A puzzle in entailment vs implicature

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   (He’ll succeed if he doesn’t, and fail if he does.)
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   = John will succeed or John goofs off (equiv. to (2))
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▶ Suppose John is such a gifted student that he’ll succeed (let’s say, pass the class) no matter whether he goofs off or not. But he’s also a serious student, so he never goofs off in class. Which of (1)-(3) feels right here?
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To thicken the plot:

(4) **Every** student will succeed unless they goof off.
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(5) **No** student will succeed unless they work hard.
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▶ Does *unless* seem to do something different in (4) and (5)?
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▶ Does *unless* seem to do something different in (4) and (5)?

▶ What can we say definitively about (4) and (5) (and the unquantified case?)
A puzzle in entailment vs implicature

We’ve identified two potential “parts” to unless:

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We’ve identified two potential “parts” to unless:

(1) John will succeed unless he goofs off.
   A. John will succeed if he does not goof off.

The literature (von Fintel 1992) says that unless is biconditional (and is like except for):

(6) Every one except for Dr. Samuels has an alibi.

That doesn’t mean we should believe it!
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▶ both possible meanings for unless agree that A is entailed.
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   B. John will not succeed if he goes goof off.

- both possible meanings for unless agree that A is entailed.
- we can’t quite make up our minds about B.
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Entailment vs implicature: some web data

Here’s some interesting data from the web:

(7) Mantou is always late unless she’s already out before we meet, but she’s often just less late then.

(8) The answer is no unless you ask. If you do ask the answer might be no.

(9) Always be yourself, unless you are Fernando Torres. Then always be someone else.
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Remember: We are trying to work out whether both A and B are entailments:

(1) John will succeed unless he goofs off.
   A. John will succeed if he does not goof off.
   B. John will not succeed if he does goof off.

What’s going on in the web data? What does it suggest about A and B?
Entailment vs. implicature: an experiment

Every marble has a dot unless it is blue.
Entailment vs. implicature: an experiment

Every marble has a dot unless it is blue.

- True
- True
- True
Entailment vs. implicature: an experiment

Every marble has a dot unless it is blue.

True

True

True
Entailment vs. implicature: an experiment

Every marble has a dot unless it is blue.

True

True

False
Entailment vs. implicature: an experiment

Every marble has a dot unless it is blue.

Every marble has a dot iff it’s not blue = All and only red marbles have dots
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True  True  False
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True  False  False

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True False False

True True True
Entailment vs. implicature: an experiment

No marble has a dot unless it is red.
Entailment vs. implicature: an experiment

No marble has a dot unless it is red.

![True](image1)

![True](image2)

![True](image3)
Entailment vs. implicature: an experiment

No marble has a dot unless it is red.

True

True

True
Entailment vs. implicature: an experiment

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True

True

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Entailment vs. implicature: an experiment

No marble has a dot unless it is red.

No marble has a dot iff it is not red = All and only blue marbles lack dots
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<table>
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Experiment design (Nadathur & Lassiter 2014)

- Forced-choice T/F

- Critical trials: quantified *if* not and *unless* statements

- Parameters: target colour, red/blue marble ratios, proportion of target marbles with dots

- 155 participants, via Amazon’s Mechanical Turk

- 48 trials/participant: 24 test, 24 fillers
Results (Nadathur & Lassiter (2014))

The results don’t match a biconditional account, a one-directional account, or intuitions!

What’s unexpected here?
Results (Nadathur & Lassiter 2014)

We expected:

▶ The blue line (if-not) to go straight across the top
▶ The red line (unless) under every to be T everywhere but 1, where it should be F
▶ The red line under no to be F at 0, and T everywhere else.

(We’re doing better than a biconditional account, but not much)
Entailment vs implicature

**But wait:** We’re forgetting the original discussion!

(1) John will succeed unless he goofs off.
   
   A. John will succeed if he does not goof off.
   
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We decided earlier that B might be an implicature.
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▶ Truth-conditionally, we expect *unless* to look like *if not*
▶ But why should our intuitions behave totally truth-conditionally? (e.g. *some* $\iff not \ all$)
▶ If B is a strong implicature, we’d expect people to be less happy about *unless* than about *if not* in those middle conditions!
New puzzles

There are still some unexplained things, though:

- What about those points where \( \text{unless} \) is just false? We expected them, but how do we encode them in our meaning?

- What's different about the \( \text{every} \) and \( \text{no} \) graphs? What do you think is going on here?
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- Experimental data supports these ideas against the current (biconditional) account.
- We found some new puzzles that might give us some insight about how people reason in choices between similar lexical items (e.g. *if not*, *unless*).
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