

Design Topic: Decision Making

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Assess the risk the
the borrower will fail
to pay back the
money ("defaulting"
on the loan)



Prediction status: Case 1 of 40

Applicant profile

Loan applicant #1 has applied for a loan of \$30,375, with an interest rate of 19.52%. The loan will be paid in 36 monthly installments of \$1,121.43. The applicant has an annual income of \$80,000 and a "Good" credit score. The applicant has a mortgage out on their home.

Make a Prediction

How likely is this applicant to default on their loan?

- 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Continue

Green, Ben, and Yiling Chen. "The principles and limits of algorithm-in-the-loop decision making." *Proceedings of the ACM on Human-Computer Interaction* 3, no. CSCW (2019): 1-24.

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Risk assessment

The risk score algorithm predicts that this person is 40% likely to default on their loan.

Make a Prediction

How likely is this applicant to default on their loan?

- 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

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Risk assessment

The risk score algorithm predicts that this person is 40% likely to default on their loan. Compared to the average applicant, the following attributes make this applicant notably

- Higher risk: Interest rate.
- Lower risk: Home ownership.

Make a Prediction

How likely is this applicant to default on their loan?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

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Human Decision

Representativeness

Insensitive to prior probability of outcomes

Insensitive to sample size

Illusion of validity

Tversky, Amos, and Daniel Kahneman. "Judgment under uncertainty: Heuristics and biases." *science* 185, no. 4157 (1974): 1124-1131.



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Human Decision

Availability

Biases due to the retrievability of instances

Biases of imaginability

Illusion of correlation

Tversky, Amos, and Daniel Kahneman. "Judgment under uncertainty: Heuristics and biases." *science* 185, no. 4157 (1974): 1124-1131.



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Human Decision

Adjustment and Anchoring

Insufficient adjustment

*Biases in evaluation of conjunctive
and disjunctive events*



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Principles in the context of making decision with the aid of ML models

- Accuracy

People using the algorithm should make more accurate predictions than they could without the algorithm

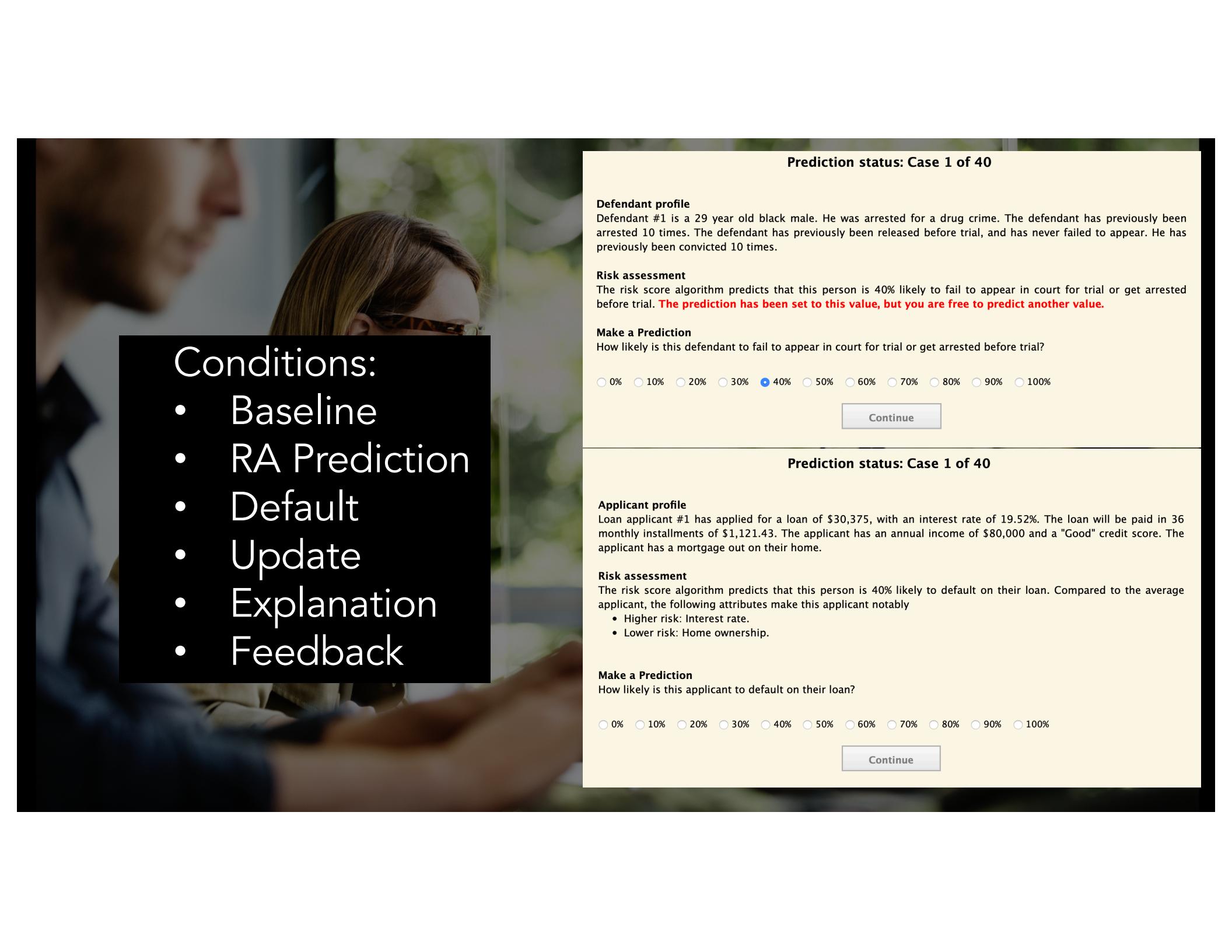
- Reliability

People should accurately evaluate their own and the algorithm's performance and should calibrate their use of the algorithm to account for its accuracy and errors.

- Fairness

People should interact with the algorithm in ways that are unbiased with regard to race, gender, and other sensitive attributes.

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- ## Conditions:
- Baseline
 - RA Prediction
 - Default
 - Update
 - Explanation
 - Feedback

Prediction status: Case 1 of 40

Defendant profile

Defendant #1 is a 29 year old black male. He was arrested for a drug crime. The defendant has previously been arrested 10 times. The defendant has previously been released before trial, and has never failed to appear. He has previously been convicted 10 times.

Risk assessment

The risk score algorithm predicts that this person is 40% likely to fail to appear in court for trial or get arrested before trial. **The prediction has been set to this value, but you are free to predict another value.**

Make a Prediction

How likely is this defendant to fail to appear in court for trial or get arrested before trial?

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

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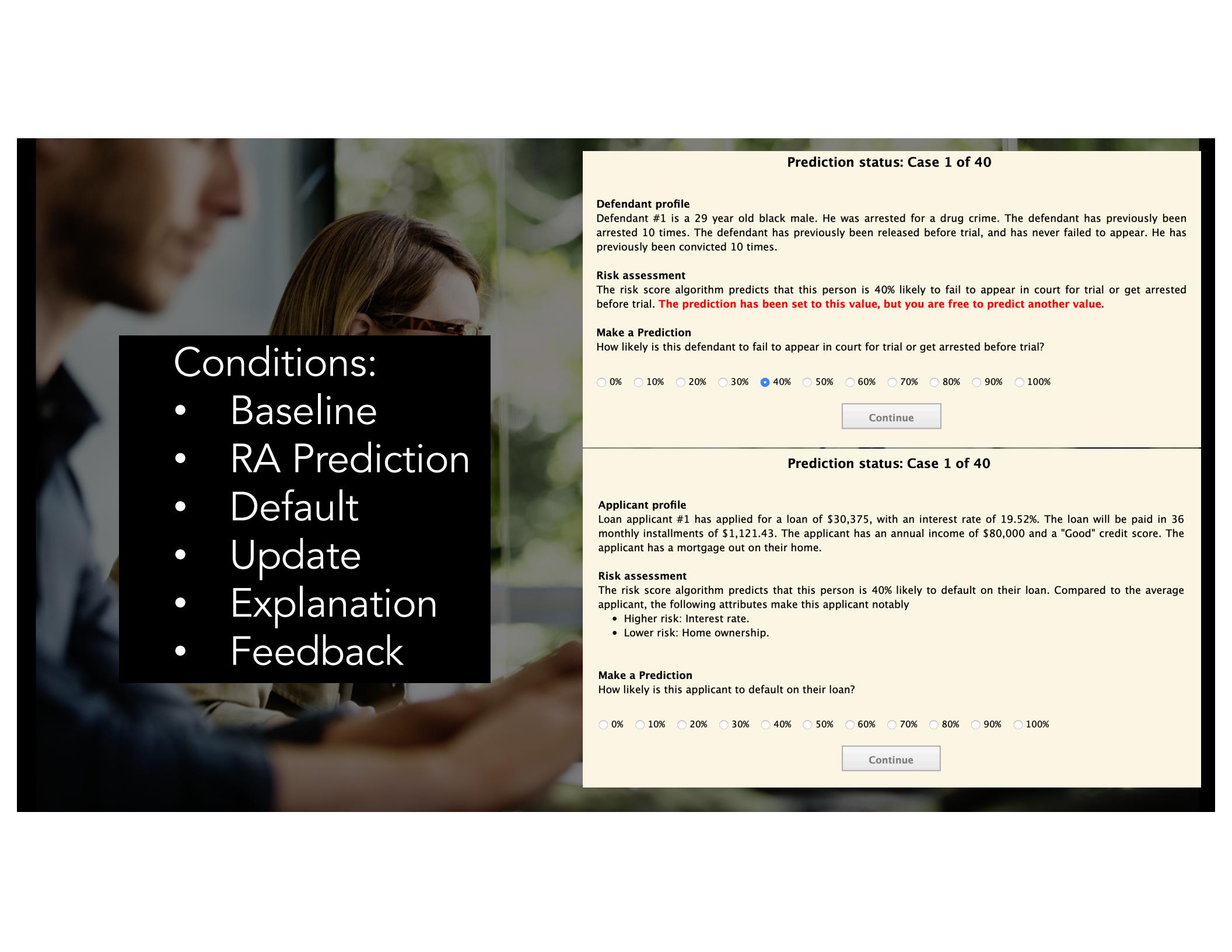
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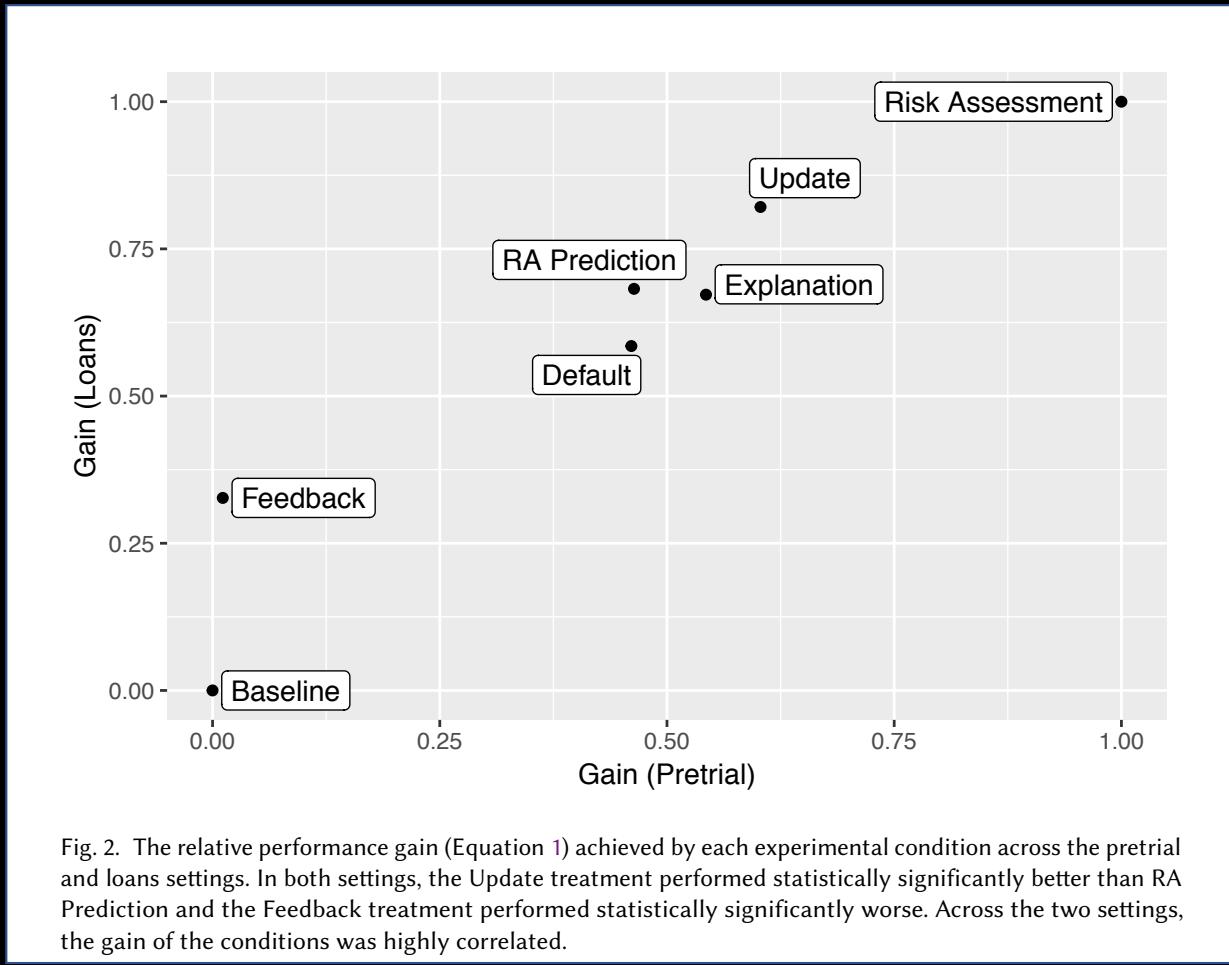
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Accuracy



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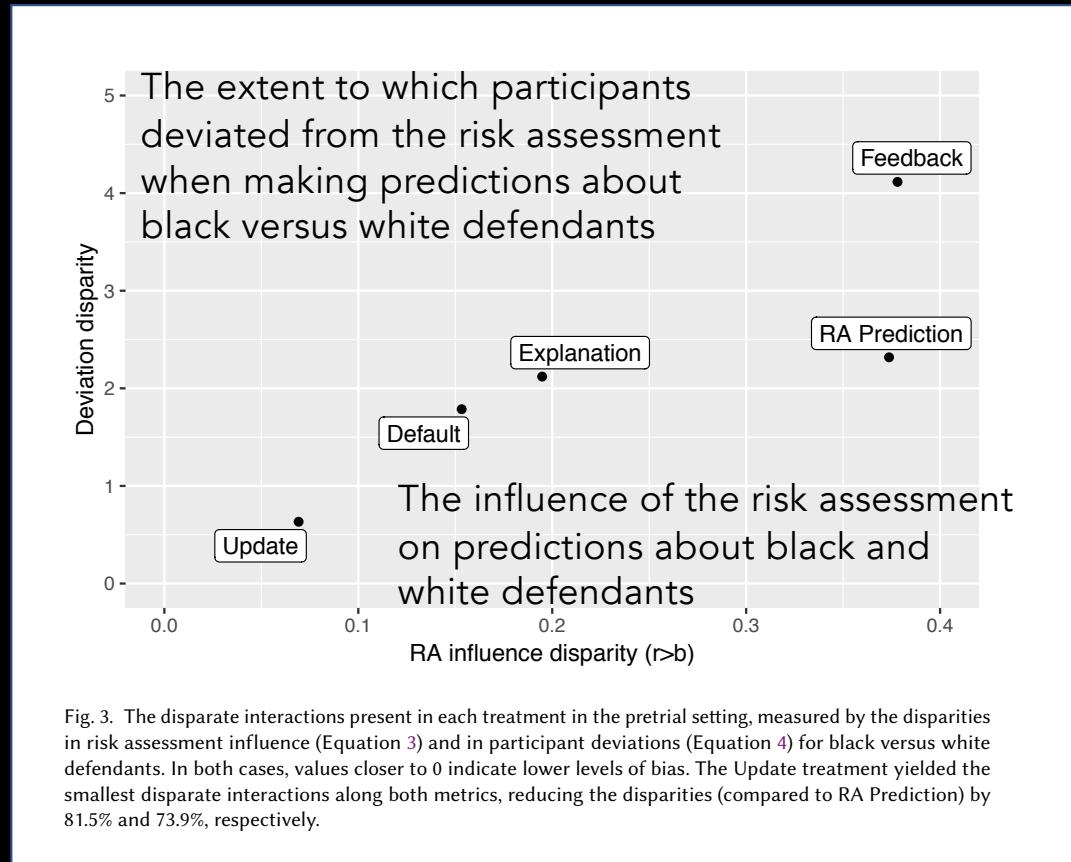
Reliability

Table 4. Summary of participant abilities to evaluate performance (first two columns) and to calibrate their predictions (third column). The columns measure the relationships between participant confidence and actual performance (Confidence), participant estimates of the algorithm's performance and its actual performance (RA Accuracy), and participant reliance on the risk assessment and the risk assessment's performance (Calibration). + signifies a positive and statistically significant relationship, - signifies a negative and statistically significant relationship, and 0 signifies no statistically significant relationship. In all cases, + means that the desired behavior was observed.

	Confidence		RA Accuracy		Calibration	
	Pretrial	Loans	Pretrial	Loans	Pretrial	Loans
RA Prediction	0	0	0	0	-	0
Default	0	-	0	-	0	0
Update	0	-	-	-	0	0
Explanation	0	0	0	0	-	+
Feedback	0	0	0	0	-	0

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Fairness



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"No matter how the risk assessment was presented, participants could not determine their own or the model's accuracy, failed to calibrate their use of the model to the quality of its predictions, and exhibited disparate interactions when making predictions. "

"That assumptions about human oversight are so central to risk assessment advocacy and governance is particularly troubling given the inability of algorithms to reason about novel or marginal cases: people may make more accurate predictions on average when informed by an algorithm, but they are unlikely to recognize and discount any errors that arise. "

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Next on Tuesday

Design for Learning