

Processing of Scalar Implicatures and the Question Under Discussion

Replication of Degen 2013 Experiment 2a

Research Question

Does the relevance of the stronger alternative to a weak scalar item, manipulated by the implicit QUD, affect the rate of scalar implicatures and the speed of scalar implicature processing?

Hypothesis

When the stronger alternative is more relevant, there are more pragmatic responses and the speed of pragmatic processing is faster.

Task

- Web-based experiment using the gumball paradigm.
- Participants see a gumball machine with different number of gumballs in the upper chamber. After a brief delay, some of the gumballs drop to the lower chamber and participants hear a statement like “You got 5 gumballs” or “You got some gumballs”. Depending on the condition that the participant is assigned to (all QUD, any QUD or no QUD) they see a cover story and are asked to respond by pressing one of two buttons to indicate that yes, they agree with, or no, they disagree with the spoken description.

Picture

- In this experiment, only the critical trials are of interest. In these trials, all 13 gumballs drop to the lower chamber and participants hear “You got some of the gumballs”. The key dependent variables are response type (agree and disagree) and response time.

#Picture

Stimuli

Picture

*experimenter mistake - needs to change

Participants

- 150 participants from Amazon Mechanical Turk.

- Each participant assigned to one of the three conditions (50 participants in each condition) and reads a cover story that sets up an implicit QUD (relevant QUD or less relevant QUD) or no QUD.

All QUD

#Picture

Any QUD

#Picture

No QUD

#Picture

Exclusions

Language: Non native speakers are excluded

number of participants excluded:

Practice Trials: Participants who got at least two practice trials wrong are excluded

number of participants excluded:

[1] 8

Audio check: Participants who got the audio check wrong more than once are excluded

number of participants excluded

[1] 1

Comprehension check: Participants who got the second comprehension question wrong more than twice are excluded

number of participants excluded

[1] 2

Accuracy check: Participants with accuracy of lower than 85% on non-critical trials are excluded

number of participants excluded

[1] 15

Response time: Trials with $\log RT > 20$ are excluded, participants with more than 5 trials that have $\log RT > 20$ are excluded

number of participants excluded:

[1] 0

number of trials excluded:

[1] 5

Exclusion Summary

Number of participants left

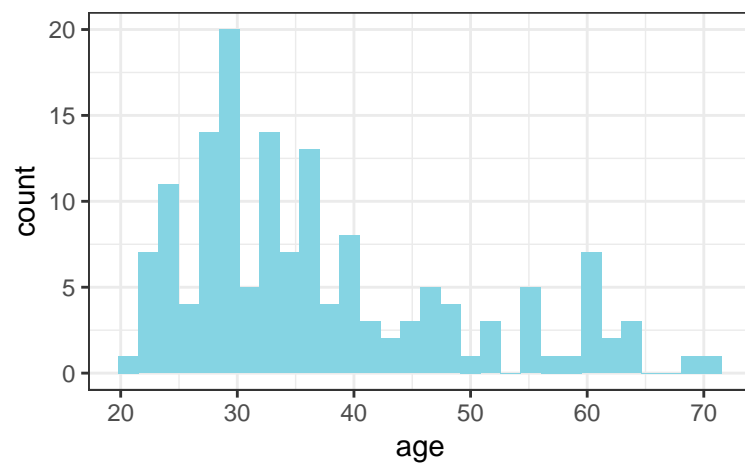
```
## [1] 121
```

Picture

General Results

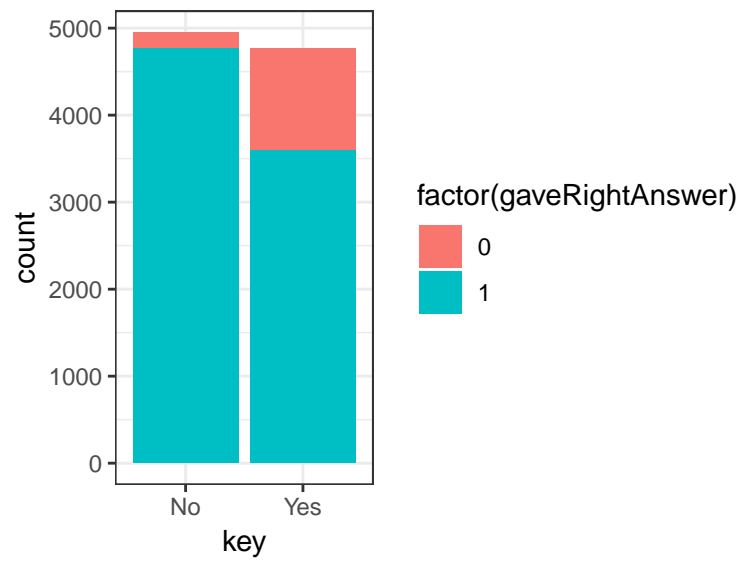
Age Distribution

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

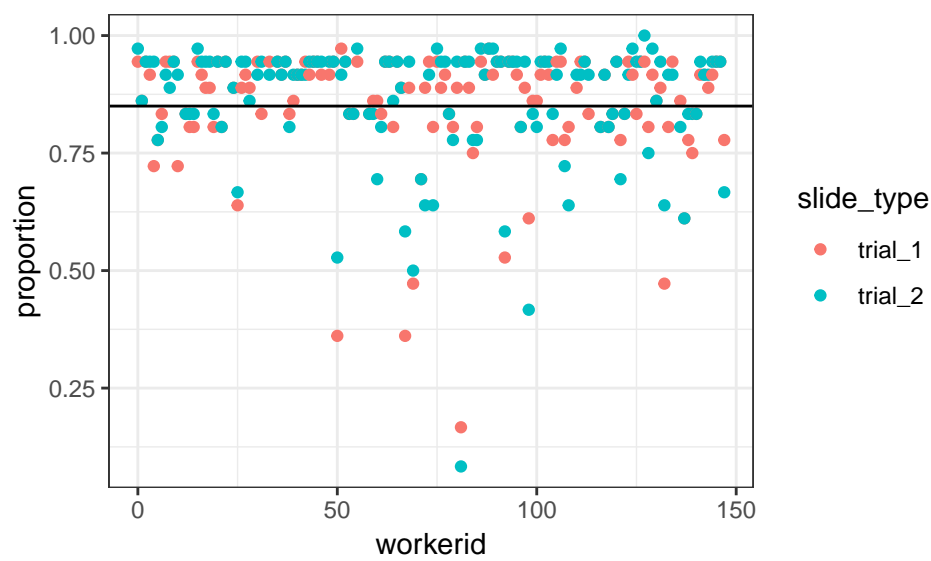


```
##
## 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45
##  1  4  3  2  9  4  7  7 11  9  5 11  3  6  1  7  6  4  6  2  2  1  2  1  2
## 46 47 48 49 50 51 55 56 57 58 60 61 62 63 64 69 71
##  3  2  3  1  1  3  2  3  1  1  4  3  2  1  2  1  1
```

Accuracy in all trials

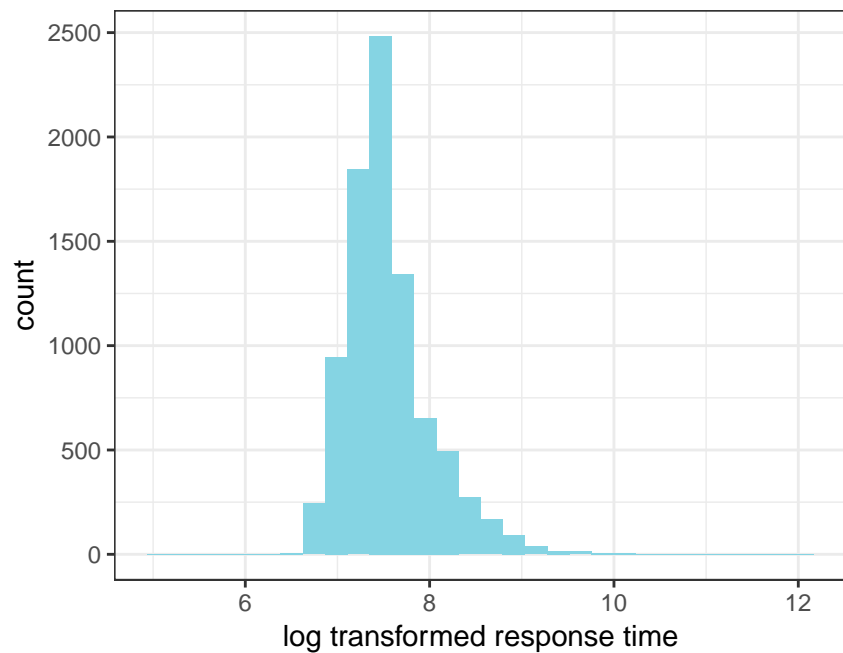


Accuracy by trial order

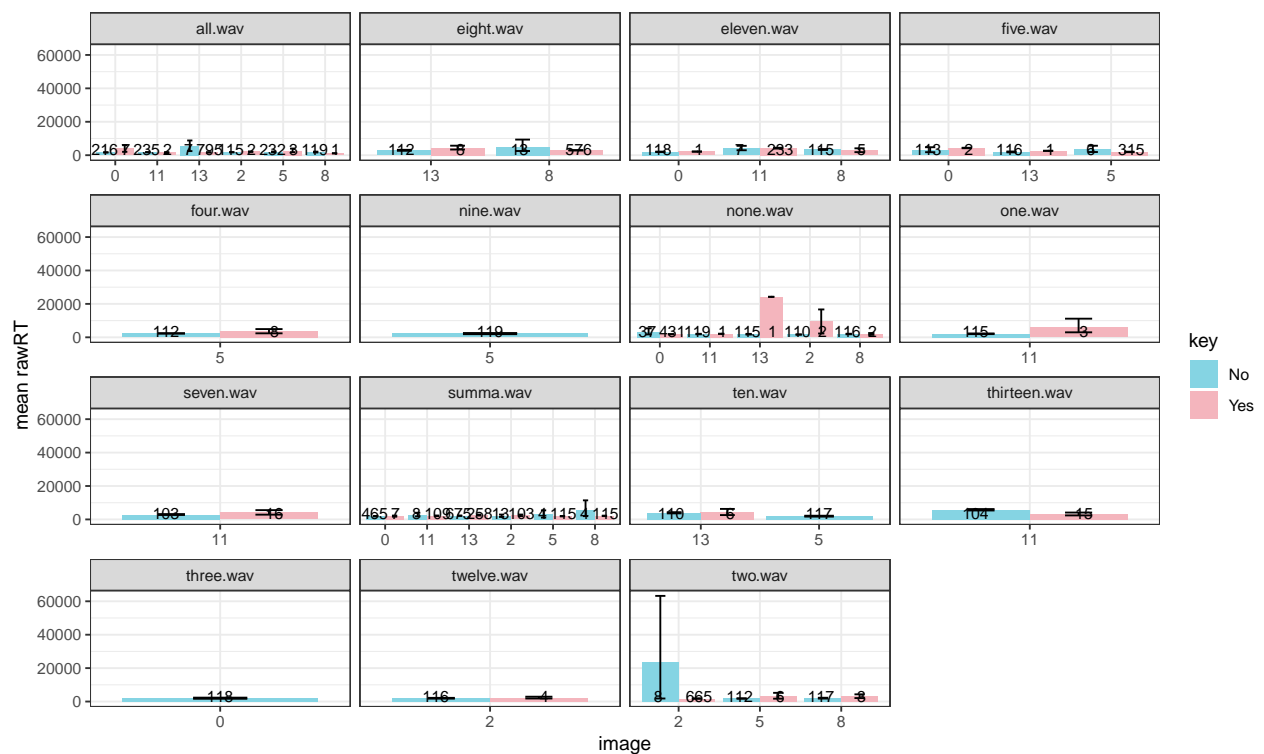


Response time distribution -for all trials

`stat_bin()` using `bins = 30`. Pick better value with `binwidth`.



Response time distribution -for non-critical trials



Critical Trials

number of data points (# of participants x 8)

[1] 0

Response Type

```
## Warning: Factor `Answer.condition` contains implicit NA, consider using
## `forcats::fct_explicit_na`

## Warning: Unknown levels in `f`: no_QUD, any_QUD

## Warning: Factor `Answer.condition` contains implicit NA, consider using
## `forcats::fct_explicit_na`

## Warning: Factor `slide_type` contains implicit NA, consider using
## `forcats::fct_explicit_na`

## Warning: Unknown levels in `f`: no_QUD, any_QUD

## Warning: Factor `Answer.condition` contains implicit NA, consider using
## `forcats::fct_explicit_na`

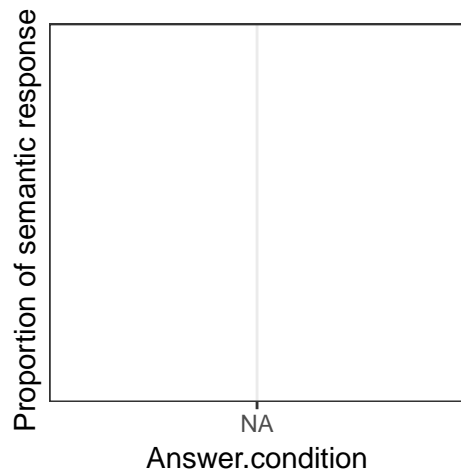
## Warning: Unknown levels in `f`: no_QUD, any_QUD
```

Original Experiment:

Picture

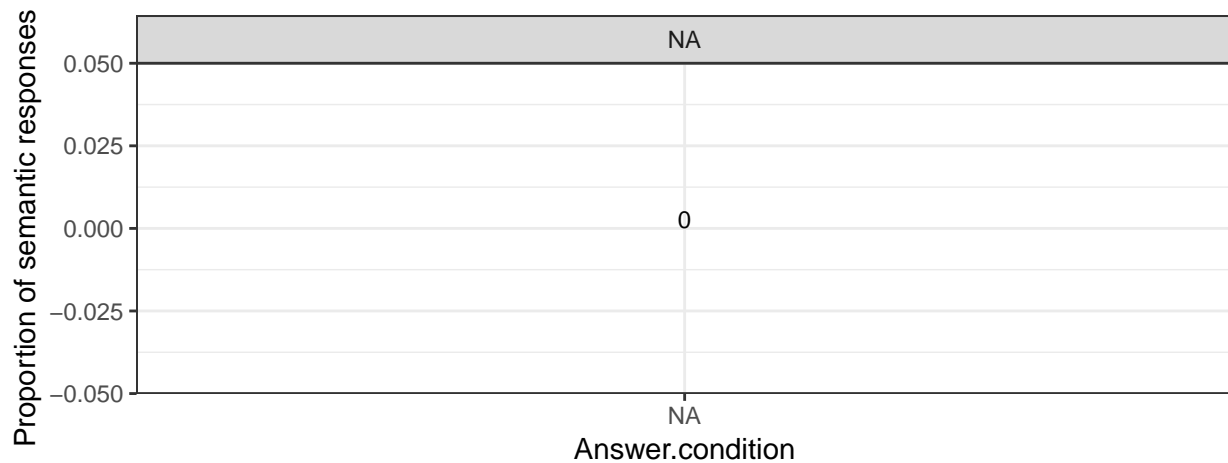
Replication:

```
## Warning: Removed 1 rows containing missing values (position_stack).
## Warning: Removed 1 rows containing missing values (geom_errorbar).
```



Replication - age effect:

```
## Warning: Removed 1 rows containing missing values (position_stack).
## Warning: Removed 1 rows containing missing values (geom_errorbar).
```



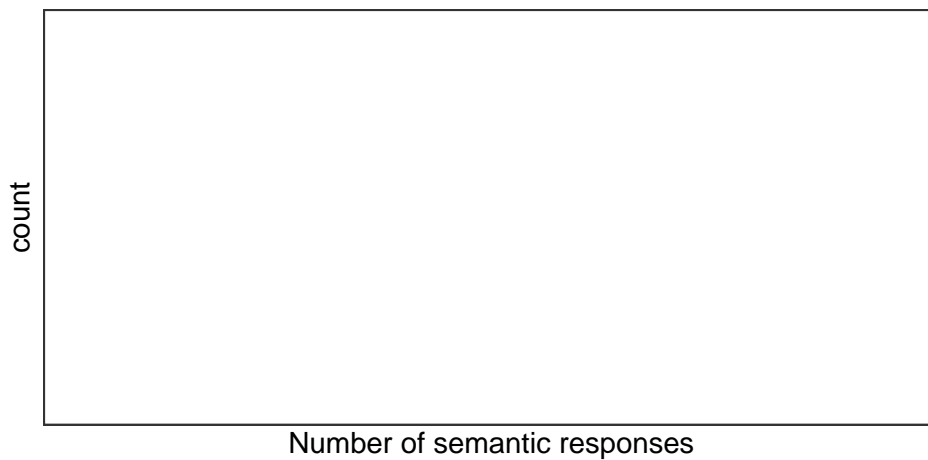
Proportion of Semantic Responses

```
## Warning: Unknown levels in `f`: no_QUD, any_QUD
## < table of extent 0 x 0 >
```

Original Experiment:

Picture

Replication:



Response Time:

```
## Warning: Factor `Answer.condition` contains implicit NA, consider using
## `forcats::fct_explicit_na`

## Warning: Factor `key` contains implicit NA, consider using
## `forcats::fct_explicit_na`

## Warning: Unknown levels in `f`: no_QUD, any_QUD
```

```
## Warning: Factor `Answer.condition` contains implicit NA, consider using
## `forcats::fct_explicit_na`

## Warning: Factor `key` contains implicit NA, consider using
## `forcats::fct_explicit_na`

## Warning: Unknown levels in `f`: no_QUD, any_QUD

## Warning: Factor `Answer.condition` contains implicit NA, consider using
## `forcats::fct_explicit_na`

## Warning: Factor `key` contains implicit NA, consider using
## `forcats::fct_explicit_na`

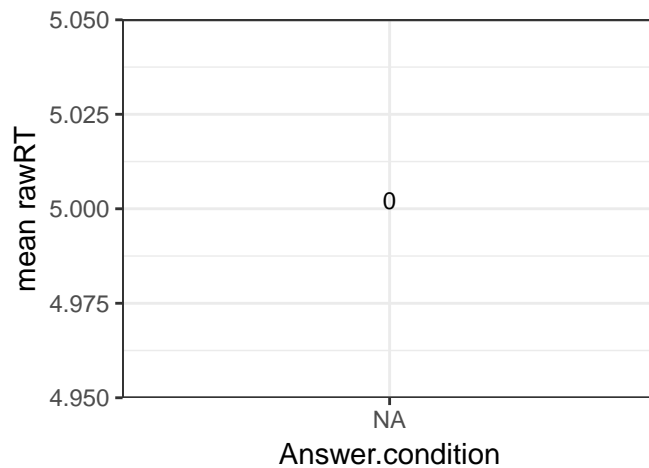
## Warning: Unknown levels in `f`: no_QUD, any_QUD
```

Original Experiment:

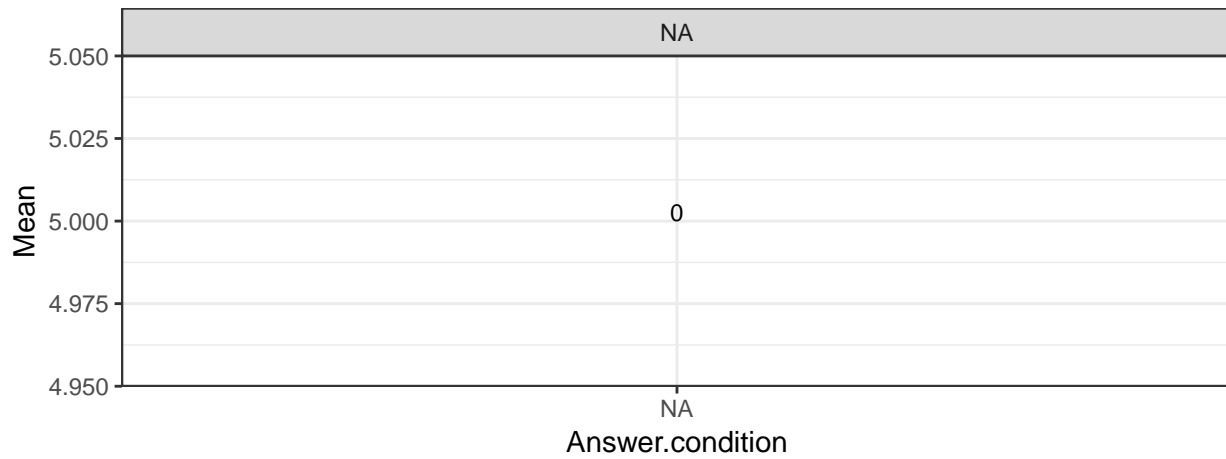
Picture

Replication:

```
## Warning: Removed 1 rows containing missing values (geom_bar).
## Warning: Removed 1 rows containing missing values (geom_errorbar).
```



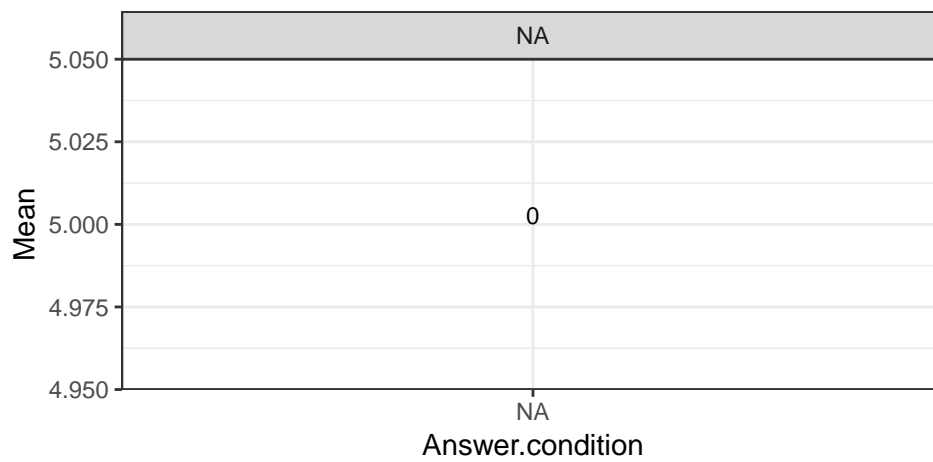
```
## Warning: Removed 1 rows containing missing values (geom_bar).
## Warning: Removed 1 rows containing missing values (geom_errorbar).
```

Replication - age effect:

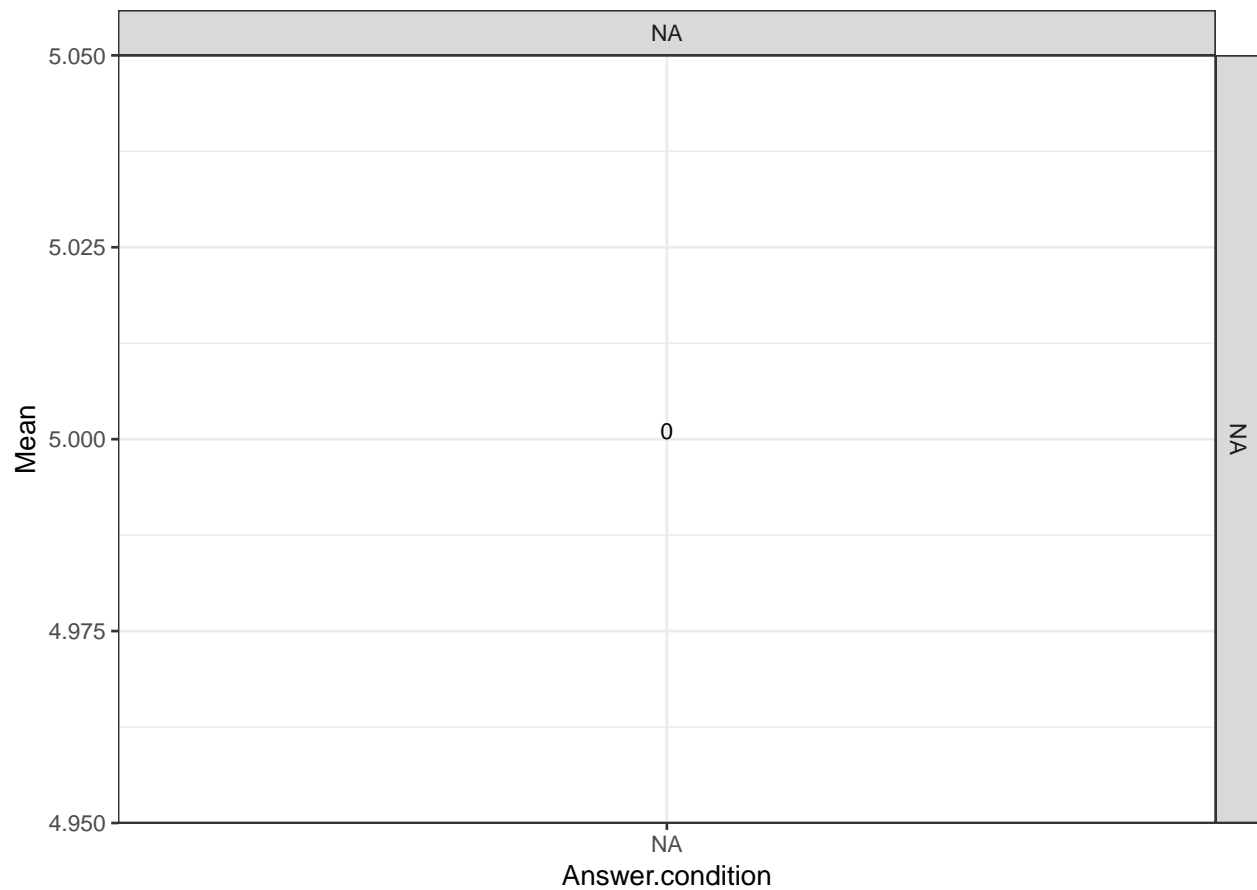
Warning: Removed 1 rows containing missing values (geom_bar).

Warning: Removed 1 rows containing missing values (geom_errorbar).



Warning: Removed 1 rows containing missing values (geom_bar).

Warning: Removed 1 rows containing missing values (geom_errorbar).

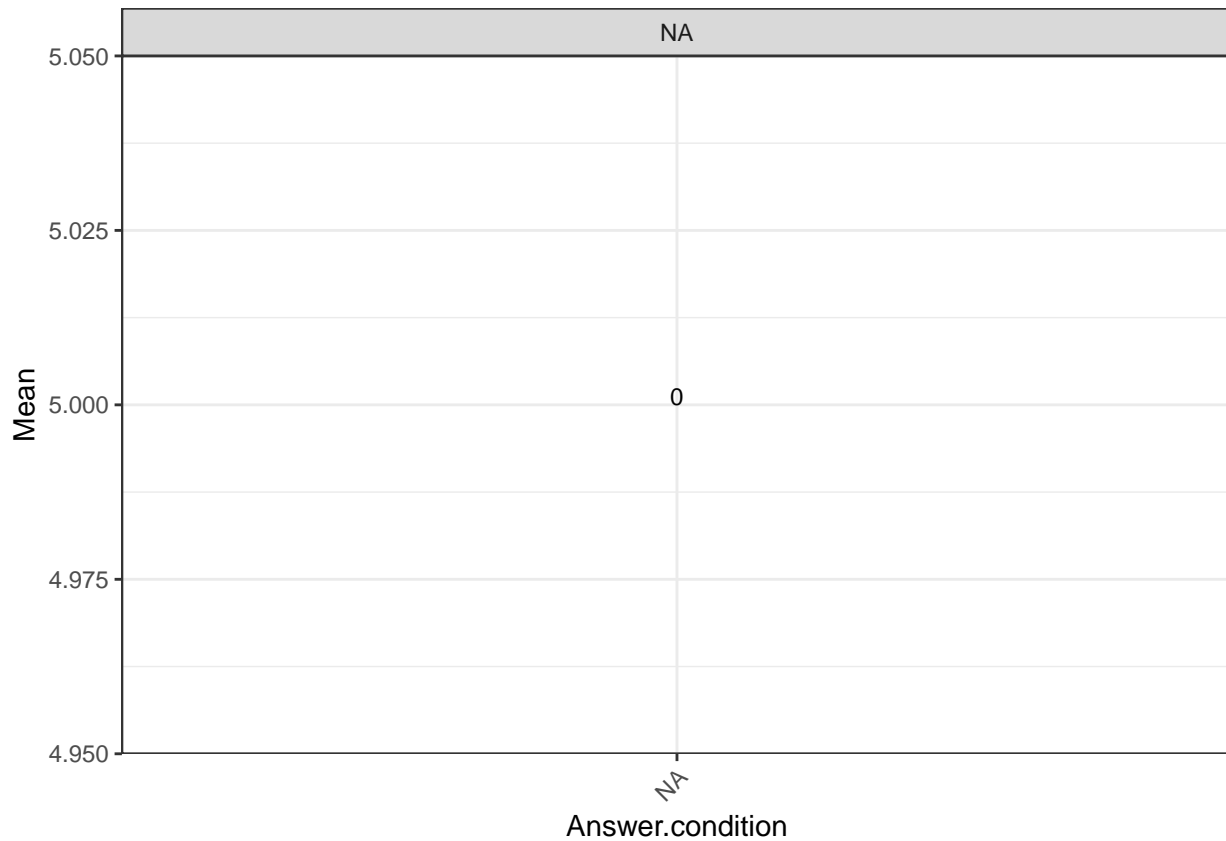


Only age effect (without responder type):

```
## Warning: Factor `Answer.condition` contains implicit NA, consider using
## `forcats::fct_explicit_na`

## Warning: Factor `key` contains implicit NA, consider using
## `forcats::fct_explicit_na`

## Warning: Removed 1 rows containing missing values (geom_bar).
## Warning: Removed 1 rows containing missing values (geom_errorbar).
```



Analysis

- 1) Mixed effects logistic regression predicting response from fixed effects of QUD
 Prediction given Degen(2013): Main effect of QUD such that there are more pragmatic responses for all-QUD compared to any-QUD and no-QUD
- 2) Linear mixed effects regression predicting log response time from fixed effects of QUD, response type and their interaction
 Prediction given Degen(2013): Interaction of QUD and response such that the more relevant the alternative, the faster the pragmatic responses become and the slower the semantic responses become.