

Framing and Persuasion

CS224C
April 18, 2024

Framing and Persuasion

1

Field et al., Framing and agenda-setting in Russian news (EMNLP, 2018)

2

Yang and Kraut, Persuading teammates to give: Systematic versus heuristic cues for soliciting loans (Proceedings of the ACM on Human-Computer Interaction, 2017)

3

Discussion

Framing and persuasion in readings from last class

1. Burke, Moira, and Robert Kraut. "Using Facebook after losing a job: Differential benefits of strong and weak ties." *Proceedings of the 2013 conference on Computer supported cooperative work*.
 - a. Positive Effects
2. Jakesch, Maurice, et al. "Co-writing with opinionated language models affects users' views." *Proceedings of the 2023 CHI conference on human factors in computing systems*.
 - a. Good and Bad



Field et al., Framing and agenda-setting in Russian news (EMNLP, 2018)

Exercise: What is Framing?

To frame is to **select some aspects of a perceived reality** and make them **more salient** in a communicating text, in such a way as **to promote problem definition, causal interpretation, moral evaluation, and/or treatment recommendation** for the item described. (Entman (1993) cited in Card et al. 2015 - MFC Paper)

Britney Spears (Rolling Stone, 2008)

MUSIC

The Tragedy of Britney Spears

She was a pop princess. Now she's in and out of hospitals, rehab and court. How Britney lost it all

BY VANESSA GRIGORIADIS

FEBRUARY 21, 2008



Britney Spears leaves the L.A. County Superior courthouse after a child custody status hearing in Los Angeles on May 6th, 2008. GABRIEL BOUYS/AFP/GETTY

Britney Spears (Rolling Stone, 2008)

“If Britney was really who we believed her to be — a puppet, a grinning blonde without a cool thought in her head, a teasing coquette clueless to her own sexual power — none of this would have happened. **She is not book-smart, granted.** But she is intelligent enough to understand what the world wanted of her: that she was created as a virgin to be deflowered before us, for our amusement and titillation. She is not ashamed of her new persona — she wants us to know what we did to her. **While it may be true that Britney suffers from the adult onset of a genetic mental disease (or a disease created by fame, yet to be named);** or that she is a “habitual, frequent and continuous” drug user, as the judge declared; or that she is a cipher with boundless depths, make no mistake — **she is enjoying the chaos she is creating.** The look on her face when **she’s goofing around with paparazzi** — one of whom, don’t forget, she is dating — is often one of pure excitement.”

Britney Spears (Rolling Stone, 2021)

MUSIC

Judge Terminates Britney Spears Conservatorship

After nearly 14 years of having no say over her own finances and personal life, the pop star is back in control

BY NANCY DILLON

NOVEMBER 12, 2021



AXELLE/BAUER-GRIFFIN/FILMMAGIC/GETTY IMAGES

Britney Spears (Rolling Stone, 2021)

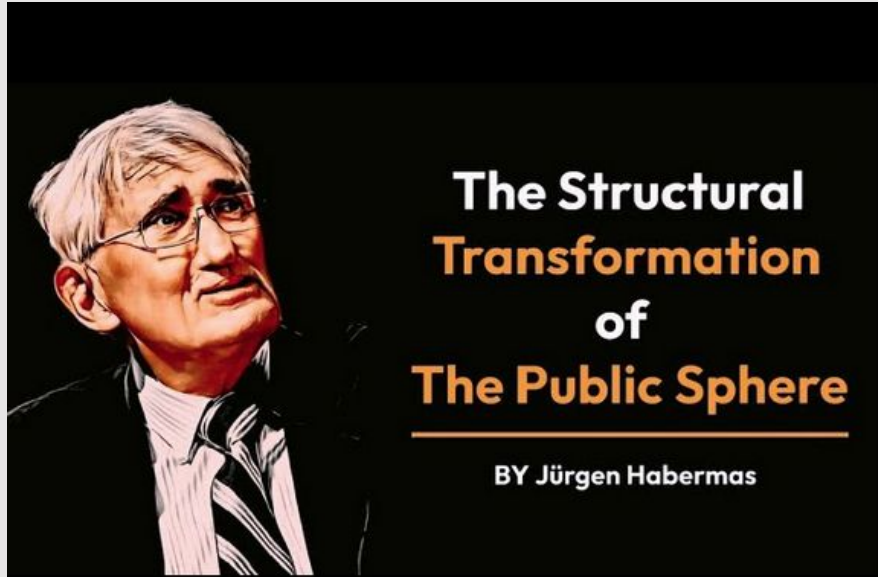
“Britney Spears is **finally free**. [...] Spears was placed in the two-part conservatorship — one side governing her personal life, one side her finances — on Feb. 1, 2008, following two back-to-back involuntary hospitalizations and a signed petition from her dad James “Jamie” Spears **claiming she had “dementia”**.

A 27-year-old pop icon at the time, **she was at the center of a media feeding frenzy, with paparazzi and the public at large relentlessly scrutinizing her every move**. Even TV’s “Dr. Phil” McGraw **wanted a slice of the spotlight** focused on her personal woes. He claimed she was in “dire need of both medical and psychological intervention” when he visited her at Los Angeles’ Cedars-Sinai hospital in early January 2008, after she was placed on her first 5150 hold for allegedly locking herself in a bathroom with her toddler son.”

Izvestia (news, herald) is a Russian daily newspaper founded in 1907.

A Columbia Journalism Review (CJR) article from 2010 on press freedom in Russia describes Izvestia as “a fiercely pro-government paper” with **235,000** daily readers. To contextualize that number, the article adds that **less than 10 percent of the population read dailies** between December 2008 and April 2009 based on a TNS Gallup Survey. In most European capitals the same figure is closer to 50 percent.

Newspaper and Public Sphere



Jürgen Habermas, The Public Sphere: An Encyclopedia Article (1964/1974)

By "the public sphere" we mean first of all a realm of our social life in which something approaching **public opinion** can be formed. [...] in every conversation in which private individuals assemble to form a **public body**. [...] A large public body this kind of communication requires specific means for **transmitting information and influencing those who receive it**. Today **newspapers and magazines, radio and television** are the media of the public sphere.

Newspaper and Imagined Communities

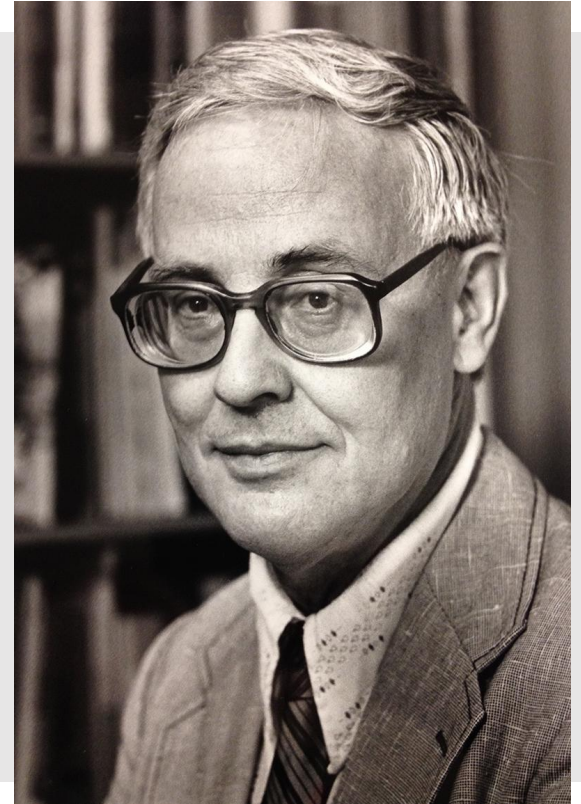
Benedict Anderson, Imagined Communities (1983)

The novel and the newspaper [...] provided the technical means for 're-presenting' the kind of **imagined community** that is the nation.

If we were to look at a sample frontpage of, say, The New York Times, we might find there stories about Soviet dissidents, famine in Mali, a gruesome murder, a coup in Iraq, the discovery of a rare fossil in Zimbabwe, and a speech by Mitterrand. **Why are these events so juxtaposed? What connects them to each other?** Yet obviously most of them happen independently, without the actors being aware of each other or of what the others are up to. The arbitrariness of their **inclusion and juxtaposition shows that the linkage between them is imagined.**

The newspaper reader, observing exact replicas of his own paper being consumed by his subway, barbershop, or residential neighbours, is continually reassured that **the imagined world is visibly rooted in everyday life.**

The very conception of the newspaper implies the refraction of even 'world events' into a specific imagined world of vernacular readers; and also how important to that **imagined community is an idea of steady, solid simultaneity through time.**



Corpus

Izvestia articles published between 2003-2016.

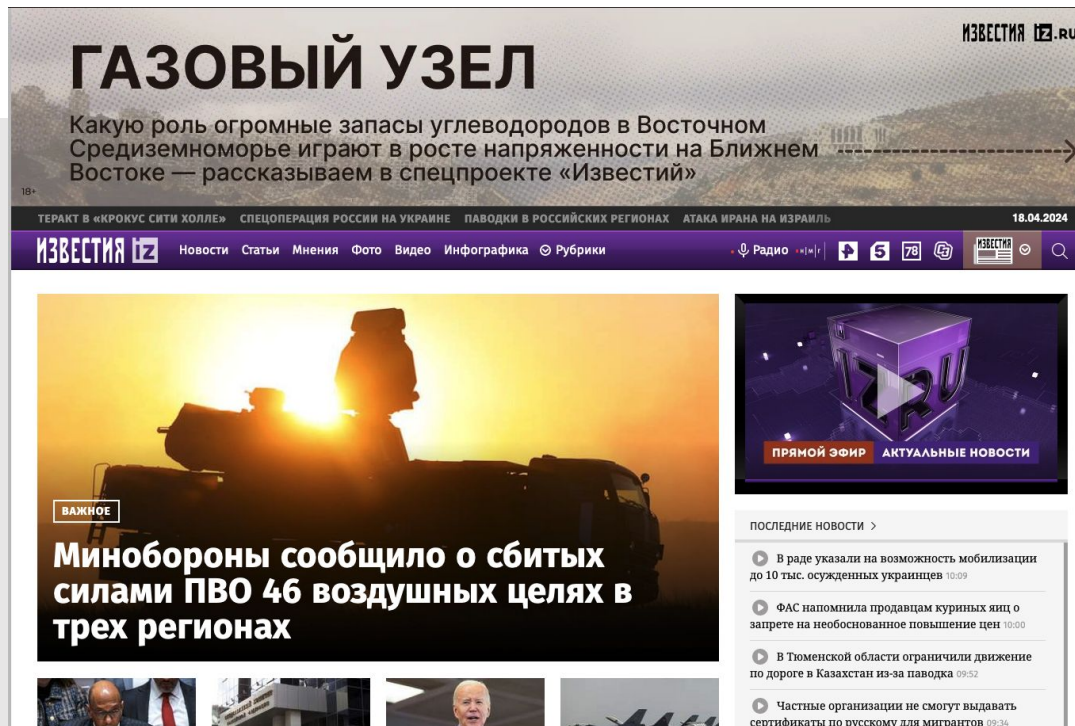
Corpus statistics:

Articles: 118,532

Average Articles per month: 718

Types: 1,013,024

Tokens: 87,761,626



The screenshot shows the top section of the Izvestia website. The main headline is "ГАЗОВЫЙ УЗЕЛ" (Gas Node) with a sub-headline: "Какую роль огромные запасы углеводородов в Восточном Средиземноморье играют в росте напряженности на Ближнем Востоке — рассказываем в спецпроекте «Известий»". Below the headline is a navigation bar with links to "ТЕРРАКТ В «КРОКУС СИТИ ХОЛЛЕ»", "СПЕЦОПЕРАЦИЯ РОССИИ НА УКРАИНЕ", "ПАВОДКИ В РОССИЙСКИХ РЕГИОНАХ", and "АТАКА ИРАНА НА ИЗРАИЛЬ". The date "18.04.2024" is in the top right. The main navigation bar includes "ИЗВЕСТИЯ", "Новости", "Статьи", "Мнения", "Фото", "Видео", "Инфографика", and "Рубрики". There are also icons for "Радио", social media, and a search icon. The main content area features a large image of a military vehicle at sunset with the text "ВАЖНОЕ" and "Минобороны сообщило о сбитых силами ПВО 46 воздушных целях в трех регионах". To the right is a "ПРЯМОЙ ЭФИР" (Live Stream) section with the text "АКТУАЛЬНЫЕ НОВОСТИ". Below this is a "ПОСЛЕДНИЕ НОВОСТИ" (Latest News) section with three items: "В раде указали на возможность мобилизации до 10 тыс. осужденных украинцев", "ФАС напомнила продавцам куриных яиц о запрете на необоснованное повышение цен", and "В Тюменской области ограничили движение по дороге в Казахстан из-за паводка".

Motivation

Investigate the relationship between **the performance of Russian economy**, through Russia Trading System Index (RTSI) and GDP, and **news coverage of foreign events** in the Izvestia newspaper.

Primarily **the news coverage of the United States** because Russia has seen the U.S. as its main rival since the Cold War.

Coverage

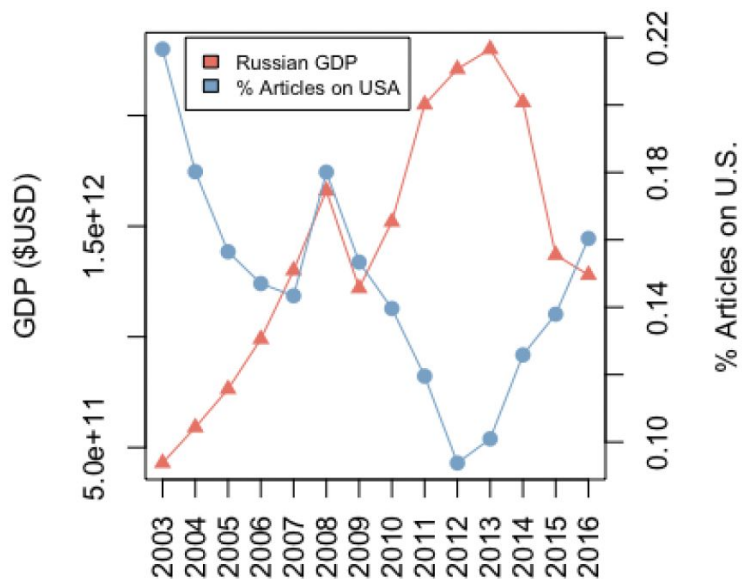


Figure 1: Proportion of articles that mention the U.S. at least twice (blue) and Russian GDP (red), 2003–2016.

U.S. coverage

Manually grouped country mentions to a single label.

Article level, normalized number of articles that mention the U.S. at least twice

Word level, the normalized frequency of the occurrences of the U.S.

Granger Causality

Directed correlations: a change in the economy is **followed** by a change in U.S. news coverage.

Granger causality: a time series X is said to Granger-cause a times series Y if past values x at t-1 are significant indicators in predicting y at t.

	1-Lag		2-Lag	
	$\alpha; \beta$	p-Value	$\alpha; \beta$	p-Value
w_{t-1}	-0.233	0.003	-0.320	0.00005
w_{t-2}	-	-	-0.301	0.0001
r_{t-1}	-0.352	0.0334	-0.369	0.024
r_{t-2}	-	-	-0.122	0.458

Table 2: Granger causality between % change in RTSI and frequency of USA (word level).

	1-Lag		2-Lag	
	$\alpha; \beta$	p-Value	$\alpha; \beta$	p-Value
a_{t-1}	-0.222	0.005	-0.290	0.000289
a_{t-2}	-	-	-0.270	0.000634
r_{t-1}	-0.311	0.035	-0.329	0.0267
r_{t-2}	-	-	-0.091	0.543

Table 3: Granger causality between % change in RTSI and frequency of USA (article level).

Frames

Media Frames Corpus (MFC) annotations to derive lexicons for each frame in the Policy Frames Codebook, translated into Russian with Google Translate.

Economic: costs, benefits, or other financial implications
Capacity and resources: availability of physical, human or financial resources, and capacity of current systems
Morality: religious or ethical implications
Fairness and equality: balance or distribution of rights, responsibilities, and resources
Legality, constitutionality and jurisprudence: rights, freedoms, and authority of individuals, corporations, and government
Policy prescription and evaluation: discussion of specific policies aimed at addressing problems
Crime and punishment: effectiveness and implications of laws and their enforcement
Security and defense: threats to welfare of the individual, community, or nation
Health and safety: health care, sanitation, public safety
Quality of life: threats and opportunities for the individual's wealth, happiness, and well-being
Cultural identity: traditions, customs, or values of a social group in relation to a policy issue
Public opinion: attitudes and opinions of the general public, including polling and demographics
Political: considerations related to politics and politicians, including lobbying, elections, and attempts to sway voters
External regulation and reputation: international reputation or foreign policy of the U.S.
Other: any coherent group of frames not covered by the above categories

Query-Expansion

Query-expansion to reduce the noisiness of machine translation and make lexicons more specific to Izvestia.

200-dimensional word embeddings on **a large background corpus in the test language**, using (continuous bag-of-words) CBOW with a 5-word context window

compute **the center of each lexicon** and **identify up to the K nearest neighbors to this center**, by cosine distance

Frames - Lexicon

The final lexicons contain between 100 and 300 words per frame.

F_{base}		F_{rus}
	Political	
republican-controlled		bills
filibuster		conservative
gubernatorial		parliamentary
	Economic	
cents		deductions
holdings		tax
profitable		fines
	Public Sentiment	
gallup		activism
demonstrators		facsim
rallied		vote

Table 4: Example lexicons extracted from the MFC and transferred to the *Izvestia* corpus.

Frames - Document

A document employs a frame F if it contains **at least 3 instances of a word from F 's lexicon**.

Primary frame of a document to be its most common frame by the number of words from each framing lexicon

Frames - English Evaluations

Primary frame identification is a **15-class classification problem**.

Evaluate on the “Immigration” subset of the MFC.

Word embeddings for the English evaluation are trained on MFC corpus and NYT articles.

Unlike prior methods, **our method is able to transfer to different domains and languages without needing further annotated data.**

Ji and Smith (2017)	58.4
Card et al. (2016)	56.8
Our model	57.3

Table 5: Accuracy of primary frame classification.

Frames - English Evaluations

	Ours	Baseline
Capacity & Resources	0.53	0.48
Crime & Punishment	0.78	0.76
Cultural Identity	0.57	0.62
Economic	0.69	0.67
External Regulation	0.25	0.47
Fairness & Equality	0.50	0.44
Health & Safety	0.58	0.53
Legality & Constitutionality	0.80	0.76
Morality	0.31	0.25
Policy Prescription	0.72	0.69
Political	0.80	0.77
Public Sentiment	0.54	0.47
Quality of Life	0.65	0.63
Security & Defense	0.63	0.63

Measuring the **salience of frames** not merely focusing on the primary frame.

Table 6: F1 Scores for identification of all frames in a document.

Frames - Russian Evaluations

Intruder Detection Task:

For each frame **5 words** sampled from the framing lexicon and 1 word from the lexicon of a different frame

Two (native Russian speaking) annotators to choose which of the 6 words did not belong in the set, given the **frame heading**.

15 sets or 75 words per frame.

Appendix B

	Hard	Soft	Avg.
Capacity & Resources	60.00	93.33	76.67
Crime & Punishment	93.33	93.33	93.33
Cultural Identity	73.33	100	86.67
Economic	100	100	100
External Regulation	93.33	100	96.67
Fairness & Equality	20.00	60.00	40.00
Health & Safety	93.33	93.33	93.33
Legality & Constitution.	86.67	93.33	90.00
Morality	46.67	73.33	60.00
Policy Prescription	86.67	100	93.33
Political	73.33	86.67	80.00
Public Sentiment	53.33	86.67	70.00
Quality of Life	66.67	93.33	80.00
Security & Defense	60.00	66.67	63.33

Soft and hard accuracy scores (%) and average precision in Russian framing lexicon intruder detection task

Are these two evaluations
equivalent of one another?

Salient Frames

Which frames are **associated or overrepresented** with the U.S.-focused news, as compared to other news?

Normalized pointwise-mutual information (nPMI) between the U.S. and each frame F

1 represents complete co-occurrence; 0 represents complete independence.

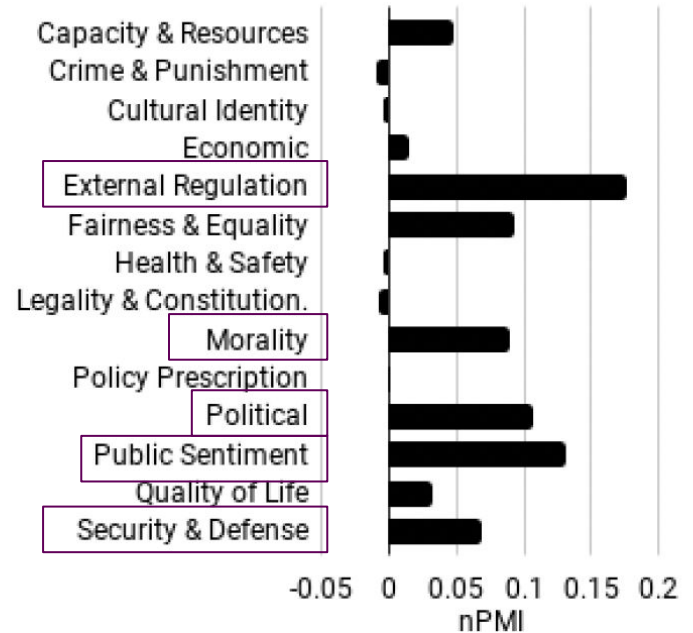


Figure 2: nPMI between U.S. and each frame.

Salient Words within Frames

AgendaLex: Which words in a frame become **more common after a stock market downturn** and become **less common after a stock market upturn**?

Example: **Security and Defense AgendaLex** contains words related to terrorism and countries enemy to the U.S.

As the RSTI declines, frequency of words from this lexicon increases (with a correlation of -0.49).

Conclusion: Quantitative

As the **stock market declines**, not only does the news focus more on the U.S., the **news focuses specifically on terrorists and other enemies to the U.S.**

Conclusion: Qualitative

By **reading sample articles** from months just after stock market downturns that used words from the Security and Defense lexicon and AgendaLex, we identified **three common strategies for distracting Russian citizens** from negative economic events:

- villainizing the U.S.,

- describing threats to the U.S., and

- promoting the Russian military over the U.S. military.

Reading social sciences research from an engineering perspective

Think of **models as lenses**, which provide **a particular kind of focus**

Ask

- What particular insights does this model afford us?
- What is insightful about this model?
- What different questions does it invite us to ask?

- **anthony lising antonio**



Academic researcher

methodology

framing w.r.t. the
US in Russian
news

framing more
broadly

Academic researcher

how effective is this approach for other languages?

can we improve this approach by incorporating new technologies (e.g. LLMs)

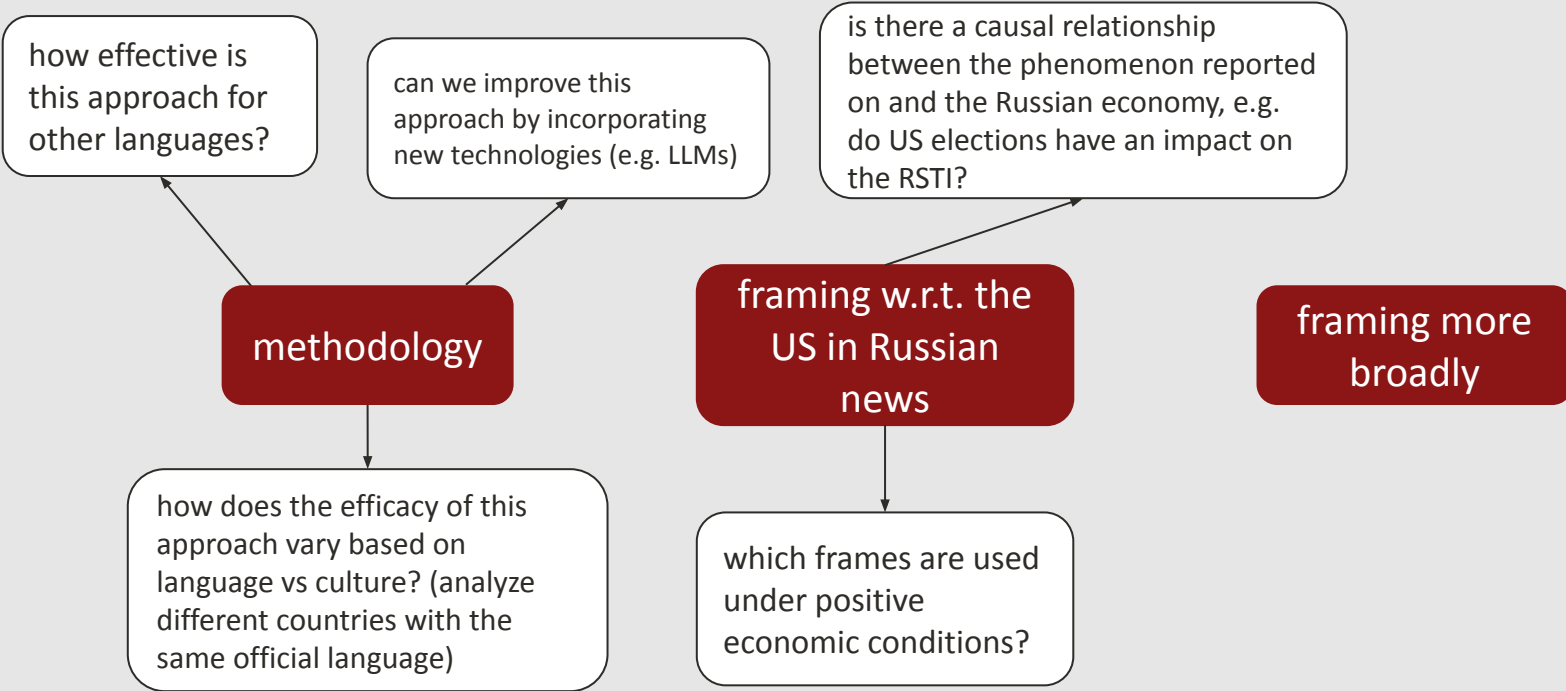
methodology

how does the efficacy of this approach vary based on language vs culture? (analyze different countries with the same official language)

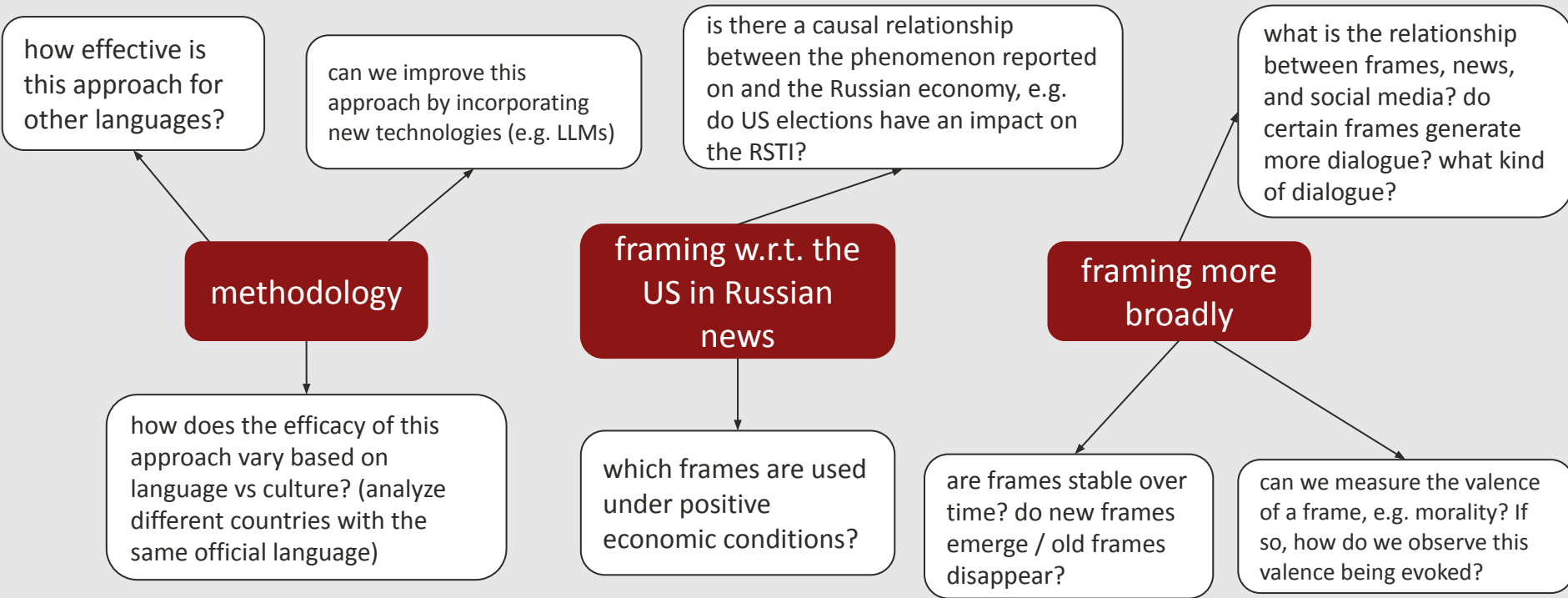
framing w.r.t. the US in Russian news

framing more broadly

Academic researcher



Academic researcher



Academic researcher - your ideas!



“Since I came to the United States alone, I have always been "warned" by my parents in China to stay away from crowd, not to go anywhere if I don't have to, and so on, to study "safely" in the United States. They claim how dangerous the U.S. is because of their experience and reading from the blog posts on social media or the news. Accordingly, applying the scope and model from this research to assess how news in China is doing regarding "agenda-setting" and "framing" would be reasonable and informative.”

“As Field et al. mention, they draw their framings from The Policy Frames Codebook which defines a set of 15 frames. Given that the codebook is developed for English text and by authors from American institutions, I wonder if there are culturally specific frames that are not incorporated.”

“I would be interested to see if more recent advancements in NLP offer new methods for detecting frames in Russian.”

“Based on the provided framing lexicons, as well as the fact that a frame was considered present merely based on having at least 3 words from a framing lexicon, it seems that the authors' approach captures agenda-setting more so than framing. Truly identifying framing would likely require an analysis of syntax and sentence-level semantics.”

Academic researcher - your ideas!



framing more broadly

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framing w.r.t. the US in Russian news

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Academic researcher

Research topic: frames and culture

In groups, **think of a research question.** Consider how you might:

- **Formulate a hypothesis:** what is one thing you would expect to observe about the relationship between frames and culture?
- **Design an experiment:** what is an accessible setting (in terms of data, compute resources, etc.) in which you could make this observation?
- **Choose a metric:** How would you measure whether or not you have made this observation?

Reviewing Field et al. (EMNLP, 2018)

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Target	Score (/5)
Reproducibility	
Contribution	
Clear discussion of limitations	
Satisfies ACL ethical guidelines	

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Target	Score (/5)
Reproducibility	0
Contribution	
Clear discussion of limitations	
Satisfies ACL ethical guidelines	

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Target	Score (/5)
Reproducibility	0
Contribution	3
Clear discussion of limitations	
Satisfies ACL ethical guidelines	

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- Reviewers follow evaluation rubrics, so let's define a **rubric**:

Target	Score (/5)
Reproducibility	0
Contribution	3
Clear discussion of limitations	3
Satisfies ACL ethical guidelines	

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- Reviewers follow evaluation rubrics, so let's define a **rubric**:

Target	Score (/5)
Clarity	0
Contribution	3
Clear discussion of limitations	3
Satisfies ACL ethical guidelines	4

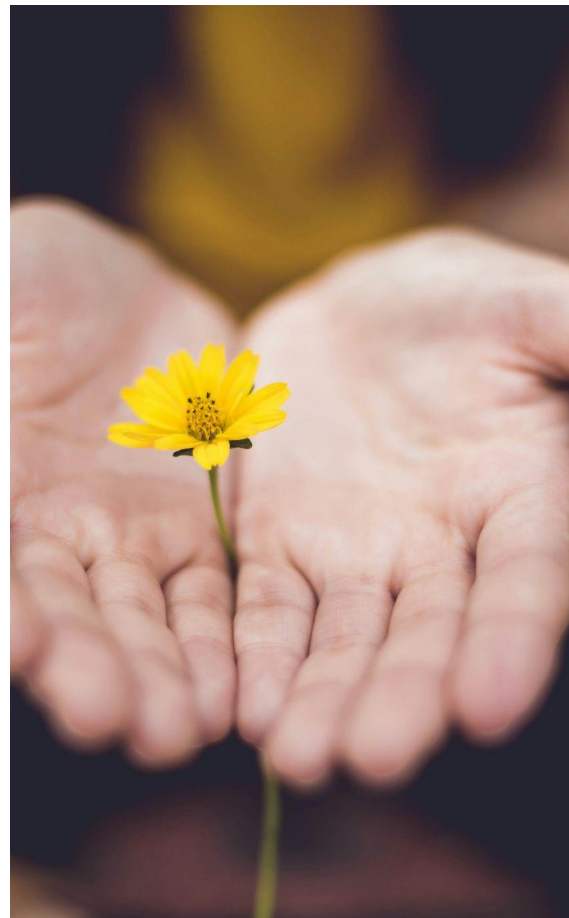
Discussion Questions

- What would be the pros and cons of developing a system, along the lines of what the authors suggest, for “automating the identification and analysis of media manipulation strategies” (like framing)?
- In a study like this, should Russia experts have explicit representation? How do you evaluate the expertise of the author team on this issue?



Next Paper

- Field et al. (2018) predicted textual frames based on prior text...
 - ... “systematic processing”
- Yang and Kraut (2017) correlate behavioral outcomes with prior behavior *and* text...
 - ... “systematic processing” + “heuristic processing”



Persuading teammates to give: Systematic versus heuristic cues for soliciting loans

Diyi Yang and Robert E. Kraut. 2017. Persuading Teammates to Give: Systematic versus Heuristic Cues for Soliciting Loans. Proc. ACM Hum.-Comput. Interact. 1, 2, Article 114 (November 2017), 21 pages.

Motivating Work: Persuasion in Psychology

- Interpersonal persuasion
 - What aspects of persuasion affect decision-making in the persuasion target?
- Computer-mediated crowd-funding campaigns → what influences success?
 - Characteristics of the project?
 - Social networks and interpersonal relationships between participants?
 - Linguistic components of disseminated messages?

Motivating Work: Previous Results

- Computer-mediated crowd-funding campaigns → what influences success?
 - Competence and credibility of asker
 - Superficial features of the asker
 - Social influence surrounding campaign
- Previous work relies on largely subjective measures and ad-hoc variables ⇒ need for more systematized and operationalized features to investigate

Dual Processing in Persuasion

Existing psychological framework: *dual processing models of persuasion* dictates that people process persuasive messages via two routes:

- **Systematic processing**
 - Analytical understanding of quality of the persuasion argument, evidentiary support and its perceived credibility
 - Requires cognitive effort
- **Heuristic processing**
 - Superficial and socially constructed cues which are relatively irrelevant to the merit of the argument
 - Relies on latent cues, less effortful

Dual Processing: Systematic vs. Heuristic

Systematic Cue Examples

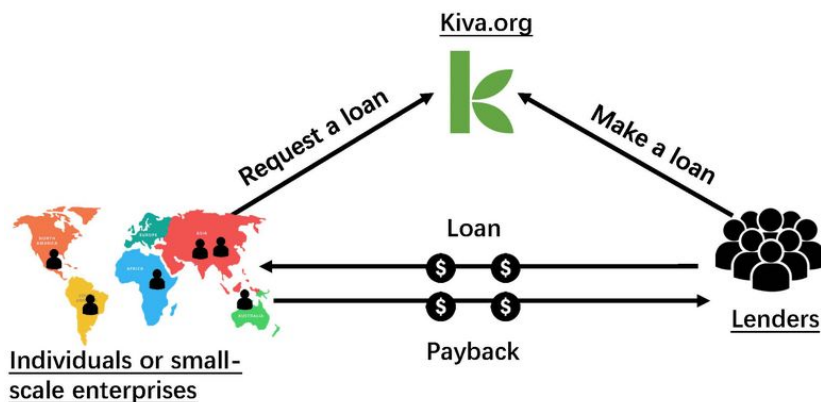
- Evidentiary support for the argument
- Quality of the reasoning and coherence
- Relevance and importance of the argument

Heuristic Cue Examples

- Physical attractiveness of the persuader
- Social proof
- Interpersonal relationship with the persuader

General Setting: Kiva Microfinance Lending

- Kiva workflow
 - “Field Partners” find and post requests for loans regarding existing businesses, non-profits, or individuals
 - Lenders can view requests for loans and choose projects to loan money



Liu, Weiwen & Guo, Jun & Sonboli, Nasim & Burke, Robin & Zhang, Shengyu. (2019). Personalized fairness-aware re-ranking for microlending. 467-471. 10.1145/3298689.3347016.

Kiva Lending Dataset

Kiva team workflow

- Teams established around various groups to induce social encouragement to loan funds
- Team members can post existing loan requests and encourage others in the group to loan

~88,000

Team Posts for Loans

~250,000

Distinct Loan Requests

1,610

Teams

364

Average Team Size

2.4

Average team members
that provided loan per
request

Kiva Team Workflow

LGBTQI (Lesbian, Gay, Bisexual, Transgender,...)

7,276 members have lent \$4,869,650 in 173,245 loans

We are everywhere. | Category: Common Interest | Team since: Aug, 2008

We loan because: We are out and proud and know what it is like to face barriers. We are delighted to help our entrepreneurs achieve their own equality. We thank our friends who join us in our loans & in supporting LGBT rights.

(a) Common Identity

Baking Int.

34 members have lent \$35,975 in 1,373 loans

anywhere / everywhere | Category: Common Interest | Team since: Aug, 2011

We loan because: We love to, and because we love bread. And because bread gives lives.

(b) Common Interest

Renfro Family Lending Team

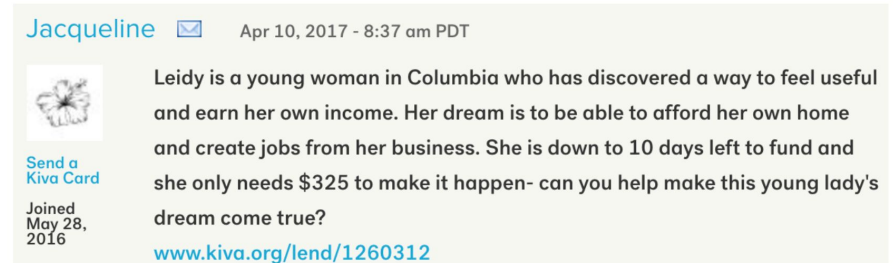
17 members have lent \$302,300 in 3,495 loans


Category: Families | Team since: Dec, 2013


We loan because: We want to make a positive impact on the world and help others. We have been blessed, and we want to give back to those in need.

(c) Personal Relation

Fig. 2. Different Types of Teams on Kiva



Jacqueline  Apr 10, 2017 - 8:37 am PDT



[Send a Kiva Card](#)

Joined May 28, 2016

Leidy is a young woman in Columbia who has discovered a way to feel useful and earn her own income. Her dream is to be able to afford her own home and create jobs from her business. She is down to 10 days left to fund and she only needs \$325 to make it happen- can you help make this young lady's dream come true?

www.kiva.org/lend/1260312

Fig. 1. An example message that advocates for a loan.

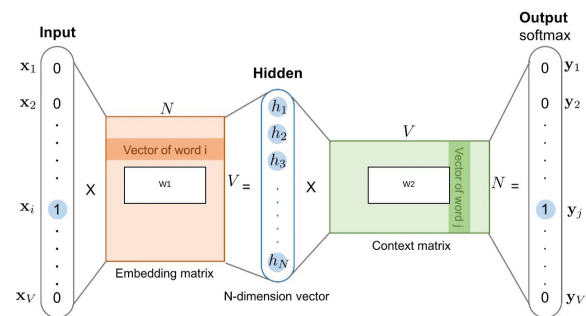
Operationalizing Systematic Cues

- **Worthiness of loan and borrower**
 - Discretized into three levels involving: reason and justification (evidence) for loan
 - Level 1: No reason or justification
 - Level 2: Reason
 - Level 3: Reason + justification (evidence)
- **Labeling and measurement**
 - Annotation on subset of messages by MTurkers
 - High agreement demonstrated
 - Machine learning models trained with labeled text in order to label remaining messages

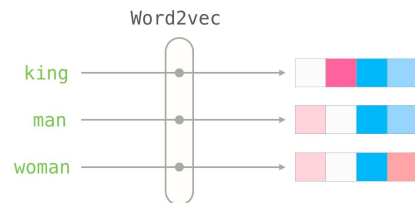
Operationalizing Systematic Cues

What Features to Use for Training ML models on annotated data?

- Word2Vec Embedding
 - Semantic meaning via coordinate-wise average of individual word embeddings
- LIWC (Linguistic Style)
 - Dictionaries for words associated with semantic categories (e.g. 3rd person singular, positive sentiment, family, causation, etc.)
- POS Tagging
 - Syntactic Cues via noun, phrases, etc.



<https://lilianweng.github.io/posts/2017-10-15-word-embedding/>



<https://jalamar.github.io/illustrated-word2vec/>

Operationalizing Systematic Cues: Performance

	Loan		Borrower	
	Corr.	Squared Mean Error	Corr.	Squared Mean Error
Bag of Words	0.493	0.398	0.395	0.343
LIWC	0.436	0.425	0.455	0.322
Word Embedding	0.620	0.322	0.546	0.285
Part Of Speech	0.455	0.416	0.449	0.323
ALL	0.661	0.295	0.636	0.242

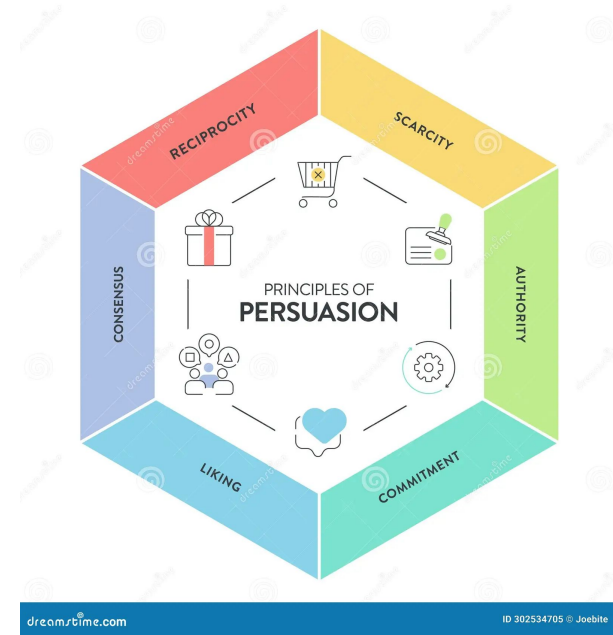
Table 1. Regression model performances for predicting the worthiness of the loan and the borrower.

Operationalizing Heuristic Cues

- Choice of features based on existing psychology and social science work in persuasion
 - Reciprocity
 - Liking
 - Authority
 - Social Identity
 - Social Proof
 - Scarcity
 - Emotional Language
- Largely draw from already available features in the dataset, i.e. no additional extraction or analysis required

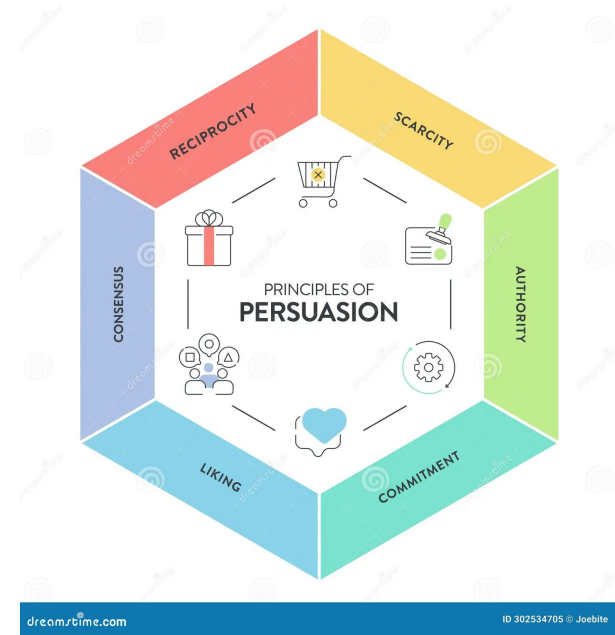
Operationalizing Heuristic Cues

- **Reciprocity**
 - number of loans from advocate to potential lender
- Liking
- Authority
- Social Identity
- Social Proof
- Scarcity
- Emotional Language



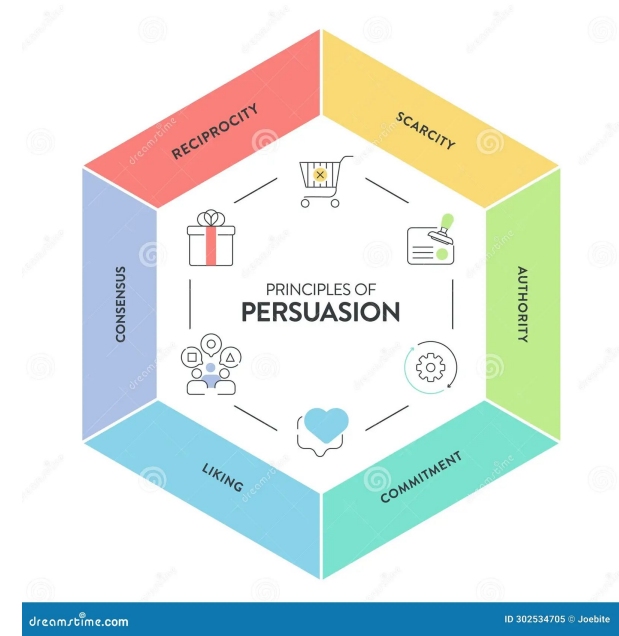
Operationalizing Heuristic Cues

- Reciprocity
- **Liking**
 - Messages between lender and advocate
- Authority
- Social Identity
- Social Proof
- Scarcity
- Emotional Language



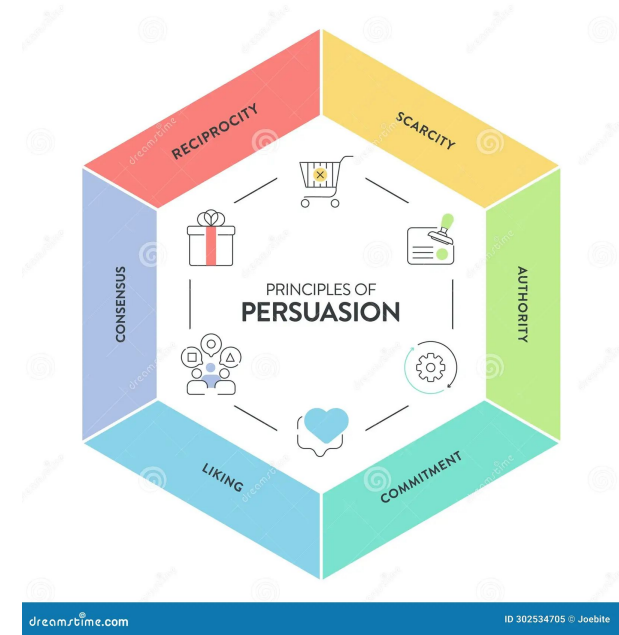
Operationalizing Heuristic Cues

- Reciprocity
- Liking
- **Authority**
 - Captain status
 - Number of posts from advocate
- Social Identity
- Social Proof
- Scarcity
- Emotional Language



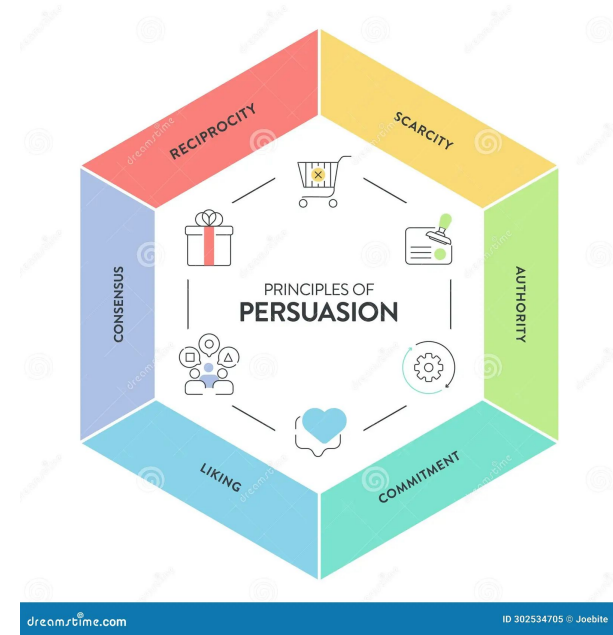
Operationalizing Heuristic Cues

- Reciprocity
- Liking
- Authority
- **Social Identity**
 - Team importance (relative number of teams)
 - 3rd person plural (LIWC)
- Social Proof
- Scarcity
- Emotional Language



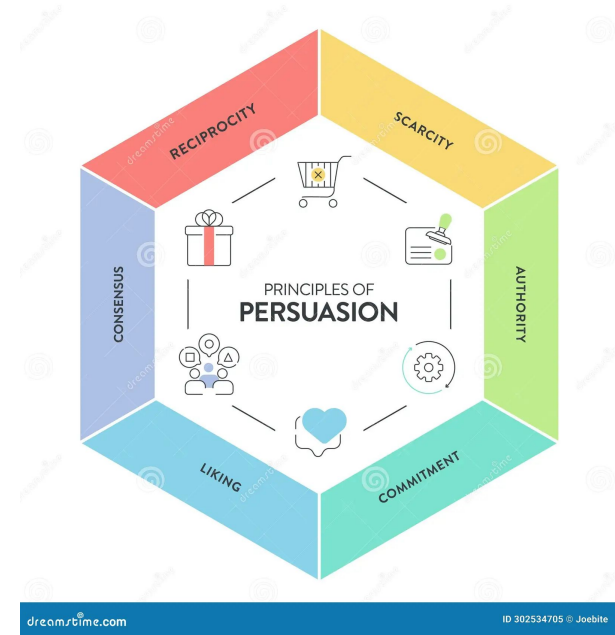
Operationalizing Heuristic Cues

- Reciprocity
- Liking
- Authority
- Social Identity
- **Social Proof**
 - Number of team members loaned
 - Explicit mention of loan
 - Actually loaned
- Scarcity
- Emotional Language



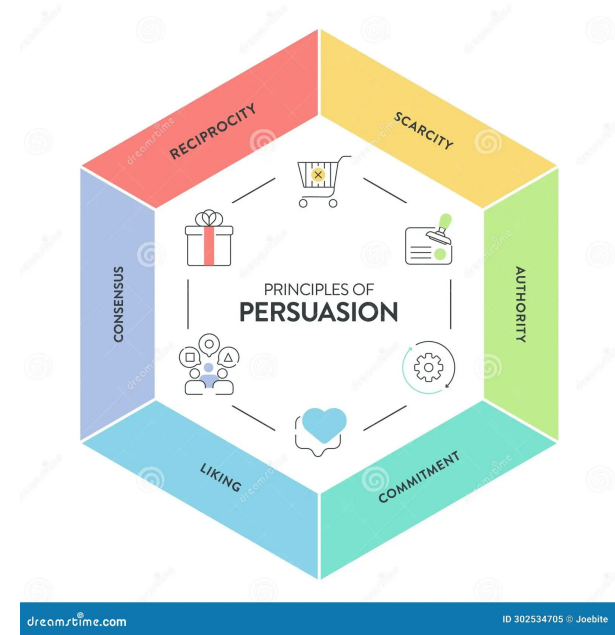
Operationalizing Heuristic Cues

- Reciprocity
- Liking
- Authority
- Social Identity
- Social Proof
- **Scarcity**
 - Mention of urgency (LIWC)
 - Actual urgency
- Emotional Language



Operationalizing Heuristic Cues

- Reciprocity
- Liking
- Authority
- Social Identity
- Social Proof
- Scarcity
- **Emotional Language**
 - Sentiment analysis for negative emotion (via existing lexicons)



Additional Processing in Operationalization

- Conceptually linked and highly correlated features \Rightarrow amalgamated into single index to ensure high internal consistency
 - Request length, worthiness of loan, worthiness of borrower \Rightarrow request worthiness
 - Messages between lender and advocate, and reciprocity \Rightarrow liking
 - Captain status and messages of advocate \Rightarrow authority
- Team categorization: **common identity, common interest, and personal**

Methodology: Features

Control Variables

- Team loan amount
- Lender loan amount
- Lender Tenure
- Borrower Loan Amount
- Borrower Gender
- Borrower Smile
- Borrower Age
- Loan Links per Message
- Loan description worthiness

Independent Variables

- Request worthiness
- Liking between lender and advocate
- Authority
- Team importance
- Use of 3rd person plural
- Number of team members loan
- Mention of advocate loan
- Actual advocate loan
- Mention of urgency
- Actual urgency
- Negative Emotion

Methodology: Features

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Systematic

Heuristic

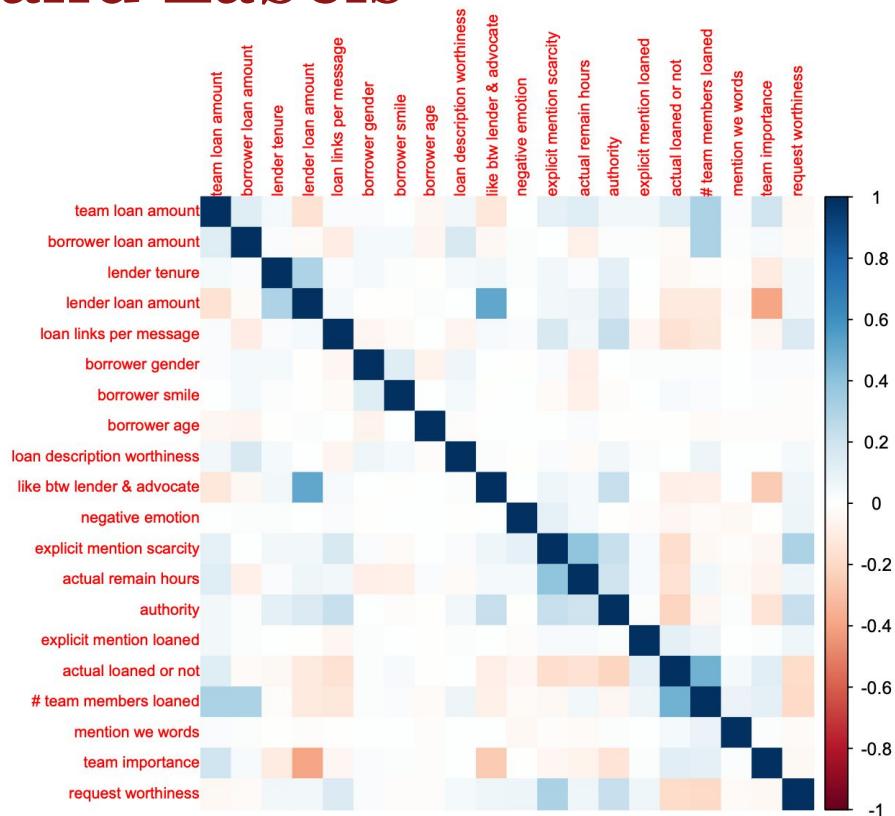
Methodology: Features and Labels

Features

- No multicollinearity amongst control variables and independent variables

Labels and Sampling

- Label: whether or not member participated in loan
- High negative occurrence (very few lenders per post out of full team)
- ⇒ under-sampling performed in which one positive instance sampled per two negative samples



Training Regressors

Model Training: Hierarchical Logistic Regression Models trained to predict whether lender contributed to a loan based on:

- **Model 1:** Control Variables
- **Model 2:** Control + Systematic Variables
- **Model 3:** Control + Heuristic Variables
- **Model 4:** Control + Systematic + Heuristic Variables
- **Model 5:** Control + Systematic + Heuristic Variables + Team Type

Training Regressors

Model Training: Hierarchical Logistic Regression Models trained to predict whether lender contributed to a loan based on set of variables

Evaluation:

Odds Ratio

- Change in odds of lending when a continuous variable is increased by one standard deviation
- Interpretation: $>1 \Rightarrow$ increase in odds of lending; $<1 \Rightarrow$ decrease; $1 \Rightarrow$ no change

Likelihood Ratio + Information Criterion

- Determine model fit and comparative model fit

Results: Importance of Persuasion Features

- Highest impact odds ratios:
 - Control Variables
 - Heuristic Variables
- Minimal change in odds ratio per feature across models

	Variables	Model 1	Model 2 Systematic	Model 3 Heuristic	Model 4 Systematic & Heuristic	Model 5 Team Type
Control Variables	team loan amount	1.458***	1.456***	1.494***	1.493***	1.179***
	borrower loan amount	1.170***	1.169***	1.190***	1.190***	1.255***
	lender tenure	0.324***	0.325***	0.343***	0.343***	0.329***
	lender loan amount	5.961***	5.982***	6.558***	6.559***	9.343***
	loan links per message	0.991	0.999	1.017**	1.021***	1.003
	borrower gender	0.971*	0.970**	0.964**	0.964***	0.972
	borrower smile	1.034*	1.032*	1.019	1.019	1.038*
	borrower age	0.976***	0.975***	0.976**	0.976***	0.952***
	loan description	0.948***	0.951***	0.955***	0.955***	0.942***
	worthiness			0.953***		0.990
Liking	liking btw lender & advocate			1.352***	1.352***	1.357***
Authority	authority			0.795***	0.797***	0.792***
Identity	mention we words			0.991	0.991	1.007
	team importance			1.598***	1.598***	1.626***
Scarcity	mention scarcity			0.964***	0.967***	0.964***
	actual remain hours			0.940***	0.941***	0.958***
Social Proof	mention loaned			0.974***	0.975***	0.982*
	actual loaned or not			1.047***	1.046***	1.031**
	#team members loaned			0.941***	0.943***	0.912***
Emotional	negative emotion			1.006	1.006	1.001
Team Type Interaction	relation-based (rb) team					0.647***
	liking x rb team					1.020
	authority x rb team					1.036
	team importance					
	x rb team					1.047

Interpreting Results: Control Variables

Large effects:

- Loan amount: Team, Borrower & **Lender**
- Lender Tenure

Minor effects:

- Borrower smile, age and gender
- Loan description of worthiness

	Variables	Model 1	Model 2 Systematic	Model 3 Heuristic	Model 4 Systematic & Heuristic	Model 5 Team Type
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Interpreting Results: Systematic Variables

- Increase in the *worthiness of loan* \Rightarrow 5% lower odds of lending
 - Wariness? Psychological reluctance?
 - Mirrored in controls
- Effect largely disappears under additional heuristic factors

	Variables	Model 1	Model 2 Systematic	Model 3 Heuristic	Model 4 Systematic & Heuristic	Model 5 Team Type
Worthiness	request's worthiness		0.953***		0.990	0.990
Liking	liking btw lender & advocate			1.352***	1.352***	1.357***
Authority	authority			0.795***	0.797***	0.792***
Identity	mention we words team importance			0.991 1.598***	0.991 1.598***	1.007 1.626***
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Emotional	negative emotion			1.006	1.006	1.001

Interpreting Results: Heuristic Variables

Major factors:

- Liking between lender & advocate (personal relationship)
- Authority \Rightarrow *less likely* to provide loan
- Team importance

Minor relationships:

- Actual loan vs. mention of loan
- Number of team members already loaned
- Urgency

	Variables	Model 1	Model 2 Systematic	Model 3 Heuristic	Model 4 Systematic & Heuristic	Model 5 Team Type
Worthiness	request's worthiness		0.953***		0.990	0.990
Liking	liking btw lender & advocate			1.352***	1.352***	1.357***
Authority	authority			0.795***	0.797***	0.792***
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Emotional	negative emotion			1.006	1.006	1.001

Interpreting Results: Team-type Variables

Primary results: (between relation-based and identity-based teams)

- Relation-based teams less likely to lend in general
- No significant change in processing cues' importance under different team types

	Variables	Model 1	Model 2 Systematic	Model 3 Heuristic	Model 4 Systematic & Heuristic	Model 5 Team Type
Team Type Interaction	relation-based (rb) team					0.647***
	liking x rb team					1.020
	authority x rb team					1.036
	team importance x rb team					1.047

Interpreting Results: High-Level Takeaways

- Systematic processing cues are less influential than heuristic cues for loan decisions
- Within heuristic processing, behavioral cues had stronger associations with lending than verbal cues
- No significant difference in processing cues' importance across team types \Rightarrow persuasion principles equally effective across groups

Methodology Takeaways

- Operationalization of a systematized idea for persuasion principles:
systematic processing vs heuristic processing
 - Use of natural language processing & characteristics
 - Chosen language models and representations
 - Performance
 - Use of human annotation
- Evaluation and odds ratio in hierarchical regression models
- Correlative measures

Interpreting Results: Limitations and Implications

- Implications for crowd-funding campaigns
 - Advance notice of loans or campaigns (urgency negatively correlated)
 - New members more likely to give
 - Borrow demographics
- Limitations
 - Model performance and measurement error
 - Human annotation
 - Correlative measures as opposed to causal relationships

Academic Researcher

What questions does this work invite us to ask about persuasion and loans on Kiva?

What questions does this work invite us to ask about persuasion in general?

Academic Researcher

among requests with worthiness level 3, what kinds of justifications are most effective?

what factors do Kiva lenders think impact their decisions? If we measure these computationally, will we find that their perception is accurate?

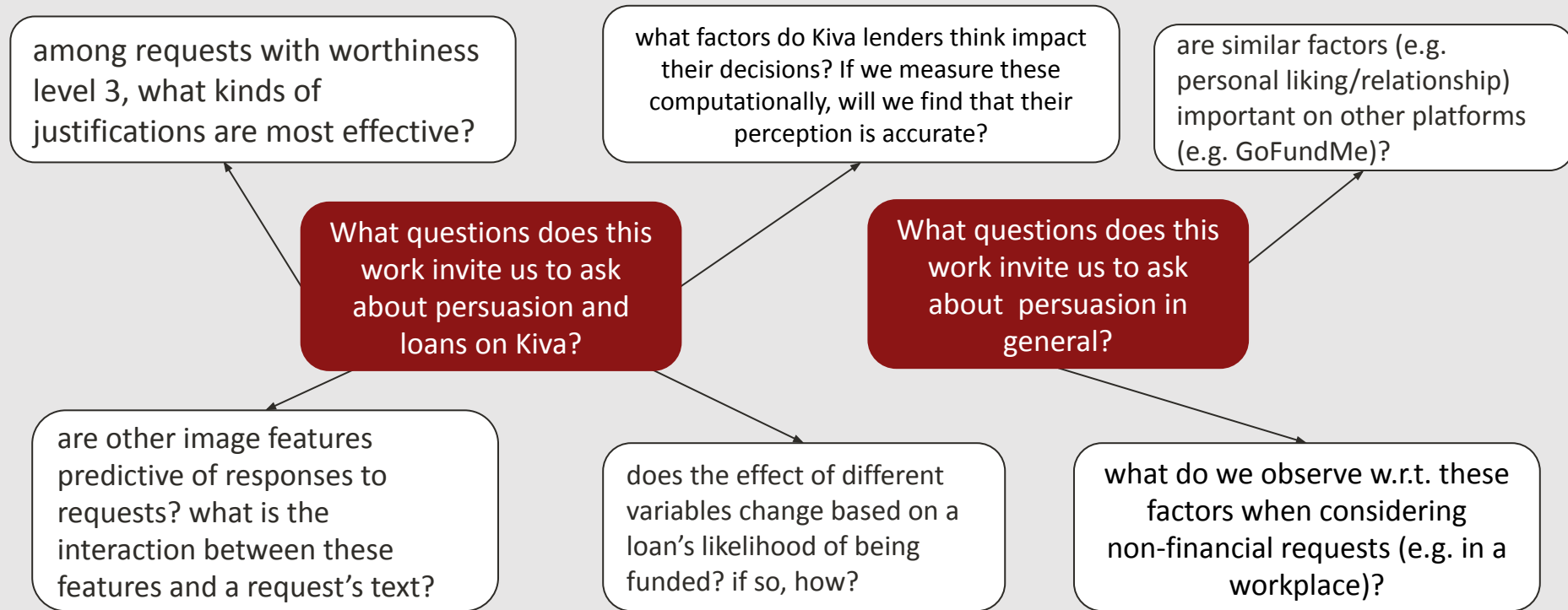
What questions does this work invite us to ask about persuasion and loans on Kiva?

What questions does this work invite us to ask about persuasion in general?

are other image features predictive of responses to requests? what is the interaction between these features and a request's text?

does the effect of different variables change based on a loan's likelihood of being funded? if so, how?

Academic Researcher



Academic researcher - your ideas!



“On systematic processing: it is **unclear how methods such as LIWC/Word2Vec can capture the nuanced details of persuasion** in texts. **Why would it make sense to expect the average embedding vectors of a sentence containing justification versus no justification to reside in different places in the vector space**, especially when the very topic of each loan request varies drastically? A more controlled way might be to characterize requests and compare within each category but even then it is unclear whether the method is producing results the authors intended to produce.”

“I notice that **a lot of the findings here might be reflected in similar settings** such as donation settings too. Like the lenders on Kiva, donors are generally more likely to donate to their close circle of friends and network. This paper also reminds me of another paper about personalized persuasive dialogue systems for social good. The authors of that paper annotate persuasive messages based on different persuasion strategies such as **logical appeal, emotional appeal, and credibility appeal**, which are features that this paper might benefit from as well.”

“This paper's results aligned with previous findings but **showed that authority did not induce higher compliance** and provide an explanation that this could possibly due to their being too many "authority" figures, which would be interesting to test either by controlling for the number of messages sent by "authority" or running it on a different lending platform. It could be interesting to **see if the results vary across different cultures and demographics** (and whether certain groups based on identities or locations exhibit stronger influence by certain systematic or heuristic factors).”

Academic Researcher

Assumption: some loans are more likely than others to be funded, based on their characteristics

Hypothesis: the specific persuasion techniques used are more important when advocating for a loan with a low likelihood of being funded

Academic researcher

Hypothesis: the specific persuasion techniques used are more important when advocating for a loan with a low likelihood of being funded

How would we study this?

- Measure the likelihood of a loan being funded independent of requests made within funding teams
- Measure the attributes of a request and the persuasiveness of a request
- Study the relationship between these factors

Academic researcher

Hypothesis: the specific persuasion techniques used are more important when advocating for a loan with a low likelihood of being funded

How would we determine whether or not this hypothesis has been confirmed?

Reviewing Yang and Kraut (Proceedings of the ACM on Human-Computer Interaction, 2017)

- Yang and Kraut, Persuading teammates to give: Systematic versus heuristic cues for soliciting loans (Proceedings of the ACM on Human-Computer Interaction, 2017)

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Target	Score (/5)
Clarity	
Contribution	
Clear discussion of limitations	
Satisfies ACL ethical guidelines	

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Clarity	4
Contribution	
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Target	Score (/5)
Clarity	4
Contribution	5
Clear discussion of limitations	
Satisfies ACL ethical guidelines	

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Clear discussion of limitations	5
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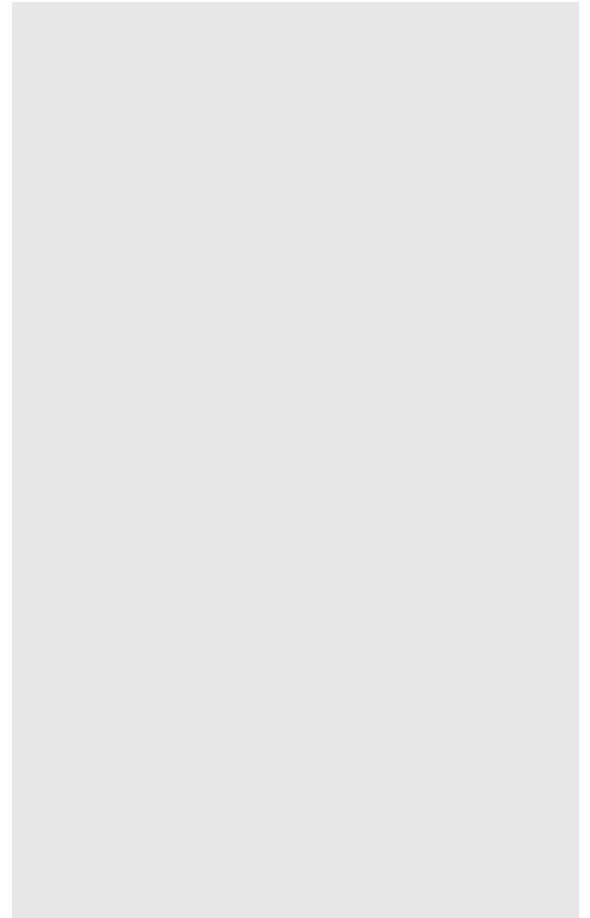
Target	Score (/5)
Clarity	4
Contribution	5
Clear discussion of limitations	5
Satisfies ACL ethical guidelines	5

Discussion Questions

- How do the conclusions presented in this paper, about persuading people to give, connect also to dark patterns or other negative kinds of influence?
- How would you design protections against this kind of framing?

Wrap-Up

Framing, persuasion, and agenda setting
are all...



Wrap-Up

Framing, persuasion, and agenda setting
are all...

... as old as we are.



Thank You