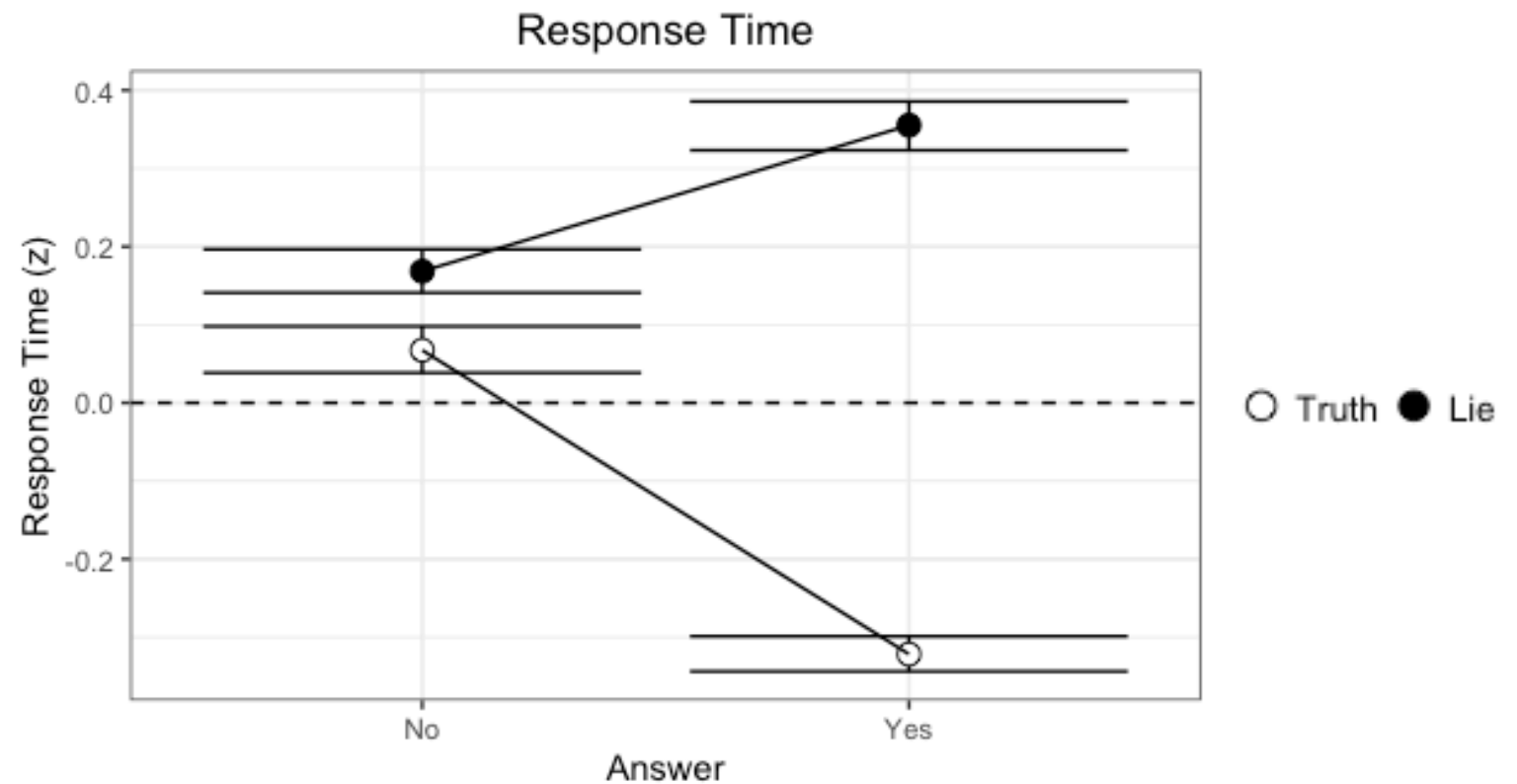


Mixed effects models results: Response time: Veracity and Response

Predictor	Response Time		
	B	SE	t
(Intercept)	68.76	26.53	2.59
Yes v No	-70.20	15.83	-4.43
Lie v Truth	305.98	15.84	19.32
Trial Number	201.15	30.17	6.67
Ans - Deep v Shallow	-25.10	10.48	-2.39
Lie - Deep v Shallow	-81.62	10.49	-7.78
Prob True	-87.68	56.29	-1.56
Yes v No * Lie v Truth	402.83	33.59	11.99
Lie v Truth * Prob True	116.09	46.20	2.51
Yes v No * Prob True	-0.29	46.09	-0.01
YvN * LvT * P(true)	940.40	127.23	7.39

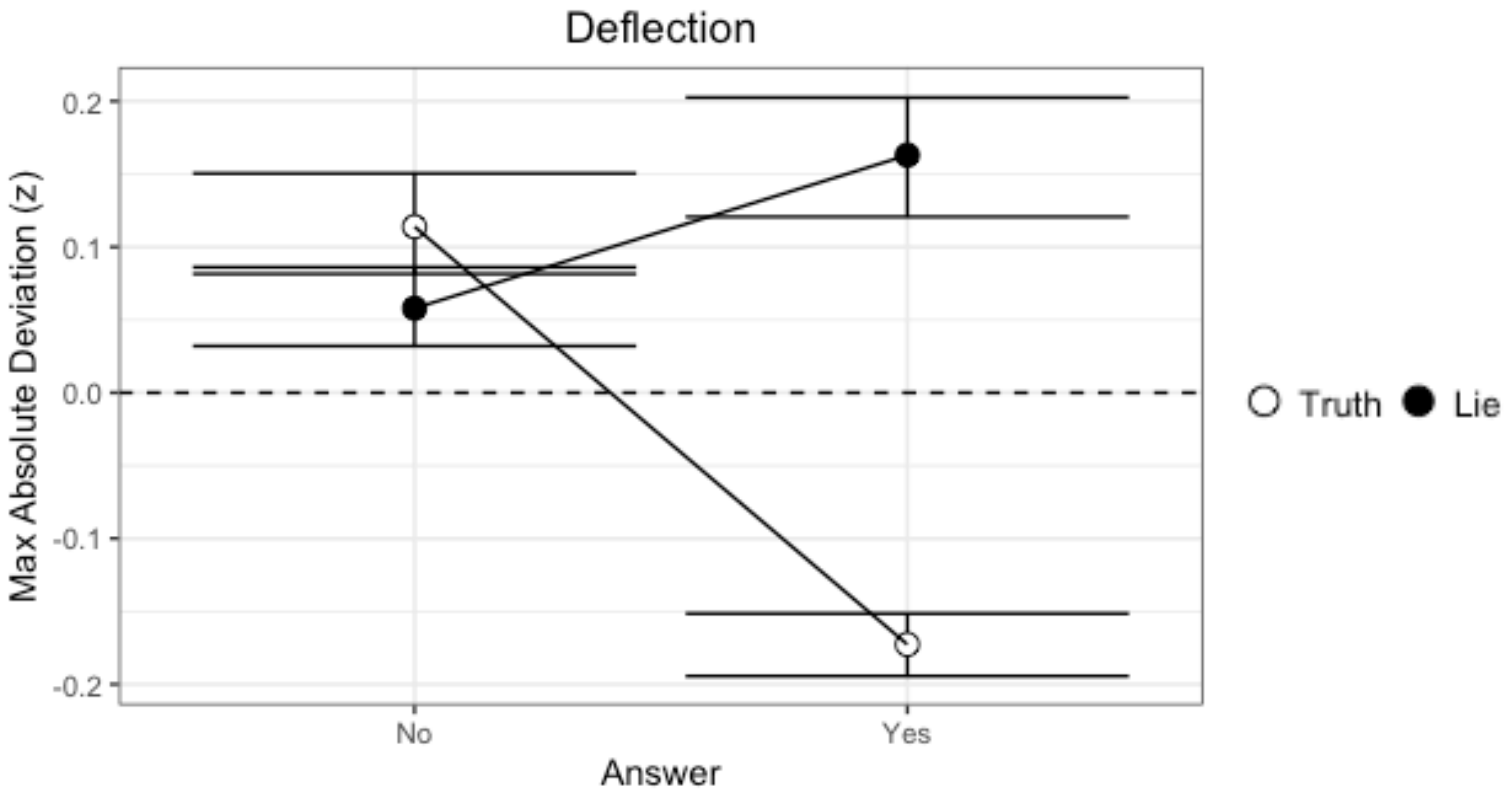


Summary

There is a main effect for response (yes vs. no), such that “yes” responses are faster (easier); a main effect for veracity (lie vs. true), such that lies take longer; and an interaction between responses and veracity. Examining the figure, there is a difference between “truth” and “lies,” but only for the “yes” responses.

Mixed effects models results: Deflection: Veracity and Response

Predictor	Deflection		
	B	SE	t
(Intercept)	3.41	3.49	0.98
Yes v No	-12.03	2.92	-4.11
Lie v Truth	20.67	2.93	7.07
Trial Number	9.93	4.56	2.18
Ans - Deep v Shallow	-10.17	1.94	-5.25
Lie - Deep v Shallow	-14.41	1.94	-7.43
Prob True	-6.34	4.87	-1.30
Yes v No * Lie v Truth	47.48	6.02	7.89
Lie v Truth * Prob True	-4.21	8.54	-0.49
Yes v No * Prob True	-13.01	8.52	-1.53
YvN * LvT * P(true)	8.69	18.98	0.46

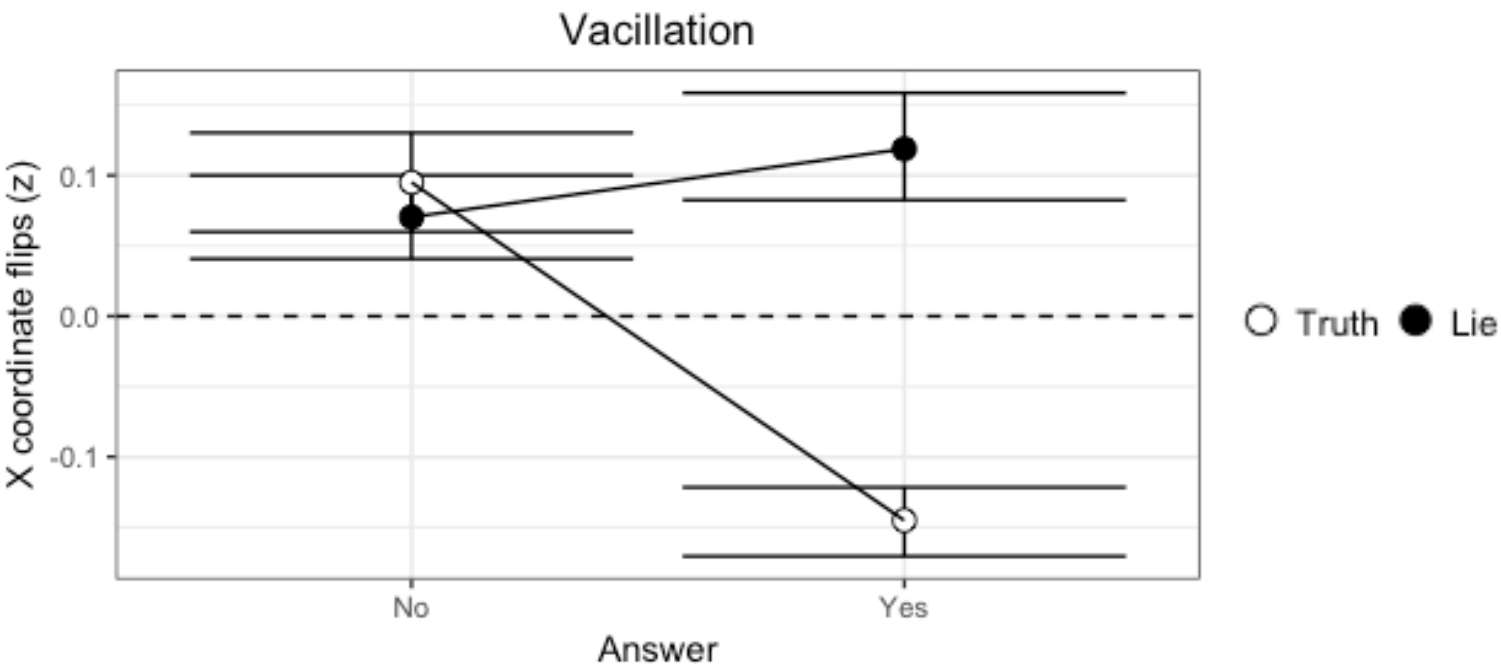


Summary

There is a main effect for response (yes vs. no), such that “no” responses are deflected more toward the competitor response (i.e., saying “yes”); a main effect for veracity (lie vs. true), such that lies are deflected more toward the competitor response (i.e., answering “true”); and an interaction between responses and veracity. Examining the figure, there is a difference between “truth” and “lies,” but only for the “yes” responses.

Mixed effects models results: Vacillation: Veracity and Response

Predictor	Vacillation		
	B	SE	z
(Intercept)	0.28	0.02	14.35
Yes v No	-0.08	0.02	-4.29
Lie v Truth	0.15	0.02	7.76
Trial Number	0.23	0.03	7.63
Ans - Deep v Shallow	-0.02	0.01	-1.62
Lie - Deep v Shallow	-0.08	0.01	-6.19
Prob True	-0.07	0.03	-2.23
Yes v No * Lie v Truth	0.22	0.04	5.48
Lie v Truth * Prob True	0.15	0.06	2.71
Yes v No * Prob True	-0.04	0.06	-0.62
YvN * LvT * P(true)	0.31	0.13	2.50

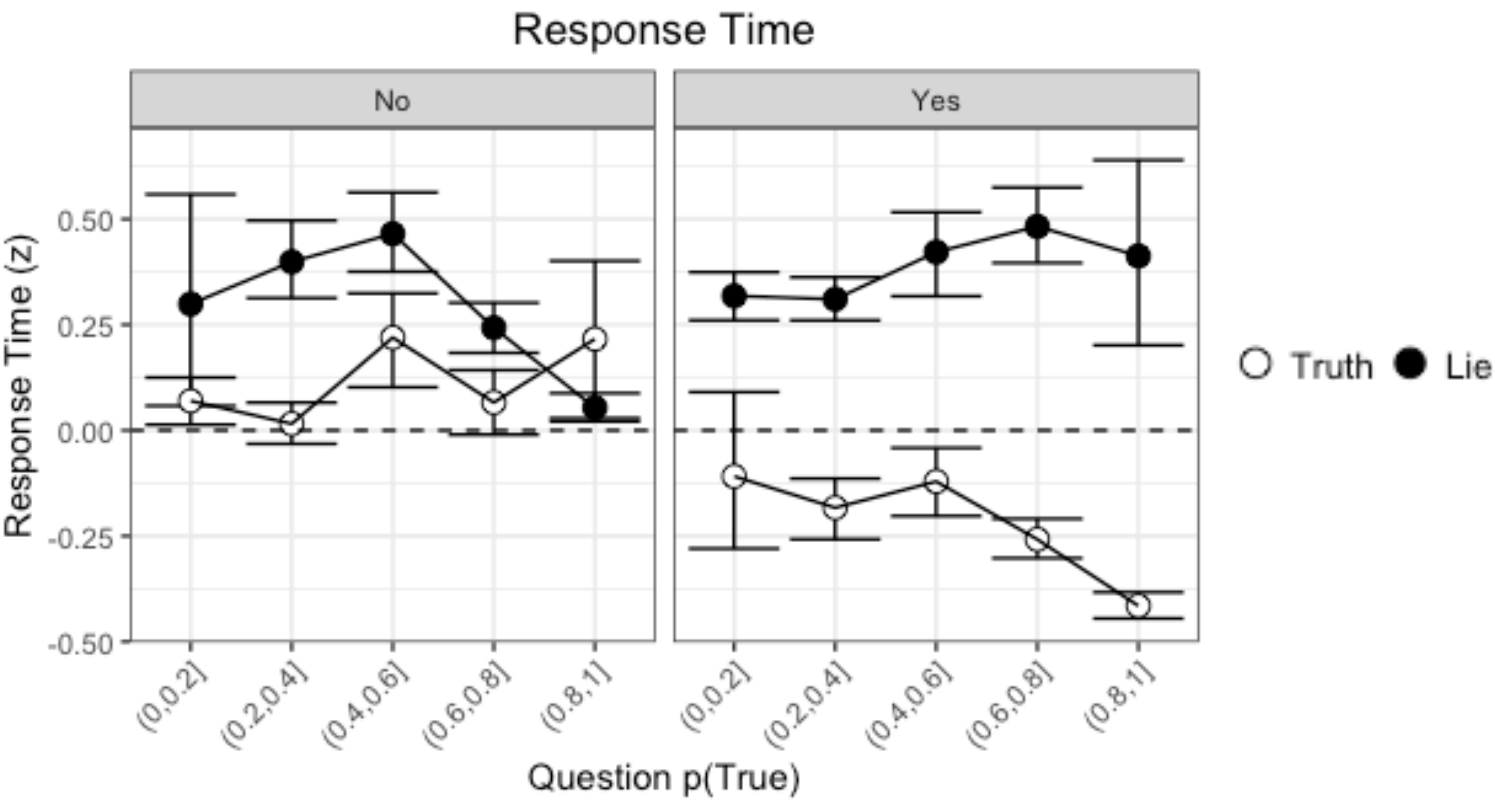


Summary

There is a main effect for response (yes vs. no), such that “no” responses show greater vacillation; a main effect for veracity (lie vs. true), such that lies show greater vacillation; and an interaction between responses and veracity. Examining the figure, there is a difference between “truth” and “lies,” but only for the “yes” responses.

Mixed effects models results: Response time: Probability of true

Predictor	Response Time		
	B	SE	t
(Intercept)	68.76	26.53	2.59
Yes v No	-70.20	15.83	-4.43
Lie v Truth	305.98	15.84	19.32
Trial Number	201.15	30.17	6.67
Ans - Deep v Shallow	-25.10	10.48	-2.39
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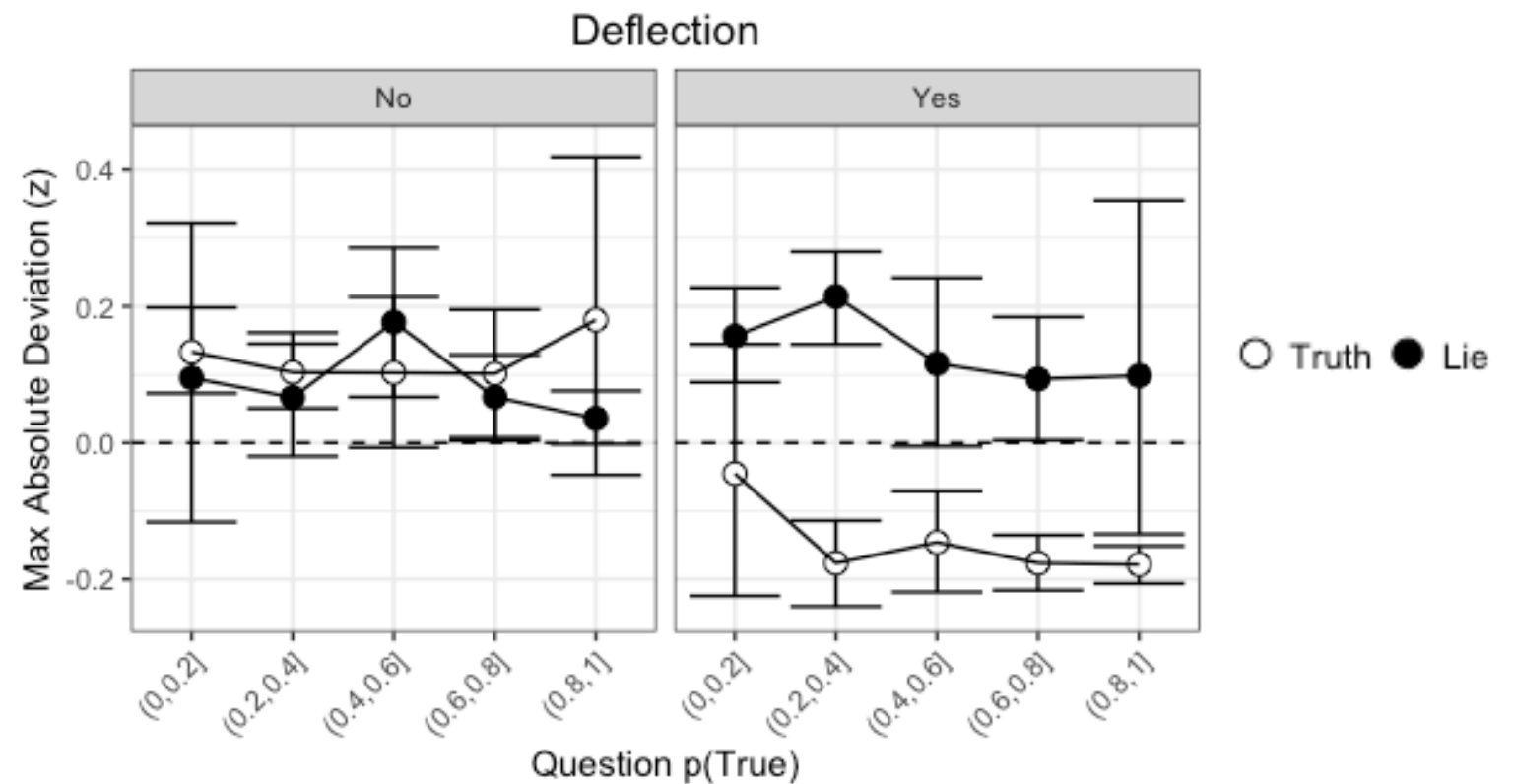


Summary

There is a main effect for probability of item being true, such that as items are more common (likely to be true), the faster to respond. There is also an interaction with veracity and probability of item being true, that is further qualified by a 3-way interaction with response (yes vs. no), suggesting that for “no” lie responses, these show faster response times as the item becomes more probable. Thus, people find it easier to lie to items like, “Have you ever gone fishing?” (high probability of being true and saying “no” as a lie).

Mixed effects models results: Deflection: Probability of true

Predictor	Deflection		
	B	SE	t
(Intercept)	3.41	3.49	0.98
Yes v No	-12.03	2.92	-4.11
Lie v Truth	20.67	2.93	7.07
Trial Number	9.93	4.56	2.18
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YvN * LvT * P(true)	8.69	18.98	0.46

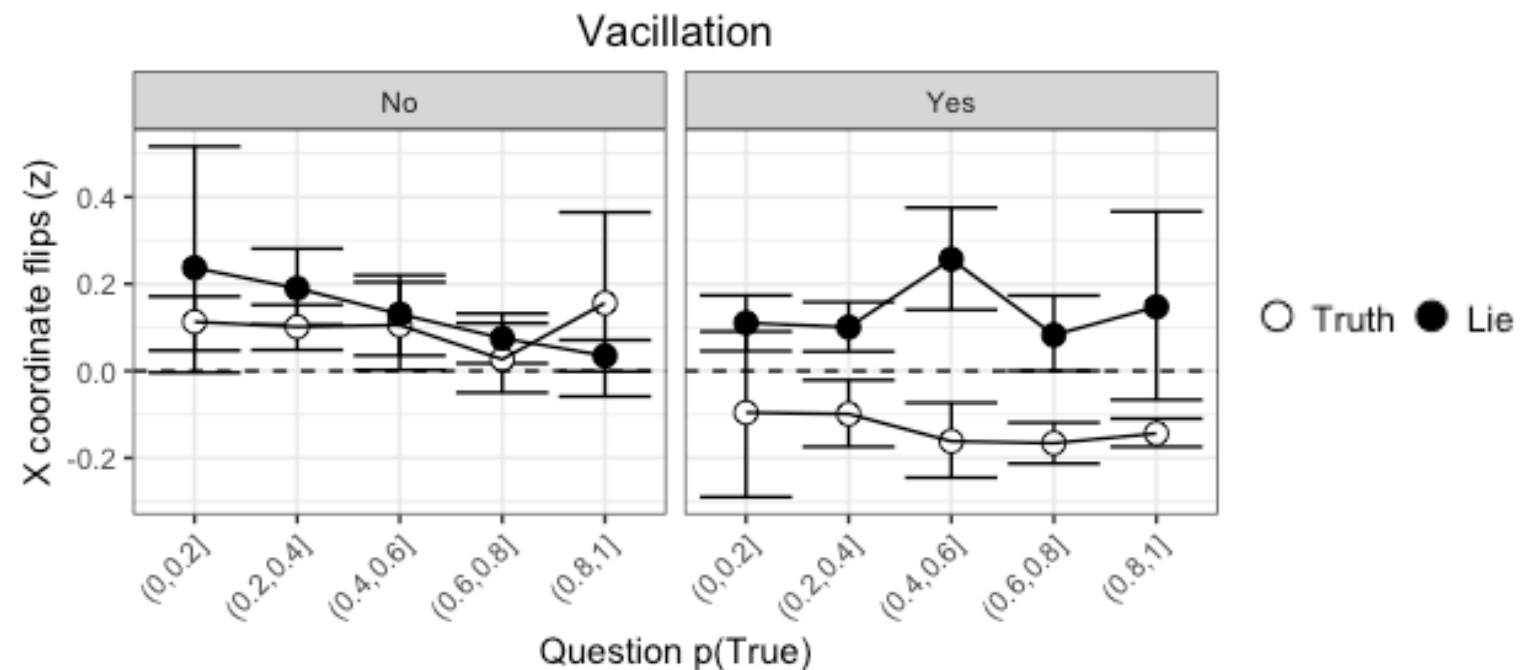


Summary

There are no statistically significant effects with deflection and probability of being true. However, see the more refined “deflection” measure as captured by the time continuous multiple regression analysis.

Mixed effects models results: Vacillation: Probability of true

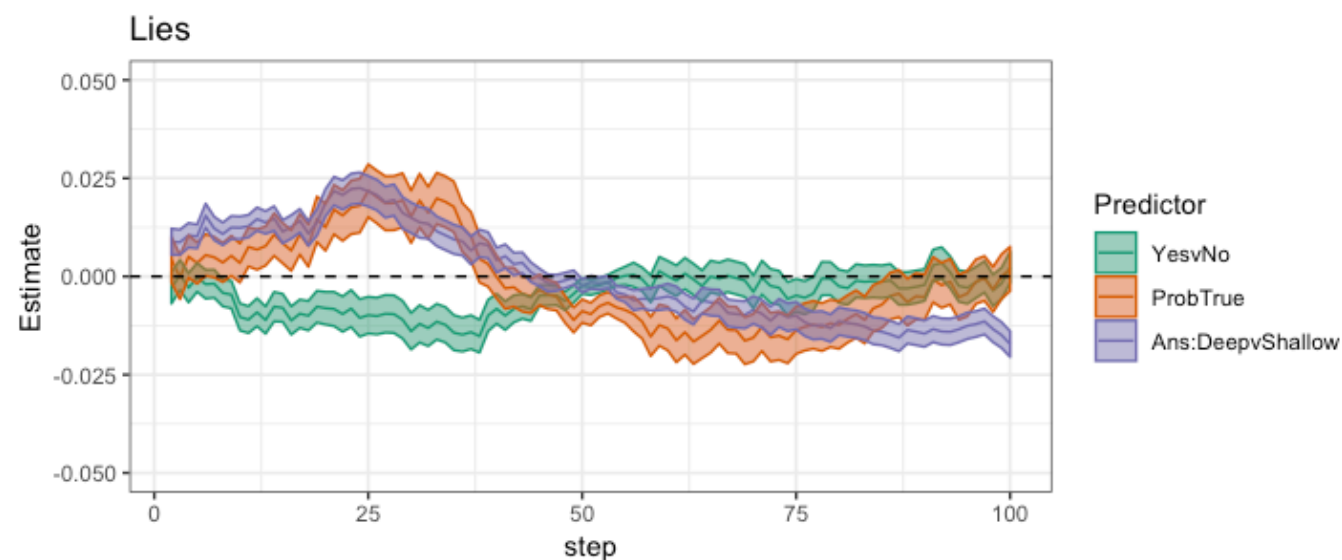
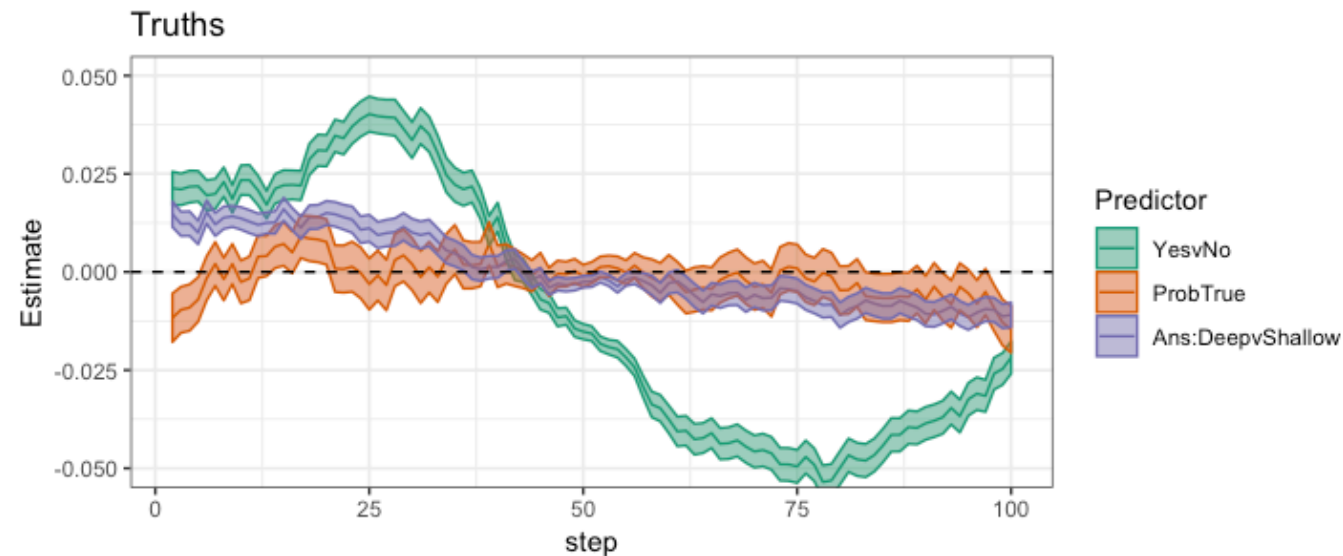
Predictor	Vacillation		
	B	SE	z
(Intercept)	0.28	0.02	14.35
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Yes v No * Lie v Truth	0.22	0.04	5.48
Lie v Truth * Prob True	0.15	0.06	2.71
Yes v No * Prob True	-0.04	0.06	-0.62
YvN * LvT * P(true)	0.31	0.13	2.50



Summary

There is a main effect for probability of item being true, such that as items are more common (likely to be true), the less vacillation. There is also an interaction with veracity and probability of item being true, that is further qualified by a 3-way interaction with response (yes vs. no), suggesting that for “no” lie responses, these show less vacillation as the item becomes more probable. Thus, people find it easier to lie to items like, “Have you ever gone fishing?” (high probability of being true and saying “no” as a lie).

TCMR: Time continuous multiple regression

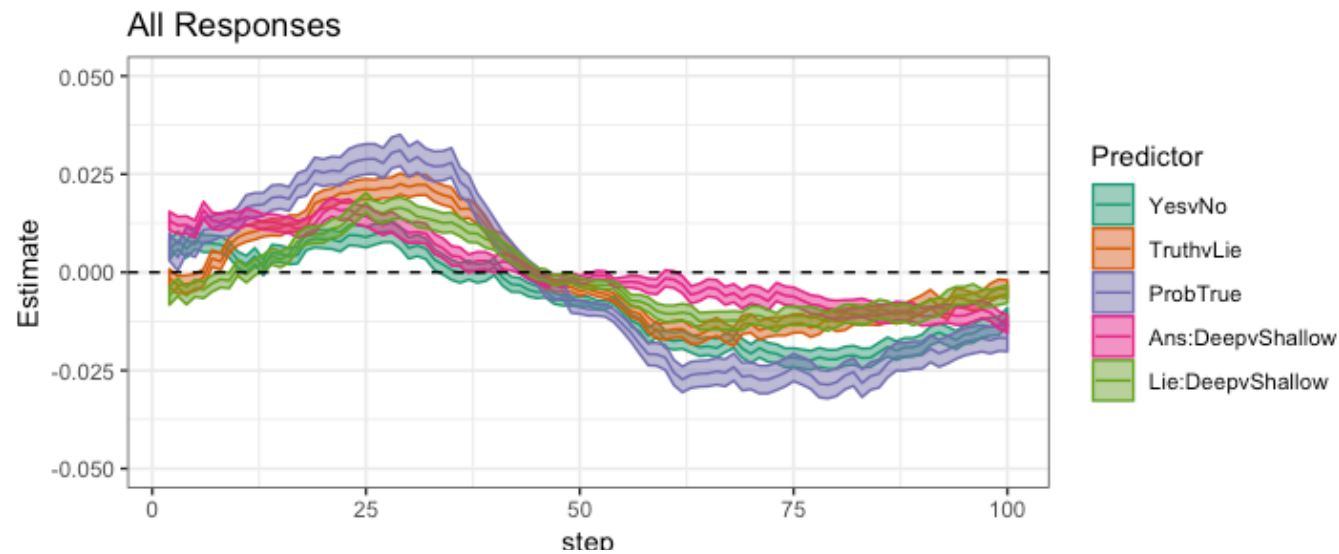


Notable patterns

For Truths: (a) the approach of “yes” responses to the target *early on* is closer relative to “no” responses **[translation: answering the truth by responding “yes” is easier than answering the truth by responding “no”]**, (b) the approach of responses that are repeated (e.g., “yes” preceded by a “yes”) to the target *early on* are closer relative to responses that switch (e.g., “yes” preceded by a “no”) **[translation: repeated trials are easiest]**, (c) the probability of an item being true does not influence the closeness to the target **[translation: for true, it’s equally easy to respond whether low or high probability of being true]**.

For Lies: (a) the approach of “no” responses to the target *early on* is closer relative to “yes” responses **[translation: lying by answering “no” is easier than lying and answering “yes”]**, (b) the approach of responses that are repeated (e.g., “yes” preceded by a “yes”) to the target *early on* are closer relative to responses that switch (e.g., “yes” preceded by a “no”) **[translation: repeated trials are easiest]**, (c) as the probability of an item being true increases, it is closer to the target *early on* **[translation: for lies, it’s easier to do so the more probable the item being falsified is actually true]**.

TCMR: Time continuous multiple regression (spatial normalization)



Notable patterns

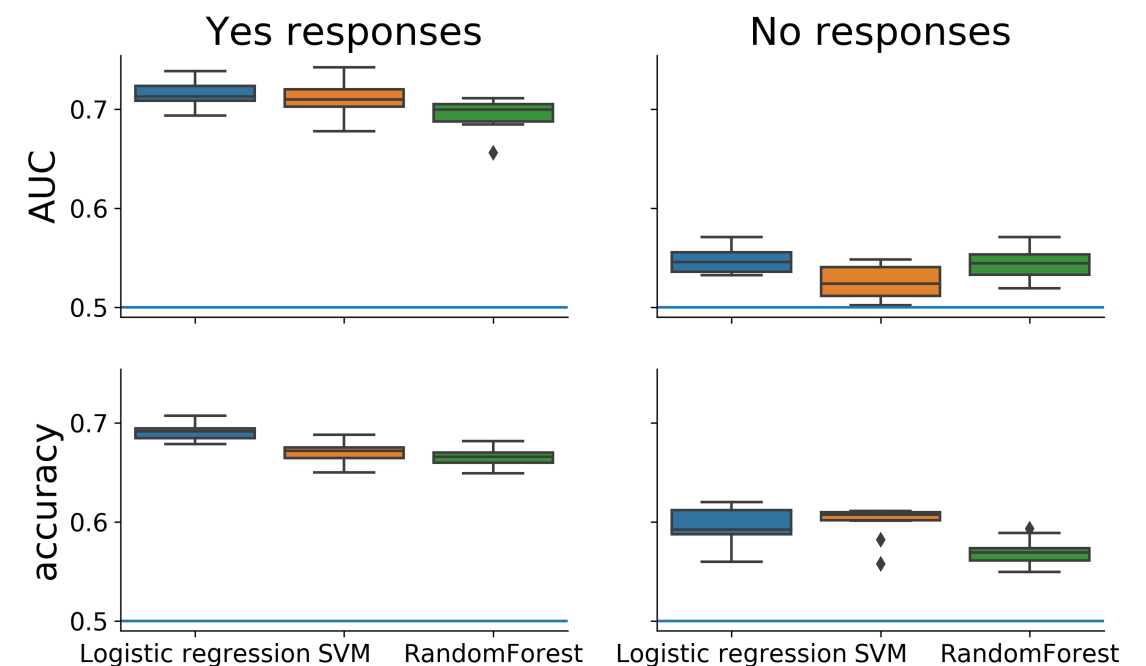
For all responses: (a) the approach of “yes” responses to the target *early on* is closer relative to “no” responses **[translation: answering “yes” is easier than answering “no”]**, (b) the approach of “truth” responses to the target *early on* is closer relative to “lie” responses **[translation: answering “truth” is easier than answering “lie”]**, (c) as the probability of an item being true increases, it is closer to the target *early on* **[translation: it’s easier to respond the more probable the item being falsified is actually true]**, (d) the approach of responses that are repeated (e.g., “yes” preceded by a “yes”; or “lie” preceded by “lie”) to the target *early on* are closer relative to responses that switch (e.g., “yes” preceded by a “no”; “lie” preceded by “true”) **[translation: repeated trials are easiest]**,

Machine learning prediction models

Summary

Using features extracted from the raw trajectories, we ran three machine learning algorithms -- simple logistic regression, support vector machine, and RandomForest to predict whether an individual trajectory is a lie or truth. We used 10-fold cross-validation, that is, randomly chosen 90% of the data is used to fit the classifier, and then the remaining 10% is used to gauge classification accuracy. Because the split into training and testing datasets is random, this is repeated ten times, accuracy is then averaged over these ten runs. Please note that all features are centered at 0 and rescaled according to interquantile difference (divided by the difference between 99th and 1st percentile).

Accuracy is measured as area under the ROC curve (AUC) and "accuracy," which is the accuracy of prediction for the default threshold of 50%. This means that a trajectory is classified as "lie" if the classifier thinks it's more than 50% likely to be a lie; this threshold balances false positive and false negative classification errors.



Machine learning prediction models

Summary

The features from the raw trajectories include:

MAD

Signed Maximum absolute deviation from the direct path connecting start and end point of the trajectory (straight line). If the MAD occurs above the direct path, this is denoted by a positive value; if it occurs below, by a negative value.

MAD_time

Time at which the maximum absolute deviation was reached first

MD_above

Maximum deviation above the direct path

MD_above_time

Time at which the maximum deviation above was reached first

MD_below

Maximum deviation below the direct path

MD_below_time

Time at which the maximum deviation below was reached first

AD

Average deviation from direct path

AUC

Area under curve, the geometric area between the actual trajectory and the direct path where areas below the direct path have been subtracted

xpos_flips

Number of directional changes along x-axis (exceeding the distance specified in flip_threshold)

ypos_flips

Number of directional changes along y-axis (exceeding the distance specified in flip_threshold)

xpos_reversals

Number of crossings of the y-axis

RT

Response time, time at which tracking stopped