

Oracles of Peace:

Topic Modeling, Cultural Opportunity, and the Nobel Prize for Peace, 1902-2012*

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Abstract

Social movement frames are dynamic, shifting and embedded within an already existent cultural milieu – milieu that affects mobilization opportunities. In this article, we invoke the concept of the “cultural clearinghouse” to tackle how broader cultural structures translate to frames or influence frame resonance. Our illustrative case – the Nobel Prize for Peace – along with our use of topic modeling, a computational technique that identifies commonalities between texts, offer an important methodological advance for social movement scholars interested in culture, frame formation and resonance, and dynamic approaches to social movement discourse. Our findings show how peace discourse, as represented by Peace Prize acceptance speeches, has increasingly become embedded within broader cultural emphases on globalization and neoliberalism versus earlier Christian and global institutions schema. We conclude by discussing the usefulness of our conceptual and methodological advance for movement scholars with special attention to the coupling of new computational techniques and more traditional methods.

Social movements use cultural tools in the generation and maintenance of collective behavior. For example, frames, as “specific calls to action and change,” connect particular movement messages to broader historical discourses or ideologies (Williams 1995: 128; Oliver and Johnston 2000). In so doing, successful frames help build and nurture group cohesion within and recruit new members to social movements. Over the past thirty years, a large and rich body of research has examined frames and specified the processes involved in the act of framing especially pertaining to internal movement dynamics, yet the relationship between the broader cultural milieu and frames warrants continued theoretical specification and empirical examination (Roscigno, Cantzler, Restifo, and Guetzkow *forthcoming*; Snow, Owens, and Tan 2014). Moreover, as Jasper (2007: 100) writes, social movement scholars “know too little about *cultural change*” (emphasis his): Frames are drawn from and embedded within broad and dynamic cultural schemas that establish boundaries around particular discourses.

Extending the literature on political opportunity structures, scholars have attempted to connect the broad cultural schemas that social movement actors draw upon to construct frames through the concept of cultural opportunity structures. Cultural opportunity structures consist of the distribution of meanings within a society and the institutions that support these meanings (Ferree, Gamson, Gerhards, and Rucht 2002; Hallgrimsdottir and Benoit 2007). Yet, the connection between cultural opportunity structures and frames remains underspecified or hidden within social psychological processes (Meyer and Minkoff 2004). We take another approach by identifying how mediating institutions, or cultural clearinghouses, help sort cultural objects and themes for social movement actors and the public and, therefore, influence frame construction.

In this paper, we ask, “What role do cultural clearinghouses play within the cultural opportunity structure available to social movements?” Theoretically, we develop the concept of

cultural clearinghouses and argue that these clearinghouses help curate cultural schema and associated themes that guide social movement discourse. Responding to calls for more longitudinal approaches to social movement discourse (Jasper 2007; Steensland 2008), we offer an analysis of Nobel Peace Prize Laureate speeches to locate key themes put forward by this central institution over time. Turning focus to the recipients of the awards offers a specific glimpse into international peace movements – as we detail below, the award has a historically Western and elite bias – but a core one nonetheless. Indeed, Desmond Tutu, the anti-apartheid activist, writes that he became viewed by the press as an “instant oracle” of peace upon winning the Nobel Prize in 1984 (Tutu 2005). As “oracles” of peace, Nobel Prize winners play a prominent role in structuring the discourse of international peace movements. With this in mind, we observe the themes deployed by Nobel Peace Prize winners as indicated by the content of the acceptance speeches that they deliver. From Elie Ducommun’s 1902 Nobel lecture to Herman von Rompuy’s 2012 speech on behalf of the European Union, these texts (N=97) constitute the most visible longitudinal collection of peace discourse in the past century.

Embracing the exciting new opportunities for digital data collection and computational analysis in social movements research (Caren 2013), we operationalize cultural schema and their affiliated themes as the emergent result of topic-modeling – a computational technique to locate patterns in unstructured text data (Bail 2014; Baumer, Polletta, Pierski, Celaya, Rosenblatt, and Gay 2013; McFarland, Ramage, Chuang, Heer, Manning, and Jurafsky 2013). These topic models reveal primary themes within the Nobel Prize for Peace speech collection. We use a network describing the relationship of these speeches through overlapping themes to build a qualitative story tracing the evolution of international peace discourse as defined by the Nobel Laureates. This combination of computational, network, and qualitative analysis illustrates how

these diverse methods can work in conjunction with one another to develop more refined pictures of social movement discourse over time. Results indicate significant thematic shifts from Christian themes to more globalized, but still elite-centric themes. Ideology permeates these themes in the form of colonialism in the early lectures and in neoliberal economic policy in the more recent speeches. In the conclusion, we discuss the importance of longitudinal approaches to analyzing social movement discourses and draw attention to the continued need for exploring how culture connects to framing practices through mediating institutions. We also highlight the promise of using digital tools alongside more traditional methods in social movement research.

MEDIATING CULTURAL OPPORTUNITY STRUCTURES

Following the general cultural turn in the social sciences, culture has become an important part of social movement scholarship over the last 30 years. For example, theories within the political opportunity structure framework provide a more significant space for culture when compared to prior social movement theories. The political opportunity structure framework emphasizes that social movements are embedded in a broader socio-political landscape and therefore are influenced by these exogenous factors (Meyer and Minkoff 2004; Williams 2004). Here, culture contributes as one possible signal that social movement actors may more or less successfully respond to. Yet, culture often appears as a sidekick to other movement processes. To bring clarity and independence to the role of culture in shaping social movements, more recent scholars have developed the idea of cultural opportunity structures to provide a more complete understanding of the relationship between social movements and culture. After outlining previous research that develops the idea of cultural opportunity structure, we describe the notion of “cultural clearinghouse” to clarify the mediating role that some organizations play in the development of social movement discourse, including frames.

Cultural opportunity structures set the boundaries of possibility for social movement discourse broadly defined.¹ Social movement actors must draw from available cultural scripts to craft their message for audiences (Williams 2004). Thus, frames are drawn from this cultural context and respond to this context. For example, as Borland (2004) describes, cultural context shaped the debate over reproductive rights in Argentina and Chile. Activists in Argentina and Chile use the scripts available to them given their society's relationship to the Catholic Church. Borland establishes this cultural context through public opinion surveys: Argentians report weaker opinions of the Church than Chileans who hold a generally high opinion of Catholicism. Reproductive rights activists use the specific cultural opportunity to craft a message that either openly critiques the Church in the case of Argentina or offers more delicate frames in the case of Chile.

Using public opinion to establish cultural context is a common technique in the social movement literature on culture and civil discourse (Borland 2004; Burstein 1999). Other common techniques include using the "mass media" (Ferree et al. 2002) or legal/historical context (Hallgrimsdottir and Benoit 2007; Holzer 2008; King and Husting 2003) as dimensions of cultural context. For example, arguing that large historical shifts influence cultural opportunities, Hallgrimsdottir and Benoit (2007) describe how growth in the manufacturing industries and an influx of skilled and semi-skilled labor during the late 19th century provided the cultural context for a change in rhetoric within the labor movement. The evidence identifies a shift from rhetoric around wage slavery to one around wage workers; however, the process that translates historical and cultural shifts remains under-theorized.

While this prior work clearly illustrates that culture is playing an important role in shaping the contours of civil debate, the mechanisms that translate a broadly construed cultural

context to the strategic actions of social movement actors remains too hidden in psychological processes (Williams 2004). Participants craft messages based on a sense of what is appropriate or available to them given a cultural context or playing field. To specify possible mechanisms we first need a clearer definition of culture.

Culture is one of the most elusive terms in the social sciences famously described by Raymond Williams (1983: 87) as “one of the two or three most complicated words in the English language.” Culture is most commonly used as an all-encompassing synonym for civilization or as the norms and values associated within a bounded – often geographic – space. In the latter case these norms and values are processed psychologically by citizens who are more or less rational actors. The cultural opportunity structure framework aims to overcome this underspecified and overly voluntaristic conceptualization (Hallgrimsdottir and Benoit 2007), yet does not offer a complete alternative definition of culture. Borrowing from cultural sociology, we define culture as the systems of meaning observable through symbols and codes or “those social objects and activities which are primarily or exclusively symbolic in their intent or social function” (Reed and Alexander 2008: 380). This description squares nicely with the aforementioned definition of cultural opportunity structures – a distribution of meanings within society operating in conjunction with the institutions that support these meanings – as it specifies that this distribution is drawn from a wider system of meaning. This specification provides analytic purchase by drawing attention to symbolic content, such as discourse.

Systems of meaning exist independently, yet reciprocally alongside the political and social and are neither subordinate, nor superior to these other fields. Alexander (2006: 233) writes that “[p]olitics is a discursive struggle” specifying that successful social movements use a “civil metalanguage” that translates core societal meaning to an audience of potential participants

or the citizenry more generally. This translation does not occur out of thin air or solely in the deep psychology of movement actors, but is negotiated in locations of struggle and mediated by organizations that have a stake in the game. We call these mediating organizations “cultural clearinghouses.”

Clearinghouses, Cultural Schema, and Social Movement Discourse

Cultural clearinghouses digest possible lines of discourse drawn from the wider system of meaning. They differ from the mass media along several dimensions. First, they are not likely to possess the same sized audience, nor are they likely to be directed towards such a general audience. Second, they may provide an alternative to the mainstream playing field suggesting that multiple forums influence public discourse (Ferree et al. 2002). Third and most importantly, they need not be media organizations at all, but may be substantial organizations that play a key role in shaping movement discourse outside of the media.

Unlike the more general concept of cultural opportunity structures, cultural clearinghouses do not set the boundaries of possibility, but identify schema and their associated themes that social movement organizations likely need to address in one way or another, but need not adopt. These schemas, in other words, help mold debate, but can be either affirmed or refuted. The National Academy of Sciences (NAS) serves as one example of a cultural clearinghouse. While not a social movement organization, the NAS affects discourse around scientific issues with social movement implications in dramatic ways. For example, initial worries by environmental organizations among others about the ecological consequences of recombinant DNA technology were affected by eventual recombinant DNA claims promulgated by the NAS and its affiliates (Krimsky 1982). While not frames in the specific sense used within the social movements literature, this schema influenced frames built around the issue by more

explicit social movement organizations. Other elite organizations, such as the Nobel Prize committee, may serve as cultural clearinghouses. While often overlooked in the literature on opportunity structures, cultural clearinghouses – alongside other institutions such as political institutions or the mass media – help mediate the schema available to social movement actors.

Other organizations play the role of cultural clearinghouses. For example, while mass media perform an independent, although related, sorting task in relationship to cultural clearinghouses, the political media are clearinghouses that influence social movement discourse. Outlets such as *Mother Jones* and *In These Times* do not fit neatly into definitions of mass media, nor are they explicit social movement organizations. Yet, they help construct schema and affiliated themes that become the source for social movement frames or are contested by social movement actors. National organizations may also serve as cultural clearinghouses for local chapters and other social movement actors (Hallgrimsdottir and Benoit 2007). Literature from national unions, for example, may establish key themes that local unions must address. Locals do not obey national unions uniformly, but interpret cultural cues within union publications, for example, and incorporate or contest these themes based on more proximate necessities (Harrison, Lopez, and Martin *forthcoming*).

As these different types of clearinghouses may generate different cultural schema, clearinghouses are also likely to adjust or shift schema given the broader cultural opportunity structure (e.g. historical/legal context or relationship to the media). Schema dynamics reflect changes in culture writ large and also help to construct those changes. In this way, the mediating role that clearinghouses play between broader cultural contexts, or systems of meaning, and individual actors is necessarily embedded within a historical process. Symbolic codes are subject to change and clearinghouses are also subject to change or risk irrelevance.

Identifying Cultural Clearinghouses

To understand the role that cultural clearinghouses play in constructing social movement discourse, we first need to be able to distinguish them from other organizations and institutions. This is not an easy task as some organizations may appear to be likely candidates in certain situations and not others. However, consistent with the prior research on cultural opportunity, a prominent role within or acknowledgement by the mass media provides some evidence of cultural relevance, a necessary characteristic of clearinghouses (Ferree et al. 2002). Note that other paths to prominence beyond the media might also exist. Next, and at the heart of the problem, we need to be able to identify the core schema that the clearinghouses are identifying. Recent machine learning tools help facilitate locating schema within text datasets. Third, we need to identify how social movement organizations/actors consume and respond to the themes available to them. In other words, we need to connect the themes to social movement frames. Much of the prior research on cultural opportunity structures already focuses on this piece of the process. Technology plays an important role in connecting schemas to social movement actors or potential recruits (see Roscigno and Danaher 2004).

Figure 1 summarizes the theoretical approach that we have outlined thus far. The figure traces the processes and relationships involved in the transmission of the symbolic objects that are the foundation for specific and strategic social movement discourses and frames. Actors and organizations are embedded within a culture or system of meaning and draw from this culture when building social movement discourse including frames. Social movement actors, of course, have direct access to the unmediated symbolic objects by which we observe these systems of meaning through norms and values. Social movement actors may also share these symbolic objects with one another directly as well. However, the exchange of culture through social

reproduction and psychological processes is *not* the only or even most likely vehicle of cultural opportunity. It is well-known that mass media performs a sorting function by emphasizing some cultural objects, such as discourses, while ignoring others. In this meso-area, the mass media and political institutions sort through symbols – some are given prominence others are dismissed – simplifying the broader cultural context and highlighting particular distributions of meaning within the cultural opportunity structure. However, as we have argued, cultural clearinghouses also function at this meso-level sorting through key cultural themes and packaging certain symbols at the expense of others. The public, and social movement actors in particular, are not required to adopt any one package of symbols and indeed different clearinghouses are likely to advance competing schema, but interested parties are likely to need to engage these visible symbols either by embracing or rejecting them.

<Figure 1 about here>

In this paper, we illustrate this theory and method by turning to the Nobel Prize for Peace. The Nobel Prize plays a tricky cultural role within global discussions of peace. First, the Nobel Committee is not a traditional social movement organization, though it operates as a global face of collective peace movement efforts. Second, social movement discourse generated by the elite politicians and social movement leaders who win the Prize may not be representative of the population of global peace discourse. Yet, we argue that the Nobel Peace Prize plays the role of a cultural clearinghouse. Following the conceptual diagram outlined above, we introduce the Nobel Prize as a case and describe its prominence and relationship to the mass media emphasizing why it is a good candidate for a clearinghouse. In the results section, we illustrate the themes that the Nobel Prize draws attention to and how these themes change over time. While we only infer connections to other peace organizations in this analysis, in conclusion, we

highlight the need for continued work that explores the origin of social movement frames and the connection between culture, cultural clearinghouses, and social movement discourse.

NOBEL PEACE PRIZE AS A CASE

The Nobel Prize may help establish “instant oracles” of peace, yet its status is somewhat uneasy relative to the broader peace movement. Elite mediating organizations are likely to be met with some amount of criticism as representing elite-defined interests. Clearinghouses mediate the broader cultural schema and, when driven by political and economic leaders, may be identified as pushing narrow agendas. The Nobel Prize is no exception. The press initially met the Nobel Prize with skepticism. In an early report, the *New York Times*, for example, concluded that Alfred Nobel’s “object is clear and laudable. But in carrying out his plan many difficulties will be encountered” (New York Times 1897). These difficulties have perhaps only grown with time as controversy often follows the most visible Nobel Prize awardees. The most recent and obvious example of this controversy was the 2009 Nobel Peace Prize awarded to Barack Obama. The Prize committee’s press release for Obama’s award heralds Obama’s “extraordinary efforts to strengthen international diplomacy and cooperation between peoples.” And concludes, “For 108 years, the Norwegian Nobel Committee has sought to stimulate precisely that international policy and those attitudes for which Obama is now the world’s leading spokesman” (Nobelprize.org 2013a). Of course, by October 2009 Obama had served only nine months as President of the United States.

The early statements about the Nobel Prize for Peace and Obama’s award signal several important characteristics of the Prize. First, it is the product of Norwegian elites, both political and economic, from Nobel himself to the current committee members. This introduces the likelihood of biases by class and geography: Western political leaders are more likely to be in the

purview of Norwegian politicians. Second, the award is often an institutional award, even when given to an individual. Collective effort is often emphasized by the committee and the awardees. Last, the award is often given as a signal of hope, a kind of wishful forecast of good deeds, in addition to a reward for past efforts towards peace. The award, then, is not solely the product of a specific social movement addressing peace. At the same time, however, the Nobel Prize for Peace remains the most visible symbol of international peace movement efforts. This contradiction – the prize is not the product of, but remains reflective of international peace movement efforts – specifies the role of the winners themselves as individuals or organizations engaged in peace work, but at the same time embodying the type of actor or organization that is on the radar of Norwegian elites.

This characteristic may be common to clearinghouses: Clearinghouses may have features of social movement organizations, but exist uncomfortably within the well-established definitions in the scholarly literature. The social movement activity of scientific societies offers an additional example of an elite organization operating within a social movement context, but not constructing the kind of rational recruitment strategies of many social movement organizations (Jasper 2014). At the same time, cultural clearinghouses often still seek space within the broader media to lend credence to their sorting function. As mentioned above, mass media attention provides one sufficient, although not necessary piece of information about whether an organization is serving as a clearinghouse. Figure 2 provides evidence of the role of that the Nobel Peace Prize plays within the media relative to the broad discourse on international peace. By tracing prominent keywords about peace in the *New York Times*, we can see the relative visibility of the Nobel Prize. Since 1900 discussions of peace in the *Times* have ebbed and flowed. The 1940s was the height of discourse on “world peace” with over 3000 article

mentions from 1940-1950. For much of this history, the Nobel Prize plays a modest, although perhaps still significant, role in peace discourse in the *Times*. By the 1990s, however, the Nobel Prize gained in relative visibility and from 2000-2010 the Prize became the most frequent keyword associated with international peace. This suggests that the Nobel Prize meets the first criteria of a clearinghouse: It is a highly visible organization within discussions of peace.

<Figure 2 about here>

Longitudinal Classifications of the Nobel Prize

To grapple with historical shifts in the Nobel Prize, previous scholarship, such as Abrams' (1984) grouping of Laureates by occupational affiliation and Alford's (2009) era-based approach to categorization, have constructed classificatory schemes to situate particular winners with like others.^{2,3} The goal of classification is obviously a common one in the social sciences and Abrams (1984) and Alford (2009) use the most common technique for constructing classifications, a top-down, researcher-centric approach. In this top-down approach, researchers use their significant knowledge about a particular topic to build classificatory schemes. These schemes are determined either based on a complete dataset or a partial one, but in either case the evaluation of these schemas derived using historical methods are based on a logic analogous to Bayesian logic. Bayesian approaches to social science assume that data has a latent structure and that we can identify this latent structure by testing various portions of the data against the dataset as a whole (Mohr and Bogdanov 2013): solutions are compared iteratively until the most parsimonious solution is identified. While these strategies are typically associated with statistical techniques, they parallel the kind of technique used by those deploying a historical, interpretive strategy for classification. As a classification scheme evolves, classificatory solutions are evaluated by how well they match the "held out" data or data that has yet to be examined. As

indicated by previous analyses of the Nobel Prize for Peace, the solutions generated by this interpretive, top-down approach often lead to logically consistent and meaningful results.

By turning to topic models, we offer an alternative means of classification that emerges computationally from the collection of texts as a whole. This alternative technique shares much in common with the logic of the top-down researcher-centric approach as it also involves iterative comparison between Nobel Peace Prize winners. However, topic models, rather than metaphorically, are explicitly Bayesian (see Mohr and Bogdanov 2013; Bail 2014). As we describe below, the results of the topic models share important characteristics with the previous classificatory schemes. For example, early Laureates are more likely to be associated with peace organizations focused on global institutions. On the other hand, more recent Laureates are more likely to be associated with non-Western organizations. However, our analysis offers new insights as well particularly by identifying evidence of the trajectory of peace discourse. This trajectory highlights the changes that have occurred with this type of international peace discourse, but also identifies consistencies. Specifically, recent speeches build themes that increasingly center on neoliberal solutions to global strife. Importantly, the central themes identified through our topic models will serve as content codes (see Hanna 2013) for a qualitative analysis of how the Nobel Peace Prize has changed from 1902-2012. This process of moving from computational techniques back to historical analysis is one of the key contributions of our approach.

DATA AND METHODS

Since its inception in 1901, 126 individuals or organizations have won the Nobel Prize for Peace. The majority of Laureates have delivered speeches (N=97) at the prize award banquet. These

speeches typically outline the Laureates' particular contributions to the international peace movement and their hopes for future efforts towards peace. The speeches differ in length and in style befitting the diversity of awardees. The longest speech, delivered by Norman E. Borlaug, the American proponent of the "green revolution," is over 60,000 words long, while the shortest speech, delivered by the Liberian activist Leymah Gbowee, is only 6,372 words long. Within this dataset the most represented countries are the United States (n=21), the United Kingdom (n=12), and Switzerland (n=9). For perspective, 25 Laureates (organizations or individuals) within this set are identified by the Nobel as originating from outside of Europe or North America (see Supplement Table 1).

Analytic strategy

We use a two-stage approach for evaluating theme dynamics in the international peace movement via the Nobel Prize for Peace combining computational and interpretive analytic strategies. First, we use topic models – a computational method – to locate themes in the Nobel Prize speech collection (Bail 2014; Baumer et al. 2013). Next, we use these topics to structure a qualitative analysis – a more interpretive turn – detailing how these "oracles of peace" develop these themes in the international peace movement.

Scholars have recently exploited the digitization of communication to analyze social movements discourse using grammar-based text analytic techniques developed by Roberto Franzosi (2004, see De Fazio 2013; Johnston and Alimi 2012; Johnston and Alimi 2013). These techniques and other forms of digital narrative analysis (Bearman, Faris and Moody 1999; Bearman and Stovel 2000) offer important strategies for the formal analysis of social movement communication, yet they remain labor intensive and remain somewhat analyst-dependent (Light 2014). Topic modeling, developed by computer scientists (Blei, Ng, and Jordan 2003), is a

strategy to locate similarities across texts within a collection with very low researcher input once the formal model is selected. Growing increasingly visible in the social sciences (see King 2007 and Mohr and Bogdanov 2013), topic models provide one approach to sociological research that attempts to locate meaning computationally (see Bail 2014; Light 2014; Mohr 1998; Mohr 2000). The intuition of our analytic strategy is that the growing digitization of social life creates a unique opportunity for the intersection of computational and qualitative techniques. Digital text widens the amount of in-depth qualitative material available for sociological analysis. However, analysts need an entry point for these text-based datasets. Previous forms of text analysis require *a priori* sequencing decisions that may affect interpretation. For example, how do we “enter” a collection of texts: Do we pick a text by a famous author? Do we start with the earliest or most recent text? Do we begin reading the text deemed “most important” by previous researchers? Topic modeling provides an alternative strategy by encouraging a computational, text-driven approach to engaging text collections. This strategy provides an “agnostic” point of entry as the problem of how to enter a text collection is avoided. This agnostic start helps emphasize the topics that span a body of texts. But, how are these topics identified?

Topic models “reverse engineer” the process of writing (Mohr and Bogdanov 2013). Topic models assume that a writer had a series of topics in mind when writing a text. A text, then, is a distribution of topics. However, the writer may not simply state what these topics are (keywords on academic papers may be an exception), but use the content of the text (or the words) to discuss these topics. Topic models identify the results of this process across texts. Topics are common themes in a collection of texts and the words most associated with them. Topic modeling is a “bag of words” technique. In other words, the terms are not ordered. This characteristic represents a significant departure from more traditional, largely narrative, forms of

socio-historical analysis. While future forms of topic modeling will likely take narrative order into account, the bag-of-words characteristic does not contradict objectives, such as ours, based on developing “forest-level” maps of digital text collections.

Prior to running the topic models, we pre-processed the text by running the speeches through a stop-list to remove prepositions, articles, and similar non-informative terms. We also processed the text using the porter-stemmer algorithm to stem the words to common roots (e.g. “root” and “roots” are identified as “root”). Following common practice in computational text analysis, we construct a weighted score for each term to reduce the effect of ubiquitous terms without arbitrarily deleting top and, perhaps, key terms.⁴

After pre-processing or “cleaning” the data, we construct correlated topic models (Grün and Hornik 2011, see Blei and Lafferty 2007) to observe the frames that structure the Nobel Peace Prize data. How many topics exist within the speeches? The question of how to select the number of topics remains the subject of debate; however, some evidence suggests that a combination of the perplexity statistic and theoretical/analytic expectation provides the best strategy for selecting the number of topics especially in exploratory analysis (Chang, Boyd-Graber, Wang, Gerrish, and Blei 2009). Common within language modeling, the perplexity statistic is the inverse of the geometric mean of the likelihood score per word. As such, a model with a lower perplexity score – or the least surprising model – is interpreted as a better performing model (Blei, Ng, and Jordan 2003: 1008; Steyvers, Smyth, Rosin-Zvi, and Griffiths 2004). In our case, we ideally sought between 15 and 25 topics given the number of texts and our visualization-based objectives. An evaluation of perplexity scores conforms to this range. As can be seen in Figure 3, the 19 topic solution is the low-score in an evaluation of a maximum of 30 topics. Thus, we selected 19 topics for the topic modeling of the Nobel speech data.

<Figure 3 about here>

Topic modeling generates a Speech x Topic matrix where the cells indicate the extent to which a topic appears in a speech.⁵ Matrices of this type within social network analysis are said to have two modes as the columns and rows consist of different types. Through what is called projection, we transform the two-mode matrix into a one-mode Speech x Speech matrix where the rows and columns both consist of speeches (Breiger 1974). This matrix indicates the relationship between speeches based on the extent to which they share topics. We use this matrix to construct and visualize a speech-to-speech network. In this network, the nodes – or points – are speeches and the edges – or lines – consist of the topics that they share in common. Node size is based on betweenness centrality for each era. Betweenness centrality identifies the extent to which a node sits between, or on the path of, other nodes (Wasserman and Faust 1994). To trace shifts in language over time, we locate communities of speeches for the whole collection using the Louvain method (Blondel, Guillaume, Lambiotte, and Lefebvre 2008). Louvain community detection is a popular way of finding groups of nodes in networks and is based on modularity maximization: The method attempts to identify collections of nodes that share more edges within each group than to outside groups. For each network, node color is based on the Louvain communities for the entire collection (e.g. the network that consists of all of the speeches) to compare the growth, spread, and shift of the thematic groups of speeches over time.

Again, the goal of the construction of these networks based on overlapping topics is to construct a map for evaluating thematic change in the international peace movement over time. We use these maps to structure a socio-historical analysis of the Nobel Prize. The thematic communities serve as broad “content codes” for qualitative analysis. Importantly, then, the construction of these models is the beginning and not the end of our analysis. We use networks

to engage in an immersive, qualitative analysis of social movement discourse and the Nobel Prize for Peace.

RESULTS

As a cultural clearinghouse the Nobel Committee recognizes specific peace efforts that fit nicely within the cultural schema it chooses to privilege, while Peace Prize speeches serve as the vehicle for conveying the chosen schema to the public. Table 1 presents the 19 emergent speech topics identified through topic modeling for all 97 speeches. Here, we provide the top-5 terms in each topic to establish an overview of the topic structure. The speech with the highest topic-loading score for each topic is also presented. These speeches can be seen as the most exemplary of each topic. Topics range from those loading most highly on early speeches – such as topic 17 with the top-5 words “crusad, migrat, sword, bestow, folli” loading on Ducommun’s 1902 lecture – to those loading on later speeches such as topic 8 with the top-5 words “borrow, innov, unionist, exit, grand” loading on the microcredit pioneer Muhammad Yunus’s 2006 lecture.

While Table 1 presents the ranked terms related to each topic across the Nobel Peace Prize speech dataset, a temporal examination of speeches and topics forms a picture of how cultural schemas surrounding international peace efforts have changed since the inception of the award. In the following sections we present an examination of the networks of prominent topics related to international peace efforts emergent over three historical periods of Peace Prize speeches (1902-1940, 1941-1975, and 1976-2012).

<Table 1 about here>

Packaging Cultural Schema: Constructing International Peace Discourse

From God to the Dawn of the Atomic Bomb (1902-1940)

Four decades after the inaugural Nobel Peace Prize, the world had endured the pain of the First World War and the early stages of the Second. A bleak era for peace, over the course of 40 years the Nobel Committee often chose not to award the prize during war time, including nine years during this period (Nobelprize.org 2013b). Of the earliest recipients, the majority were associated with the organized international peace movement with numerous recipients specifically involved in the establishment of the League of Nations (Abrams 1984).

Figure 4 presents the relationships between speeches and the themes revealed through topic modeling highlighting the 1902-1940 period (see Supplementary Table 1 for a list of recipients and their corresponding number in our analysis). Six communities of topics emerged in the network analysis of pre-1941 Peace Prize speech data, forming around the following topics: Christianity and the State, Building Global Institutions, Consequences of War/Oppression, Post-Conflict Rebuilding, Armaments and Social/Scientific Progress, and Language of Historical Struggle.⁶ Because the themes of Christianity and the State and Building Global Institutions dominate the era, these two themes are examined in this section while the other four communities are addressed in the sections on subsequent time periods, where the themes grew in prominence.

<Figure 4 about here>

Pre-1941 Peace Prize rhetoric reflects religious themes pertaining to Christianity, both as a reference to the belief system and to Christian liberalism. While only one Laureate, Nathan Söderblom, a Swedish bishop, was classified as a known religious leader within the first 40 years of the award (Abrams 1984), results reveal Christianity as an early, influential theme in the discourse on worldwide peace. Only three additional speeches surfaced in the Christianity and the State community post-1940, demonstrating the specific importance of how the Christian

rhetorical schema was drawn upon during the first four decades of the award. Typifying the Christianity-as-peace narrative, Laureate Klas Pontus Arnoldson (1908), a Swedish pacifist and politician, declared that “Christianity...is a true religion of peace...absolutely incompatible with all war and military organization.” Christianity was also regarded as motivating the active moral responsibility of the state. Laureate Ernesto Teodoro Moneta (1907), a leader of the Italian peace movement, saw the role of the church as an “international arbiter” of peace, calling upon European nations to follow the example set by Christian love and warning the church not to put material interests above moral interests lest authority within the state wither. Moneta’s message straddles the rhetorical use of Christianity as reference to both religion and ideology, and exemplifies the emphasis of the pre-1940 discourse on the state as a moral actor.

Multiple speeches within the Christianity and the State community shared discourse with the Building Global Institutions community. Even after the First World War some Laureates maintained optimism toward the total abolition of war. Analysis of the pre-1940 data reveals a discourse that places hope for the achievement of global peace into institutions, whether religious or governmental. Established in 1919, at the end of World War I, the League of Nations stood as the exemplar intergovernmental institution formed to bring about world peace (Northedge 1986). Beginning with Woodrow Wilson in 1919, Laureates selected until the end of the Second World War shared a common thread of support for the vision of the League of Nations. Léon Bourgeois (1920), an early proponent of global governance, delivering his lecture on the heels of World War I, implored his audience to remember the importance of the state in the development of any global institution noting that “the states themselves are the only units that can form the basic constitution of a viable international organization.” At the near-height of League of Nations membership in 1933 (Northedge 1986), British writer and Laureate Sir Norman Angell extolled

the virtue of the League as a herald of moral regulation, stating,

We who urge a League of Nations are told so often that we forget human nature, overlook the fact that men are naturally quarrelsome. The fact that men are naturally quarrelsome is presumed to be an argument against such institutions as the League. But it is precisely the fact of the natural pugnacity of man that makes such institutions necessary.

Peace, then, was constructed as an outcome achievable through institutionally-sanctioned morality. After two major blows to peace efforts – the decline and eventual dissipation of the League of Nations in the 1940s and the transformative event of World War II (see McAdam and Sewell 2001) – peace discourse changed to match shifts in the cultural opportunity structure: the concept of an international peace league was transformed from an entity working to end global war and aggression to an organization focused upon international cooperation and diplomacy. This shift in institutional approaches to peace was ultimately realized through the formation of the United Nations (UN) in 1945 (Kennedy 2006).

Post-War Progress and Global Poverty (1941-1975)

Between 1941 and 1975, an apparent shift and division in peace efforts and interests within the broad cultural opportunity structure emerges: First, concerns regarding racial, ethnic, and religious inequality are brought to the fore, displacing but not entirely replacing earlier rhetorical patterns about trust in institutions. Second, global concerns shift to focus upon the aftermath of war and how to proceed after realizing complete disarmament is simply not probable. Adding post-1940 Peace Prize lectures to the network results in the emergence of two additional communities – Race and Religious Group Oppression, and Global Poverty and Public Health – along with the growth of topics related to armaments and the consequences of war. Figure 5 depicts the increase in themes regarding interest in post-war adjustment and recovery.

<Figure 5 about here>

Alfred Nobel wrote in his will that the Peace Prize be awarded “to the person who shall have done the most or the best work for fraternity between nations, the abolition or reduction of standing armies and for the holding and promotion of peace congresses” (Feldman 2000). After World War II those engaged in humanitarian efforts dominated the Laureateship, standing in contrast to the mere two humanitarian Laureates selected before the war (Abrams 1984). Feldman (2000) calls attention to whether Nobel’s will implied that humanitarian work should be included for consideration. After the failures of previous peace work to viably eliminate war or facilitate international peace, the Laureate choices by the Nobel Committee were altered to fit the reality of war without end. Topic model results demonstrate that World War II created an ontological shift in the definition of peace and changed the trajectory of how the Nobel Committee carried out Nobel’s instructions, suggesting that the Committee placed greater importance on the mediation of culture than upon the wishes of Nobel.

An idealistic desire for peace was replaced by a more pragmatic view about the consequences and implications of progress. The 1965 speech offered by UN agency United Nations Children’s Fund (UNICEF) captures the affect of the era regarding pragmatic needs: Speaking on behalf of the agency, Zena Harman, chairperson of the UNICEF Executive Board, notes that “Universal declarations, giving lip service to the dignity of man and human justice, have never been more numerous and more loudly proclaimed. In a world of unbelievable affluence, millions flounder and struggle for survival, as they suffer indescribable need.” Parallel to the message and mission of UNICEF, Dr. Martin Luther King Jr.’s (1964) speech exemplifies the post-1940 humanitarian turn in the awarding of the Peace Prize:

The time has come for an all-out world war against poverty. The rich nations must use their vast resources of wealth to develop the underdeveloped, school the unschooled, and feed the unfed. Ultimately a great nation is a compassionate nation. No individual or nation can be great if it does not have a concern for "the least of these."

Dr. King contended that world peace efforts in the form of disarmament would yield fruitless results unless the pragmatic needs of humanity were first met.

Network analysis exhibits the simultaneous rise of Laureates focused upon armament and those engaged in humanitarian efforts. Around the end of World War II, the armament theme shifted from disarmament and non-proliferation to armament management, demonstrating a major modification in how the Committee chose to define peace. Former Prime Minister of Japan, Eisaku Satu (1974), advocated an “unshakeable confidence... in the progress of science and technology” to find a workable way to put nuclear fusion to good use. Satu’s sentiment, his explicit welcoming of nuclear technology, exemplifies the embrace of the post-World War II change. The Armaments and Social/Scientific Progress community contains a mixture of those who advocate for complete disarmament and those who view arms as peacekeeping mechanisms: The distance between these two viewpoints only grows more deeply within the post-1975 era – the era of global economy.

The Rise of Global Economy (1976-2012)

In the period between 1941 and 1975, peace efforts were dedicated to recovery from war while humanitarian Laureates dominated among Peace Prize recipients. Laureates chosen in the post-1975 period – dominated by the work of those who are classified as statesmen (Alford 2009) – centered their work on the global development and maintenance of peace. Topic models demonstrate considerable network growth in the Armaments and Social/Scientific Progress and Consequences of War/Oppression communities, while the Global Poverty and Public Health community also experienced a fair degree of growth during this time period. Within those three communities, Figure 6 exhibits the emergence of nodes with high betweenness centrality, demonstrating the salience of the speeches arising during the post-1975 period.

<Figure 6 about here>

In the late 1970s, globalization and the rise of neoliberal economic policy changed the cultural schema within which peace efforts were situated. As a cultural clearinghouse, the Nobel Committee altered its Laureate selection to reflect broad cultural shifts in peace effort activities with an interest in global economic practices. In our final network, this change is reflected within each community. Focused upon economy, poverty, and post-war oppression, the lecture of former South African President F.W. de Klerk (1993) provides insight into the approaches to peace during the era. De Klerk declared, “Around the world forces which favour peace are on the move. Amongst those, economic development is fundamentally important. Economic growth, generated by the free market, is transforming societies everywhere” thus imbuing the notion that peace can be achieved through economic avenues. The emphasis upon economy as peacemaker in the 1976-2012 period is punctuated by former Finnish President Martti Ahtisaari’s (2008) lecture. Ahtisaari emphasized the importance of economic stability in the maintenance of peace, stating:

Conflict settlement requires the injection of optimism and hope born from employment and economic opportunities. Otherwise, fragile peace agreements can rarely be sustained. Over the long term, only the private sector is capable of growing new enterprises, creating investment opportunities which provide employment and enduring economic security.

Ahtisaari’s approach to peace, echoed by multiple other recipients within the same period, demonstrates a clear shift in the priorities of peace actors, although not all Laureates who discussed global economy spoke about it as a factor favorable toward peace efforts. In particular, those Laureates who were not statesmen spoke to the influence of neoliberal policies from a critical standpoint. Human rights and environmental justice activist, Wangari Maathai (2004) cited “injustices of international economic arrangements” as a factor in societal and

environmental degradation in Kenya. The Laureates of the post-1975 period not only shift the conversation about the role of institutional peace efforts away from moral regulation and toward economic intervention, but also transfer the discussion of institutional intervention onto different kinds of institutions including organizations within the private sector.

Within the temporal network analysis, we find that in the post-1975 period a unique type of Laureate emerged: one focused upon issues regarding the environment. Just as Martin Luther King Jr. bridged the civil rights and peace movements in the early 1960s, emergence of environmental justice and anti-globalization movements in the 1980s and 1990s changed the trajectory of peace efforts in the last quarter of the 20th century. While no Laureates primarily identify themselves as “environmentalists,” peace work involving the interaction between human activities and the physical environment has become common among recipients of all classifications. Concomitant with a focus upon a globalized free-market, speeches addressing the environment in the post-1975 period tend toward supporting policies that promote ecological modernization. Theorists of ecological modernization contend that a new era of technological innovation and entrepreneurship was borne out of the 1980s, and, accordingly, if society commits to a free-market system of industrial innovation, ecological sustainability and financial stability will ultimately prevail on a global level (Mol 2003; Sonnenfeld 2000). Despite critical predictions that the long-term effects of unbridled natural resource use for the pursuit of technological innovation will lead to greater environmental degradation and social stratification (Foster 2002; York and Rosa 2003), hopeful messages of ecological modernization appear as good news to the war torn, poverty stricken, and financially destitute.

By the 2000s, the Nobel Committee had digested the broad cultural interest upon the environment and the discourse of ecological modernization began to permeate Laureates’

speeches. Former U.N. Secretary General Kofi Annan's 2001 speech reflects the belief that the power of technology can mitigate society's afflictions, stating, "We thus inherit from the 20th century the political, as well as the scientific and technological power, which – if only we have the will to use them – give us the chance to vanquish poverty, ignorance and disease." Annan's speech echoes the praise for technology found in pre-1975 speeches, but the focus centers upon a concern for humanity, not the machines of war. In 2007, former U.S. Vice President Al Gore and the Intergovernmental Panel on Climate Change jointly won the Prize for efforts in educating the world about human-produced climate change. Though Gore's speech notes that "individual, isolated, private actions are [not] the answer" to solving environmental problems, in the language of ecological modernization he urges, "We must ensure that entrepreneurs and inventors everywhere on the globe have the chance to change the world." Concern for humans' relationship to the environment (i.e. access to food, water, and the use of Earth's resources) is central to peace efforts of the post-1975 period, yet the issue is framed through technological innovation encouraged through a free market system.

Two additional components emerged in the 1976-2012 period: a small, disconnected community subtly focused upon the Arab-Israeli Conflict and genocide, and an isolated speech comprised of Desmond Tutu's (1984) lecture (see Figure 6). Most of these speeches hold in common an appeal to end terrorism and genocide, infused with religious discourse. In this era, however, religious discussion neither centers on Christianity nor places faith in the peace-making ability of religious institutions. Laureate and writer Elie Wiesel (1986) summarizes the tenor of the small component stating, "Terrorism must be outlawed by all civilized nations – not explained or rationalized, but fought and eradicated. Nothing can, nothing will justify the murder of innocent people and helpless children."

Laureate choices in the post-1975 period demonstrate the Nobel Committee's interest in global issues. While very few Laureates in the pre-1976 period represented a non-Western country, the small component is comprised mainly of individuals who hailed from outside of the West. This finding holds significance within the structure of the data: Laureates falling within the small component frame arguments calling for peace in a manner similar to the Western speeches of the early period (1902-1940). Whereas Laureates from the West tapered their discussion of terrorism and violence over the first 75 years of the award, non-Western exclusion led to the suppression of such narratives, thus reflecting, perhaps, the importance of the impact conferred by the designation – and the media attention – of the award, while reinforcing the overarching biases of the Nobel Committee's function as a cultural clearinghouse.

CONCLUSION

Cultural clearinghouses sort through the broad system of meaning that constitutes culture writ large. The cultural opportunity structure consists of a distribution of meanings and the institutions that support these meanings. Clearinghouses, such as the Nobel Prize, are one set of institutions operating within the broader opportunity structure. Filling a meso-level space between macro cultural structures and micro-level actor interpretations, cultural clearinghouses package cultural schema and affiliated themes dynamically responding to shifts in the broad cultural field. In our illustrative analysis of the Nobel Prize for Peace, we provide evidence of this dynamic property within discourse on international peace: We see the rise of themes related to globalization and neoliberalism, specifically ecological modernization. In the first 25 years of the Prize, recipients narrowly framed their contribution to and hope for international peace within religious and/or international institution-building discourse. By the middle of the twentieth century, the Nobel's schema transformed to include early reference to armament

strategies and the early foundations of scientism and globalization; however, until 1960 no non-Western individual or organization had won the award. From 1976-2012, the international movement solidified and expanded these schema consistent with broader processes of neo-liberalization and also grew to include global recipients.

While these shifts within the Nobel Peace Prize exhibit a pronounced response to exogenous factors, these transformations undoubtedly had an influence on the general public's perceptions of the international peace movement. Clearinghouses recursively engage the broader opportunity structure and the Nobel Peace Prize remains the most visible emanation of the peace movement. However, this visibility does *not* suggest that the international peace movement is *best* represented by the Nobel Prize and its Laureates. Rather, the Nobel Prize is an elite organization representing a specific elite perspective. In fact, our results suggest as much. Future research should expand this longitudinal analysis of social movement discourse to other peace organizations, especially those working in opposition to the dominant ideologies influencing the Nobel Prize schema. Socialist and anti-globalization peace movements likely offer quite different responses to the exogenous forces of globalization and neo-liberalization.

Nonetheless, this analysis points to the importance of looking at culture, transnational movements and how social movements change over time following recent calls (Steenland 2008; Snow et al. 2014). A challenge for this line of research is specifying the links between exogenous historical processes to specific movement properties and discourses. Research on cultural opportunity begins to answer this challenge as it identifies a specific role of culture relative to political and resource-based concerns. Our concept of clearinghouses focuses attention on how the dynamic relationship between movements and culture operates multidimensionally from macro socio-historical processes through meso-level mediation to micro discursive

strategies and power relations. More work should continue to explore *both* the dynamic *and* multidimensional relationship between culture and social movements. Additionally, longitudinal data spanning years, if not decades, encourage a greater engagement with how cultural meaning translates to social movement rhetoric. Fortunately, this type of data is now far more feasible to collect than in the past with the massive digitization of texts. Given the promise of computational techniques like topic modeling, there is little reason to believe that this interest in discourse will subside.

A multi-methodological analysis combining the tools of computational social science and more in-depth qualitative analysis encourages the incorporation of more diverse voices as hundreds or thousands of actors “speak” in a more “natural” setting on their own terms. This strategy navigates the divide between qualitative and quantitative research. The construction of network maps based on the results of computational techniques offers one tool for bridging these two analytic approaches. Topic modeling allows for the analysis of thousands of texts increasing our confidence in the breadth of the data. The resulting topics may indicate frames used by social movement actors or broader themes curated by mediating organizations depending on the analytic focus. In either case, using topic models to construct network maps and content codes for immersive analysis maintains a focus on the voices of those who are generating the text. Contemporary research on social movements has turned to websites, twitter feeds, digitized newspapers and historical collections, and other digital communications exhibiting the range of actors engaged in the movement activism (Johnston and Alimi 2013 and Hanna 2013). Our analytic strategy further encourages this turn towards analyzing the digitization of social movement discourse.

REFERENCES

- Abrams, Irwin. 1984. "The Transformation of the Nobel Peace Prize." *Peace & Change* 10(3-4):1-25.
- Ahtisaari, Martti. 2008. *Nobel Lecture*. Retrieved December 20, 2013
(http://www.nobelprize.org/nobel_prizes/peace/laureates/2008/ahtisaari-lecture.html).
- Alexander, Jeffrey. 2006. *The Civil Sphere*. New York: Oxford University Press.
- Alford, Roger Paul. 2009. "The Nobel Effect : Nobel Peace Prize Laureates as Norm Entrepreneurs." *Virginia Journal of International Law* 49(1):60-153.
- Angell, Norman. 1933. "Peace and the Public Mind." *Nobel Lecture*. Retrieved April 19, 2014
from (http://www.nobelprize.org/nobel_prizes/peace/laureates/1933/angell-lecture.html).
- Annan, Kofi. 2001. *Nobel Lecture*. Retrieved June 23, 2014
(http://www.nobelprize.org/nobel_prizes/peace/laureates/2001/annan-lecture.html).
- Arnoldson, Klas Pontus. 1908. "World Referendum." *Nobel Lecture*. Retrieved December 20, 2013 (http://www.nobelprize.org/nobel_prizes/peace/laureates/1908/arnoldson-lecture.html).
- Bail, Christopher A. 2014. "The Cultural Environment: Measuring Culture with Big Data." *Theory and Society* 43(3-4):465-482.
- Baumer, Eric PS, Francesca Polletta, Nicole Pierski, Chris Celaya, Karen Rosenblatt, and Geri K. Gay. 2013. "Developing Computational Supports for Frame Reflection." Proceedings of the iConference, Forth Worth, TX.
- Bearman, Peter, Faris, Robert, and James Moody. 1999. "Blocking the Future: New Solutions for Old Problems in Historical Social Science." *Social Science History* 23:501-33.
- Bearman, Peter S. and Katherine Stovel. 2000. "Becoming a Nazi: A Model for Narrative

- Networks.” *Poetics* 27:69-90.
- Blei, David M., and John D. Lafferty. 2007. “A Correlated Topic Model of Science.” *The Annals of Applied Statistics* 1(1):17-35.
- Blei, David, Andrew Ng, and Michael Jordan. 2003. “Latent Dirichlet Allocation.” *Journal of Machine Learning Research* 3(4-5):993-1022.
- Blondel, Vincent D., Jean-Loup Guillaume, Renaud Lambiotte, and Etienne Lefebvre. 2008. “Fast Unfolding of Communities in Large Networks.” *Journal of Statistical Mechanics: Theory and Experiment* 10: P10008.
- Borland, Elizabeth. 2004. “Cultural Opportunities and Tactical Choice in the Argentine and Chilean Reproductive Rights Movements.” *Mobilization* 9(3):327-339.
- Börner, Katy, Chen, Chaomei, and Kevin W. Boyack. 2003. “Visualizing Knowledge Domains.” *Annual Review of Information Science and Technology* 37:179-255.
- Bourgeois, Leon. 1920. “The Reasons for the League of Nations.” *Nobel Lecture*. Retrieved December 20, 2013 from (http://www.nobelprize.org/nobel_prizes/peace/laureates/1920/bourgeois-lecture.html)
- Burstein, Paul. 1999. “Social Movements and Public Policy.” Pp 3-21 in *How Social Movements Matter* edited by Marco Giugni, Doug McAdam, and Charles Tilly. Minneapolis: University of Minnesota Press.
- Breiger, Ronald L. 1974. “The Duality of Persons and Groups.” *Social Forces* 53:181-190.
- Caren, Neal. 2013. “Frontiers in Social Movement Methodology.” *Mobilization* 18:363-65.
- Chang, Jonathan, Jordan Boyd-Graber, Chong Wang, Sean Gerrish, and David M. Blei. 2009. “Reading Tea Leaves: How Humans Interpret Topic Models.” *Neural Information Processing Systems*.

- De Fazio, Gianluca. 2013. "The Radicalization of Contention in Northern Ireland, 1968-1972: A Relational Perspective." *Mobilization* 18(4):475-96.
- de Klerk, F.W. 1993. *Nobel Lecture*. Retrieved December 20, 2013
(http://www.nobelprize.org/nobel_prizes/peace/laureates/1993/klerk-lecture.html).
- Feldman, Burton. 2000. *The Nobel Prize: A History of Genius, Controversy, and Prestige*. New York: Arcade Publishing.
- Ferree, Myra Marx, William Anthony Gamson, Jürgen Gerhards, and Dieter Rucht. 2002. *Shaping Abortion Discourse: Democracy and the Public Sphere in Germany and the United States*. Cambridge: Cambridge University Press.
- Franzosi, Roberto. 2004. *From Words to Numbers: Narrative, Data, and Social Science*. Cambridge, UK: Cambridge University Press.
- Foster, John Bellamy. 2002. *Ecology Against Capitalism*. New York: Monthly Review Press.
- Gore, Albert. 2007. *Nobel Lecture*. Retrieved June 23, 2014
(http://www.nobelprize.org/nobel_prizes/peace/laureates/2007/gore-lecture_en.html).
- Grün, Bettina and Kurt Hornik. 2011. "topicmodels: An R Package for Fitting Topic Models." *Journal of Statistical Software* 40(13):1-30.
- Hallgrimsdottir, Helga Kristin, and Cecilia Benoit. 2007. "From Wage Slaves to Wage Workers: Cultural Opportunity Structures and the Evolution of the Wage Demands of the Knights of Labor and the American Federation of Labor, 1880-1900." *Social Forces* 85(3):1393-1411.
- Hanna, Alexander. 2013. "Computer-Aided Content Analysis of Digitally-Enabled Movements." *Mobilization*. 18(4):367-88.
- Harrison, Jill Ann, Lopez, Steven H., and Andrew Martin. Forthcoming. "Rethinking Organizational Decoupling: Fields, Power Struggles, and Work Routines." *Social*

Currents.

- Holzer, Elizabeth. 2008. "Borrowing from the Women's Movement 'for Reasons of Public Security': A Study of Social Movement Outcomes and Judicial Activism in the European Union." *Mobilization* 13(1):195-214.
- Jasper, James. 2007. "Cultural Approaches in the Sociology of Social Movements." Pp. 59-109 in *Handbook of Social Movements across Disciplines*, edited by Bert Klandermans and Conny M. Roggeband. New York: Springer.
- , 2014. *Protest: A Cultural Introduction to Social Movements*. Cambridge, UK: Polity Press.
- Johnston, Hank and Eitan Y. Alimi. 2012. "Primary Frameworks, Keying and the Dynamics of Contentious Politics: The Islamization of the Chechen and Palestinian National Movements." *Political Studies* 60:603-620.
- , 2013. "A Methodology Analyzing for Frame Dynamics: The Grammar of Keying Battles in Palestinian Nationalism." *Mobilization* 18(4):453-74.
- Kennedy, Paul. 2006. *The Parliament of Man: The Past, Present, and Future of the United Nations*. New York: Random House.
- King, Gary. 2007. "An Introduction to the Dataverse Network as an Infrastructure for Data Sharing." *Sociological Methods & Research* 36(2):173-99.
- King, Leslie, and Ginna Husting. 2003. "Anti-Abortion Activism in the U.S. and France: Comparing Opportunity Environments of Rescue Tactics." *Mobilization* 8(3): 297-312.
- King, Martin Luther. 1964. *The Quest for Peace and Justice*. Retrieved April 19, 2013 (http://www.nobelprize.org/nobel_prizes/peace/laureates/1964/king-lecture.html).

- Krimsky, Sheldon. 1982. *Genetic Alchemy: The Social History of the Recombinant DNA Controversy*. Cambridge, MA: MIT Press.
- Light, Ryan. 2014. "From Words to Networks and Back: Digital Text, Computational Social Science, and the Case of Presidential Inaugural Addresses." *Social Currents* 1:111-129.
- Maathai, Wangari. 2004. *Nobel Lecture*. Retrieved December 20, 2013
(http://www.nobelprize.org/nobel_prizes/peace/laureates/2004/maathai-lecture-text.html).
- McAdam, Doug, and William H. Sewell. 2001. "It's About Time: Temporality in the Study of Social Movements and Revolutions." Pp. 89-125 in *Silence and Voice in the Study of Contentious Politics*, edited by Ronald Aminzade, Jack A. Goldstone, Doug McAdam, Elizabeth Perry, William H. Sewell, Jr., Sidney Tarrow, and Charles Tilly. New York: Cambridge University Press.
- McFarland, Daniel A., Daniel Ramage, Jason Chuang, Jeffrey Heer, Christopher D. Manning, and Daniel Jurafsky. 2013. "Differentiating Language Usage through Topic Models." *Poetics* 41: 607-625.
- Meyer, David S. and Debra Minkoff. 2004. "Conceptualizing Political Opportunity." *Social Forces* 82(4):1457-1492.
- Mohr, John. 1998. "Measuring Meaning Structures." *Annual Review of Sociology* 24:345-370.
- . 2000. "Introduction : Structures, Institutions, and Cultural Analysis." *Poetics* 27(2-3):57-68.
- Mohr, John, and Petko Bogdanov. 2013. "Introduction – Topic Models: What They are and Why They Matter." *Poetics* 41(6):545-569.
- Mol, Arthur. 2003. *Globalization and Environmental Reform: The Ecological Modernization of the Global Economy*. Cambridge, MA: MIT Press.

- Moneta, Ernesto Teodoro. 1907. "Peace and Law in the Italian Tradition." *Nobel Lecture*.
Retrieved December 20, 2013
(http://www.nobelprize.org/nobel_prizes/peace/laureates/1907/moneta-lecture.html).
- New York Times. 1897. "A Hard Task for Scandinavians." P.18. May 30, 1897.
- Nobelprize.org. 2013a. "The Nobel Peace Prize for 2009." Retrieved September 5, 2013
(http://www.nobelprize.org/nobel_prizes/peace/Laureates/2009/press.html).
- Nobelprize.org. 2013b. "Nobel Prize Facts." Retrieved December 20, 2013
(http://www.nobelprize.org/nobel_prizes/facts/).
- Northedge, F. S. 1986. *The League of Nations: Its Life and Times, 1920-1946*. New York:
Holmes and Meier.
- Oliver, Pamela, and Hank Johnston. 2000. "What a Good Idea! Ideologies and Frames in Social
Movement Research." *Mobilization* 4(1):37-54.
- Reed, Isaac, and Jeffrey Alexander. 2008. "Cultural Sociology." Pp. 378-390 in *The New
Blackwell Companion to Social Theory*, edited by B. Turner. West Sussex, UK: Wiley
Blackwell.
- Roscigno, Vincent J., Julia Miller Cantzler, Salvatore J. Restifo, and Joshua Guetzkow.
Forthcoming. "Legitimation, State Repression and the Sioux Massacre at Wounded
Knee." *Mobilization*.
- Roscigno, Vincent J., and William F. Danaher. 2004. *The Voice of Southern Labor: Radio,
Music, and Textile Strikes, 1929-1934*. Minneapolis: University of Minnesota Press.
- Satu, Eisaku. 1974. "Peace and Law in the Italian Tradition." Nobel Lecture. Retrieved
December 20, 2013 (http://www.nobelprize.org/nobel_prizes/peace/laureates/1974/sato-lecture.html).

- Snow, David, Peter Owens, and Anna Tan. 2014. "Libraries, Social Movements, and Cultural Change: Toward an Alternative Conceptualization of Culture." *Social Currents* (1):35-43.
- Sonnenfeld, D. 2000. "Contradictions of Ecological Modernization: Pulp and Paper Manufacturing in South-East Asia." *Environmental Politics* 9(1):235-56.
- Steensland, Brian. 2008. "Why do Policy Frames Change? Actor-idea Coevolution in Debates Over Welfare Reform." *Social Forces* 86:1027-1054.
- Steyvers, Mark, Padhraic Smyth, Michal Rosin-Zvi, and Thomas Griffiths. 2004. "Probabilistic Author-Topic Models for Information Discovery." 10th ACM SigKDD Conference Knowledge Discovery and Data Mining, Seattle, WA.
- Tutu, Desmond. 2005. "Where is Africa Heading?" Pp. 6-8 in *How? Thoughts about Peace*, edited by Øivind Stenersen. Oslo: Nobel Peace Center.
- United Nations Children's Fund. 1965. "UNICEF: Achievement and Challenge." *Nobel Lecture*. Retrieved December 20, 2013 (http://www.nobelprize.org/nobel_prizes/peace/laureates/1965/unicef-lecture.html).
- Wasserman, Stanley and Katherine Faust. 1994. *Social Network Analysis: Methods and Applications*. Cambridge, UK: Cambridge University Press.
- Wiesel, Elie. 1986. "Hope, Despair, and Memory." *Nobel Lecture*. Retrieved December 20, 2013 (http://www.nobelprize.org/nobel_prizes/peace/laureates/1986/wiesel-lecture.html).
- Williams, Raymond. 1983. *Keywords: A Vocabulary of Culture and Society*. London: Fontana.
- Williams, Rhys. 1995. "Constructing the Public Good : Social Movements and Cultural Resources." *Social Problems* 42(1):124-144.

-----, 2004. "The Cultural Contexts of Collective Action: Constraints, Opportunities, and the Symbolic Life of Social Movements." Pp. 91-115 in *The Blackwell Companion to Social Movements*, edited by David A. Snow, Sarah A. Soule, and Hanspeter Kriesi. West Sussex, UK: Blackwell Publishing Ltd.

York, Richard, and Rosa, Eugene. 2003. "Key Challenges to Ecological Modernization Theory." *Organization and Environment* 16(3):273-288.

¹ Note the previous literature uses cultural opportunity and discursive opportunity structures in very similar ways. We see discourse as deeply embedded within the broader symbolic context of cultural opportunity and, therefore, use the more general cultural opportunity structure as an encompassing concept.

² Locating Peace Prize winners from 1901 to 1983, respective to their relationship with the peace movement, Abrams (1984) proposes six key classifications of Laureates: organized peace movement actors, humanitarians, international jurists, statesmen, religious leaders, and human rights activists. Abrams' classification scheme provides a lens through which Laureate motivations and attributes can be examined and compared. Though there is room for discussion about whether all winners fit appropriately into the six categories, Abrams' work remains authoritative on the topic.

³ Alford's (2009:62) study of Peace Prize Laureates as "international norm entrepreneurs" examines the Laureates' influence upon international law. Using a scheme based upon the era of award, Alford (2009:65) submits "five periods in the life of the Nobel Peace Prize," that demonstrate how "Laureates highlighted different international norms at different times." Demonstrating shifts in peace-effort priorities, Alford's (2009:66-67) classification of eras consists of the pacifist (1901-1913), statesman (1917-1938), humanitarian (1944-1959), human rights (1960-1986), and democracy (1987-present) periods.

⁴ We use the popular tf x idf weight (Börner, Chen and Boyack 2003). As we are ultimately interested in constructing meaningful networks between speeches, we simplify the models by selecting the top 5% of terms based on the tf-idf scores. Adjusting the number of terms subject to the topic modeling alters the results of topic models; however, our goal is to create a clear picture of the dataset to facilitate a more hermeneutic analysis, not developing relative or comparative topic models.

⁵ To simplify we binarize this matrix such that speeches are identified as belonging to a topic if their topic-score is greater than .1. Modestly adjusting this threshold does not substantively alter the results.

⁶ Each community was assigned a label based upon the most frequent words in the topics that are grouped together. As mentioned above, the communities were identified using the popular Louvain method of community detection (Blondel et al. 2008).

Table 1. Overview of Topic Model Results

Topic	Top Five Words	Exemplar Speech
1	pope, mediat, vote, apostl, unleash	Ludwig Quidde (1927)
2	instinct, vote, analog, neutral, publish	Lester Bowles Pearson (1957)
3	print, spontan, evolv, abus, repudi	Emily Greene Balch (1946)
4	ban, dehuman, expend, african, babi	Desmond Tutu (1984)
5	plant, fertil, african, crop, breed	Intergovernmental Panel on Climate Change (2007)
6	uphold, enmiti, stir, nonviol, sword	Albert Lutuli (1960)
7	senat, holocaust, detent, heal, pole	John Hume (1998)
8	borrow, innov, unionist, excit, grand	Muhammad Yunus (2006)
9	punish, tortur, detain, indivis, repress	Elihu Root (1912)
10	dear, cathol, bless, wife, career	Georges Pire (1958)
11	repress, nonviol, dictatorship, abus, unarm	Rigoberta Menchú Tum (1992)
12	trampl, pledg, summon, purchas, inaugur	Gustav Stresemann (1926)
13	warhead, stockpil, hiroshima, dismantl, burn	Seán MacBride (1974)
14	bless, prayer, plestinian, bestow, smile	Yitzhak Rabin (1994)
15	abstract, misinterpret, peacmak, colour, clash	David Trimble (1998)
16	zone, locat, dmag, fusion, stockpil, contract	International Campaign to Ban Landmines (1997)
17	crusad, migrat, sword, bestow, folli	Élie Ducommun (1902)
18	nansen, immigr, repatri, sister, emigr	Office of the U.N. High Commissioner for Refugees (1954)
19	senat, momentum, countrymen, enhanc, abid	Elihu Root (1912)

Supplementary Table 1. Nobel Prize Speech Corpus

ID	Year	Laureate	Country	Speech Title
1	1902	Élie Ducommun	Switzerland	The Futility of War Demonstrated by History
2	1902	Albert Gobat	Switzerland	The Development of the Hague Conventions of July 29, 1899
3	1903	Randal Cremer	UK	The Progress and Advantages of International Arbitration
4	1904	Institute of International Law	Belgium	The Work of the Institute of International Law
5	1905	Bertha von Suttner	Austria	The Evolution of the Peace Movement
6	1906	Theodore Roosevelt	USA	International Peace
7	1907	Ernesto Teodoro Moneta	Italy	Peace and Law in the Italian Tradition
8	1907	Louis Renault	France	The Work at The Hague in 1899 and in 1907
9	1908	Klas Pontus Arnoldson	Sweden	World Referendum
10	1908	Fredrik Bajer	Denmark	The Organization of the Peace Movement
11	1912	Elihu Root	USA	Towards Making Peace Permanent
12	1920	Léon Bourgeois	France	The Reasons for the League of Nations
13	1921	Hjalmar Branting	Sweden	Fraternity among Nations
14	1921	Christian Lange	Norway	Internationalism
15	1922	Fridtjof Nansen	Norway	The Suffering People of Europe
16	1926	Gustav Stresemann	Germany	The New Germany
17	1927	Ferdinand Buisson	France	Changes in Concepts of War and Peace
18	1927	Ludwig Quidde	Germany	Security and Disarmament
19	1930	Nathan Söderblom	Sweden	The Role of the Church in Promoting Peace
20	1933	Sir Norman Angell	United Kingdom	Peace and the Public Mind
21	1934	Arthur Henderson	United Kingdom	Essential Elements of a Universal and Enduring Peace
22	1937	Robert Cecil	United Kingdom	The Future of Civilization
23	1938	Nansen International Office for Refugees	Switzerland	The Nansen International Office for Refugees
24	1944	International Committee of the Red Cross 2	Switzerland	The Activity of the International Committee of the Red Cross during the War
25	1946	Emily Greene Balch	USA	Toward Human Unity or Beyond Nationalism
26	1946	John R. Mott	USA	The Leadership Demanded in This Momentous Time
27	1947	Friends Service Council	United Kingdom	The International Service of the Society of Friends
28	1947	American Friends Service Committee	USA	Quakers and Peace
29	1949	Lord Boyd Orr	United Kingdom	Science and Peace
30	1950	Ralph Bunche	USA	Some Reflections on Peace in Our Time
31	1951	Léon Jouhaux	France	Fifty Years of Trade-Union Activity in Behalf of Peace
32	1952	Albert Schweitzer	France	The Problem of Peace
33	1953	George C. Marshall	USA	Essentials to Peace
34	1954	Office of the U.N. High Commissioner for Refugees 1	Switzerland	Refugee Problems and Their Solutions
35	1957	Lester Bowles Pearson	Canada	The Four Faces of Peace
36	1958	Georges Pire	Belgium	Brotherly Love: Foundation of Peace
37	1959	Philip Noel-Baker	United Kingdom	Peace and the Arms Race
38	1960	Albert Lutuli	South Africa	Africa and Freedom

39	1962	Linus Pauling	USA	Science and Peace
40	1963	International Committee of the Red Cross ³	Switzerland	Some Aspects of the Mission of the International Committee of the Red Cross
41	1963	League of Red Cross Societies	Switzerland	The Red Cross in a Changing World
42	1964	Martin Luther King	USA	The Quest for Peace and Justice
43	1965	United Nations Children's Fund	USA	UNICEF: Achievement and Challenge
44	1968	René Cassin	France	The Charter of Human Rights
45	1969	International Labour Organization	Switzerland	ILO and the Social Infrastructure of Peace
46	1970	Norman E. Borlaug	USA	The Green Revolution, Peace, and Humanity
47	1971	Willy Brandt	Germany	Peace Policy in Our Time
48	1974	Seán MacBride	Ireland	The Imperatives of Survival
49	1974	Eisaku Sato	Japan	The Pursuit of Peace and Japan in the Nuclear Age
50	1975	Andrei Sakharov	USSR	Peace, Progress, Human Rights
51	1976	Betty Williams	United Kingdom	
52	1977	Amnesty International	United Kingdom	
53	1978	Mohamed Anwar al-Sadat	Egypt	
54	1978	Menachem Begin	Israel	
55	1979	Mother Teresa	India	
56	1980	Adolfo Pérez Esquivel	Argentina	
57	1981	Office of the United Nations High Commissioner for Refugees 2	Switzerland	From Tragedy to Hope
58	1982	Alva Myrdal	Sweden	Disarmament, Technology and the Growth in Violence
59	1982	Alfonso García Robles	Mexico	The Latin American Nuclear-Weapon Free Zone
60	1983	Lech Walesa	Poland	
61	1984	Desmond Tutu	South Africa	
62	1985	International Physicians for the Prevention of Nuclear War	USA	Tragedy and Triumph of Reason
63	1985	International Physicians for the Prevention of Nuclear War	USA	A Prescription for Hope
64	1986	Elie Wiesel	USA	Hope, Despair and Memory
65	1987	Oscar Arias Sánchez	Costa Rica	Only Peace Can Write the New History
66	1988	United Nations Peacekeeping Forces	USA	
67	1989	The 14th Dalai Lama	Tibet	
68	1990	Mikhail Gorbachev	USSR	
69	1992	Rigoberta Menchú Tum	Guatemala	
70	1993	Nelson Mandela	South Africa	
71	1993	F.W. de Klerk	South Africa	
72	1994	Yasser Arafat	Palestine	
73	1994	Shimon Peres	Israel	
74	1994	Yitzhak Rabin	Israel	
75	1995	Joseph Rotblat	United Kingdom	Remember Your Humanity
76	1995	Pugwash Conferences on Science and World Affairs	Canada	Arms Limitation and Peace Building in the Post-Cold-War World
77	1997	International Campaign to Ban Landmines	USA	

78	1997	Jody Williams	USA	
79	1998	John Hume	United Kingdom	
80	1998	David Trimble	United Kingdom	
81	1999	Médecins Sans Frontières	Belgium	
82	2000	Kim Dae-jung	South Korea	
83	2001	Kofi Annan	Ghana	
84	2002	Jimmy Carter	USA	
85	2003	Shirin Ebadi	Iran	In the name of the God of Creation and Wisdom
86	2004	Wangari Maathai	Kenya	
87	2005	Mohamed ElBaradei	Egypt	
88	2006	Muhammad Yunus	Bangladesh	
89	2007	Intergovernmental Panel on Climate Change	USA	
90	2007	Al Gore	USA	
91	2008	Martti Ahtisaari	Finland	
92	2009	Barack Obama	USA	A Just and Lasting Peace
93	2010	Liu Xiaobo	China	I Have No Enemies: My Final Statement
94	2011	Ellen Johnson Sirleaf	Liberia	A Voice for Freedom
95	2011	Leymah Gbowee	Liberia	
96	2011	Tawakkol Karman	Yemen	In the Name of God the Compassionate the Merciful
97	2012	European Union	Europe	From War to Peace: A European Tale

Figure 1. Theoretical Diagram

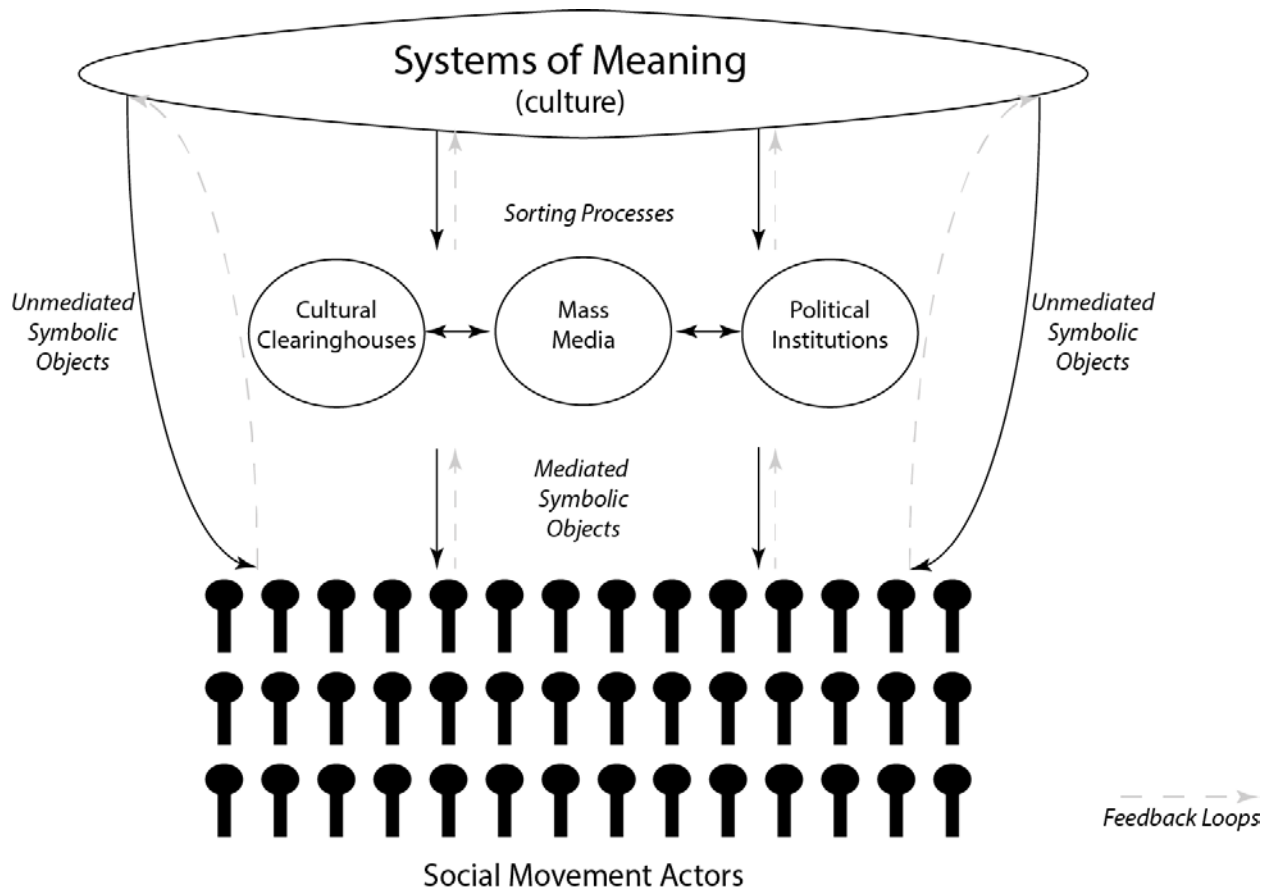


Figure 2. Key Number of Mentions (Articles) in the NY Times

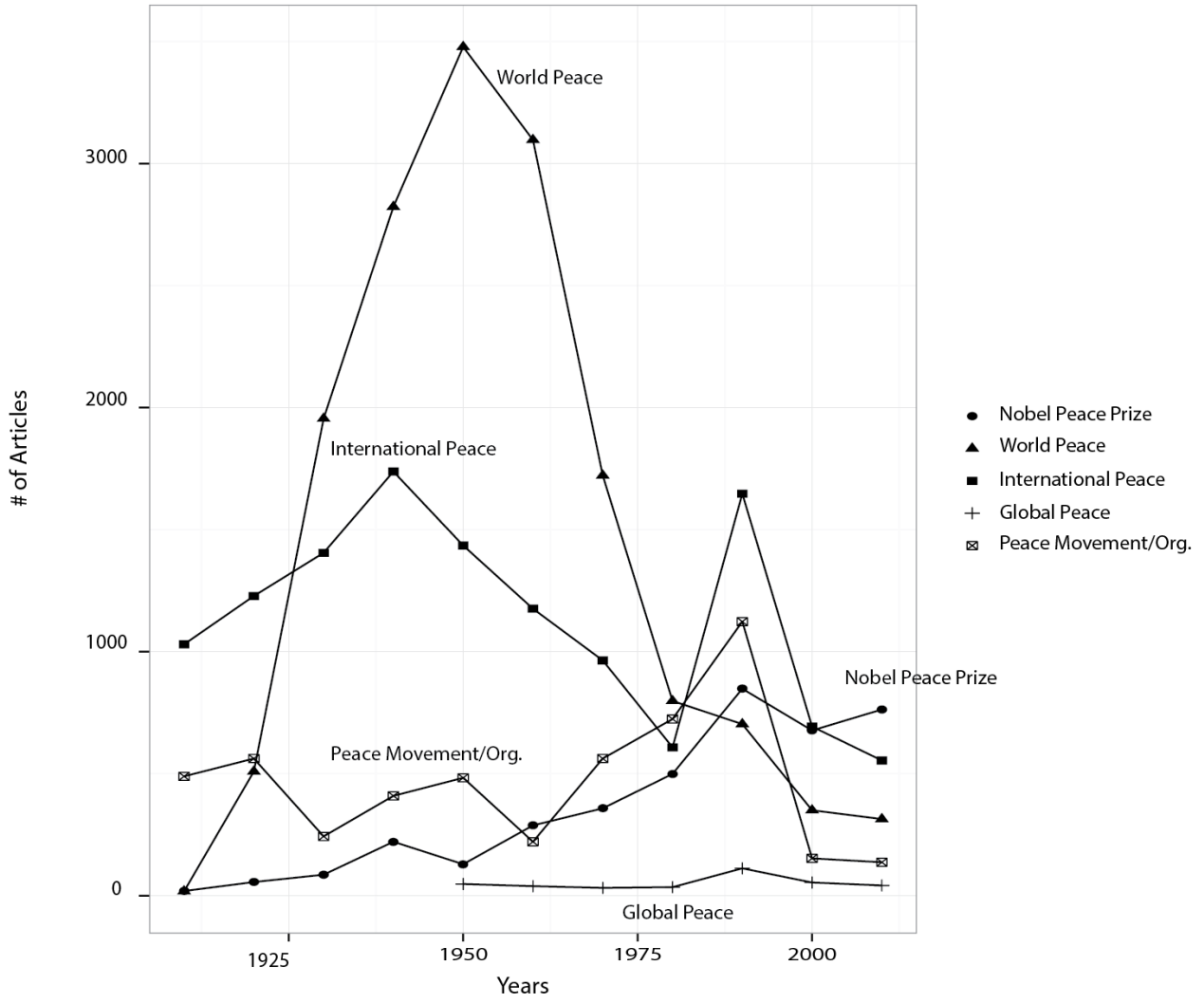


Figure 3. Perplexity Scores by Number of Topics

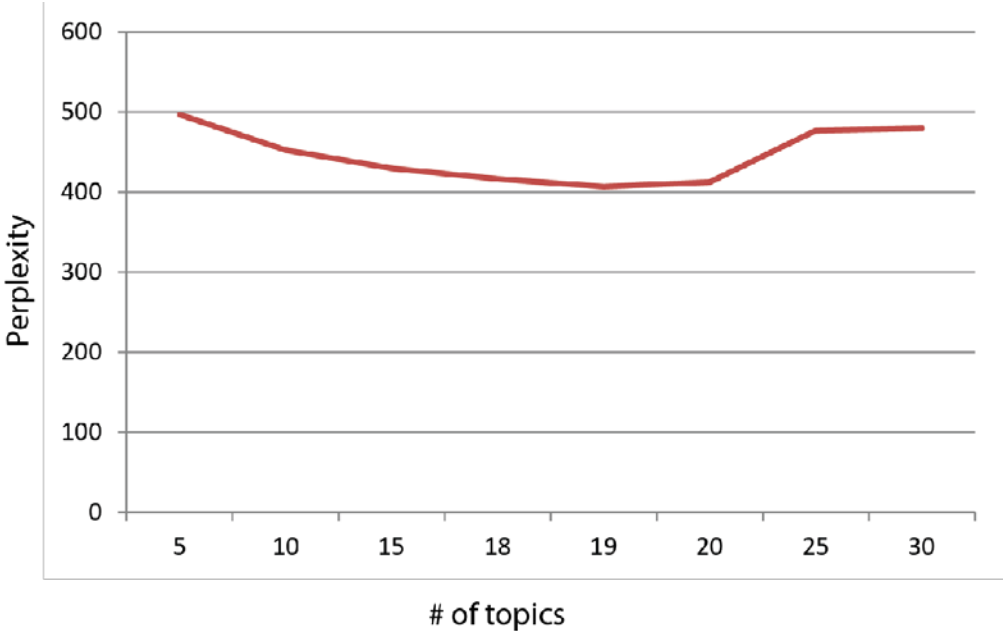
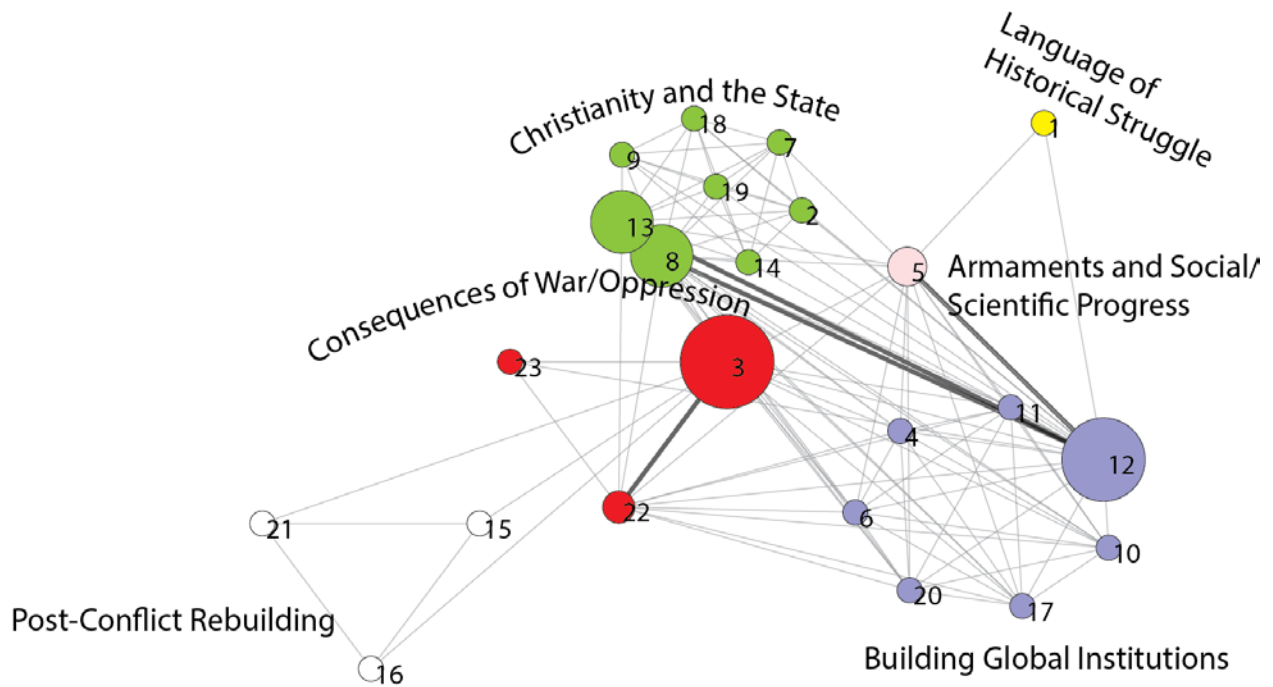
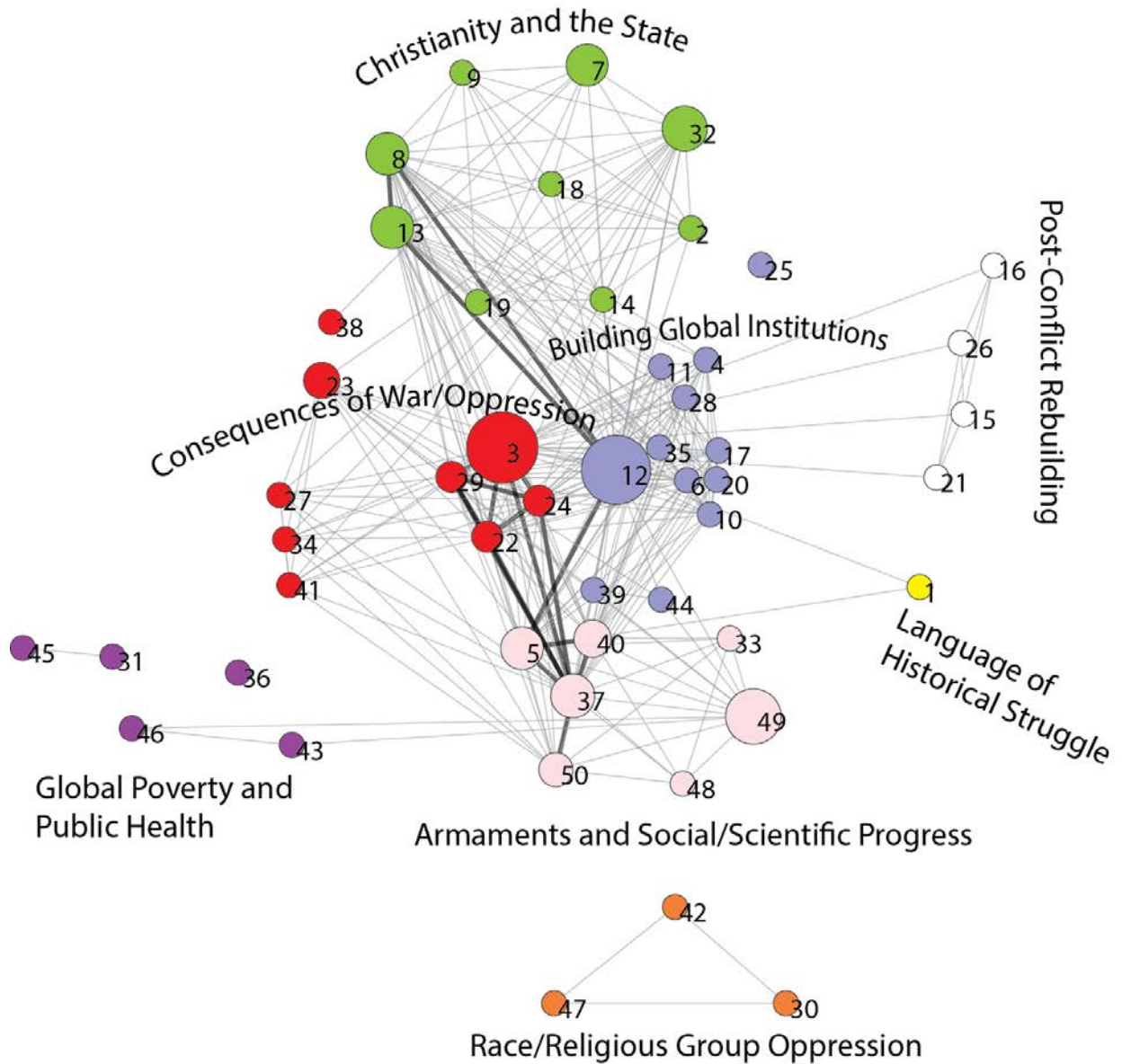


Figure 4. Topic Models of the Nobel Prize for Peace, 1902-1940¹



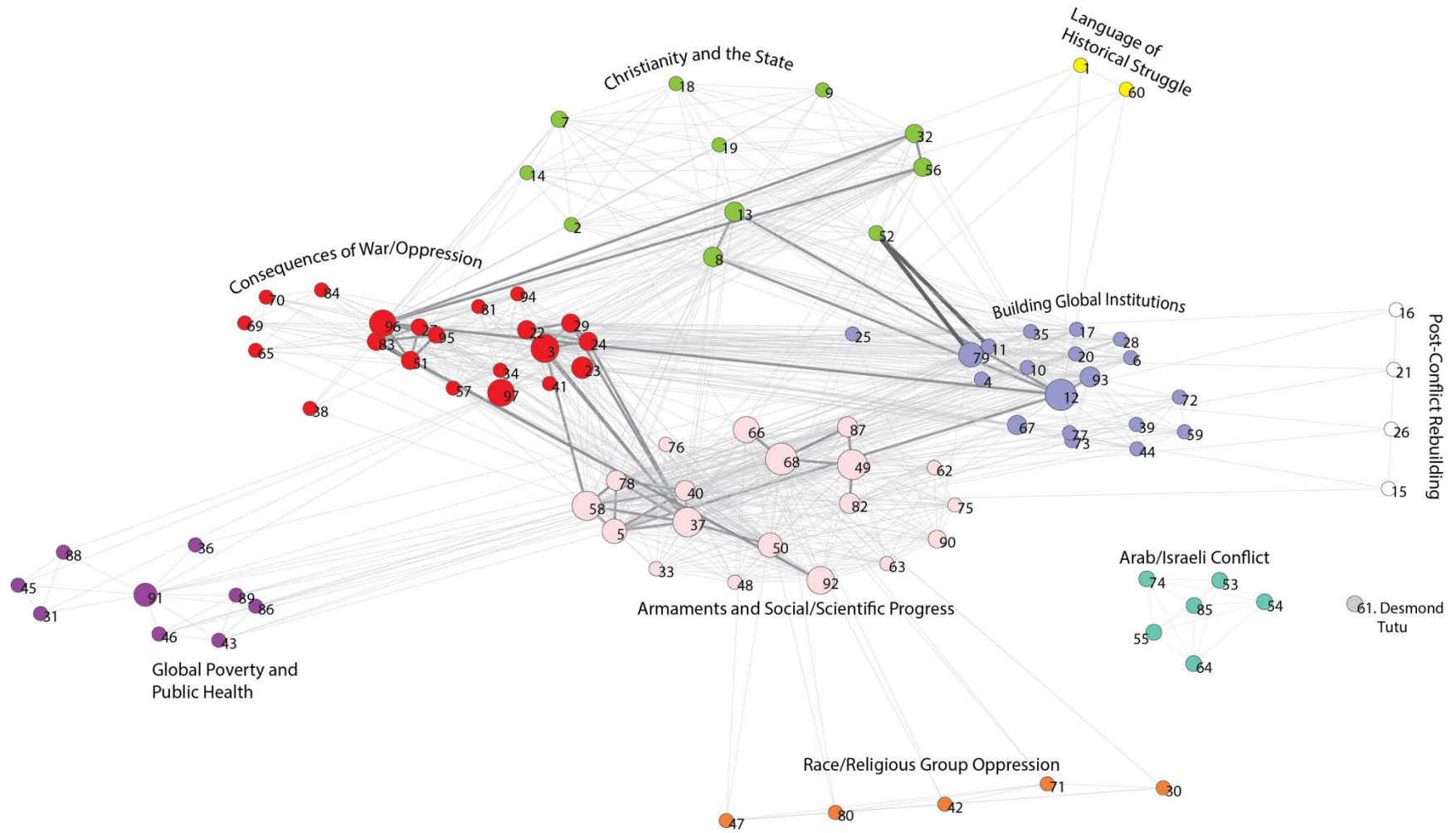
¹ As meaning is constructed cumulatively, we ran topic models on the entire collection of texts and followed the same logic in the construction of the speech networks. This graph highlights the speeches from 1902-1940 with the whole graph in the background. Node size is based on betweenness centrality; tie strength is based on overlapping topics across speeches; node color is based on Louvain community detection. See supplement table 1 for speech number key.

Figure 5. Topic Models of the Nobel Prize for Peace, 1902-1975²



² As meaning is constructed cumulatively, we ran topic models on the entire collection of texts and followed the same logic in the construction of the speech networks. This graph highlights the speeches from 1902-1975 with the whole graph in the background. Node size is based on betweenness centrality; tie strength is based on overlapping topics across speeches; node color is based on Louvain community detection. See supplement table 1 for speech number key.

Figure 6. Topic Models of the Nobel Prize for Peace, 1902-2012³



³ Note: As meaning is constructed cumulatively, we ran topic models on the entire collection of texts and followed the same logic in the construction of the speech networks. This graph consists of the largest component of all of the speeches from 1902-2012, a small component on the Arab-Israeli conflict and Desmond Tutu's isolated 1984 speech are disconnected from this large community. Node size is based on betweenness centrality; tie strength is based on overlapping topics across speeches; node color is based on Louvain community detection. See supplement table 1 for speech number key.