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Terror through the Looking Glass: Information Orientations and the Lens of Web Search Engines

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ABSTRACT

Researchers and pundits alike regularly describe terrorism as being a theatrical performance that depends on publicity to build recognition, garner attention and command legitimation. Clearly, the mechanical contours of the information environment matter when it comes to determining the opportunities and challenges for both terrorist and counterterrorist success. This article addresses arguably the most singularly significant intermediary for information access in modern society: web search engines. These information gatekeepers play a crucial role in guiding both government and non-state approaches to terror. That said, these tools are associated with bias and malperformance on a number of fronts. This study examines the degree to which different search engine usage might present a differential view of terrorism to different users. I turn to agent-based digital infrastructure as a basis for studying divergent information experiences with a major terrorist incident, specifically the suicide bombing and subsequent small arms attacks on the Hamid Karzai International Airport in Kabul, Afghanistan on August 26, 2021. The results are striking, confirming that there is substantial and clear variation in the outputs based around a host of factors—variable queries and query styles, information orientations and subsequent personalization, geographic location and, of course, search engine choice.

Researchers and pundits alike regularly describe terrorism as being a theatrical performance of sorts, a sociopolitical act of contestation that depends on publicity to build recognition, garner attention and command legitimation.[1] Democratic states' responses to terror also depend—at least in part—on a well-functioning system of information access, a "marketplace of ideas" fueled by the free portrayal and interpretation of information.[2] On that front, so the classical argument goes, democracies benefit from an informed citizenry that is motivated towards prudent discourse on issues of local and national import.[3] And yet, scholarship has shown that information transparency—a hallmark of democratic societies usually cited as positive—is also positively correlated with increased terroristic activity, as "freer transmission of information creates opportunities" for great publicity for terror and accordingly motivates extremists' targeting and messaging strategies.[4] Information transparency, it seems, cuts both ways. And so, since both arguments may hold water, a clear takeaway is that the mechanical contours of the information environment matter when it comes to determining the relative opportunities and challenges for both terrorist and counterterrorist success.

This article addresses arguably the most singularly significant intermediary for information access in modern digital societies: web search engines. These information gatekeepers play a crucial role in guiding both government and non-state approaches to terror.[5] Billions of people use search engines daily to quickly and effectively navigate the Internet,[6] and indeed are the first source of new data for most citizens of Western democracies.[7] Web search engines are widely trusted[8] and play a significant

role not only in helping form individuals' opinions across the full range of human context,[9] but also in validating previously held views.[10] On the one hand, such engines are a significant information retrieval mechanism. On the other, they are also a heuristic tool, with parameters laid out in code, developer assumptions, and personalization algorithms constituting an individualized resource for interpreting real-world events.

These diverse design features are also associated with experiential differences and malperformance on a number of fronts. Substantial bodies of research link search results and user search behavior to both biased and inaccurate outputs.[11] Output inaccuracy is particularly concerning for societal function given that misrepresentation of possible information results affects the baseline of data being made available to the general population.[12] Biased results amplify a particular perspective or detail—much in the way that spin reporting might—and force users to survey more information to reach balanced conclusions.[13] These are problematic, of course, but arguably less so than the alternative. Spin and intentional misinformation are undesirable but regular features of human societies. Inaccurate results, by contrast, may contain factually incorrect information without the attribution or lexical features that provide searchers the clues to potential misinformation. Sources of misinformation may, because few question the functional validity of search engines, thus appear arbitrary to the typical user.[14]

This study examines the provenance of search results pertaining to major terroristic events. It does so in a multimethod fashion, casting a wide net across both different search engine kinds and different individualized methods of using search engines. At the base level, the goal of this research is to ascertain the degree to which different engine usage—in terms of platform selection, informational inputs and geography—might present a differential view of terrorism to users. The dual approach to thinking about information access and accuracy (i.e. by looking at both tools and human inputs in tandem) blends focuses found in recent work in the communications and information systems (IS) fields[15] and brings significant advantages to the study of a sociopolitical phenomenon like terrorism. Public and elite audiences around the world interface with information about terrorist incidents via the use of a range of different search engines. Whilst Google, Bing and Yahoo are used by hundreds of millions of citizens across the West alongside more minor services like Ask or Lycos, engines like Yandex, DuckDuckGo, Baidu, CocCoc and more are in far more common usage in parts of Africa and across Eurasia. These engines employ distinct algorithms, verification standards and user management practices that produce web search presentation and randomization effects.[16] But it is not only these developer-side qualities and design intentions that shape divergent user experiences. Major variation in these effects also emerges from user behavior. Different information orientations—meaning focus on identities, affiliations, themes, specific narratives and more, all operationalized in search habits— interact with underlying algorithmic settings to alter the way information is both initially presented and thereafter tailored to that user over time. The result of these two interlocking sets of factors is often a divergent view of major social, political, and security events for users across the globe. This study sets out to explore just how divergent views of major terroristic events may actually be.

In the sections that follow, we turn to agent-based digital infrastructure as a basis for studying divergent information experiences with a major terrorist incident, specifically the suicide bombing and subsequent small arms attacks on the Hamid Karzai International Airport in Kabul, Afghanistan on August 26, 2021. Modeling of computational agents is a method increasingly utilized by researchers to examine all manner of user-system effects and outcomes, including the nature of user engagement with algorithmic products like search engines. Between August and September, 2021, we employed hundreds of such autonomous agents to map the informational anatomy of the Kabul terrorist attack by Islamic State—Khorosan Province (ISIS-K) operatives. These agents differed in their basic use characteristics along three lines. First, queries were spread across six major search engines. Second, the base region was varied so as to control for geographic differentials in developer-side design features. Finally, the virtual agents searched for information on the attack in line with pre-established information orientations, specifically variably focused on attack details, political context, prevailing narratives about the conflict and more.

The results are pronounced. While it is clear that there are assumptions about how to curate and present information to users that is held in common among the world's search engines, there is substantial and clear variation in the outputs based around a host of factors—variable queries and query styles, information orientations and subsequent personalization, geographic location and, naturally, search engine choice. The results of the sections below show that an individual's view of significant foreign policy crises is likely to vary dramatically from those of others in an expanding sense dependent largely on information orientation and search engine choice. On the one hand, the location of the searcher and their exact search terminology matters. However, on the other hand, these are clearly overridden by the ways in which searchers' attempt to contextualize their information seeking by looking for, among other things, objective facts, parochial details, or spin. Different algorithms clearly treat these queries by presenting information in different volumes and styles, from different kinds of sources (i.e. not just substitutable news media), and with increasing variability over time. The result of these findings is a confirmation that characteristics of the search engine medium are critical determinants of both popular and elite responsiveness to terrorist and other security crises, a fact that has substantial implications for both scholarship and policy practice.

The remainder of the paper proceeds in five parts. After further describing the purpose, design, and usage search engines, we introduced agent-based testing as a novel and appropriate methodology for better understanding divergent informational outcomes around terrorist incidents and other related national security events. we describe the data collection process, the infrastructure involved and the pipeline for qualitatively interpreting results. Then, in the third section, we introduce the Kabul airport attack case context and present findings across two lines: (1) across different search engines and regions, and (2) across information orientations. The timeframe of study (a month following the attack) is sufficient to build a novel picture of the informational anatomy of major terrorist events and offers a unique perspective on the development of distinct narratives in line with information search preferences. The fourth section discusses results in detail before final remarks expand on implications for practice, policy, and research.

Information orientation, personalization, and randomization

In recent years, a growing number of researchers have attempted to ascertain the degree to which search engine results are biased or might output factually imprecise information.[17] Several studies, generally drawn from the information systems and communications studies literatures, stand out. One in 2017 demonstrated that search engine results have gradually become more political in character over time, particularly given the growing degree to which political events (political campaign events, referenda debates, etc.) act as catalysts for large issue-oriented search volume and the subsequent tailoring of search terminology.[18] Through impact auditing—in which researchers study the outputs of algorithmic retrieval and ranking processes[19]—researchers have also shed light on a great many biases that can be found in either use of specific search tools or in the specific manner in which tools are used.[20] These include gender[21] and regional[22] biases found in image searches, source-related biases, and text-specific linguistic biases, some of which manifest through translation or shortening tools found as a feature of certain major search engines (for instance, Google). Over and above any single specific source of bias, though, the personalization of web search produced via a range of account-, browser- and IP-specific inputs has succeeded in producing informational echo chambers.[23] These silos of information narrowcast to individuals the same as a private intelligence report might, something that invariably produces information inequalities across searchers that otherwise look remarkably similar.

This study thinks of bias as a control variable,[24] something to be considered as we test for differentiation in the fundamentals of information retrieval and presentation surrounding terrorist incidents. As will be described in the next section, we follow Unkel and Haim's notion of differential information orientations in measuring for potential bias in inputs across a reasonable range of user inputs.[25] Specifically, Unkel and Haim leverage an approach similar to that employed here to simulate

human search behaviors that reflect different information orientations.[26] They take to heart the point that some have made that search engine operation is fundamentally an exercise in producing bias.[27] After all, different search terminology or framing should be expected to output different results for a better user experience. However, there is an in-built assumption in such an ideal-type activity that the user's input is sensitively linked to variation in search outputs.[28] Instead, it is not clear that such a tight relationship exists across search tools.[29] Simulating different search inputs, thus, becomes a necessary exercise in adjudicating on the sensitivity of underlying retrieval and presentation algorithms for any exploration of web search engines writ large.

Here, the subject of bias is certainly interesting in the context of major terrorist incidents. However, as described above, some degree of bias is to be expected insofar as users pick and sequence-specific terms in order to get at facets of the event they deem of interest or relevance.[30] What's not to be expected is outright factual inaccuracy and imprecision. Although the digital world is full of factually questionable content and information that is outright fabricated, web search engine developers aim to ensure that their products present these sources only under highly specific circumstances (i.e. direct keyword or site-specific search). But both journalistic and scholarly reporting over just the past few years shows that such data appear far more often in the conduct of regular search behavior than might be assumed.[31]

Better assessing the factual basis of web search returns for national security incidents and terrorist activities, in particular, is critical for a number of reasons. Most broadly, search engines are widely used, arguably more so than any other non-oral method of seeking and retrieving information.[32] As such, they often remain outside the purview of regulators and policymakers with the task of ensuring the legitimate function of democratic discourse in mind, several politicized exceptions since 2016 notwithstanding.[33] Search engine usage also has a reinforcing effect on user confidence in their view of issues and in their certainty that the information they receive is credible, often at the expense of alternative disconfirming information later introduced.[34] Given that web search clearly influences opinion on critical sociopolitical, economic, and policy issues[35]—as well as the fact that search engine results often inform the provision of information on secondary platforms, from social media to traditional news reporting—the potential for inaccurate information in standard web search experiences is concerning.[36]

With national security incidents, in particular, misrepresentations of real-world events and political responses thereto might prompt deviant behavior on the part of publics, governments and even terrorist groups. After all, governments' understanding of public perception often shapes the contours of overarching counterterrorism strategies, up to and including broad programs of economic development, social outreach, and foreign policy posture.[37] Publics likewise express support for or against particular courses of action based on their understanding of cases and case narrative represented in more or less divided national (or regional or international) public discourse.[38] Given that such divisiveness may increasingly be an artifact of algorithmic shortcomings, public expression would resultantly also be artificially distinct from what may be found under ideal circumstances.[39] And terrorist groups too may either make decisions about attack stratagems and tactics based on either a faulty read of public information conditions or, under a worst case scenario, alter their approach to take advantage of such artificial divisions.[40]

Methods

On August 26, 2021, a suicide bomber detonated a belt laden with explosives at Abbey Gate, one of the several key entrances to the Hamid Karzai International Airport that was—at that time—the site of frenzied efforts to evacuate a great diversity of individuals from the Taliban-controlled city. Immediately following the attack, gunmen opened fire on the assembled crowd at Abbey Gate and a firefight erupted with American service personnel operating the entryway.[41] The death toll of this attack, which was quickly claimed as the work of ISIS-K operatives, was 183 people, mostly Afghan civilians.[42] However, thirteen members of the U.S. military died in the attack[43] and the United States

also admitted that some casualties of the gunfight may have been the result of friendly fire by panicked responding servicemen and servicewomen.[44]

In the hours following the attack, an agent-based testing infrastructure—setup to study the informational elements of terrorist incidents several months prior to the events of August 26—was employed to study the varying lenses through which people around the world and in diverse media ecosystems viewed the unfolding dimensions of the crisis. This section describes these methods and lays the foundation for reporting this study's results in the sections to follow.

Agent-based modeling

This study joins others that have employed autonomous agents to study digital behaviors and the contours of algorithmic systems with which everyday users of the Internet interact.[45] Early work using these methods is just over a decade old and aimed to examine how the information orientation of web users interacted with the parameters of web search algorithms.[46] Various studies since 2011 have demonstrated that personalization algorithms permit biased search outcomes in the case of particular online personas (i.e. individuals that opt towards politically defined phraseology and terminology).[47] Other studies in recent years have employed a hybrid approach, using surveys or other crowdsourced data to compare the results that different users receive dependent on different tiers of exposure to search engine personalization,[48] from completely un-personalized results to those catalogued by agents employed in different geographic regions.[49]

The core of this method is the use of software the simulates the information seeking behavior of median Internet users. There are a number of benefits to using autonomous agents for recording information in an online setting beyond what one might expect in comparison with a supervised alternative, such as employing student human coders or coordinating a study via the use of a platform like MTurk. Most of these benefits come down to having direct control over what algorithmic settings are encountered by the user (or agent, in this case). By varying the location of agents under a central design scheme, researchers can more reasonably assess geographic variation in the conditions encountered by a user.[50] Likewise, by employing agents either gradually or all at once, researchers can bypass bias injected into the process by the research activity itself. After all, when a large number of persons in an area begin to search for information on a given topic, the algorithmic underpinnings of the search engine in question alter the probability that information in general and information from particular sources will be presented nearer to the top of presented results. And, finally, autonomous agent can be employed from machines and under operating conditions that are identical to one another so that no variation in how web search activity is personalized based on processor capacity, operating system, browser choice, browser versions, mobile vs. other device preferences, and more enters the study.

The data collection process

All agents in this study were employed between August 26, 2021, and September 27, 2021. Autonomous agents were controlled via use of Amazon's Elastic Compute Cloud (EC2) in much the fashion that similar studies of web search dynamics have in recent years. The in-browser software setup for data gathering was extremely straightforward and, following Urman et al.,[51] involved using a pair of browser plugins to direct two sets of activities.[52] The first was the opening of a browser page (both Firefox and Chrome were employed in this study) based on certain pre-established search criteria. The second was a tracker that recorded the basic HTML contents of the first page of search results in a separate location.

This study then took an additional step not commonly taken in such web search-focused studies. Specifically, we employed a scraping tool to visit the URLs presented in different search engine results in real time and collect the contents of those pages in a separate location for later analysis.[53] There were a small handful of exceptions to this data collection entered in the form of

a domain-based stoplist that omitted certain webpages based on their generic presentation of information (primarily Wikipedia). In the sections that follow, we parse the content of these pages and apply a topic modeling treatment to show how content presented to information searchers not only varies over time in terms of the sites presented in different search engines in different locations but also within the same high-profile information sources over time.[54] And since the data were gathered in real time, we avoid any of the problems that conventionally arise around website editing and optimization following publication of initial information.

Multiple search engines

Autonomous agents were employed to search for information about the Kabul Airport bombing across six search engines: Bing, Yahoo, Google, DuckDuckGo, Yandex, and Baidu. These search engines are, not coincidentally, the most popular search engines globally by market share.[55] While there is clearly a case for replicating this and other studies centering on less popular search engines—perhaps particularly those with exclusive populations in countries like Russia, Iran, or even Vietnam—the case for greatest generalizability from focus on these top platforms is strong. For each engine, agents were deployed at five-day intervals for a total of six deployments. Thirty agents were deployed for each search engine, half using Chrome as the browser and half using Firefox. No significant differences in results from browser usage presented in the conduct of the study. Thirty agents were selected so as to allow for various information orientations (discussed below) and browser controls. Across the timeframe of the study, no significant issues were encountered in the deployment of agents barring a single instance in which one search engine (Yandex) barred further queries due to bot-detection alarms. This experience mirrors what other researchers, notably Urman et al., have reported in their research.[56]

Information orientations

To better examine the potential malperformance of search engines and the impact of algorithmic underpinnings around information search behaviors, we followed Unkel and Haim's general design for agent-based testing centered on information orientations.[57] In their study, Unkel and Haim varied their search queries via an understanding of voters (their study focused on national elections in Germany) as focused on different elements of unfolding events. The authors argued that different persons might search for information centered on (1) party platforms and happenings, (2) specific candidates and their campaigns, as well as on (3) issues, (4) factual information about an election process itself, and what they (5) election guidance, which is essentially the search for opinion-based advice and spin reporting. Taken together, these orientations reflect a reasonable spread of those informational interests seen to be expressed in voter and consumer behavior on a number of fronts in diverse literature in political science, economics, and communications.

  Unkel and Haim base their typology of information orientation on the well-known Michigan model.[58] As the focus here is not voting behavior but rather terrorist incidents, we adapted my approach to produce the following five categories of agent-based information orientation. First, we deploy a group of (1) *event fact* agents whose search queries center on the raw detail of the terrorist incident in question and responses to/recovery from the attack. Second, we deployed (2) *tactical grievance* agents whose incident queries center on the supposed rationale behind the attack. We also deployed (3) *strategic grievance* agents whose focus centered somewhat differently on the identity and motivations of the perpetrator, in this case ISIS-K. Finally, we deployed two agents that mirror the "issue" and "guidance" orientations suggested by Unkel and Haim. The first of these we label simply as (4) *political context* agents whose queries centered on the actors and contours of the recent Taliban reoccupation of Afghanistan and withdrawal of Western forces. And the second is a set of (5) *spin* agents who actively searched for voices offering opinion about the meaning and implications of the incident.

Agent deployment

Prior to the events in Kabul, we built a network of CentOS virtual machines across three regional locations for potential deployment for several studies: Northern Virginia (U.S. East), Paris (Europe) and Singapore (Asia Pacific). The theoretical considerations behind these choices were twofold. First, we sought to differentiate search dynamics between the United States, whose voice conventionally has distinct weight and inflection on matters of global terrorism, and other parts of the West. Here, that opportunistically produced an additional benefit, tragic though the events in Kabul were, where victims from the West were entirely members of the U.S. armed forces. Second, a non-Western location was also selected to capture both variation in geo-strategic perspective and areas in which multiple Western and other search engines are in common use. Additional locations could make further theoretical sense. However, the resource limitations on such further experimentation were steep and so constrained study parameters.

All told, the agents deployed for this study employed eighty-three distinct search queries modeled around the information orientation profiles listed above. At the base level, these included straightforward terms and phrases such as "Kabul airport" and "ISIS-K." Other terms from the different profiles included "Afghanistan withdrawal," "airport evacuation," "Kabul terrorism" and a set of issues related to the attack seeded by a peer group of colleagues prior to the first data collection run.

Results were stored for the first page of search returns (extended to thirty entries), including all preview text information and URLs, ordinal page rank, and page titles.[59] "Similar search term" suggestions were also captured where relevant but this feature was not active on all instances. As mentioned above, a secondary script then visited these webpages and stored structured information regarding the content thereon, omitting multimedia. In some cases, only limited information was retained, as paywalls partially blocked content presented to users linked to certain publications. Overall, the length of browsing sessions was short, under five minutes in all instances across the month long period of the study before each was shut down and a clean instance was generated for the next test.

The Kabul airport bombing in diverse digital perspectives

The Kabul Airport bombing in 2021 followed a flurry of activity surrounding the withdrawal of American and other NATO force from Afghanistan. The withdrawal began pursuant to an arrangement, the Doha Agreement, signed between the Trump administration and the Taliban in February of the previous year and committed Western governments to a pullback timeline leading up to late summer of 2021.[60] As the early stages of this pullback got underway in late spring of 2021, the Taliban launched a major offensive against entrenched Afghan government forces.[61] Their advance was swift, unexpectedly so in the eyes of Western defense communities. By August, most of Afghanistan was under Taliban control, with the surrender of large formations of the Afghan National Army and the willing takeover of various provincial capitals making the collapse of the national government in Kabul all but inevitable.[62] By the second week in August, Taliban forces had Kabul surrounded and they took the city just a few days later.[63]

As the Taliban took control of Kabul, NATO forces retained control of Hamid Karzai International Airport. Indeed, the airport became the sole method of leaving Afghanistan by air virtually overnight and by August 15 had become the locus of much panic among the population of the city. The airport was the source of many Afghan military aircraft that fled to other parts of Central and South Asia, as well as the primary egress point for aircraft evacuating diplomatic personnel and general citizenry of the United States, the United Kingdom, Philippines, Italy, Spain, Germany, and many more nations. Beyond these operations, however, the airport supported unprecedented efforts made by many national governments, non-profit organizations and private entities to airlift as many Afghan nationals that wanted to leave the country—particularly those in danger of retaliation by the Taliban—as possible. Crowds formed around the main arteries leading to airport gates and numerous convoy operations designed to ferry groups of foreign-born evacuees to the airport—often with Taliban

assistance—were organized. By August 26, tens of thousands had fled Kabul and, though debate still continued in some settings about whether U.S. forces should extend their withdrawal timeline by several days, NATO forces were making preparations to fully evacuate the facility.

On August 26, an ISIS-K suicide bomber detonated an explosive belt alongside a canal area where American service personnel were manning a gate and performing checks of evacuee documents and affects.[64] Islamic State—Khorosan Province is an organization largely made up of imported extremists from Syria and Iraq alongside disaffected former members of the Afghan Taliban, Tehrik-i-Taliban Pakistan and even the Afghan National Army.[65] Its membership is drawn from across South Asia and claims allegiance to Abu-Bakr al Baghdadi. Its objectives are simple: to wrest control of large swathes of South Asia, including territories in Afghanistan, Pakistan, India, and Bangladesh for Islamic State under the banner of the Khorosan Province. Its foothold in the region remains small at time of writing but the group has succeeded in carrying out a number of attacks since 2015, including numerous sorties and terror attacks against the Afghan Taliban.[66]

While there was no warning in the moments leading up to the attack on Abbey Gate on August 26, a series of announcements and warnings about credible threats on the airport were voiced by British,[67] Australian,[68] and American intelligence sources earlier in the day.[69] The explosion occurred amidst the crowd waiting to approach the gate. Against the claims of some survivor accounts, there was only a single explosion followed by gunfire from fighters positioned some distance from the airport gate. The explosion and gun attack killed 170 Afghan civilians, several of which were dual-nationality British citizens, and took the lives of thirteen American service personnel.[70] No Taliban lives were lost but American defense officials have gone on record casting doubt over any Taliban involvement in or permissiveness of the attack.[71]

The two sections that follow outline the findings of the agent-based testing described above. The first looks to similarities and differences in search content returns across the different search engines in question, across each of the agent origin locations. The second reports returns for the varied information orientations described above, again across locations. Both sections array results along two lines. First, they present descriptive illustrations of the similarities encountered across platforms. Then, they address issues of misrepresentation (i.e. under-representation or misinformation) and malperformance.

Findings: Differences across search engines

Across the nearly seven dozen search queries employed by automated agents in this study, there is clear evidence of variation in outcomes in the kinds of information being presented by different search engines. As noted below, however, there appears to be only limited differentiation in outputs with reference to usage of competing browsers, mostly explained by the fact that two search engines accessed from one particular browser (Firefox) did not randomize top results. Thus, with space limitations in mind, this section focuses its presentation of results primarily on engine- and location-based findings.

Informational similarities

In the broadest sense, it is clear that there are enormous differences in the information search experience across search engines. In line with the expectations of past research discussed above, the findings of this study see similarity values across the search engines for multiple search terms (which are array below in Figure 1, using two search terms as examples) below .33 in over 94 percent of all cases. While some variation in outputs is to be expected of services that utilize fundamentally different algorithms—with all of the design intentionality and process-based idiosyncrasies that implies—the scope of this variation is remarkable. Users are clearly presented with dramatically different pieces of information. These findings make this statement undeniable even if the same *kind* of information or information perspective were being presented by reference to different sources. We address this below. However, it is also worthwhile noting in these initial results that there is
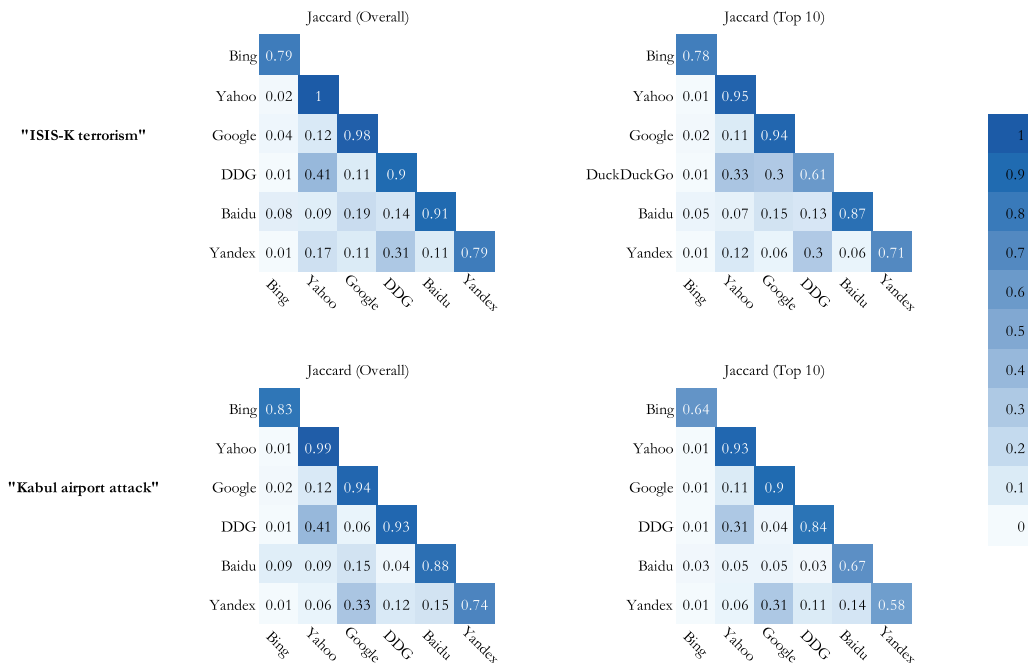
Figure 1. Cross-engine similarities for search engine queries "ISIS-K terrorism" and "Kabul airport attack."

great volatility in page ranking similar to that noted by Urman et al.[72] This is not sensitive to personalization and essentially means that information presentation differs dramatically for users even with usage of just one search engine.

It is this randomization effect that has particular consequences in the West. Since Google accounts for something near 90 percent of all search engine usage across North America and Europe, the high degree of variability across all search engines has limited implications for regions where platform preference is relatively homogenous. Rather, vendor-side randomization, which is substantial in it's presentation effects, is the source of radically different information even for users operating in non-personalized settings and using the same engine.

For significant issues of international affairs and security, however, the basic lack of similarity in outputs across search engines is immediately concerning. When it comes to transnational terrorism, low similarity information search retrieval means that national publics are potentially seeing very different narratives and curated fact portfolios about the events—and responses—in question. This has grave implications for foreign policymaking given the degree to which decision-making about counterterrorism narratives and diplomacy often assigns static values to foreign government and public preferences.[73] In other words, not only is the information environment subject to manipulation along conventional cultural- or regime-specific lines, but rather also fluid in a manner determined by the design and management practices of technology vendors.

Looking to more specific query-based analysis with Figure 2, there are noteworthy differences in both the search result content being represented by the search engines and the kinds of media that are being relied upon, particularly for the top ten results on each platform. The figures below reflect search returns for similar seed phrases split along two lines. The first set explicitly mention terrorism, specifically "ISIS-K attack," "Kabul terrorism" and "Kabul airport attack." The second set rely on temporal proximity to the events of August 26 and search for more generic location- and context-based information, specifically "Afghanistan withdrawal," "Kabul airport" and "ISIS-K." These six queries are simply representative of the many (n = 83) queries employed, many of which could similarly be placed in the same categories of explicit vs. implicit reference to terrorism.
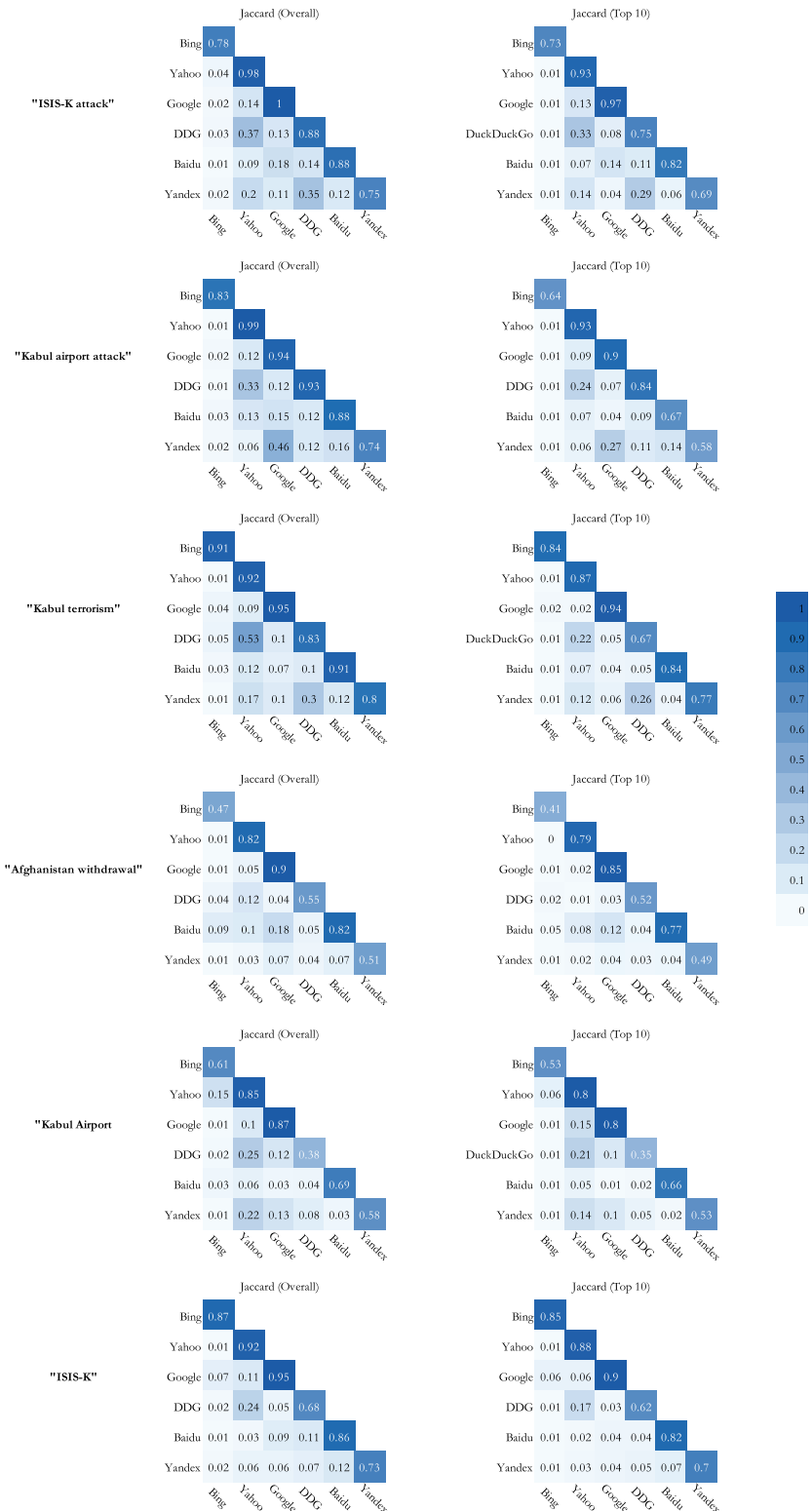
Figure 2. Cross-engine similarities for terms that explicitly mention the terror event vs. those that do not.

Search outputs engines are generally as dissimilar for these queries as they are for the entire set of findings. However, there is much greater dissonance for queries that do not explicitly reference terrorism or an attack in Kabul (or linked to ISIS-K, in Afghanistan, etc.). This is to be expected, as searching for context or for a specific incident only by contextual reference necessarily prompts the algorithm to cast a wider net around possible pieces of relevant information for the user. What's striking here is both how limited the similarity overlap is between search engines across terror-specific queries at the baseline and then how much less similar again overlap is for the set of broader queries. Even within single search engines, as noted above, randomization means that users of the same tools are likely to get vastly different individual pieces of information, even if the actual content conveys similar meaning or facts. Across engines, the dissimilarities are pronounced.

These findings must, naturally, be contextualized. After all, if what we witness here is simply different algorithms finding similar kinds of information in entirely different sources and presenting a balanced portfolio of results, then it might be said that the cross-national and cross-platform user experience is less unique than might otherwise be suggested. Indeed, this reality is to be expected to some great degree, as search engine operators take into account, among other factors, regional preferences for news sources and usership of social aggregation or other sites. Thus, it is important that we consider specific variation in information sources being relied upon across engines and then the same across distinct locations.

Figure 3 below arrays the two categories of search query findings by type of media found in the top three and top thirty results for each search engine. The categorization of media type borrows from Urman et al.'s study and represents a robust cross-section of possible information types encountered by search engine users in a typical setting. The cross-engine results tell us several things about the engines involved, namely that Western vendors favor traditional news media sources in reporting results. This is slightly more the case with the event-specific queries but the difference is seemingly not significant. Of interest, however, is the fact that Google almost never returns purely informational results to the user—meaning repositories of curated information like Wikipedia—for event-specific searches but does so for the alternatives. Several search engines present much more user-oriented social or opinion content for broader queries about the context of the Kabul attack than for event-specific ones. And the most narrowband specification of interest in the airport attack—i.e. "Kabul airport attack"—returns substantially more social media content for all search engines except Bing. Indeed, Bing presents as something of an outlier in each case, presenting a simpler cross-section of traditional media coverage and reference sites than the rest.

The same findings presented across the three locations from which autonomous agents were employed in this study show similar trends across the two categories of search query (simplified here in Figure 4 for space purposes to center on just one query—event-specific search), at least in terms of the general scope of differences between the two. The proportion of traditional news coverage is greater from Europe-based users than those in the United States, which might be expected given higher saturation of Google usage relative to obvious alternatives like Bing and Yahoo. Of most interest, however, are the results obtained from users based in Singapore. Here, there is a substantially higher proportion of social media, news aggregator, alternative media, and politician-specific (or party-specific) results in the returns of most engines relative to the American and European counterpart experiences. Again, Bing and Yahoo stand out as exceptions to this differentiated experience but the dynamic holds for both event-explicit and contextual queries, with social media and political sources appearing even more often with the latter.

There are a great many factors that seem to determine differences in information being presented to end users. Aside from engine-side dynamics, the management practices and underlying algorithms involved in the production of content for sources prioritized by search engines affect a second layer of variation that is passed on to the information seeker. The question of variation in search results based on such practices is particularly significant for incidents of national and international importance, doubly so when unprecedented events coincide with periods of critical activity (such as a terrorist attack during an international crisis). In those instances, human agency is often responsible for radical

Figure 3. Media type in top results (top three and top thirty) by search engine across two query types (explicit event search and other).

shifts in everything from editorial practice to social media engagement, which drives usership and impacts the decisions made by search engine algorithms. Thus, it is necessary to look more closely at the content of search engine returns to truly get an idea of variation in information presentation across distinct global circumstances.

Misrepresentation and malperformance

Here, we accomplish such a granular review of content various over time by use of topic models. Probabilistic topic modeling allows for the discovery of thematic similarities spread across an otherwise unstructured corpus of documents,[74] in this case the content scraped from URLs presented in
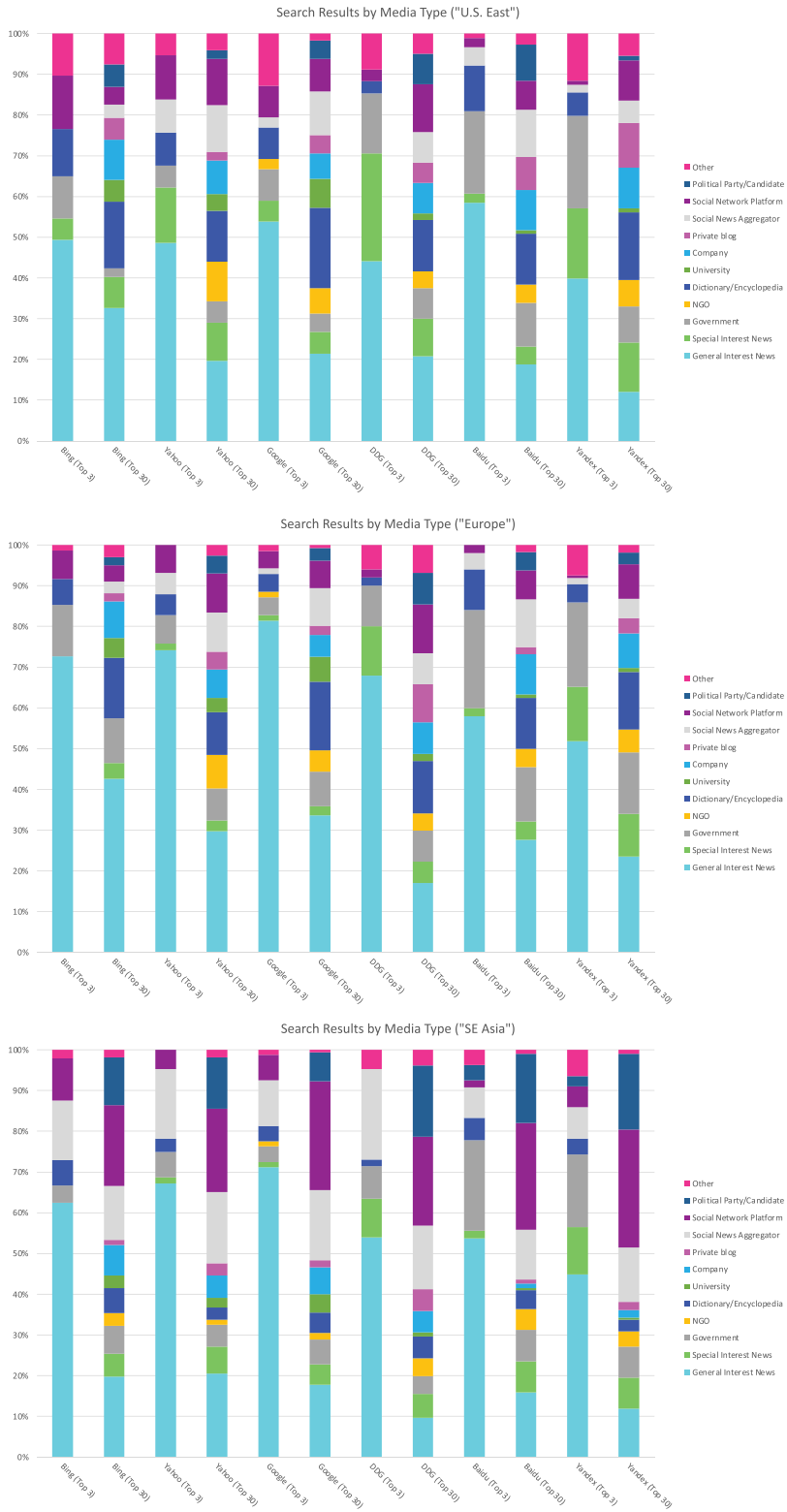
Figure 4. Media type in top results (top three and top thirty) by search engine across for explicit event search across three locations.

Table 1. Top ten words for 10 topic model across all search engines for event-explicit vs. other queries from LDA

Explicit Event Search	Topic	Contextual Event Search
Crisis, evacuation, agreement, agree, out, timeline, attack, overtake, kind, advance	1	*Attack, capital, american, evacuees, documents, substitute, checkpoint, terrorist, british, soldier*
Kill, gunmen, fatality, soldier, protect, khorosan, casualty, isis, crowd, explosion	2	*Evacuation, takeover, city, resistance, holdout, firm, remove, flee, unsafe, foreign*
Bomb, explosion, gate, radius, shot, panic, bombing, bomber, egress, gates	3	*Internet, intelligence, surprise, embassy, plan, removal, assistance, deadline, agreement, major*
Troops, assistance, overtake, surrender, taliban, convoy, assist, agreement, fighters, citizens	4	*Bombing, explosion, casualties, fire, area, morning, gunmen, isis, attack, terror*
Condemn, response, terror, macron, nato, view, minister, release, assistance, afghan	5	*Information, call, security, responsibility, administration, beijing, close, leader, taliban, slow*
Biden, evacuate, administration, deal, flights, deadline, trump, agreement, days, limit	6	*Group, women, evacuate, organization, taliban, occupation, girls, assume, team, funds*
Occupation, america, capital, karzai, responsibility, fleeing, mission, leave, troops	7	*American, trump, ana, speed, imperial, karzai, collapse, biden, further, out*
Cross, aid, casualties, response, gates, timeline, injured, dead, organizations, workers	8	*Welcome, support, sorrow, assistance, jinping, legs, biden, leave, response, islamic*
Security, terminal, route, safety, vehicle, taliban, embassy, Emirates, staff, safely	9	*Libya, isis, tension, attack, radical, abandon, cities, taliban, Pakistan, border*
Discourse, irresponsible, short, western, bridge, risk, potential, islamic, extremism, chapter	10	*Flee, responsibility, Iraq, karzai, timeline, august, deadline, washington, biden, condemn*

testing across different queries, locations, and engines.[75] The discovery of these themes happens inductively and only requires a few decisions on the part of the researcher, notably the number of topics desired, the nature of a stoplist to be used and the smoothing requirements of the model.[76] Table 1 illustrates a basic thematic analysis of the content by outlining the top ten words by topic in content across search engines for the two explicit vs. implicit queries used in the sections above. The value of this data is instantly clear, as it provides a method of considering the value of information being presented beyond just labeling sources.

Figure 5 then operationalizes the thematic information gained from the topic model in a simple fashion for two of the more divergent search engines (as determined by the similarity testing above), Google and Baidu. We consider the context of different themes in detail in the discussion section below. Here, however, it is sufficient to color code the topics across engines and queries to illustrate the degree to which information makes up a part of what is presented to end users over time. Figure 5 outlines this information across the month of data gathered around and after the Kabul airport attack in late August. Several dramatic differences in thematic representation are immediately clear. It is naturally to be expected that topics are not represented equally across the period, with prominent thematic elements appearing as new developments are made public and others disappearing as the crisis moves to new stages. Here, there is clear variation in how prominently new themes appear across engines. At the onset of the episode, Google search queries produce significantly more incident-specific information across sources than is true with Baidu, despite a clear convergence of these trends by September 2. Baidu, by contrast, returns information across sources that relate the incident to geopolitical context even on day 1 of the episode, particularly returning thematic content focused on the actions of the former Trump administration, the current Biden administration and the context of Western responsibility for events in Afghanistan as a much more substantial proportion of the whole than Google. Finally, while Google expectedly returns information thematically linked to the condemnation of global leaders and other voices in the days following the attack at Abbey Gate, Baidu returns remarkably little of the same before until the fourth day of the crisis.

Finally, to the question of imprecision and accuracy in the results obtained in the course of this study, we employ an additional test on the various corpi of search results across queries secured above. Table 2 below illustrates the findings of a standard misinformation detection tool (the Fake News Detection tool) for the set of explicit queries used in the foregoing topic model illustrations. The table presents a score for
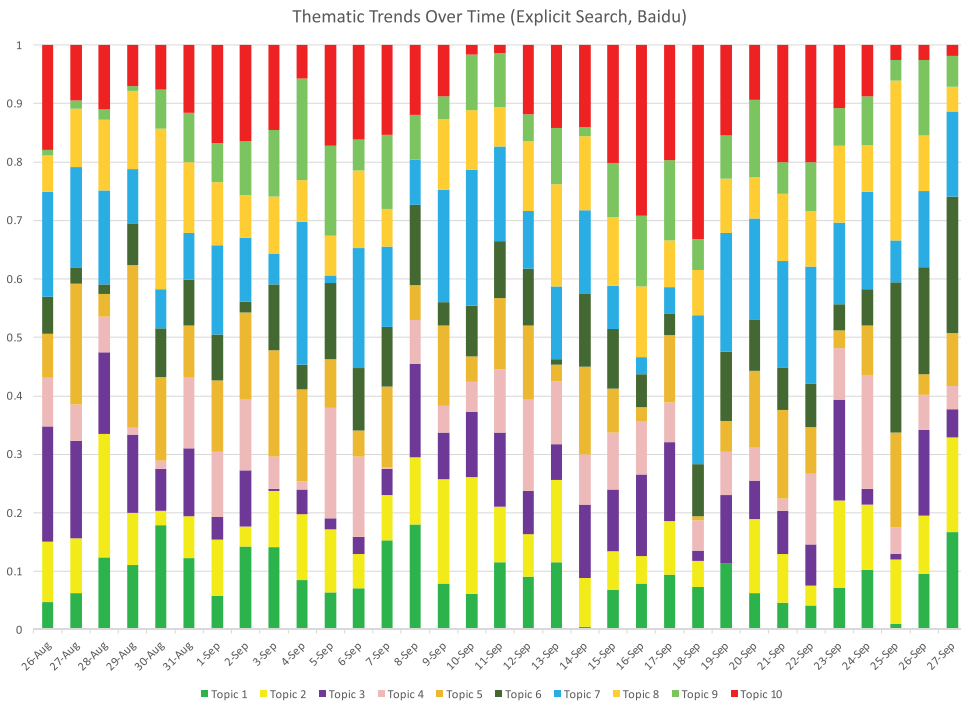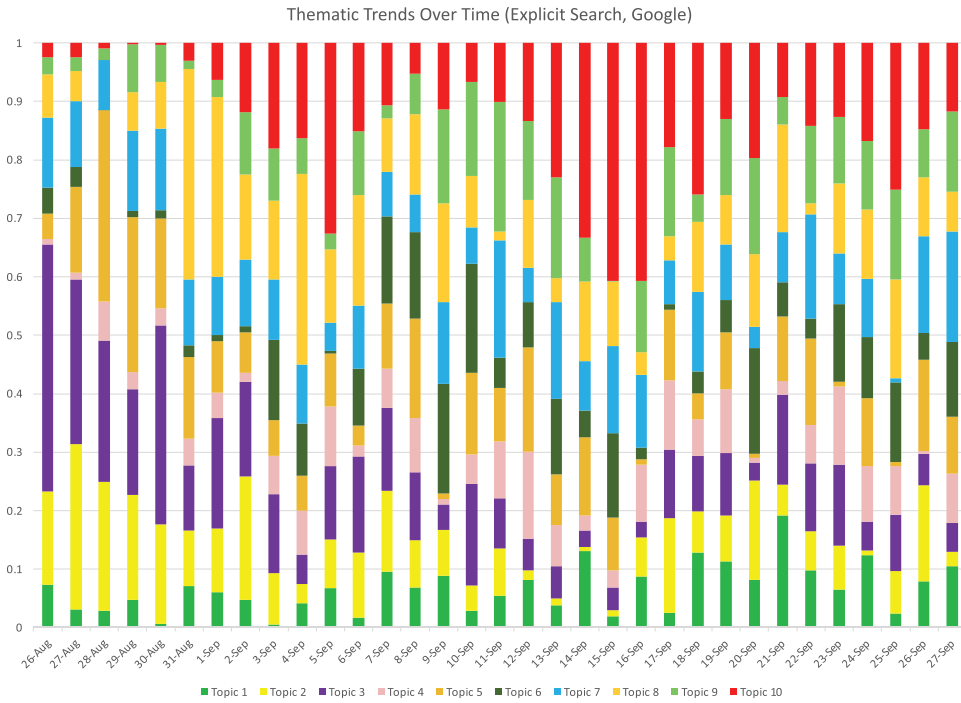
Figure 5. Thematic trends over time, ten topic model by engines (Google and Baidu).

Table 2. Misinformation scores for perceived accuracy of statements made across content

	>25% Accuracy (U.S. East)	>10% Accuracy (U.S. East)	>5% Accuracy (U.S. East)	>1% Accuracy (U.S. East)	>25% Accuracy (Europe)	>10% Accuracy (Europe)	>5% Accuracy (Europe)	>1% Accuracy (Europe)	>25% Accuracy (SE Asia)	>10% Accuracy (SE Asia)	>5% Accuracy (SE Asia)	>1% Accuracy (SE Asia)
Bing (Top 3)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Bing (Top 30)	94%	96%	99%	100%	92%	96%	98%	100%	90%	95%	98%	99%
Yahoo (Top 3)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Yahoo (Top 30)	98%	99%	100%	100%	97%	99%	99%	100%	92%	99%	100%	100%
Google (Top 3)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Google (Top 30)	99%	100%	100%	100%	98%	99%	100%	100%	96%	100%	100%	100%
DDG (Top 3)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
DDG (Top 30)	91%	92%	100%	100%	88%	92%	98%	99%	87%	92%	93%	100%
Baidu (Top 3)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Baidu (Top 30)	95%	98%	100%	100%	93%	95%	98%	100%	83%	89%	97%	100%
Yandex (Top 3)	98%	100%	100%	100%	98%	100%	100%	100%	98%	99%	100%	100%
Yandex (Top 30)	83%	88%	92%	99%	92%	97%	99%	100%	73%	90%	94%	99%

the perceived accuracy of statements made in content (at the level of single web pages) across several thresholds as a percentage of content deemed as fully accurate. As might be expected, all search engines present more accurate results at lower levels of inaccuracy detected (i.e. all engines present results that are at least 5 percent accurate roughly 100 percent of the time).

At higher thresholds, however, there is some concerning variation in outputs that varies across geographical locations. Specifically, Yandex, Baidu and (to a lesser degree) DuckDuckGo present content that has between 10 percent and 25 percent inaccuracies between 10 percent and 27 percent of the time. This dynamic is significantly more pronounced in search results obtained by the Singapore-based agents than with those in Europe and North America.

Findings: Information orientations

In this section, we repeat the presentation of results outlined above with specific reference to the personalized search experiences outlined in the foregoing methods section. Specifically, the data here emerges from focus on five distinct information orientations. To reiterate, briefly, these involve (1) *event fact* agents whose queries center on the raw detail of incidents as well as responses to/recovery from the attack; (2) *tactical grievance* agents that center on the supposed rationale behind the attack; (3) *strategic grievance* agents that focus on the identity and motivations of the perpetrator (here, ISIS-K); (4) *political context* agents whose queries center on the contours of the recent Taliban reoccupation of Afghanistan and withdrawal of Western forces; and (5) *spin* agents that actively look for voices offering opinion about the meaning and implications of the incident.

Informational similarities

As Figure 6 below shows, the wide gap in search experience outlined in the section above widens yet further when we consider the context of personalized information seeking habits. Jaccard similarity metrics are under .3 in more than 98.3 percent of all cases, suggesting that narrowcasting one's search interests combines with the underlying features of diverse web search engine algorithms and other presets to produce unique browsing situations in an exceedingly high number of instances. Ironically, the most minimal differences between engines can be seen with spin agents. This is likely a result of the way in which search was executed in this study, however, with this information orientation seeking contextualization and meaning rather than looking for specific voices (for instance, queries like "Kabul attack Anderson Cooper" or "ISIS attack Joe Rogan"), as many web users undoubtedly do.
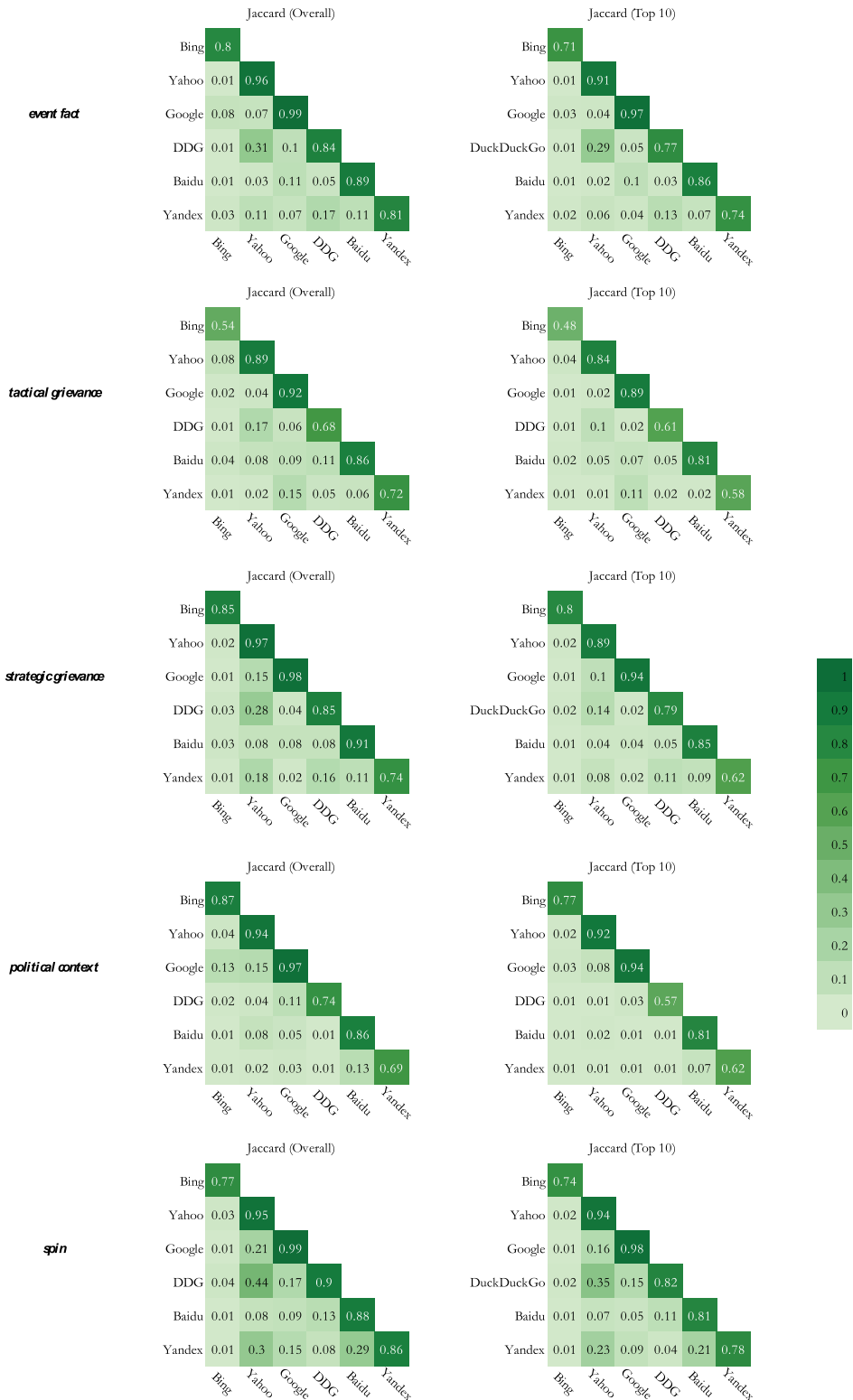
Figure 6. Cross-engine similarities for different information orientations.
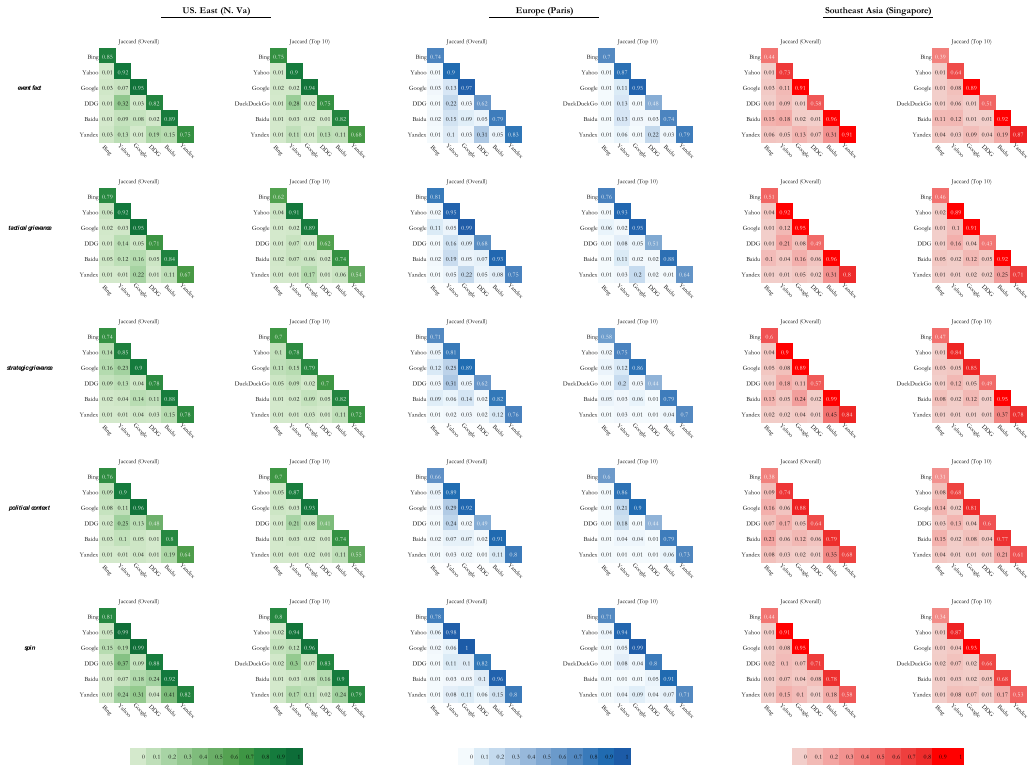
Figure 7. Cross-engine similarities for different information orientations across locations.

Interestingly, in Figure 7, this outlier dynamic appears to disappear in the non-American location cases when we consider the returns of agents across search engines with reference to distinct information orientations for all but two engines (Bing and Yahoo). This is perhaps because regional tailoring of search algorithms acknowledges the geopolitical context of users in more (linguistically, politically and culturally) diverse, densely populated regions like Europe or Southeast Asia.

The types of media seen across information orientations across different engines also differ somewhat dramatically, though perhaps unexpectedly. Event fact agents saw conventional news media sourcing of more than 50 percent of all information returned across all search engines in contrast with a high volume of social media, political and expert commentary media returned for the two grievance agents. Event fact agents also saw substantial referential (Wikipedia and "what you need to know"-style work, in particular) and fact-checker, as did the political context orientation. Spin agents, unsurprisingly, returned a great amount of political and expert commentary but ironically saw much lower social media inclusion than the grievance orientations. Again, this is likely because of the generalized nature of the spin queries employed for this study against the alternative of much more highly targeted voice search that is difficult to systematically study.

Finally, in Figure 8, media type differentiation across locations paralleled the above similarity findings in many ways. Where there was more clearcut cross-engine variation in findings for the non-American agents, there is also more diversity in the media types encountered in those locations across all search engines by Bing. Here, as with before, Bing's search algorithm seems to be unique in how it prioritizes just a few kinds of informational content above others. In the interests of space, however, we do not present these results here as they substantially parallel the trends presented in the foregoing subsection.

Figure 8. Media type in top results (top 3 and top 30) by search engine across information orientations.

Misrepresentation and malperformance

Mirroring the analysis of the previous section, we obtained further results from a topic model that arrays thematic information about the content encountered in the top thirty results across engines and search orientations. The topics are available in this paper's appendix across query types and search orientations, but generally reflect a similar thematic breakdown of content to that seen in the above subsection (i.e. event-specific topics, various contextual themes, etc.).

Figure 9 takes a novel approach to comparing the topics obtained during testing. Specifically, Figure 9 shows one version of a similarity test for the ten topics obtained for one style of search query (event-specific) across two information orientations, namely the *event fact* and *spin* orientations. In testing the validity of different modeling parameters, a researcher might use this technique to visualize similarities between model outcomes, generally hoping to see as much blue (i.e. as close to similar as possible) on the chart as possible. Here, some variation is expected but the incidence of so much red on the chart (i.e. topics that are more or less dissimilar to one another) illustrates effectively how divergent the search outputs are for distinct information orientations.

Finally, the table below (Table 3), repeats the accuracy testing of the last section and arrays results for all search engines (both top three and top thirty results) across each information orientation and accuracy categories. As before, there is relative consistency in the finding that most search engines
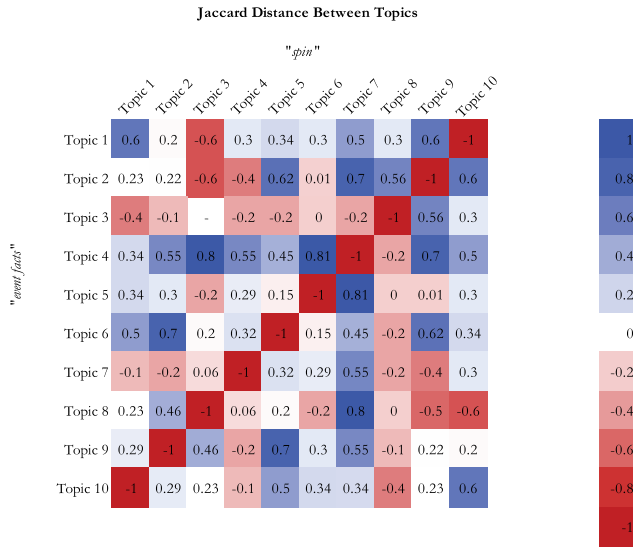
Jaccard Distance Between Topics

"spin"

	Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6	Topic 7	Topic 8	Topic 9	Topic 10
Topic 1	0.6	0.2	-0.6	0.3	0.34	0.3	0.5	0.3	0.6	-1
Topic 2	0.23	0.22	-0.6	-0.4	0.62	0.01	0.7	0.56	-1	0.6
Topic 3	-0.4	-0.1	-	-0.2	-0.2	0	-0.2	-1	0.56	0.3
Topic 4	0.34	0.55	0.8	0.55	0.45	0.81	-1	-0.2	0.7	0.5
Topic 5	0.34	0.3	-0.2	0.29	0.15	-1	0.81	0	0.01	0.3
Topic 6	0.5	0.7	0.2	0.32	-1	0.15	0.45	-0.2	0.62	0.34
Topic 7	-0.1	-0.2	0.06	-1	0.32	0.29	0.55	-0.2	-0.4	0.3
Topic 8	0.23	0.46	-1	0.06	0.2	-0.2	0.8	0	-0.5	-0.6
Topic 9	0.29	-1	0.46	-0.2	0.7	0.3	0.55	-0.1	0.22	0.2
Topic 10	-1	0.29	0.23	-0.1	0.5	0.34	0.34	-0.4	0.23	0.6

"event facts" (vertical axis label)

Legend scale: 1, 0.8, 0.6, 0.4, 0.2, 0, -0.2, -0.4, -0.6, -0.8, -1

Figure 9. Jaccard similarity measures for ten topic model LDA for one style of search query (event-specific) across two information orientations (*event fact* and *spin*).

return highly inaccurate results (e.g. a conspiracy theory webpage) in extremely rare instances. This is particularly true with the "top three" results returned by each engine. Some smaller proportion of inaccurate statements found in engine returns appears somewhat common, however, with notable variation across orientations.

The *event facts* agency is by far the orientation that corresponds to the most accurate search results across search engines, with even minimally inaccurate content appearing across a tiny fraction of returns. Other orientations return partially inaccurate information sources across a substantial minority of instances. In some cases, this appears to be specific to an engine in the aggregate. Yandex, for instance, performs quite poorly at both 10 percent and 5 percent thresholds across all orientations bar "*event facts*," as does DuckDuckGo. The distance in performance between Baidu's performance for top three results returned is also unusually high when compared with the other "gold standard" engines, Google and Yahoo. The only engine with a similar discrepant distance is Bing, which interestingly returned information sources within the top thirty entries that were notably less accurate than the top three, but only for the *spin, tactical grievance* and, in particular, *strategic grievance* orientations. The takeaway from these findings is fairly clear and simple—there are real and significant differences in source type and source accuracy across search engines and information orientations, meaning that the underlying algorithmic assumptions about user search preferences is impactfully variable across commercial providers of search services.

Discussion: The informational anatomy of terror

The attack by ISIS-K bombers and gunmen on the Abbey Gate represented a high point of insecurity in a broader foreign policy episode of nigh unprecedented form. Not, arguably, since the rapid rescue of American government personnel and other fleeing persons from Saigon in 1975 has such a substantial evacuation event coincided with such a dramatic development in the international security interests of Western countries. With the fall of Afghanistan to the resurgent Taliban and the withdrawal of American-led forces by the end of August, the security focus of the United States and her partners in South Asia has shifted back towards offshore management of extremist and state-sponsored security threats for the first time in two decades. Clearly, the public sphere developments and narratives surrounding the terror attack thus not only shaped transnational attitudes towards

Table 3. Misinformation scores for perceived accuracy of statements made across content

	>10% Accuracy (event facts)	>5% Accuracy (event facts)	>1% Accuracy (event facts)	>10% Accuracy (tactical grievance)	>5% Accuracy (tactical grievance)	>1% Accuracy (tactical grievance)	>10% Accuracy (strategic grievance)	>5% Accuracy (strategic grievance)	>1% Accuracy (strategic grievance)	>10% Accuracy (political context)	>5% Accuracy (political context)	>1% Accuracy (political context)	>10% Accuracy (spin)	>5% Accuracy (spin)	>1% Accuracy (spin)
Bing (Top 3)	100%	100%	100%	98%	100%	100%	99%	100%	100%	95%	97%	100%	91%	94%	98%
Bing (Top 30)	96%	99%	99%	90%	95%	99%	82%	95%	98%	92%	95%	99%	87%	91%	96%
Yahoo (Top 3)	100%	100%	100%	95%	100%	100%	93%	98%	100%	96%	97%	100%	90%	92%	99%
Yahoo (Top 30)	98%	100%	100%	89%	97%	100%	90%	94%	99%	91%	93%	98%	85%	89%	95%
Google (Top 3)	100%	100%	100%	99%	100%	100%	100%	100%	100%	97%	99%	100%	96%	97%	100%
Google (Top 30)	100%	100%	100%	96%	99%	100%	94%	97%	99%	90%	95%	98%	90%	94%	99%
DDG (Top 3)	100%	100%	100%	95%	100%	100%	86%	88%	95%	89%	93%	95%	85%	89%	94%
DDG (Top 30)	95%	99%	100%	76%	84%	95%	80%	86%	94%	86%	94%	95%	80%	91%	97%
Baidu (Top 3)	100%	100%	100%	93%	96%	98%	94%	97%	99%	96%	97%	99%	94%	99%	100%
Baidu (Top 30)	98%	98%	100%	91%	94%	100%	86%	92%	97%	87%	96%	99%	83%	92%	97%
Yandex (Top 3)	98%	100%	100%	90%	93%	97%	84%	89%	96%	89%	93%	97%	88%	91%	94%
Yandex (Top 30)	94%	96%	99%	73%	83%	96%	79%	84%	92%	79%	84%	87%	72%	90%	99%

a specific extremist threat, but also likely cast the implications of the threat posed by ISIS-K in the variable context of—depending on the nature of information consumed—distinct geopolitical, parochial, and event-specific detail.

Divergent lenses

In the broadest sense, search engines return divergent information experiences to users despite some amount of evidence of general conformity in the way that they—the six major engines studied here, at any rate—select relevant information and sources for presentation in response to changing user inputs. Certainly, the types of media surveyed, the basic textual similarities across engines and more suggest that the algorithms underlying the diverse engines studied are motivated by similar design considerations. This implies that researchers might safely assume that certain broad details of terroristic incidents are encountered in a consistent fashion across global populations. In the details, however, there is substantial evidence that individuals searching for information in a unique fashion, from different locations and using different search engine products, view world events through distinct informational lenses.

With the attack on Abbey Gate during the evacuation of Kabul, there is clear volatility in the information viewed by agents even within single search engine contexts. Moreover, that variability increased given specific information query variation and search orientations such that, across engines, there is remarkably little chance that even uniquely influential media sources—such as the BBC, for example—will show up consistently across search instances. The nuance of this is laid out in the sections above, but the centrality of algorithmic idiosyncrasies can be typified in some simple examples. On one hand, the sizable variation in similarity of outcomes across search orientations shows that algorithms are reasonably sensitive to the syntax and wording of user inputs. This implies various potential sources of perturbation, such as model accuracy that differs across language and dialectic inputs. On the other hand, the aforementioned tendency of Google to avoid returning informational results (e.g. Wikipedia) for event-based queries in contrast with alternative search criterion might reflect an assumption that such sources will not contain episode-specific information relevant to the user in the near term. That may be correct in some sense, but the resulting behavior in the algorithm means that a Google user is likely to get less objective context in their search findings

than users of Yahoo or Yandex. This has various implications, the foremost of which is the reality that the population of non-encyclopedic drive citizen reactions to crisis, something that pushes back on the oft-cited idea that the Internet benefits citizenry and polities by providing a basic fact-checking and information updating resource.[77]

The interaction of user habits and algorithms

There is also a clear area of concern in the way that algorithmic tendencies might interact with user habits in the user of search engines. Generalized search, as illustrated in the sections above, lead to greater variation in informational outcomes across all search engines. This is concerning given that past research has established the tendency for information seekers to start with broad search criteria and then rapidly refine their search based on the interaction of user interests and the content of information provided. The implication here is simply that large variation at the initial stage of any information seeking endeavor involving search engines—as seen through the lens of this study—will inevitably produce substantially greater variation in subsequent targeted searches, regardless of whether or not the initial search terms were event-focused. This is prospectively a positive for search engine operation in the demonstrative sense if one assumes that the goal of such services is to furnish users with the possibility to get discrete, unique insight into topics that vary from alternatives only in small degrees. But the lack of consistent informational returns in the general sense may contribute to a lack of generalized common knowledge about national interests or historical context, among other things. Given that researchers and policymakers regularly presume that such common knowledge foundations exist at a sufficiently general level, these findings thus call into question the validity of countless foreign policymaking models and base assumptions.

Temporal-regional variation in information presentation

The sections above also show that the temporal view of the unfolding events in Afghanistan—and the broader South Asian region dealing with the fallout of the crisis—is starkly different for search engine users based on several factors. Perhaps the most obvious of these are regional variations in user characteristics, both in terms of differential search engine usage and location. As noted above in the topical comparison of search engine returns over time, Google search queries produce significantly more incident-specific information across sources from the start of the crisis than was true for Baidu, despite a clear convergence of trends by September 2. Baidu, by contrast, returned information across sources that relate the incident to geopolitical context even on day 1 of the episode, particularly returning thematic content focused on the actions of the former Trump administration, the current Biden administration and the context of Western responsibility for events in Afghanistan as a much more substantial proportion of the whole than Google. And while Google expectedly returns information thematically linked to the condemnation of global leaders and other voices in the days following the attack at Abbey Gate, Baidu returned remarkably little of the same before until the fourth day of the crisis. In broad terms, this variation may reflect different assumptions about information relevance baked into the products of companies from different national and regional marketplaces. Indeed, the fact that this is borne out despite locational variation in information returns suggests the validity of such a proposition. Southeast Asian searchers, for instance, were exposed to media content from much more diverse sources than European or American users across almost all queries and instances, notably social media aggregator or network sources. This, naturally, further underwrites the notion that the timeline of information about the Kabul attack diverged based on regional preferences and locations. But the fact that Baidu's presentation of information was distinct—insofar as it more clearly contextualized the crisis around Western actions and made reporting on the immediate response of world leaders less visible through the fourth day—across all locations studied illustrates the interaction of geographic vs. alternative considerations within the function of the company's algorithm. Personalization, geographic variations, and input query all affect content presentation, but core assumptions among different platforms about how to curate and present information to users are clearly the key determinants of divergent informational outcomes.

Search engine bias and malperformance in foreign policy

As noted above, the results of this study's research on search engine performance are remarkable. Certain assumptions about how to curate and present information to users are clearly held in common by the search engine providers. But there is substantial variation in the outputs based around a host of factors, from variable queries and query styles to information orientations and subsequent personalization, geographic location, and search engine choice. The results of the sections above illustrate that users' views of significant foreign policy crises are likely to vary greatly on a person-by-person basis. Most significantly, they are likely to do so in an expanding sense centered on two particular variables—information orientation and search engine choice. While the location of the searcher and their exact search terminology matters, these are clearly overridden by the ways in which searchers' attempt to contextualize their information seeking by looking for, among other things, objective facts, parochial details, or spin. Different algorithms clearly treat these queries by presenting information in different volumes and styles, from different kinds of sources (i.e. not just substitutable news media), and with increasing variability over time.

This article's study confirms that the characteristics of search engine design and usage are critical determinants of national responsiveness to terrorist and other security crises. As such, a number of implications emerge from the data produced here. In a broad sense, the performative implications of both terroristic and counterterror activities has become more complex in the twenty-first century. What's particularly noteworthy about the Kabul attack case is the global fallout and information variation. It's possible that terrorism or counterterrorism activities might succeed in controlling tight narratives in geographically constrained areas of operation, particularly where relative market dominance for one search medium exists. But it seems unlikely that even carefully tailored messaging will avoid falling prey to the perturbations of search engine function where the scope and policy implications are geographically expansive. This particularly suggests limitations for nations with global counterterrorism mission interests, as well as for transnational extremist movements that must couch their struggle in terms that find common cause across diverse locales, cultures and polities.

These results speak to a range of future potential research agendas for scholars of extremism and political violence. One obvious point of limitation in the use of autonomous agents is that they are designed and set to task by the researcher. While this succeeds in getting quite clearly to algorithmic dynamics set around fixed parameters (meaning that effects are not ambiguous), human users often revert to idiosyncratic habits and heuristics when searching for information. Examining these habits would do much to buttress and validate the methods of this study. Another set of research projects should focus on information sorting found beyond search engines. Clearly, search engines represent the most ubiquitous medium for information search today, and thus produce the most generalizable results for this kind of research. But extremist elements use a range of specific tools that themselves will help shape the perception, aspiration, and operationalization of terror activities. Both data science explorations and ethnographic investigations of these mediums would do much to advance these findings.

Search engine malperformance is also clearly an issue with implications for efforts to react to terrorist incidents. Here, again, it is the backend design features of different search platforms that are the critical determinant of much variation worthy of concern. The potential for misinformation to appear in search engine results, whilst rare in the extreme among high-level results, does exist for deeper search behaviors and across both specific engines (Yandex, in particular) and location. Clearly, the opportunity for fringe perspectives or factual error to inform individuals' search behavior and, possibly, their eventual view a crisis and its correlates is non-trivial. Indeed, the malperformance described and contextualized in the sections above draws out a clear imperative for policymakers, namely that the companies themselves and the algorithms they employ represent a critical driver of foreign policy dynamics. If these products so clearly produced dramatic variation in the informational context and subsequent perspectives of a given population, then their function must be made sufficiently transparent. Otherwise, there

is substantial risk to national security policymaking and other necessary government action premised on a simple inability for scholars, practitioners and others to effectively understand how information is curated, presented, and consumed in the twenty-first century.

Disclosure statement

Notes on contributor

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Notes

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