Scope without Syntax

Luke Smith

University of Arizona

December 1, 2017

Generative syntax has an poor record with scope. . .

Generative syntax has an poor record with scope. . .

- Scope is often used as a metric understanding the underlying structure of a sentence (is there covert movement? phase edges? etc.)

Generative syntax has an poor record with scope. . .

- Scope is often used as a metric understanding the underlying structure of a sentence (is there covert movement? phase edges? etc.)
- Despite this, there's *no really systematic* metric for how scope interacts with the syntax (see the literature in response to Han, Lidz, and Musolino (2007)).

Generative syntax has an poor record with scope. . .

- Scope is often used as a metric understanding the underlying structure of a sentence (is there covert movement? phase edges? etc.)
- Despite this, there's *no really systematic* metric for how scope interacts with the syntax (see the literature in response to Han, Lidz, and Musolino (2007)).
- Scope is highly sensitive to linear order. Minimalist syntacticians either have to deny this or model it as a crazy coincidence (Antisymmetry, or see works like Collins (2017)).

Generative syntax has an poor record with scope...

- Scope is often used as a metric understanding the underlying structure of a sentence (is there covert movement? phase edges? etc.)
- Despite this, there's *no really systematic* metric for how scope interacts with the syntax (see the literature in response to Han, Lidz, and Musolino (2007)).
- Scope is highly sensitive to linear order. Minimalist syntacticians either have to deny this or model it as a crazy coincidence (Antisymmetry, or see works like Collins (2017)).
- Scope is *highly* dependent on context (Chomsky's Aphasia).

This is a social construct!

$$\forall x \exists y, eat(x, y)$$

This is a social construct!

$$\forall x \exists y, eat(x, y)$$

- We place quantifiers visually to the left...

This is a social construct!

$$\forall x \exists y, eat(x, y)$$

- We place quantifiers visually to the left...
- Corresponding visually to "the place they take scope".

This is a social construct!

$$\forall x \exists y, eat(x, y)$$

- We place quantifiers visually to the left...
- Corresponding visually to "the place they take scope".
- Both of these *are metaphors*.

This is a social construct!

$$\forall x \exists y, eat(x, y)$$

- We place quantifiers visually to the left...
- Corresponding visually to "the place they take scope".
- Both of these *are metaphors*.
- **YET**, there's a tendency for some linguists to talk about the notation of formal logic as if it's somehow psychologically real.

This is a social construct!

$$\forall x \exists y, eat(x, y)$$

- We place quantifiers visually to the left...
- Corresponding visually to "the place they take scope".
- Both of these *are metaphors*.
- **YET**, there's a tendency for some linguists to talk about the notation of formal logic as if it's somehow psychologically real.
  - We physically move quanitifers in our derivations to get the right "logical form".

This is a social construct!

$$\forall x \exists y, eat(x, y)$$

- We place quantifiers visually to the left...
- Corresponding visually to "the place they take scope".
- Both of these *are metaphors*.
- **YET**, there's a tendency for some linguists to talk about the notation of formal logic as if it's somehow psychologically real.
  - We physically move quanitifers in our derivations to get the right "logical form".
  - Linguistics Wars: does formal logic create language or *vice versa*?

Let's Divorce Scope from Syntax

Let's Divorce Scope from Syntax

- This is not a new theory of syntax.

Let's Divorce Scope from Syntax

- This is not a new theory of syntax.
- But an account of scope without reference to syntactic structure.

Let's Divorce Scope from Syntax

- This is not a new theory of syntax.
- But an account of scope without reference to syntactic structure.
- Why?

Let's Divorce Scope from Syntax

- This is not a new theory of syntax.
- But an account of scope without reference to syntactic structure.
- Why?
  - It's Minimalist™.

Let's Divorce Scope from Syntax

- This is not a new theory of syntax.
- But an account of scope without reference to syntactic structure.
- Why?
  - It's Minimalist™.
  - We can handle the linear order effects and the context dependence of scope.

Typical Scope Data (English)

Typical Scope Data (English)

- English active sentences tend to be ambiguous:

Typical Scope Data (English)

- English active sentences tend to be ambiguous:

(1) a. Every arrow hit a target. ($\forall > \exists, \exists > \forall$)

Typical Scope Data (English)

- English active sentences tend to be ambiguous:

(1) a. Every arrow hit a target. ($\forall > \exists, \exists > \forall$)

b. Some jackass ruins every party. ($\forall > \exists, \exists > \forall$)

Typical Scope Data (English)

- English active sentences tend to be ambiguous:

(1) a. Every arrow hit a target. ($\forall > \exists, \exists > \forall$)
b. Some jackass ruins every party. ($\forall > \exists, \exists > \forall$)

- But their passive equivalents tend not to be...

Typical Scope Data (English)

- English active sentences tend to be ambiguous:

  (1) a. Every arrow hit a target. ($\forall > \exists, \exists > \forall$)
  b. Some jackass ruins every party. ($\forall > \exists, \exists > \forall$)

- But their passive equivalents tend not to be...

  (2) a. A target was hit by every arrow. ($\exists > \forall$)

Typical Scope Data (English)

- English active sentences tend to be ambiguous:

(1) a. Every arrow hit a target. ($\forall > \exists, \exists > \forall$)
b. Some jackass ruins every party. ($\forall > \exists, \exists > \forall$)

- But their passive equivalents tend not to be...

(2) a. A target was hit by every arrow. ($\exists > \forall$)
b. Every party is ruined by some jackass. ($\forall > \exists$)

Typical Scope Data (English)

- English active sentences tend to be ambiguous:

  (1) a. Every arrow hit a target. ($\forall > \exists, \exists > \forall$)
  b. Some jackass ruins every party. ($\forall > \exists, \exists > \forall$)

- But their passive equivalents tend not to be...

  (2) a. A target was hit by every arrow. ($\exists > \forall$)
  b. Every party is ruined by some jackass. ($\forall > \exists$)

- NB: There are some differences between scopes of universals and existentials. This won't be a part of my analysis, but I'll talk about it later.

Intuitions of the Theory

Intuitions of the Theory

- In the abstract, *all* possible quantifier scope interpretations are possible. . .

Intuitions of the Theory

- In the abstract, *all* possible quantifier scope interpretations are possible...
- But, given context, the cost of communication and other pragmatic effects, we narrow down on the plausible interpretations.

Intuitions of the Theory

- In the abstract, *all* possible quantifier scope interpretations are possible...
- But, given context, the cost of communication and other pragmatic effects, we narrow down on the plausible interpretations.
- Unambiguous sentences are those with one sensible interpretation left, while ambiguous ones have several.

Intuitions of the Theory

- In the abstract, *all* possible quantifier scope interpretations are possible...
- But, given context, the cost of communication and other pragmatic effects, we narrow down on the plausible interpretations.
- Unambiguous sentences are those with one sensible interpretation left, while ambiguous ones have several.
- Interesting empirical correlates, but we'll get into that later.

Implementation: Game Theory

Implementation: Game Theory

- I'll be using Game Theory for this analysis.

Implementation: Game Theory

- I'll be using Game Theory for this analysis.
- Game Theory is a way of formalizing decision-making in a **game** where **players** have the opportunity to choose among different **strategies** to achieve different **payoffs**.

Implementation: Game Theory

- I'll be using Game Theory for this analysis.
- Game Theory is a way of formalizing decision-making in a **game** where **players** have the opportunity to choose among different **strategies** to achieve different **payoffs**.
- E.g. a game of paper-scissors-rock:

Implementation: Game Theory

- I'll be using Game Theory for this analysis.
- Game Theory is a way of formalizing decision-making in a **game** where **players** have the opportunity to choose among different **strategies** to achieve different **payoffs**.
- E.g. a game of paper-scissors-rock:
  - Two players

Implementation: Game Theory

- I'll be using Game Theory for this analysis.
- Game Theory is a way of formalizing decision-making in a **game** where **players** have the opportunity to choose among different **strategies** to achieve different **payoffs**.
- E.g. a game of paper-scissors-rock:
  - Two players
  - Each player has three different strategies: paper, scissors or rock.

Implementation: Game Theory

- I'll be using Game Theory for this analysis.
- Game Theory is a way of formalizing decision-making in a **game** where **players** have the opportunity to choose among different **strategies** to achieve different **payoffs**.
- E.g. a game of paper-scissors-rock:
  - Two players
  - Each player has three different strategies: paper, scissors or rock.
  - The winner gets a "payoff" to symbolize victory.

Our Game

Our Game

- Three players: a Speaker, a Hearer and *Nature*

Our Game

- Three players: a Speaker, a Hearer and *Nature*
- Goal: the Speaker communicates the correct message to the Hearer.

Our Game

- Three players: a Speaker, a Hearer and *Nature*
- Goal: the Speaker communicates the correct message to the Hearer.
- Strategies (they happen in this order):

Our Game

- Three players: a Speaker, a Hearer and *Nature*
- Goal: the Speaker communicates the correct message to the Hearer.
- Strategies (they happen in this order):
  - Nature has two: it (randomly) decides if the sentence the Speaker produces should have the agent scoping over the patient or *vice versa*.

Our Game

- Three players: a Speaker, a Hearer and *Nature*
- Goal: the Speaker communicates the correct message to the Hearer.
- Strategies (they happen in this order):
  - Nature has two: it (randomly) decides if the sentence the Speaker produces should have the agent scoping over the patient or *vice versa*.
  - The Speaker, knowing what Nature has decided, decides whether to word a sentence as an *Active* one or a *Passive* one.

Our Game

- Three players: a Speaker, a Hearer and *Nature*
- Goal: the Speaker communicates the correct message to the Hearer.
- Strategies (they happen in this order):
  - Nature has two: it (randomly) decides if the sentence the Speaker produces should have the agent scoping over the patient or *vice versa*.
  - The Speaker, knowing what Nature has decided, decides whether to word a sentence as an *Active* one or a *Passive* one.
  - Lastly, the Hearer, ignorant of Nature's choice, but knowing what the Speaker said, chooses whether to interpret the sentence with a *Surface* scope reading or an *Inverse* scope reading.

Payoffs and Costs

Payoffs and Costs

- Both the Speaker and Hearer get a payoff of c (for **c**ommunication) if the Hearer ends up figuring out the right reading from the Speaker's sentence. This is the MacGuffin.

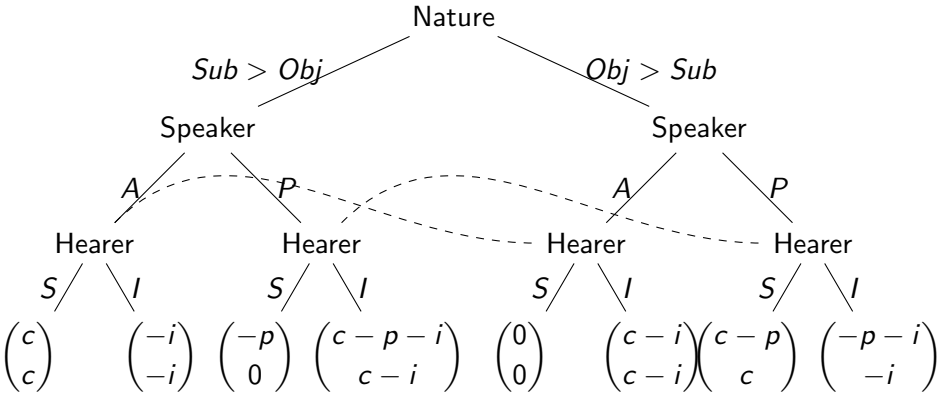
Payoffs and Costs

- Both the Speaker and Hearer get a payoff of c (for **c**ommunication) if the Hearer ends up figuring out the right reading from the Speaker's sentence. This is the MacGuffin.
- Certain constructions, like passives are marked. The Speaker's payoff is deduced by $-p$ when he employs a passive.

Payoffs and Costs

- Both the Speaker and Hearer get a payoff of c (for **c**ommunication) if the Hearer ends up figuring out the right reading from the Speaker's sentence. This is the MacGuffin.
- Certain constructions, like passives are marked. The Speaker's payoff is deduced by $-p$ when he employs a passive.
- Inverse scope is also non-preferred. When the Hearer reconstructs a sentence with inverse scope, both players lose $-i$.

The Entire Game



Meta-game Thinking

Meta-game Thinking

- Why would the Speaker undergo the cost of passivization unless it improved his position? (i.e. to avoid the inverse scope penalty) *Passivization as signalling.*

Meta-game Thinking

- Why would the Speaker undergo the cost of passivization unless it improved his position? (i.e. to avoid the inverse scope penalty) *Passivization as signalling.*
- This would seem to indicate that if the Speaker has chosen *Passive*, Nature has chosen $Obj > Sub$.

Meta-game Thinking

- Why would the Speaker undergo the cost of passivization unless it improved his position? (i.e. to avoid the inverse scope penalty) *Passivization as signalling.*
- This would seem to indicate that if the Speaker has chosen *Passive*, Nature has chosen $Obj > Sub$.
- But if the Speaker has chosen *Active*, two hypotheses are possible:

Meta-game Thinking

- Why would the Speaker undergo the cost of passivization unless it improved his position? (i.e. to avoid the inverse scope penalty) *Passivization as signalling.*
- This would seem to indicate that if the Speaker has chosen *Passive*, Nature has chosen $Obj > Sub$.
- But if the Speaker has chosen *Active*, two hypotheses are possible:
  - This is indeed the desired scope order.

Meta-game Thinking

- Why would the Speaker undergo the cost of passivization unless it improved his position? (i.e. to avoid the inverse scope penalty) *Passivization as signalling.*
- This would seem to indicate that if the Speaker has chosen *Passive*, Nature has chosen $Obj > Sub$.
- But if the Speaker has chosen *Active*, two hypotheses are possible:
  - This is indeed the desired scope order.
  - Inverse scope is the correct interpretation, but the Speaker doesn't mind taking $-i$ because $-p$ is more grave.

Meta-game Thinking

- Why would the Speaker undergo the cost of passivization unless it improved his position? (i.e. to avoid the inverse scope penalty) *Passivization as signalling.*
- This would seem to indicate that if the Speaker has chosen *Passive*, Nature has chosen $Obj > Sub$.
- But if the Speaker has chosen *Active*, two hypotheses are possible:
  - This is indeed the desired scope order.
  - Inverse scope is the correct interpretation, but the Speaker doesn't mind taking $-i$ because $-p$ is more grave.
- Result: there's only one plausible choice if the Speaker uses a Passive, but there are two possibilities if he uses an Active (ambiguity).

What if there's another strategy?

What if there's another strategy?

- Some languages have free word order, and unlike English can acheive surface scope without marked transformations/additional material.

What if there's another strategy?

- Some languages have free word order, and unlike English can acheive surface scope without marked transformations/additional material.
- These languages are nearly entirely scopally unambiguous and take only surface scope (Karimi 2003).

What if there's another strategy?

- Some languages have free word order, and unlike English can acheive surface scope without marked transformations/additional material.
- These languages are nearly entirely scopally unambiguous and take only surface scope (Karimi 2003).

(3) a. Yek dāneshju hame ketāb-i xānd.
a student all book-IND read
"A student read every book." ($\exists > \forall$; *$\forall > \exists$)

What if there's another strategy?

- Some languages have free word order, and unlike English can acheive surface scope without marked transformations/additional material.
- These languages are nearly entirely scopally unambiguous and take only surface scope (Karimi 2003).

(3) a. Yek dāneshju hame ketāb-i xānd.
a student all book-IND read
"A student read every book." ($\exists > \forall$; *$\forall > \exists$)

b. Hame ketāb-i yek dāneshju xānd.
all book-IND a student read
"A student read every book." ($\forall > \exists$; *$\exists > \forall$)

In other scrambling languages as well. . .

In other scrambling languages as well. . .

(4) dass eine Frau jeden liebt
that a woman everybody loves
". . . that everyone loves a woman" (some > every; ??every > some)

In other scrambling languages as well. . .

(4) dass eine Frau jeden liebt
that a woman everybody loves
"...that everyone loves a woman" (some > every; ??every > some)

(5) dass jeden eine Frau liebt
that everybody a woman loves
"...that everyone loves a woman" (every > some; ??some > every)

Scramble as an alternative strategy

Scramble as an alternative strategy

- We can say that in these languages, Speakers have the additional strategy *Scramble*, which achieves a different word order without the $-p$ cost.

Scramble as an alternative strategy

- We can say that in these languages, Speakers have the additional strategy *Scramble*, which achieves a different word order without the $-p$ cost.
- Let's examine the Speaker's payoffs with this new strategy:

Scramble as an alternative strategy

- We can say that in these languages, Speakers have the additional strategy *Scramble*, which achieves a different word order without the $-p$ cost.
- Let's examine the Speaker's payoffs with this new strategy:

	Sub, *S*	*Sub*, *I*	*Obj*, *S*	*Obj*, *I*
Active	c	$-i$	0	$c-i$
Passive	$-p$	$c-p-i$	$c-p$	$-p-i$
Scramble	0	$c-i$	c	$-i$

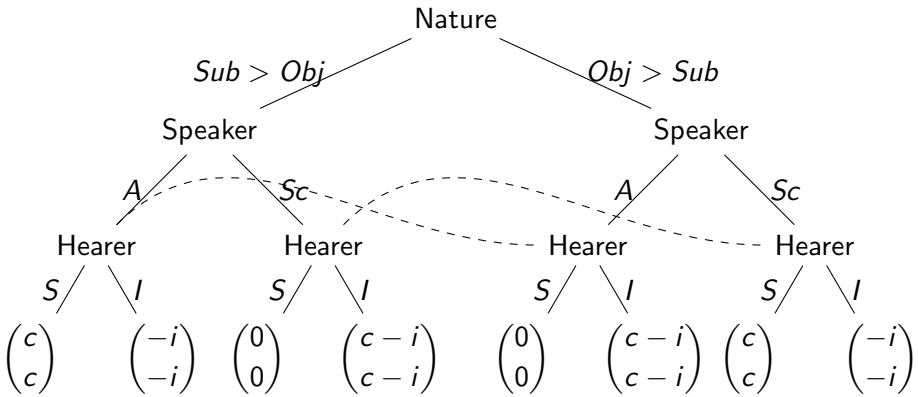
Scramble as an alternative strategy

- We can say that in these languages, Speakers have the additional strategy *Scramble*, which achieves a different word order without the $-p$ cost.
- Let's examine the Speaker's payoffs with this new strategy:

	Sub, *S*	*Sub*, *I*	*Obj*, *S*	*Obj*, *I*
Active	c	$-i$	0	$c-i$
Passive	$-p$	$c-p-i$	$c-p$	$-p-i$
Scramble	0	$c-i$	c	$-i$

- *Scramble* **dominates** *Passive* as a strategy when it is available.

Scrambling Game



Meta-game Thinking

Meta-game Thinking

- There are clear Schelling Points in this game: No matter what Nature chooses, the Speaker and Hearer can *always* get to c, c with no costs.

Meta-game Thinking

- There are clear Schelling Points in this game: No matter what Nature chooses, the Speaker and Hearer can *always* get to c, c with no costs.
- The Speaker will want to put the Hearer on track to get to this payoff.

Meta-game Thinking

- There are clear Schelling Points in this game: No matter what Nature chooses, the Speaker and Hearer can *always* get to c, c with no costs.
- The Speaker will want to put the Hearer on track to get to this payoff.
- And the Hearer knows no matter what, this will always be a payoff given by choosing *Surface* (since *Inverse always* yields a $-i$).

Meta-game Thinking

- There are clear Schelling Points in this game: No matter what Nature chooses, the Speaker and Hearer can *always* get to c, c with no costs.
- The Speaker will want to put the Hearer on track to get to this payoff.
- And the Hearer knows no matter what, this will always be a payoff given by choosing *Surface* (since *Inverse always* yields a $-i$).
  - Hearer: Always choose *Surface*

Meta-game Thinking

- There are clear Schelling Points in this game: No matter what Nature chooses, the Speaker and Hearer can *always* get to c, c with no costs.
- The Speaker will want to put the Hearer on track to get to this payoff.
- And the Hearer knows no matter what, this will always be a payoff given by choosing *Surface* (since *Inverse always* yields a $-i$).
  - Hearer: Always choose *Surface*
  - Speaker: Always choose what strategy will yield c, c when the Hearer chooses *Surface*.

Meta-game Thinking

- There are clear Schelling Points in this game: No matter what Nature chooses, the Speaker and Hearer can *always* get to c, c with no costs.
- The Speaker will want to put the Hearer on track to get to this payoff.
- And the Hearer knows no matter what, this will always be a payoff given by choosing *Surface* (since *Inverse always* yields a $-i$).
  - Hearer: Always choose *Surface*
  - Speaker: Always choose what strategy will yield c, c when the Hearer chooses *Surface*.
- No ambiguity ever—every sentence is unambigous and surface scope.

Generalization

Generalization

- From the Game Theoretics of this we can generalize:

Generalization

- From the Game Theoretics of this we can generalize:

(6) Word order rigidity $\rightarrow$ ambiguity

Generalization

- From the Game Theoretics of this we can generalize:

(6) Word order rigidity $\rightarrow$ ambiguity

(7) Word order flexibility $\rightarrow$ disambiguation

Generalization

- From the Game Theoretics of this we can generalize:

  (6) Word order rigidity $\rightarrow$ ambiguity

  (7) Word order flexibility $\rightarrow$ disambiguation

- This is not just a "parameter", but a principle of order independent of formal syntactic properties of languages.

Generalization

- From the Game Theoretics of this we can generalize:

  (6) Word order rigidity → ambiguity

  (7) Word order flexibility → disambiguation

- This is not just a "parameter", but a principle of order independent of formal syntactic properties of languages.
- The Game Theoretics should be constant across *not just* rigid/flexible languages, but across rigid/flexible constructions.

English negation

English negation

- English negation may only appear *after* a modal:

English negation

- English negation may only appear *after* a modal:

(8) Billy can not go. ($\neg >$ can; can $> \neg$)

English negation

- English negation may only appear *after* a modal:

(8) Billy can not go. ($\neg >$ can; can $> \neg$)

(9) * Billy not can go.

English negation

- English negation may only appear *after* a modal:

  (8) Billy can not go. ($\neg >$ can; can $> \neg$)

  (9) * Billy not can go.

- But where there are multiple modals, there are different places the negation can appear and there is only one interpretation available, just like the scrambling data:

English negation

- English negation may only appear *after* a modal:

  (8) Billy can not go. ($\neg >$ can; can $> \neg$)

  (9) * Billy not can go.

- But where there are multiple modals, there are different places the negation can appear and there is only one interpretation available, just like the scrambling data:

  (10) Billy could not have gone before we arrived. (*not* > *have*)

English negation

- English negation may only appear *after* a modal:

  (8) Billy can not go. ($\neg >$ can; can $> \neg$)

  (9) * Billy not can go.

- But where there are multiple modals, there are different places the negation can appear and there is only one interpretation available, just like the scrambling data:

  (10) Billy could not have gone before we arrived. (*not* > *have*)

  (11) Billy could have not gone before we arrived. (*have* > *not*)

Chinese local rigidity

Chinese local rigidity

- Normally, Chinese exhibits scrambling-style surface scope:

Chinese local rigidity

- Normally, Chinese exhibits scrambling-style surface scope:

(12) a. Meigeren dou zhuazou yige nüren.
everyone all arrest a woman
"Everyone arrested a woman."

Chinese local rigidity

- Normally, Chinese exhibits scrambling-style surface scope:

(12) a. Meigeren dou zhuazou yige nüren.
everyone all arrest a woman
"Everyone arrested a woman."

b. (You) yige nüren meigeren dou zhuazou.
(have) a woman everyone all arrest.
"A woman was arrested by everyone."

Chinese local rigidity

- Normally, Chinese exhibits scrambling-style surface scope:

(12) a. Meigeren dou zhuazou yige nüren.
everyone all arrest a woman
"Everyone arrested a woman."

b. (You) yige nüren meigeren dou zhuazou.
(have) a woman everyone all arrest.
"A woman was arrested by everyone."

- But in certain constructions, which are rigid, ambiguity arises:

Chinese local rigidity

- Normally, Chinese exhibits scrambling-style surface scope:

(12) a. Meigeren dou zhuazou yige nüren.
everyone all arrest a woman
"Everyone arrested a woman."

b. (You) yige nüren meigeren dou zhuazou.
(have) a woman everyone all arrest.
"A woman was arrested by everyone."

- But in certain constructions, which are rigid, ambiguity arises:

(13) a. Meigeren dou bei yige nüren zhuazou.
everyone all PASS a woman arrest
"Everyone was arrested by a woman."

Chinese local rigidity

- Normally, Chinese exhibits scrambling-style surface scope:

(12) a. Meigeren dou zhuazou yige nüren.
everyone all arrest a woman
"Everyone arrested a woman."

b. (You) yige nüren meigeren dou zhuazou.
(have) a woman everyone all arrest.
"A woman was arrested by everyone."

- But in certain constructions, which are rigid, ambiguity arises:

(13) a. Meigeren dou bei yige nüren zhuazou.
everyone all PASS a woman arrest
"Everyone was arrested by a woman."

b. * Bei yige nüren meigeren dou zhuazou.
PASS a woman everyone all arrest

Persian local rigidity

Persian local rigidity

- Persian is a scrambling language, but negation is stuck at the end with the ver, being rigid:

Persian local rigidity

- Persian is a scrambling language, but negation is stuck at the end with the ver, being rigid:

(14) Yek dāneshju ān ketāb-rā na-xānd.
one student that book-ACC not-read
"A student didn't read that book."

Persian local rigidity

- Persian is a scrambling language, but negation is stuck at the end with the ver, being rigid:

(14) Yek dāneshju ān ketāb-rā na-xānd.
one student that book-ACC not-read
"A student didn't read that book."

- *But*, you do have an amount of flexibility with movement verbs. In those cases, flexibility remove ambiguity.

Persian local rigidity

- Persian is a scrambling language, but negation is stuck at the end with the ver, being rigid:

(14) Yek dāneshju ān ketāb-rā na-xānd.
one student that book-ACC not-read
"A student didn't read that book."

- *But*, you do have an amount of flexibility with movement verbs. In those cases, flexibility remove ambiguity.

(15) Billy na-raft hame shahr-i.
B. not-went all city-IND
"Billy didn't go to every city." $(\neg > \forall;\ ^*\forall > \neg)$

Persian local rigidity

- Persian is a scrambling language, but negation is stuck at the end with the ver, being rigid:

(14) Yek dāneshju ān ketāb-rā na-xānd.
one student that book-ACC not-read
"A student didn't read that book."

- *But*, you do have an amount of flexibility with movement verbs. In those cases, flexibility remove ambiguity.

(15) Billy na-raft hame shahr-i.
B. not-went all city-IND
"Billy didn't go to every city." $(\neg > \forall; *\forall > \neg)$

(16) Billy be hame shahr-i na-raft.
B. to all city-IND not-went.
"Billy didn't go to any city." $(\forall > \neg; *\neg > \forall)$

Generalizations

Generalizations

Rigid Constructions	Flexible Constructions

Generalizations

Rigid Constructions	Flexible Constructions
English main clauses	Main clauses in scrambling languages

Generalizations

Rigid Constructions	Flexible Constructions
English main clauses	Main clauses in scrambling languages
Persian negation	Chinese negation

Generalizations

Rigid Constructions	Flexible Constructions
English main clauses	Main clauses in scrambling languages
Persian negation	Chinese negation
Typical English negation	English negation around auxes

Generalizations

Rigid Constructions	Flexible Constructions
English main clauses	Main clauses in scrambling languages
Persian negation	Chinese negation
Typical English negation	English negation around auxes
Chinese passives	English passives*

Generalizations

Rigid Constructions	Flexible Constructions
English main clauses	Main clauses in scrambling languages
Persian negation	Chinese negation
Typical English negation	English negation around auxes
Chinese passives	English passives*
All of these are ambiguous	**All of these are non-ambiguous**

Generalizations

Rigid Constructions	Flexible Constructions
English main clauses	Main clauses in scrambling languages
Persian negation	Chinese negation
Typical English negation	English negation around auxes
Chinese passives	English passives*
All of these are ambiguous	**All of these are non-ambiguous**

- This is probably the most prominent empirical statement of my theory; I think it's borne out by typological data.

Generalizations

Rigid Constructions	Flexible Constructions
English main clauses	Main clauses in scrambling languages
Persian negation	Chinese negation
Typical English negation	English negation around auxes
Chinese passives	English passives*
All of these are ambiguous	**All of these are non-ambiguous**

- This is probably the most prominent empirical statement of my theory; I think it's borne out by typological data.
- Passives as a "bad" strategy.

Toward a General Theory of Quantifier Scope

Toward a General Theory of Quantifier Scope

- This account is incomplete. Notably it misses:

Toward a General Theory of Quantifier Scope

- This account is incomplete. Notably it misses:
  - The tendency for universal and existential quantifiers to behave differently.

Toward a General Theory of Quantifier Scope

- This account is incomplete. Notably it misses:
  - The tendency for universal and existential quantifiers to behave differently.
  - The tendency for some quantifiers of either type to prefer a certain range of scope (wide or narrow).

Toward a General Theory of Quantifier Scope

- This account is incomplete. Notably it misses:
  - The tendency for universal and existential quantifiers to behave differently.
  - The tendency for some quantifiers of either type to prefer a certain range of scope (wide or narrow).
- On the first point, there have been some attempts (Clark 2012) to implement this in Game Theory.

Toward a General Theory of Quantifier Scope

- This account is incomplete. Notably it misses:
  - The tendency for universal and existential quantifiers to behave differently.
  - The tendency for some quantifiers of either type to prefer a certain range of scope (wide or narrow).
- On the first point, there have been some attempts (Clark 2012) to implement this in Game Theory.
- The second point can be dealt with in Evolutionary Game Theory, that is, languages have different quantifiers and conventionalize them as preferring one scope or another. This also can tell us *why* different languages have "synonymous" quantifiers.

Toward a General Theory of Quantifier Scope

- This account is incomplete. Notably it misses:
  - The tendency for universal and existential quantifiers to behave differently.
  - The tendency for some quantifiers of either type to prefer a certain range of scope (wide or narrow).
- On the first point, there have been some attempts (Clark 2012) to implement this in Game Theory.
- The second point can be dealt with in Evolutionary Game Theory, that is, languages have different quantifiers and conventionalize them as preferring one scope or another. This also can tell us *why* different languages have "synonymous" quantifiers.
- Combine my account here with the other two pieces and you would have a phenomenologically complete theory of quantification.

References

Clark, Robin (2012). *Meaningful Games: Exploring Language with Game Theory*. MIT Press.

Collins, Chris (2017). "A scope freezing effect with negated quantifier phrases". In: *Natural Language Semantics* 25.4, pp. 315–327.

Han, Chung-hye, Jeffrey Lidz, and Julien Musolino (2007). "V-raising and grammar competition in Korean: Evidence from negation and quantifier scope". In: *Linguistic Inquiry* 38.1.

Karimi, Simin (2003). *Word Order and Scrambling*. Blackwell Publishing Ltd.