Two types of existential quantification

Research Colloquium
Philosophy of Language, Logic, and Information, RUB

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IPG_CORE

The German impersonal pronoun *man*

- German *man* occurs only in subject position.
- It has a characteristic generic use in generic sentences:

(1) Man lebt nur einmal. ($\approx$ 'people in general')
'One only lives once.'

(see, e.g., Cabredo Hofherr 2015, Malamud 2012, Zifonun 2000)

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- It has a characteristic generic use in generic sentences:

(1) Man lebt nur einmal. (≈ 'people in general')
'One only lives once.'

- It can also be used in episodic sentences:

(2) Gestern hat man die Uni angezündet.
'Yesterday, MAN set the university on fire.'

  – impossible for English *one*
  – also unavailable in some German varieties

(see, e.g., Cabredo Hofherr 2015, Malamud 2012, Zifonun 2000)

Plan for today

Focus on German *man* in episodic sentences: "existential *man*"

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   $\Rightarrow$ requires existential quantification without anaphoric update

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1. Show: existential *man* has exceptional semantic behavior looking at sentence internal and discourse anaphoric behavior
   - $\Rightarrow$ requires existential quantification without anaphoric update
2. Present: two-layered semantic system with an extensional semantics on top of a dynamic core
   - $\Rightarrow$ allows us to define a "dynamic" existential quantifier $\exists$ and a "static" existential quantifier $\bigvee$

Plan for today

Focus on German *man* in episodic sentences: "existential *man*"

1. Show: existential *man* has exceptional semantic behavior looking at sentence internal and discourse anaphoric behavior
   - $\Rightarrow$ requires existential quantification without anaphoric update
2. Present: two-layered semantic system with an extensional semantics on top of a dynamic core
   - $\Rightarrow$ allows us to define a "dynamic" existential quantifier $\exists$ and a "static" existential quantifier $\bigvee$
3. Show: behavior of existential *man* is captured perfectly by the static existential quantifier

Existential *man* does not denote an individual

Semantic contribution of existential *man* intuitively close to *someone*:
(Cabredo Hofherr 2010, 2015; Malamud 2012; Zifonun 2000)

(3) Man hat mir mein Rad gestohlen. ("existential use")
'MAN stole my bike.'
⇒ Someone stole my bike.

- the speaker might know who did it
- the addressee does not know/learn the identity of the culprit

⇒ subject is intuitively existentially quantified

Is existential *man* an existential indefinite?

Jemand 'someone' and *man* share some semantic properties:

- contribute existential quantification
- can be used discourse initially

(4) You'll never guess what happened!

a. Man hat mir mein Rad gestohlen. ('MAN stole my bike')
b. Someone stole my bike.
c. #{The man / he} stole my bike.

- cannot be anaphoric to definite or indefinite NPs

(5) {A man / my neighbor} was arrested.

a. #Man hat mir mein Rad gestohlen. ('MAN stole my bike')
b. #Someone stole my bike.
c. {The man / he} stole my bike.

Differences: *man* ≠ *jemand* – I

Different scope behavior: (a.o., Zifonun 2000)

(6) a. Man hat mir genau drei Räder gestohlen.
'For three bikes, it's the case that MAN stole them.' (3 < ∃)

b. Jemand hat mir genau drei Räder gestohlen.
'Someone stole exactly three bikes.' (∃ < 3)

⇒ *man* scopes below 'exactly three bikes'

⇒ *jemand* 'someone' scopes above 'exactly three bikes' as expected in this syntactic position

Differences: *man* $\neq$ *jemand* – II

Different number specification: *man* but not *jemand* can take collective predicates and reciprocal expressions

(7) a. Man hat sich vor der Uni versammelt.
'MAN gathered in front of the university.'
b. Man hat sich gegenseitig gedeckt.
'MAN covered for each other.'

(8) a. *Someone gathered in front of the university.
b. *Someone covered for each other.

$\Rightarrow$ number of subject individuals depends on the predicate
$\Rightarrow$ *call* (sg) vs. *gather* (pl)

Is *man* a special existential indefinite?

Data so far suggests: *man* is a number-neutral existential indefinite with obligatory low scope

⇒ number neutrality: variable ranging over individuals and sets of individuals

⇒ low scope: lexical restriction OR connection to established low scope quantifiers (e.g., existential event closure; see e.g., Malamud 2012)

No: different antecedent behavior – I

- *Man* cannot be an antecedent for arbitrary definite NPs or singular personal pronouns: (e.g., Cabredo Hofherr 2010 Zobel 2017)

(9) **Man**$_i$ hat mir mein Rad gestohlen. ('MAN stole my bike.')

a. ?#**Der Mann**$_i$ hat das Schloss aufgebrochen.

b. #**Er**$_i$ hat das Schloss aufgebrochen.

'The man / he pried open the lock.'

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  b. #**Er**$_i$ hat das Schloss aufgebrochen.
  'The man / he pried open the lock.'

- Both possible for indefinite NPs:

(10) **Ein Mann**$_i$ hat mir mein Rad gestohlen. ('A man stole my bike.')
  a. **Der Mann**$_i$ hat das Schloss aufgebrochen.
  b. **Er**$_i$ hat das Schloss aufgebrochen.
  'The man / he pried open the lock.'

No: different antecedent behavior – II

- Existential *man* cannot be an antecedent for possessive pronouns:

(e.g., Cabredo Hofherr 2010, Zobel 2017)

(11) **Man**$_i$ hat hier **sein**$_{*i/j}$ Rad abgestellt.
'MAN parked his bike here.'

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- Existential *man* cannot be an antecedent for possessive pronouns:

  (e.g., Cabredo Hofherr 2010, Zobel 2017)

  (11) **Man**$_i$ hat hier **sein**$_{*i/j}$ Rad abgestellt.
  ‘MAN parked his bike here.’

- Possible for indefinite NPs:

  (12) a. **Ein Mann**$_i$ hat hier **sein**$_i$ Rad abgestellt.
  ‘A man parked his bike here.’
  b. **Jemand**$_i$ hat hat hier **sein**$_i$ Rad abgestellt.
  ‘Someone parked his bike here.’

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  'Someone parked his bike here.'

⇒ Existential *man* is *discourse inert*. (cf. Koenig & Mauner 1999)

Interim summary

- Properties of existential *man*:
  - pronominal expression confined to subject position
  - contributes existential quantification
  - obligatory low scope
  - singular morphosyntax but number neutral semantics
- Anaphoric/antecedent behavior of existential *man*:
  - can occur discourse initially
  - not anaphoric to definite or indefinite DPs
  - no viable antecedent for 3rd person singular pronouns
- Upshot: the existential quantification of *man* differs from the existential quantification of *jemand*

Roadmap

The dynamic component

- *Dynamic existential quantifier*
  $[\![\exists x_n \varphi]\!](G) = [\![\varphi]\!](\{h \mid \exists g \in G : g \subset_{x_n} h\})$
- *Dynamic conjunction*
  $[\![\varphi \wedge \psi]\!](G) = [\![\psi]\!]([\![\varphi]\!](G))$
- *Atomic sentences*: prelim.
  $[\![Px_1 \ldots x_n]\!](G) = \{g \in G \mid \langle g(x_1), \ldots, g(x_n)\rangle \in P'\}$

(esp. Heim 1982, Groenendijk & Stokof 1991, Dekker 1996)

The dynamic component

- $[\![\exists x_n \varphi]\!](G) = [\![\varphi]\!](\{h \mid \exists g \in G : g \subset_{x_n} h\})$
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- $[\![Px_1 \ldots x_n]\!](G) = \{g \in G \mid \langle g(x_1), \ldots, g(x_n)\rangle \in P'\}$

A cat slept. $\rightsquigarrow \exists x_1[Cx_1] \wedge Sx_1$

The dynamic component

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$[\![\exists x_1 [Cx_1] \wedge Sx_1]\!](G)$

G	x_1	x_2	$\ldots$
g_1	#	#	$\ldots$

The dynamic component

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G	x_1	x_2	$\ldots$
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G	x_1	x_2	$\ldots$
g_1	#	#	$\ldots$

H	x_1	x_2	$\ldots$
h_1	a	#	$\ldots$
h_2	c_1	#	$\ldots$
h_3	c_2	#	$\ldots$

The dynamic component

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$$[\![\exists x_1 [Cx_1] \wedge Sx_1]\!](G) \quad = [\![Sx_1]\!]([\![Cx_1]\!](H))$$

G	x_1	x_2	$\ldots$
g_1	#	#	$\ldots$

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h_2	c_1	#	$\ldots$
h_3	c_2	#	$\ldots$

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g_1	#	#	$\ldots$

H	x_1	x_2	$\ldots$
h_1	a	#	$\ldots$
h_2	c_1	#	$\ldots$
h_3	c_2	#	$\ldots$

H'	x_1	x_2	$\ldots$
h_2	c_1	#	$\ldots$
h_3	c_2	#	$\ldots$

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G	x_1	x_2	$\ldots$
g_1	#	#	$\ldots$

H	x_1	x_2	$\ldots$
h_1	a	#	$\ldots$
h_2	c_1	#	$\ldots$
h_3	c_2	#	$\ldots$

H'	x_1	x_2	$\ldots$
h_2	c_1	#	$\ldots$
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$$[\![\exists x_1[Cx_1] \wedge Sx_1]\!](G) \quad = [\![Sx_1]\!](H') = H'$$

G	x_1	x_2	$\ldots$
g_1	#	#	$\ldots$

H	x_1	x_2	$\ldots$
h_1	a	#	$\ldots$
h_2	c_1	#	$\ldots$
h_3	c_2	#	$\ldots$

H'	x_1	x_2	$\ldots$
h_2	c_1	#	$\ldots$
h_3	c_2	#	$\ldots$

The dynamic component

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It purred. $\rightsquigarrow Px_1$

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$[\![Px_1]\!](H')$

H'	x_1	x_2	$\ldots$
h_2	c_1	$\#$	$\ldots$
h_3	c_2	$\#$	$\ldots$

The dynamic component

- $[\![\exists x_n \varphi]\!](G) = [\![\varphi]\!](\{h \mid \exists g \in G : g \subset_{x_n} h\})$
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$[\![Px_1]\!](H')$

H'	x_1	x_2	$\ldots$
h_2	c_1	#	$\ldots$
h_3	c_2	#	$\ldots$

$[\![Px_2]\!](H')$
undefined!

The dynamic component

- $[\![\exists x_n \varphi]\!](G) = [\![\varphi]\!](\{h \mid \exists g \in G : g \subset_{x_n} h\})$
- $[\![\varphi \wedge \psi]\!](G) = [\![\psi]\!]([\![\varphi]\!](G))$
- $[\![Px_1 \ldots x_n]\!](G) = \{g \in G \mid \langle g(x_1), \ldots, g(x_n)\rangle \in P'\}$

$[\![Px_1]\!](H')$

H'	x_1	x_2	$\ldots$
h_2	c_1	#	$\ldots$
h_3	c_2	#	$\ldots$

$[\![Px_2]\!](H')$
undefined!

$[\![\exists x_1[Cx_1]]\!](H')$
undefined!

The dynamic component

- $[\![\exists x_n \varphi]\!](G) = [\![\varphi]\!](\{h \mid \exists g \in G : g \subset_{x_n} h\})$
- $[\![\varphi \wedge \psi]\!](G) = [\![\psi]\!]([\![\varphi]\!](G))$
- $[\![Px_1 \ldots x_n]\!](G) = \{g \in G \mid \langle g(x_1), \ldots, g(x_n)\rangle \in P'\}$

$[\![Px_1]\!](H')$

H'	x_1	x_2	$\ldots$
h_2	c_1	#	$\ldots$
h_3	c_2	#	$\ldots$

$[\![Px_2]\!](H')$
undefined!
(antecedentless pronoun)

$[\![\exists x_1[Cx_1]]\!](H')$
undefined!
(Novelty Condition)

Accounting for composition (Montague 1970)

Types

1. $\boldsymbol{e}, \boldsymbol{t} \in T$; 2. If $a, b \in T$, then $(ab) \in T$; 3. and nothing else.

Syntax

For any $a, b \in T$:

1. $Con_a \subseteq Fml_a$
2. $Var_a \subseteq Fml_a$
3. If $\alpha \in Fml_{(ab)}$ and $\beta \in Fml_a$ then $\alpha(\beta) \in Fml_b$.
4. If $\boldsymbol{x} \in Var_a$ and $\alpha \in Fml_b$, then $(\lambda \boldsymbol{x}.\alpha) \in Fml_{(ab)}$
5. If $\alpha, \beta \in Fml_a$, then $\alpha = \beta \in Fml_{\boldsymbol{t}}$

Accounting for composition (Montague 1970)

Domains

1. $D_{\boldsymbol{e}} = D$; 2. $D_{\boldsymbol{t}} = \{0, 1\}$; 3. $D_{(ab)} = D_b^{D_a}$, for all $a, b \in T$.

Semanics

For any $a, b \in T$:

1. $[\![c]\!]^{\omega} \in D_a$, for all $c \in Con_a$
2. $[\![\boldsymbol{x}]\!]^{\omega} = \omega(\boldsymbol{x})$, for all $\boldsymbol{x} \in Var_a$
3. $[\![\alpha(\beta)]\!]^{\omega} = [\![\alpha]\!]^{\omega}([\![\beta]\!]^{\omega})$
4. $[\![(\lambda \boldsymbol{x}.\alpha)]\!]^{\omega} = (\lambda u.[\![\alpha]\!]^{\omega[\boldsymbol{x}/u]})$
5. $[\![\alpha = \beta]\!]^{\omega} = 1$ iff $[\![\alpha]\!]^{\omega} = [\![\beta]\!]^{\omega}$; and 0 otherwise.

Accounting for composition (Montague 1970)

Some abbreviations

For all $a \in T$ $(\varphi \in Fml_{\boldsymbol{t}})$

- $(\bigwedge \boldsymbol{x}_a)[\varphi]$ for $(\lambda \boldsymbol{x}_a.\varphi) = (\lambda \boldsymbol{x}.\boldsymbol{x} = \boldsymbol{x})$ Universal quantification
- $\neg\varphi$ for $\varphi = (\bigwedge \boldsymbol{p}_{\boldsymbol{t}})[p]$ Negation
- $(\bigvee \boldsymbol{x}_a)[\varphi]$ for $\neg(\bigwedge \boldsymbol{x}_a)[\neg\varphi]$ Existential quantification

Dynamic types

- $[\![\exists x_n \varphi]\!](G) = [\![\varphi]\!](\{h \mid \exists g \in G : g \subset_{x_n} h\})$
- $[\![\varphi \wedge \psi]\!](G) = [\![\psi]\!]([\![\varphi]\!](G))$

Dynamic types

- $[\![\exists x_n \varphi]\!] = \lambda G.[\![\varphi]\!](\{h \mid \exists g \in G : g \subset_{x_n} h\})$
- $[\![\varphi \wedge \psi]\!] = \lambda G.[\![\psi]\!]([\![\varphi]\!](G))$

Dynamic types

- $[\![\exists x_n \varphi]\!] = \overbrace{\lambda G.\ \underbrace{[\![\varphi]\!]}_{t}(\{h \mid \exists g \in G : g \subset_{x_n} h\})}^{t}$
- $[\![\varphi \wedge \psi]\!] = \overbrace{\lambda G.\ \underbrace{[\![\psi]\!]}_{t}(\underbrace{[\![\varphi]\!]}_{t}(G))}^{t}$

Dynamic types

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- $[\![\varphi \wedge \psi]\!] = \overbrace{\lambda G.\ \underbrace{[\![\psi]\!]}_{t}(\underbrace{[\![\varphi]\!]}_{t}(G))}^{t}$

$D_t :=$ The set of functions from files (i.e. sets of embeddings) into files.

Dynamic types

$D_{\boldsymbol{t}}$:= The set of functions from files into files.

Dynamic types

$D_{\boldsymbol{t}}$:= The set of functions from files into files.

$D_{\boldsymbol{e}}$:= The set of functions from files into functions from embeddings into individuals.

Dynamic types

$D_{\boldsymbol{t}}$:= The set of functions from files into files.

$$[\![x_n]\!] = \overbrace{\lambda G.\lambda g.g(x_n)}^{\boldsymbol{e}}$$

$D_{\boldsymbol{e}}$:= The set of functions from files into functions from embeddings into individuals.

Dynamic types

Domains

1. $D_{\boldsymbol{e}} :=$ The set of functions from files into functions from embeddings into individuals.
2. $D_{\boldsymbol{t}} :=$ The set of functions from files into files.
3. $D_{a,b} := D_b^{D_a}$, for all $a, b \in T$

Dynamic constants

- *Discourse referents*: $Con_{\boldsymbol{e}}$
  $[\![x_n]\!] = \lambda G.\lambda g.g(x_n)$
- *Dynamic existential quantifier*:
  $[\![\exists x_n \varphi]\!] = \lambda G.[\![\varphi]\!](\{h \mid \exists g \in G : g \subset_{x_n} h\})$
- *Dynamic conjunction*:
  $[\![\varphi \wedge \psi]\!] = \lambda G.[\![\psi]\!]([\![\varphi]\!](G))$

Dynamic constants

- *Discourse referents*: $Con_{\boldsymbol{e}}$
  $[\![x_n]\!] = \lambda G.\lambda g.g(x_n)$
- *Dynamic existential quantifier*: $Con_{\boldsymbol{tt}}$
  $[\![\exists x_n]\!](p) = \lambda G.p(\{h \mid \exists g \in G : g \subset_{x_n} h\})$
- *Dynamic conjunction*: $Con_{\boldsymbol{t(tt)}}$
  $[\![\wedge]\!](q)(p) = \lambda G.q(p(G))$

Dynamic constants

- *Discourse referents*: $Con_{\boldsymbol{e}}$
  $[\![x_n]\!] = \lambda G.\lambda g.g(x_n)$
- *Dynamic existential quantifier*: $Con_{\boldsymbol{tt}}$
  $[\![\exists x_n]\!](p) = \lambda G.p(\{h \mid \exists g \in G : g \subset_{x_n} h\})$
- *Dynamic conjunction*: $Con_{\boldsymbol{t(tt)}}$
  $[\![\wedge]\!](q)(p) = \lambda G.q(p(G))$

- *Predicates* (of arity n): $Con_{(\boldsymbol{e}^n\boldsymbol{t})}$
  $[\![\beta]\!](u_1)\ldots(u_2) = \lambda G.\{g \in G \mid \langle u_1(G)(g), \ldots, u_n(G)(g)\rangle \in \beta'\}$

Application, Variables, Abstraction

- $[\![\boldsymbol{x}]\!]^{\omega} = \omega(\boldsymbol{x})$, for all variables of all types.
- $[\![\alpha(\beta)]\!]^{\omega} = [\![\alpha]\!]^{\omega}([\![\beta]\!]^{\omega})$
- $[\![(\lambda \boldsymbol{x}.\alpha)]\!]^{\omega} = (\lambda u.[\![\alpha]\!]^{\omega[\boldsymbol{x}/u]})$

(For further details and discussion surrounding the system, see Köpping 2018.)

Translations

- a(n) $\rightsquigarrow (\lambda \boldsymbol{Q_{et}}.(\lambda \boldsymbol{P_{et}}.(\exists x_n)[\boldsymbol{Q}x_n] \wedge \boldsymbol{P}x_n))$
- cat $\rightsquigarrow C$, with $[\![C]\!]^{\omega}(u) = \lambda G.\{g \in G \mid \langle u(G)(g)\rangle \in C'\}$
- slept $\rightsquigarrow S$, with $[\![S]\!]^{\omega}(u) = \lambda G.\{g \in G \mid \langle u(G)(g)\rangle \in S'\}$
- it $\rightsquigarrow x_n$
- purred $\rightsquigarrow P$, with $[\![P]\!]^{\omega}(u) = \lambda G.\{g \in G \mid \langle u(G)(g)\rangle \in P'\}$

A cat slept.

$\rightsquigarrow (\lambda \boldsymbol{Q_{et}}.(\lambda \boldsymbol{P_{et}}.(\exists x_1)[\boldsymbol{Q}x_1] \wedge \boldsymbol{P}x_1))\ (C)(S) \equiv (\exists x_1)[Cx_1] \wedge Sx_1$

It purred.

$\rightsquigarrow Px_1$

Further dynamic constants

Identity ($Con_{\boldsymbol{e(et)}}$)

- $[\![\overset{\boldsymbol{e}}{=}]\!]^{\omega}(u_1)(u_2) = \lambda G.\{g \in G \mid u_1(G)(g) = u_2(G)(g)\}$
- AND NOT:
  $[\![\overset{\boldsymbol{e}}{=}]\!]^{\omega}(u_1)(u_2) = \lambda G.\{g \in G \mid u_1 = u_2\}$

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Further identities:

- $[\![\overset{\boldsymbol{t}}{=}]\!]^{\omega}(u_1)(u_2) = \lambda G.\{g \in G \mid u_1(G) = u_2(G)\}$
- $[\![\overset{\boldsymbol{et}}{=}]\!]^{\omega}(P)(Q) = \lambda G.\{g \in G \mid P(u)(\{g\}) = Q(u)(\{g\})$, for all $u \in D_{\boldsymbol{e}}\}$
- $[\![\overset{\boldsymbol{tt}}{=}]\!]^{\omega}(\mathtt{f})(\mathtt{g}) = \lambda G.\{g \in G \mid \mathtt{f}(u)(\{g\}) = \mathtt{g}(u)(\{g\})$, for all $u \in D_{\boldsymbol{t}}\}$

Montague's abbreviations

- *Universal quantification*
  $(\bigwedge \boldsymbol{x_e})[\varphi] := (\lambda \boldsymbol{x}.\varphi) \overset{\boldsymbol{et}}{=} (\lambda \boldsymbol{x}.\boldsymbol{x} \overset{\boldsymbol{e}}{=} \boldsymbol{x})$
  $(\bigwedge \boldsymbol{x_t})[\varphi] := (\lambda \boldsymbol{x}.\varphi) \overset{\boldsymbol{tt}}{=} (\lambda \boldsymbol{x}.\boldsymbol{x} \overset{\boldsymbol{t}}{=} \boldsymbol{x})$
- *Negation*
  $\neg\varphi := (\varphi \overset{\boldsymbol{t}}{=} (\bigwedge \boldsymbol{p_t})[\boldsymbol{p}])$
- *Existential quantification*
  $(\bigvee \boldsymbol{x_e})[\varphi] := \neg(\bigwedge \boldsymbol{x})[\neg\varphi]$

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Semantic values

- $[\![\neg\varphi]\!]^{\omega} = \lambda G.\{g \in G \mid [\![\varphi]\!]^{\omega}(\{g\}) = \emptyset\}$
- $[\![(\bigvee \boldsymbol{x_e})[\varphi]]\!]^{\omega} = \lambda G.\{g \in G \mid [\![\varphi]\!]^{\omega[\boldsymbol{x}/u]}(\{g\}) \neq \emptyset$, for some $u \in D_{\mathbf{e}}\}$

Roadmap

The denotation of existential *man*

- $man \rightsquigarrow (\lambda \boldsymbol{P}_{et}.(\bigvee \boldsymbol{x_e})[H\boldsymbol{x} \wedge \boldsymbol{P}\boldsymbol{x}])$
- *Man hat geschlafen.* / 'MAN slept.' $\rightsquigarrow (\bigvee \boldsymbol{x_e})[H\boldsymbol{x} \wedge S\boldsymbol{x}]$,
- with $human \rightsquigarrow H$

- $[\![(\bigvee \boldsymbol{x_e})[H\boldsymbol{x} \wedge S\boldsymbol{x}])]\!]^{\omega}(G)$

$= \{g \in G \mid [\![H\boldsymbol{x} \wedge S\boldsymbol{x}]\!]^{\omega[\boldsymbol{x}/u]}(\{g\})$, for some $u \in D_{\mathbf{e}}\}$

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G	x_1	x_2	...
g_1	#	#	...

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$=$ G, if there is a u; $\emptyset$, otherwise.

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$=$ G, if there is a u; $\emptyset$, otherwise.

G	x_1	x_2	...
g_1	#	#	...

$[\![Px_n]\!](G)$

undefined! for any n

(antecedentless pronoun)

The properties of existential *man*

- The proposal automatically captures the antecedent behavior of *man*:
  - can occur discourse initially
  - no viable antecedent for 3rd person singular pronouns
- It also captures that *man* cannot be anaphoric to definite or indefinite DPs.

$$[\![(\bigvee \boldsymbol{x_e})[H\boldsymbol{x} \wedge S\boldsymbol{x}]]\!]^{\omega}(G) = \{g \in G \mid [\![H\boldsymbol{x} \wedge S\boldsymbol{x}]\!]^{\omega[x/u]}(\{g\}), \text{ for some } u\}$$

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doesn't (re)use a dref

doesn't introduce a dref

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doesn't (re)use a dref

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Further evidence: *man* cannot be bound

- Current proposal: existential *man* is a special type of quantifying expression
- Prediction: *man* cannot be bound by individual quantifiers

(13) #Jeder$_i$ hat mir gesagt, dass man$_i$ mein Rad umgeworfen hat.
(*intended:* 'Everyone$_i$ told me that they$_i$ knocked over my bike.')

$\Rightarrow$ prediction is borne out

The properties of existential *man*

- Number neutral semantics

Not implemented but can be captured:

Wider Domain

${}^*D_{\boldsymbol{e}} :=$ The set of functions from files into functions from embeddings into singular or plural individuals.

- $[\![(\bigvee \boldsymbol{x_e})[{}^*H\boldsymbol{x} \wedge {}^*S\boldsymbol{x}]]\!]^{\omega}(G)$

(e.g. Link 1991, a.o.)

The properties of existential *man*

- Obligatory low scope

Not accounted for (but there are ways . . .). But note:

(14) a. Man hat eine Katze gefunden.
'MAN found a cat.'

b. Sie war gefleckt.
'It was dappled.'

- $(\bigvee \boldsymbol{x_e})[H\boldsymbol{x} \wedge (\exists x_1)[Cx_1] \wedge Fx_1\boldsymbol{x}]$

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- $(\exists x_1)[Cx_1] \wedge (\bigvee \boldsymbol{x_e})[H\boldsymbol{x} \wedge Fx_1\boldsymbol{x}]$
- Obligatory low scope even in truth conditionally equivalent environments!

Potential problems

Four contexts in which existential *man* seemingly takes part in an anaphoric relation:

1. C1: combinations with reflexives
2. C2: combinations with another occurrence of *man*
3. C3: combinations with a 3rd pl pronoun
4. C4: combinations with particular definite DPs

We argue: these are not counterexamples to the claim that existential *man* is discourse inert

C1: combinations with reflexives – I

- Existential *man* can serve as an antecedent for reflexive *sich*:

(15) Man$_i$ hat sich$_i$ hier gewaschen.
'MAN washed himself here.'

(16) Man$_i$ hat sich$_i$ gegenseitig gedeckt.
'MAN covered for each other.'

- We argue: (see Quine 1960)
  - anaphoric relationships with reflexives do not involve discourse referents
  - The reflexive pronoun *sich* identifies two arguments of the verb:

(17) $\lambda \boldsymbol{R}_{e(et)}.\lambda \boldsymbol{x}_e.\boldsymbol{Rxx}$ 'Reflexivizer'

C1: combinations with reflexives – II

Example:

(18) a. *kick* $\rightsquigarrow K$
b. $[\![K]\!](u_1)(u_2)(G) = \{g \in G \mid \langle u_1(G)(g), u_2(G)(g)\rangle \in K'\}$

(19) a. *kick him-/herself* $\rightsquigarrow [\lambda \boldsymbol{R_{e(et)}}.\lambda \boldsymbol{x_e}.\boldsymbol{Rxx}](K)$
b. $\lambda \boldsymbol{x_e}.K\boldsymbol{xx}$

(20) Man$_i$ hat sich$_i$ getreten. $(\bigvee \boldsymbol{x_e})[H\boldsymbol{x} \wedge K\boldsymbol{xx}]$
'MAN kicked himself.'

(21) Ein Mann$_i$ hat sich$_i$ getreten. $(\exists x_n)[Mx_n] \wedge Kx_nx_n$
'A man kicked himself.'

C2: combinations with existential *man* – I

- Existential *man* can be apparently anaphoric to itself...

(22) Man hat mir mein Rad gestohlen.
Man hat das Schloss aufgebrochen.
'MAN stole my bike. MAN pried open the lock.'

C2: combinations with existential *man* – I

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(22) Man hat mir mein Rad gestohlen.
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- ...but only if the containing sentences stand in the discourse relation *Specification*; not, e.g., with *Narration*:

(23) Man hat mir mein Rad gestohlen.
Und meinem Nachbarn hat man das Auto zerkratzt.
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- We conclude: No 'true' anaphoricity. The identity of the subject is inferred.

C2: combinations with existential *man* – II

Supporting evidence: no general availability of donkey uses with existential *man*

(24) Jeden Esel, den ein Bauer$_i$ gekauft hat, hat er$_i$ später gestriegelt.
($\approx$ 'Every farmer$_i$ later groomed every donkey that he$_i$ bought.')

(25) #Jeden Esel, den man$_i$ gekauft hat, hat man$_i$ später gestriegelt.
(*intended:* 'Everyone$_i$ later groomed every donkey that he$_i$ bought.')

$\Rightarrow$ apparent link is only available if the discourse configurations strongly suggest that the agents are identical

C3: combinations with 3rd pl pronouns

- Existential *man* can serve as an apparent antecedent to 3rd pl personal pronouns and demonstrative pronouns.

(26) Man hat mir mein Rad gestohlen.
{Sie / die} haben das Schloss aufgebrochen.
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- We again conclude: No 'true' anaphoricity.

C4: combinations with certain definite DPs

- Existential *man* can serve as an apparent antecedent to certain plural DPs:

(28) Man$_i$ hat mir mein Rad gestohlen. ('MAN stole my bike.')

a. Der Täter$_i$ hat das Schloss aufgebrochen.

b. Die Täter$_i$ haben das Schloss aufgebrochen.
'The culprit(s) pried open the lock.'

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b. Die Täter$_i$ haben das Schloss aufgebrochen.
'The culprit(s) pried open the lock.'

- But: availability depends on the nominal material in the DP

(29) Man$_i$ hat meinen Hund gefunden. ('*Man* found my dog.')

a. #Der Täter$_i$ hat ihn heute vorbeigebracht.
b. Der Finder$_i$ hat ihn heute vorbeigebracht.
'{#The culprit / the finder} brought it by today.'

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Summary and conclusion

- Properties of existential *man*:
  - pronominal expression confined to subject position
  - contributes existential quantification
  - obligatory low scope
  - singular morphosyntax but number neutral semantics
  - discourse inert: can occur discourse initially, cannot be bound, cannot be anaphoric, cannot antecede 3rd person pronouns
- Dynamic semantics in a type logical framework:
  - two modes of binding: ‘dynamic’ via discourse referents and ‘static’ via (boldface) variables
  - dynamic quantifier for (in)definite descriptions, static quantifier for existential *man*
  - discourse referents model anaphoric 3rd person pronouns, reflexivizers model reflexives.

Man dankt.

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References

Cabredo Hofherr, Patricia. 2010. Binding properties of impersonal human pronouns in generic and episodic contexts. Handout *Workshop on impersonal pronouns*, May 28.

Cabredo Hofherr, Patricia. 2015. Les pronoms impersonnels humains – Syntaxe, sémantique, morphologie. Habilitation Thesis: Université Paris 8.

Dekker, Paul. 1996. The values of variables in dynamic semantics. *Linguistics and Philosophy* 19: 211–257.

Groenendijk, Jeroen & Martin Stokhof. 1991. Dynamic predicate logic. *Linguistics and Philosophy* 14: 39–100.

Heim, Irene. 1982. The Semantics of Definite and Indefinite Noun Phrases in English. Amherst, Mass.: PhD Dissertation.

Koenig & Mauner. 1999. A-definites and the Discourse Status of Implicit Arguments. *Journal of Semantics* 16: 207–236.

References (cont'd)

Köpping, Jan. 2018. *The individual parameter* (Doctoral dissertation, Universität Frankfurt).

Link, Godehard. 1991. Plural. In: Arnim von Stechow, & Dieter Wunderlich, (eds.) *Semantik/Semantics*, Berlin: de Gruyter, 418–440.

Malamud, Sophia A. 2012. Impersonal indexicals: one, you, man, and du. *Journal of Comparative Germanic Linguistics* (Online First): 1–48.

Montague, Richard. 1970. Universal Grammar. *Theoria* 36: 373–398.

Quine, W. V. O. 1960. Variables explained away. *Proceedings of the American Philosophical Society* 104: 343–347

Zifonun, Gisela. 2000. "Man lebt nur einmal." Morphosyntax und Semantik des Pronomens *man*. *Deutsche Sprache* 3/00: 232–253.

References (cont'd)

Zobel, Sarah. 2017. On the (in)definiteness of impersonal pronouns. *Linguistica* 56: 363–374.

Parallel data for implicit agents – I

- contribute existential quantification

  (30) Mir wurde mein Rad gestohlen.
  ‘My bike was stolen.’ (≈ My bike was stolen by someone.)

- can occur discourse-initially

  (31) You’ll never guess what happened! Mir wurde mein Rad gestohlen!

- cannot be anaphoric to definite or indefinite NPs

  (32) {A man$_i$ / my neighbor$_i$} was arrested.
  #Mir wurde IA$_i$ mein Rad gestohlen.

- obligatory lowest scope

  (33) Mir wurden genau drei Räder gestohlen.
  ‘Three bikes were stolen from me.’ ($3 < \exists$)

Parallel data for implicit agents – II

- number neutral

  (34) Die Universität wurde umzingelt.
  ‘The university was surrounded.’

- cannot be an antecedent for arbitrary definite NPs and singular personal pronouns

  (35) Mir wurde IA$_i$ mein Rad gestohlen.
  #{Der Mann$_i$ / er$_i$} hat das Schloss aufgebrochen.
  ‘My bike was stolen. {A man / he } pried open the lock.’

- cannot be an antecedent for possessive pronouns

  (36) #Hier wurde IA$_i$ sein$_i$ Rad abgestellt.
  ‘His bike was parked here.’

Parallel data for implicit agents – III

- C1: combination with reflexives

(37) Es wurde sich getreten.
(≈ 'Someone kicked himself.')

- C2: combinations with other IA

(38) Mir wurde IA mein Rad gestohlen. ('My bike was stolen.')
a. Das Schloss wurde IA aufgebrochen.
'The lock was pried open.'
b. Und meinem Nachbarn wurde IA das Auto zerkratzt.
'And my neighbor's car was scratched.'

- C2: no donkey use

(39) #Jeder Esel, der IA_i gekauft wurde, wurde IA_i später gestriegelt.
'Every donkey that was bought was groomed later.'

Parallel data for implicit agents – IV

- C3: combination with 3rd plural pronouns

(40) Mir wurde IA mein Rad gestohlen. ('My bike was stolen.')
a. {Sie / die} haben das Schloss aufgebrochen.
'They pried open the lock.'
b. Und meinem Nachbarn haben {sie/die} das Auto zerkratzt.
'And they scratched my neighbor's car.'

- C4: combinations with certain definite DPs

(41) Mir wurde ia_i mein Rad gestohlen.
Der Täter$_i$ hat das Schloss aufgebrochen.
'My bike was stolen. The culprit pried open the lock.'

(42) Mein Hund wurde ia_i gefunden.
#Der Täter$_i$ hat ihn heute vorbeigebracht.
'My dog was found. #The culprit brought it by today.'