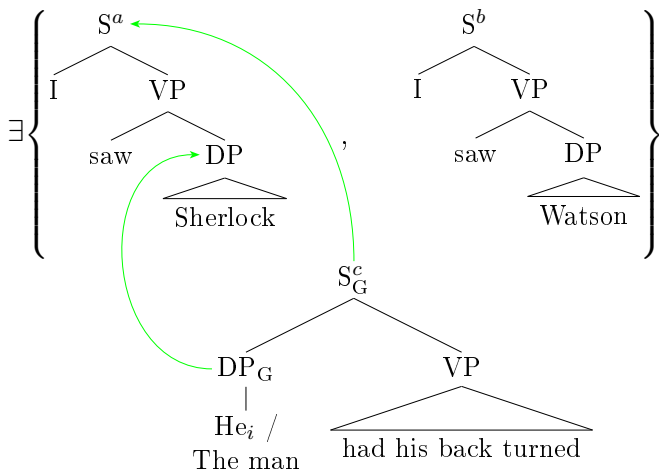
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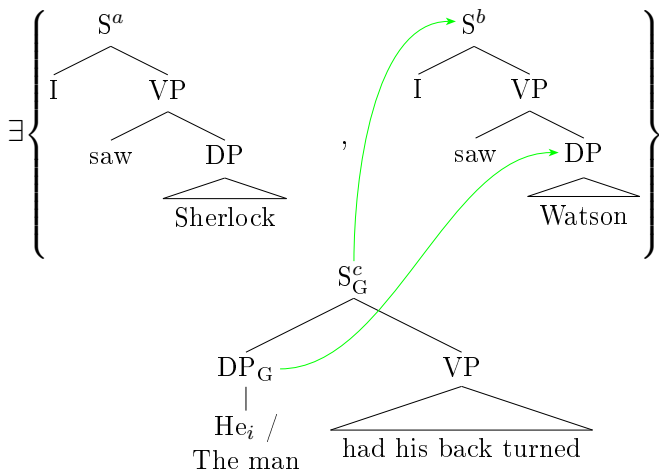
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Collapsing Propositions

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- Borrowing terminology from quantum physics, we can see sentences denoting alternative sets as existing in a number of potential states corresponding to their alternative propositions.

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References

- Borrowing terminology from quantum physics, we can see sentences denoting alternative sets as existing in a number of potential states corresponding to their alternative propositions.
 - In a given world and time of evaluation, these states collapse into a single proposition – the one true in that world and time:
- 1** Collapse of a Proposition Set (to be revised):
 $\text{COLLAPSE}(\Phi)(w)$, for a set of propositions Φ and a world/time w , only returns a value if exactly one proposition $\phi \in \Phi$ is such that $\phi(w) = 1$. If so, $\text{COLLAPSE}(\Phi)(w)$ returns this ϕ .

Single Names

Focus
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Phenomenon

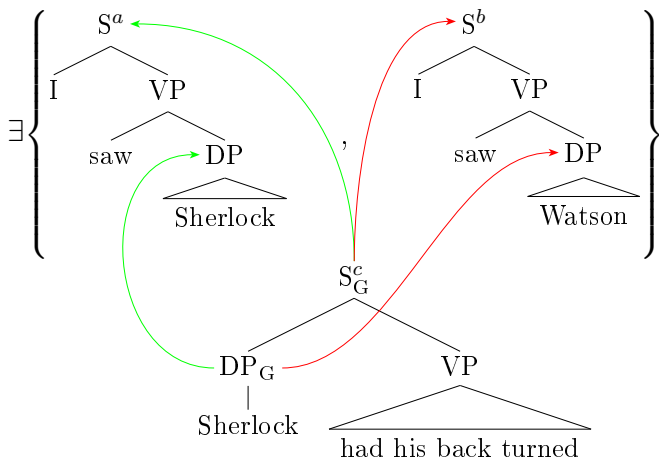
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Technical Details

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1 Interpretation of GIVEN Nodes (final version)

For any GIVEN node α_G , world/time w , and assignment g , $\llbracket \alpha \rrbracket^{w,g}$ returns a value iff there is a salient node β and an assignment modification m such that

- (a) $\llbracket \beta \rrbracket^{g^m} \cap \llbracket \alpha \rrbracket^{f,g^m} \neq \emptyset$, and
- (b) if $\llbracket \beta \rrbracket^{g^m}$ is a set of propositions,
 $\text{COLLAPSE}(\llbracket \beta \rrbracket^{g^m})(w) \in \llbracket \alpha \rrbracket^{f,g^m}$.

If so, $\llbracket \alpha \rrbracket^{w,g} = \llbracket \alpha \rrbracket^{w,g^m}$.

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If so, $\llbracket \alpha \rrbracket^{w,g} = \llbracket \alpha \rrbracket^{w,g^m}$.

- The (a) portion of the rule requires the focus value of a GIVEN node to overlap with some antecedent's denotation.

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1 Interpretation of GIVEN Nodes (final version)

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If so, $\llbracket \alpha \rrbracket^{w,g} = \llbracket \alpha \rrbracket^{w,g^m}$.

- The (a) portion of the rule requires the focus value of a GIVEN node to overlap with some antecedent's denotation.
- The (b) portion requires any α that is a proposition to have an antecedent whose collapse is one of α 's focus alternatives.

Plurals

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Plural DPs provide more data for focus theory:

- 1 Larry, Moe, and Curly walked into a bar.
 - (a) [The three stooges]_G needed STITCHes.

Plurals

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References

Plural DPs provide more data for focus theory:

- 1 Larry, Moe, and Curly walked into a bar.
 - (a) [The three stooges]_G needed STITCHes.
 - (b) #Curly_G needed STITCHes. (cf. ✓CURLy needed...)

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References

Plural DPs provide more data for focus theory:

- 1 Larry, Moe, and Curly walked into a bar.
 - (a) [The three stooges]_G needed STITCHes.
 - (b) #Curly_G needed STITCHes. (cf. ✓CURly needed...)
 - (c) #[Moe and Curly]_G needed STITCHes. (cf. ✓[Moe and CURly]...)

Plural DPs provide more data for focus theory:

- 1 Larry, Moe, and Curly walked into a bar.
 - (a) [The three stooges]_G needed STITches.
 - (b) #Curly_G needed STITches. (cf. ✓Curly needed...)
 - (c) #[Moe and Curly]_G needed STITches. (cf. ✓[Moe and Curly]...)

Need a slight revision of COLLAPSE:

- 2 Collapse of a Proposition Set (final version):
COLLAPSE(Φ)(w), for a set of propositions Φ and a world/time w , only returns a value if $\exists\phi \in \Phi$ such that $\forall\psi \in \Phi [[\psi(w) = 1] \rightarrow [\phi \subseteq \psi]]$. If so, COLLAPSE(Φ)(w) returns this ϕ .

Sheep Anaphora

Focus
binding

E. Keshet

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References

- 1** (a) John owns some sheep, and (b) Harry vaccinates them in the spring. (Evans 1980, Ex. (8), p. 340)

Sheep Anaphora

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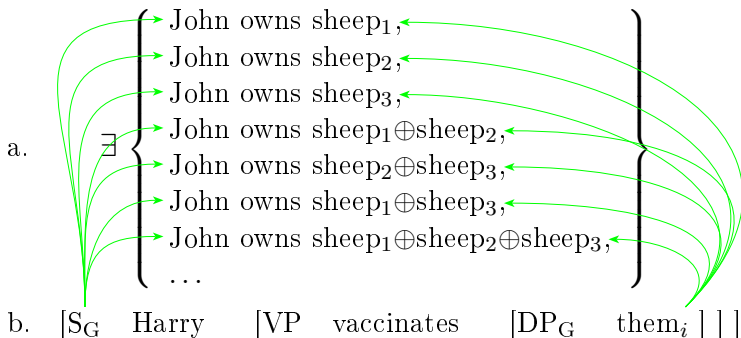
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References

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Road Map

Focus
binding

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1 Phenomenon

2 Analysis

3 Paycheck pronouns

4 Alternatives

5 Donkey anaphora

Donkey Pronouns (Geach 1962)

Focus
binding

1 Every farmer who owns a donkey beats it.

2 If a farmer owns a donkey, he beats it.

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Donkey Pronouns (Geach 1962)

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References

- 1 Every farmer who owns a donkey beats it.
 - 2 If a farmer owns a donkey, he beats it.
- Donkey pronouns co-vary with an indefinite in the absence of the usual c-command relation.

Donkey Pronouns (Geach 1962)

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References

- 1 Every farmer who owns a donkey beats it.
 - 2 If a farmer owns a donkey, he beats it.
- Donkey pronouns co-vary with an indefinite in the absence of the usual c-command relation.
 - For instance, each farmer is taken to only beat his own donkey – a co-varying interpretation – and yet in neither case does the DP *a donkey* c-command the pronoun *it*.

From Paychecks...

Focus
binding

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References

- 1 Each of us got a bonus.
- 2 John deposited it. Everyone else spent it.

From Paychecks...

Focus
binding

1 Each of us got a bonus.

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2 John deposited it. Everyone else spent it.

Phenomenon

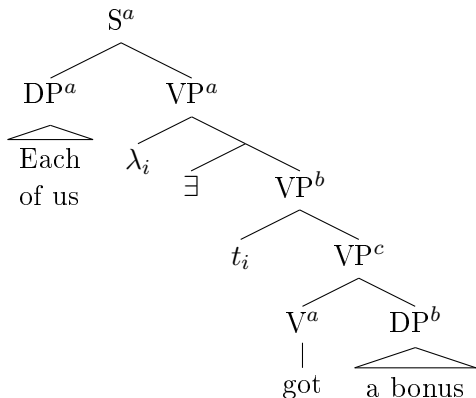
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From Paychecks...

Focus
binding

1 Each of us got a bonus.

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Phenomenon

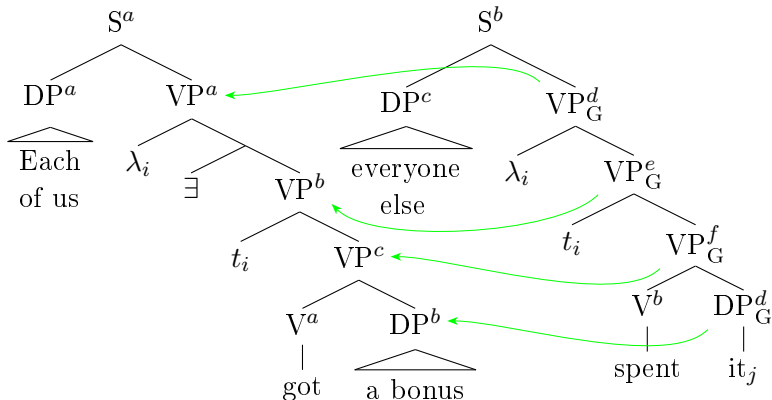
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... to Donkeys

Focus binding

E. Keshet

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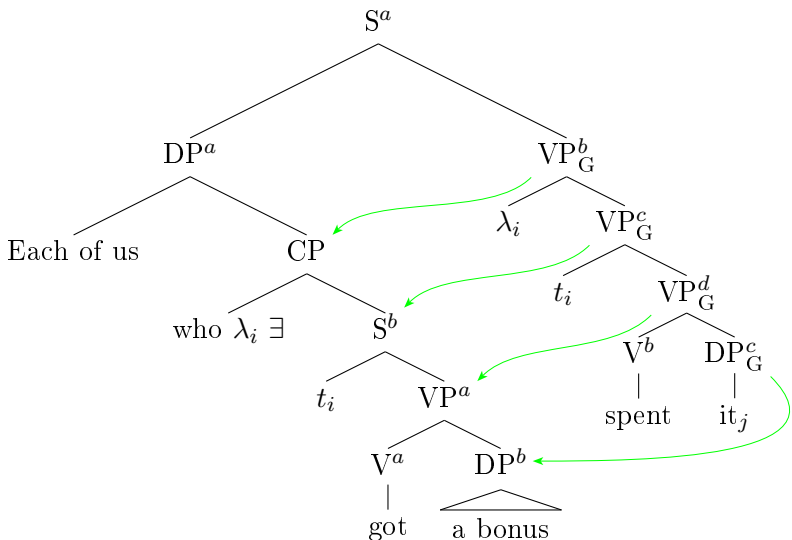
Analysis

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Conditional Donkeys

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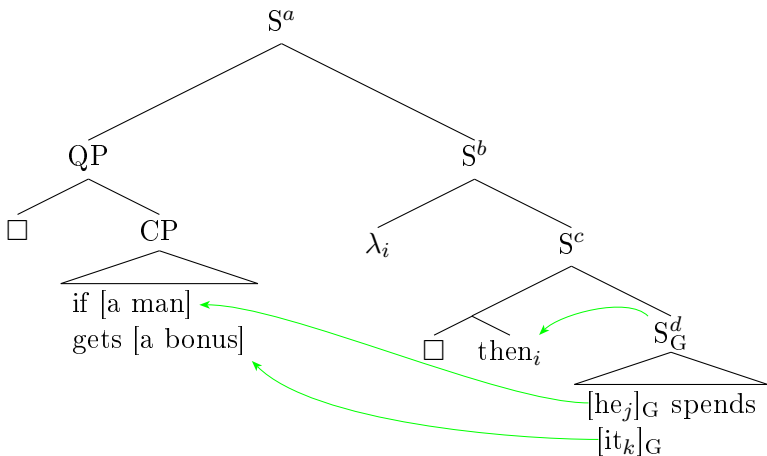
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Advantages (Heim 1990)

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References

- Formal Link:

- 1 Every man who has a wife sits next to her.
- 2 #Every married man sits next to her.

Advantages (Heim 1990)

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References

■ Formal Link:

- 1 Every man who has a wife sits next to her.
- 2 #Every married man sits next to her.

■ Indistinguishable Participants:

- 3 If a bishop meets a bishop, he blesses him. (Kamp)
- 4 [\square [CP if a bishop $\lambda_j \exists$ [VP t_j meets a bishop]]
[S $\lambda_i \square$ then _{i} he _{j} blesses him _{k}]]

Advantages (Heim 1990)

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[S $\lambda_i \square$ then _{i} he _{j} blesses him _{k}]]

■ Proportion Problem:

- 5 If a man owns a donkey, he usually beats it.
- 6 [usually [CP if a man $\lambda_j \exists$ [VP t_j owns a donkey]]
[S $\lambda_i \square$ then _{i} he _{j} beats it _{k}]]

Conclusion

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References

- Main idea: GIVEN pronouns share the denotation of more explicit GIVEN material in the same position.
 - Our representation of discourse must be sufficient (for independent reasons) to determine whether a phrase is GIVEN.
 - It's only a small step (via the Focus Binding Hypothesis) from determining GIVENness to pronoun interpretation.

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References

- Main idea: GIVEN pronouns share the denotation of more explicit GIVEN material in the same position.
 - Our representation of discourse must be sufficient (for independent reasons) to determine whether a phrase is GIVEN.
 - It's only a small step (via the Focus Binding Hypothesis) from determining GIVENness to pronoun interpretation.
- This point is partly independent of the particular implementations shown today (assignment modification, alternative semantics, correlative conditionals, etc.).

Conclusion

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References

- Main idea: GIVEN pronouns share the denotation of more explicit GIVEN material in the same position.
 - Our representation of discourse must be sufficient (for independent reasons) to determine whether a phrase is GIVEN.
 - It's only a small step (via the Focus Binding Hypothesis) from determining GIVENness to pronoun interpretation.
- This point is partly independent of the particular implementations shown today (assignment modification, alternative semantics, correlative conditionals, etc.).
- Thank you!

References

Focus
binding

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