# Free choice: semantics and pragmatics

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# Overview

1. Modal and subtrigging effects of Free Choice (FC) items:

(1) a. #Anyone fell.
    b. Anyone may fall.
    c. Anyone who tried to jump fell. (**subtrigging**)

2. EMPIRICAL GOAL:

   Explain distribution and meaning of FC *any* in (1).

3. THEORETICAL GOAL:

   Contribute to the ongoing debate on the grammar-pragmatics interface:

(2) Free choice effect in (1b) and universal meaning in (1c):
   - Entailments (e.g. Dayal 1998) or
   - (Local) implicatures (e.g. Chierchia 2006)?

# The classical analysis: Dayal 1998

- *Any* as wide scope universal quantifier over possible individuals:

(3) a. John may read any book.
b. $\forall s \forall x[\text{Book}(x,s)][!\text{Read}(j,x,s)]$

(4) a. #John read any book.
b. $\forall s \forall x[\text{Book}(x,s)][PAST_{s@}(s) \wedge \text{Read}(j,x,s)]$

(5) a. John read any book he found.
b. $\forall s \forall x[\text{Book}(x,s) \wedge \exists s'[s < s' \wedge PAST_{s@}(s') \wedge \text{Find}(j,x,s')]]$
$[PAST_{s@}(s) \wedge \text{Read}(j,x,s)]$

'(4) is unacceptable because one cannot choose a domain that includes possible individuals and predicate something that is purely episodic of those individuals. [...] The temporal bound introduced by the relative clause in (5) restricts the domain appropriately.'

# Dayal 1998: problems

- *Any* doesn't seem to be a universal quantifier:

(6) To continue, push any key! [Giannakidou 2001]

- Explanation of subtrigging: vague but also counterintuitive:

(7) Maria iniziò a bussare a qualsiasi porta avesse i battenti in legno.
'Mary started knocking to whatever door had$_{SUB}$ wooden shutters'

Subjunctive mood in subtrigging restrictions in Romance. SUB cannot anchor tense back to actual world.

# A first sketch of my proposal (Aloni 2007)

(1) a. #Anyone fell.
b. Anyone may fall. $\Rightarrow \forall x \Diamond F(x)$
c. Anyone who tried to jump fell. $\Leftrightarrow \forall x(T(x) \rightarrow F(x))$

1. FC items are indefinite (*contra* Dayal)
2. Indefinites induce sets of propositional alternatives (Aloni 2002, K&S 2002)
3. FC *any* requires the application of two covert operators:

   (8) [∀]... **exh** (... any ...)

4. Contrast between (1a) and (1b) explained by interplay between [∀], **exh** and the possibility operator (Menéndez-Benito 2005)
5. Subtrigging effects in (1c) explained by interactions between [∀], **exh** and the post-nominal modifier
6. **Speculation**: A pragmatic origin for [∀] and **exh**?

# Structure of the talk

1. Background:
   - ‘Hamblin’ semantics for indeterminate pronouns (K&S 2002);
   - Menéndez-Benito (2005) on *any* in modal statements.
2. Proposal: modal and subtrigging effects via exhaustification.
   - Tools:
     - Exhaustification (e.g. Zeevat);
     - Type-shift rules: $\text{SHIFT}_e$ & $\text{SHIFT}_{\langle s,t\rangle}$;
   - Applications:
     - Free relatives and questions (Jacobson 1995);
     - Subtrigging and modal effects of FC *any*.
   - Core idea: parallelism

     Free relatives ⇔ Subtrigged case (1c)
     Questions ⇔ Unsubtrigged cases (1a and 1b)
3. Speculation: a pragmatic origin for [∀] and **exh**.

# ‘Hamblin’ semantics for indeterminate pronouns

MOTIVATION

- Explain variety of indefinites. E.g.
  - English: *a*, *some*, *any*, ...
  - Italian: *un(o)*, *qualche*, *qualsiasi*, *nessuno*, ...

HOW

- Indefinites ‘introduce’ sets of propositional alternatives;
- These are bound by propositional operators: [∃], [∀], [Neg], [Q];
- Different indefinites associate with different operators.

EXAMPLES

(9) a. [∃] (someone fell)
b. [∀] (anyone fell)
c. [Q] (who fell)
d. [Neg] (nessuno cadde)

e.

| | | | |
|---|---|---|---|
| $d_1$ fell | $d_2$ fell | $d_3$ fell | ... |

# A closer look

- In a Hamblin semantics, all expressions denote sets.
- Mostly singleton sets of traditional denotations. E.g.

(10) $[\![\textbf{fell}]\!]_{w,g} = \{\lambda x \lambda w'.\text{FELL}(x)(w')\}$

- Indefinites map to multi-membered sets of alternatives. E.g.

(11) $[\![\textbf{someone/anyone/who}]\!]_{w,g} = \{x \mid \text{HUMAN}(x)(w)\}$

- Via pointwise functional application, these individual alternatives expand into propositional alternatives:

(12) $[\![\textbf{fell}]\!]_{w,g}([\![\textbf{someone/anyone/who}]\!]_{w,g}) = \{$that $d_1$ fell, that $d_2$ fell, that $d_3$ fell,...$\}$

- Until they reach one of the propositional operators. E.g.

(13) $[\forall]([\![\textbf{fell}]\!]_{w,g}([\![\textbf{anyone}]\!]_{w,g})) = \{$that everyone fell$\}$

# *Any*: naif account

- [∀] quantifies over propositional alternatives.

(14) a. [∀](anyone fell)

| | | | |
|---|---|---|---|
| $d_1$ fell | $d_2$ fell | $d_3$ fell | ... |

*Predicted meaning:* $\forall x F(x)$

b. [∀](anyone may fall)

| | | | |
|---|---|---|---|
| $\Diamond\, d_1$ fall | $\Diamond\, d_2$ fall | $\Diamond\, d_3$ fall | ... |

*Predicted meaning:* $\forall x \Diamond F(x)$

c. [∀](anyone who tried to jump fell)

| | |
|---|---|
| $d_1$ fell | $d_2$ fell |

*Predicted meaning:* $\forall x(T(x) \rightarrow F(x))$

- MERITS: captures universal meaning of (c);
- PROBLEMS: doesn't explain (a) & dubious truth-conditions for (b):

  E.g. suppose only two options: (i) nobody falls; (ii) everybody falls. Then (b) would be true against intuitions [Menéndez-Benito 2005].

# *Any*: Menéndez-Benito account

- **Excl** transforms Hamblin alternatives into sets of mutually exclusive propositions.

(15) a. $[\forall](\textbf{Excl}(\text{anyone fell}))$

| only $d_1$ fell | only $d_2$ fell | ... |
|---|---|---|

*Predicted meaning:* $\forall x\ \text{ONLY}_x F(x)$, i.e. $\bot$

b. $[\forall](\Diamond(\textbf{Excl}(\text{anyone fall})))$

| $\Diamond$ only $d_1$ fall | $\Diamond$ only $d_2$ fall | ... |
|---|---|---|

*Predicted meaning:* $\forall x \Diamond\ \text{ONLY}_x F(x)$

c. $[\forall](\textbf{Excl}(\text{anyone who tried to jump fell}))$

| only $d_1$ fell | only $d_2$ fell |
|---|---|

*Predicted meaning:* $\forall x(T(x) \rightarrow \text{ONLY}_x\ F(x))$, i.e. $\bot$

- MERITS: captures (a) (out because inconsistent) and (b) (consistent and unrestricted liberty of choice);
- PROBLEMS: doesn't extend to (c) (out because inconsistent).

# Synopsis

- DESIDERATA:
  - M-B's predictions for the unsubtrigged and modal cases (a) and (b) [via **Excl**];
  - Naif account's predictions for the subtrigged case (c) [no **Excl**].
- Question: why **Excl** does not seem to play a role when a post-nominal modifier is present?
- My answer will assume, rather than **Excl**, a much more general and independently motivated notion **exh** of exhaustification.
- **What's next**:
  - Main ingredients: exhaustification & type-shift principles
  - Independent motivation: free relatives and wh-interrogatives
  - Main application: free choice in modal and subtrigged sentences

# Exhaustification

- Exhaustive interpretations (Gr & St 84, vSt& Zim 84):

(16) a. John and Mary fell $\Rightarrow$ nobody else fell
b. John can spend 150 Euro $\Rightarrow$ J cannot spend *more*
c. John can live on 150 Euro $\Rightarrow$ J cannot live on *less*

- (16) can be explained by *pragmatic* reasoning (Spector, S&vR)
- But exhaustification at work in the *semantics* of a large variety of constructions (Grosu & Landman). E.g.

(17) Questions (Gr & St):
a. John knows who fell.
b. John knows of those who fell that they fell and that nobody else fell.

(18) Free relatives (Jacobson):
a. What J can spend is less than what J can live on.
b. The max amount of money that J can spend is less than the min amount of money that J can live on.

# The **exh** operator

- **exh** takes a domain D (type $e$) and a property $P$ (type $\langle e, \langle s, t\rangle\rangle$) and returns the property of exhaustively satisfying $P$ wrt $D$:

(19) a. $\mathbf{exh}[D, P]$ type: $\langle e, \langle s, t\rangle\rangle$
b. $\{\lambda x \lambda w[x$ exhaustively satisfies $P$ wrt $\alpha$ in $w]\}$

- E.g. using Zeevat 1994:

(20) $x$ exhaustively satisfies $P$ wrt $D$ iff $x$ is in $D$, $P(x)$ is true, and for all $y$ in $D$ if $P(y)$ is true then $P(x)$ entails $P(y)$.

- $x$ and $y$ range over domains of plural individuals (e.g. Link 1983).

# Illustration of '$x$ exhaustively satisfies $P$ wrt $D$'

- Normally exhaustive values are maximal plural entities:

(21) a. D: people $\{\emptyset, a, b, c, a+b, a+c, c+b, a+b+c\}$
b. P: $\lambda x[x \text{ fell}]$ $\{\emptyset, a, b, a+b\}$
c. $x$: the max collection of people that fell $a+b$

- But with scalar predication other exhaustification effects show up:

(22) a. D: amount of money $\{0, 50, 100, 150, ...\}$
b. P: $\lambda x[\text{J can live on } x]$ $\{100, 150, 200, ...\}$
c. $x$: the min amount of money that J can live on $100$

(23) a. D: amount of money $\{0, 50, 100, 150, 200, ...\}$
b. P: $\lambda x[\text{J can spend } x]$ $\{0, 50, 100, 150\}$
c. $x$: the max amount of money that J can spend $150$

# Two type-shift rules for properties

1. SHIFT$_e$: $\langle e, \langle s, t\rangle\rangle \rightarrow e$ (from properties to **entities**)

   (24) Partee iota rule:

   a. $\mathbf{P} \rightarrow \iota x[\mathbf{P}(x)(w_0)]$

   b. $\{P\} \rightarrow \{d\}$ if $d$ is the unique $P$ in $w_0$, undefined otherwise

2. SHIFT$_{\langle s,t\rangle}$: $\langle e, \langle s, t\rangle\rangle \rightarrow \langle s, t\rangle$ (from properties to **propositions**)

   (25) 'Hamblin' question formation rule:

   a. $\mathbf{P} \rightarrow \hat{p}\ [\exists x(\mathbf{P}(x) = p)]$

   b. $\{P\} \rightarrow \{d_1$ is $P$, $d_2$ is $P$, $d_3$ is $P$, ...$\}$

# Exhaustification and type-shift principles

When applied to $\mathbf{exh}[\alpha, \mathbf{P}]$

(i) $\textsc{shift}_e$ (always defined) yields normally maximal plural entities:

(26) a. $\textsc{shift}_e(\mathbf{exh}[\alpha, \mathbf{P}])$
b. {the maximal plural entity from $\alpha$ satisfying $P$ in the world of evaluation $w_0$}

(ii) $\textsc{shift}_{\langle s,t\rangle}$ yields sets of mutually exclusive propositions:

(27) a. $\textsc{shift}_{\langle s,t\rangle}(\mathbf{exh}[\alpha, \mathbf{P}])$
b. {nobody is $P$, only $d_1$ is $P$, only $d_2$ is $P$, only $d_1$ & $d_2$ are $P$, ... }

# First application: Free relatives and wh-interrogatives

- Examples:

(28) a. **Free relative:** John read [$_{DP}$ what was on the list]
b. **Wh-interrogative:** John knows [$_{Q}$ what was on the list]

- Main ideas:
  - Exhaustification at work in both constructions (Jacobson, Gr&St)
  - Free relatives and wh-interrogatives born with the same meaning, but typeshift differently (Cooper, Jacobson)

# Formalizing main ideas

- Common meaning of free relatives and wh-interrogatives:

(29) what was on the list

a. **exh**[what, on the list] type: $\langle e, \langle s, t\rangle\rangle$

b. $\{\lambda x \lambda v.\ x$ is the maximal collection of things on the list in $v\}$

- Different type-shift:

(30) (John read) $[_{DP}$ what was on the list$]$

a. $\textsc{shift}_e$(**exh**[what, on the list]) type: $e$

b. {the maximal collection of things on the list in $w_0$}

(31) (John knows) $[_{Q}$ what was on the list$]$

a. $\textsc{shift}_{\langle s,t\rangle}$(**exh**[what, on the list]) type: $\langle s, t\rangle$

b. {nothing was on the list, only $d_1$ was on the list, only $d_2$ was on the list, ... }

# A closer look at free relatives (FRs)

- Definite meaning of FR follows (Jacobson):

(32) a. John read [$_{DP}$ what was on the list]
b. [Q] (**read**(j)(SHIFT$_e$(**exh**[what, on the list])))
c. {that John read the things on the list in $w_0$}

- FRs, however, sometimes also have a universal reading:

(33) We will veto three-quarters of whatever proposals you make.
a. **Definite**: Of the proposals: three-quarters won't make it.
b. **Universal**: For each proposal: three-quarters of it will be vetoed.

[Grosu and Landman 98]

# Universal reading of FRs

- Universal meanings captured in terms of $[\forall]$:

(34) We will veto three-quarters of whatever proposals you make.

a. $[Q](\mathbf{P}(\textsc{shift}_e(\mathbf{exh}[\text{whatever}, \mathbf{S}])))$ (definite)

b. $[\forall]([Q](\mathbf{P}(\downarrow\textsc{shift}_e(\mathbf{exh}[\text{whatever}, \mathbf{S}]))))$ (universal)

- For (34)-b, we need $\downarrow$ mapping plural individuals back into their atomic elements:

(35) a. $[\![\alpha]\!]_{w,g} = \{a + b\}$ a singleton set of plural individuals

b. $[\![\downarrow \alpha]\!]_{w,g} = \{a, b\}$ a multi-membered set of atoms

# A closer look at interrogatives

- Declaratives and interrogatives have the same type here: $\langle s, t \rangle$. But:

  a. Declaratives $\mapsto$ singleton sets of propositions
  b. Interrogatives $\mapsto$ multi-membered sets of mutually exclusive propositions

- For example:

(36) a. Mary fell $\mapsto$ {that Mary fell}
b. Who fell? $\mapsto$ {that no-one fell, that only M fell, ...}

- I.e. Groenendijk and Stokhof's partitions in a Hamblin's setting.

# Know, believe and wonder

Different embedding potential of attitude verbs could be explained in terms of propositional quantifiers:

(37) a. John believes that Mary fell/#who fell.
b. $\mathrm{Bel}_j[\exists](A)$ [trivial, if A partition]

(38) a. John wonders who fell/# that Mary fell.
b. [Neg] $(\mathrm{Bel}_j[Q](A))$ [vacuous, if A singleton]

(39) a. John knows who fell/that Mary fell.
b. $\mathrm{Bel}_j[\mathrm{true}](A)$
c. $j$ believes the unique true proposition in $A$, if there is one, undefined otherwise.

# More on *know*: factivity

- When *know* embeds a proposition p, p must be true, otherwise undefined:

(40)
  a. John knows that Mary fell.
  b. $\text{Bel}_j[\text{true}](\mathbf{fell}(m))$
  c. $j$ believes the unique true proposition in {that Mary fell}, if there is one, undefined otherwise.

- Factivity explained: (a) presupposes (b).

(41)
  a. John knows that Mary fell
  b. Mary fell

## More on *know*: exhaustivity

- When *know* embeds a question (here a partition), always defined:

(42) a. John knows who fell.
b. $\mathrm{Bel}_j[\mathrm{true}]([\mathrm{Q}](\textsc{shift}_{\langle s,t\rangle}(\mathbf{exh}[\mathrm{who, fell}])))$
c. $j$ believes the unique true proposition in {that no-one fell, that only M fell, ...}

- Weak and strong exhaustivity follow.

(43) a. John knows who fell & M fell. ⇒
b. John knows that M fell. (weak exhaustivity)

(44) a. John knows who fell & M didn't fall. ⇒
b. John knows that M didn't fall. (strong exhaustivity)

# Subtrigging and modal effects of FC items: core idea

- FC items like wh-words trigger the application of **exh**.
- UNSUBTRIGGED CASES:

(45) a. $[_{IP}$ Anyone fell$]$
b. $[_{IP}$ Anyone may fall$]$

  - Exhaustification must apply at the IP level;
  - SHIFT$_{\langle s,t \rangle}$ generates sets of mutually exclusive propositional alternatives.

- SUBTRIGGED CASES:

(46) $[_{DP}$ Anyone who tried to jump$]$ fell.

  - Exhaustification can apply at the DP level;
  - SHIFT$_e$ and $\downarrow$ apply and generate sets of individuals.

- Post-nominal modifier crucial for (46) because it supplies the 2nd argument essential for the application of **exh** inside the DP.

# *Any*: final proposal

(47) a. $[\forall](\text{SHIFT}_{(s,t)}(\mathbf{exh}[\text{anyone, fell}]))$

*Predicted meaning:* $\perp$

| only $d_1$ fell | only $d_2$ fell | ... |
|---|---|---|

b. $[\forall](\Diamond(\text{SHIFT}_{(s,t)}(\mathbf{exh}[\text{anyone, fall}])))$

*Pr. m.:* $\forall x \Diamond \text{ONLY}_x F(x)$

| $\Diamond$ only $d_1$ fall | $\Diamond$ only $d_2$ fall | ... |
|---|---|---|

*Predicted meaning:* $\forall x \Diamond \text{ONLY}_x F(x)$

c. $[\forall](\downarrow\text{SHIFT}_e(\mathbf{exh}[\text{anyone, who tried to jump}])\ \text{fell})$

*Predicted meaning:* $\forall x(T(x) \rightarrow F(x))$

| $d_1$ fell | $d_2$ fell |
|---|---|

- MERITS: captures (a) (out because inconsistent), (b) (consistent and unrestricted freedom of choice) and (c) (consistent and universal meaning).
- PROBLEMS: ...

# Problems, problems, problems

- THEORETICAL: Where do [$\forall$] and **exh** come from?
- EMPIRICAL: No account of rule-like meaning of subtrigged French *tout* (Jayez & Tovena) and Spanish *cualquier* (Menendez-Benito):

(48) a. #Tout étudiant qui était dans le couloir est rentré.
  'Any student who was in the corridor came in'

 b. Tout étudiant qui avait triché a été renvoyeé.
  'Any student who had cheated was excluded'

- ...

# The status of [∀] and **exh**: a speculation

- The proposed analysis:

(49) a. Anyone may fall.

b. $[\forall](\Diamond(\textsc{shift}_{(s,t)}(\mathbf{exh}[\text{anyone, fall}])))$

- Hypothesis:

(49)-b result of fossilization/conventionalization of an originally pragmatic free choice implicature.

# Free choice implicatures

- Permission (50)-a pragmatically implicates (50)-b:

(50) a. You may go to the beach or go to the cinema.
b. You may go to the beach and you may go to the cinema.

- Intuitive reasoning behind implicature:

(51) a. Speaker said $\Diamond(A \vee B)$:
b. Could it be that $A$ is not possible? No, otherwise the speaker would have used $\Diamond B$;
c. Could it be that $B$ is not possible? No, otherwise the speaker would have used $\Diamond A$;
d. Therefore, we can conclude that $A$ is possible and that $B$ is possible.

# Deriving free choice implicatures

- Various formalisations of (51) have been proposed (e.g. Fox, Schulz, Geurts, Aloni)
- Aloni (2006): in BiOT using Grice's maxims + MMP which derives pragmatic exhaustification;
- Predictions for disjunctive permissions:

(52) a. original sentence: $\Diamond(A \vee B)$
b. FC implicature: $\Diamond(A \wedge \neg B) \wedge \Diamond(B \wedge \neg A)$

- Generalization to the existential case:

(53) a. original sentence: $\Diamond \exists x F(x)$
b. FC implicature: $\forall x \Diamond \textsc{only}_x F(x)$

# Back to FC items: Chierchia 2006

- Why not Chierchia's analysis?

(54) Anyone may fall.

a. basic meaning: $\Diamond \exists x F(x)$

b. FC (local) implicature: $\forall x \Diamond \textsc{only}_x F(x)$

- Hard to extend to the episodic case:

(55) Anyone who tried to jump fell.

a. basic meaning: $\exists x (T(x) \wedge F(x))$

b. antiexhaustiveness implicature: $\forall x (T(x) \rightarrow F(x))$

(56) #Anyone fell.

a. basic meaning: $\exists x F(x)$

b. antiexhaustiveness implicature: $\forall x F(x)$

- Problems:
  - Antiexhaustiveness implicature: not a rational implicature;
  - Dayal's explanation needed for (55) and (56).

# My proposal: a diachronic perspective

- In languages with specialized free choice morphology, free choice implicatures, pragmatic in origin, have been conventionalized using mechanisms of propositional quantification:

(57) Anyone may fall.

a. Original FC implicature: $\forall x \Diamond \textsc{only}_x F(x)$

b. Logical form after fossilization: $[\forall](\Diamond(\textsc{shift}_{(s,t)}(\mathbf{exh}[\text{anyone, fall}])))$

- **exh** $\mapsto$ grammaticalized version of originally pragmatic exhaustification.
- Once in the grammar, **exh** in interplay with $[\forall]$ and standard type-shift rules explain restricted distribution and subtrigging effects.

# Diachronic stages

- Three diachronic stages wherein languages gradually developed free choice morphology:

  stage 1 Languages with no specialized free choice morphology e.g. Maltese

  stage 2 Languages in which emphatic indefinites may prefer free choice interpretations e.g. German *irgendein*

  stage 3 Languages with free choice morphology e.g. Romance, Hebrew, Lavtian,...

- Back to our initial question: semantics or pragmatics?
  - FC effects:
    - In stage 1 and 2 languages: global implicatures (cancellable)
    - In stage 3 languages: conventionalized implicatures (i.e. entailments)
  - Subtrigging effects: entailments (⇒ occurs only in stage 3 languages)

# Future plans

- Look for evidence for diachronic hypothesis (*Vidi* project)
- Extend the proposal to account for rule-like interpretations of subtrigged sentences;
- Apply the analysis to explain variety of disjunctions (e.g. Szabolcsi).

(58) I didn't see John or Mary.

a. $\neg A \vee \neg B$

b. $\neg(A \vee B)$

(59) a. Non ho visto Giovanni *o* Maria. $\neg A \vee \neg B$

b. Non ho visto *né* Giovanni *né* Maria. $\neg(A \vee B)$

- ...