Harris: Semantics without semantic content

*Presented by Chris Barker, slides version of April*21, 2021

Harris, Daniel. 2020. Semantics without semantic content. *Mind and Language*; 1-25. https://doi.org/10.1111/mila.12290

- "A sentence's semantic value is not its content but a partial and defeasible constraint on what it can be used to say."
- So let general cognition worry about identifying content, let alone update.
- Semantics can still be internally dynamic, but not externally dynamic

Plan

- Harris 2020
- Frank and Goodman 2012, if time permits

New draft from Craige:

Roberts, Craige. 2021. Imperatives in a dynamic pragmatics. Ms. [on the repo]

- "This account is essentially pragmatic in that a central aspect of the meaning of an imperative utterance—its apparent deontic force—is not given by its compositional, syntactico-semantic content, but instead arises from the interaction between that content and the pragmatics of the canonical use of imperative clauses.
- The semantics of imperatives, like that of other linguistic constituents, is static, with the usual truth conditional, compositional derivations.
- The dynamics, the way that content serves as an update on context, lies entirely in the pragmatics of use of the conventional content."

The connection on Harris 2020 with this seminar

- Standard view:
  - The content—truth conditions, reference—of expressions depend on context
  - Evaluating certain expressions affects the context against which future expressions get evaluated
  1. **Anaphora**: Evaluating an indefinite guarantees the presence of a discourse referent that will be available (within certain systematic limits) for anaphoric reference
  2. **Presupposition projection**: evaluating a left conjunct constrains the local context against which the presuppositions triggered in the right conjunct will be evaluated
  3. **Epistemic modality**: evaluating a left conjunct constrains the epistemic accessibility relation against which epistemic modals in the right conjunct will be evaluated
- But this all assumes that DPs refer and that Ss denote props
- What if the semantics of DPs merely **constrain** reference?
- What if the semantics of Ss merely **constrains** the proposition conveyed by an utterance?
- Then we must reconsider the motivation for putting dynamics in the semantics

Content semantics vs. constraint semantics

Content semantics (OG semantics):

- an expression's semantic value is its content
- that content can vary dpending on non-linguistic context

$[\![\text{Ann}]\!]^{w,g,c} = \text{Ann}$

$[\![\text{smokes}]\!]^{w,g,c} = \lambda x_e \,.\, x \text{ smokes at } w$

FUNCTIONAL APPLICATION

If α is a branching node and $\{\beta, \gamma\}$ the set of its daughters, then, for any world w, assignment g, and context c, α is in the domain of $[\![\cdot]\!]^{w,g,c}$ if both β and γ are and $[\![\beta]\!]^{w,g,c}$ is a function whose domain contains $[\![\gamma]\!]^{w,g,c}$. In this case, $[\![\alpha]\!]^{w,g,c} = [\![\beta]\!]^{w,g,c}([\![\gamma]\!]^{w,g,c})$.

* "The assignment parameter g and context parameter c come into play because many natural language expressions are semantically underspecified."

- . . . and contextual parameters take up the slack

What about anaphora? (Still exploring content semantics)

- “deictic pronouns, such as the occurrence of “he” in (8), are standardly taken to be sensitive to the assignment parameter."
- Perhaps? “context-sensitive expressions’ semantic values are fixed by speakers’ intentions.”
- "Why divide off a category of expressions that are indirectly sensitive to context by being sensitive to assignments? The reason is that pronouns can also have bound occurrences.

13. [Every doctor]$_1$ denies that he$_1$ smokes.

- [similarly, perhaps the most compelling argument in favor of dynamic semantics comes from donkey binding]

Constraint semantics

- "Constraint semantics, as I understand it, is the view that an expression's semantic value is not its context-relative content but something context-neutral and therefore less informative."
- "Roughly, the semantic value of an expression ϕ is just what a competent speaker can know about what someone would be saying in uttering ϕ, assuming they were speaking literally, but without any knowledge about the context or the speaker's intentions."
- "For example, the semantic value of "he" tells a hearer that the speaker is referring to a male (if they are speaking literally), but not which male."
- "If a view like this is correct, there may be no need for compositional semantics to traffic in a theoretical notion of context at all."
- "constraint semantics, as I conceive it, does not give up the idea that propositions are the things we assert, say, or mean."

Other similar views

- Pietroski: the meanings of declarative sentence "constrain without determining truth/reference/satisfaction conditions".
- Bach: "propositional radicals" ["Ann is ready." Ready for what?]
- Neale: a sentence's semantic value should be thought of as "a blueprint for (a template, a schematic or skeletal representation of) what someone will be taken to be saying when using [the sentence] to say something"
- Schiffer, García-Carpintero, ...
- What's still needed: a compositional method for constructing constraints of complex expressions [exception: Pietroski]

Modularity

- To what extent is taking on modularity a requirement for Harris' main conclusions?
  - If language is modular in the way that Harris claims, it follows that semantics computes constraints rather than contents
  - But we can adopt a constraint view without taking on modularity
- "the operations and the database of the semantic module are *centrally inaccessible*."
- I.e., "Language users are not aware of the intermediate steps of semantic composition or of the contents of the database on which it draws."

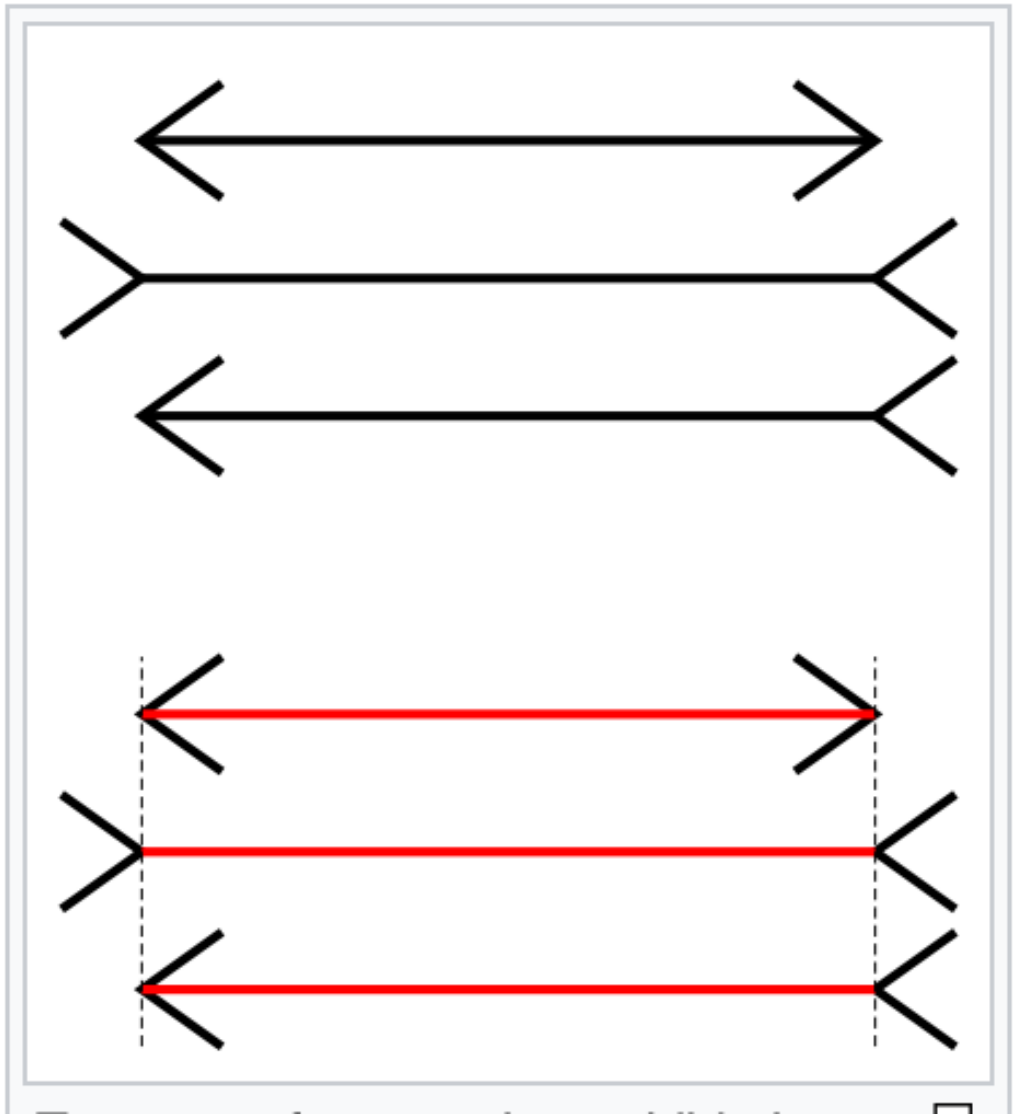
The opacity of semantic composition

- How does the semantics deal with generalized quantifiers in object position?
  - Quantifier Raising (May)
  - in-situ type shifting (Hendriks)
- What kinds of meanings do proper names have?
  - direct reference (Kaplan, Soames)
  - variables (Cumming)
  - predicates (Fara)
  - quantifiers (Montague)
  - type-flexible (Partee)
- "Questions like these are the bread and butter of contemporary semantics, and yet we utterly lack the ability to answer them by introspecting"

The argument from illusions

1. Let's have mud for lunch. [I didn't follow this argument.]

- Müller-Lyer illusion:



Autonomicity: no conscious control, or even influence

- Fodor: The lines continue to *seem* to have different lengths, no matter how strongly one believes that they are the same length.
- One linguist, call him "Robert", believes that DPs take scope via QR
- Another linguist, call her "Pauline", believs that DPs take scope via type shifting operators.
- "it would be truly shocking if we were to find evidence that believing certain semantic theories either enhanced or detracted from one's linguistic capacities, even a little bit."
- [PSA: Barker 2020 *S&P* proves that QR + Partee's LIFT validates Hendrik's core type shifters, and vice versa. So Robert and Pauline's views are provably equivalent.]

How modularity implies constraint semantics

- "if semantic composition is an informationally encapsulated process, then it does not have access to all of the information that it would need in order to identify lexical expressions' contents"
- Rather, "content resolution is a process that relies heavily on mindreading, which is a paradigmatic central-cognitive task".

Sedivy et al. 1999 (Anna Alsop)

Sedivy, J., Tanenhaus, M., Chambers, C., & Carlson, G. 1999. Achieving incremental semantic interpretation through contextual representation. *Cognition* 71: 109-147.

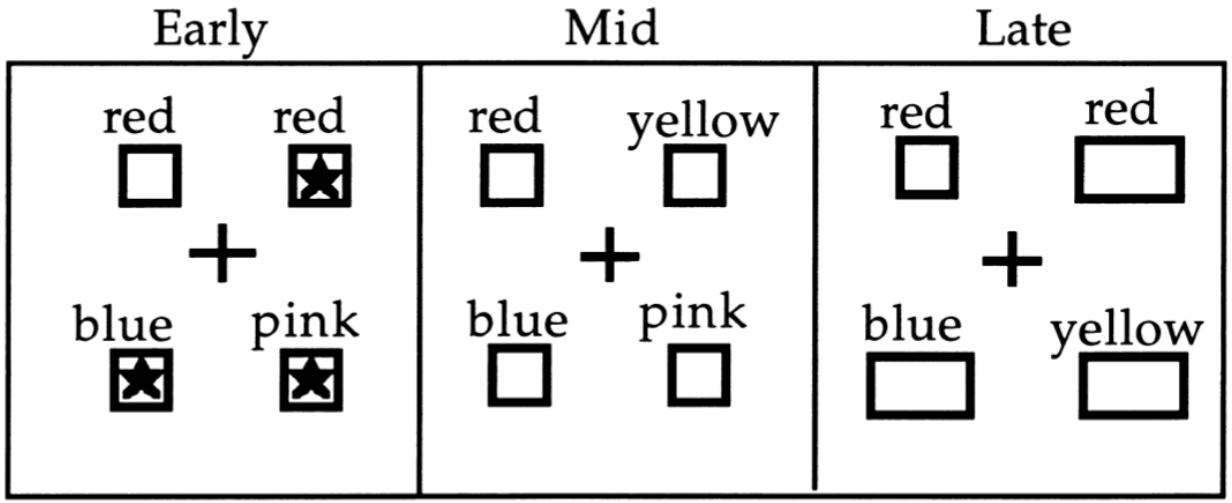


Figure 2: Touch the plain red square

Eye movement data for Experiment 1A, showing eye movement latencies as computed from the onset of the head noun, and the percentage of trials that included an eye movement to a non-target object

Condition	Eye movement latency (ms)	Looks to competitor or control object (%) Total looks to non-target objects (%)
Early	378	4.4416.26
Late	460	18.3321.66

Positive view: compositional constraint semantics

- Minimal adjustment of standard framework
- Simple but wrong approach:

(17) $[\![\text{it}_1 \text{ stinks}]\!]^c = \lambda w \,.\, g_c(1) \text{ stinks at } w$

(18) $[\![\text{it}_1 \text{ stinks}]\!] = \lambda c \,.\, \lambda w \,.\, g_c(1) \text{ stinks at } w$

Figure 4: Abstracting over the context parameter

- What is wrong with this is "this proposal requires language users' central-cognitive system(s) to be capable of working with representations that are framed in terms of centrally inaccessible concepts, such as those of assignment functions and numerical indices."

Instead...

- the outputs of semantics include representations of
  - individuals
  - worlds
  - properties
  - relations
  - propositions
- But not
  - assignment functions
  - indices
  - linguistic expressions
- sentential semantic values are properties of propositions... type <st,t>

19. [[[it stinks]]] = \p.Ex. p = \w. x stinks at w

Constraint Abstraction (preliminary version)

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If α dominates unbound variables $v_i \ldots v_n$ and $[\![\alpha]\!]^g \in D_\tau$

Then $[\![\alpha]\!] = \lambda p_\tau.(\exists x^i)\ldots(\exists x^n)p = [\![\alpha]\!]^{g^{i \to x^i \ldots n \to x^n}}$

Figure 5: Constraint Abstraction (preliminary version)

- "Constraint Abstraction is a general tool for converting assignment-relativized intensions into constraints of the kind that I take to be the outputs of the semantic module."
- Similar to embedding conditions for DRSs?

Problem: sensitivity to syntax

- "In order to determine the output semantic value [[[a]]], [the preliminary version] needs *syntactic* information about the variables contained in *a*."
- Assume that the lexicon associates variables with constraints on their referents:

24. $\mu(\text{he}) = \lambda x.x$ is male
25. $\mu(\text{she}) = \lambda x.x$ is female

- "When I say"he smokes," it is not part of the content of what I say that I am talking about a male; rather, this information is a clue I give my addressee in order to help them recover my intended content."
- Side note: the word "content" is not quite right anymore

Double-barreled semantics

(27) For every node α in every LF, $[\![\alpha]\!]^{w,g} = \langle [\![\alpha]\!]_1^{w,g}, [\![\alpha]\!]_2 \rangle$

The two coordinates within an expression's semantic value track different information about its meaning. The first coordinate, $[\![\alpha]\!]_1^{w,g}$, is α's semantic value according to the standard framework—an assignment-and world-relativized extension. The second coordinate, $[\![\alpha]\!]_2$, keeps track of the constraint properties of any variables in α. Constraint Abstraction, as I will define it below, puts these two values together into a single output semantic value, $[\![[\![\alpha]\!]]\!]$.

Because only variables have constraint properties, and $[\![\cdot]\!]_2$ stores information about constraint properties, only variables are assigned substantive values by $[\![\cdot]\!]_2$.

(28) For any variable v and numerical index i, $[\![v_i]\!]_2 = \{\langle i, \mu(v)\rangle\}$

(29) For any non-variable lexical item α, $[\![\alpha]\!]_2 = \emptyset$.

Figure 6: double-barreled semantic values

- Detailed definition of how to combine constraints of co-indexed variables $\uplus$

Final composition

Functional Application

$[\![\alpha\beta]\!]^{w,g} = \langle [\![\alpha\beta]\!]_1^{w,g}, [\![\alpha\beta]\!]_2 \rangle$, such that:

- $[\![\alpha\beta]\!]_1^{w,g} = [\![\alpha]\!]_1^{w,g}([\![\beta]\!]_1^{w,g})$ or $[\![\beta]\!]_1^{w,g}([\![\alpha]\!]_1^{w,g})$ (whichever is defined); and
- $[\![\alpha\beta]\!]_2 = [\![\alpha]\!]_2 \uplus [\![\beta]\!]_2$

Figure 7: Double-barreled function application

Constraint Abstraction (final version)

If $[\![\alpha]\!]_2 = \{\langle i, f^1 \rangle ... \langle j, f^n \rangle\}$ and $[\![\alpha]\!]_1^g \in D_\tau$

Then $[\![[\![\alpha]\!]]\!] = \lambda p_\tau \,.\, (\exists x^1 : f^1(x^1)) ... (\exists x^n : f^n(x^n))(p = [\![\alpha]\!]_1^{g^{i \to x^1 ... j \to x^n}})$

Figure 8: Constraint abstraction, final

Indexicals

33. $\mu(\mathsf{I}) = \lambda x.x$ is the speaker of the utterance being interpreted
    - "the semantics module lacks access to information about who the speaker is"

"Consider, for example, the well worn example of stones on a beach, arranged by a storm into the shape of a sentence. In this case, there is no utterance to interpret, and the agent may realize this, but the stones are sufficiently similar to the evidence usually left behind by genuine utterances that the language module fires up and construes the "sentence" as having a meaning just the same."

Harris' strategy

- Minimal modification of standard theory
- Retains full standard theory, internal to the semantics module
- Sanitizes the model-theoretic value, removing all indices and assignment fns
- Delivers the santitized value to the general cognition reasoner
- General cognition determines the specific proposition the speaker intended to convey

- Note that the semantics module can be *internally* dynamic
  - donkey anaphora
  - local presupposition satisfaction?
- But definitely, no context update functions for computing local contexts

Timing

- Per utterance? or per clause/DP/phase?
- Sedivy and co: reference is closely time-locked to incremental descriptive content
- What about the apparent need to compute local contexts?

1. c + Ann arrived and Ann might$^{(c+\text{Ann arrived})}$ not have arrived.

RSA. . .

RSA

Frank, Michael and Noah D. Goodman. 2012. Predicting Pragmatic Reasoning in Language Games. *Science* 336 (6084): 998. https://doi.org/10.1126/science.1218633

- "Each utterance need not carry every detail; instead, listeners can infer speakers' intended meanings by assuming utterances convey only relevant information"
- Reference games (Wittgenstein: *five red apples*)
- "We modeled human behavior by assuming that a listener can use Bayesian inference to recover a speak- er's intended referent r_S in context C, given that the speaker uttered word w:"

$$P(r_s|w,C) = \frac{P(w|r_s,C)P(r_s)}{\sum_{r' \in C} P(w|r',C)P(r')}$$

In what sense is RSA a dynamic theory?

- P is the prior probability
- Bayes' rule says how to update P in view of new evidence
- Prior probabilities get updated to posterior probabilities
- P is the scoreboard, utterances are the evidence

HOWEVER, here P is an agent's mental state.

- This is genuine external dynamics, i.e., belief update

Using RSA to model reference

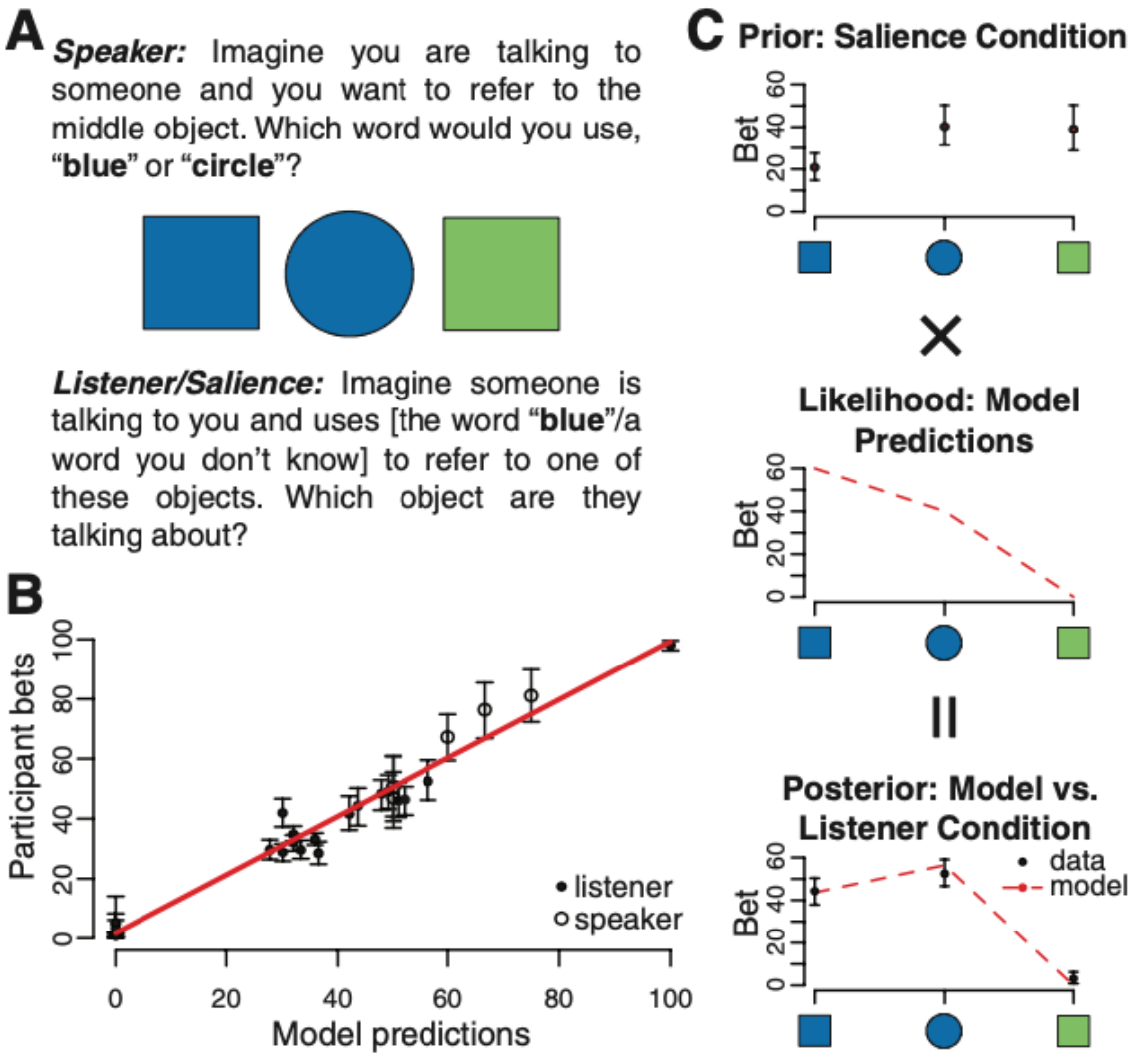
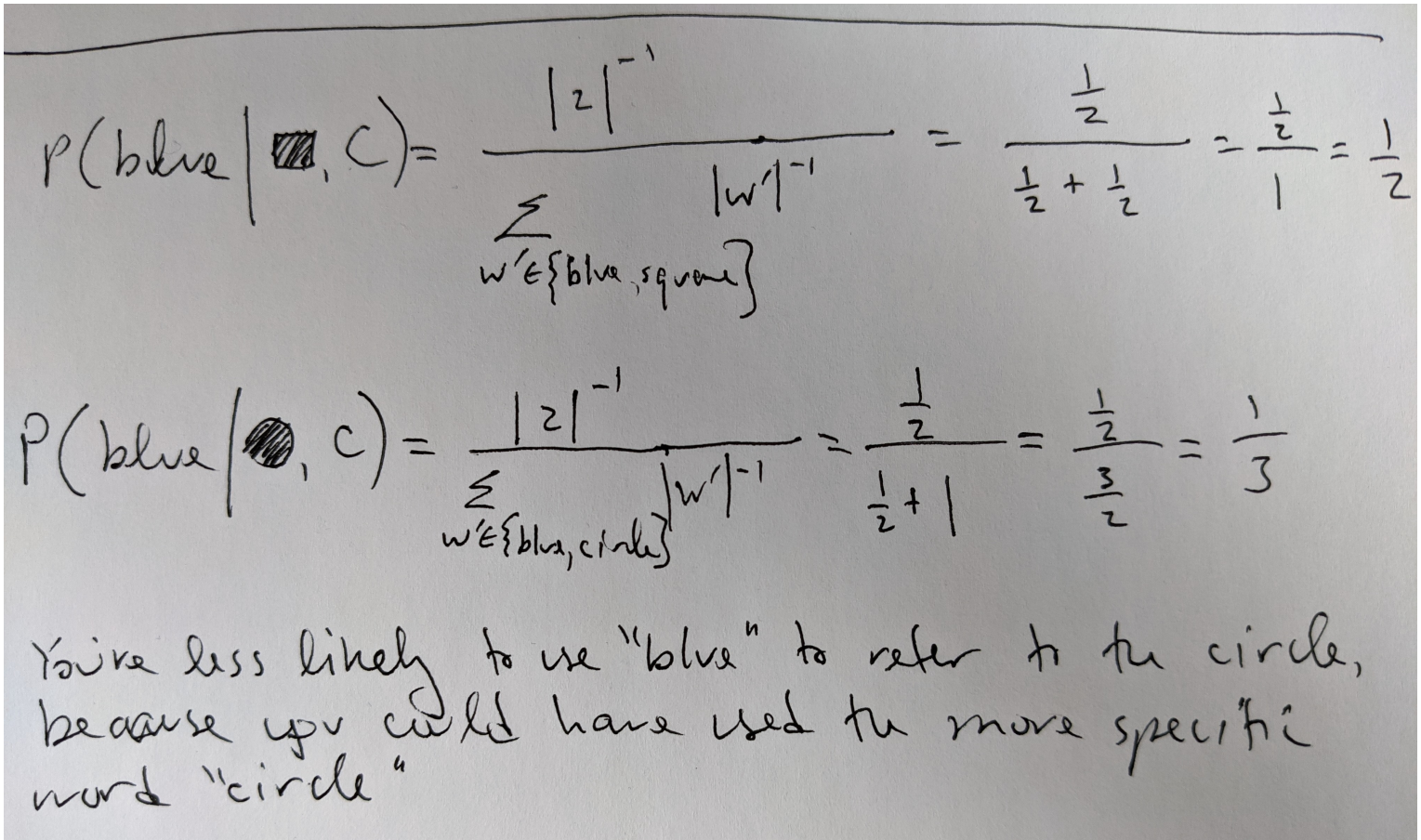


Figure 10: RSA model for a reference task

Likelihood: model predictions: informativity

$$P(w|r_s, C) = \frac{|w|^{-1}}{\sum_{w' \in W} |w'|^{-1}}$$

Figure 11: Informativity



Comments on the RSA model

- Informativity trade-off with brevity (cost)
- "The blue shape" does not have a unique referent—
  - That is, the description is a *constraint* on reference

Incremental RSA

Cohn-Gordon, Reuben, Noah Goodman, and Christopher Potts. 2018. An Incremental Iterated Response Model of Pragmatics. Manuscript. An RSA model of incremental interpretation that can handle data that is "out of reach" of global models. [on repo]

- Next week: Dan Lassiter and Noah Goodman, RSA and vagueness