SMU SINGAPORE MANAGEMENT UNIVERSITY | School of Computing and Information Systems

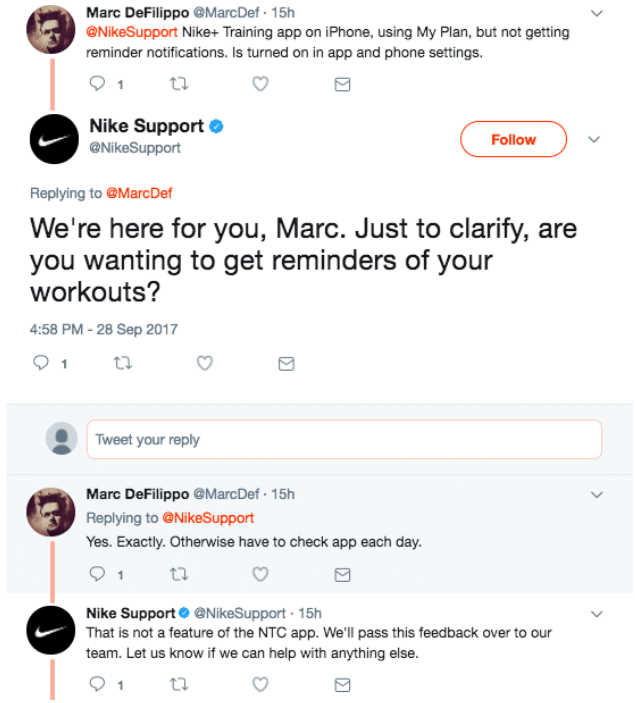
The Power of Identity Cues in Text-Based Customer Service: Evidence from Twitter

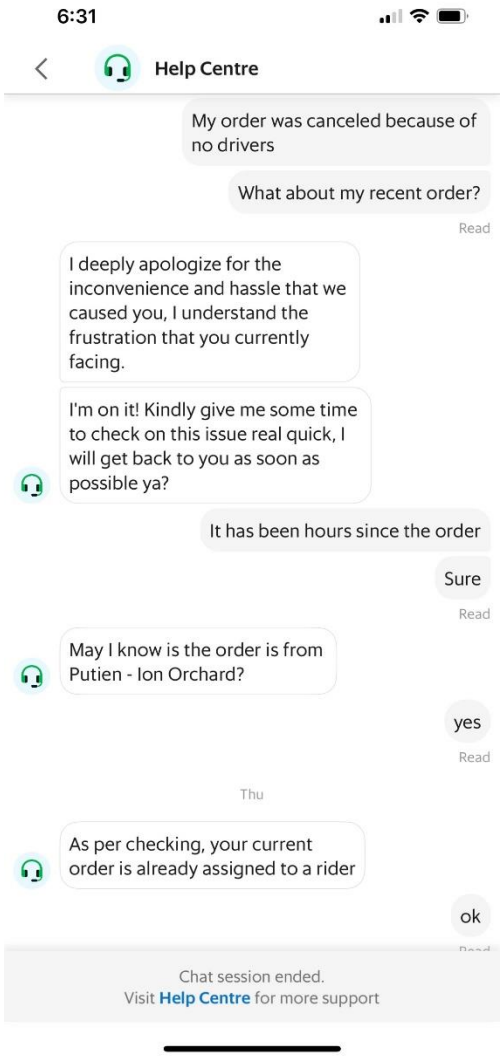
Yang Gao[1], Huaxia Rui[2], Shujing Sun[3]

[1]School of Computing and Information Systems, Singapore Management University
[2]Simon Business School, University of Rochester
[3]Naveen Jindal School of Management, University of Texas at Dallas

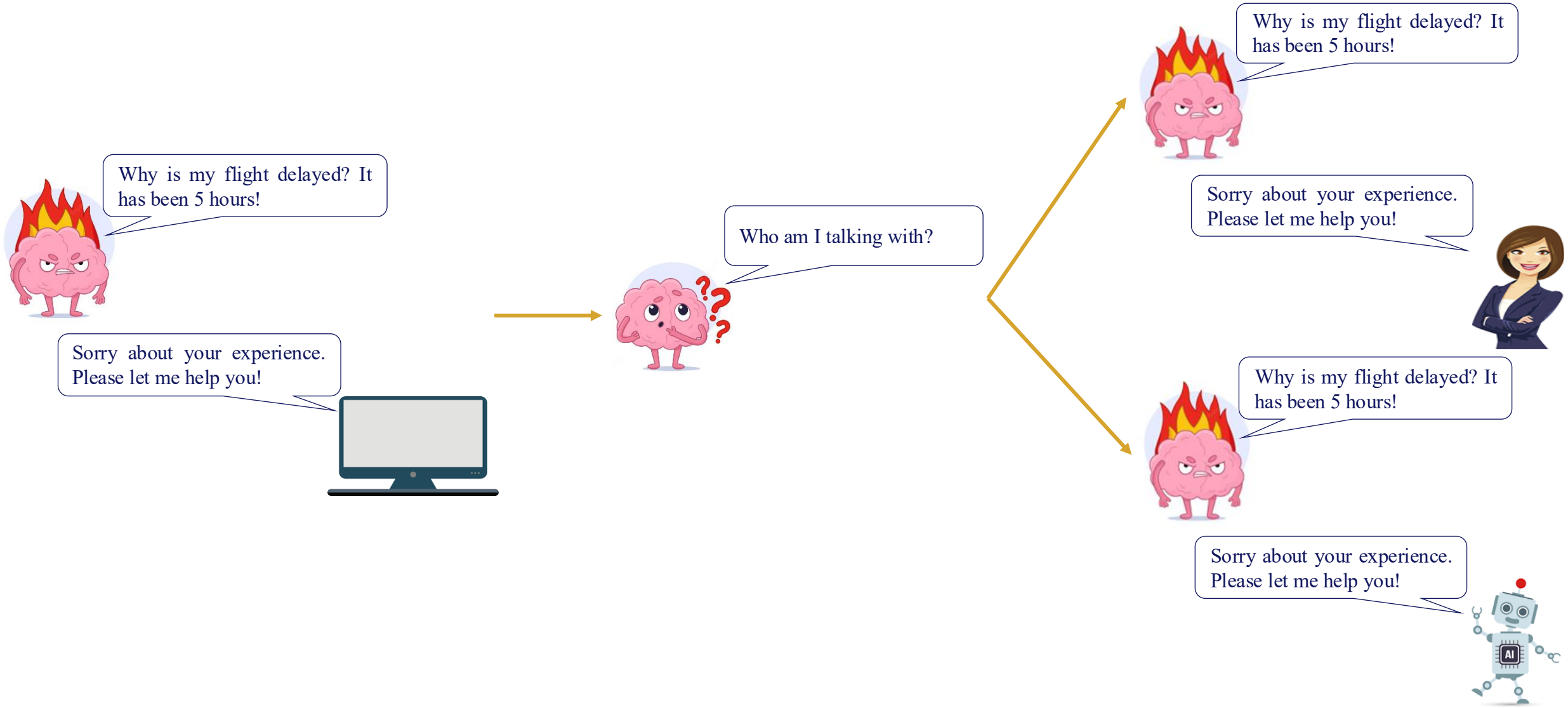
Text-Based Customer Service

- Text-based customer service is everywhere.
  - Live chat
  - Social media customer service
  - In-app customer service
  - …
- Many benefits for firms and customers.
  - Low cost
  - Short waiting time
  - …
- However, cues for service agents' identities are missing.



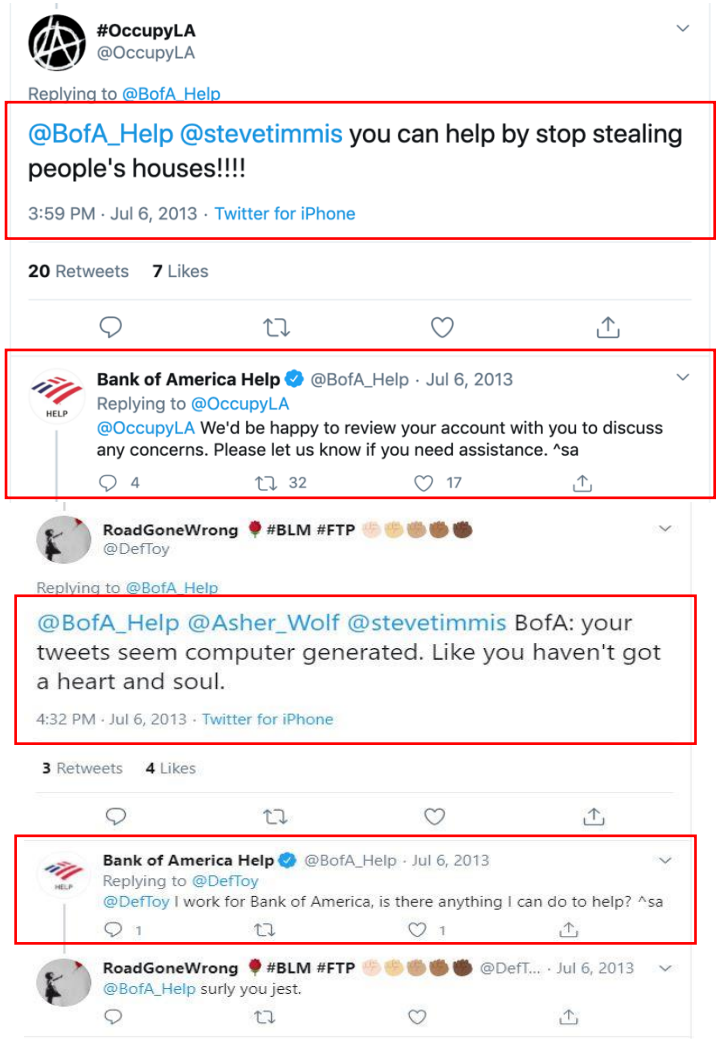


Text-Based Customer Service



Anecdotal Evidence — The Epic Failure of BoA's Twitter Customer Service in 2013

- Customers started to question whether *"the Bank of America Twitter account was run exclusively through autobots"* (Coine and Babbit 2014).



Anecdotal Evidence — TechCrunch

TC

Join TechCrunch+

Login

Search

TechCrunch+

Startups

Venture

Security

Crypto

Apps

Events

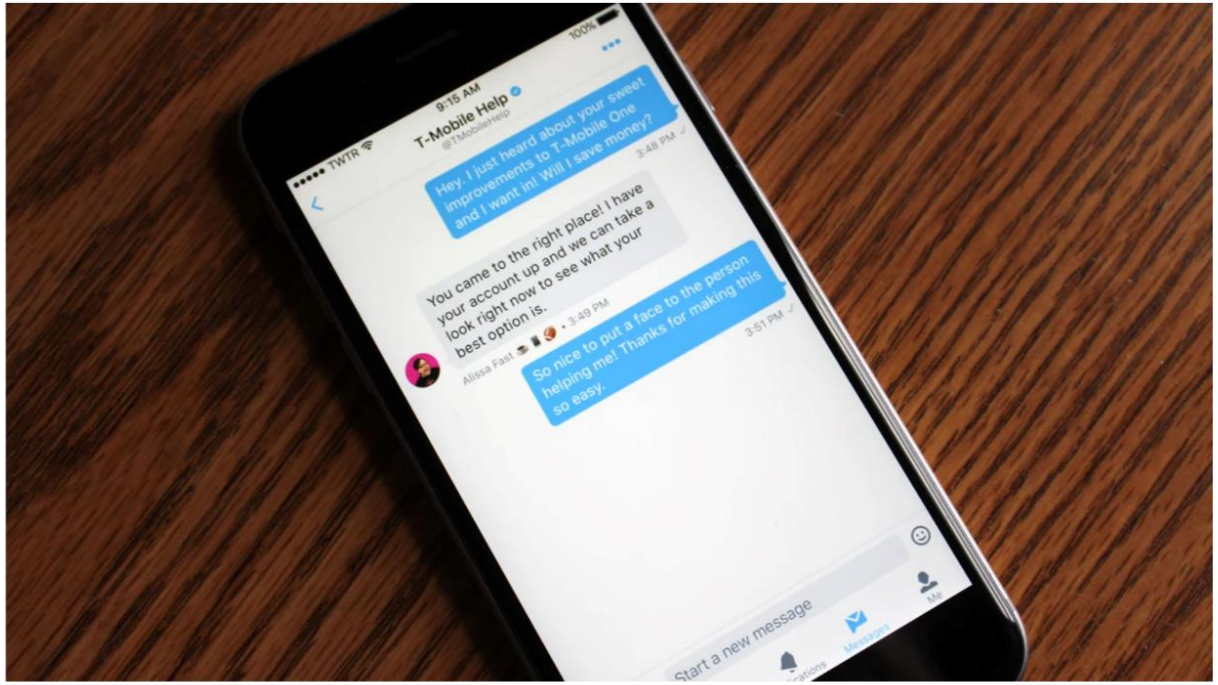
Advertise

More

Twitter debuts custom profiles for businesses' agents, so people don't think they're talking to bots

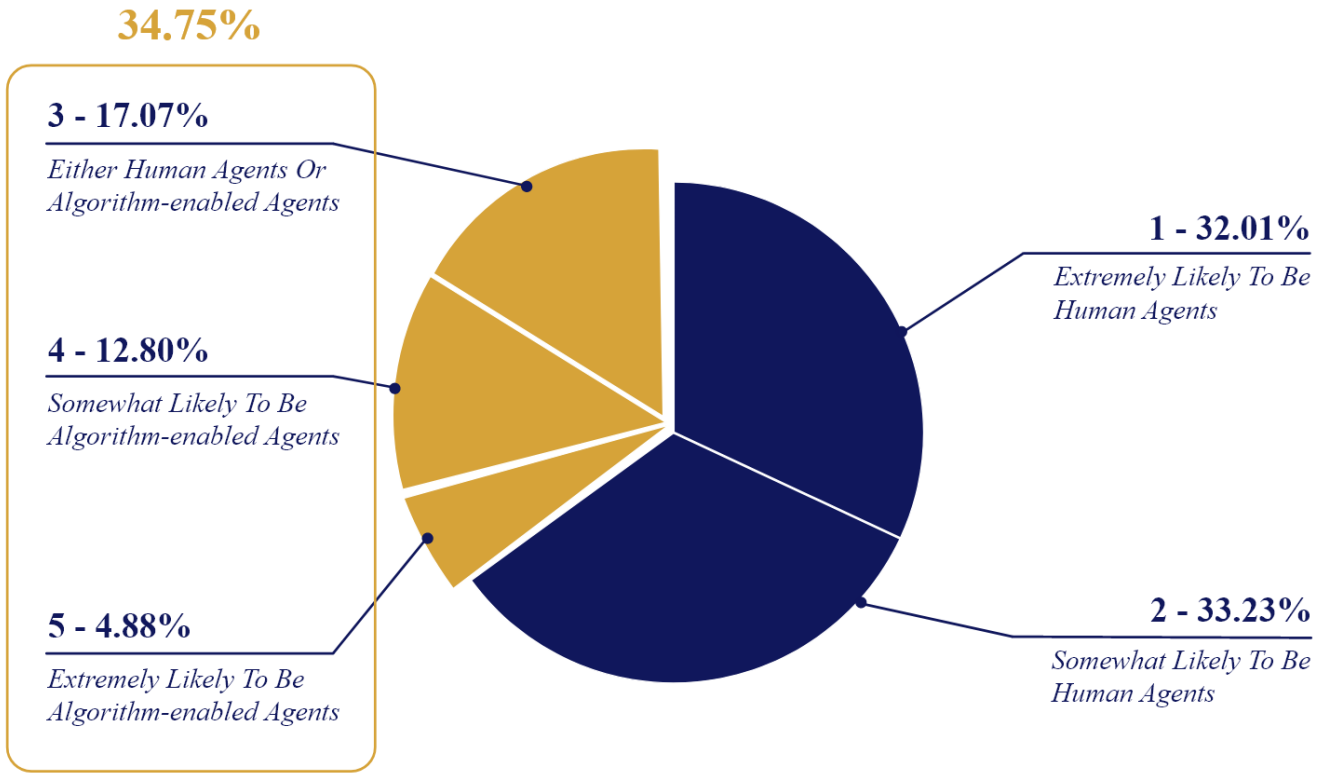
Sarah Perez @sarahintampa / 1:00 AM GMT+8 • February 23, 2017

Comment



Anecdotal Evidence — Survey

- We surveyed 328 customers who had customer service experience on social media.
  - *"Do you think social media customer service agents are human agents or algorithm-enabled agents?"*
  - 114 respondents (34.75%) were uncertain about the human identity of agents or confident that agents were algorithm-enabled.



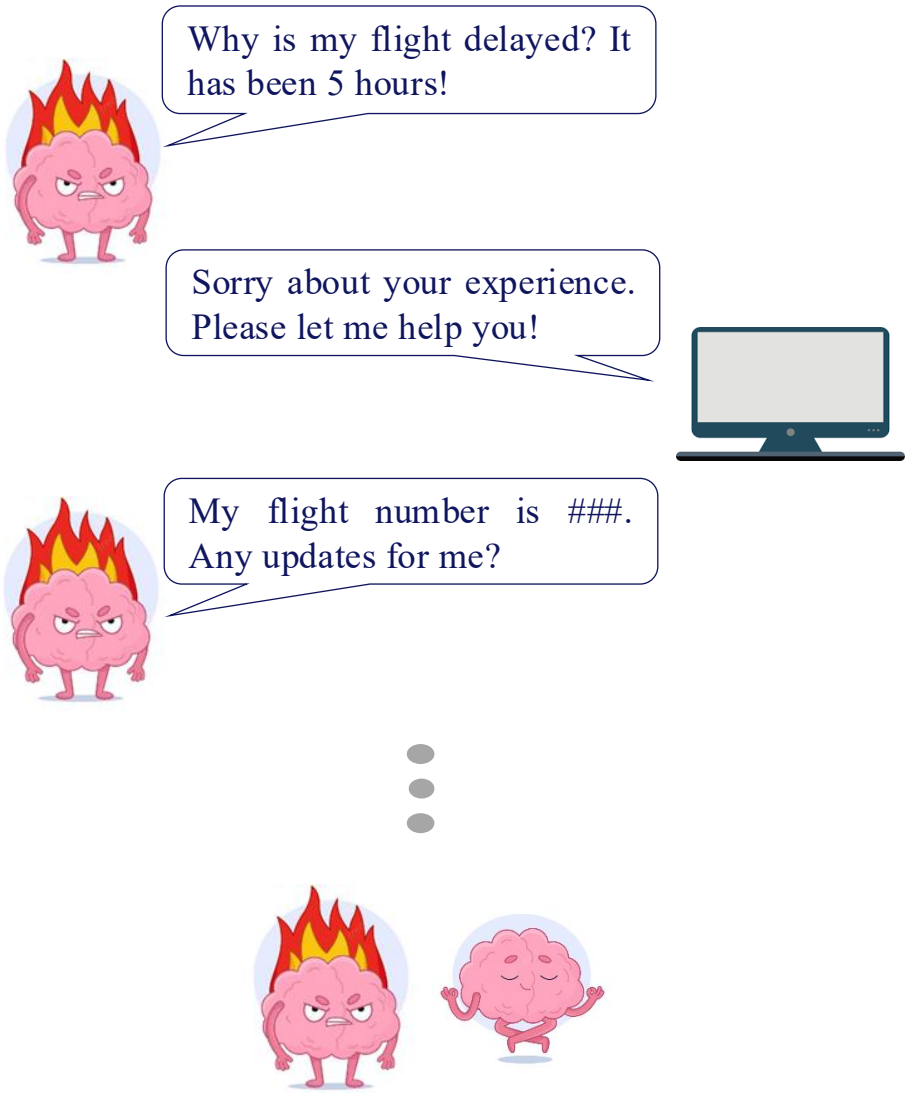
Research Question

- Due to the lack of identity cues, a significant proportion of customers are uncertain or suspicious about agents' human identities.

- Do customers' perceptions of agents' human identity affect service interactions? If so, how?
  - **Negative effect** suggests that customers prefer algorithm-enabled agents (e.g., chatbots).
  - **No effect** suggests that customers have no preference for human agents or algorithm-enabled agents.
    - 265 billion customer service requests every year, and it costs $1.3 trillion (IBM).
    - Firms should bravely deploy algorithm-enabled agents ~~to replace human agents~~ for customer service purposes.
  - **Positive effect** suggests that customers prefer human agents.
    - The human touch is still much valued by customers.
    - A human-AI collaboration strategy may be more beneficial.

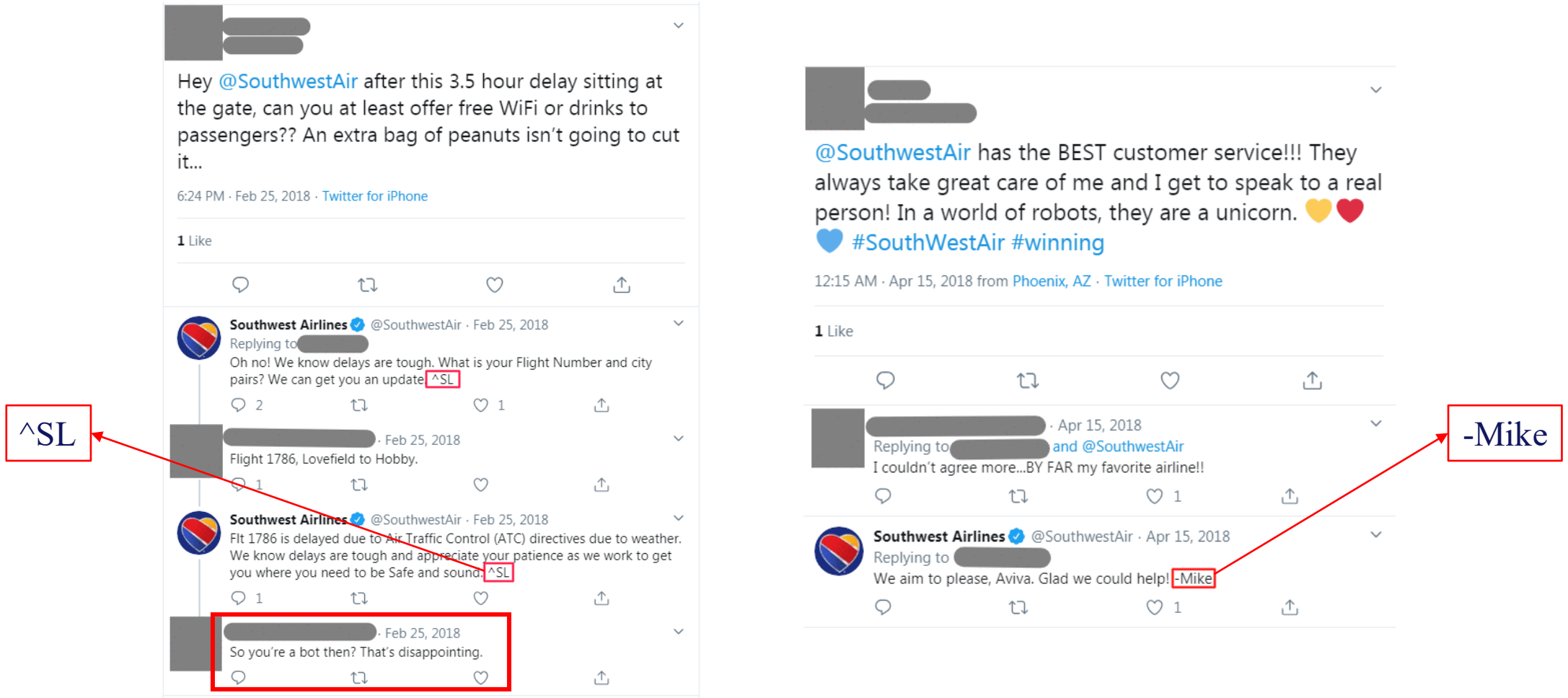
Research Question

- How do customers' **perceptions** regarding agents' human identity affect their behavior?
  - Service outcomes
    - Willingness to engage
    - Service resolution
  - Customers' attitude toward agent
    - Verbal aggressiveness



Identification Strategy — Signature Experiment

- Since March 16th, 2018, Southwest Airlines required customer service agents on Twitter to include their first names in responses to customer requests.



Literature on Online Complaint Management

- Management response on online review platforms
  - The literature mainly focuses on externality.
    - E.g., the impact of management responses on the volume and valence of future reviews of a brand (Chen et al., 2019; Proserpio & Zervas, 2017; Chevalier et al., 2018; Wang & Chaudhry, 2018).

- Social media customer service
  - Customer side (Gans et al., 2021; Gunarathne et al., 2017; He et al., 2019; Ma et al., 2015).
  - Firm side (Gunarathne et al., 2018, 2022; Hu et al., 2019; Mousavi et al., 2020; Sun et al., 2021).

- Our paper introduces an important and novel perspective to this literature by studying the implications of social presence in customer service delivery on social media.

Literature on Social Presence

- **<u>Social presence/Humanization:</u>** The continuum of a customer's perception of being present with a "real" human agent during a customer service interaction.

- A major theme of the literature on social presence is identifying factors that can influence individuals' perceptions of social presence.
  - When the counterpart's identity is known to be software (e.g., a chatbot), the relevant literature is referred to as ***digital anthropomorphism***.
  - When the real identity of a counterpart is not disclosed, ***identity cues*** or ***social context cues*** are key contextual factors that can influence individuals' perceptions of social presence (Oh et al., 2018).

- Our paper fits into the second stream of literature because the real identity of agents on Twitter is unknown.

Hypotheses Development

Hypothesis 1: *The presence of an identity cue improves customer service interactions by increasing: (a) customers' willingness to engage, and (b) the chance of reaching a resolution.*

- Since a first name usually suggests human authorship, the inclusion of first names as identity cues should improve customers' perceptions of agents' humanization levels.

- An enhanced humanization level may affect service outcomes through two channels.
  - Social presence positively correlates with customers' **trust** in a service provider (Cyr et al., 2007; Gefen & Straub, 2003; Hassanein & Head, 2004; Lankton et al., 2015).
    - Customers are more willing to seek and receive help from trustworthy service providers, especially in an online environment.
    - Trust plays a critical role in persuasion (Hovland & Weiss, 1951; Sternthal et al., 1978), a critical aspect of customer service.
  - **Empathy** is the unique human capacity to understand and feel what another person is experiencing.
    - Customers prefer agents who can resonate with their requests.
    - Empathy positively contributes to the customer's satisfaction (Tax et al., 1998).

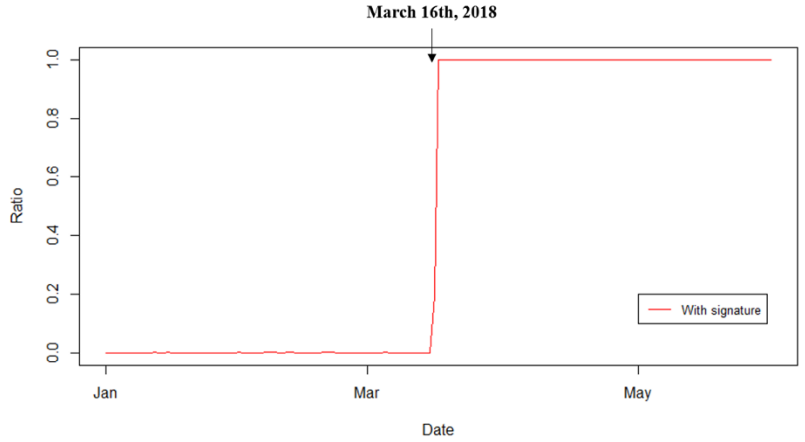
Hypotheses Development

Hypothesis 2a: *The presence of an identity cue increases a customer's aggressiveness in a service interaction.*
Hypothesis 2a: *The presence of an identity cue decreases a customer's aggressiveness in a service interaction.*

- Underlying motives of customer complaining behavior: ***goal-oriented*** and ***emotion-focused*** (Kowalski 1996).
  - Goal-oriented customers complain in order to seek redress or economic compensation rather than for venting.
    - A goal-oriented customer's verbal aggression is not necessarily affected by social presence/humanization.
    - A goal-oriented customer could behave more aggressively toward more humanized agents as a strategic move to better achieve their goals.
  - Emotion-focused customers complain due to the frustration and the desire to express emotional dissatisfaction.
    - The aggressiveness of complaints partly depends on how humanized the recipient of the action is perceived (Bandura 1978).
    - Identity cues create a less anonymous setting, which will lead customers to be less explicit in expressing negative emotions (Derks et al., 2008).
- The motivations of customer complaints may be mixed.

A Quasi-Experiment

- A nice quasi-experiment setting.
  - The policy change is abrupt.
  - The lack of advanced notice or discussion about the change.



- Data
  - Customer service-related conversations by Southwest Airlines from February 16, 2018 to April 16, 2018.

- One-group before-and-after analysis

$$Y_i = \beta_0 + \beta_1 signature_i + \beta_2 X_i + \beta_4 Z_t + \varepsilon_i$$

  - *Engagement* measures a customer's willingness to engage with an agent.
  - *Resolution* is a binary variable indicating whether a resolution is reached at the end of a conversation.
  - *Aggressiveness* captures customers' verbal aggression toward agents in customer service encounters.

Balance Check

- Circumstance
  - *contentCluster*
  - *initialAggressiveness*
- Customer characteristics
  - Customer online profile
  - Big five personalities
- Agent reply quality
  - Reply efficiency
  - DM
  - Reply style

Table 2. Balance Check

Variable	Pre-treatment		Post-treatment		Std. Diff.
	Mean	S.D.	Mean	S.D.	
initialAggressiveness	0.099	0.109	0.102	0.111	-0.027
logFollowers	4.998	1.979	4.967	2.016	0.016
logFollowings	5.517	1.446	5.468	1.468	0.034
logUpdates	7.120	2.466	7.028	2.511	0.037
agreeableness	7.397	1.077	7.345	1.089	0.048
conscientiousness	-1.574	0.768	-1.582	0.801	0.010
extraversion	4.114	1.162	4.071	1.185	0.037
neuroticism	1.585	0.908	1.596	0.920	-0.012
openness	-10.11	2.407	-10.06	2.436	-0.021
responseTime	2.309	1.146	2.327	1.142	-0.016
numReplies	1.316	0.628	1.367	0.735	-0.075
avgWords	26.65	9.360	26.83	9.074	-0.020
DM	0.217	0.412	0.220	0.414	-0.007
hello	0.272	0.445	0.271	0.445	0.002
gratitude	0.143	0.350	0.157	0.364	-0.039
apology	0.315	0.465	0.307	0.461	0.017
hedges	0.211	0.408	0.231	0.422	-0.048
please	0.201	0.401	0.211	0.408	-0.025
request	0.009	0.093	0.008	0.088	0.011

Note: This table reports the before-after difference in means of the key covariates in the analyses. S.D. stands for standard deviation. Std. Diff. stands for standardized difference. Austin (2009) suggested that an absolute standardized difference of 0.10 or more indicates that covariates are imbalanced between groups.

Baseline Results

- Using four different estimation windows to alleviate the endogeneity concern of unobserved confounding events.
- Hypothesis 1 is supported.
- Hypothesis 2a and 2b are not supported.

Table 3. Baseline Results

		± 1 month			± 3 weeks	
	engagement	*resolution*	*aggressiveness*	*engagement*	*resolution*	*aggressiveness*
	(1)	(2)	(3)	(4)	(5)	(6)
signature	0.0842*** (0.0216)	0.0695** (0.0352)	-0.0093* (0.0050)	0.1177*** (0.0254)	0.0822* (0.0425)	-0.0083 (0.0058)
Controls	Y	Y	Y	Y	Y	Y
Time Trend	Y	Y	Y	Y	Y	Y
Seasonality FE	Y	Y	Y	Y	Y	Y
Observations	8214	3258	3258	5771	2249	2249
R^2	0.06	0.14	0.07	0.07	0.15	0.09
		± 2 weeks			± 1 week	
	engagement	*resolution*	*aggressiveness*	*engagement*	*resolution*	*aggressiveness*
	(7)	(8)	(9)	(10)	(11)	(12)
signature	0.2256*** (0.0378)	0.2082*** (0.0686)	0.0074 (0.0082)	0.2262*** (0.0632)	0.2810** (0.1071)	-0.0092 (0.0123)
Controls	Y	Y	Y	Y	Y	Y
Time Trend	Y	Y	Y	Y	Y	Y
Seasonality FE	Y	Y	Y	Y	Y	Y
Observations	3885	1518	1518	2010	744	744
R^2	0.08	0.16	0.10	0.10	0.19	0.12

Note: *** $p < 0.01$ ** $p < 0.5$ * $p < 0.1$. Robust standard errors in parentheses. This table reports one-group before-and-after regression results with different estimation windows using conversations from Southwest Airlines on Twitter. *Engagement* is a binary variable indicating whether a customer is willing to engage with an agent. *Resolution* is a binary variable indicating whether a resolution is reached at the end of the interaction. *Aggressiveness* is a continuous variable measuring a customer's attitude toward agents. For *resolution* and *aggressiveness*, we include only conversations with customers' further engagement in the sample.

Endogeneity Concerns

- **Concern I:** Temporal shift in the quality of customer service provisions or the composition of customer service requests.
  - **Solution I:** The balance check of the conversation-level characteristics.
  - **Solution II: Two popular matching methods.**

Robustness Check

- Two popular methods are conducted to further balance the sample.
  - Entropy Balancing (EB)
  - Coarsened Exact Matching (CEM)

Table A6. Entropy Balancing and Coarsened Exact Matching

	EB			CEM		
	engagement	*resolution*	*aggressiveness*	*engagement*	*resolution*	*aggressiveness*
	(1)	(2)	(3)	(4)	(5)	(6)
signature	0.0620*** (0.0229)	0.0670* (0.0380)	-0.0086 (0.0057)	0.0791*** (0.0249)	0.0853** (0.0420)	-0.0077 (0.0051)
Controls	Y	Y	Y	Y	Y	Y
Time Trend	Y	Y	Y	Y	Y	Y
Seasonality FE	Y	Y	Y	Y	Y	Y
Observations	8214	3258	3258	7733	3110	3110
R^2	0.01	0.02	0.01	0.02	0.07	0.06

Note: *** $p < 0.01$ ** $p < 0.5$ * $p < 0.1$. Robust standard errors in parentheses. Columns 1 - 3 report regression results with the sample reweighted by Entropy Balancing (EB). No observation is dropped because the sample weights are all above zero. Columns 4 - 6 report regression results after the application of Coarsened Exact Matching (CEM).

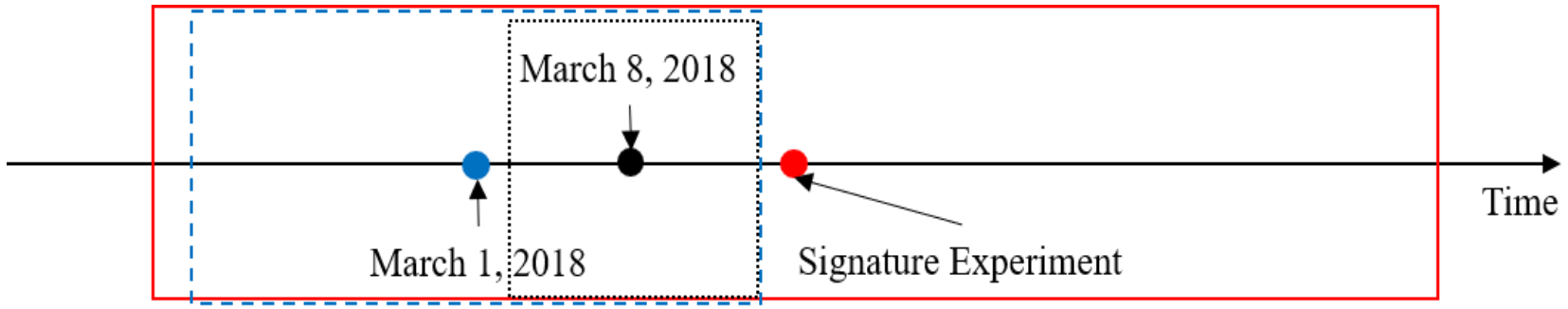
Endogeneity Concerns

- **<u>Concern I:</u>** Temporal shift in the quality of customer service provisions or the composition of customer service requests.
  - **Solution I:** The balance check of the conversation-level characteristics.
  - **Solution II:** Two popular matching methods.

- **<u>Concern II:</u>** Time-varying confounding events/factors.
  - **Solution I:** Four different estimation windows.
  - **<u>Solution II: Falsification tests with pseudo treatments.</u>**

Falsification Tests with Pseudo Treatments

- **Falsification Test I:** Two pseudo treatments before the actual signature experiment.



- **Falsification Test II:** A pseudo treatment for Southwest Airlines on March 16, 2017.
  - Unobserved seasonality specific to Southwest Airlines

- **Finding:** No significant effect of these pseudo treatments.

Endogeneity Concerns

- **<u>Concern I:</u>** Temporal shift in the quality of customer service provisions or the composition of customer service requests.
  - **Solution I:** The balance check of the conversation-level characteristics.
  - **Solution II:** Two popular matching methods.

- **<u>Concern II:</u>** Time-varying confounding events/factors.
  - **Solution I:** Four different estimation windows.
  - **Solution II:** Falsification tests with pseudo treatments.
  - **<u>Solution III: Synthetic control analysis.</u>**

Synthetic Control Analysis

- Construct a synthetic control from a donor pool of candidate controls.
  - Donor pool: *American Airlines*, *Delta Airlines*, *JetBlue Airlines*, and *United Airlines*.
    - Similar offline operations or a similar online presence to Southwest Airlines.
    - No similar policy change during our sample period.
  - Conversation-level data are aggregated at the daily level for each airline.
    - Conversation-level characteristics are not fully incorporated in the analysis.

Table A7. Synthetic Control Analysis

	$engagement_{f,t}$	$resolution_{f,t}$	$aggressiveness_{f,t}$
	(1)	(2)	(3)
$signature_{f,t}$	0.018** (0.008)	0.016** (0.007)	-0.0012 (0.0029)
Controls	Y	Y	Y
Firm FE	Y	Y	Y
Time FE	Y	Y	Y
Observations	300	300	300

Note: *** $p < 0.01$ ** $p < 0.5$ * $p < 0.1$. Bootstrapped standard errors in parentheses.

Endogeneity Concerns

- **<u>Concern I:</u>** Temporal shift in the quality of customer service provisions or the composition of customer service requests.
  - **Solution I:** The balance check of the conversation-level characteristics.
  - **Solution II:** Two popular matching methods.

- **<u>Concern II:</u>** Time-varying confounding events/factors.
  - **Solution I:** Four different estimation windows.
  - **Solution II:** Falsification tests with pseudo treatments.
  - **Solution III:** Synthetic control analysis.
  - **<u>Solution IV: Two-way matching analysis.</u>**

Two-way Matching

- A two-way matching analysis at conversation level.

① Match (X_{t0}, Y_{t0}) with (X_{c0}, Y_{c0})

① Match (X_{t1}, Y_{t1}) with (X_{c1}, Y_{c1})

① $\Delta Y_0 = Y_{t0} - Y_{c0}$ $\Delta Y_1 = Y_{t1} - Y_{c1}$

② Match $(X_{t0}, \Delta Y_0)$ with $(X_{t1}, \Delta Y_1)$

② treatment effect $= \Delta Y_1 - \Delta Y_0$

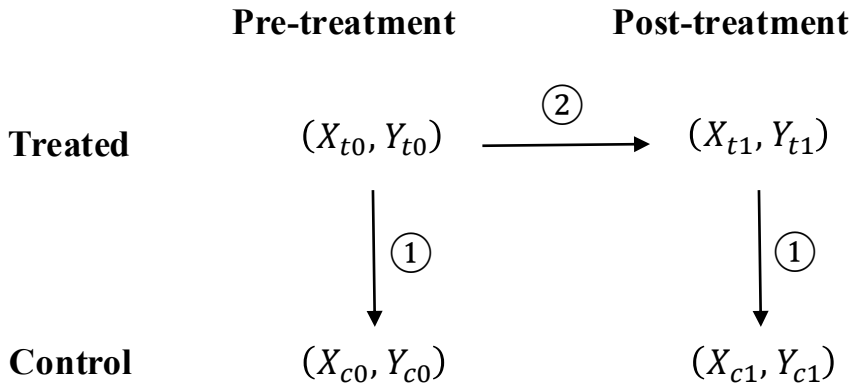


Table A8. Two-way Matching Analysis

	caliper = 3			caliper = 4		
	engagement	*resolution*	*aggressiveness*	*engagement*	*resolution*	*aggressiveness*
	(1)	(2)	(3)	(4)	(5)	(6)
signature	0.0314** (0.0157)	0.0878*** (0.0331)	-0.0023 (0.0057)	0.0290** (0.0148)	0.0823*** (0.0277)	-0.0019 (0.0049)
Observations	3629	797	797	4138	1130	1130

Note: *** $p < 0.01$ ** $p < 0.5$ * $p < 0.1$. We use calipers to exclude the matched pairs whose distance is larger than the threshold. For instance, if the caliper is specified as three, the matched pairs whose distance is more than three times the standard deviation of all distances among matched pairs will be dropped.

Mechanism Test — A Randomized Experiment

- The experiment is to reveal the mechanism underlying the effects of identity cues on customer engagement and resolution.

- A factorial design consisting of two factors.
  - Factor 1: Whether an agent's response was specific or generic.
  - Factor 2: Whether a signature was included at the end of a reply.

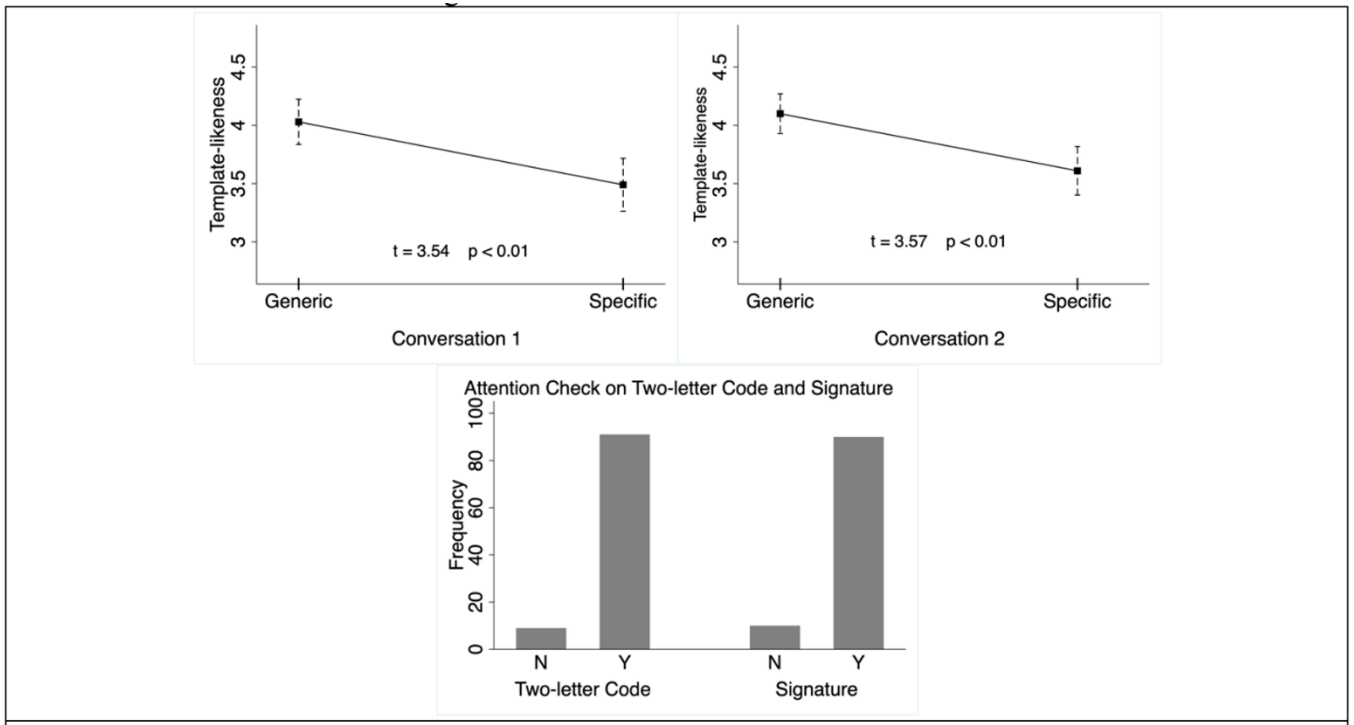
- Four experimental conditions
  - Group 1: specific replies with two-letter codes.
  - Group 2: specific replies with signatures.
  - Group 3: generic replies with two-letter codes.
  - Group 4: generic replies with signatures.

	specific	generic
Two-letter code		
signature		

- Respondents will read two service encounters initiated by two types of common requests: flight delay and lost baggage.

Manipulation Check

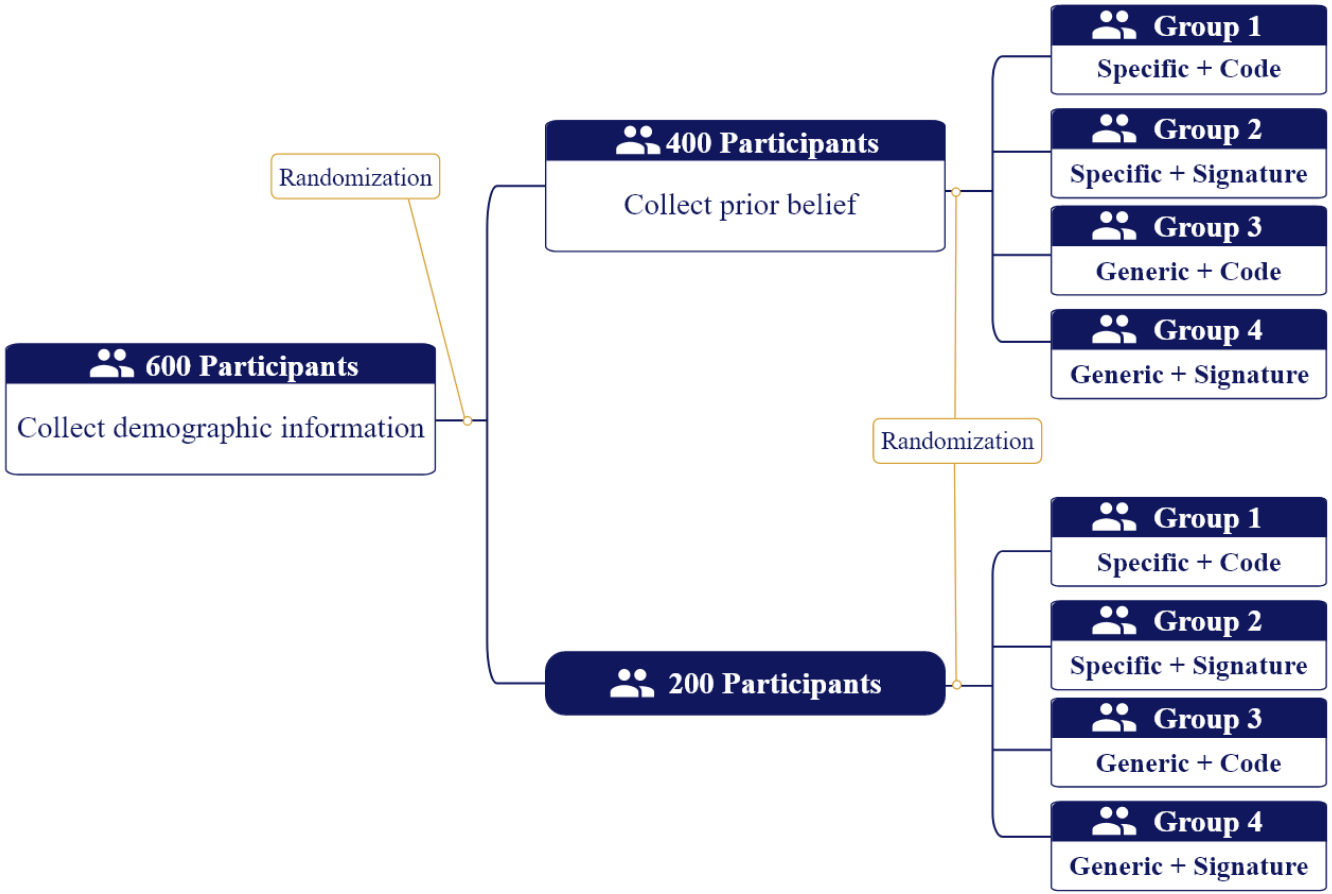
- 200 respondents are randomly assigned to one of the four experimental conditions and read two service encounters.
  - *"Do you agree that the agent's responses are generic because they are template-like?"*
  - Two-letter code groups (Group 1 & 3): *"Have you noticed the two-letter nodes (e.g., -RR, -MR) at the end of agent responses?"*
  - Signature groups (Group 2 & 4): *"Have you noticed the signatures (e.g., -Rachel, -Michael) at the end of agent responses?"*



Note: The error bars of the estimate for treatment effects indicate the 95% confidence intervals.

Figure 5. Manipulation Check

Experimental Procedure



Experimental Results

- The collection of customers' prior beliefs about agent's identities does not alter participants' behaviors in survey responses.
  - Humanization: diff. = -0.07 (SD = 0.07, $p > 0.10$)
  - Engagement: diff. = -0.01 (SD = 0.08, $p > 0.10$)
  - Satisfaction: diff. = 0.02 (SD = 0.10, $p > 0.10$)

- No significant difference between treatment conditions in terms of demographic attributes.

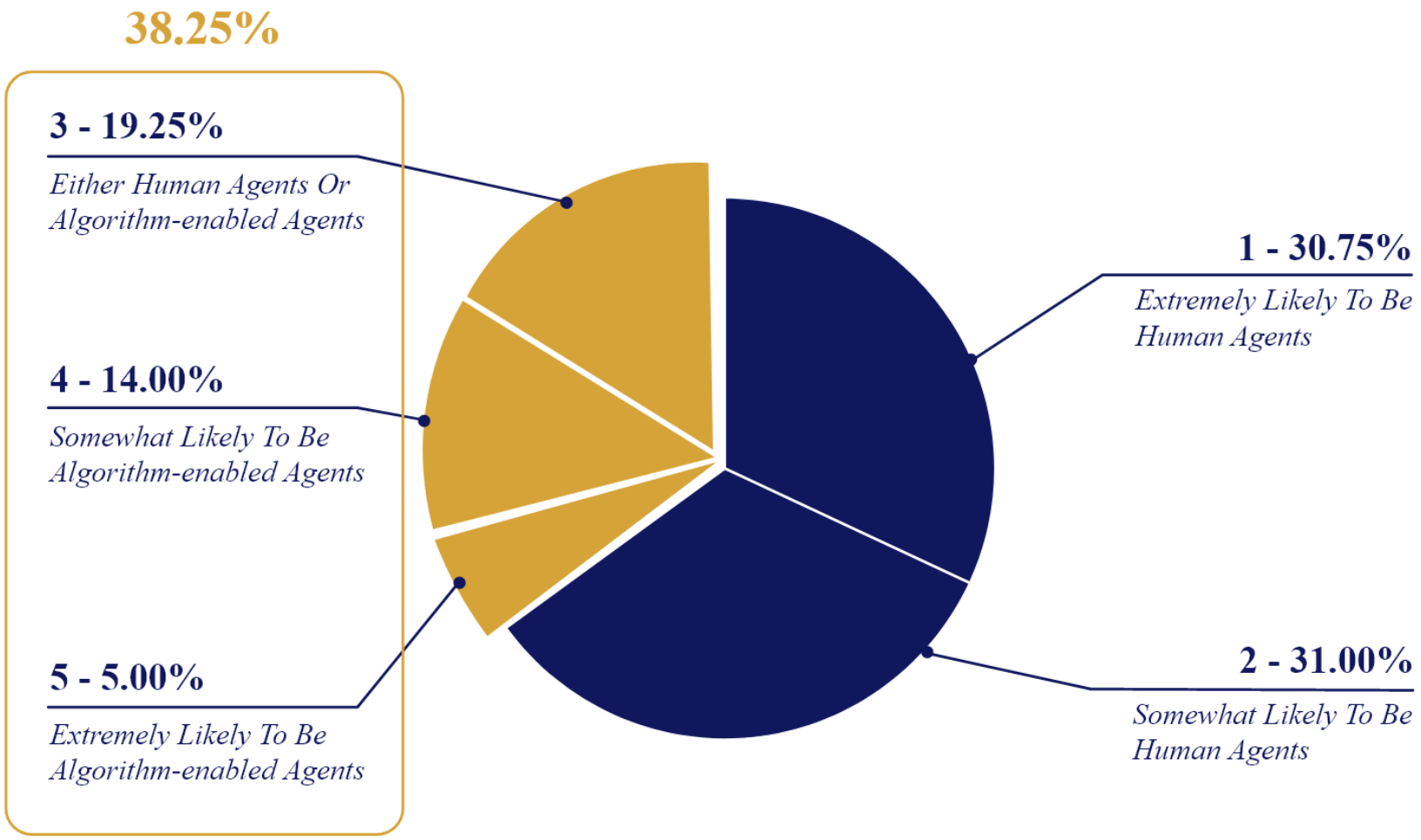
Table 4. Balance Check on Demographics

	Specific vs. Generic			Signature vs. Two-letter Code		
	Specific	Generic	Diff.	Signature	Two-letter Code	Diff.
Age	2.95 (0.06)	2.93 (0.05)	0.02 (0.09)	2.92 (0.06)	2.96 (0.07)	-0.04 (0.09)
Gender	1.46 (0.04)	1.49 (0.04)	-0.03 (0.05)	1.51 (0.04)	1.44 (0.04)	0.07 (0.05)
Education	3.15 (0.06)	3.11 (0.06)	0.04 (0.09)	3.12 (0.06)	3.13 (0.06)	-0.01 (0.09)

Note: Standard errors are reported in the parentheses. The number of observations for each treated and control group is 200.

Experimental Results

- 38.25% of the 400 respondents were either uncertain or suspicious about the human identity of service agents.



Experimental Results

- **Finding:** The effects of identity cues came from customers who were uncertain or suspicious about agents' human identity.
  - Customers perceived agents with signatures more humanized.
  - Customers became more willing to engage with agents and reached higher level of satisfaction.
  - The effects were stronger when the agent's reply style was generic.

Table 5. Effects of Agent Signature Conditional on Customers' Prior Beliefs of Agents' Identity

	Prior Belief	Reply style	Obs.	Humanization			Engagement			Satisfaction		
				Treated	Control	Diff.	Treated	Control	Diff.	Treated	Control	Diff.
(1)	Human	Both	247	3.35 (0.07)	3.45 (0.07)	-0.10 (0.10)	3.96 (0.08)	3.93 (0.08)	0.03 (0.12)	3.41 (0.11)	3.67 (0.09)	**0.26* (0.14)**
(2)	Human	Generic	116	3.13 (0.12)	3.29 (0.12)	-0.16 (0.17)	3.75 (0.12)	3.76 (0.14)	-0.01 (0.19)	3.14 (0.16)	3.49 (0.16)	-0.35 (0.23)
(3)	Human	Specific	131	3.57 (0.08)	3.57 (0.08)	0.004 (0.11)	4.18 (0.10)	4.07 (0.10)	0.12 (0.14)	3.68 (0.13)	3.80 (0.11)	-0.12 (0.16)
(4)	Uncertain or algorithm-enabled	Both	153	3.45 (0.07)	2.84 (0.11)	**0.61*** (0.14)**	3.83 (0.09)	3.08 (0.09)	**0.75*** (0.13)**	3.50 (0.09)	2.57 (0.13)	**0.93*** (0.16)**
(5)	Uncertain or algorithm-enabled	Generic	84	3.42 (0.10)	2.48 (0.15)	**0.94*** (0.19)**	3.68 (0.14)	2.81 (0.13)	**0.87*** (0.19)**	3.51 (0.13)	2.09 (0.15)	**1.43*** (0.21)**
(6)	Uncertain or algorithm-enabled	Specific	69	3.48 (0.10)	3.38 (0.13)	0.10 (0.16)	3.97 (0.10)	3.47 (0.10)	**0.50*** (0.14)**	3.48 (0.12)	3.28 (0.17)	0.20 (0.20)

Note: * *p<0.10* ** *p<0.05*, *** *p<0.01*. Standard errors are reported in the parentheses. Obs. Stands for the number of observations. The treated group corresponds to respondents who receive agent replies with a signature and the control group corresponds to two-letter codes.

Experimental Results

- Causal Mediation Analysis
  - Trust and empathy together mediate the effect of identity cues on customer engagement.
  - Trust and empathy together mediate the effect of identity cues on customer satisfaction.
  - These findings provide empirical support to the theoretical mechanism for Hypothesis 1.

Table 6. Causal Mediation Analysis

Dependent Variable	Mediator	Direct Effect	Indirect Effect
Engagement	Trust	0.30 [0.01, 0.59]	0.45 [0.26, 0.65]
Engagement	Empathy	0.44 [0.15, 0.72]	0.32 [0.15, 0.49]
Engagement	Trust + Empathy	0.44 [0.11, 0.77]	0.29 [0.09, 0.50]
Satisfaction	Trust	0.40 [0.13, 0.67]	0.53 [0.35, 0.70]
Satisfaction	Empathy	0.53 [0.28, 0.79]	0.40 [0.24, 0.56]
Satisfaction	Trust + Empathy	0.63 [0.36, 0.90]	0.30 [0.10, 0.49]

Note: The 95% confidence intervals are reported in the brackets. All confidence intervals are bootstrapped with bias correction.

Mechanism Test on Expressiveness

- We denote *expressive* as one if the customer was purely venting without mentioning any remedy in the initial tweet.
  - Tweets that were not identified as expressive may be primarily goal-oriented or with mixed motivations.

- **Finding:** The effect of identity cues depends on the complaint type.

Table 7. Heterogeneous Effect of Humanization on Aggressiveness

	aggressiveness			
	± 1 month	**± 3 weeks**	**± 2 weeks**	**± 1 week**
	(1)	(2)	(3)	(4)
signature	-0.0042 (0.0055)	-0.0010 (0.0065)	0.0198** (0.0096)	-0.0020 (0.0124)
expressive	0.0195*** (0.0046)	0.0221*** (0.0054)	0.0269*** (0.0069)	0.0248*** (0.0080)
signature × *expressive*	-0.0109* (0.0060)	-0.0157** (0.0071)	-0.0244*** (0.0090)	-0.0163* (0.0092)
Controls	Y	Y	Y	Y
Time Trend	Y	Y	Y	Y
Seasonality FE	Y	Y	Y	Y
Treatment Effect for the Expressive Type	-0.0151** (0.0062)	-0.0166** (0.0071)	-0.0046 (0.0090)	-0.0183 (0.0134)
Observations	3258	2249	1518	744
R^2	0.08	0.10	0.11	0.13

Note: *** $p < 0.01$ ** $p < 0.5$ * $p < 0.1$. Robust standard errors in parentheses. *aggressiveness* is a continuous variable measuring a customer's attitude toward agents. For *aggressiveness*, we include only conversations with customers' further engagement in the sample.

Conclusions

Main findings

- With the inclusion of identity cues, customers are more willing to engage, and upon engagement, more likely to reach a resolution.
- There is no evidence of increased or decreased customer verbal aggression towards agents with identity cues.

Contributions to literature

- First empirical investigation on whether a service agent's identity cue affects the service interaction.
- This study contributes theoretically to social presence.
  - Empirically validate the moderating role of customers' prior beliefs regarding agents' human identity.
  - Reveal two fundamental mechanisms driving the effect of identity cues: trust and empathy.
  - The effect of identity cues on customer attitude is new to the literature.

Contributions to practice

- All firms should adopt the signature policy when delivering text-based customer service.
- Firms may consider the inclusion of stronger identity cues, such as a portrait of an agent.
- A human-AI collaboration strategy is more beneficial given customers' inherent preference for the human touch.