



Reduced Certainty Preference After Solving Problems with Insight Than Solving with Analysis

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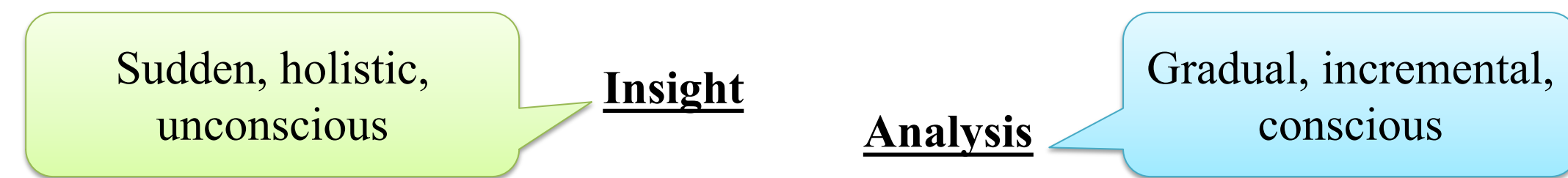
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Motivation

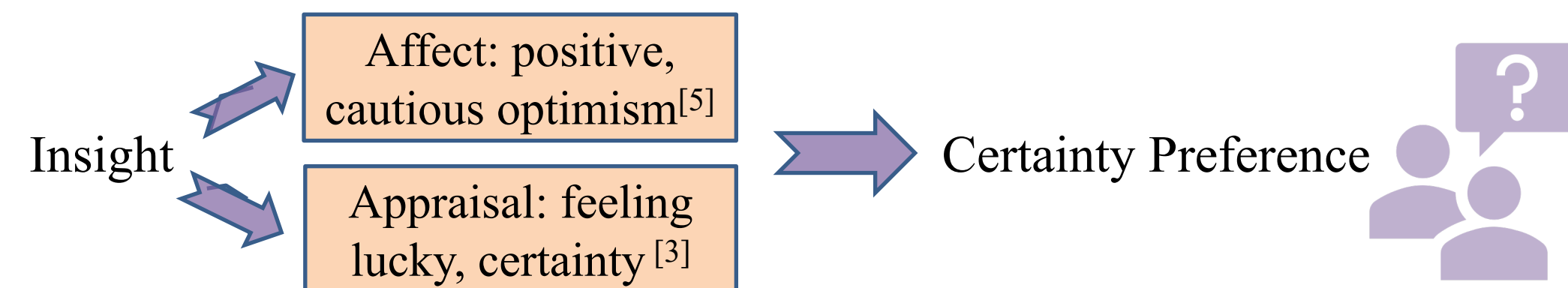
How does solving a problem by insight, or by analysis, alter the mental state and affect the subsequent decision making?

A problem can be solved by insight, by analysis³

An insight (Aha! moment) is often associated with certain breakthrough or discovery.

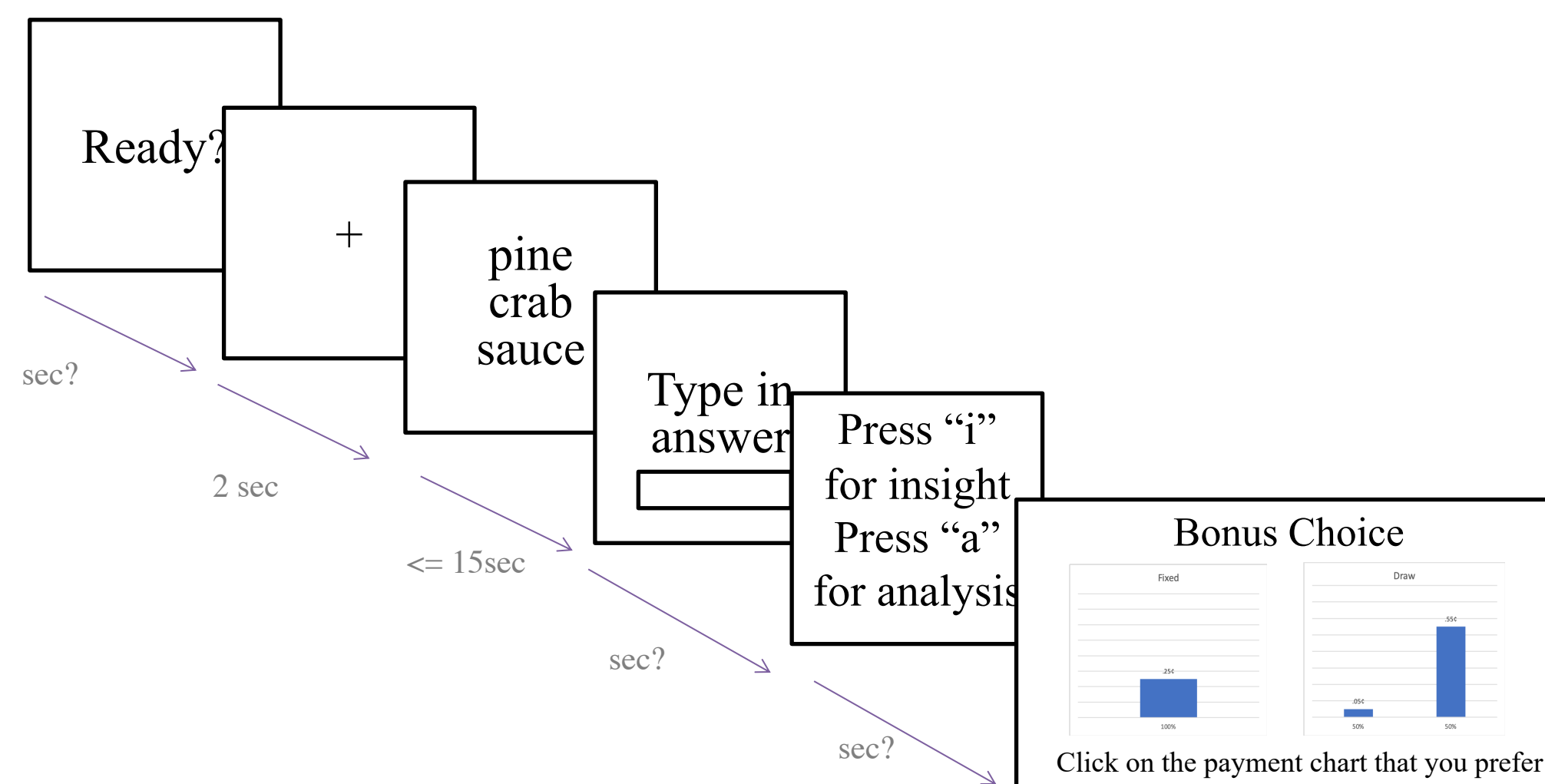


In real life, solving a problem is often followed by actions and decision involving uncertainty.



Material and Procedures

- 350 subjects were recruited on Amazon Mechanical Turk, screened for language, mental disorder, etc.
- Compound Remote Associate problems (CRA): Three words, each forming a compound word or phrase with solution (e.g., pine/crab/sauce —APPLE). Solution to each problem obtained either via *Insight* or via *Analysis* [1, 2]
- Bonus choice: **Risky** versus **Fixed**; customized to match each individual's baseline risk preference using a simplified *Multiple Price List*.



Result

Percentage of **risk choice** binned by the preceding problem-solving outcome:

- Correct items: solved correctly by insight or analysis
- Answered items: solved (incl. incorrectly) by insight or analysis
- All items: solved correctly vs. not solved (time-out)

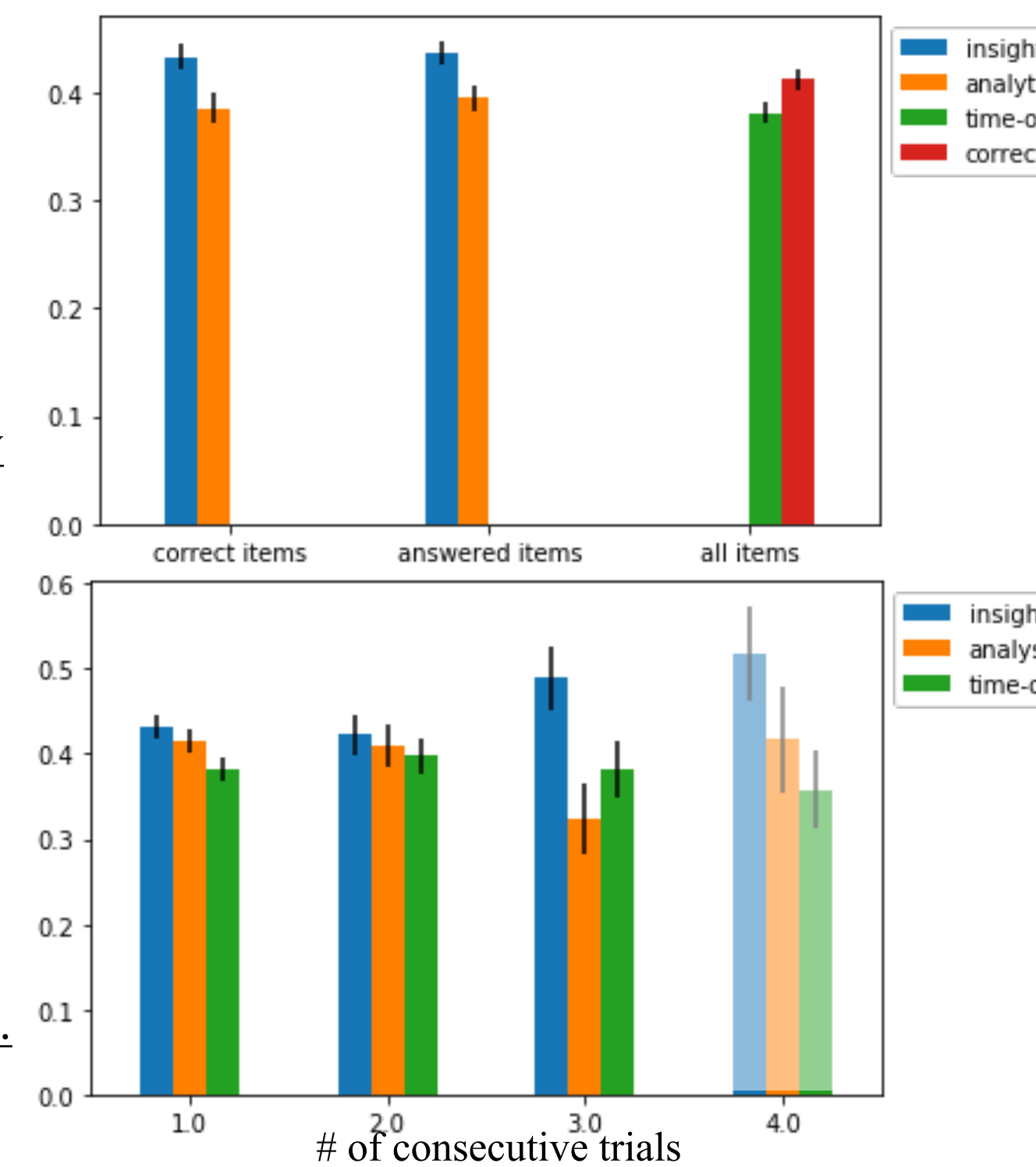
Higher chance of choosing the risky bonus following an insight solution.

The “accumulation” effect

Risk bonus choice, binned by the # of consecutive solutions of same type preceding that choice.

More consecutive insight solutions, more likely to choose the risky bonus.

Chance of making a risk choice



Generalized Mixed-Effect Model Fit

Predictors	Odds Ratios	CI	p	Bonus choice as dependent variable
(Intercept)	0.59	0.43 – 0.80	0.001**	1(risky), 0 (fixed)
insight [1]	1.16	0.96 – 1.41	0.121	

Random Effects: ICC 0.45
 σ^2 : 3.29 $\tau_{00 id}$ 2.71
 N id 142 Observations 2921

Male Only				Female Only			
Predictors	Odds Ratios	CI	p	Predictors	Odds Ratios	CI	p
(Intercept)	0.7	0.40 – 1.23	0.216	(Intercept)	0.52	0.36 – 0.74	<0.001**
insight [1]	1.41	1.04 – 1.90	0.025*	insight [1]	1.03	0.8 – 1.32	0.830

Random Effects: ICC 0.55 Random Effects: ICC 0.35
 N id 62 N id 80

Insight effect is significant for male, but not for female.

Conclusion

- Participants were more likely to make a risky choice (reduced certainty preference) after they solved problems with insight than with analysis.
 - Individual differences, including gender, appear to mediate this effect
- The insight effect (on certainty preference) can accumulate over trials solved in the same manner

Discussion

Overall problem-solving performance from online participants consistent with previous experiments [4].

Break-down of solution type

	Insight	Analysis
Right	0.291(0.14)	0.196(0.14)
Wrong	0.066(0.09)	0.071(0.10)

63% of the time an answer is provided. Accuracy: Insight 83% >> Analysis 75%

Overall bonus choice (36% risky, 64% fixed) implies the benchmark baseline preference is biased.

Many participants stuck with the same bonus choice (mostly fixed), possibly due to the limitation of the online testing environment: e.g., trust, attention. Thus, almost half of subjects failed to provide data (never altered bonus choice).

References

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