Semantic change without semantic reanalysis

Gunnar Lund

We often think of semantic change as change in lexical meaning, but change in the form of lexical items can change the inferences they give rise to, and therefore its interpretation.

Conventionalization of inference

Inferences that frequently co-occur with a particular exponent become conventionalized.

Context dependent inference > Generalized inference > Semanticization

(Traugott & Dasher 2002)

Be going to (Eckardt 2006)

Horatio is going to visit a friend.

Implicates: It is imminent that Horatio visits a friend.

Something something implicatures

Shifting strategies

Deo 2015, Ahern and Clark 2017: Semantic change modeled as shifting speaker and hearer strategies. This process is driven by communicative success.

Grammaticalization is both functional and formal

Clines

content item > **grammatical item** > **clitic** > **inflectional affix** > (**zero**)

(Hopper & Traugott 2003)

Which came first?

The chicken: formal change is driven by functional change.

The egg: functional change is driven by formal change.

Maxim of Manner

1. Avoid obscurity of expression.
2. Avoid ambiguity.
3. Be brief (avoid unnecessary prolixity).
4. Be orderly.

Division of pragmatic labor (Horn 1984)

The Q Principle:

> Make your contribution sufficient!
> Say as much as you can (given R)!

The R Principle:

> Make your contribution necessary!
> Say no more than you must (given Q)!

Can changes in form drive semantic change?

Yes!

Two preliminary case studies:

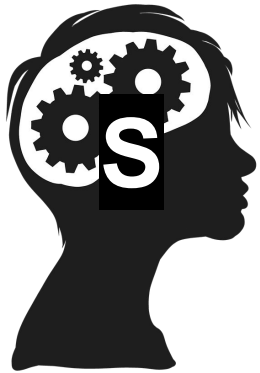
1. Progressive-to-imperfective shift
2. Negative cycle

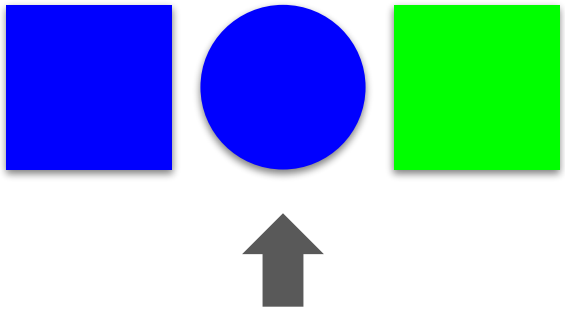
Rational Speech Act (RSA) model

Recursive reasoning between speakers and listeners

(Frank & Goodman 2012; Goodman & Frank 2016)

Rational Speech Act model

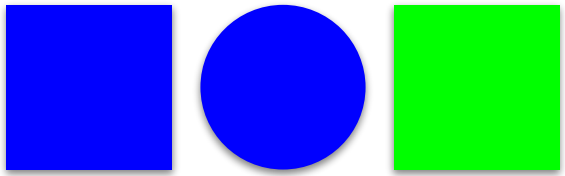




“blue” “circle”

Frank & Goodman 2012

Rational Speech Act model



? ? ?

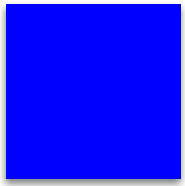
“blue”

Frank & Goodman 2012

Literal semantics

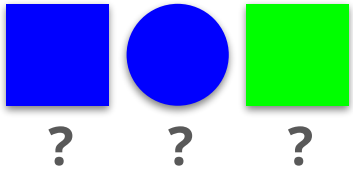
$$[[u]](s)$$

Literal semantics

[[*blue*]]() = true

Literal listener

$$P_{L0}(s \mid u) \propto [[u]](s) \cdot P(s)$$

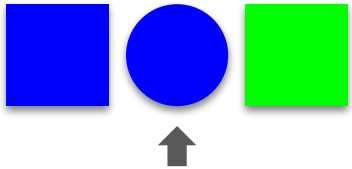


"blue"

Pragmatic speaker

$$P_{S1}(u \mid s) \propto exp(\boldsymbol{\alpha} \cdot [\log(L_0(s \mid u)) - C(u)])$$

$$P_{L0}(s \mid u) \propto [[u]](s) \cdot P(s)$$



"blue" "circle"

Pragmatic listener

$$P_{L1}(s \mid u) \propto P_{S1}(u \mid s) \cdot P(s)$$

$$P_{S1}(u \mid s) \propto exp(\boldsymbol{\alpha} \cdot [\log(L_0(s \mid u)) - C(u)])$$

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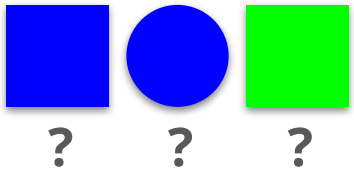


"blue"

The vanilla RSA model

$$P_{L1}(s \mid u) \propto P_{S1}(u \mid s) \cdot P(s)$$

$$P_{S1}(u \mid s) \propto exp(\boldsymbol{\alpha} \cdot [\log(L_0(s \mid u)) - C(u)])$$

$$P_{L0}(s \mid u) \propto [[u]](s) \cdot P(s)$$

First, progressive-to-imperfective shift.

Joint work with Rebecca Jarvis and Gregory Scontras. (See Lund, Jarvis, and Scontras 2019 for details)

Progressive-to-imperfective shift

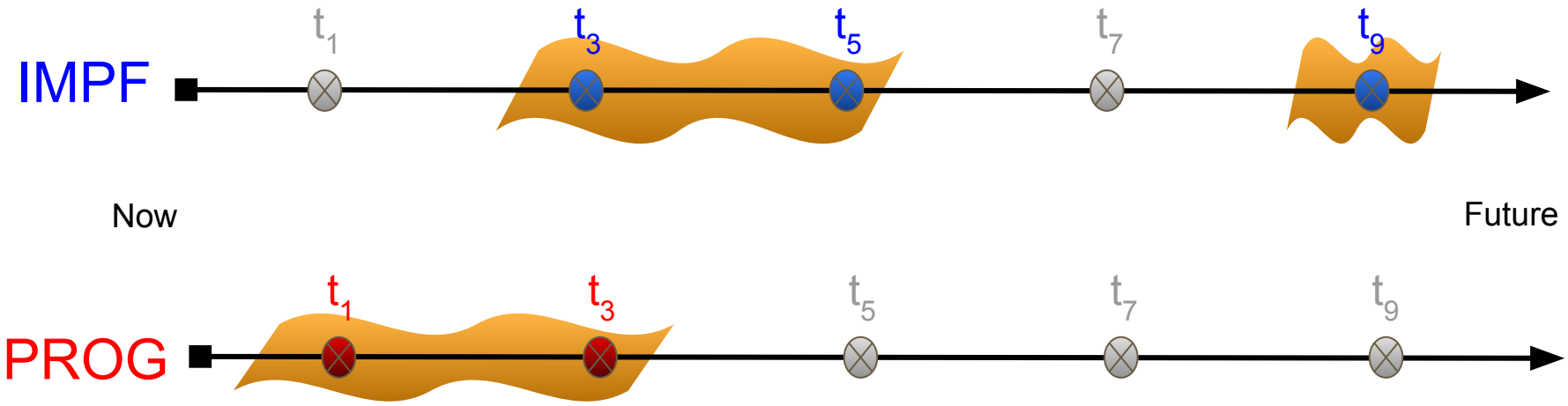
Progressive exponents originate to describe events-in-progress while imperfective exponents may describe both events-in-progress and characterizing scenarios.

Over time, imperfective exponents lose their ability to describe events-in-progress, while progressive exponents gain the ability to describe characterizing scenarios.

Eventually, the progressive replaces the old imperfective as a new imperfective.

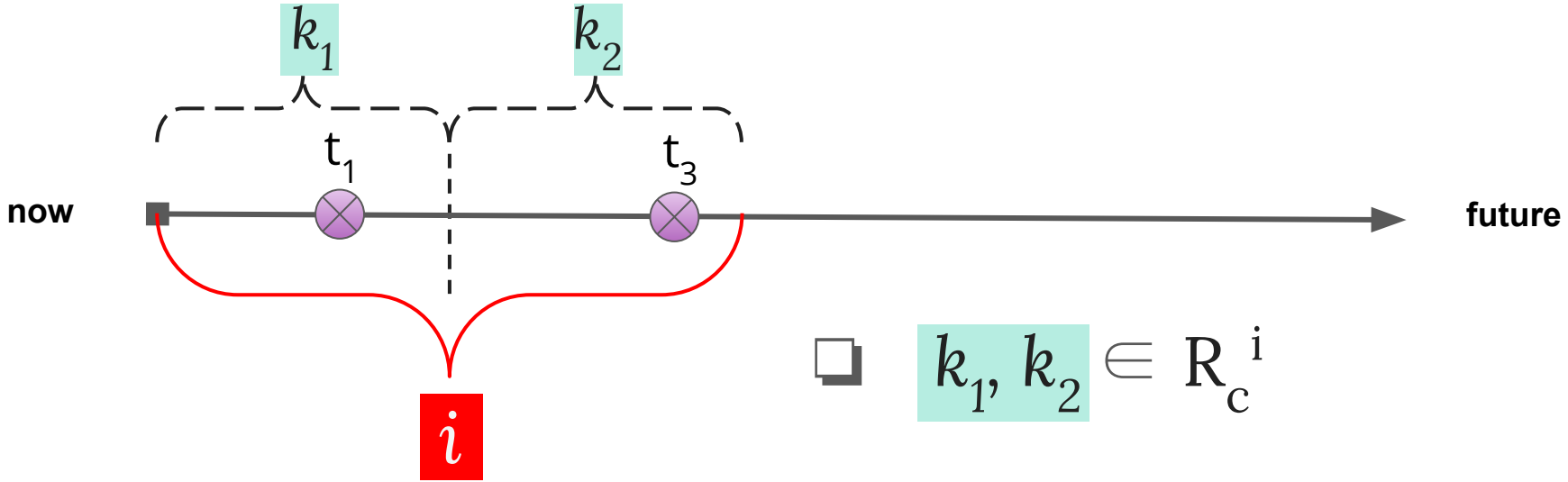
Literal semantics (Deo 2009, 2015)

Both the imperfective and progressive check whether a predicate holds regularly over an interval of time.



Literal semantics (Deo 2009, 2015)

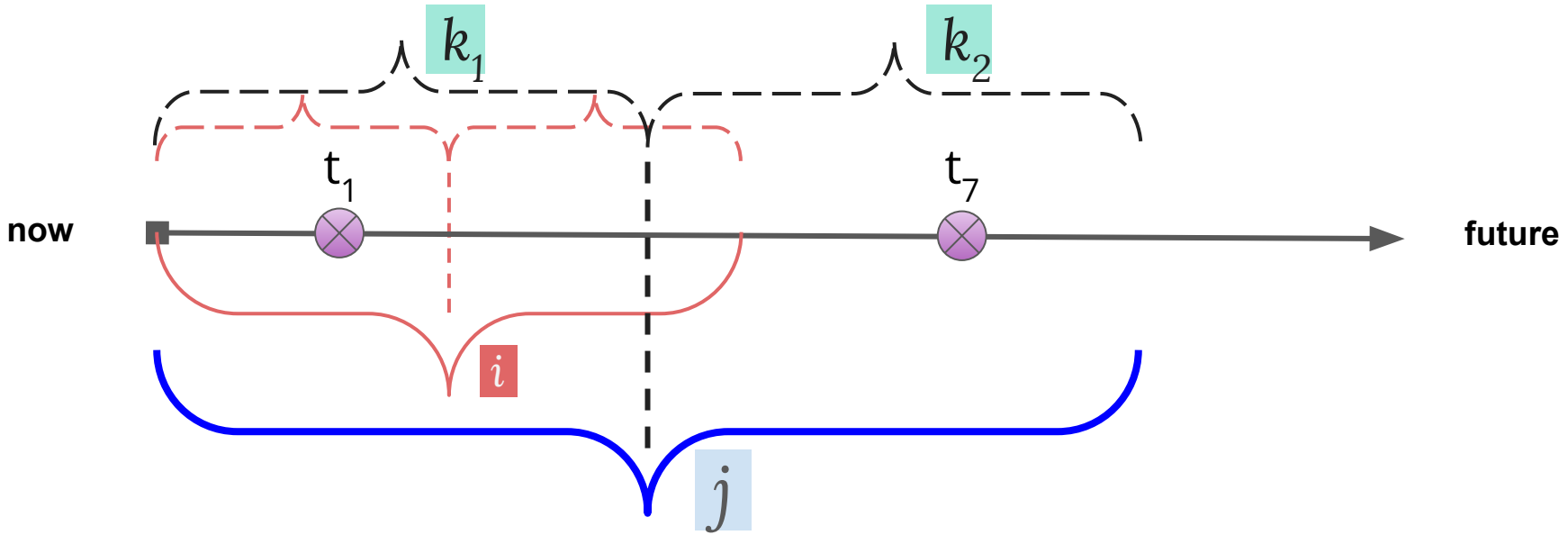
$$[\![\text{PROG}]\!](P)(i)(w) = \forall k\,[k \in R_c^{\,i} \rightarrow \text{COIN}(P, k, w)]$$



- $k_1, k_2 \in R_c^{\,i}$

Semantics (Deo 2009, 2015)

$$[\![\text{IMPF}]\!](P)(i)(w) = \exists j\, [i \subseteq_{ini} j \wedge \forall k\, [k \in R_c^j \rightarrow \text{COIN}(P, k, w)]]$$



Rational Speech Act model

our model of PROG-to-IMPF shift

parameterized meaning function

$$[[\text{PROG}]]^{I_{ref}, I_{sup}} = \lambda s.\ \forall k[k \in R_c^{I_{ref}} \rightarrow \text{COIN}(P,k,s)]$$

$$[[\text{IMPF}]]^{I_{ref}, I_{sup}} = \lambda s.\ \forall k[k \in R_c^{I_{sup}} \rightarrow \text{COIN}(P,k,s)]$$

$$[[\text{NULL}]]^{I_{ref}, I_{sup}} = \lambda s.\ \texttt{true}$$

$$I_{ref} \subseteq_{\text{ini}} I_{sup}$$

Form and Meaning

Turkish progressive:

yorı- ‘to walk’		yorı-		-Iyor
content Item	>	grammatical Item	>	suffix

Erdal 2004; Lewis 1967

Form and Meaning

is eating		**eats**	
periphrastic		bound	
progressive (18/19)	95%	**imperfective (7/7)**	100%
perfect (16/18)	88%	past (33/45) perfective (17/20)	73% 85%
future (27/50)	54%	future (23/50)	46%

Dahl 1985

Vanilla RSA

$$P_{L1}(s \mid u) \propto P_{S1}(u \mid s) \cdot P(s)$$

$$P_{S1}(u \mid s) \propto exp(\boldsymbol{\alpha} \cdot [\log(L_0(s \mid u)) - C(u)])$$

$$P_{L0}(s \mid u) \propto [[u]](s) \cdot P(s)$$

Our model

$$P_{L1}(s, \mathbf{I}_{ref}, \mathbf{I}_{sup} \mid u) \propto P_{S1}(u \mid s, \mathbf{I}_{ref}, \mathbf{I}_{sup}) \cdot P(s) \cdot P(\mathbf{I}_{ref}) \cdot P(\mathbf{I}_{sup} \mid \mathbf{I}_{ref})$$

$$P_{S1}(u \mid s, \mathbf{I}_{ref}, \mathbf{I}_{sup}) \propto exp(\boldsymbol{\alpha} \cdot [\log(L_0(s \mid u, \mathbf{I}_{ref}, \mathbf{I}_{sup})) - C(u)])$$

$$P_{L0}(s \mid u, \mathbf{I}_{ref}, \mathbf{I}_{sup}) \propto [[u]]^{\mathbf{I}_{ref}, \mathbf{I}_{sup}}(s) \cdot P(s)$$

Rational Speech Act model

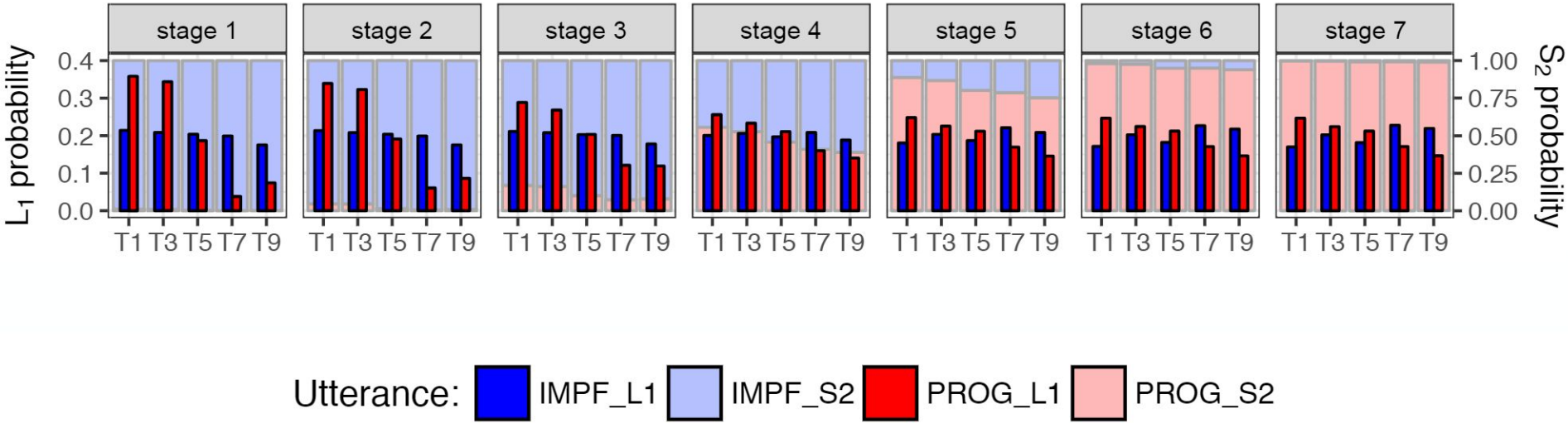
$$P_{S2}(u \mid s) \propto exp(\boldsymbol{\alpha} \cdot [log(\sum_{I_{ref}, I_{sup}} P_{L1}(s, \boldsymbol{I}_{ref}, \boldsymbol{I}_{sup} \mid u)) - C(u)])$$

$$P_{L1}(s, \boldsymbol{I}_{ref}, \boldsymbol{I}_{sup} \mid u) \propto P_{S1}(u \mid s, \boldsymbol{I}_{ref}, \boldsymbol{I}_{sup}) \cdot P(s) \cdot P(\boldsymbol{I}_{ref}) \cdot P(\boldsymbol{I}_{sup} \mid \boldsymbol{I}_{ref})$$

$$P_{S1}(u \mid s, \boldsymbol{I}_{ref}, \boldsymbol{I}_{sup}) \propto exp(\boldsymbol{\alpha} \cdot [\log(L_0(s \mid u, \boldsymbol{I}_{ref}, \boldsymbol{I}_{sup})) - C(u)])$$

$$P_{L0}(s \mid u, \boldsymbol{I}_{ref}, \boldsymbol{I}_{sup}) \propto [[u]]^{\boldsymbol{I}ref, \boldsymbol{I}sup}(s) \cdot P(s)$$

Results


stage 1
stage 2
stage 3
stage 4
stage 5
stage 6
stage 7
L1 probability
S2 probability
0.0
0.1
0.2
0.3
0.4
0.00
0.25
0.50
0.75
1.00
T1 T3 T5 T7 T9
Utterance:
IMPF_L1
IMPF_S2
PROG_L1
PROG_S2

Changing utterance costs can drive meaning change!

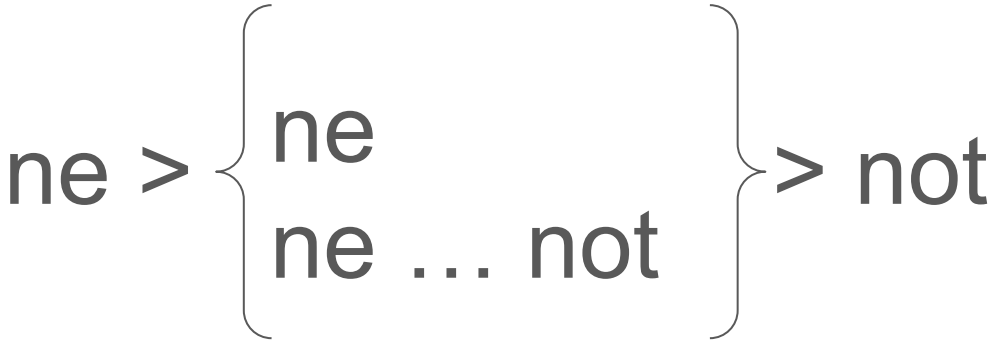
Next, the negative cycle

The negative cycle

A language with one form of negation develops a second form of negation via an additional element (e.g. an indefinite) signaling emphatic negation.

Eventually the first form is replaced by the second form.

The negative cycle



English

we **ne** mugen þat don
we **NEG** can that do
‘We cannot do that’

(CMTRINIT,103.1369)

1225

I **ne** may **nat** denye it
I **NEG** may **not** deny it
‘I may not deny it’

(CMBOETH,435.C1.262)

1380

I know **nat** the cause
I know **not** the cause
‘I do not know the cause’

(CMMALORY,627.3550)

1470

(Wallage 2008)

Greek

	οὔ. . . τι	οὔ-δε. . . εν
	(οὐ)δέν. . . τι	δέν. . . τίποτε
	δέν. . . τίποτε	δέν. . . πρᾶμα
	δέν. . . πρᾶμα	δεν. . . ἀπαντοχή

Two facets

Ahern and Clark (2017) distinguish the functional and formal cycles.

Functionally, the innovated marker, initially expressing emphatic negation, becomes plain.

Formally, the innovated marker consists of the original plain negation plus a second element. It then streamlines, losing the original element.

Ahern and Clark 2017

Speakers choose utterances based on an observation, which serves as a standard of evidence, and a strategy, where higher standards of evidence map to the emphatic form.

Hearers choose an action based on a message, which corresponds to time and attention paid to the speaker.

Crucial to their model is that the messages are **costless**.

Emphatic negation as M-Implicature

A tension between Q and R principles!

“As with all such dialectic processes, the new synthesis is never a resting place, but only the first step in a new cycle.” (Horn 1989: 457)

Emphatic negation as M-Implicature

“[T]he conflation of the formal and functional cycles understandably stems from the fact that the functional cycle often coincides with the first transition of the formal cycle. Intuitively, *ne. . . not* is a more complex form than *ne*, and thus we would expect it have a more restricted and hence stronger meaning.

...

Note that this does not apply to the second transition of the formal cycle given that the same relationship between *not* and *ne. . . not* does not hold.”

(Ahern and Clark 2017: 6-7)

At the same time...

Ahern and Clark point out that *ne* occurs more frequently than *ne...not* after 1350, right as *not* overtakes both in frequency...

Lexical Uncertainty

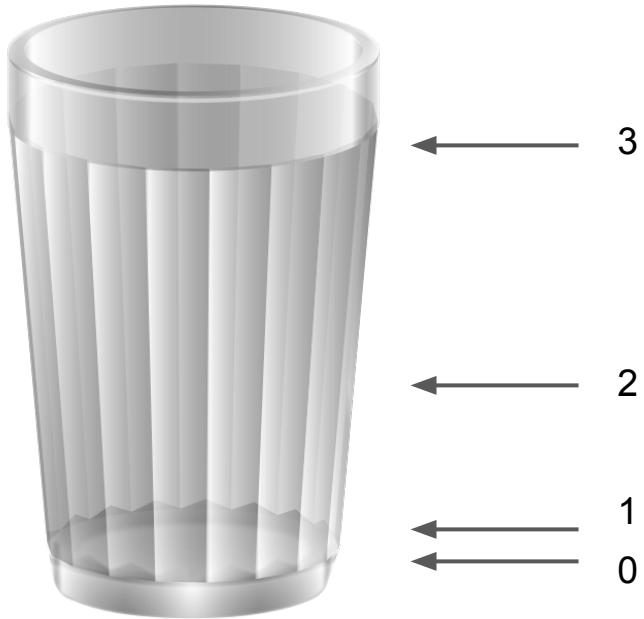
Speakers and listeners reason about the **speaker's lexicon**.

(Bergen et al. 2016, Scontras et al. 2018)

Prelude to a model - world states

We can think of model world as one about water in a glass.

S = {0, 1, 2, 3}



Prelude to a model - speaker knowledge

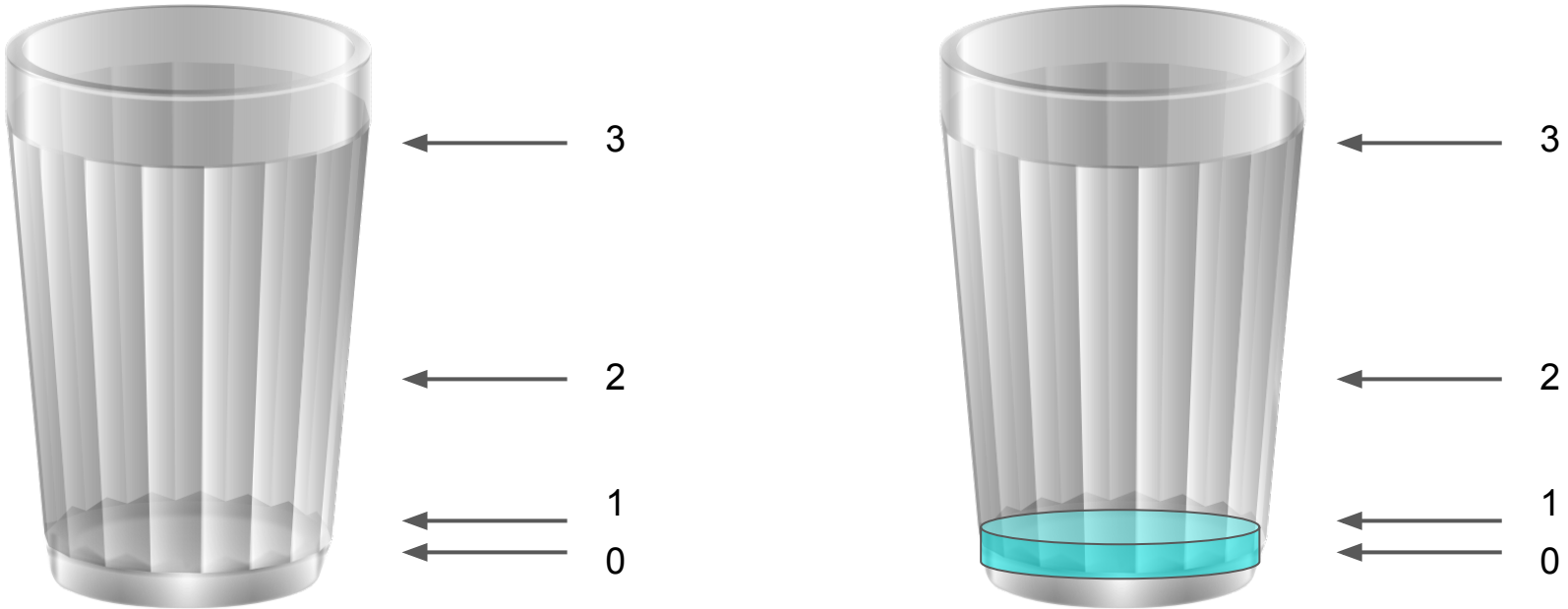
Speakers may have inexact information; pragmatic listeners reason about the speaker's belief state.

Belief states = {[0], [1], [2], [3], [0, 1], [1, 2], [2, 3], [0,1,2], [1,2,3], [0,1,2,3]}

Knowledge levels = {0, 1, 2, 3}

$P(b \mid k) \propto \exp(-k \cdot |b|)$

“John didn’t drink water”



The lexica

$$L_1 = \left\{ \begin{array}{l} [[\text{emph no}]] = \{0\} \\ [[\text{no}]] = \{1, 0\} \end{array} \right\}$$

$$L_3 = \left\{ \begin{array}{l} [[\text{emph no}]] = \{1, 0\} \\ [[\text{no}]] = \{1, 0\} \end{array} \right\}$$

$$L_2 = \left\{ \begin{array}{l} [[\text{emph no}]] = \{0\} \\ [[\text{no}]] = \{0\} \end{array} \right\}$$

Vanilla Rational Speech Act model

$$P_{L1}(s|u) \propto P_{S1}(u|s) \cdot P(s)$$

$$P_{S1}(u|s) \propto exp(\alpha \cdot [\log(L_0(s|u)) - C(u)])$$

$$P_{L0}(s|u) \propto [[u]](s) \cdot P(s)$$

Negation Rational Speech Act model

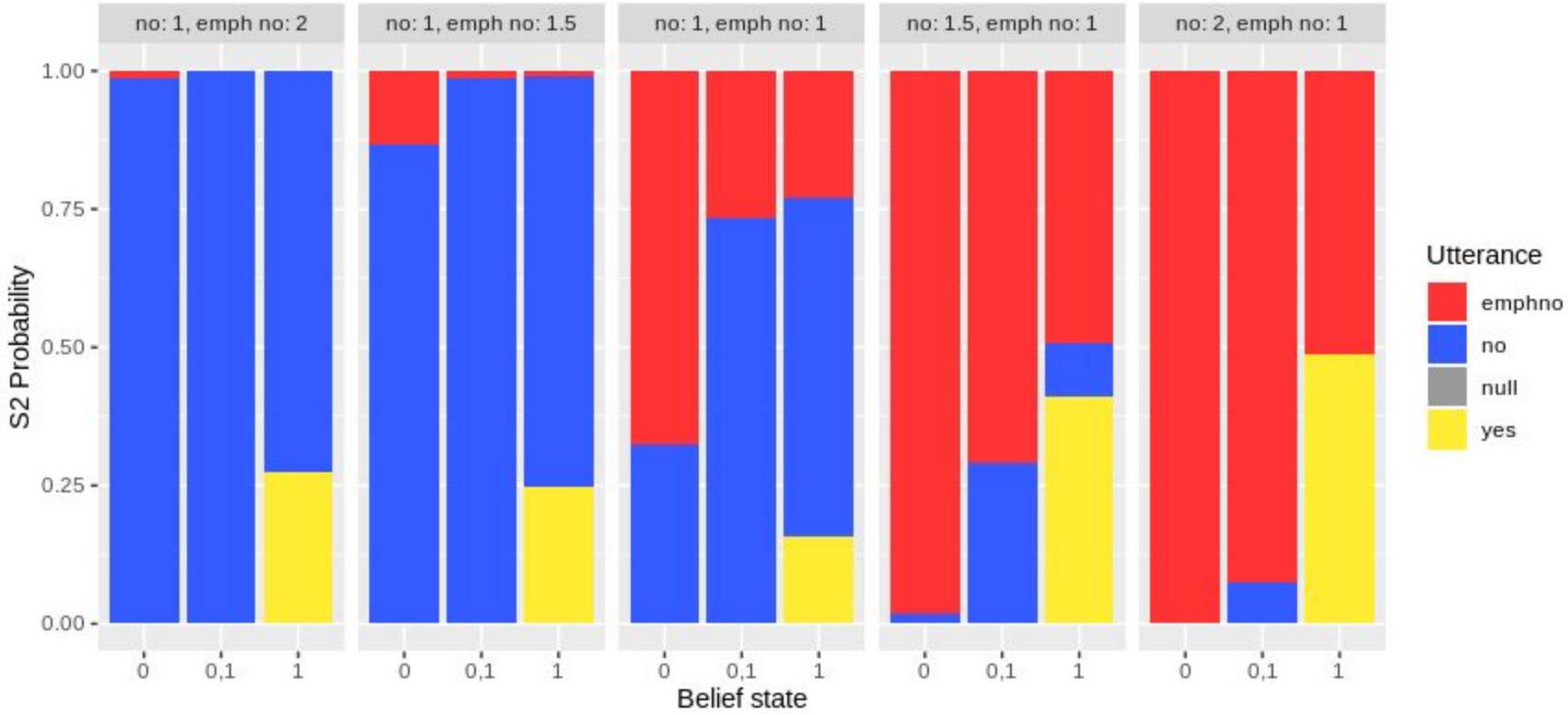
$$P_{S2}(u \mid b) \propto exp(\alpha \cdot [\log(\textstyle\sum_b L_1(b \mid u)) - C(u)])$$

$$P_{L1}(b \mid u) \propto P_{S1}(u \mid b, l) \cdot P(l, k) \cdot P(b \mid k)$$

$$P_{S1}(u \mid b, l) \propto exp(\alpha \cdot [\log(\tfrac{1}{|b|} \textstyle\sum_{w' \in b} L_0(w' \mid u)) - C(u)])$$

$$P_{L0}(s \mid u, l) \propto I(u,s) \cdot P(s)$$

Results


no: 1, emph no: 2
no: 1, emph no: 1.5
no: 1, emph no: 1
no: 1.5, emph no: 1
no: 2, emph no: 1
1.00
0.75
0.50
0.25
0.00
S2 Probability
0
0,1
1
Belief state
Utterance
emphno
no
null
yes

Discussion

- What factors determine utterance cost, and how should they be modeled?
- We need an evolutionary model of changing costs.
- Should we meet in the middle, and if so, in what way?

Thank you!