

# Algorithmic Transference: People Overgeneralize Failures of Artificial Intelligence in the Government

## WEB APPENDIX

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## WEB APPENDIX A. STIMULI OF ALL STUDIES

### STIMULI OF PILOT STUDY REPORTED IN THE INTRODUCTION

Thank you for participating in this survey! Please read the questions in this study carefully and answer them honestly. Please be assured that all responses will be kept completely confidential. Also please note that there are no right or wrong answers. We are simply interested in your honest opinion. Your answers should reflect what “feels right to you” given the information you have.

*Page Break*

Please do not take a break during the study. Once you click “next,” please do not take any pause or be distracted. This study contains attentions checks. You will not be paid if you do not pass them. If you are not fine with this, please leave the survey now. We thank you in advance for your honest and thoughtful responses to these questions.

*Page Break*

[*Attention Check*] What is 12-4? Please write a number: \_\_\_\_\_

*Page Break*

We are interested in how people classify people and algorithms into groups. To do this, in this task we will ask you to classify people and algorithms into groups in a way that makes sense to you. In the next pages, you will read a brief description of a person or an algorithm and then answer the questions that follow. Note that we are interested in your immediate reactions, so do not overthink this exercise and just classify the person/algorithm as it makes most sense to you.

[*ai1*] Consider an algorithm employed by an agency of the federal government to calculate unemployment benefits to distribute to citizens. To what extent do you view this algorithm as..

[*ai2*] Consider an algorithm employed by an agency of the federal government to disburse disability benefits to distribute to citizens. To what extent do you view this algorithm as..

[*ai3*] Consider an algorithm employed by an agency of the federal government to review applications for Temporary Assistance for Needy Families (TANF) benefits. To what extent do you view this algorithm as..

[*h1*] Consider a algorithm employed by an agency of the federal government to review consumer complaints, identify trends, and predict consumer harm in textual consumer complaints. To what extent do you view this person as..

[*h2*] Consider a person employed by a company to allocate unemployment benefits to its employees. To what extent do you view this person as...

[h3] Consider a person employed by a governmental agency to review healthcare benefits applications.

To what extent do you view this person as...

- Part of a group to which you belong to as well
  - A member of your same group
  - Belonging to the same group as you do
- 1 – *Not at all*, 7 – *Very much*

## STIMULI OF STUDY 1A

Please do not take a break during the study. Once you click “next,” please do not take any pause or be distracted. This study contains attentions checks. You will not be paid if you do not pass them. If you are not fine with this, please leave the survey now.



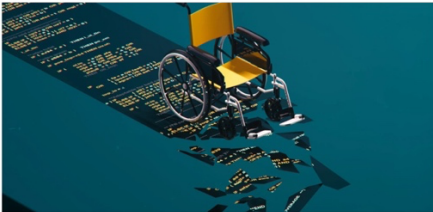









We are interested in your opinions about a scenario. You will read a brief description of this scenario, and we will ask your opinions and preferences. You might feel like you have little information; just answer what seems right to you.

*Page Break*

[Attention Check] What is 12-4? Please write a number: \_\_\_\_\_

*Page Break*

Please read the following excerpt from news that appeared in *The Verge*:

<p><b>THE VERGE</b>  TWITTER  FACEBOOK</p> <p><b>WHAT HAPPENS WHEN A PERSON CUTS YOUR HEALTH CARE</b></p>  <p>By Colin Lecher   @colinlecher   Mar 21, 2016, 9:00am EDT Illustrations by William Joel; Photography by Amelita Holowaty Kralkes</p> <p>   SHARE</p> <p>Tammy Dobbs moved to the state of <b>Arkansas</b> in 2008 and signed up for a state disability program to help her with her cerebral palsy. Under the program, the state had to determine the number of caregiver hours she would need. Because Tammy spent most of her waking hours in a wheelchair and had stiffness in her hands, she was allocated 56 hours of home care per week. In 2016, the state of <b>Arkansas</b> employed a <b>person</b> to recalculate the number of caregiver hours Tammy would be allotted. Without any explanation or opportunity for comment, discussion, or reassessment, the <b>person</b> allotted Tammy 32 hours per week, a massive and sudden drop that Tammy had no chance to prepare for and that severely reduced her quality of life.</p>	<p><b>THE VERGE</b>  TWITTER  FACEBOOK</p> <p><b>WHAT HAPPENS WHEN AN ALGORITHM CUTS YOUR HEALTH CARE</b></p>  <p>By Colin Lecher   @colinlecher   Mar 21, 2016, 9:00am EDT Illustrations by William Joel; Photography by Amelita Holowaty Kralkes</p> <p>   SHARE</p> <p>Tammy Dobbs moved to the state of <b>Arkansas</b> in 2008 and signed up for a state disability program to help her with her cerebral palsy. Under the program, the state had to determine the number of caregiver hours she would need. Because Tammy spent most of her waking hours in a wheelchair and had stiffness in her hands, she was allocated 56 hours of home care per week. In 2016, the state of <b>Arkansas</b> employed an <b>algorithm</b> to recalculate the number of caregiver hours Tammy would be allotted. Without any explanation or opportunity for comment, discussion, or reassessment, the <b>algorithm</b> allotted Tammy 32 hours per week, a massive and sudden drop that Tammy had no chance to prepare for and that severely reduced her quality of life.</p>
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*Page Break*

In the article you read, most of the benefits calculations completed by the Arkansas [*algorithm* / *person*] were wrong.

*[Inferential judgment]* If the state of Kentucky were to employ *[an algorithm / a person]* to calculate disability benefits, how likely do you think the Kentucky *[algorithm / person]* would be to make wrong calculations? (1 – *Unlikely to make wrong calculations*, 7 – *Likely to make wrong calculations*)

## STIMULI OF STUDY 1B

Please do not take a break during the study. Once you click “next,” please do not take any pause or be distracted. This study contains attentions checks. You will not be paid if you do not pass them. If you are not fine with this, please leave the survey now.

We are interested in your opinions about a scenario. You will read a brief description of this scenario, and we will ask your opinions and preferences. You might feel like you have little information; just answer what seems right to you.

*Page Break*

[*Attention Check*] What is 12-4? Please write a number

*Page Break*

Please read the following excerpt from news that appeared in *The London Economics*:

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*Page Break*

In the article you read, most of the benefits calculations completed by the Universal Credit [*algorithm / person*] were wrong. Now consider this information: The Social Security program in

the United States provides protection against the loss of earnings due to retirement, death, or disability.

*[Inferential judgment]* If the state of Arkansas were to employ *[an algorithm / a person]* to calculate social security benefits, how likely do you think this *[algorithm / person]* would be to make wrong calculations? (1 – *Unlikely to make wrong calculations*, 7 – *Likely to make wrong calculations*)

## STIMULI OF STUDY 1C

Please do not take a break during the study. Once you click “next,” please do not take any pause or be distracted. This study contains attentions checks. You will not be paid if you do not pass them. If you are not fine with this, please leave the survey now.



We are interested in your opinions about a scenario. You will read a brief description of this scenario, and we will ask your opinions and preferences. You might feel like you have little information; just answer what seems right to you.

*Page Break*

[Attention Check] What is 12-4? Please write a number

*Page Break*

Please read the following excerpt from news that appeared in *Time*:

<p>TIME</p> <p>U.S. • JUSTICE</p> <p>Michigan Fraud Detection Algorithm Trapped Citizens in Bureaucratic Nightmares With Their Lives on the Line</p>  <p>Justin and Lindsay Perry in Traverse City, Michigan, on May 17, 2020. The couple was forced to file bankruptcy after being charged with unemployment fraud by an algorithm. <i>Brittany Greenon for TIME</i></p> <p><b>L</b>indsay Perry was 30 weeks pregnant and on bedrest when her husband Justin was accused by a Michigan automated system of unemployment fraud and fined \$10,000 after losing his job as a chef. Their tax returns were seized for three years in a row, their van was repossessed, and they filed for bankruptcy. Later, Michigan reversed the charges as the fraud determination was incorrect and reimbursed the couple \$6,000, but the damage was already done.</p> <p>Perry's husband was one of many people across Michigan who were wrongly accused of unemployment insurance fraud as a result of a poorly trained algorithmic system operated by the state.</p>	<p>TIME</p> <p>U.S. • JUSTICE</p> <p>Michigan Fraud Detection Person Trapped Citizens in Bureaucratic Nightmares With Their Lives on the Line</p>  <p>Justin and Lindsay Perry in Traverse City, Michigan, on May 17, 2020. The couple was forced to file bankruptcy after being charged with unemployment fraud by a person. <i>Brittany Greenon for TIME</i></p> <p><b>L</b>indsay Perry was 30 weeks pregnant and on bedrest when her husband Justin was accused by a Michigan person of unemployment fraud and fined \$10,000 after losing his job as a chef. Their tax returns were seized for three years in a row, their van was repossessed, and they filed for bankruptcy. Later, Michigan reversed the charges as the fraud determination was incorrect and reimbursed the couple \$6,000, but the damage was already done.</p> <p>Perry's husband was one of many people across Michigan who were wrongly accused of unemployment insurance fraud as a result of a poorly trained person employed by the state.</p>
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*Page Break*

In the article you read, most of the fraud determinations completed by the Michigan [*algorithm* / *person*] were wrong.



*[Inferential judgment]* If the state of  $\{e://Field/stateName\}$  were to employ *[an algorithm / a person]* to check for unemployment frauds, how likely would this *[algorithm / person]* be to erroneously check for fraud? (1 – *Unlikely to erroneously check for fraud*, 7 – *Likely to erroneously check for fraud*)

## STIMULI OF STUDY 2

Please do not take a break during the study. Once you click “next,” please do not take any pause or be distracted. This study contains attentions checks. You will not be paid if you do not pass them. If you are not fine with this, please leave the survey now.

We are interested in your opinions about a scenario. You will read a brief description of this scenario, and we will ask your opinions and preferences. You might feel like you have little information; just answer what seems right to you.

*Page Break*

[*Attention Check*] What is 12-4? Please write a number:

*Page Break*

The nation’s unemployment insurance program is a federal-state system that provides temporary income support for unemployed workers. The system is funded by taxes collected from employers and held in trust funds administered by individual states. States - which are charged with distributing and overseeing many federally funded benefits - are taking these calculations seriously. On average, between 35 and 40 percent of unemployment benefits calculations are inaccurate. In the recent past, the state of Michigan employed [*an algorithm / a person*] to calculate unemployment benefits. The state then allocated unemployment benefits to its residents based on the [*algorithm's / person's*] calculations. As it turns out, a state review later determined that most of these calculations completed by the Michigan [*algorithm / person*] were wrong.

[*Inferential judgment*] If the state of Arkansas were to employ [*an algorithm / a person*] to calculate unemployment benefits, how likely do you think this [*algorithm / person*] would be to make wrong calculations? (1 – *Unlikely to make wrong calculations*, 7 – *Likely to make wrong calculations*).

*Page Break*

[*Group homogeneity perceptions*] Think about the [*algorithms/people*] performing tasks like the ones described above in various agencies and states across the country. To what extent do you believe that:

- These [*algorithms/people*] are most likely very similar to each other in terms of their characteristics
  - These [*algorithms/people*] most likely resemble one another in terms of their characteristics and capabilities
  - These [*algorithms/people*] most likely share common underlying characteristics
- 1 – *Disagree strongly*, 7 – *Agree strongly*

*Page Break*

[Perceived locus of causality] In the scenario you read, the state of Michigan employed [an algorithm / a person] to calculate unemployment benefits. In your opinion, the [algorithm / person] performs this task because of:

1 - Intrinsic motivation, 7- Extrinsic Motivation

1 - Causes within the [algorithm/person], 7 - Causes external to the [algorithm/person]

1 - Internal reasons, 7 - External reasons

1 - The task's own sake, 7 - Some external reason

*Page Break*

In the next pages we will ask you 16 questions about your general knowledge of Artificial Intelligence and algorithms. It is very important that you do not look up or google these answers online, as that would defeat the purpose of our survey. We are interested in people's actual understanding of Artificial Intelligence and algorithms. So please just answer the following questions to best of your knowledge. We need your honest responses to understand people's general knowledge of AI and algorithms.

(1) An AI system that is designed and trained to complete a specific task such as virtual personal assistants like Apple's Siri, is called:

Narrow AI [correct]

General Artificial Intelligence,

Smart home AI

(2) There are three types of machine learning algorithms:

Supervised learning, unsupervised learning, and reinforcement learning [correct]

Machine vision, natural language processing, and robotics

Reactive machines, limited memory, and theory of mind

(3) Which of the languages below are used to code a robot?

Python [correct]

Html

Computer vision

(4) Any device that perceives its environment and takes actions that maximize its chance of success at some goal is called...

Intelligent agent [correct]

Input

Data

(5) Which of these is a tool used in Artificial Intelligence?

Neural networks [correct]

Art

Design

(6) Which key technology is behind Artificial Intelligence?

Machine learning [correct]

Electric battery  
Robotics

(7) Which method is used by reinforcement learning to find solutions for defined problems?

Trial and error method to maximize rewards [correct]

Trial and error method to maximize punishment

Trial and error method to maximize error messages

(8) Which of the following tasks could most likely be performed by Artificial Intelligence?

The analysis of X-ray images, for example to detect a torn meniscus or a tumor [correct]

The complete replacement of a doctor in the treatment of patients

The implementation of psychotherapies

(9) Some algorithms are better than others even if they...

Produce the same results [correct]

Have logical errors

Have syntax errors

(10) Which of these is a notable algorithmic problem?

Sorting [correct]

Counting

Multiplication

(11) Computer scientists have spent decades inventing algorithms for sorting. Which of these are sorting algorithms?

Bubble Sort and Spaghetti Sort [correct]

Lather Sort and Fettuccine Sort

Foam Sort and Macaroni Sort

(12) A series of items of the same type, like airfare prices, is called:

An array [correct]

A scalar

A grid

(13) An algorithm that sorted an array by repeatedly finding the smallest element is called:

Selection sort [correct]

Merge sort

Spaghetti sort

(14) Which notation is used in Computer Science to describe the performance or complexity of an algorithm?

Big O Notation [correct]

N-squared Notation

Standard Notation

(15) Every time you use a service like Google Maps to get directions, which kind of algorithm is running?

A Graph Search [correct]

A Merge Sort of round numbers

A Brute Force algorithm

(16) Which of these is a measure of an algorithm's complexity?

Time complexity [correct]

Step complexity

Sort complexity

### STIMULI OF STUDY 3

Please do not take a break during the study. Once you click “next,” please do not take any pause or be distracted. This study contains attentions checks. You will not be paid if you do not pass them. If you are not fine with this, please leave the survey now.

We are interested in your opinions about a scenario. You will read a brief description of this scenario, and we will ask your opinions and preferences. You might feel like you have little information; just answer what seems right to you.

*Page Break*

[*Attention Check*] What is 12-4? Please write a number

*Page Break*

The nation’s unemployment insurance program is a federal-state system that provides temporary income support for unemployed workers. The system is funded by taxes collected from employers and held in trust funds administered by individual states. States - which are charged with distributing and overseeing many federally funded benefits - are taking these calculations seriously. On average, between 35 and 40 percent of unemployment benefits calculations are inaccurate. In the recent past, the state of Michigan employed [*an algorithm / a person*] to calculate unemployment benefits. The state then allocated unemployment benefits to its residents based on the [*algorithm's / person's*] calculations. As it turns out, a state review later determined that most of these calculations completed by the Michigan [*algorithm / person*] were wrong.

[*Group heterogeneity salient*] Note that different states rely on different contractors that train algorithms for these purposes, and therefore the algorithms making these decisions share very few similarities and are unlikely to resemble one another in terms of their characteristics and capabilities, so much so that it would be hard to group these algorithms in one homogeneous group.

[*Control*] --

[*Inferential judgment*] If the state of Arkansas were to employ [*an algorithm / a person*] to calculate unemployment benefits, how likely do you think this [*algorithm / person*] would be to make wrong calculations? (1 – *Unlikely to make wrong calculations*, 7 – *Likely to make wrong calculations*)

## STIMULI OF STUDY 4

Please do not take a break during the study. Once you click “next,” please do not take any pause or be distracted. This study contains attentions checks. You will not be paid if you do not pass them. If you are not fine with this, please leave the survey now.

We are interested in your opinions about a scenario. You will read a brief description of this scenario, and we will ask your opinions and preferences. You might feel like you have little information; just answer what seems right to you.

*Page Break*

[*Attention Check*] What is 12-4? Please write a number

*Page Break*

[*Discomfort with technology*] To begin, we will ask you some questions about your views and opinions. Please rate the extent to which you agree with the following statements:

- Sometimes, you think that technology systems are not designed for use by ordinary people
  - There should be caution in replacing important people-tasks with technology because new technology can breakdown or get disconnected
  - Many new technologies have health or safety risks that are not discovered until after people have used them
  - Technology always seems to fail at the worst possible time
  - New technology makes it too easy for governments and companies to spy on people
- 1 – *Disagree strongly*, 5 – *Agree strongly*

*Page Break*

Now please read the following excerpt from news that appeared in the *London Economics*:

THE LONDON ECONOMIC

## Poorly trained Universal Credit algorithm forces people into hunger and debt

A new report found that the government benefit system - which is reliant on an algorithm that calculates benefits for people on a low income or out of work - threatens the rights of people most at risk of poverty.

by Henry Goodwin



People in the UK are being pushed into poverty by a computer algorithm that incorrectly allocated how much money they are entitled to in social security payments.

Universal Credit claimants are being forced to forego food and take on debt because of a poorly trained algorithm, a leading human rights charity warned.

A new report by Human Rights Watch found that the government benefit system - which is reliant on an algorithm to calculate benefits for people on a low income or out of work - "threatens the rights of people most at risk of poverty". The charity is calling on the government to take action ahead of an anticipated winter jobs crisis, with up to nine million workers at risk of redundancy as the furlough scheme is wound down.

THE LONDON ECONOMIC

## Poorly trained Universal Credit person forces people into hunger and debt

A new report found that the government benefit system - which is reliant on a person who calculates benefits for people on a low income or out of work - threatens the rights of people most at risk of poverty.

by Henry Goodwin



People in the UK are being pushed into poverty by a person who incorrectly allocated how much money they are entitled to in social security payments.

Universal Credit claimants are being forced to forego food and take on debt because of a poorly trained person, a leading human rights charity warned.

A new report by Human Rights Watch found that the government benefit system - which is reliant on a person to calculate benefits for people on a low income or out of work - "threatens the rights of people most at risk of poverty". The charity is calling on the government to take action ahead of an anticipated winter jobs crisis, with up to nine million workers at risk of redundancy as the furlough scheme is wound down.

*Page Break*

In the article you read, most of the benefits calculations completed by the Universal Credit [algorithm / person] were wrong.

[Inferential judgment] If the state of Arkansas were to employ [an algorithm / a person] to calculate social security benefits, how likely do you think this [algorithm / person] would be to make wrong calculations? (1 – Unlikely to make wrong calculations, 7 – Likely to make wrong calculations)



## STIMULI OF STUDY 5

Please do not take a break during the study. Once you click “next,” please do not take any pause or be distracted. This study contains attentions checks. You will not be paid if you do not pass them. If you are not fine with this, please leave the survey now.

We are interested in your opinions about a scenario. You will read a brief description of this scenario, and we will ask your opinions and preferences. You might feel like you have little information; just answer what seems right to you.

*Page Break*

[*Attention Check*] What is 12-4? Please write a number

*Page Break*

Residents living in the state of Michigan may sign up for the state disability program to help with their expenses. To assess eligibility for disability benefits, the state considers, among others, the following: the claimant's ability to resume work or find work, the claimant's income situation, the severity of the claimant's impairment, the claimant's medical condition, and the claimant's ability to perform past work or any type of work. On average, between 35 and 40 percent of disability benefits calculations are inaccurate. States – which are charged with distributing and overseeing many federally funded benefits – are taking these benefits recalculations seriously.

[*Algorithm*] In the recent past, the state of Michigan employed an algorithm to calculate disability benefits. Given the algorithm's calculations of the amount and type of disability benefits, the state allocated disability benefits to its residents. A state review later determined that most of these calculations-completed by the Michigan algorithm were wrong. Now imagine that the state of Ohio were to employ an algorithm to calculate disability benefits. The algorithm would make a final determination about the disability benefits to allocate. This way of deciding is technically called “artificial intelligence,” because it uses what algorithm to replace what intelligence can do.

[*Inferential judgment*] How likely do you think the Ohio algorithm would be to make wrong calculations? (1 – *Unlikely to make wrong calculations*, 7 – *Likely to make wrong calculations*)

[*Human*] In the recent past, the state of Michigan employed a person to calculate disability benefits. Given the person's calculations of the amount and type of disability benefits, the state allocated disability benefits to its residents. A state review later determined that most of these calculations-completed by the Michigan person were wrong. Now imagine that the state of Ohio were to employ a person to calculate disability benefits. The person would make a final determination about the disability benefits to allocate. This way of deciding is technically called “human intelligence,” because it uses what human intelligence can do.

[*Inferential judgment*] How likely do you think the Ohio person would be to make wrong calculations? (1 – *Unlikely to make wrong calculations*, 7 – *Likely to make wrong calculations*)

*[Human oversight]* In the recent past, the state of Michigan employed an algorithm to calculate disability benefits. Given the algorithm's calculations of the amount and type of disability benefits, the state allocated disability benefits to its residents. A state review later determined that most of these calculations-completed by the Michigan algorithm were wrong. Now imagine that the state of Ohio were to employ an algorithm to calculate disability benefits. The algorithm would make an initial calculation and assists a person who would make the final determination about the disability benefits to allocate. This way of deciding is technically called “augmented intelligence,” because it uses algorithms to enhance and augment what human intelligence can do.

*[Inferential judgment]* How likely do you think the Ohio algorithm would be to make wrong calculations? (1 – *Unlikely to make wrong calculations*, 7 – *Likely to make wrong calculations*)

## STIMULI OF STUDY 6A

Please do not take a break during the study. Once you click “next,” please do not take any pause or be distracted. This study contains attentions checks. You will not be paid if you do not pass them. If you are not fine with this, please leave the survey now.

We are interested in your opinions about a scenario. You will read a brief description of this scenario, and we will ask your opinions and preferences. You might feel like you have little information; just answer what seems right to you.

*Page Break*

[*Attention Check*] What is 12-4? Please write a number

*Page Break*

Please read the information below about Social Security Disability Insurance Benefits program available at <https://www.benefits.gov/>

*Page Break*



The screenshot shows the top portion of the Social Security Disability Insurance Benefits page on the benefits.gov website. At the top left is the BENEFITS.gov logo with the tagline "Your Path to Government Benefits". To the right is a "MENU" button and a language selector for "Español". Below the header is a yellow banner with the text: "View coronavirus (COVID-19) resources on Benefits.gov. Visit Coronavirus.gov for live updates." The main heading is "Social Security Disability Insurance Benefits" in white text on a blue background. Below this is a "Quick Info" section with a dropdown arrow. The breadcrumb trail reads: "Benefit Categories > Disability Assistance Social Security / Insurance Social Security / Social Security and Retirement". The first section is titled "What is Social Security Disability Insurance Benefits?" and contains a paragraph explaining that these benefits are federally funded and administered by the U.S. Social Security Administration (SSA). It states that SSA pays disability benefits to individuals and certain family members who have worked long enough and have a medical condition that prevents them from working for at least 12 months or is expected to end in death. A "See more" link is provided. The second section is titled "Who is eligible for Social Security Disability Insurance Benefits?" and lists the requirements: being unable to work due to a long-term medical condition, not having a partial or short-term disability, meeting SSA's definition of a disability, and being younger than the full retirement age. It also notes that certain family members may be eligible based on the individual's work record. A link to the "Benefit Eligibility Screening Tool" is provided at the bottom.

*Page Break*

Residents living in the state of Michigan may sign up for the state Social Security Disability program to help with their expenses. In the recent past, the state of Michigan employed [*an*

*algorithm / a person*] to calculate disability benefits. The state then allocated Social Security disability benefits to its residents based on [*the algorithm's / the person's*] calculations. As it turns out, a state review later determined that most of the benefits calculations completed by the Michigan [*algorithm / person*] were wrong.

[*Inferential judgment*] If  $\{e://Field/stateName\}$  were to employ [*an algorithm / a person*] to calculate disability benefits, how likely do you think this [*algorithm / person*] would be to make wrong calculations? (1 – *Unlikely to make wrong calculations*, 7 – *Likely to make wrong calculations*)

[*Propensity to apply*] If  $\{e://Field/stateName\}$  were to employ [*an algorithm / a person*] to calculate disability benefits, how likely would you be to apply for these benefits if you needed them? (1 – *Likely to apply*, 7 – *Unlikely to apply*)

## STIMULI OF STUDY 6B

Please do not take a break during the study. Once you click “next,” please do not take any pause or be distracted. This study contains attentions checks. You will not be paid if you do not pass them. If you are not fine with this, please leave the survey now.

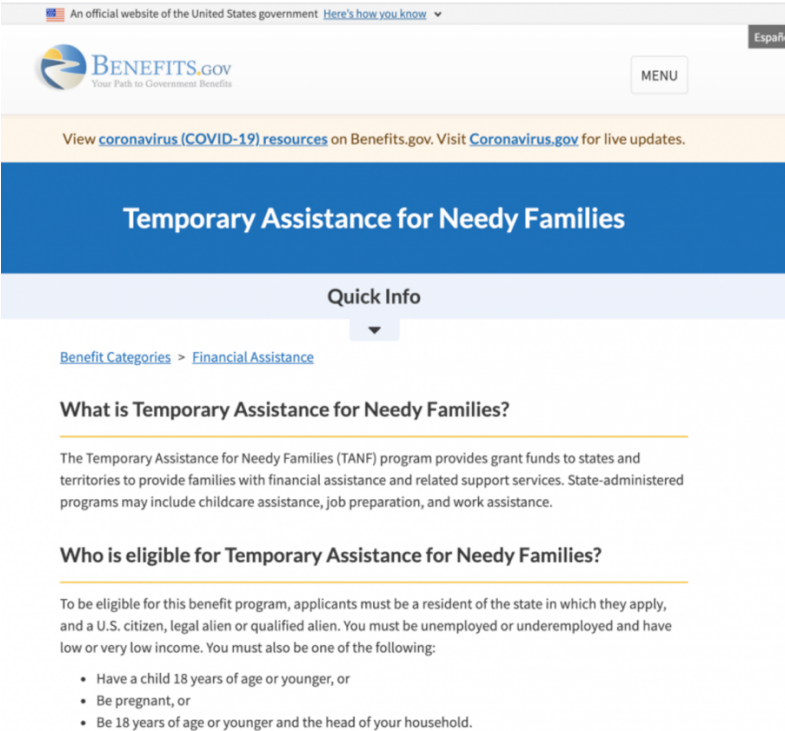
We are interested in your opinions about a scenario. You will read a brief description of this scenario, and we will ask your opinions and preferences. You might feel like you have little information; just answer what seems right to you.

*Page Break*

[*Attention Check*] What is 12-4? Please write a number

*Page Break*

Please read the information below about The Temporary Assistance for Needy Families (TANF) program available at <https://www.benefits.gov>



The screenshot shows the Benefits.gov website. At the top, it says "An official website of the United States government" and "Here's how you know". The logo for BENEFITS.GOV is "Your Path to Government Benefits". There is a "MENU" button and a "Español" link. A banner reads "View coronavirus (COVID-19) resources on Benefits.gov. Visit Coronavirus.gov for live updates." The main heading is "Temporary Assistance for Needy Families". Below this is a "Quick Info" section with a dropdown arrow. The breadcrumb trail is "Benefit Categories > Financial Assistance".

### What is Temporary Assistance for Needy Families?

The Temporary Assistance for Needy Families (TANF) program provides grant funds to states and territories to provide families with financial assistance and related support services. State-administered programs may include childcare assistance, job preparation, and work assistance.

### Who is eligible for Temporary Assistance for Needy Families?

To be eligible for this benefit program, applicants must be a resident of the state in which they apply, and a U.S. citizen, legal alien or qualified alien. You must be unemployed or underemployed and have low or very low income. You must also be one of the following:

- Have a child 18 years of age or younger, or
- Be pregnant, or
- Be 18 years of age or younger and the head of your household.

*Page Break*

In the recent past, the state of Michigan employed [*an algorithm / a person*] to calculate TANF benefits to its residents. The state then allocated TANF benefits to its residents based on [*the algorithm's / the person's*] calculations. As it turns out, state review later determined that most of these TANF calculation decisions completed by the Michigan [*algorithm / person*] were

wrong.

[*Inferential judgment*] If  $\{e://Field/stateName\}$  were to employ [*an algorithm / a person*] to calculate TANF benefits, how likely do you think this [*algorithm / person*] would be to make wrong calculations? (1 – *Unlikely to make wrong calculations*, 7 – *Likely to make wrong calculations*)

[*Propensity to apply*] If  $\{e://Field/stateName\}$  were to employ [*an algorithm / a person*] to calculate TANF benefits, how likely would you be to apply for TANF benefits if you needed them? (1 – *Likely to apply*, 7 – *Unlikely to apply*)

## STIMULI OF STUDY 6C

Please do not take a break during the study. Once you click “next,” please do not take any pause or be distracted. This study contains attentions checks. You will not be paid if you do not pass them. If you are not fine with this, please leave the survey now.

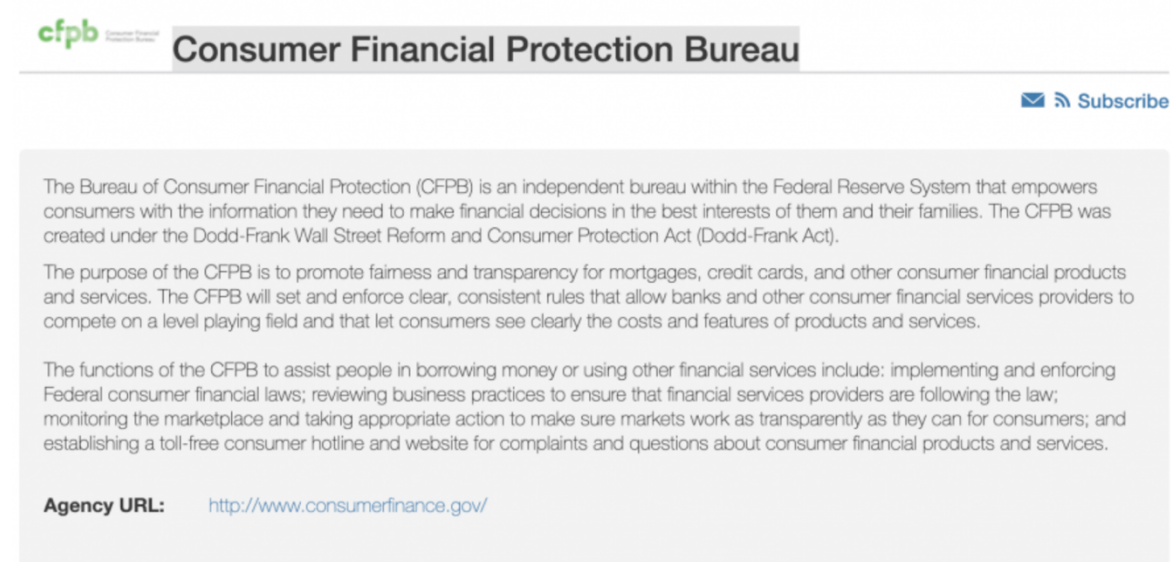
We are interested in your opinions about a scenario. You will read a brief description of this scenario, and we will ask your opinions and preferences. You might feel like you have little information; just answer what seems right to you.

*Page Break*

[*Attention Check*] What is 12-4? Please write a number

*Page Break*

The Bureau of Consumer Financial Protection, known as the Consumer Financial Protection Bureau (CFPB), is an independent bureau within the Federal Reserve System that makes sure banks, lenders, and other financial companies treat consumers fairly. The CFPB was created to provide a single point of accountability for enforcing federal consumer financial laws and protecting consumers in the financial marketplace. Please review the information below from the CFPB's website:



**cfpb** Consumer Financial Protection Bureau

Subscribe

The Bureau of Consumer Financial Protection (CFPB) is an independent bureau within the Federal Reserve System that empowers consumers with the information they need to make financial decisions in the best interests of them and their families. The CFPB was created under the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act).

The purpose of the CFPB is to promote fairness and transparency for mortgages, credit cards, and other consumer financial products and services. The CFPB will set and enforce clear, consistent rules that allow banks and other consumer financial services providers to compete on a level playing field and that let consumers see clearly the costs and features of products and services.

The functions of the CFPB to assist people in borrowing money or using other financial services include: implementing and enforcing Federal consumer financial laws; reviewing business practices to ensure that financial services providers are following the law; monitoring the marketplace and taking appropriate action to make sure markets work as transparently as they can for consumers; and establishing a toll-free consumer hotline and website for complaints and questions about consumer financial products and services.

**Agency URL:** <http://www.consumerfinance.gov/>

*Page Break*

Imagine you read in the news that in the recent past, the Consumer Financial Protection Bureau has employed [*a natural language processing algorithm/ a person*] to categorize narratives, identify trends, and predict consumer harm in textual consumer complaints. The [*algorithm / person*] handled consumer complaints about credit cards, mortgages, student loans, bank accounts or services, vehicle and consumer loans, credit reporting, debt collection, and money

transfers. An audit by the Federal Reserve System later revealed that the [*algorithm / person*] erroneously handled most of these consumer complaints.

The Consumer Protection Agency of the state of \${e://Field/stateName} enforces laws to protect consumers from fraud, deception, and other unfair business practices.

[*Inferential judgment*] If the Consumer Protection Agency of the state of \${e://Field/stateName} were to employ [*a natural language processing algorithm / a person*], how likely would this algorithm be to erroneously handle consumer complaints? (1- *Unlikely to erroneously handle consumer complaints*, 7 – *Likely to erroneously handle consumer complaints*)

[*Propensity to apply*] If the Consumer Protection Agency of the state of \${e://Field/stateName} were to employ [*a natural language processing algorithm / a person*] to handle claims, how likely would you be to submit a consumer complaint? (1 – *Definitively submit*, 7 – *Definitively not submit*)



## WEB APPENDIX B. DETAILS OF REPLICATION OF STUDY 1A WITH ARKANSAS RESIDENTS

This replication tested whether algorithmic transference changes when recruiting participants from the same state mentioned in the instruments. To do so, in this study we recruited participants only from the state of Arkansas, the same state mentioned in the article reporting the failure.

### *Procedure*

Respondents recruited from Amazon Mechanical Turk and residing in the state of Arkansas participated in exchange for \$0.35-\$0.70 ( $N = 209$ ;  $M_{\text{age}} = 42.7$ ,  $SD = 12.6$ ; Females = 46.5%, Males = 47.4%, Non-binary/Third gender = 0.9%; Prefer to not say: 1.9%; data collection was very slow, possibly because we were recruiting only from the state of Arkansas, so we increased payment to boost recruitment). Participants were randomly assigned to one condition in a 2-cell (algorithm, human) between-subjects design. Specifically, participants read a news article describing the failure of either an algorithm or a person employed by the State of Arkansas in the allocation of caregiver benefits to the state's residents. This article was based on a piece by Lecher (2018) that appeared in *The Verge*:

*What Happens When [An Algorithm / A Person] Cuts Your Healthcare.*

Tammy Dobbs moved to the state of Arkansas in 2008 and signed up for a state disability program to help her with her cerebral palsy. Under the program, the state had to determine the number of caregiver hours she would need. Because Tammy spent most of her waking hours in a wheelchair and had stiffness in her hands, she was allocated 56 hours of home care per week. In 2016, the state of Arkansas employed [*an algorithm / a person*] to recalculate the number of caregiver hours Tammy would be allotted. Without any explanation or opportunity for comment, discussion, or reassessment, the [*algorithm / person*] allotted Tammy 32 hours per week, a massive and sudden drop that Tammy had no chance to prepare for and that severely reduced her quality of life.

Then, participants made an inferential judgement about the likelihood that another agent of the same group (i.e., an algorithm or a person) employed by a different state (Kentucky) would fail. Specifically, participants rated the likelihood that [an algorithm / a person] employed by the state of Kentucky would make wrong disability benefits calculations (1 – *Unlikely to make wrong calculations*, 7 – *Likely to make wrong calculations*).

### *Results*

Replicating the results of study 1A, participants were more prone to transfer algorithmic than human failures, inferring that an algorithm, but less so another person, would fail ( $M_{\text{AI}} = 5.55$ ,  $SD = 1.30$ ;  $M_{\text{H}} = 4.79$ ,  $SD = 1.42$ ;  $t(207) = 4.06$ ,  $p < .001$ ,  $d = 0.56$ ).

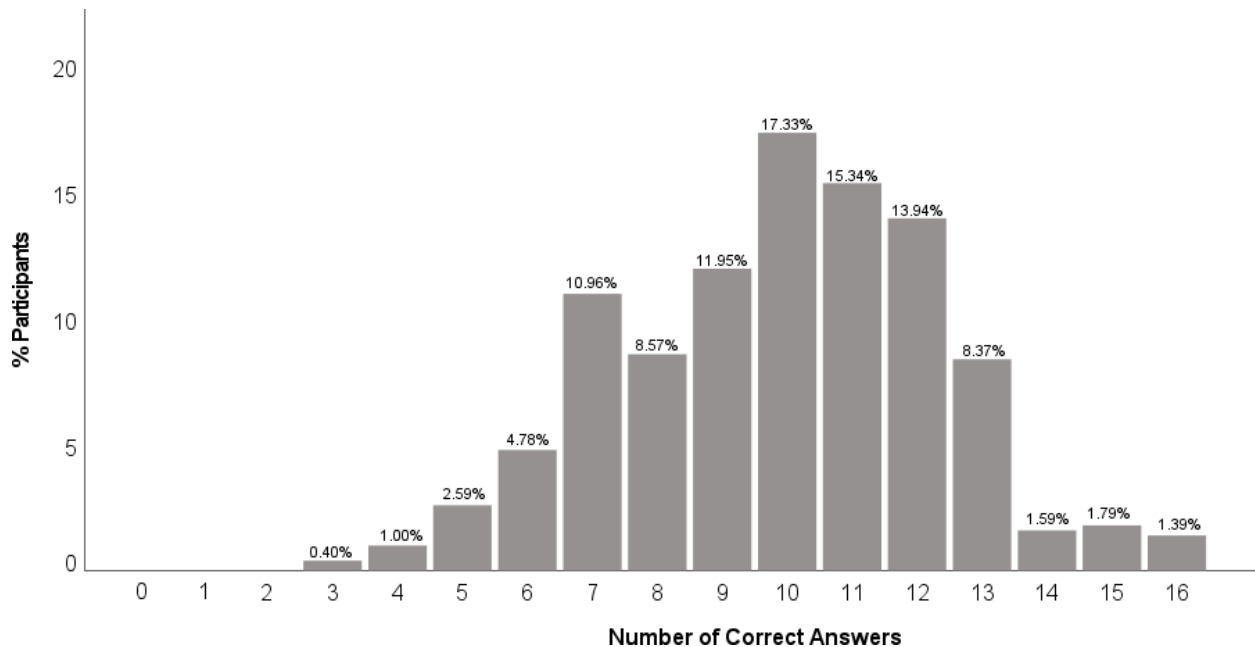
## WEB APPENDIX C. ALGORITHMIC LITERACY TEST IN STUDY 2

*List of questions comprising the algorithmic literacy test and percent of correct responses by question item*

Question	% Correct Responses
<i>Note.</i> Order of questions and order of answers within each question were randomized.	
<p><b>(1) An AI system that is designed and trained to complete a specific task such as virtual personal assistants like Apple's Siri, is called:</b>                      Narrow AI [correct]                      General Artificial Intelligence                      Smart home AI</p>	28.7%
<p><b>(2) There are three types of machine learning algorithms:</b>                      Supervised learning, unsupervised learning, and reinforcement learning [correct]                      Machine vision, natural language processing, and robotics                      Reactive machines, limited memory, and theory of mind</p>	50.3%
<p><b>(3) Which of the languages below are used to code a robot?</b>                      Python [correct]                      Html                      Computer vision</p>	75.0%
<p><b>(4) Any device that perceives its environment and takes actions that maximize its chance of success at some goal is called...</b>                      Intelligent agent [correct]                      Input                      Data</p>	81.5%
<p><b>(5) Which of these is a tool used in Artificial Intelligence?</b>                      Neural networks [correct]                      Art                      Design</p>	74.7%
<p><b>(6) Which key technology is behind Artificial Intelligence?</b>                      Machine learning [correct]                      Electric battery                      Robotics</p>	86.8%
<p><b>(7) Which method is used by reinforcement learning to find solutions for defined problems?</b>                      Trial and error method to maximize rewards [correct]                      Trial and error method to maximize punishment                      Trial and error method to maximize error messages</p>	64.8%
<p><b>(8) Which of the following tasks could most likely be performed by Artificial Intelligence?</b>                      The analysis of X-ray images, for example to detect a torn meniscus or a tumor [correct]                      The complete replacement of a doctor in the treatment of patients                      The implementation of psychotherapies</p>	84.5%
<p><b>(9) Some algorithms are better than others even if they...</b>                      Produce the same results [correct]                      Have logical errors                      Have syntax errors</p>	68.0%
<p><b>(10) Which of these is a notable algorithmic problem?</b>                      Sorting [correct]                      Counting                      Multiplication</p>	71.9%
<p><b>(11) Computer scientists have spent decades inventing algorithms for sorting. Which of these are sorting algorithms?</b>                      Bubble Sort and Spaghetti Sort [correct]                      Lather Sort and Fettuccine Sort                      Foam Sort and Macaroni Sort</p>	72.3%
<p><b>(12) A series of items of the same type, like airfare prices, is called:</b></p>	

An array [correct] A scalar A grid	73.5%
<b>(13) An algorithm that sorted an array by repeatedly finding the smallest element is called:</b> Selection sort [correct] Merge sort Spaghetti sort	67.8%
<b>(14) Which notation is used in Computer Science to describe the performance or complexity of an algorithm?</b> Big O Notation [correct] N-squared Notation Standard Notation	15.9%
<b>(15) Every time you use a service like Google Maps to get directions, which kind of algorithm is running?</b> A Graph Search [correct] A Merge Sort of round numbers A Brute Force algorithm	47.2%
<b>(16) Which of these is a measure of an algorithm's complexity?</b> Time complexity [correct] Step complexity Sort complexity	13.8%

*Distribution of correct responses (ranging from 0 = no response was correct, to 16 = all responses were correct) across participants*



## WEB APPENDIX D. MEDIATION MODELS FOR STUDY 2

*Mediation model entering group homogeneity perceptions as mediator.*

Direct effect: .19 (95% CI [-.03, .40]).

	Effect	LLCI	ULCI
Total	.67	.45	.88
Group homogeneity perceptions	.48	.34	.64

*Mediation model entering group homogeneity perceptions and perceived locus of causality as simultaneous mediators.*

Direct effect: .19 (95% CI [-.03, .42]).

	Effect	LLCI	ULCI
Total	.47	.33	.63
Group homogeneity perceptions	.48	.34	.63
Perceived locus of causality	-.01	-.06	.05

## WEB APPENDIX E. DETAILS OF STUDY 7 REPORTED IN THE GENERAL DISCUSSION

### *Procedure*

Respondents recruited from Amazon Mechanical Turk participated in this study in exchange for \$0.35 ( $N = 299$ ;  $M_{\text{age}} = 44.6$ ,  $SD = 13.3$ ; Females = 45.4%, Males = 47.3%, Non-binary/Third gender = 1.6%; Prefer to not say: 0.6%). Participants were randomly assigned to one condition in a 3-cell (agent: algorithm, human, brand) between-subjects design. Specifically, participants read about the failure of (i) an algorithm, or (ii) a person, or (iii) a company/brand in the allocation of unemployment benefits.

[*Algorithm*] In the recent past, the state of Michigan employed an algorithm to calculate unemployment benefits. The state then allocated unemployment benefits to its residents based on the algorithm's calculations. As it turns out, a review later determined that most of these calculations completed by the Michigan algorithm were wrong.

[*Human*] In the recent past, the state of Michigan employed a person to calculate unemployment benefits. The state then allocated unemployment benefits to its residents based on the person's calculations. As it turns out, a review later determined that most of these calculations completed by the Michigan person were wrong.

[*Brand*] In the recent past, a company in the state of Michigan called Lear calculated unemployment benefits to allocate to the company's employees. The company Lear then allocated unemployment benefits to its employees based on its calculations. As it turns out, a review later determined that most of these calculations completed by the Michigan company were wrong.

Participants rated the likelihood to incorrectly calculate unemployment benefits by: (i) another algorithm employed by the state of Arkansas, or (ii) another person employed by the state of Arkansas, or (iii) another brand in the state of Arkansas called Watson (1- *Unlikely to make wrong calculations*, 7 – *Likely to make wrong calculations*). Additionally, participants rated the extent to which, in their opinion, the decisions regarding the unemployment calculations were 1 – *Made by algorithms*, 7 – *Made by people*.

### *Results and Discussion*

*Algorithmic transference.* A one-way ANOVA on inferential performance was significant ( $F(2, 296) = 13.56$ ,  $p < .001$ ,  $\eta^2 = .08$ ). Consistent with our theoretical model, participants transferred the scandal to another algorithm ( $M_{\text{AI}} = 5.14$ ,  $SD = 1.37$ ) to a greater degree than they transferred the scandal to another person ( $M_{\text{H}} = 4.46$ ,  $SD = 1.20$ ,  $t(296) = 3.66$ ,  $p < .001$ ,  $d = .52$ ) and to another brand ( $M_{\text{B}} = 4.21$ ,  $SD = 1.34$ ,  $t(296) = 5.03$ ,  $p < .001$ ,  $d = .71$ ). There was no difference in transference between the person and the brand conditions ( $t(296) = 1.34$ ,  $p = .18$ ,  $d = .19$ ).

*Failure attribution.* A one-way ANOVA on failure attribution was also significant ( $F(2, 296) = 705.52$ ,  $p < .001$ ,  $\eta^2 = .83$ ). Corroborating our predictions, participants attributed the scandal in

the algorithm condition to algorithmic decisions rather than human decisions ( $M_{AI} = 1.26$ ,  $SD = 0.93$ ) whereas the scandals in the human and brand conditions were attributed more to human decisions ( $M_H = 6.78$ ,  $SD = 0.78$ , human vs. algorithm:  $t(296) = 34.66$ ,  $p < .001$ ,  $d = 4.91$ ;  $M_B = 5.97$ ,  $SD = 1.51$ ; brand vs. algorithm:  $t(1, 296) = 29.75$ ,  $p < .001$ ,  $d = 4.12$ ).

## WEB APPENDIX F. DETAILS OF STUDY 8 REPORTED IN THE GENERAL DISCUSSION

### *Procedure*

Respondents from Amazon Mechanical Turk participated in exchange for \$0.35 ( $N = 200$ ,  $M_{\text{age}} = 40.7$ ,  $SD = 13.7$ ; Females = 53.0%, Males = 45.5%, Non-binary/Third gender = 0.5%; Prefer to not say: 1.0%). In a 2-cell, between-subject design, participants read a news article describing an error in predictive policing carried out by either an algorithm or a person employed by the Allegheny County's Police Department. This article was based on a piece by Hurley (2018) that appeared in *The New York Times*.

The Police Department of Allegheny County, Office Children, Youth and Families, employs [an algorithm/a person] to enforce child protection practices. Specifically, this [algorithm/person] considers information from the police, social care, schools, and other community groups to monitor children and prevent instances of child abuse and exploitation. The Wednesday after Thanksgiving 2016, this [algorithm/person] dismissed mistreatment allegations about 3-year-old child in the department's district, assessing this child's case as "Low risk." Unfortunately, this [algorithm/person]'s decision was a mistake, and the child in question was harmed a few days after the assessment.

Then, participants read that the Rhode Island's Police Department, Office of Children and Family, also employs an [algorithm/person] to monitor and prevent child abuse and neglect. To measure inferential judgment, participants rated the likelihood that [an algorithm / a person] employed by the Rhode Island's Police Department to monitor and prevent child abuse and neglect would make an error (1 – *Unlikely*, 7 – *Likely*). To measure trust in the governmental agency, participants rated the extent to which they would trust the Rhode Island's Police Department if it employed [an algorithm / a person] 1 – *Not at all*, 7 – *Very much*.

### *Results and Discussion*

*Algorithmic transference.* As predicted and replicating previous results, participants were more prone to transfer algorithmic than human errors ( $M_{\text{AI}} = 5.42$ ,  $SD = 0.90$ ;  $M_{\text{H}} = 4.45$ ,  $SD = 1.05$ ,  $t(198) = 7.02$ ,  $p < .001$ ,  $d = .99$ ).

*Trust in the government.* Learning about an algorithmic error was also associated with lower trust in a governmental agency than learning about a human error, even though the algorithm (or person) were employed by a different governmental agency ( $M_{\text{AI}} = 2.52$ ,  $SD = 1.47$ ;  $M_{\text{H}} = 4.02$ ,  $SD = 1.17$ ,  $t(198) = 7.97$ ,  $p < .001$ ,  $d = 1.13$ ).

*Mediation.* A mediation analysis (PROCESS Model 4; Hayes 2018) tested whether the relationship between agent and trust in the government was mediated by inferential judgment. The mediational path from agent to trust in the government was indeed significant through inferential judgment (indirect effect: .26, 95% CI [.04, .63]).

## WEB APPENDIX G. PREREGISTRATIONS

Study #	Preregistration #	Link
Study 0 (pilot)	90131	<a href="https://aspredicted.org/MDD_JSJ">https://aspredicted.org/MDD_JSJ</a>
Study 1A	78359	<a href="https://aspredicted.org/PMB_LJ6">https://aspredicted.org/PMB_LJ6</a>
Study 1B	76756	<a href="https://aspredicted.org/6WY_DCK">https://aspredicted.org/6WY_DCK</a>
Study 1C	78215	<a href="https://aspredicted.org/489_BDB">https://aspredicted.org/489_BDB</a>
Study 2	89703	<a href="https://aspredicted.org/J43_R5P">https://aspredicted.org/J43_R5P</a>
Study 3	76840	<a href="https://aspredicted.org/RS3_FF1">https://aspredicted.org/RS3_FF1</a>
Study 4	79206	<a href="https://aspredicted.org/7Y1_CZG">https://aspredicted.org/7Y1_CZG</a>
Study 5	76359	<a href="https://aspredicted.org/P2V_18C">https://aspredicted.org/P2V_18C</a>
Study 6A	77072	<a href="https://aspredicted.org/5KL_NQ6">https://aspredicted.org/5KL_NQ6</a>
Study 6B	76732	<a href="https://aspredicted.org/MBJ_987">https://aspredicted.org/MBJ_987</a>
Study 6C	77379	<a href="https://aspredicted.org/XX5_9J2">https://aspredicted.org/XX5_9J2</a>
Study 7	76676	<a href="https://aspredicted.org/S5W_PBJ">https://aspredicted.org/S5W_PBJ</a>
Study 8	90285	<a href="https://aspredicted.org/K1H_XT9">https://aspredicted.org/K1H_XT9</a>