

# Who's to Blame for Survey Instability: Respondents with Nonexistent Preferences or Researchers with Flawed Measures?<sup>1</sup>

Gary King<sup>2</sup>

Institute for Quantitative Social Science  
Harvard University

University of Chicago, 4/14/2026

---

<sup>1</sup>Slides, paper, data: [GaryKing.org](http://GaryKing.org)

<sup>2</sup>Joint work with [Libby Jenke](#), University of Houston



# A Quiz (for you, as a survey researcher)

## A Quiz (for you, as a survey researcher)

- **Ask:** any nontrivial, binary choice survey question

## A Quiz (for you, as a survey researcher)

- **Ask:** any nontrivial, binary choice survey question
- **Ask again:** same question

## A Quiz (for you, as a survey researcher)

- **Ask:** any nontrivial, binary choice survey question
- **Ask again:** same question
- **What % answer differently?**

## A Quiz (for you, as a survey researcher)

- **Ask:** any nontrivial, binary choice survey question
  - **Assume:** No (1) memory, (2) material changes, (3) attrition
- **Ask again:** same question
- **What % answer differently?**

## A Quiz (for you, as a survey researcher)

- **Ask:** any nontrivial, binary choice survey question
  - **Assume:** No (1) memory, (2) material changes, (3) attrition
- **Ask again:** same question
- **What % answer differently?**

0%  $\longleftrightarrow$  50%

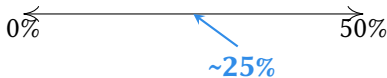
## A Quiz (for you, as a survey researcher)

- **Ask:** any nontrivial, binary choice survey question
  - **Assume:** No (1) memory, (2) material changes, (3) attrition
- **Ask again:** same question
- **What % answer differently?**



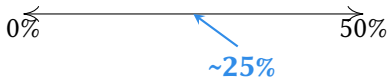
## A Quiz (for you, as a survey researcher)

- **Ask:** any nontrivial, binary choice survey question
  - **Assume:** No (1) memory, (2) material changes, (3) attrition
- **Ask again:** same question
- **What % answer differently?**



## A Quiz (for you, as a survey researcher)

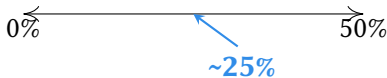
- **Ask:** any nontrivial, binary choice survey question
  - **Assume:** No (1) memory, (2) material changes, (3) attrition
- **Ask again:** same question
- **What % answer differently?**



- Midpoint of 0 to coin flip

## A Quiz (for you, as a survey researcher)

- **Ask:** any nontrivial, binary choice survey question
  - **Assume:** No (1) memory, (2) material changes, (3) attrition
- **Ask again:** same question
- **What % answer differently?**



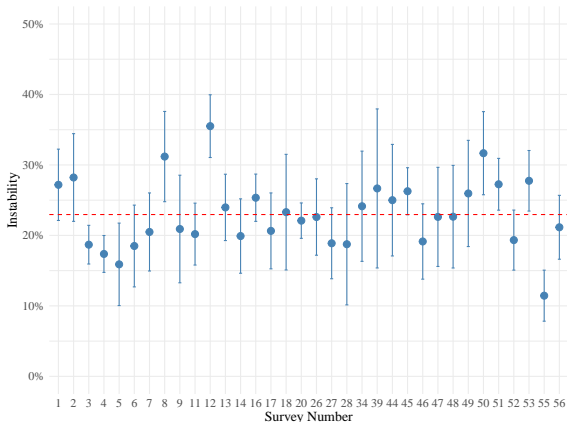
- Midpoint of 0 to coin flip
- Unchanged for 75 years

# A Quiz (for you, as a survey researcher)

- **Ask:** any nontrivial, binary choice survey question
  - **Assume:** No (1) memory, (2) material changes, (3) attrition
- **Ask again:** same question
- **What % answer differently?**

0% ←————→ 50%

~25%



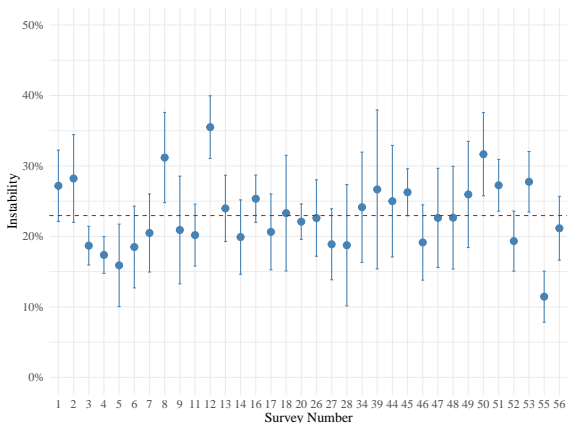
- Midpoint of 0 to coin flip
- Unchanged for 75 years

# A Quiz (for you, as a survey researcher)

- **Ask:** any nontrivial, binary choice survey question
  - **Assume:** No (1) memory, (2) material changes, (3) attrition
- **Ask again:** same question
- **What % answer differently?**

0% ←————→ 50%

~25%



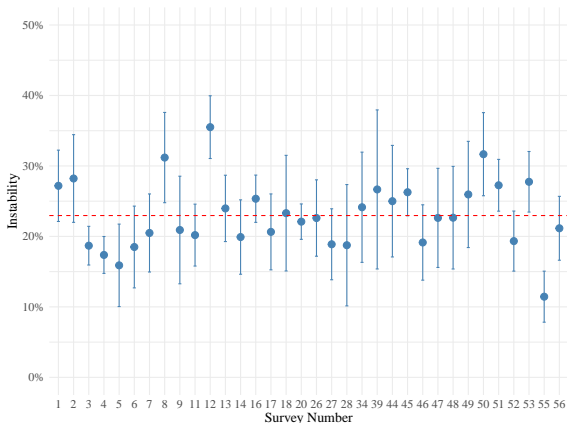
- Midpoint of 0 to coin flip
- Unchanged for 75 years
- **Why trust any survey analysis?**

# A Quiz (for you, as a survey researcher)

- **Ask:** any nontrivial, binary choice survey question
  - **Assume:** No (1) memory, (2) material changes, (3) attrition
- **Ask again:** same question
- **What % answer differently?**

0% ←————→ 50%

~25%



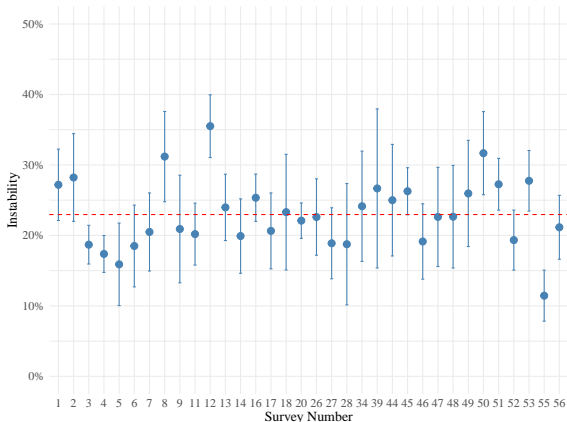
- Midpoint of 0 to coin flip
- Unchanged for 75 years
- **Why trust any survey analysis?**
  - $\frac{1}{2}$  of quant. polisci

# A Quiz (for you, as a survey researcher)

- **Ask:** any nontrivial, binary choice survey question
  - **Assume:** No (1) memory, (2) material changes, (3) attrition
- **Ask again:** same question
- **What % answer differently?**

0% ←————→ 50%

~25%



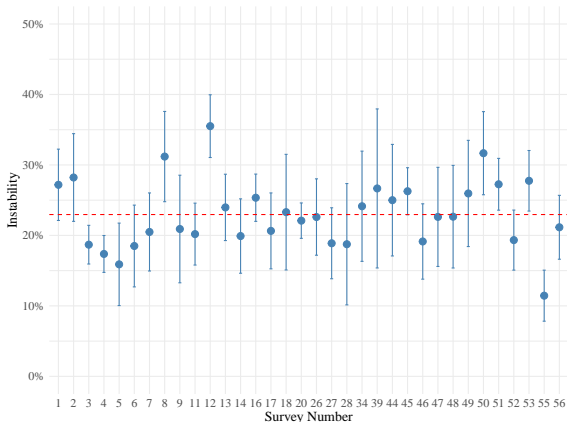
- Midpoint of 0 to coin flip
- Unchanged for 75 years
- **Why trust any survey analysis?**
  - ½ of quant. polisci
  - similar across socsci, health, etc.

# A Quiz (for you, as a survey researcher)

- **Ask:** any nontrivial, binary choice survey question
  - **Assume:** No (1) memory, (2) material changes, (3) attrition
- **Ask again:** same question
- **What % answer differently?**

0% ←————→ 50%

~25%



- Midpoint of 0 to coin flip
- Unchanged for 75 years
- **Why trust any survey analysis?**
  - ½ of quant. polisci
  - similar across socsci, health, etc.
  - multi-\$B industry

# Research Strategy

# Research Strategy

- Assumptions: No (1) memory, (2) material changes, (3) attrition

# Research Strategy

- Assumptions: No (1) memory, (2) material changes, (3) attrition
- Previous Research

# Research Strategy

- Assumptions: No (1) memory, (2) material changes, (3) attrition
- Previous Research
  
- New Experimental Platform

# Research Strategy

- Assumptions: No (1) memory, (2) material changes, (3) attrition
- Previous Research
  - Strategy: separate surveys, months apart
- New Experimental Platform

# Research Strategy

- **Assumptions:** No (1) memory, (2) material changes, (3) attrition
- **Previous Research**
  - **Strategy:** separate surveys, months apart
  - **Problems:** the 3 assumptions conflict
- **New Experimental Platform**

# Research Strategy

- Assumptions: No (1) memory, (2) material changes, (3) attrition
- Previous Research
  - Strategy: separate surveys, months apart
  - Problems: the 3 assumptions conflict
- New Experimental Platform
  - Single survey, conjoint question:  $Q_1$  [distractors]  $Q_2$

## A Binary Choice Conjoint Question

(Ono and Burden, 2018)

Please carefully review the two potential candidates running for election to the U.S. House of Representatives, detailed below.

	<b>Candidate 0</b>	<b>Candidate 1</b>
Race/Ethnicity	Hispanic	Asian American
Age	52	60
Favorability rating among the public	70%	34%
Position on immigrants	Favors giving citizenship or guest worker status to undocumented immigrants	Opposes giving citizenship or guest worker status to undocumented immigrants
Party affiliation	Republican Party	Democratic Party
Position on abortion	Abortion is not a private matter (pro-life)	Abortion is a private matter (pro-choice)
Position on government deficit	Wants to reduce the deficit through tax increase	Wants to reduce the deficit through tax increase
Salient personal characteristics	Really cares about people like you	Really cares about people like you
Position on national security	Wants to cut military budget and keep the U.S. out of war	Wants to maintain strong defense and increase U.S. influence
Gender	Female	Female
Policy area of expertise	Education	Foreign policy
Family	Single (divorced)	Married (no child)
Experience in public office	12 years	4 years

If you had to choose between them, which of these candidates would you vote to be a member of the U.S. House of Representatives?

# Research Strategy

- Assumptions: No (1) memory, (2) material changes, (3) attrition
- Previous Research
  - Strategy: separate surveys, months apart
  - Problems: the 3 assumptions conflict
- New Experimental Platform
  - Single survey, conjoint question:  $Q_1$  [distractors]  $Q_2$

# Research Strategy

- Assumptions: No (1) memory, (2) material changes, (3) attrition
- Previous Research
  - Strategy: separate surveys, months apart
  - Problems: the 3 assumptions conflict
- New Experimental Platform
  - Single survey, conjoint question:  $Q_1$  [distractors]  $Q_2$
  - Assumptions: Easy: (2) and (3). Also works: (1).

## A Binary Choice Conjoint Question

(Ono and Burden, 2018)

Please carefully review the two potential candidates running for election to the U.S. House of Representatives, detailed below.

	<b>Candidate 0</b>	<b>Candidate 1</b>
Race/Ethnicity	Hispanic	Asian American
Age	52	60
Favorability rating among the public	70%	34%
Position on immigrants	Favors giving citizenship or guest worker status to undocumented immigrants	Opposes giving citizenship or guest worker status to undocumented immigrants
Party affiliation	Republican Party	Democratic Party
Position on abortion	Abortion is not a private matter (pro-life)	Abortion is a private matter (pro-choice)
Position on government deficit	Wants to reduce the deficit through tax increase	Wants to reduce the deficit through tax increase
Salient personal characteristics	Really cares about people like you	Really cares about people like you
Position on national security	Wants to cut military budget and keep the U.S. out of war	Wants to maintain strong defense and increase U.S. influence
Gender	Female	Female
Policy area of expertise	Education	Foreign policy
Family	Single (divorced)	Married (no child)
Experience in public office	12 years	4 years

If you had to choose between them, which of these candidates would you vote to be a member of the U.S. House of Representatives?

# Research Strategy

- Assumptions: No (1) memory, (2) material changes, (3) attrition
- Previous Research
  - Strategy: separate surveys, months apart
  - Problems: the 3 assumptions conflict
- New Experimental Platform
  - Single survey, conjoint question:  $Q_1$  [distractors]  $Q_2$
  - Assumptions: Easy: (2) and (3). Also works: (1).

# Research Strategy

- **Assumptions:** No (1) memory, (2) material changes, (3) attrition
- **Previous Research**
  - **Strategy:** separate surveys, months apart
  - **Problems:** the 3 assumptions conflict
- **New Experimental Platform**
  - **Single survey, conjoint question:**  $Q_1$  [distractors]  $Q_2$
  - **Assumptions:** **Easy:** (2) and (3). **Also works:** (1).
  - **Technology Change:** online survey platforms

# Research Strategy

- **Assumptions:** No (1) memory, (2) material changes, (3) attrition
- **Previous Research**
  - **Strategy:** separate surveys, months apart
  - **Problems:** the 3 assumptions conflict
- **New Experimental Platform**
  - **Single survey, conjoint question:**  $Q_1$  [distractors]  $Q_2$
  - **Assumptions:** **Easy:** (2) and (3). **Also works:** (1).
  - **Technology Change:** online survey platforms
    - **Prep time:** months  $\rightsquigarrow$  hours

# Research Strategy

- **Assumptions:** No (1) memory, (2) material changes, (3) attrition
- **Previous Research**
  - **Strategy:** separate surveys, months apart
  - **Problems:** the 3 assumptions conflict
- **New Experimental Platform**
  - **Single survey, conjoint question:**  $Q_1$  [distractors]  $Q_2$
  - **Assumptions:** **Easy:** (2) and (3). **Also works:** (1).
  - **Technology Change:** online survey platforms
    - **Prep time:** months  $\rightsquigarrow$  hours
    - **Validation:** Preregistration + one test  $\rightsquigarrow$  many sequential tests

# Research Strategy

- **Assumptions:** No (1) memory, (2) material changes, (3) attrition
- **Previous Research**
  - **Strategy:** separate surveys, months apart
  - **Problems:** the 3 assumptions conflict
- **New Experimental Platform**
  - **Single survey, conjoint question:**  $Q_1$  [distractors]  $Q_2$
  - **Assumptions:** **Easy:** (2) and (3). **Also works:** (1).
  - **Technology Change:** online survey platforms
    - **Prep time:** months  $\rightsquigarrow$  hours
    - **Validation:** Preregistration + one test  $\rightsquigarrow$  many sequential tests
    - **Stopping rule:** 1 run  $\rightsquigarrow$  ability to predict in new data

# Research Strategy

- **Assumptions:** No (1) memory, (2) material changes, (3) attrition
- **Previous Research**
  - **Strategy:** separate surveys, months apart
  - **Problems:** the 3 assumptions conflict
- **New Experimental Platform**
  - **Single survey, conjoint question:**  $Q_1$  [distractors]  $Q_2$
  - **Assumptions:** **Easy:** (2) and (3). **Also works:** (1).
  - **Technology Change:** online survey platforms
    - **Prep time:** months  $\rightsquigarrow$  hours
    - **Validation:** Preregistration + one test  $\rightsquigarrow$  many sequential tests
    - **Stopping rule:** 1 run  $\rightsquigarrow$  ability to predict in new data
    - **We tested:** every prior hypothesis & ours, in many ways

# Research Strategy

- **Assumptions:** No (1) memory, (2) material changes, (3) attrition
- **Previous Research**
  - **Strategy:** separate surveys, months apart
  - **Problems:** the 3 assumptions conflict
- **New Experimental Platform**
  - **Single survey, conjoint question:**  $Q_1$  [distractors]  $Q_2$
  - **Assumptions:** **Easy:** (2) and (3). **Also works:** (1).
  - **Technology Change:** online survey platforms
    - **Prep time:** months  $\rightsquigarrow$  hours
    - **Validation:** Preregistration + one test  $\rightsquigarrow$  many sequential tests
    - **Stopping rule:** 1 run  $\rightsquigarrow$  ability to predict in new data
    - **We tested:** every prior hypothesis & ours, in many ways
    - **We ran:** 59 unique surveys

# Research Strategy

- **Assumptions:** No (1) memory, (2) material changes, (3) attrition
- **Previous Research**
  - **Strategy:** separate surveys, months apart
  - **Problems:** the 3 assumptions conflict
- **New Experimental Platform**
  - **Single survey, conjoint question:**  $Q_1$  [distractors]  $Q_2$
  - **Assumptions:** **Easy:** (2) and (3). **Also works:** (1).
  - **Technology Change:** online survey platforms
    - **Prep time:** months  $\rightsquigarrow$  hours
    - **Validation:** Preregistration + one test  $\rightsquigarrow$  many sequential tests
    - **Stopping rule:** 1 run  $\rightsquigarrow$  ability to predict in new data
    - **We tested:** every prior hypothesis & ours, in many ways
    - **We ran:** 59 unique surveys (observational, experimental, eye tracking, open/closed ended, conjoint/standard, ....)

# Research Strategy

- **Assumptions:** No (1) memory, (2) material changes, (3) attrition
- **Previous Research**
  - **Strategy:** separate surveys, months apart
  - **Problems:** the 3 assumptions conflict
- **New Experimental Platform**
  - **Single survey, conjoint question:**  $Q_1$  [distractors]  $Q_2$
  - **Assumptions:** **Easy:** (2) and (3). **Also works:** (1).
  - **Technology Change:** online survey platforms
    - **Prep time:** months  $\rightsquigarrow$  hours
    - **Validation:** Preregistration + one test  $\rightsquigarrow$  many sequential tests
    - **Stopping rule:** 1 run  $\rightsquigarrow$  ability to predict in new data
    - **We tested:** every prior hypothesis & ours, in many ways
    - **We ran:** 59 unique surveys (observational, experimental, eye tracking, open/closed ended, conjoint/standard, ....)
    - **We were wrong & changed directions:**

# Research Strategy

- **Assumptions:** No (1) memory, (2) material changes, (3) attrition
- **Previous Research**
  - **Strategy:** separate surveys, months apart
  - **Problems:** the 3 assumptions conflict
- **New Experimental Platform**
  - **Single survey, conjoint question:**  $Q_1$  [distractors]  $Q_2$
  - **Assumptions:** **Easy:** (2) and (3). **Also works:** (1).
  - **Technology Change:** online survey platforms
    - **Prep time:** months  $\rightsquigarrow$  hours
    - **Validation:** Preregistration + one test  $\rightsquigarrow$  many sequential tests
    - **Stopping rule:** 1 run  $\rightsquigarrow$  ability to predict in new data
    - **We tested:** every prior hypothesis & ours, in many ways
    - **We ran:** 59 unique surveys (observational, experimental, eye tracking, open/closed ended, conjoint/standard, ....)
    - **We were wrong & changed directions:** A lot.

# Research Strategy

- **Assumptions:** No (1) memory, (2) material changes, (3) attrition
- **Previous Research**
  - **Strategy:** separate surveys, months apart
  - **Problems:** the 3 assumptions conflict
- **New Experimental Platform**
  - **Single survey, conjoint question:**  $Q_1$  [distractors]  $Q_2$
  - **Assumptions:** **Easy:** (2) and (3). **Also works:** (1).
  - **Technology Change:** online survey platforms
    - **Prep time:** months  $\rightsquigarrow$  hours
    - **Validation:** Preregistration + one test  $\rightsquigarrow$  many sequential tests
    - **Stopping rule:** 1 run  $\rightsquigarrow$  ability to predict in new data
    - **We tested:** every prior hypothesis & ours, in many ways
    - **We ran:** 59 unique surveys (observational, experimental, eye tracking, open/closed ended, conjoint/standard, ....)
    - **We were wrong & changed directions:** A lot.
  - **Transparency**

# Research Strategy

- **Assumptions:** No (1) memory, (2) material changes, (3) attrition
- **Previous Research**
  - **Strategy:** separate surveys, months apart
  - **Problems:** the 3 assumptions conflict
- **New Experimental Platform**
  - **Single survey, conjoint question:**  $Q_1$  [distractors]  $Q_2$
  - **Assumptions:** **Easy:** (2) and (3). **Also works:** (1).
  - **Technology Change:** online survey platforms
    - **Prep time:** months  $\rightsquigarrow$  hours
    - **Validation:** Preregistration + one test  $\rightsquigarrow$  many sequential tests
    - **Stopping rule:** 1 run  $\rightsquigarrow$  ability to predict in new data
    - **We tested:** every prior hypothesis & ours, in many ways
    - **We ran:** 59 unique surveys (observational, experimental, eye tracking, open/closed ended, conjoint/standard, ....)
    - **We were wrong & changed directions:** A lot.
  - **Transparency**
    - **Replicable results,** from data and code (in Dataverse)

# Research Strategy

- **Assumptions:** No (1) memory, (2) material changes, (3) attrition
- **Previous Research**
  - **Strategy:** separate surveys, months apart
  - **Problems:** the 3 assumptions conflict
- **New Experimental Platform**
  - **Single survey, conjoint question:**  $Q_1$  [distractors]  $Q_2$
  - **Assumptions:** **Easy:** (2) and (3). **Also works:** (1).
  - **Technology Change:** online survey platforms
    - **Prep time:** months  $\rightsquigarrow$  hours
    - **Validation:** Preregistration + one test  $\rightsquigarrow$  many sequential tests
    - **Stopping rule:** 1 run  $\rightsquigarrow$  ability to predict in new data
    - **We tested:** every prior hypothesis & ours, in many ways
    - **We ran:** 59 unique surveys (observational, experimental, eye tracking, open/closed ended, conjoint/standard, ....)
    - **We were wrong & changed directions:** A lot.
  - **Transparency**
    - **Replicable results,** from data and code (in Dataverse)
    - **Replicable data collection** from scratch

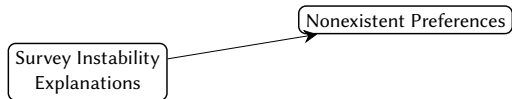
# Research Strategy

- **Assumptions:** No (1) memory, (2) material changes, (3) attrition
- **Previous Research**
  - **Strategy:** separate surveys, months apart
  - **Problems:** the 3 assumptions conflict
- **New Experimental Platform**
  - **Single survey, conjoint question:**  $Q_1$  [distractors]  $Q_2$
  - **Assumptions:** **Easy:** (2) and (3). **Also works:** (1).
  - **Technology Change:** online survey platforms
    - **Prep time:** months  $\rightsquigarrow$  hours
    - **Validation:** Preregistration + one test  $\rightsquigarrow$  many sequential tests
    - **Stopping rule:** 1 run  $\rightsquigarrow$  ability to predict in new data
    - **We tested:** every prior hypothesis & ours, in many ways
    - **We ran:** 59 unique surveys (observational, experimental, eye tracking, open/closed ended, conjoint/standard, ....)
    - **We were wrong & changed directions:** A lot.
  - **Transparency**
    - **Replicable results,** from data and code (in Dataverse)
    - **Replicable data collection** from scratch
    - **Full research history** incl. failed hypotheses & mistakes

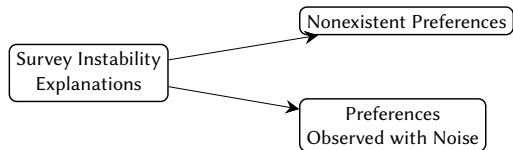
# What We Know

Survey Instability  
Explanations

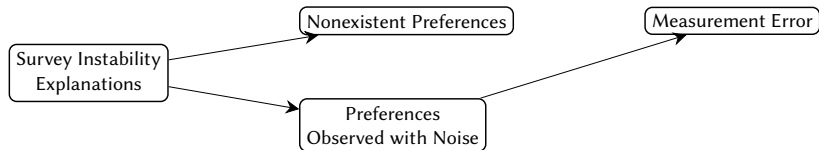
# What We Know



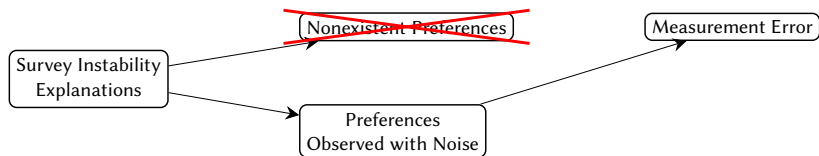
# What We Know



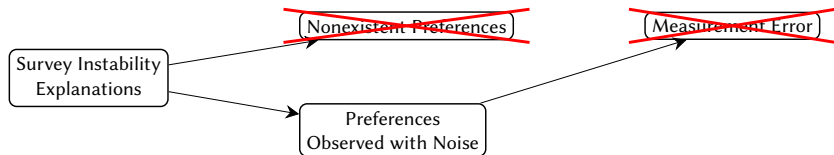
## What We Know



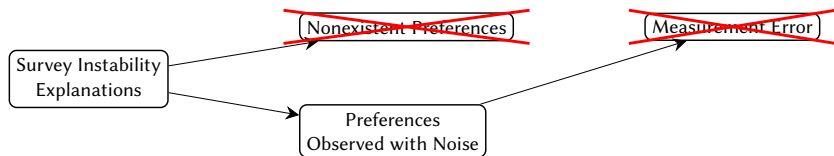
## What We Know



# What We Know

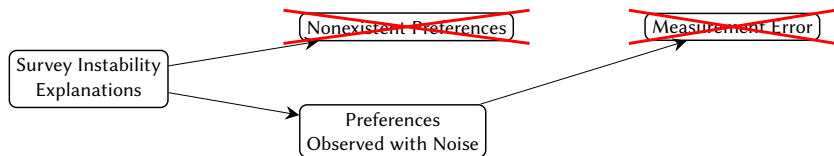


## What We Know



- (Not) Nonexistent Preferences

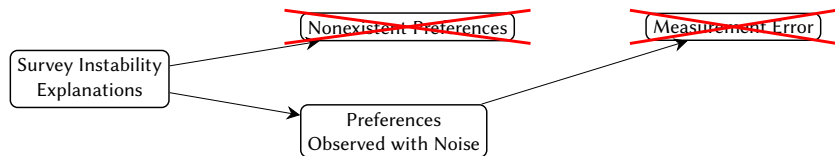
## What We Know



- (Not) Nonexistent Preferences

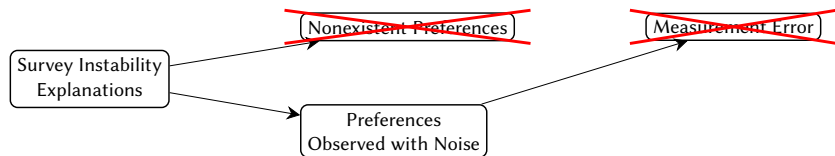
- (Not) Measurement Error

# What We Know



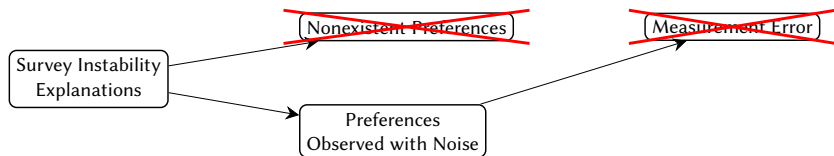
- (Not) Nonexistent Preferences
  - **Research:** ~all evidence contradicts Converse
  
- (Not) Measurement Error

# What We Know



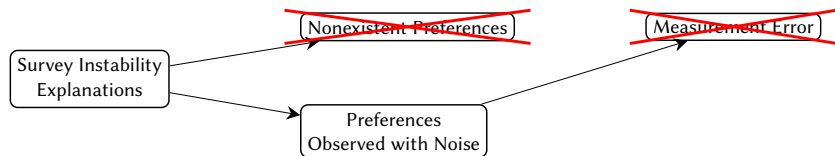
- (Not) Nonexistent Preferences
  - **Research:** ~all evidence contradicts Converse
  - **Survey Research:** numerous strong, replicable findings
  
- (Not) Measurement Error

# What We Know



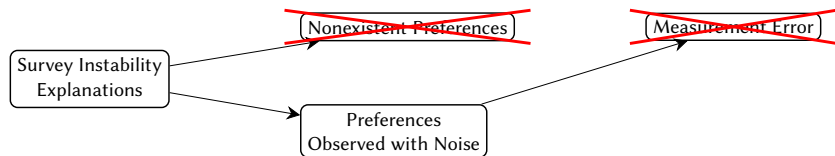
- (Not) Nonexistent Preferences
  - **Research:** ~all evidence contradicts Converse
  - **Survey Research:** numerous strong, replicable findings
  - **Persuasion attempts:** usually fail
  
- (Not) Measurement Error

# What We Know



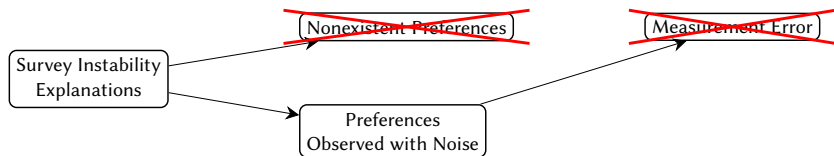
- (Not) Nonexistent Preferences
  - **Research:** ~all evidence contradicts Converse
  - **Survey Research:** numerous strong, replicable findings
  - **Persuasion attempts:** usually fail
    - **Candidates, dictators, marketers:** change subject, not preferences
- (Not) Measurement Error

# What We Know



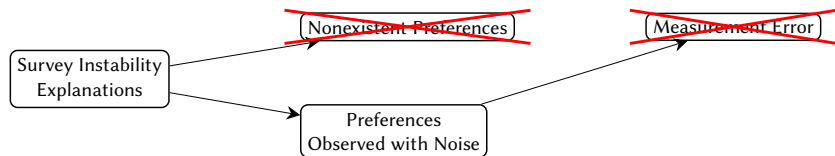
- (Not) Nonexistent Preferences
  - **Research:** ~all evidence contradicts Converse
  - **Survey Research:** numerous strong, replicable findings
  - **Persuasion attempts:** usually fail
    - **Candidates, dictators, marketers:** change subject, not preferences
  - $\Rightarrow$  Preferences exist & rarely change (without a reason)
- (Not) Measurement Error

# What We Know



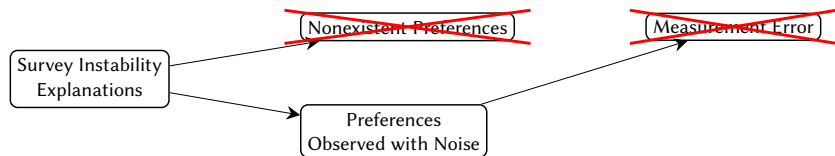
- (Not) Nonexistent Preferences
  - **Research:** ~all evidence contradicts Converse
  - **Survey Research:** numerous strong, replicable findings
  - **Persuasion attempts:** usually fail
    - **Candidates, dictators, marketers:** change subject, not preferences
  - $\Rightarrow$  Preferences exist & rarely change (without a reason)
- (Not) Measurement Error
  - **The Literature:** must be, because people have preferences!

# What We Know



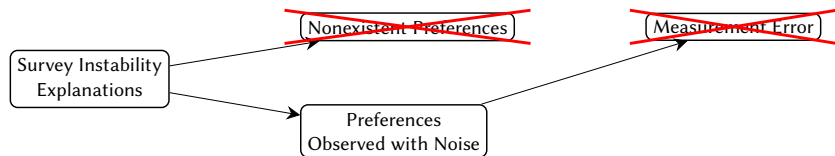
- (Not) Nonexistent Preferences
  - **Research:** ~all evidence contradicts Converse
  - **Survey Research:** numerous strong, replicable findings
  - **Persuasion attempts:** usually fail
    - **Candidates, dictators, marketers:** change subject, not preferences
  - ⇒ Preferences exist & rarely change (without a reason)
- (Not) Measurement Error
  - **The Literature:** must be, because people have preferences!
  - **Survey improvements:**

# What We Know



- (Not) Nonexistent Preferences
  - **Research:** ~all evidence contradicts Converse
  - **Survey Research:** numerous strong, replicable findings
  - **Persuasion attempts:** usually fail
    - **Candidates, dictators, marketers:** change subject, not preferences
  - ⇒ Preferences exist & rarely change (without a reason)
- (Not) Measurement Error
  - **The Literature:** must be, because people have preferences!
  - **Survey improvements:**
    - affect both questions

# What We Know



- (Not) Nonexistent Preferences
  - **Research:** ~all evidence contradicts Converse
  - **Survey Research:** numerous strong, replicable findings
  - **Persuasion attempts:** usually fail
    - **Candidates, dictators, marketers:** change subject, not preferences
  - ⇒ Preferences exist & rarely change (without a reason)
- (Not) Measurement Error
  - **The Literature:** must be, because people have preferences!
  - **Survey improvements:**
    - affect both questions
    - reduce bias, not instability

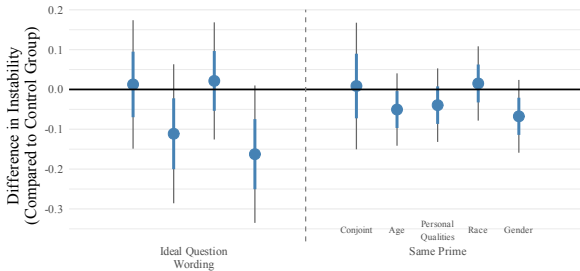
# What We Know

~~(Nonexistent Preferences)~~

~~(Measurement Error)~~

Survey Instability  
Explains

## Reducing Bias Doesn't Reduce Instability



- reduce bias, not instability

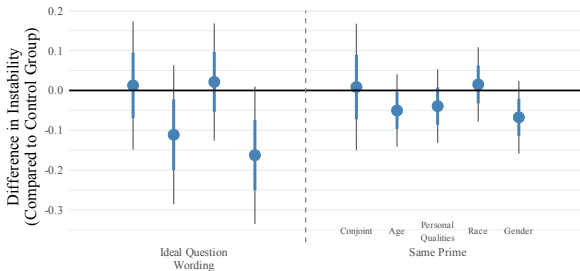
# What We Know

~~(Nonexistent Preferences)~~

~~(Measurement Error)~~

Survey Instability  
Explains

## Reducing Bias Doesn't Reduce Instability



- Left: 2008 ANES question wording changes

- reduce bias, not instability

ferences

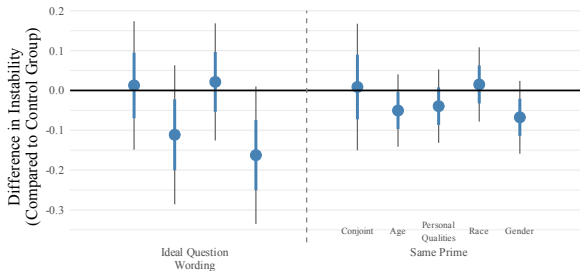
# What We Know

~~(Nonexistent Preferences)~~

~~(Measurement Error)~~

Survey Instability  
Explains

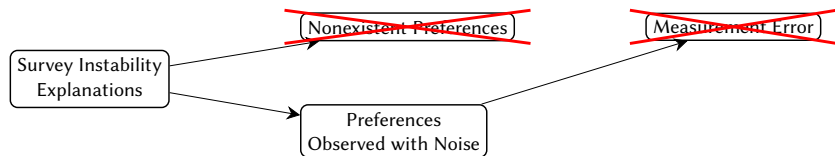
## Reducing Bias Doesn't Reduce Instability



- Left: 2008 ANES question wording changes
- Right: different (priming) “considerations”
  - reduce bias, not instability

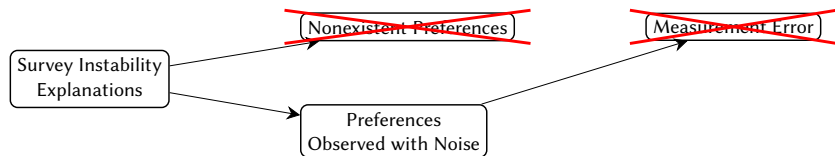
ferences

# What We Know



- (Not) Nonexistent Preferences
  - **Research:** ~all evidence contradicts Converse
  - **Survey Research:** numerous strong, replicable findings
  - **Persuasion attempts:** usually fail
    - **Candidates, dictators, marketers:** change subject, not preferences
  - ⇒ Preferences exist & rarely change (without a reason)
- (Not) Measurement Error
  - **The Literature:** must be, because people have preferences!
  - **Survey improvements:**
    - affect both questions
    - reduce bias, not instability

# What We Know



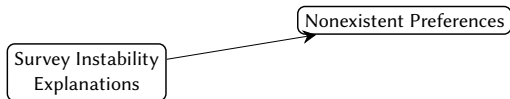
- (Not) Nonexistent Preferences
  - **Research:** ~all evidence contradicts Converse
  - **Survey Research:** numerous strong, replicable findings
  - **Persuasion attempts:** usually fail
    - **Candidates, dictators, marketers:** change subject, not preferences
  - ⇒ Preferences exist & rarely change (without a reason)
- (Not) Measurement Error
  - **The Literature:** must be, because people have preferences!
  - **Survey improvements:**
    - affect both questions
    - reduce bias, not instability
  - ⇒ Most instability isn't due to measurement error



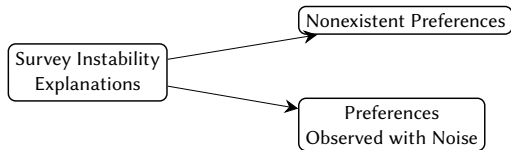
# What We Show

Survey Instability  
Explanations

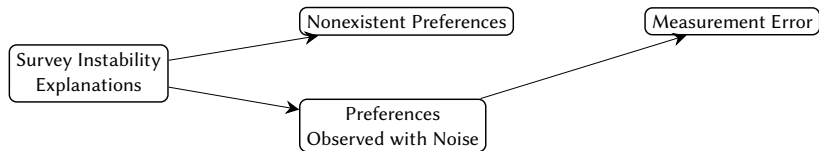
# What We Show



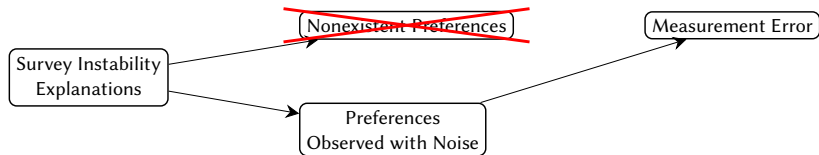
# What We Show



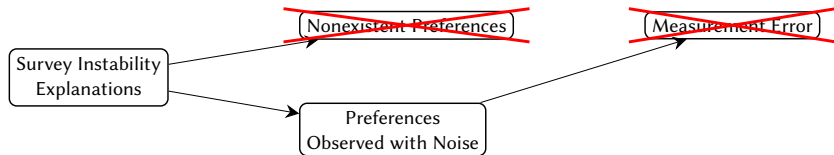
# What We Show



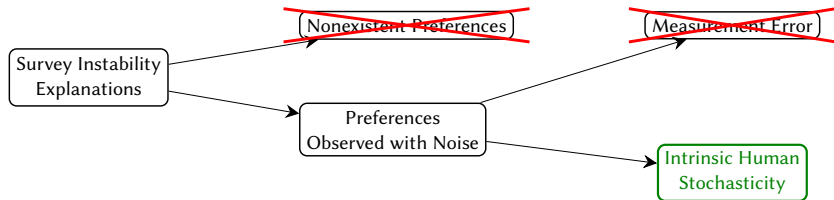
# What We Show



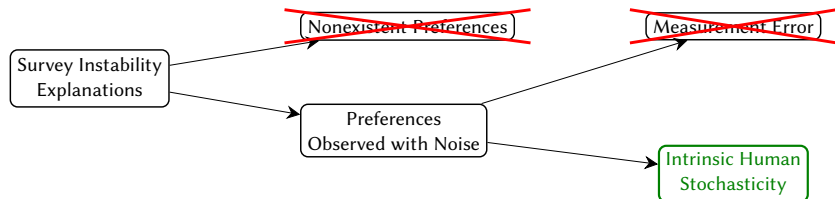
# What We Show



# What We Show

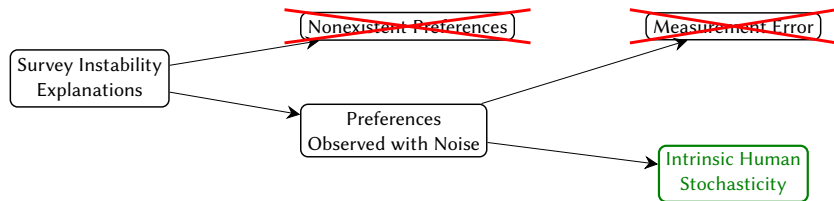


## What We Show



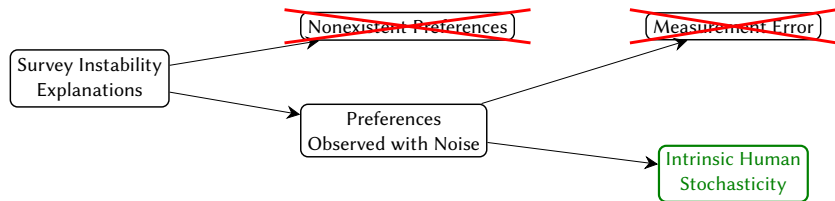
- Generally, in other fields: **instrument** v. **subject** variability

# What We Show



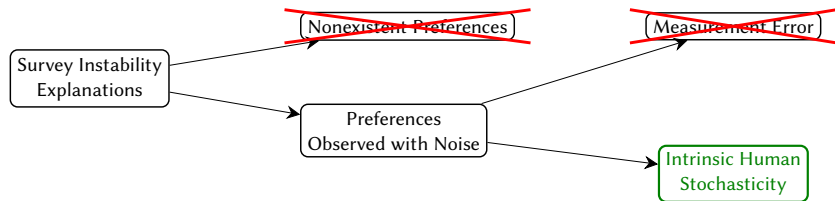
- Generally, in other fields: instrument v. subject variability
  - soft matter physics: tracking error v. thermal noise

# What We Show



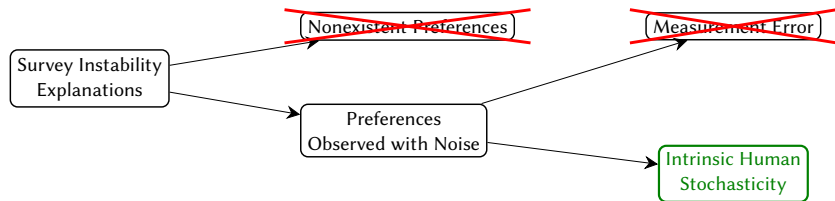
- Generally, in other fields: instrument v. subject variability
  - soft matter physics: tracking error v. thermal noise
  - psychometrics: measurement error v. individual differences

# What We Show



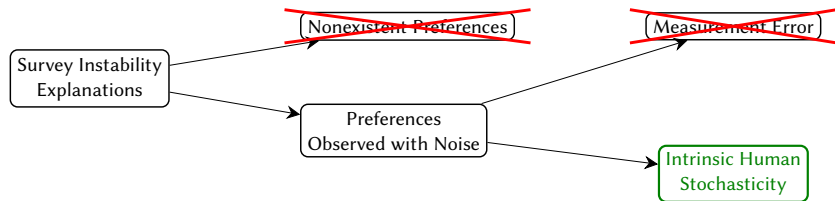
- Generally, in other fields: instrument v. subject variability
  - soft matter physics: tracking error v. thermal noise
  - psychometrics: measurement error v. individual differences
  - social science methods: estimation v. fundamental uncertainty

# What We Show



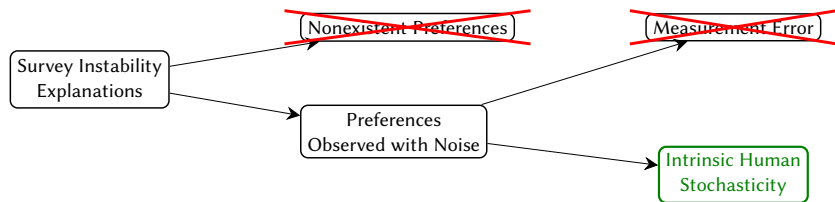
- Generally, in other fields: instrument v. subject variability
  - soft matter physics: tracking error v. thermal noise
  - psychometrics: measurement error v. individual differences
  - social science methods: estimation v. fundamental uncertainty
- Definitions

# What We Show



- Generally, in other fields: instrument v. subject variability
  - soft matter physics: tracking error v. thermal noise
  - psychometrics: measurement error v. individual differences
  - social science methods: estimation v. fundamental uncertainty
- Definitions
  - “Intrinsic”: A component of; essential to its existence

# What We Show



- Generally, in other fields: **instrument** v. **subject** variability
  - soft matter physics: **tracking error** v. **thermal noise**
  - psychometrics: **measurement error** v. **individual differences**
  - social science methods: **estimation** v. **fundamental** uncertainty
- **Definitions**
  - **“Intrinsic”**: A component of; essential to its existence
  - **Zero stochasticity**: not an attentive respondent, or live human

# Intrinsic Human Stochasticity

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- Omnipresent

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- Omnipresent
- Beneficial (not mistakes)

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- Omnipresent
  - Examples:

- Beneficial (not mistakes)

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- Omnipresent
  - Examples: Synaptic fluctuations,

- Beneficial (not mistakes)

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- Omnipresent
  - Examples: Synaptic fluctuations, Neural noise,
  
  
  
  
  
  
  
  
  
  
- Beneficial (not mistakes)

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- Omnipresent
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences,
  
  
  
  
  
  
  
  
  
  
- Beneficial (not mistakes)

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- Omnipresent
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts,
  
  
  
  
  
  
  
  
  
  
- Beneficial (not mistakes)

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- Omnipresent
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise,
  
  
  
  
  
  
  
  
  
  
- Beneficial (not mistakes)

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations,
  
- **Beneficial (not mistakes)**

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory,
  
- **Beneficial (not mistakes)**

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood,
  
- **Beneficial (not mistakes)**

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling,
  
- **Beneficial (not mistakes)**

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart,
  
- **Beneficial (not mistakes)**

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs,
  
- **Beneficial (not mistakes)**

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning,
  
- **Beneficial (not mistakes)**

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing,
  
- **Beneficial (not mistakes)**

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis,
  
- **Beneficial (not mistakes)**

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching,
  
- **Beneficial (not mistakes)**

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving,
  
- **Beneficial (not mistakes)**

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- Omnipresent
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving, Metabolic rate changes,
- Beneficial (not mistakes)

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving, Metabolic rate changes, Hydration influencing organ size,
  
- **Beneficial (not mistakes)**

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- Omnipresent
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving, Metabolic rate changes, Hydration influencing organ size, ...
- Beneficial (not mistakes)

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving, Metabolic rate changes, Hydration influencing organ size, ...
  - **Do you feel like a new person today? You are!** 1.2% of cells/day are replaced (& many more bacteria & viruses)
- **Beneficial (not mistakes)**

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving, Metabolic rate changes, Hydration influencing organ size, ...
  - **Do you feel like a new person today? You are!** 1.2% of cells/day are replaced (& many more bacteria & viruses)
- **Beneficial (not mistakes)**
  - **Darwinianism:** random variation + nonrandom selection

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving, Metabolic rate changes, Hydration influencing organ size, ...
  - **Do you feel like a new person today? You are!** 1.2% of cells/day are replaced (& many more bacteria & viruses)
- **Beneficial (not mistakes)**
  - **Darwinianism:** random variation + nonrandom selection
  - **Stochastic facilitation** (the right amount of randomness):

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving, Metabolic rate changes, Hydration influencing organ size, ...
  - **Do you feel like a new person today? You are!** 1.2% of cells/day are replaced (& many more bacteria & viruses)
- **Beneficial (not mistakes)**
  - **Darwinianism:** random variation + nonrandom selection
  - **Stochastic facilitation** (the right amount of randomness): enhances learning,

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving, Metabolic rate changes, Hydration influencing organ size, ...
  - **Do you feel like a new person today? You are!** 1.2% of cells/day are replaced (& many more bacteria & viruses)
- **Beneficial (not mistakes)**
  - **Darwinianism:** random variation + nonrandom selection
  - **Stochastic facilitation** (the right amount of randomness): enhances learning, creativity,

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving, Metabolic rate changes, Hydration influencing organ size, ...
  - **Do you feel like a new person today? You are!** 1.2% of cells/day are replaced (& many more bacteria & viruses)
- **Beneficial (not mistakes)**
  - **Darwinianism:** random variation + nonrandom selection
  - **Stochastic facilitation** (the right amount of randomness): enhances learning, creativity, stability of cognitive states,

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving, Metabolic rate changes, Hydration influencing organ size, ...
  - **Do you feel like a new person today? You are!** 1.2% of cells/day are replaced (& many more bacteria & viruses)
- **Beneficial (not mistakes)**
  - **Darwinianism:** random variation + nonrandom selection
  - **Stochastic facilitation** (the right amount of randomness): enhances learning, creativity, stability of cognitive states, recall,

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving, Metabolic rate changes, Hydration influencing organ size, ...
  - **Do you feel like a new person today? You are!** 1.2% of cells/day are replaced (& many more bacteria & viruses)
- **Beneficial (not mistakes)**
  - **Darwinianism:** random variation + nonrandom selection
  - **Stochastic facilitation** (the right amount of randomness): enhances learning, creativity, stability of cognitive states, recall, decision making,

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving, Metabolic rate changes, Hydration influencing organ size, ...
  - **Do you feel like a new person today? You are!** 1.2% of cells/day are replaced (& many more bacteria & viruses)
- **Beneficial (not mistakes)**
  - **Darwinianism:** random variation + nonrandom selection
  - **Stochastic facilitation** (the right amount of randomness): enhances learning, creativity, stability of cognitive states, recall, decision making, information processing,

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving, Metabolic rate changes, Hydration influencing organ size, ...
  - **Do you feel like a new person today? You are!** 1.2% of cells/day are replaced (& many more bacteria & viruses)
- **Beneficial (not mistakes)**
  - **Darwinianism:** random variation + nonrandom selection
  - **Stochastic facilitation** (the right amount of randomness): enhances learning, creativity, stability of cognitive states, recall, decision making, information processing, efficiency of neural networks,

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving, Metabolic rate changes, Hydration influencing organ size, ...
  - **Do you feel like a new person today? You are!** 1.2% of cells/day are replaced (& many more bacteria & viruses)
- **Beneficial (not mistakes)**
  - **Darwinianism:** random variation + nonrandom selection
  - **Stochastic facilitation** (the right amount of randomness): enhances learning, creativity, stability of cognitive states, recall, decision making, information processing, efficiency of neural networks, perception,

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving, Metabolic rate changes, Hydration influencing organ size, ...
  - **Do you feel like a new person today? You are!** 1.2% of cells/day are replaced (& many more bacteria & viruses)
- **Beneficial (not mistakes)**
  - **Darwinianism:** random variation + nonrandom selection
  - **Stochastic facilitation** (the right amount of randomness): enhances learning, creativity, stability of cognitive states, recall, decision making, information processing, efficiency of neural networks, perception, ...

# Intrinsic Human Stochasticity

Imagine: Two (error-free) CTs, taken moments apart

- **Omnipresent**
  - **Examples:** Synaptic fluctuations, Neural noise, Environmental influences, Subconscious thoughts, Sensory noise, Olfactory representations, Path dependence in memory, Flowing Blood, Electrical & chemical signaling, Pumping heart, Moving diaphragm & lungs, Stomach churning, Hormones releasing, Peristalsis, Muscles twitching, Eyes moving, Metabolic rate changes, Hydration influencing organ size, ...
  - **Do you feel like a new person today? You are!** 1.2% of cells/day are replaced (& many more bacteria & viruses)
- **Beneficial (not mistakes)**
  - **Darwinianism:** random variation + nonrandom selection
  - **Stochastic facilitation** (the right amount of randomness): enhances learning, creativity, stability of cognitive states, recall, decision making, information processing, efficiency of neural networks, perception, ...
  - **But not:** with too much or little stochasticity

Introduction

Intrinsic Human Stochasticity

**Sources of Stochasticity Leading to Survey Instability**

Substantive Conclusions, Practical Implications

# Sources of Stochasticity Leading to Survey Instability

## **Survey Instability**

$C_1 \neq C_2$  (No memory,  
material change, or  
attrition)

# Sources of Stochasticity Leading to Survey Instability

Survey Response Level

## Decision Making

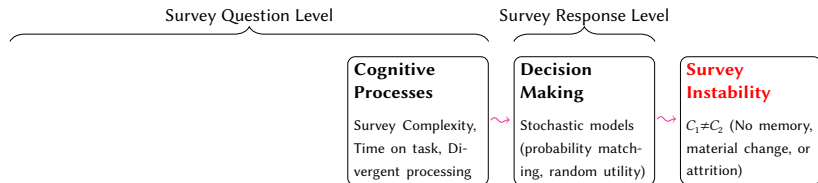
Stochastic models  
(probability matching,  
random utility)

## Survey Instability

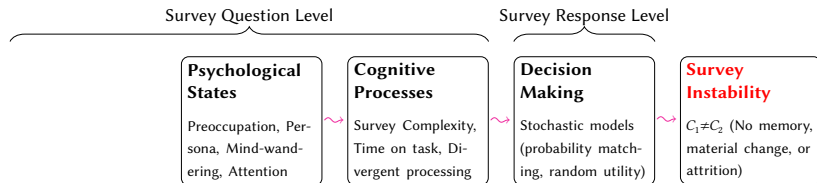
$C_1 \neq C_2$  (No memory,  
material change, or  
attrition)



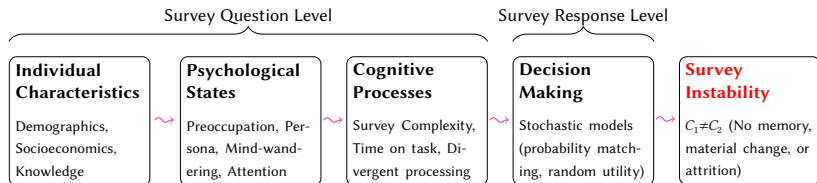
# Sources of Stochasticity Leading to Survey Instability



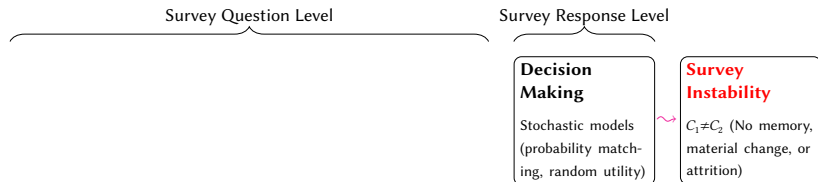
# Sources of Stochasticity Leading to Survey Instability



# Sources of Stochasticity Leading to Survey Instability



# Sources of Stochasticity Leading to Survey Instability



# Stochasticity Sources: Decision Making

## Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)

## Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)

## Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed).

## Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]

## Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

# Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

**Election Day**

# Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

## Election Day

- 10 offices, each with Party A & B candidates

# Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

## Election Day

- 10 offices, each with Party A & B candidates
- In 6/10, Party A is better for you than Party B.

# Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

## Election Day

- 10 offices, each with Party A & B candidates
- In 6/10, Party A is better for you than Party B.
- How many Party A candidates will you choose?

## Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

## Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

$C_t$

## Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

$$C_t \left\{ \right.$$

## Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

$$C_t \left\{ \begin{array}{l} = \mathbf{1}(\pi > 0.5) \end{array} \right.$$

# Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

$$C_t \left\{ \begin{array}{l} = \mathbf{1}(\pi > 0.5) \quad \text{Expected Utility (deterministic)} \\ \end{array} \right.$$

## Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

$$C_t \left\{ \begin{array}{l} = \mathbf{1}(\pi > 0.5) \quad \text{Expected Utility (deterministic)} \quad E(D) = 0 \end{array} \right.$$

## Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

$$C_t \begin{cases} = \mathbf{1}(\pi > 0.5) & \text{Expected Utility (deterministic)} & E(D) = 0 \\ = \mathbf{1}(\pi + \eta_t > 0.5) \end{cases}$$

## Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

$$C_t \begin{cases} = \mathbf{1}(\pi > 0.5) & \text{Expected Utility (deterministic)} & E(D) = 0 \\ = \mathbf{1}(\pi + \eta_t > 0.5) & \text{Random Utility (stochastic, } \eta_t \sim F) \end{cases}$$

## Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

$$C_t \begin{cases} = \mathbf{1}(\pi > 0.5) & \text{Expected Utility (deterministic)} & E(D) = 0 \\ = \mathbf{1}(\pi + \eta_t > 0.5) & \text{Random Utility (stochastic, } \eta_t \sim F) & E(D) > 0 \end{cases}$$

## Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

$$C_t \begin{cases} = \mathbf{1}(\pi > 0.5) & \text{Expected Utility (deterministic)} & E(D) = 0 \\ = \mathbf{1}(\pi + \eta_t > 0.5) & \text{Random Utility (stochastic, } \eta_t \sim F) & E(D) > 0 \\ \sim \text{Bernoulli}(\pi) \end{cases}$$

# Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

$$C_t \begin{cases} = \mathbf{1}(\pi > 0.5) & \text{Expected Utility (deterministic)} & E(D) = 0 \\ = \mathbf{1}(\pi + \eta_t > 0.5) & \text{Random Utility (stochastic, } \eta_t \sim F) & E(D) > 0 \\ \sim \text{Bernoulli}(\pi) & \text{Probability Matching (stochastic)} & \end{cases}$$

# Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

$$C_t \begin{cases} = \mathbf{1}(\pi > 0.5) & \text{Expected Utility (deterministic)} & E(D) = 0 \\ = \mathbf{1}(\pi + \eta_t > 0.5) & \text{Random Utility (stochastic, } \eta_t \sim F) & E(D) > 0 \\ \sim \text{Bernoulli}(\pi) & \text{Probability Matching (stochastic)} & E(D) > 0 \end{cases}$$

# Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

$$C_t \begin{cases} = \mathbf{1}(\pi > 0.5) & \text{Expected Utility (deterministic)} & E(D) = 0 \\ = \mathbf{1}(\pi + \eta_t > 0.5) & \text{Random Utility (stochastic, } \eta_t \sim F) & E(D) > 0 \\ \sim \text{Bernoulli}(\pi) & \text{Probability Matching (stochastic)} & E(D) > 0 \end{cases}$$

- Experiments:

# Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]

- How Beliefs become Choices

$$C_t \begin{cases} = \mathbf{1}(\pi > 0.5) & \text{Expected Utility (deterministic)} & E(D) = 0 \\ = \mathbf{1}(\pi + \eta_t > 0.5) & \text{Random Utility (stochastic, } \eta_t \sim F) & E(D) > 0 \\ \sim \text{Bernoulli}(\pi) & \text{Probability Matching (stochastic)} & E(D) > 0 \end{cases}$$

- Experiments:
  - Tell (teach) respondents their beliefs ( $\pi$ )

# Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]

- How Beliefs become Choices

$$C_t \begin{cases} = \mathbf{1}(\pi > 0.5) & \text{Expected Utility (deterministic)} & E(D) = 0 \\ = \mathbf{1}(\pi + \eta_t > 0.5) & \text{Random Utility (stochastic, } \eta_t \sim F) & E(D) > 0 \\ \sim \text{Bernoulli}(\pi) & \text{Probability Matching (stochastic)} & E(D) > 0 \end{cases}$$

- Experiments:
  - Tell (teach) respondents their beliefs ( $\pi$ )
  - Minimize:  $\eta$ , uncertainty, indifference

# Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

$$C_t \begin{cases} = \mathbf{1}(\pi > 0.5) & \text{Expected Utility (deterministic)} & E(D) = 0 \\ = \mathbf{1}(\pi + \eta_t > 0.5) & \text{Random Utility (stochastic, } \eta_t \sim F) & E(D) > 0 \\ \sim \text{Bernoulli}(\pi) & \text{Probability Matching (stochastic)} & E(D) > 0 \end{cases}$$

- Experiments:
  - Tell (teach) respondents their beliefs ( $\pi$ )
  - Minimize:  $\eta$ , uncertainty, indifference
  - Result: still 40-60% stochastic!

# Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)

- Budget constraint:  $\sum_{i=1}^n x_i = 1$

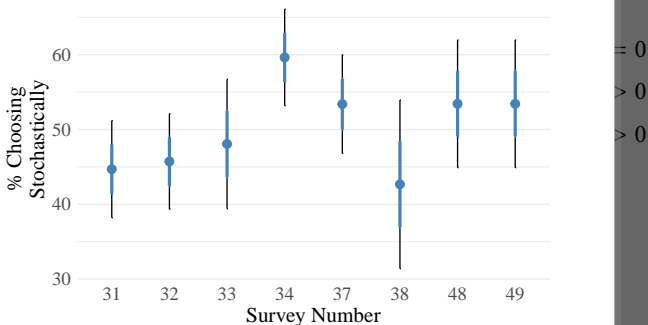
- Choice set:  $C_t = \{x \in \mathbb{R}^n : x_i \geq 0, \sum_{i=1}^n x_i = 1\}$

- History:  $H_t = \{x^1, \dots, x^{t-1}\}$

$C_t$

- Endowment:  $x^0$

## Decision Making: Highly Stochastic!



# Stochasticity Sources: Decision Making

- Preference:  $\rho \in \{0, 1\}$  (unknown)
- Belief:  $\pi = \Pr(\rho = 1)$  (known)
- Choices:  $C_1, C_2$  (observed). [Instability:  $D = \mathbf{1}(C_1 \neq C_2)$ ]
- How Beliefs become Choices

$$C_t \begin{cases} = \mathbf{1}(\pi > 0.5) & \text{Expected Utility (deterministic)} & E(D) = 0 \\ = \mathbf{1}(\pi + \eta_t > 0.5) & \text{Random Utility (stochastic, } \eta_t \sim F) & E(D) > 0 \\ \sim \text{Bernoulli}(\pi) & \text{Probability Matching (stochastic)} & E(D) > 0 \end{cases}$$

- Experiments:
  - Tell (teach) respondents their beliefs ( $\pi$ )
  - Minimize:  $\eta$ , uncertainty, indifference
  - Result: still 40-60% stochastic!

# Stochasticity Sources: Cognitive Processing

# Stochasticity Sources: Cognitive Processing

## **Survey Instability**

$C_1 \neq C_2$  (No memory,  
material change, or  
attrition)

# Stochasticity Sources: Cognitive Processing

Survey Response Level

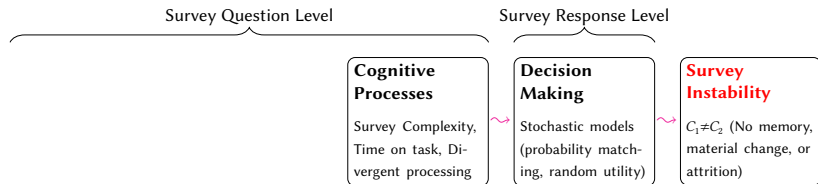
## Decision Making

Stochastic models  
(probability matching,  
random utility)

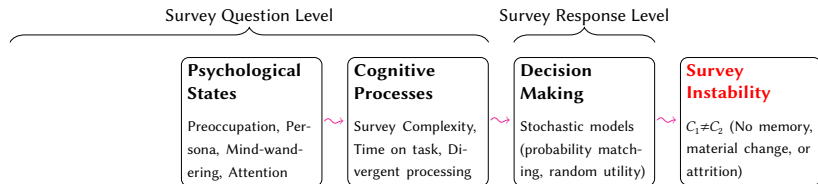
## Survey Instability

$C_1 \neq C_2$  (No memory,  
material change, or  
attrition)

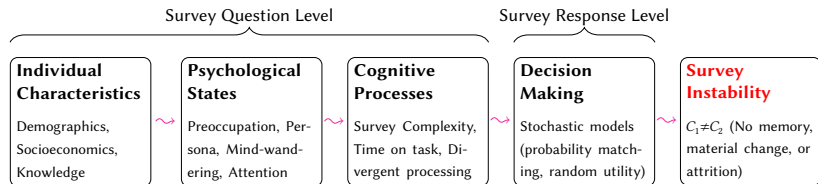
# Stochasticity Sources: Cognitive Processing



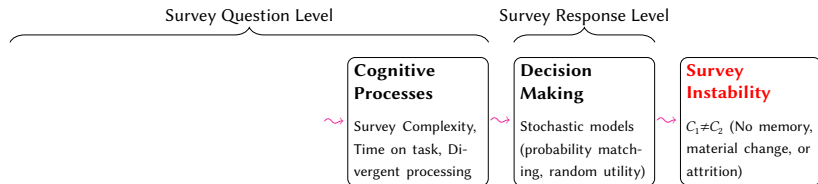
# Stochasticity Sources: Cognitive Processing



# Stochasticity Sources: Cognitive Processing



# Stochasticity Sources: Cognitive Processing



# Stochasticity Sources: Cognitive Processing

What increases stochasticity (and instability)?

# Stochasticity Sources: Cognitive Processing

What increases stochasticity (and instability)?

- High cognitive complexity: hard Qs; many As

# Stochasticity Sources: Cognitive Processing

What increases stochasticity (and instability)?

- **High cognitive complexity:** hard Qs; many As
- **Low time-on-task:** for any given question


# Stochasticity Sources: Cognitive Processing

What increases stochasticity (and instability)?

- High cognitive complexity: hard Qs; many As
- Low time-on-task: for any given question
- Differential cognitive processing:  $Q_1$  vs  $Q_2$

# Stochasticity Sources: Cognitive Processing

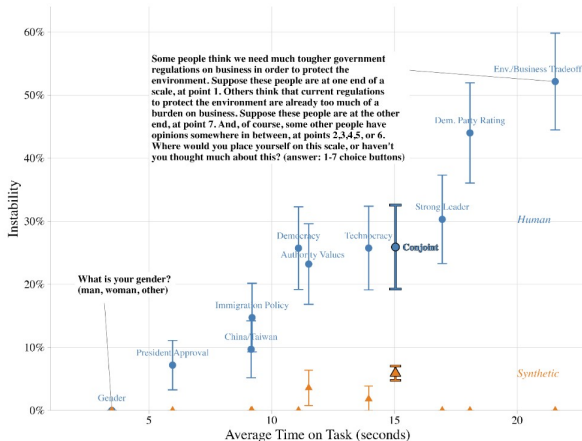
What increases stochasticity (and instability)?

- High cognitive complexity: hard Qs; many As 
- Low time-on-task: for any given question
- Differential cognitive processing:  $Q_1$  vs  $Q_2$

# Stochasticity Sources: Cognitive Processing


What

- H
- L
- [



# Stochasticity Sources: Cognitive Processing

What increases stochasticity (and instability)?

- High cognitive complexity: hard Qs; many As 
- Low time-on-task: for any given question
- Differential cognitive processing:  $Q_1$  vs  $Q_2$

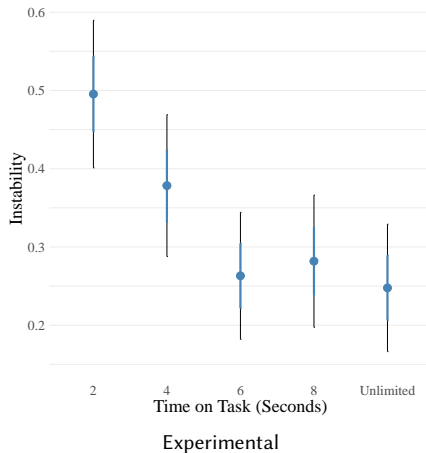
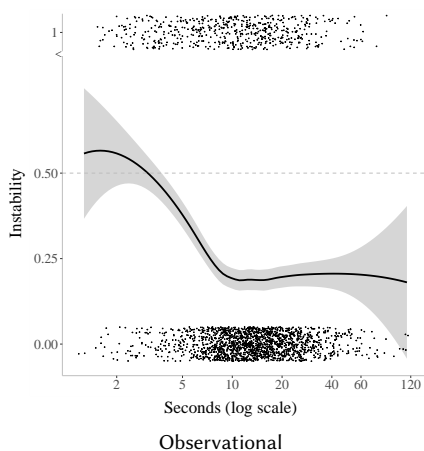
# Stochasticity Sources: Cognitive Processing

What increases stochasticity (and instability)?

- High cognitive complexity: hard Qs; many As
- Low time-on-task: for any given question 📱
- Differential cognitive processing:  $Q_1$  vs  $Q_2$

# Stochasticity Sources: Cognitive Processing

## Limited time-on-task causes survey instability




# Stochasticity Sources: Cognitive Processing

What increases stochasticity (and instability)?

- High cognitive complexity: hard Qs; many As
- Low time-on-task: for any given question 📱
- Differential cognitive processing:  $Q_1$  vs  $Q_2$

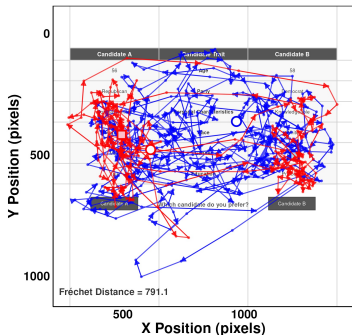
# Stochasticity Sources: Cognitive Processing

What increases stochasticity (and instability)?

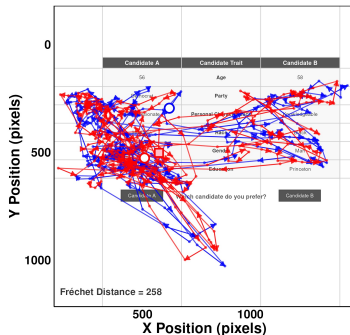
- High cognitive complexity: hard Qs; many As
- Low time-on-task: for any given question
- Differential cognitive processing:  $Q_1$  vs  $Q_2$  

# Stochasticity Sources: Cognitive Processing

## Stochasticity in Gaze Behavior

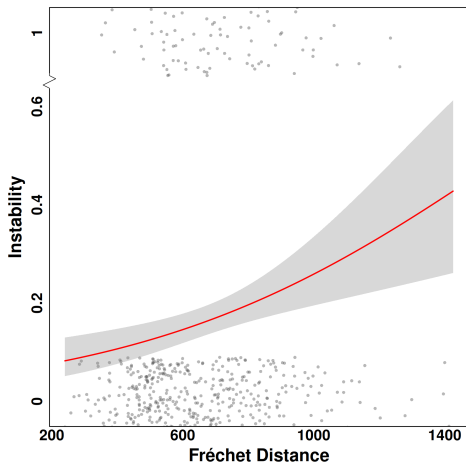


Large difference




Small difference

## Stochastic Distance $\rightsquigarrow$ Survey Instability



# Stochasticity Sources: Cognitive Processing

What increases stochasticity (and instability)?

- High cognitive complexity: hard Qs; many As
- Low time-on-task: for any given question
- Differential cognitive processing:  $Q_1$  vs  $Q_2$  

# Stochasticity Sources: Cognitive Processing

What increases stochasticity (and instability)?

- High cognitive complexity: hard Qs; many As
- Low time-on-task: for any given question
- Differential cognitive processing:  $Q_1$  vs  $Q_2$

# Stochasticity Sources: Psychological States

## **Survey Instability**

$C_1 \neq C_2$  (No memory,  
material change, or  
attrition)

# Stochasticity Sources: Psychological States

Survey Response Level

## Decision Making

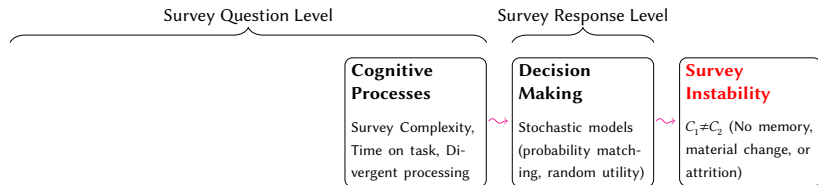
Stochastic models  
(probability matching,  
random utility)

## Survey Instability

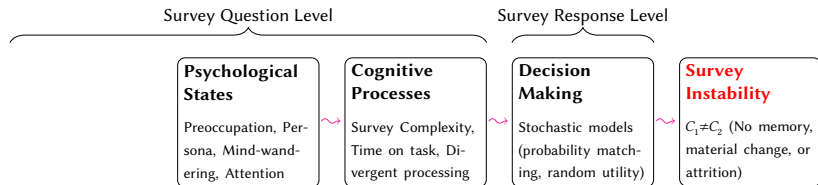
$C_1 \neq C_2$  (No memory,  
material change, or  
attrition)



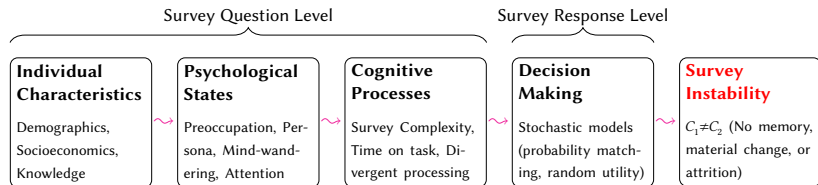
# Stochasticity Sources: Psychological States



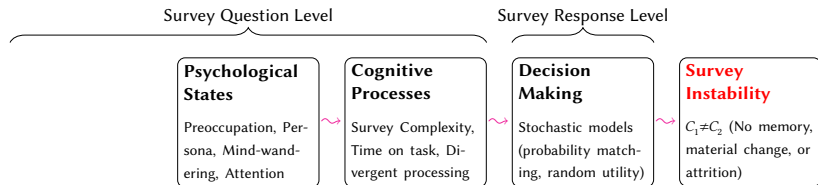
# Stochasticity Sources: Psychological States



# Stochasticity Sources: Psychological States



# Stochasticity Sources: Psychological States



# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Q1: We would like to get a sense of your consumption of political news. To demonstrate that you've read this much, just go ahead and select both every day and never among the options below, no matter how often you watch political news.

Based on the text you read above, how often do you watch political news on TV? (1) Every day, (2) Once a week, (3) Once a month, (4) A few times a year, (5) Never

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Q2: Which of these is a vegetable?

(1) Ham, (2) Ice cream, (3) Carrot, (4) Bread, (5) Apple

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Attention Checks:

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Attention Checks:

- **The Good:** Predicts TOT & survey instability

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Attention Checks:

- **The Good:** Predicts TOT & survey instability
- **The Bad:** Ruin relationship with respondent

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Attention Checks:

- **The Good:** Predicts TOT & survey instability
- **The Bad:** Ruin relationship with respondent
  
- **The Ugly:** Unacceptable statistical properties

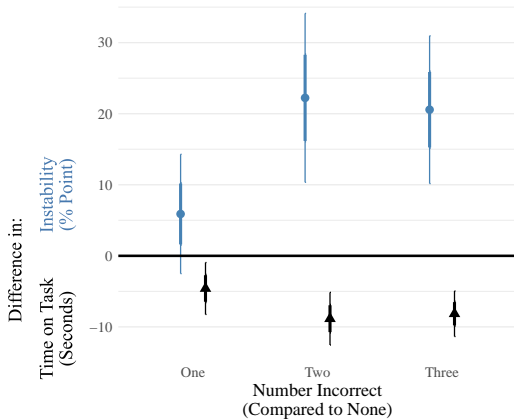
# Stochasticity Sources: Psychological States

Strong

Attent

- T
- T
- T

## Attention Checks Predict TOT & Survey Instability



# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Attention Checks:

- **The Good:** Predicts TOT & survey instability
- **The Bad:** Ruin relationship with respondent
  
- **The Ugly:** Unacceptable statistical properties

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Attention Checks:

- **The Good:** Predicts TOT & survey instability
- **The Bad:** Ruin relationship with respondent
  - **Standard Qs:** follows Gricean maxims of mutual cooperation
- **The Ugly:** Unacceptable statistical properties

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Attention Checks:

- **The Good:** Predicts TOT & survey instability
- **The Bad:** Ruin relationship with respondent
  - **Standard Qs:** follows Gricean maxims of mutual cooperation
  - **Attention checks reduce attention:**
- **The Ugly:** Unacceptable statistical properties

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Attention Checks:

- **The Good:** Predicts TOT & survey instability
- **The Bad:** Ruin relationship with respondent
  - **Standard Qs:** follows Gricean maxims of mutual cooperation
  - **Attention checks reduce attention:** Trick questions
- **The Ugly:** Unacceptable statistical properties

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Attention Checks:

- **The Good:** Predicts TOT & survey instability
- **The Bad:** Ruin relationship with respondent
  - **Standard Qs:** follows Gricean maxims of mutual cooperation
  - **Attention checks reduce attention:** Trick questions  $\rightsquigarrow$  surveys become games
- **The Ugly:** Unacceptable statistical properties

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Attention Checks:

- **The Good:** Predicts TOT & survey instability
- **The Bad:** Ruin relationship with respondent
  - **Standard Qs:** follows Gricean maxims of mutual cooperation
  - **Attention checks reduce attention:** Trick questions  $\rightsquigarrow$  surveys become games  $\rightsquigarrow$  less TOT
- **The Ugly:** Unacceptable statistical properties

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Attention Checks:

- **The Good:** Predicts TOT & survey instability
- **The Bad:** Ruin relationship with respondent
  - **Standard Qs:** follows Gricean maxims of mutual cooperation
  - **Attention checks reduce attention:** Trick questions  $\rightsquigarrow$  surveys become games  $\rightsquigarrow$  less TOT  $\rightsquigarrow$  less attention to other questions
- **The Ugly:** Unacceptable statistical properties

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

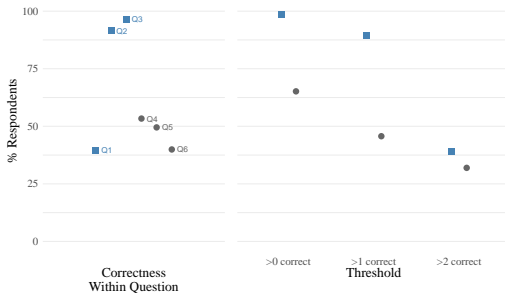
Attention Checks:

- **The Good:** Predicts TOT & survey instability
- **The Bad:** Ruin relationship with respondent
  - **Standard Qs:** follows Gricean maxims of mutual cooperation
  - **Attention checks reduce attention:** Trick questions  $\rightsquigarrow$  surveys become games  $\rightsquigarrow$  less TOT  $\rightsquigarrow$  less attention to other questions
- **The Ugly:** Unacceptable statistical properties
  - **Massive differences across AC questions**

# Stochasticity Sources: Psychological States

Strongly Influenced by:

## Huge Variation in Attention Check Thresholds



Attention

- T
- T

become games  $\approx$  less ROI  $\approx$  less attention to other questions

- **The Ugly:** Unacceptable statistical properties
  - Massive differences across AC questions

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Attention Checks:

- **The Good:** Predicts TOT & survey instability
- **The Bad:** Ruin relationship with respondent
  - **Standard Qs:** follows Gricean maxims of mutual cooperation
  - **Attention checks reduce attention:** Trick questions  $\rightsquigarrow$  surveys become games  $\rightsquigarrow$  less TOT  $\rightsquigarrow$  less attention to other questions
- **The Ugly:** Unacceptable statistical properties
  - **Massive differences across AC questions**

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Attention Checks:

- **The Good:** Predicts TOT & survey instability
- **The Bad:** Ruin relationship with respondent
  - **Standard Qs:** follows Gricean maxims of mutual cooperation
  - **Attention checks reduce attention:** Trick questions  $\rightsquigarrow$  surveys become games  $\rightsquigarrow$  less TOT  $\rightsquigarrow$  less attention to other questions
- **The Ugly:** Unacceptable statistical properties
  - **Massive differences across AC questions**
  - **Highly instable,** likely endogenous

# Stochasticity Sources: Psychological States

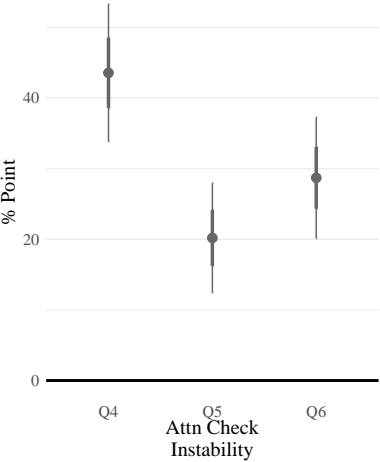
Strongly Infl

Re  
Co

Attention Ch

- The Good
- The Bad
  - Sta
  - Att
- The Ugl
  - Ma
  - Highly instable, likely endogenous

## Attention Checks are Highly Instable



cooperation  
→ surveys  
other questions

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Attention Checks:

- **The Good:** Predicts TOT & survey instability
- **The Bad:** Ruin relationship with respondent
  - **Standard Qs:** follows Gricean maxims of mutual cooperation
  - **Attention checks reduce attention:** Trick questions  $\rightsquigarrow$  surveys become games  $\rightsquigarrow$  less TOT  $\rightsquigarrow$  less attention to other questions
- **The Ugly:** Unacceptable statistical properties
  - **Massive differences across AC questions**
  - **Highly instable,** likely endogenous

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Attention Checks:

- **The Good:** Predicts TOT & survey instability
- **The Bad:** Ruin relationship with respondent
  - **Standard Qs:** follows Gricean maxims of mutual cooperation
  - **Attention checks reduce attention:** Trick questions  $\rightsquigarrow$  surveys become games  $\rightsquigarrow$  less TOT  $\rightsquigarrow$  less attention to other questions
- **The Ugly:** Unacceptable statistical properties
  - **Massive differences across AC questions**
  - **Highly instable, likely endogenous**
  - **$\Rightarrow$ Not usable as a filter**

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Everyone comes to a new task (like this survey) with things on their minds. How preoccupied were you, just before you started this survey, with thoughts or worries about your partner, job, health, children, friends, money, or other concerns?

(1) Very preoccupied, (2) Fairly preoccupied, (3) Slightly preoccupied, or (4) Not at all preoccupied.

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

Preoccupation:

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

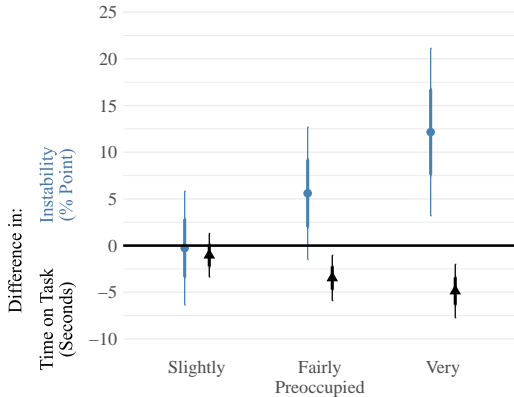
## Preoccupation:

- **Reduces** time-on-task; **Increases** survey instability

# Stochasticity Sources: Psychological States

Strong

## Preoccupation: reduces TOT & Survey Instability



# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

## Preoccupation:

- **Reduces** time-on-task; **Increases** survey instability

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

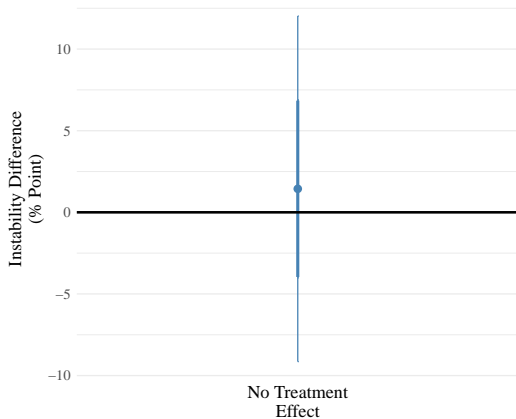
## Preoccupation:

- **Reduces** time-on-task; **Increases** survey instability
- Has **no effect** on other questions

# Stochasticity Sources: Psychological States

Strong

## Preoccupation: no effect on other questions



# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

## Preoccupation:

- **Reduces** time-on-task; **Increases** survey instability
- Has **no effect** on other questions

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

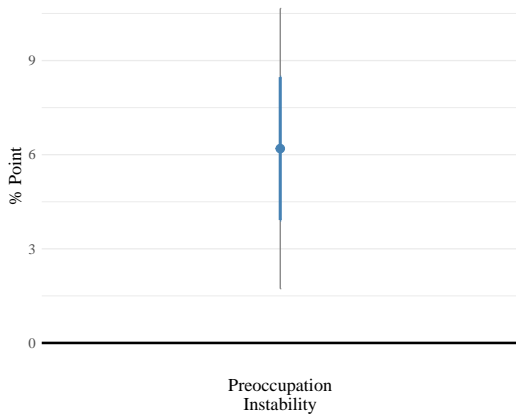
## Preoccupation:

- **Reduces** time-on-task; **Increases** survey instability
- Has **no effect** on other questions
- **Highly stable** (6%  $\ll$  25%)

# Stochasticity Sources: Psychological States

Strong

## Preoccupation: highly stable



# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

## Preoccupation:

- **Reduces** time-on-task; **Increases** survey instability
- Has **no effect** on other questions
- **Highly stable** (6%  $\ll$  25%)

# Stochasticity Sources: Psychological States

Strongly Influenced by:

		Other Survey Questions	
		No	Yes
Respondent's Conscious Choice	No	Preoccupation	Mind-wandering
	Yes	Persona	Attention

## Preoccupation:

- Reduces time-on-task; Increases survey instability
- Has no effect on other questions
- Highly stable (6%  $\ll$  25%)
- $\Rightarrow$  Great for understanding (and filtering) respondents

# Stochasticity Sources: Individual Characteristics

## **Survey Instability**

$C_1 \neq C_2$  (No memory,  
material change, or  
attrition)

# Stochasticity Sources: Individual Characteristics

Survey Response Level

## Decision Making

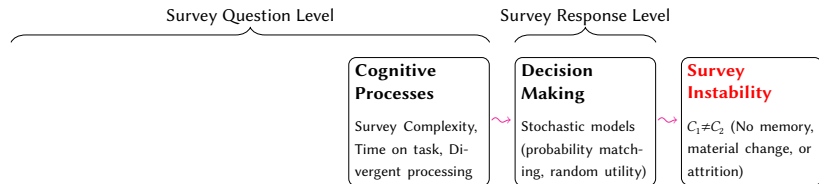
Stochastic models  
(probability matching,  
random utility)

## Survey Instability

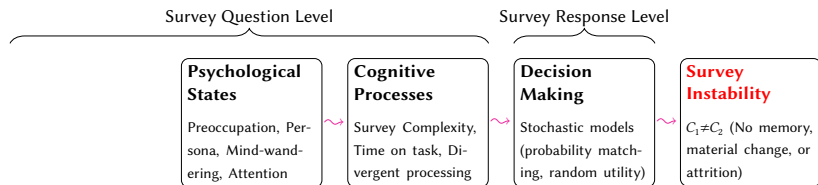
$C_1 \neq C_2$  (No memory,  
material change, or  
attrition)



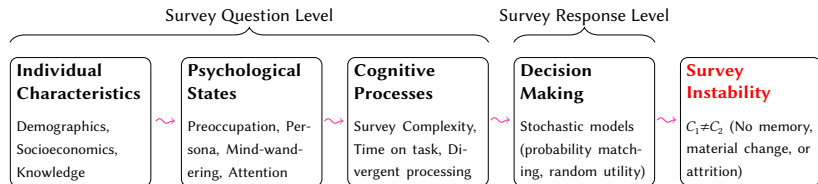
# Stochasticity Sources: Individual Characteristics



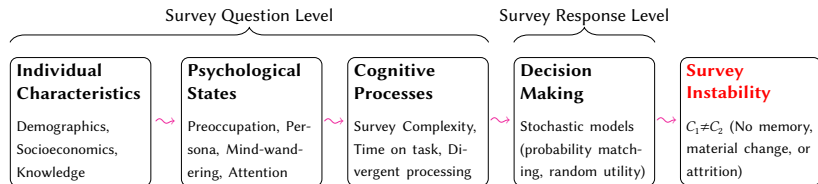
# Stochasticity Sources: Individual Characteristics



# Stochasticity Sources: Individual Characteristics

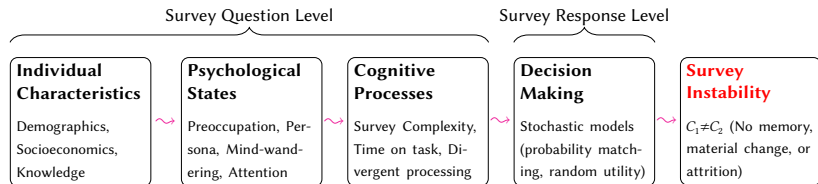


# Stochasticity Sources: Individual Characteristics



e.g., Older folks:

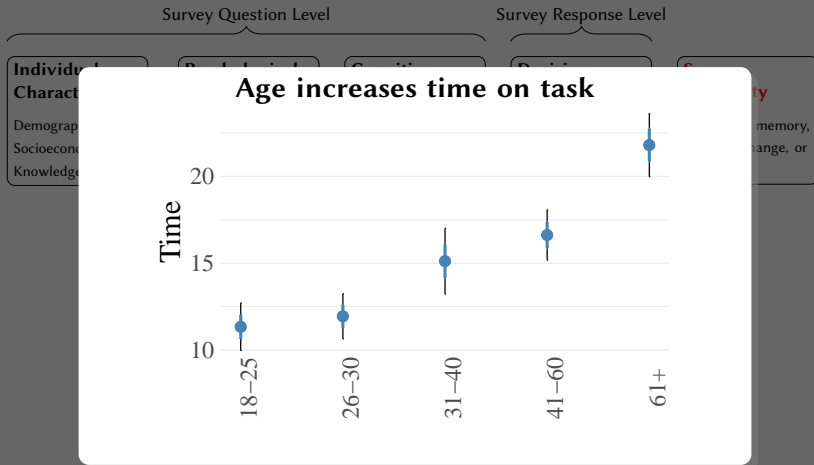
# Stochasticity Sources: Individual Characteristics



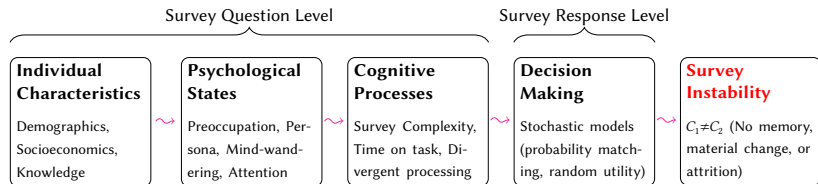
e.g., Older folks:

- spend **more** time on task

# Stochasticity Sources: Individual Characteristics



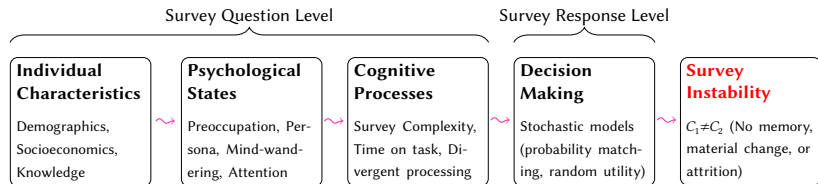
# Stochasticity Sources: Individual Characteristics



e.g., Older folks:

- spend **more** time on task

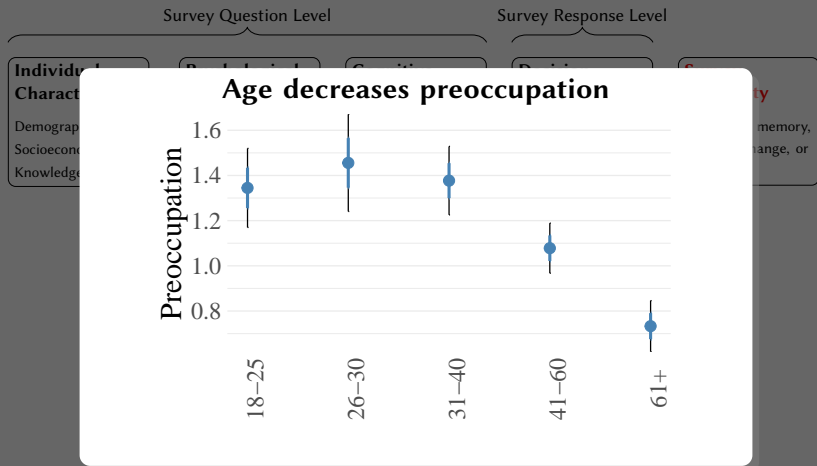
# Stochasticity Sources: Individual Characteristics



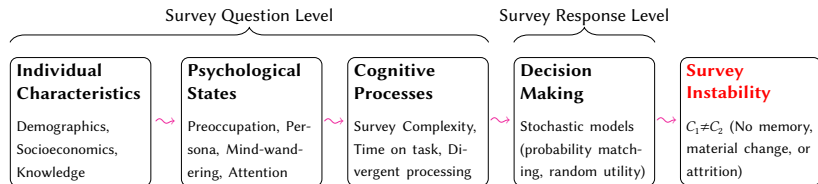
e.g., Older folks:

- spend **more** time on task
- are **less** preoccupied

# Stochasticity Sources: Individual Characteristics



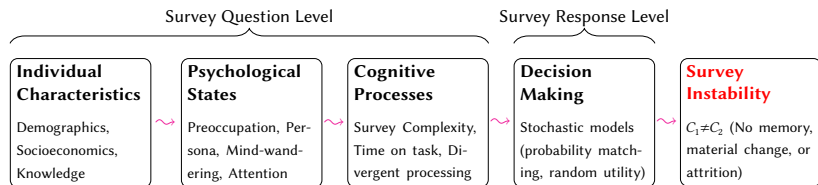
# Stochasticity Sources: Individual Characteristics



e.g., Older folks:

- spend **more** time on task
- are **less** preoccupied

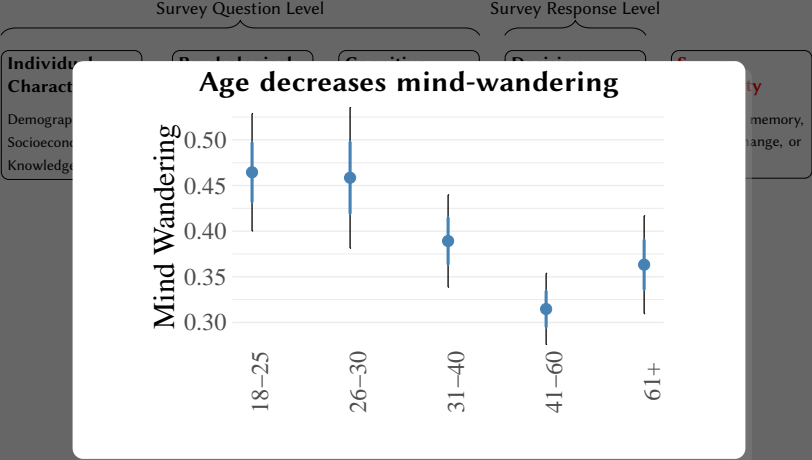
# Stochasticity Sources: Individual Characteristics



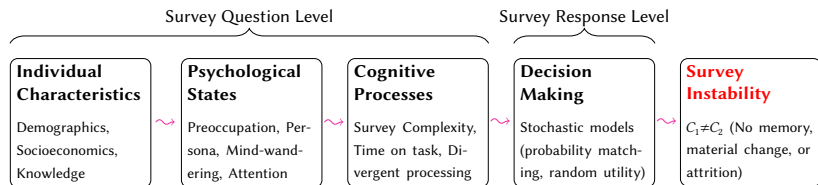
e.g., Older folks:

- spend **more** time on task
- are **less** preoccupied
- mind-wander **less**

# Stochasticity Sources: Individual Characteristics



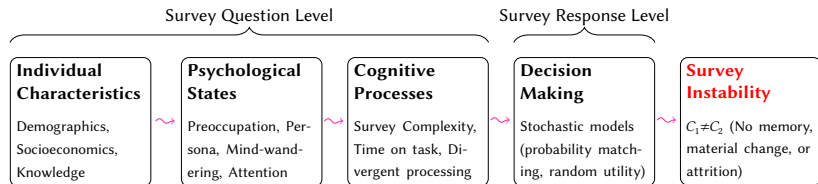
# Stochasticity Sources: Individual Characteristics



e.g., Older folks:

- spend **more** time on task
- are **less** preoccupied
- mind-wander **less**

# Stochasticity Sources: Individual Characteristics



e.g., Older folks:

- spend **more** time on task
- are **less** preoccupied
- mind-wander **less**
- have **lower** survey instability

# Stochasticity Sources: Individual Characteristics

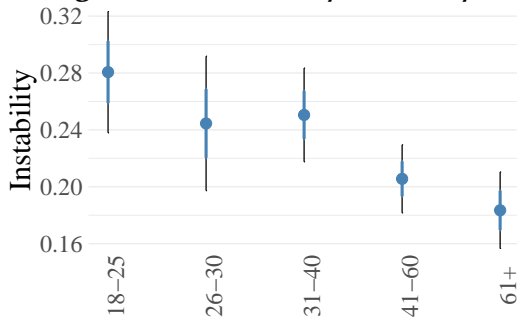
Survey Question Level

Survey Response Level

Individual  
Character

Demograp  
Socioecon  
Knowledge

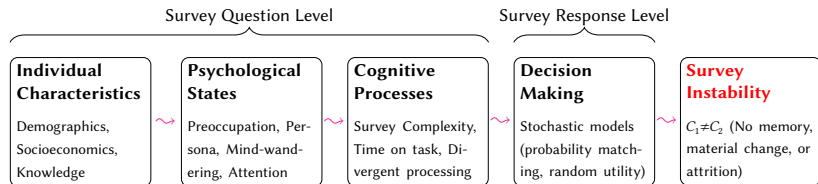
## Age decreases survey instability



ty

memory,  
change, or

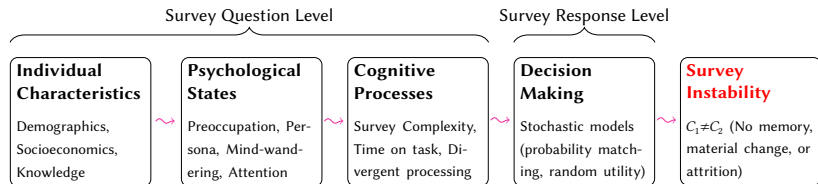
# Stochasticity Sources: Individual Characteristics



e.g., Older folks:

- spend **more** time on task
- are **less** preoccupied
- mind-wander **less**
- have **lower** survey instability

# Stochasticity Sources: Individual Characteristics



e.g., Older folks:

- spend **more** time on task
- are **less** preoccupied
- mind-wander **less**
- have **lower** survey instability

Future research:

What else predicts survey instability?

Introduction

Intrinsic Human Stochasticity

Sources of Stochasticity Leading to Survey Instability

**Substantive Conclusions, Practical Implications**

# Implications for Survey Practice

# Implications for Survey Practice

- Improve Survey Instruments

# Implications for Survey Practice

- Improve Survey Instruments
- Filter (Likely Instable) Respondents

# Implications for Survey Practice

- Improve Survey Instruments
- Filter (Likely Instable) Respondents
- Improve Statistical Methods

# Implications for Survey Practice

- Improve Survey Instruments
  - Reduce cognitive complexity:
- Filter (Likely Instable) Respondents
- Improve Statistical Methods

# Implications for Survey Practice

- Improve Survey Instruments
  - Reduce cognitive complexity: Simpler Qs,
- Filter (Likely Instable) Respondents
- Improve Statistical Methods

# Implications for Survey Practice

- Improve Survey Instruments
  - Reduce cognitive complexity: Simpler Qs, Fewer As
- Filter (Likely Instable) Respondents
- Improve Statistical Methods

# Implications for Survey Practice

- **Improve Survey Instruments**
  - **Reduce cognitive complexity:** Simpler Qs, Fewer As
  - **Measure remaining survey instability:** Just one extra Q
- **Filter (Likely Instable) Respondents**
  
- **Improve Statistical Methods**

# Implications for Survey Practice

- **Improve Survey Instruments**
  - **Reduce cognitive complexity:** Simpler Qs, Fewer As
  - **Measure remaining survey instability:** Just one extra Q
- **Filter (Likely Instable) Respondents**
  - **Preoccupied** (without “attention checks”)
- **Improve Statistical Methods**

# Implications for Survey Practice

- **Improve Survey Instruments**
  - **Reduce cognitive complexity:** Simpler Qs, Fewer As
  - **Measure remaining survey instability:** Just one extra Q
- **Filter (Likely Instable) Respondents**
  - **Preoccupied** (without “attention checks”)
  - **Low time-on-task** (for burn-ins)
- **Improve Statistical Methods**

# Implications for Survey Practice

- **Improve Survey Instruments**
  - **Reduce cognitive complexity:** Simpler Qs, Fewer As
  - **Measure remaining survey instability:** Just one extra Q
- **Filter (Likely Instable) Respondents**
  - **Preoccupied** (without “attention checks”)
  - **Low time-on-task** (for burn-ins)
- **Improve Statistical Methods**
  - **Selection:**

# Implications for Survey Practice

- **Improve Survey Instruments**
  - **Reduce cognitive complexity:** Simpler Qs, Fewer As
  - **Measure remaining survey instability:** Just one extra Q
- **Filter (Likely Instable) Respondents**
  - **Preoccupied** (without “attention checks”)
  - **Low time-on-task** (for burn-ins)
- **Improve Statistical Methods**
  - **Selection:** Change QOI;

# Implications for Survey Practice

- **Improve Survey Instruments**
  - **Reduce cognitive complexity:** Simpler Qs, Fewer As
  - **Measure remaining survey instability:** Just one extra Q
- **Filter (Likely Instable) Respondents**
  - **Preoccupied** (without “attention checks”)
  - **Low time-on-task** (for burn-ins)
- **Improve Statistical Methods**
  - **Selection:** Change QOI; Oversample filtered groups; or

# Implications for Survey Practice

- **Improve Survey Instruments**
  - **Reduce cognitive complexity:** Simpler Qs, Fewer As
  - **Measure remaining survey instability:** Just one extra Q
- **Filter (Likely Instable) Respondents**
  - **Preoccupied** (without “attention checks”)
  - **Low time-on-task** (for burn-ins)
- **Improve Statistical Methods**
  - **Selection:** Change QOI; Oversample filtered groups; or Impute

# Implications for Survey Practice

- **Improve Survey Instruments**
  - **Reduce cognitive complexity:** Simpler Qs, Fewer As
  - **Measure remaining survey instability:** Just one extra Q
- **Filter (Likely Unstable) Respondents**
  - **Preoccupied** (without “attention checks”)
  - **Low time-on-task** (for burn-ins)
- **Improve Statistical Methods**
  - **Selection:** Change QOI; Oversample filtered groups; or Impute
  - **Remaining instability:** correct statistically

# So Who's to Blame for Survey Instability?

# So Who's to Blame for Survey Instability?

## Explanations:

# So Who's to Blame for Survey Instability?

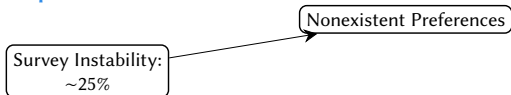
## Explanations:

Survey Instability:

~25%

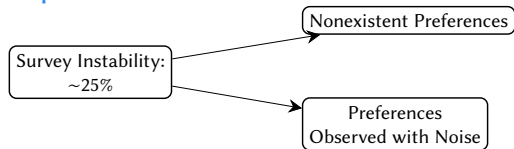
# So Who's to Blame for Survey Instability?

## Explanations:



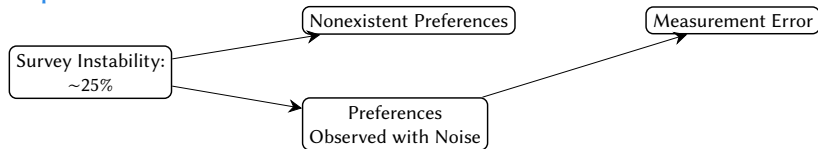
# So Who's to Blame for Survey Instability?

## Explanations:



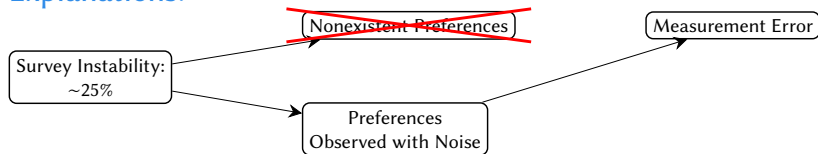
# So Who's to Blame for Survey Instability?

## Explanations:



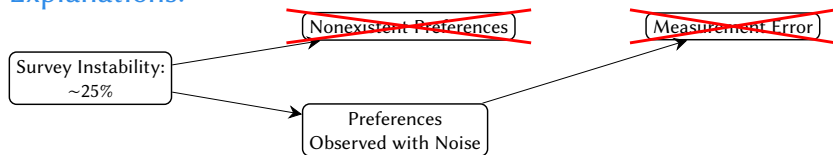
# So Who's to Blame for Survey Instability?

## Explanations:



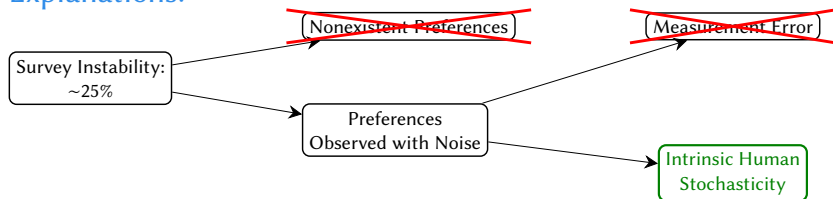
# So Who's to Blame for Survey Instability?

## Explanations:



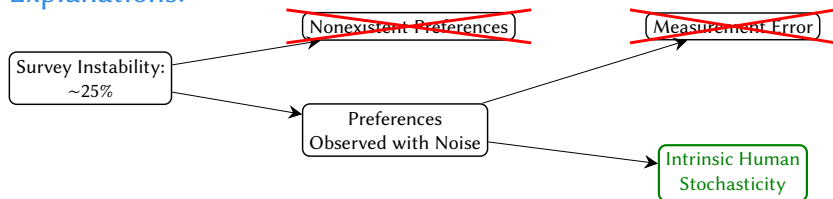
# So Who's to Blame for Survey Instability?

## Explanations:



# So Who's to Blame for Survey Instability?

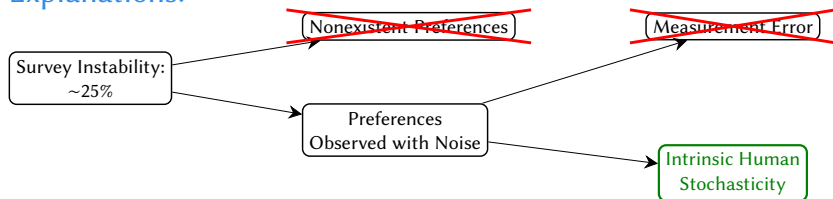
## Explanations:



## Sources:

# So Who's to Blame for Survey Instability?

## Explanations:



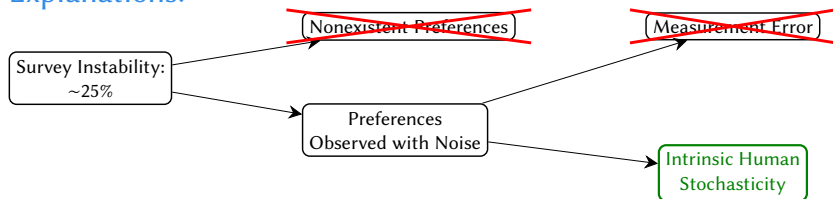
## Sources:

### Survey Instability

$C_1 \neq C_2$  (No memory, material change, or attrition)

# So Who's to Blame for Survey Instability?

## Explanations:



## Sources:

### Survey Response Level

#### Decision Making

Stochastic models  
(probability matching,  
random utility)

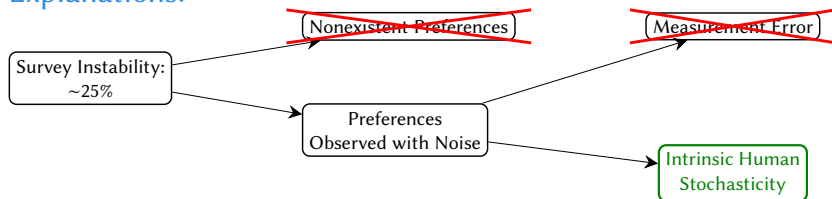
#### Survey Instability

$C_1 \neq C_2$  (No memory,  
material change, or  
attrition)

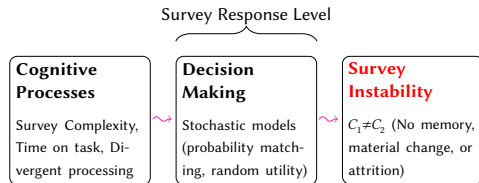


# So Who's to Blame for Survey Instability?

## Explanations:

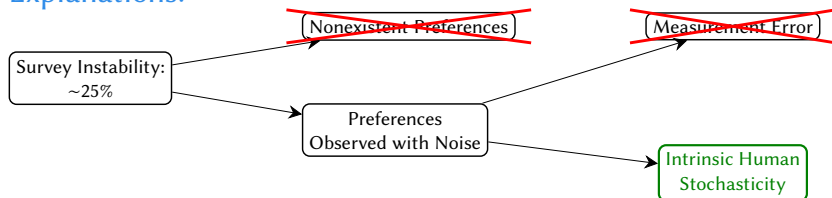


## Sources:

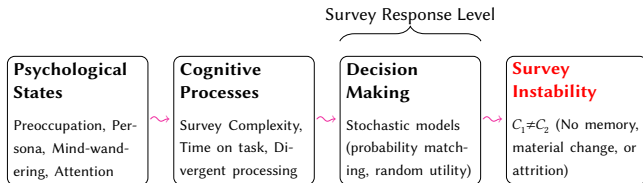


# So Who's to Blame for Survey Instability?

## Explanations:

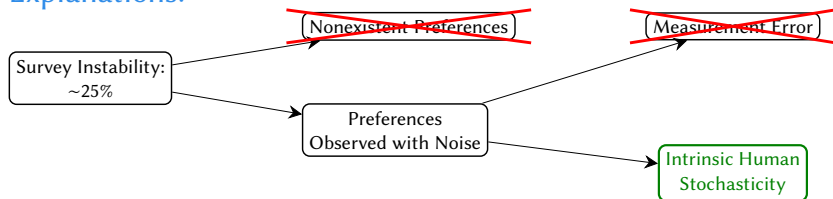


## Sources:

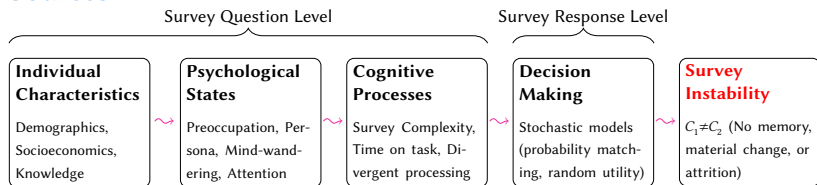


# So Who's to Blame for Survey Instability?

## Explanations:

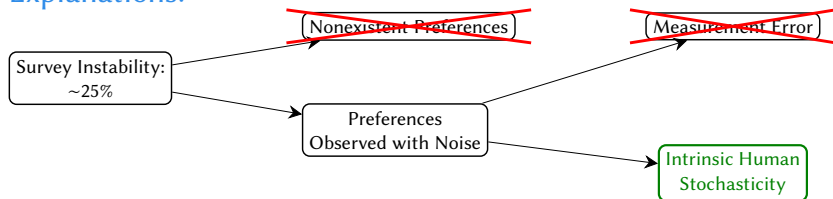


## Sources:

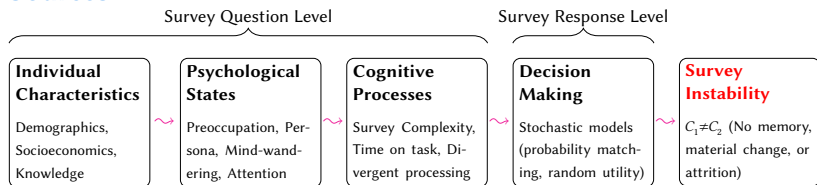


# So Who's to Blame for Survey Instability?

## Explanations:



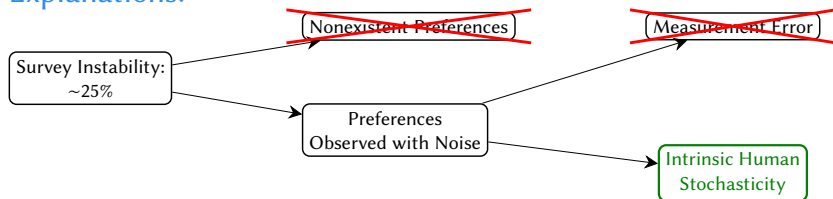
## Sources:



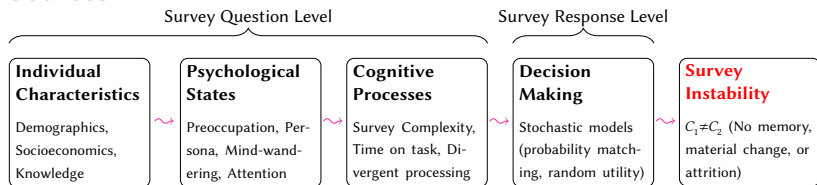
## Implications

# So Who's to Blame for Survey Instability?

## Explanations:



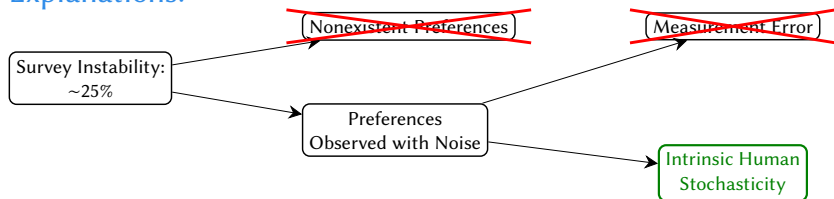
## Sources:



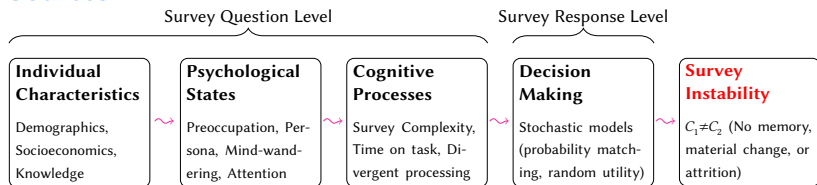
## Implications Survey Qs:

# So Who's to Blame for Survey Instability?

## Explanations:



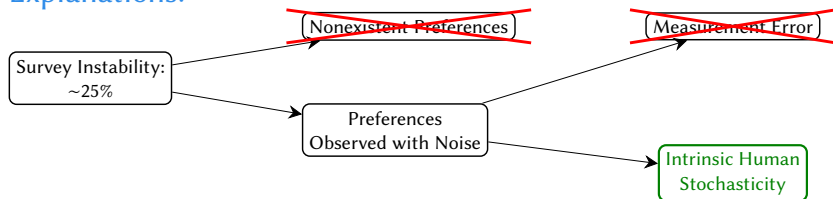
## Sources:



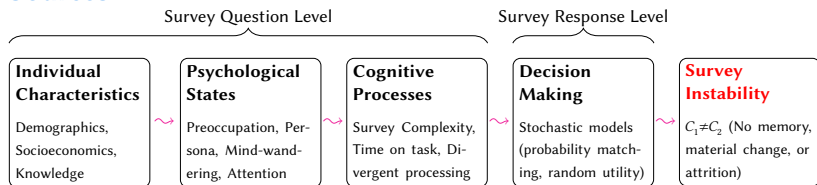
**Implications** Survey Qs: reduce cognitive complexity,

# So Who's to Blame for Survey Instability?

## Explanations:



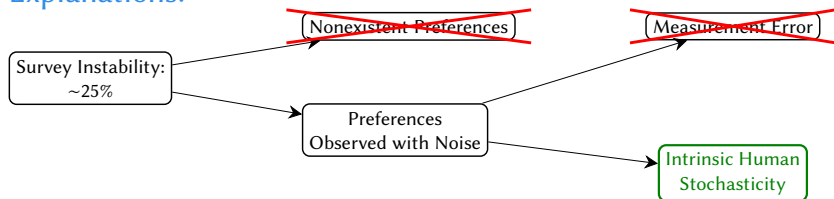
## Sources:



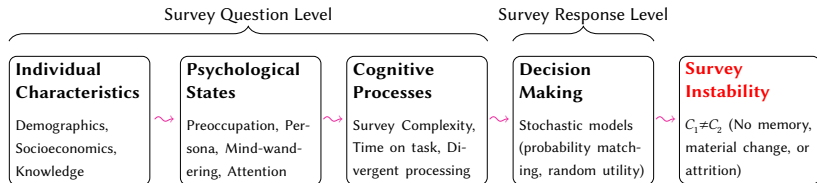
**Implications** Survey Qs: reduce cognitive complexity, measure instability

# So Who's to Blame for Survey Instability?

## Explanations:



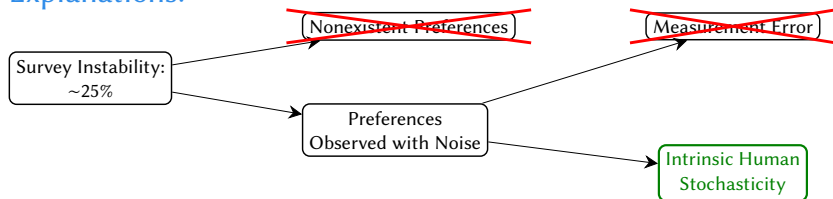
## Sources:



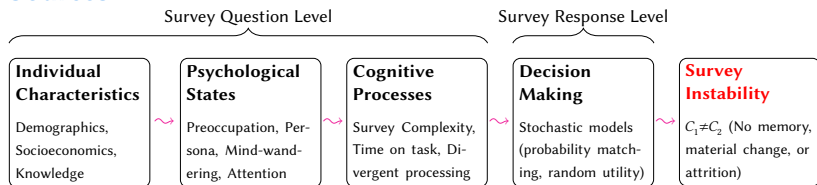
**Implications** Survey Qs: reduce cognitive complexity, measure instability  
**Filter:**

# So Who's to Blame for Survey Instability?

## Explanations:



## Sources:



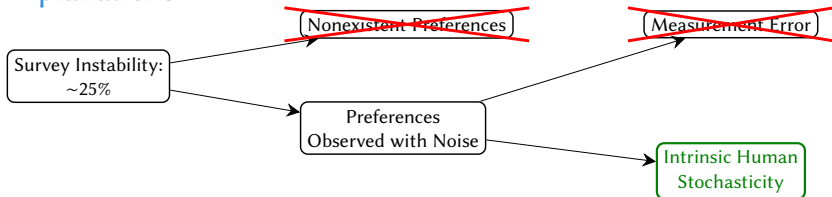
**Implications** **Survey Qs:** reduce cognitive complexity, measure instability  
**Filter:** preoccupied,



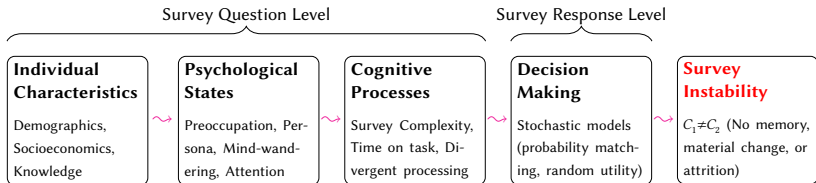


# So Who's to Blame for Survey Instability?

## Explanations:



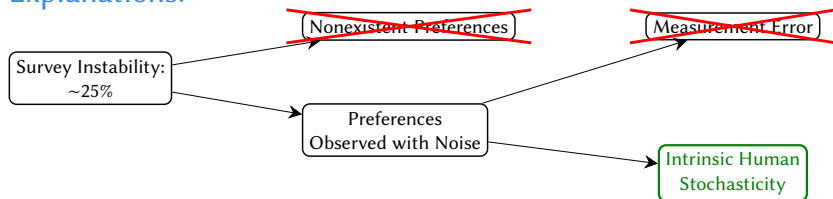
## Sources:



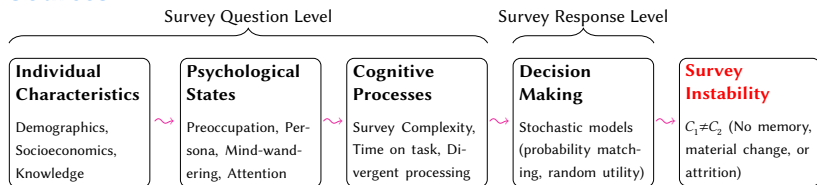
**Implications** **Survey Qs:** reduce cognitive complexity, measure instability  
**Filter:** preoccupied, low time-on-task  
**Correct for:** selection bias,

# So Who's to Blame for Survey Instability?

## Explanations:



## Sources:



**Implications** **Survey Qs:** reduce cognitive complexity, measure instability

**Filter:** preoccupied, low time-on-task

**Correct for:** selection bias, remaining instability

