Modeling Framing in Immigration Discourse on Social Media

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How do people talk about immigration?
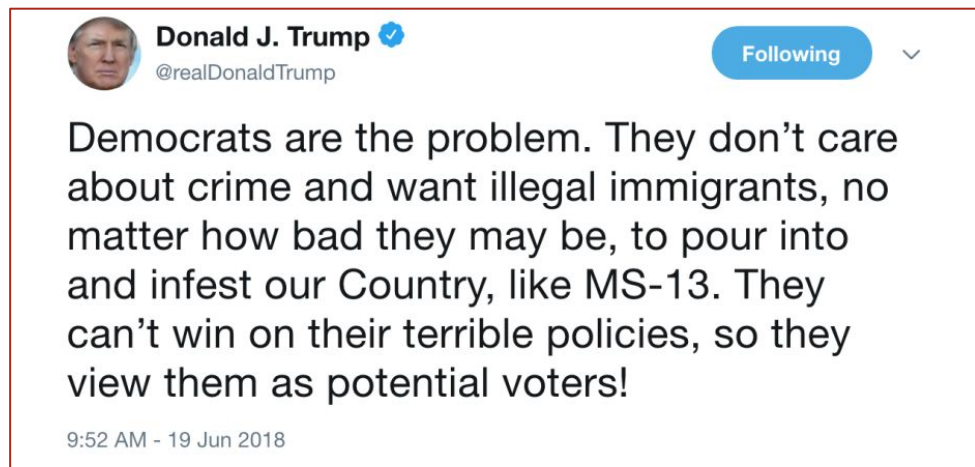
Framing

- *"**Selecting some aspects of a perceived reality and make them more salient in a communicating text,** in such a way as to promote a particular problem definition, causal interpretation, moral evaluation, and/or treatment recommendation for the item described"* [Entman, 1993]

- Impacts collective action, public opinion, and policy [de Vreese, 2005]

Framing has real impact

- Framing is a key mechanism by which a text exerts influence over its audience. It serves four main functions [Entman, 1993]

    1. Defining problems

    2. Diagnosing causes

    3. Making evaluative judgments

    4. Suggesting solutions

- Framing impacts what people notice about an issue

- Framing shapes audience perceptions and interpretations of an issue
  [Iyengar, 1991; Chong & Druckman, 2007; Lecheler et al., 2015]

Our Goal

- **Combine political communication and NLP to analyze the public's production and reception of frames in immigration discourse on Twitter**

- Use massive scale to compare framing strategies across numerous cross-sections of the (Twitter-using) population

- Model interactive behaviors (e.g. likes and retweets) to help understand what framing strategies resonate more strongly with a message's audience

Roadmap

	Brief introduction to framing processes and typologies
	Dataset collection and annotation
	Automated frame detection
	Frame-building: how do region and ideology impact framing?
	Frame-setting: how does framing affect readers' reactions?

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Framing processes

- **Frame-building**: what factors affect how an author frames an issue?
  - Frames are treated as dependent variables
- **Frame-setting**: how framing affects how audiences interpret & evaluate issues
  - Frames are treated as independent variables

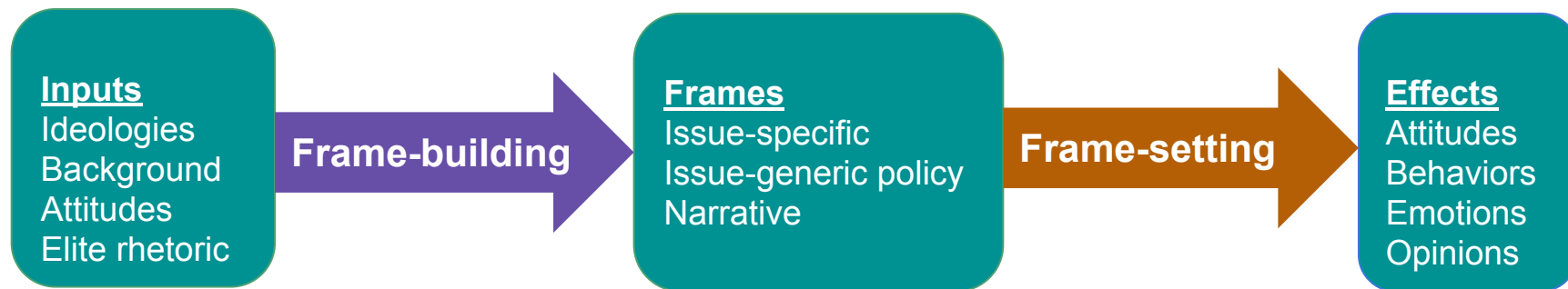| Inputs	Frame-building	Frames	Frame-setting	Effects
Ideologies Background Attitudes Elite rhetoric	→	Issue-specific Issue-generic policy Narrative	→	Attitudes Behaviors Emotions Opinions

Figure and theoretical model adapted from de Vreese [2005], and is
a simplification of an earlier four-process model [Scheufele, 1999]

Multiple ways to analyze a message's framing

- **Issue-generic Policy** [Boydstun et al., 2013]
  - *Crime & punishment, morality, economic, policy*
- **Issue-generic Narrative** [Iyengar, 1991]
  - *<u>Episodic</u>: focus on specific actions, speech acts, examples, or case studies*
  - *<u>Thematic</u>: more generic views, placing story in broader political, social, and cultural context*
- **Immigration-specific** [Benson, 2013]
  - *Immigrants as victims (e.g. of global economy or discrimination)*
  - *Immigrants as heroes (e.g. contributing to economy or providing cultural diversity)*
  - *Immigrants as threats (e.g. to jobs, or to public safety)*
- **Metaphorical framing** [Santa Ana, 1999]
  - *Animals, Dangerous Waters, Invading Army*
- **Lexical (equivalency)** [Lakoff, 2006]
  - *Illegals, undocumented workers, illegal immigrants*

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Frame Type	Frame	Description
Issue-Generic Policy	Economic	Financial implications of an issue
	Capacity & Resources	The availability or lack of time, physical, human, or financial resources
	Morality & Ethics	Perspectives compelled by religion or secular sense of ethics or social responsibility
	Fairness & Equality	The (in)equality with which laws, punishments, rewards, resources are distributed
	Legality, Constitutionality & Jurisdiction	Court cases and existing laws that regulate policies; constitutional interpretation; legal processes such as seeking asylum or obtaining citizenship; jurisdiction
	Crime & Punishment	The violation of policies in practice and the consequences of those violations
	Security & Defense	Any threat to a person, group, or nation and defenses taken to avoid that threat
	Health & Safety	Health and safety outcomes of a policy issue, discussions of health care
	Quality of Life	Effects on people's wealth, mobility, daily routines, community life, happiness, etc.
	Cultural Identity	Social norms, trends, values, and customs; integration/assimilation efforts
	Public Sentiment	General social attitudes, protests, polling, interest groups, public passage of laws
	Political Factors & Implications	Focus on politicians, political parties, governing bodies, political campaigns and debates; discussions of elections and voting
	Policy Prescription & Evaluation	Discussions of existing or proposed policies and their effectiveness
	External Regulation & Reputation	Relations between nations or states/provinces; agreements between governments; perceptions of one nation/state by another
Immigration Specific	Victim: Global Economy	Immigrants are victims of global poverty, underdevelopment and inequality
	Victim: Humanitarian	Immigrants experience economic, social, and political suffering and hardships
	Victim: War	Focus on war and violent conflict as reason for immigration
	Victim: Discrimination	Immigrants are victims of racism, xenophobia, and religion-based discrimination
	Hero: Cultural Diversity	Highlights positive aspects of differences that immigrants bring to society
	Hero: Integration	Immigrants successfully adapt and fit into their host society
	Hero: Worker	Immigrants contribute to economic prosperity and are an important source of labor
	Threat: Jobs	Immigrants take nonimmigrants' jobs or lower their wages
	Threat: Public Order	Immigrants threaten public safety by being breaking the law or spreading disease
	Threat: Fiscal	Immigrants abuse social service programs and are a burden on resources
	Threat: National Cohesion	Immigrants' cultural differences are a threat to national unity and social harmony
Narrative	Episodic	Message provides concrete information about on specific people, places, or events
	Thematic	Message is more abstract, placing stories in broader political and social contexts

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Roadmap

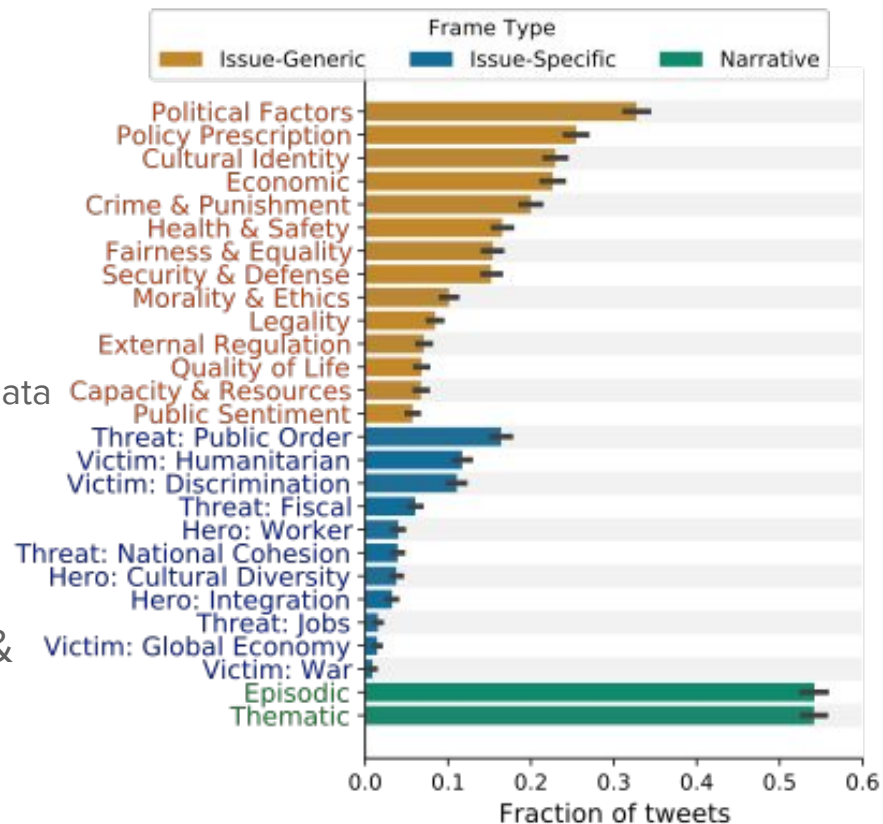|	
	Brief introduction to framing processes and typologies
	Dataset collection and annotation
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Building a corpus of immigration-related tweets

- 2.6M English-language tweets from 10% Twitter sample from 2018-2019
  - Must contain an immigration-related term (e.g. immigrant(s), undocumented, illegal alien(s))
  - Included quote tweets, excluded retweets with no additional content
- Restricted to US, UK, and EU using location inference tool [Compton et al., 2014]
- Ideology point estimation with for US users with existing technique [Barberá 2015]
  - Liberal to conservative scale
  - ~60% coverage, based on elite accounts users follow
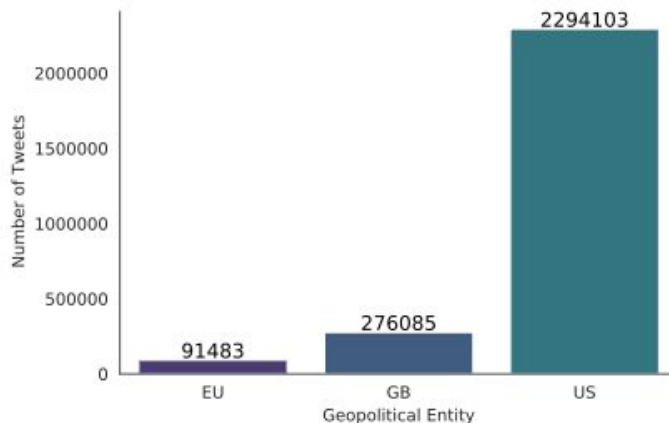
Data Annotation

- Annotators identified **all frames explicitly cued** in a tweet
  - Codebook available in GitHub repository
- Singly-annotated training dataset of 3600 tweets (80%) balanced across region
  - More but noisier training data > less but cleaner data for text annotation [Barberá et al., 2019]
- Consensus-coded dev/test sets of 450 tweets each (10%) in pairs
  - Krippendorff α = 0.45 before adjudication
- 80% of tweets had ≥1 issue-generic policy & narrative frame
- 50% of tweets had ≥1 issue-specific frame

Frame Type
- Issue-Generic
- Issue-Specific
- Narrative

Political Factors
Policy Prescription
Cultural Identity
Economic
Crime & Punishment
Health & Safety
Fairness & Equality
Security & Defense
Morality & Ethics
Legality
External Regulation
Quality of Life
Capacity & Resources
Public Sentiment
Threat: Public Order
Victim: Humanitarian
Victim: Discrimination
Threat: Fiscal
Hero: Worker
Threat: National Cohesion
Hero: Cultural Diversity
Hero: Integration
Threat: Jobs
Victim: Global Economy
Victim: War
Episodic
Thematic

Fraction of tweets

Some messages are *hard* to annotate

- "@USER You can't compare Irish migrants to Islamic nutjobs who are making filth of countries they enter."

  - What does "filth" mean? (crime? culture? health?)

- "@USER Should we suffer in silence at the horrific war in Iraq created by Blair? Or the huge debt we face created by being part or EU and mass uncontrolled immigration & the housing crisis etc etc..."

  - What is the scope of "the huge debt we face"?
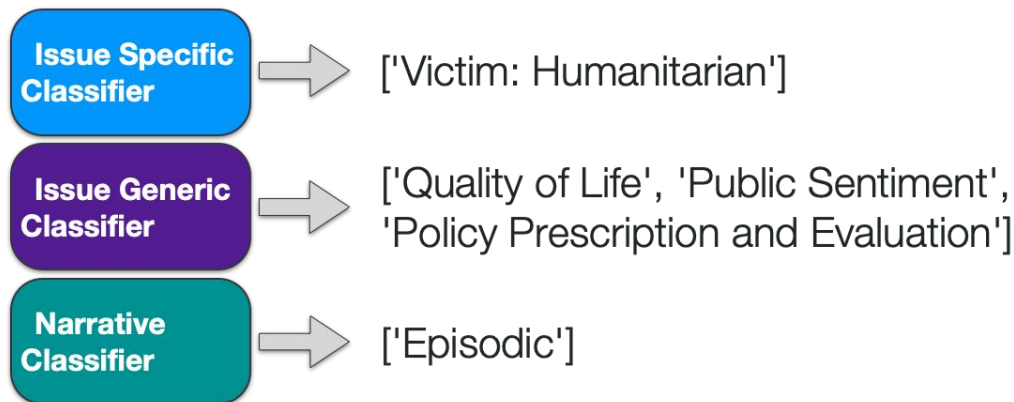
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Task setup

- 3600 training tweets (singly annotated), balanced across US, UK, EU
- 450 tweets in each dev and test data (adjudicated), balanced across region
- Multilabel classification task

"The proposed #TitleIX rule will exacerbate the negative experiences of undocumented students on campus. Get ready to speak your voice loudly. Go to https://t.co/7kAlhYjeLl to learn how with @endrapeoncampus"

Issue Specific Classifier ➡ ['Victim: Humanitarian']

Issue Generic Classifier ➡ ['Quality of Life', 'Public Sentiment', 'Policy Prescription and Evaluation']

Narrative Classifier ➡ ['Episodic']

Model Selection for Detecting Frames

- **<u>Our model</u>**: multilabel classification layer for each frame type atop a RoBERTa language model
  - Fine-tune on full data to better recognize patterns in Twitter immigration discourse

- **<u>Baselines</u>**: random prediction, logistic regression, RoBERTa without fine-tuning

- **<u>All models</u>**: 5 initialization seeds, default hyperparameters, early stopping

Fine-tuned ROBERTa outperforms all baselines

F1 score by model on test set
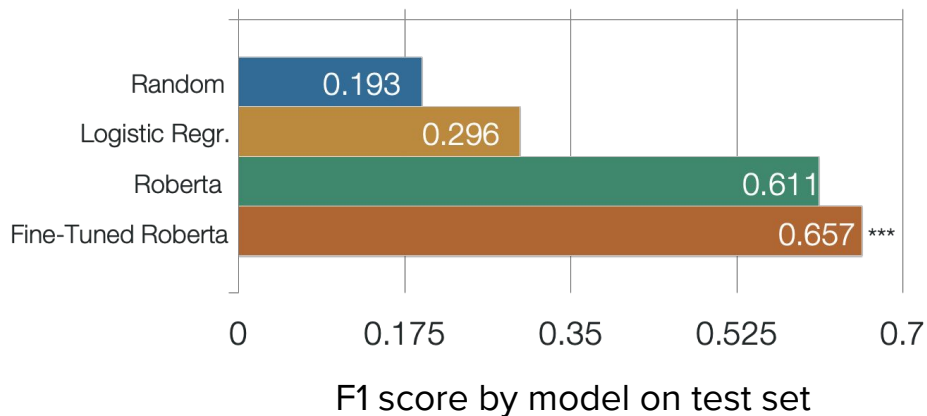
Frame Type	Precision	Recall	F1 Score	LRAP
Issue-Generic Policy	0.727	0.721	0.711	0.750
Issue-Specific	0.593	0.531	0.552	0.806
Narrative	0.757	0.887	0.808	0.894

Test set performance on each frame typology

RoBERTa shows performance gains particularly for low-frequency frames

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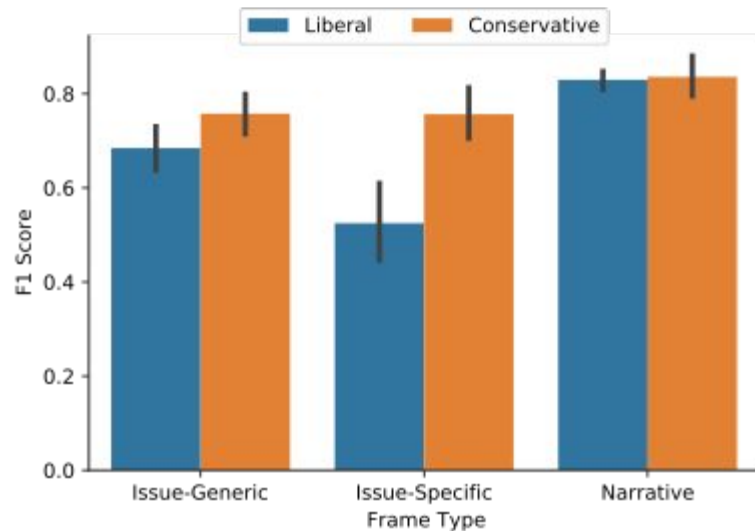# Conservatives are more consistent in framing immigration

Classifiers achieve higher F1 scores on conservatives' tweets than liberals'

↓

More linguistic regularities across conservatives' messages

↓

Conservatives are more consistent than liberals in their framing of immigration
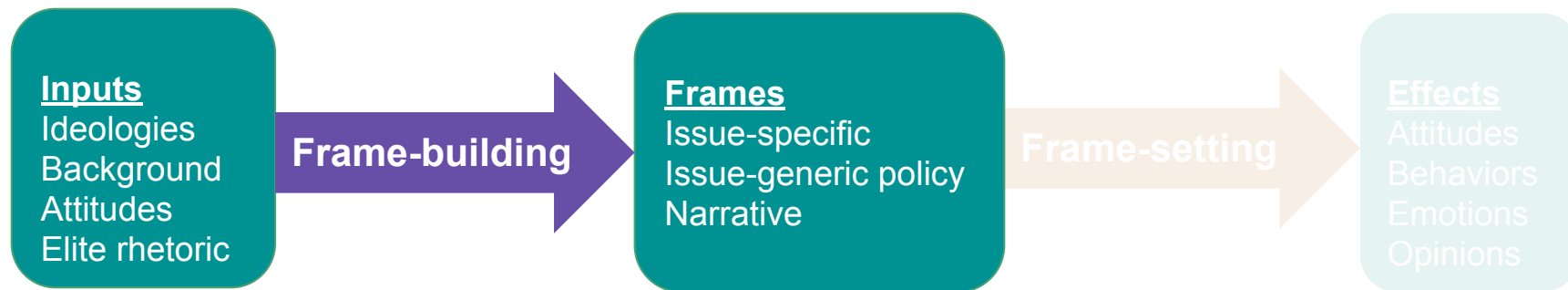

Average F1 scores on combined dev/test set separated by US authors' ideologies.

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What role does identity play in selecting frames?

| Inputs Ideologies Background Attitudes Elite rhetoric	→ **Frame-building** →	Frames Issue-specific Issue-generic policy Narrative	→ Frame-setting →	Effects Attitudes Behaviors Emotions Opinions

- **Nation/Region**: The unique political, social, and historical contexts of nation-states impact framing of immigration [Helbling, 2014]
- **Ideology**: newspaper slant and political movements impacts framing, but unclear if patterns generalize to ordinary individuals on social media

Frame-building experimental setup

- Predict frames for all 2.6M tweets with fine-tuned RoBERTa model.

- Fit separate mixed-effects logistic regression models to predict the presence or absence of each frame (frames are dependent variables).

- Independent variables:
  a. Country/region (US, UK, EU) is categorical variable with US as reference level
  b. Ideology is continuous variable (analysis restricted to US tweets)

- Controls included as fixed effects (independent variables)
  a. User characteristics (follower count, friends count, verified status, number of posts)
  b. Tweet characteristics (length, if reply or quote tweet, containing hashtags, URLS, mentions)
  c. Nested random effects for year, month, and date to account for exogenous events

- Apply Holm-Bonferroni corrections to account for multiple hypothesis testing

Liberals frame immigrants as **heroes** and **victims**
Conservatives frame immigrants as **threats**
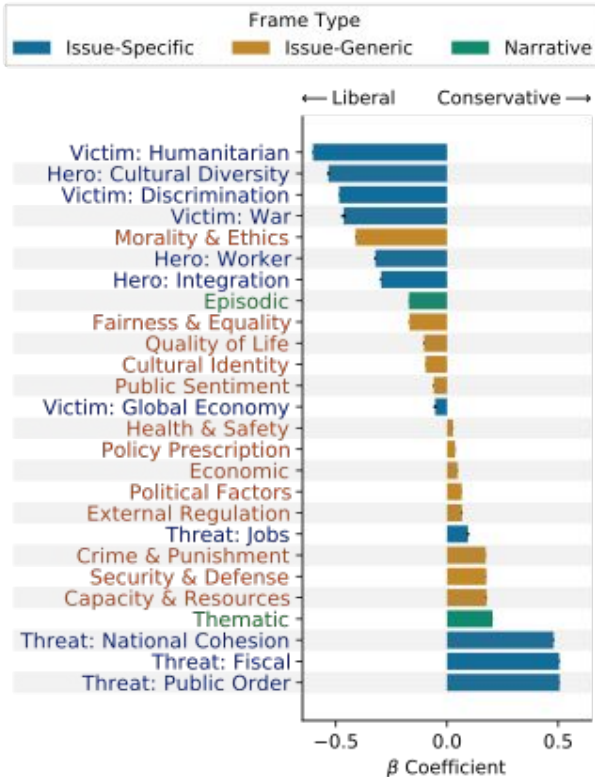
- Liberals cue *fairness* and *morality*, framing immigrants as *victims of discrimination* and *inhumane* policies.

- Conservatives frame immigrants as *threat to public safety*, *burden on taxpayers & government programs*

- Consistent with prior work in psychology

  - Conservatism linked to sensitivity to threats [Jost et al., 2003]
  - Moral Foundations: Conservatives are more sensitive to ingroup/loyalty and authority and liberals to care and fairness [Graham et al., 2009]

Each frame typology offers valuable insights
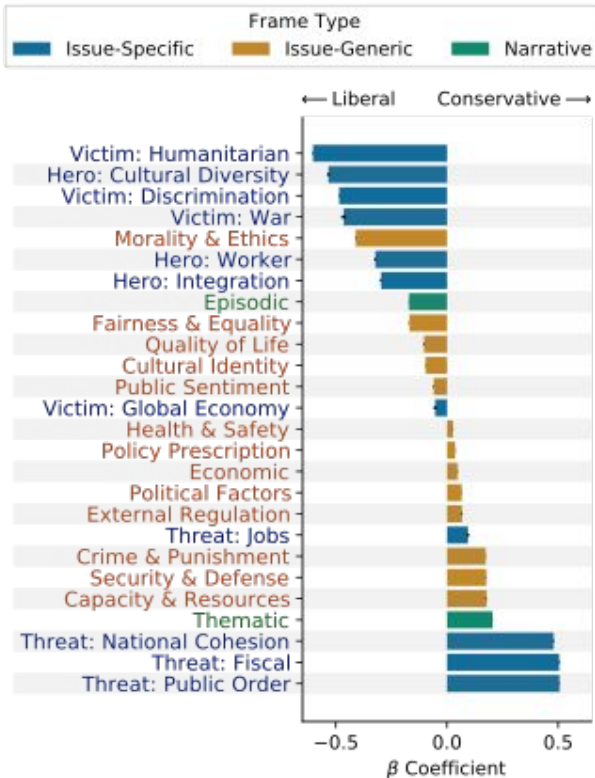
- Issue-specific frames are the most ideologically extreme & reveal differences obscured by issue-generic policy frames (e.g. ***cultural identity***)

- Ideological variation in narrative frames

  - Liberals tend to use ***episodic*** frames
  - Conservatives tend to use ***thematic*** frames
  - Similar trend in immigration news [Somaini, 2019]
  - Possible role of emotion: episodic frames have emotional appeal, and liberals are more emotionally-driven than conservatives [Iyengar 1991, Pliskin et al., 2014]
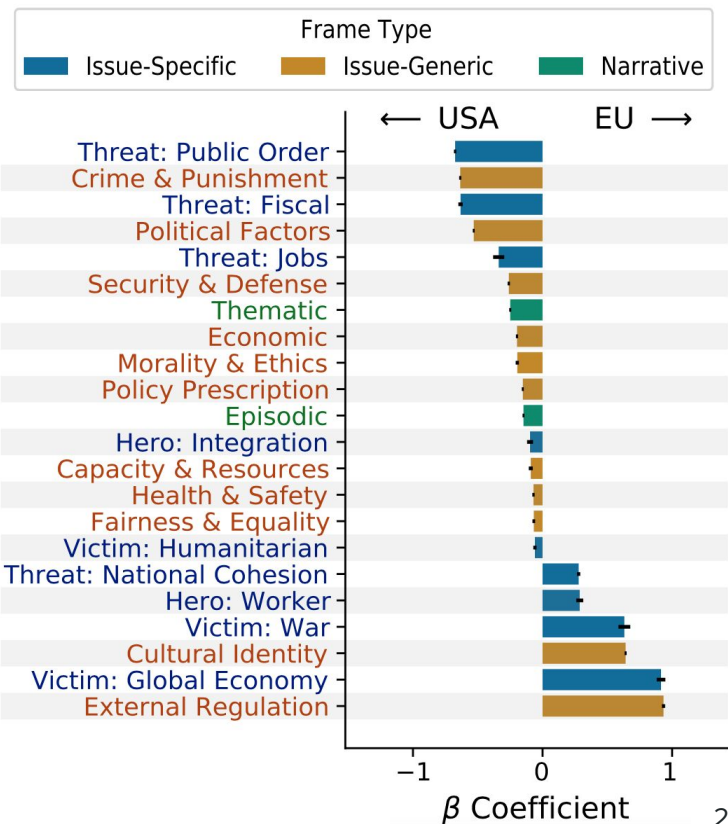
Mendelsohn, Budak, Jurgens

The frame-building role of region: 🇺🇸 vs 🇪🇺

- Most ideologically-extreme frames in the US are also most US-biased

- Europeans cue ***cultural identity*** more than Americans.
  - Immigrants' backgrounds may be marked in European discourse due to history of homogeneity
  - European newspapers frame immigration differently depending on countries of origin [Eberl et al., 2018]

- European focus on global relationships (e.g. ***external regulation***, ***victim: global economy***)

Frame Type
- Issue-Specific
- Issue-Generic
- Narrative

← USA   EU →

Threat: Public Order
Crime & Punishment
Threat: Fiscal
Political Factors
Threat: Jobs
Security & Defense
Thematic
Economic
Morality & Ethics
Policy Prescription
Episodic
Hero: Integration
Capacity & Resources
Health & Safety
Fairness & Equality
Victim: Humanitarian
Threat: National Cohesion
Hero: Worker
Victim: War
Cultural Identity
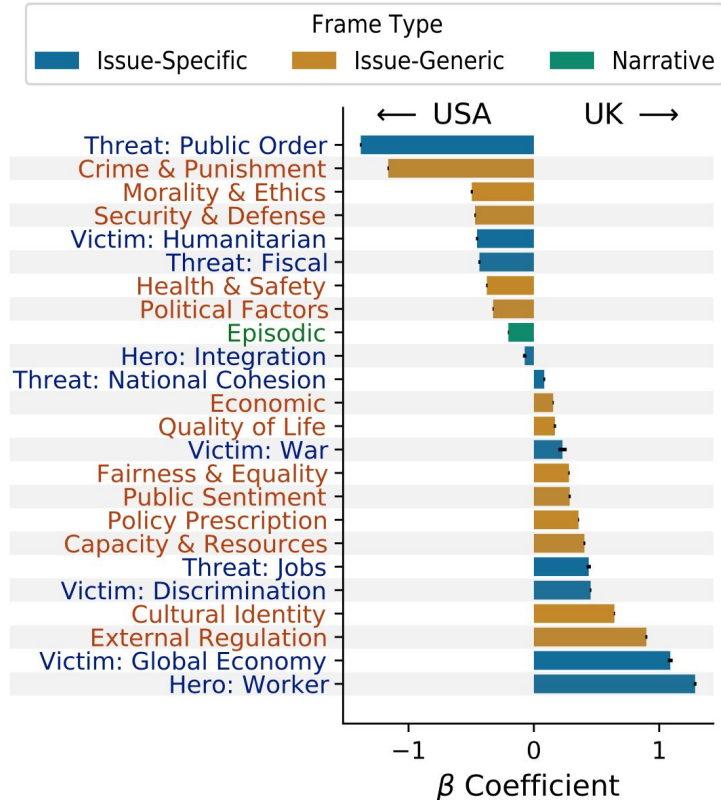Victim: Global Economy
External Regulation

−1   0   1
β Coefficient

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The frame-building role of region: 🇺🇸 vs 🇬🇧

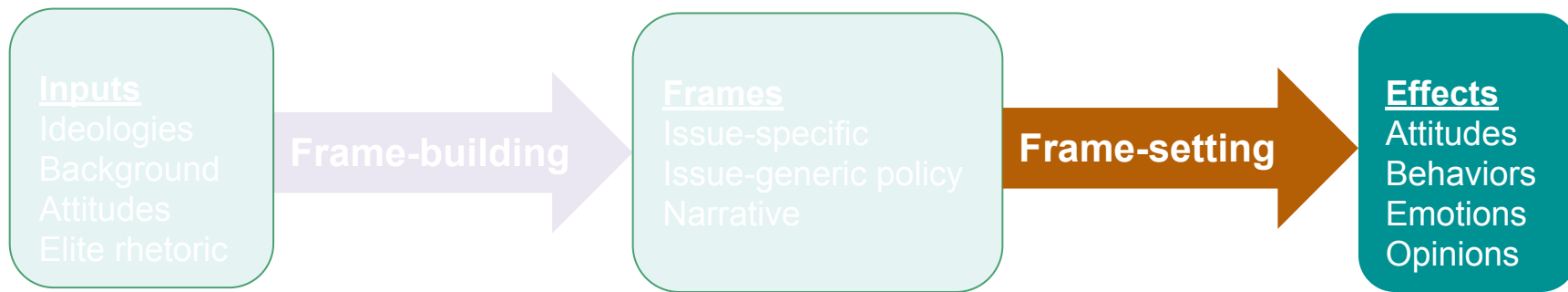- ***Economic* frames more associated with UK**
  - Also more common in UK press [Caviedes, 2015]

- May be consequence of different labor markets [Caviedes, 2015]
  - In US and most of EU, immigrants work in different sectors
  - But in UK they work in same industries as native-born Brits, making both economic competition and contribution more salient.

Frame Type
Issue-Specific   Issue-Generic   Narrative

← USA   UK →

Threat: Public Order
Crime & Punishment
Morality & Ethics
Security & Defense
Victim: Humanitarian
Threat: Fiscal
Health & Safety
Political Factors
Episodic
Hero: Integration
Threat: National Cohesion
Economic
Quality of Life
Victim: War
Fairness & Equality
Public Sentiment
Policy Prescription
Capacity & Resources
Threat: Jobs
Victim: Discrimination
Cultural Identity
External Regulation
Victim: Global Economy
Hero: Worker

−1   0   1

β Coefficient

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How does framing impact a message's audience?

| Inputs
Ideologies
Background
Attitudes
Elite rhetoric | **Frame-building** → | Frames
Issue-specific
Issue-generic policy
Narrative | **Frame-setting** → | **Effects**
Attitudes
Behaviors
Emotions
Opinions |

- Framing impacts participants' opinions about immigration [Lecheler et al., 2015]

- Twitter provides insight into frame-setting via interactive signals

    ♥ **Favoriting**: endorsement, reader aligns with author's message

    🔁 **Retweeting**: amplification, diverse motivations, e.g. desire to inform or entertain others [boyd et al., 2010]

Frame-setting experimental setup

- Fit hierarchical linear mixed effects models with (log-transformed) favorites and retweets as dependent variables, and frames as independent variables.

- Include same temporal, user, and tweet control variables as before (e.g. is user verified, number of followers, tweet length)

- Analysis restricted to US users, additionally control for ideology

Many frames have an effect on user engagement

- Cultural (e.g. ***hero: integration***) and human interest frames (e.g. ***morality, victim: discrimination***) have more engagement, especially favorites.

  - Perhaps due to increased emotional appeal

- Frames about security & safety (e.g. ***threat: public order, victim: humanitarian***) get more retweets.

  - Perhaps messages are amplified due to perceived urgency or the desire to persuade others of such concerns.

- ***Political*** frame is associated with more retweets.

  - Emphasis on competition and strategy may lead users to amplify political messages to help their side win.
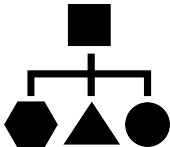

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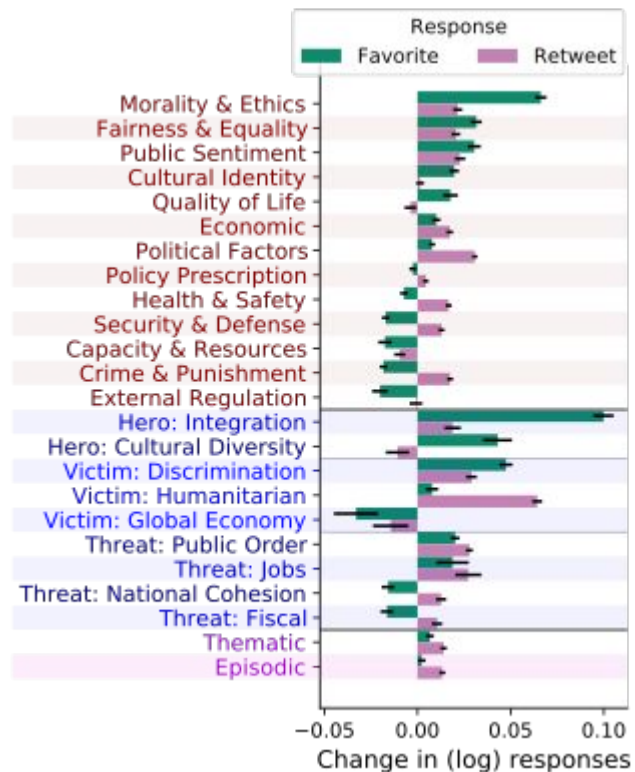
# Effects of issue-specific and narrative frames

- <u>Issue-specific</u> frames have largest effect on responses, highlighting importance of expanding analyses beyond issue-generic policy frames

- Having a clear <u>narrative</u> is important! Both ***episodic*** and ***thematic*** frames are significantly associated with increased engagement, although less strongly than issue frames.
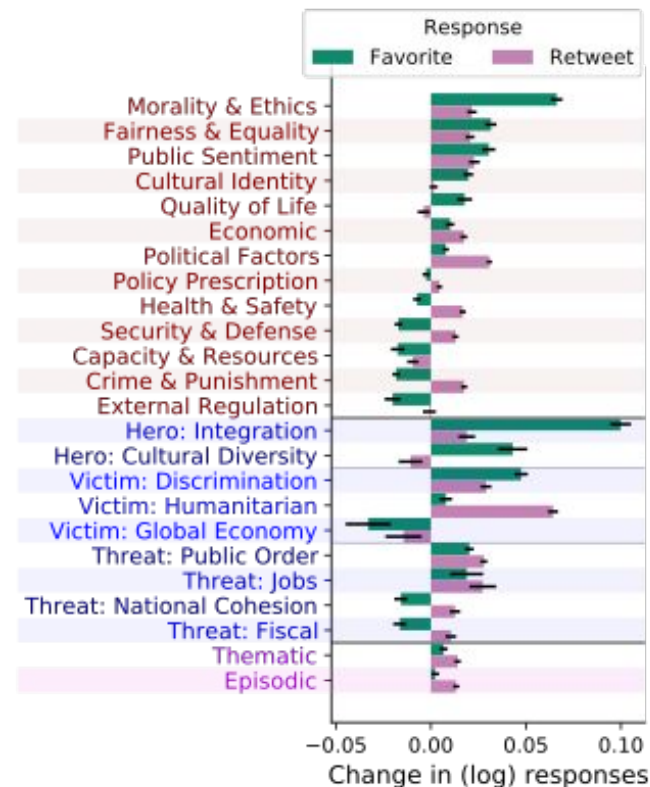
Summary of contributions

	Create a novel dataset of tweets labeled with issue-generic policy, immigration-specific, and narrative (episodic and thematic) frames
	Build multilabel classification models to automatically detect frames
	Show how an author's region (USA, UK, and EU) and political ideology influence the frames they use
	Show how a message's framing affects audience reactions via interactive signals of favorites and retweets
	Highlight the need to consider multiple typologies to better understand the framing of immigration and its effects
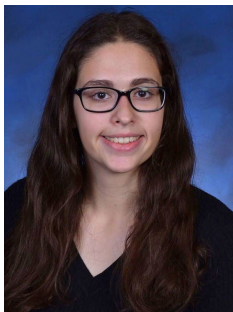
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Thank you!

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Data, annotation guidelines, code, and models available: https://github.com/juliamendelsohn/framing

Additional thanks to RAs: Anoop Kotha, Shiqi Sheng, Guoxin Yin, and Hongting Zhu