Communicative Uncertainty and Best-Guess Updating

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Communicative Uncertainty

Communication is uncertain, or so the empirical literature tells us (see, e.g., Drożdżowicz [2022] and references therein).

Even when a speaker does their best to make their communicative intentions manifest, audiences are often unable to recover exactly what they intended.

- In these situations, interlocutors will have to guess, estimate, or inductively infer what the speaker has asserted.

Uniformity

But in the common-ground framework, rational communication by means of assertion cannot involve uncertainty.

According to Stalnaker, in order to rationally communicate by means of an assertion, the following principle must be satisfied:

Uniformity An assertoric utterance must express the same proposition relative to each world in the context set. Stalnaker [1974/2002, p. 90]

Consequences of Uniformity

Uniformity has (at least) two striking consequences:

Entailment For rational communication to take place, context must entail a unique content for each assertoric utterance.

Certainty For rational communication to take place, given the information in the context, each interlocutor must be certain of the content of each assertoric utterance.

Goals of the Talk

1. Argue that Uniformity is false.

2. Develop a theory of how interlocutors update their presuppositions under uncertainty—i.e. when Uniformity is violated.

3. Show how this theory can be integrated into the common-ground framework.

The Plan

1. Rational Communication and Uniformity
2. Underspecification and Apparent Violations of Uniformity
3. Against Uniformity
4. Best Guesses
5. Best-Guesses as Uncertain Updates
6. Best-Guesses and Common-Ground Updating

Rational Communication and Uniformity

Common Ground

Every conversation involves a set of interlocutors. At any point in the conversation, there is some information that these interlocutors share.

Common Ground The set of propositions commonly accepted by all interlocutors at a particular point in the conversation.

Context Set Let the context set of c at w, CS_w^c, be the intersection of the propositions in the common ground.

Presupposition

Following Stalnaker [2014], we can define what it is to presuppose that p in terms of the common ground:

Presupposition An interlocutor i presupposes that p just in case i believes that p is common ground.

Defective Contexts A context c is *defective* if and only if interlocutors have different presuppositions in c.

Question Under Discussion

The Question Under Discussion (QUD) serves as a model of the topic of conversation. [Roberts, 1996]

- The QUD partitions the common ground into exclusive and exhaustive cells.
- Each cell represents a *complete answer* to the question.
- Partial answers to the QUD are unions (or disjunctions) of complete answers.

The goal of conversation is to add to the common ground until it entails a complete answer to the QUD.

Two Roles for Common Ground

In the common-ground framework, common ground plays the two roles of context:

Metasemantic Role A body of information relative to which the meanings of context-sensitive expressions are fixed.

Dynamic Role A body of information that evolves in response to conversational actions.

Assertion

According to Stalnaker [1974/2002], rational communication by means of assertion is governed by the following rule:

Assertion Rule If accepted, an assertion changes the context by adding its content to the common ground.

Stalnaker [1974/2002]

So if the context set at the time of assertion is CS_w^c and the content of my assertion is p, then if my assertion is accepted, the resulting context set is $CS_w^c \cap p$.

Uniformity

But in order for interlocutors to apply Assertion Rule, certain conditions must be met, one of which is Uniformity:

Uniformity In all instances of rational communication: for all assertoric utterances u, conversations c, contents p and worlds w, w', if $w' \in CS^c_w$ and p is the CS^c_w-content of u in w', such that the CS^c_w-content of u at w' is p, then for all $w'' \in \mathrm{CS}^c_w$, p is the CS^c_w-content of u at w''.

Kirk-Giannini [2018]

Here, the CS^c_w-content of an assertoric utterance is the intersection of its content with the context set CS^c_w.

Uniformity Motivated

Fair Play In all cases of rational communication: For all assertoric utterances u, conversations c, contents p and worlds w, s performs u at w only if every interlocutor in c is in a position to apply Assertion Rule to CG^c_w in response to u.

Stuck For all conversations c, assertoric utterances u, contents p, and worlds w, w', if w' is in CS^c_w, and if p is the CS^c_w-content of u in w', and if there is some world w'' such that w'' is in C^s_w and the C^s_w-content of u in w'' is not p, then some interlocutor in c is not in a position at w to apply Assertion Rule to CG^c_w in response to u.

Kirk-Giannini [2018]

Underspecification and Apparent Violations of Uniformity

Infelicitous Underspecification

[Fire]: Smith is watching Jones through a doorway. She can see the corridor in which Jones is standing, but not the room into which Jones is looking. It is common ground between Smith and Jones that the room contains either Bill or Ben and no one else. Bill or Ben (whoever it is) is performing a dangerous chemical experiment. Something goes horribly awry, and Jones turns to Smith and exclaims 'He is on fire!'.

Hawthorne and Magidor [2009]

$R = \{\text{Bill is on fire, Ben is on fire}\}$

Felicitous Underspecification

Dinner Party: We're at a tedious dinner party. It is common ground that I either want to leave to get ice cream, leave to go to another party, or leave to go home, but you are uncertain which. It is also common ground that I often like to get ice cream after dinner. I utter (1):

(1) I'm ready.

1. C_1: I'm ready to go get ice cream.
2. C_2: I'm ready to go to another party.
3. C_3: I'm ready to go home.

$R = \{C_1, C_2, C_3\}$

Underspecification Violates Uniformity

Felicitous underspecification is ubiquitous.

- It arises for nearly every context-sensitive expression: modals, conditionals, quantifiers, gradable adjectives, possessives, incomplete expressions, even demonstratives!

But felicitous underspecification also involves a *prima facie* violation of Uniformity.

- If Uniformity is a condition on rational communication, how do we ever rationally communicate?

Reinterpretation: Diagonalization

Option 1: Diagonalize. [Stalnaker, 1974/2002]

$\mathfrak{A}$	a	b	c
a	T	F	F
b	F	F	T
c	F	T	F

Let the CS_w^c-diagonal content of u be the set of worlds $w \in CS_w^c$ such that the CS_w^c-content of u at w is true in w.

So the content of my assertion in (1) is $\{a\}$.

Reinterpretation: Disjunction or Conjunction

Option 2: Disjoin or conjoin. [King, 2021]

> *Update CS_w^c with the weakest candidate propositional update available for u in c [...] such that: (1) it gives a partial answer to the immediate question under discussion while adhering to Gricean maxims and not being ruled out by the common ground; and (2) no stronger candidate propositional update for u in c gives a better answer to the immediate question under discussion. King [2021, p. 39]*

So the content of my assertion in (1) is: $C_1 \vee C_2 \vee C_3$.

Against Uniformity

The Common Ground as Evidence

The common ground is a body of information that can make interlocutors *more or less confident* that the speaker has asserted a particular content.

It is a body of *evidence* that can rationalise certain credences.

- We need to consider the credences that rational interlocutors have about the contents of assertions conditional on the information in the common ground.

The Argument

When I utter 'I'm ready' in the situation above, you are not indifferent between the candidate propositions left open.

Conditional on the information in the common ground, you will have a distribution of credences $P(R|CG)$ over the three candidate contents.

Let's suppose that it looks as follows:

- $P(C_1|CG) = .8$
- $P(C_2|CG) = .1$
- $P(C_3|CG) = .1$

Rational Probabilistic Communication

Suppose that, guided by your credences, you take me to have asserted C_1, apply the Assertion Rule, and update your presuppositions with C_1.

Suppose further that you were correct: I had a Gricean intention to communicate C_1, and I knew the evidence would make you very confident that I meant C_1.

- I claim that this is an instance of rational communication that violates Uniformity.

Against Diagonalization

Stalnaker's view gives the wrong verdicts:

- It entails that we have not rationally communicated.
- It also entails that the content of my assertion is the CS_w^c-diagonal proposition.
- But it is overwhelmingly plausible that we have communicated, and that the content of my utterance of (1) is C_1.

Against King's View

King does not say anything about whether we have rationally communicated. But:

- King's view entails that the content of my assertion of (1) is $C_1 \vee C_2 \vee C_3$.
- Again, the content is plausibly much more specific.

What we need is an account of how updating works that shows how probabilistic communication is rational.

An Objection

Objection: Even if you are confident that I meant C_1, why is it rational for you to take it to be common ground?

Response: Great question, I'll answer it in the last section.

Best Guesses

Latif's Choice

In inquiry, we're often faced with questions without being certain of the answers. Suppose I ask you where you think Latif will go to school.

Here are the statistics for people with the same choice:

Yale	Harvard	Stanford	NYU
38%	30%	20%	12%

Good Guesses

These guesses seem to be permissible:

(2)
a. Yale
b. Yale or Harvard
c. Yale or Harvard or Stanford
d. Yale or Harvard or Stanford or NYU

Bad Guesses

These guesses seem to not make any sense:

(3)
a. Harvard
b. NYU
c. Yale or Stanford
d. Not Yale.
e. Harvard, Stanford, or NYU.
f. Yale, or he has a birthmark on his left toe.

Five Principles of Good Guessing

Improbable Guessing It's sometimes permissible to answer p even when $P(p) < 0.5$.

Question Sensitivity Whether p is a permissible answer depends not just on the guesser's credence in p but also in what question is being answered.

Optionality Given any question Q, for any $k : 1 \leq k \leq |Q|$, it's permissible for your guess about Q to be the union of exactly k cells of Q.

Filtering A guess about Q is permissible only if it is filtered: if it includes a complete answer p, it must include all complete answers that are more probable than p.

Fit If a guess crosscuts a complete answer, it's impermissible.

Informativity-Accuracy Tradeoff

According to Dorst and Mandelkern [2023], what explains these principles is that good guesses optimize a tradeoff between accuracy and informativity.

Jamesian Expected Answer-Value :

$$\begin{aligned} E_Q^J(p) &= P(p) \cdot J^{Q_p} + P(p) \cdot 0 \\ &= P(p) \cdot J^{Q_p} \end{aligned}$$

- $P(p)$ is the credence you have in P.
- Q_p is the proportion of answers to Q ruled out by a guess p.
- J is a parameter that weights informativity.

Best Guesses

Basically, best guesses are either complete answers or disjunctions of complete answers that obey the principles above.

- When J is high, informativity matters, so your guess at a question will be specific—you will pick the complete answer that is most probable.
- When J is low, informativity does not matter, so your guess will be general—you will pick the weakest answer.

Best-Guesses as Uncertain Updates

Violations of Uniformity Shift the QUD

In **Dinner Party**, my utterance violates Uniformity, and so leaves interlocutors uncertain about what I've asserted.

I claim that in such cases, the QUD, whatever it was before, shifts to:

(4) What have I asserted?

We need to answer this question before conversation can proceed.

Probabilities

Recall that the context leaves open three possible contents for my utterance:

(5) a. I've asserted that I'm ready to go get ice cream.
b. I've asserted that I'm ready to go to another party.
c. I've asserted that I'm ready to go home.

Given the information in the common ground, you will have a distribution of credences over (5-a-c), $P(R|CG)$:

Ice Cream	Party	Home
.8	.1	.1

Best-Guess Updating

Given this distribution of credences, define the *communicative value* of a guess p as:

$$P(p|CG) \cdot J^{Q_p}.$$

Best guesses maximise communicative value.

Best-Guess Updating Update with your best guess concerning the content of the speaker's assertion, if you accept it (the guess).

Specificity of Guesses

What is your best guess? It depends on your J-value.

- You may set your J-values high and guess C_1.
- Or you may set your J-values low and guess $C_1 \vee C_2 \vee C_3$.

What do J-values represent?

- Best guesses represent your estimate of the specificity of my intention.

Setting J-values

Here is an intuitive idea: speakers specify only as much as they need to for conversational purposes.

If the purpose of the conversation is to answer the QUD, then J-values are set by the QUD:

Minimal J-value In cases of communicative uncertainty, guess with the lowest J-value such that any lower value would yield a worse answer to the QUD.

Best-Guesses and Common-Ground Updating

Bayesian Updating

According to Best-Guess Updating, when an utterance violates Uniformity, each interlocutor should update their presuppositions with their best guess concerning its content.

Question: Under what conditions do individual best-guess updates yield an update to the common ground?

The Components of Best-Guess Updates

Best-guess updates are determined by two things: interlocutors' distribution of credences and their J-values.

The distribution of credences is conditional on the common ground, and calculated according to Bayes' rule:

$$P(i|CG) = \frac{P(CG|i) \times P(i)}{\sum_{(i' \in I)} P(CG|i') \times P(i')}$$

These credences are then weighted by J-values.

Two Assumptions

Two assumptions guarantee that interlocutors guess in the same way:

Common Prior Assumption If interlocutors have common priors, and update their credences on common evidence, then their posteriors must be the same.

Common J-Values If interlocutors weight their identical posteriori distributions by the same J-value, then their guesses must be the same.

Transparency Assumptions

But in order to guarantee that best-guess updates are not only the same, but are *common ground*,

Transparent Prior The common prior is common ground.

Transparent Bayesian Updating The fact that interlocutors update their credences according to Bayes' rule must be common ground.

Transparent Best-Guess Updating Best-Guess Updating must be common ground.

Transparent J-Values The J-value with which interlocutors guess must be common ground.

The Result

These are *not* necessary conditions, but they are jointly sufficient. It may be that interlocutors will still guess in the same way when the common-prior assumption is weakened.

In particular, the lower the J-value the less the CPA matters.

But when interlocutors have different enough priors, or differing J-values, or when these are not common ground to begin with, best-guess updating will yield a defective context.

Thanks very much!

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References

Kevin Dorst and Matthew Mandelkern. Good guesses. *Philosophy and Phenomenological Research*, 105(3):581–618, 2023.

Anna Drożdżowicz. Making it precise—imprecision and underdetermination in linguistic communication. *Synthese*, 200(219), 2022.

John Hawthorne and Ofra Magidor. Assertion, context, and epistemic accessibility. *Mind*, 118 (470):377–397, April 2009.

Jeffrey C. King. *Felicitous Underspecification: Contextually Sensitive Expressions Lacking Unique Semantic Values in Context*. Oxford University Press, Oxford and New York, 2021.

Cameron Domenico Kirk-Giannini. Uniformity motivated. *Linguistics and Philosophy*, 41: 665–684, 2018.

Craige Roberts. Information structure in discourse: Towards an integrated formal theory of pragmatics. In Jae-Hak Yoon & Andreas Kathol, editor, *OSU Working Papers in Linguistics, Vol 49: Papers in Semantics*. The Ohio State University Department of Linguistics, 1996.

Robert Stalnaker. *Context*. Oxford University Press, Oxford and New York, 2014.

Robert C. Stalnaker. Assertion. In Paul Portner and Barbara H. Partee, editors, *Formal Semantics: The Essential Readings*, pages 147–162. Blackwell Publishers, 1974/2002.