

Black Magazines as a Mirror to 1960-70s America: A machine learning perspective

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Abstract

In many ways, the turbulent times of the 1960s and early 1970s America, though fraught with social unrest, foreign crisis, and cultural revolution, played a great role in shaping a generation. In addition to the many significant developments of the time, this era was also a witness to changing African American society, lifestyle and culture. This evolution was also reflected in Black American magazines and publications of the time.

In this paper, we use machine learning and natural language processing tools to study two leading Black magazines – *Negro Digest* (later renamed *Black World*) and *Ebony* – for a period of 16 years from 1961 to 1976. Primarily, we observe one major shift in media narrative during this era that coincides with the end of the civil rights movement in 1968. Narratives connecting African Americans to race, discrimination, protests and movements, which are more pronounced during the civil rights era gradually make way for narratives related to African American art, music, culture and socio-economic development post 1968. Furthermore, we study changes in contextual relationship between pairs of words over time – in particular, how contextual association of a word with respect to identity words like “*black*” or “*negro*” changes with the gradual shift from “*negro*” to “*black*” as the more popular identity word.

Introduction

Since the latter half of the 20th century, news media has served to not only reflect and represent society’s morale, but has been an active participant in the social and political climate (Kamalipour & Carilli, 1998). Changes in media narratives are often reflective of

changing times (Ryan, 2004; Huisman, et al., 2006). These narratives are not simply determined as matter of two-party politics and a wider, more involved consideration of the discourse that shapes our society is required to feel out their contours and index evolutions in public opinion. Besides the usual social and political influences, one issue of key interest is the evolution of *blackness* as a staple idiom with African American or Black American publications (Curran, 2011).

Here, we focus on the time period of 1960s and early 1970s – a time period with monumental influence in shaping up the Black American society and culture of today (Smith, 1978; Isserman & Kazin, 2000; Schulman, 2001; Carlisle & Golson, 2008). This was a period of great social and political turmoil. The freedom struggle of the Black Americans seeking equal rights and social justice gained nationwide attention – a movement popularly known as the *civil rights movement* (Morris, 1986; Murphree, 2007). The assassination of the movement's greatest pioneer Dr. Martin Luther King in 1968 started a new phase marked by the rise of the Black Power (Van Deburg, 1992; Cone, 2008; Hamilton & Ture, 2011) and the Black Arts movements (Neal, 1968; Smethurst, 2006; Baker, 2018). This period was also replete with foreign crisis- the Vietnam war (1961-1975) and the many anti-war movements it spawned (Garfinkle, 1995; Summers, 1995; Moore, 1999), and the rise of a new counterculture and hippie revolution in late 1960s and early 1970s (Frank, 1998; Grunenberg & Harris, 2005; Rockwell & Goebel, 2008). A detailed timeline of the significant events of this time period is provided in **Supplementary Figure S1**.

In this paper, we attempt to understand how the social and political movements and developments of this era shaped media narratives through the lens of two leading monthly African American magazines of the time, *Negro Digest* – later renamed *Black World*, and *Ebony*. The massive scale of the text data available from these magazines over this period of 16 years makes it hard to carry out

subjective analysis and interpretation. To this end, we employ state-of-the-art machine learning and natural language processing tools to objectively quantify the differences in narratives between these magazines and also for the same magazine portal over time.

Our analysis points to one major shift in media narrative happening around the time of Dr. King's assassination in 1968 that marked the end of the civil rights movement. The narrative during the civil rights era (pre-1968) is driven more by social and political issues focusing on racism, discrimination, protest movement and freedom struggle. The post-1968 narrative however is driven by narratives related to the Black arts movement and ones talking about social and economic development. Also, this era saw a gradual decline in usage of the identity word "*negro*" which is largely substituted in later years by the identity word "*black*". This shift in identity revealed interesting examples of words showing increasing or decreasing trends of contextual association with identity words.

Methods and Materials

Founded originally in 1942 by the Chicago based publisher John Johnson, the *Negro Digest* magazine was revived in 1961 and was consistently in circulation for a period of 16 years from 1961 to 1976. In May 1970, this magazine was re-named *Black World*.

The *Ebony* magazine, also founded by John Johnson, was founded in 1945 and has been in continuous circulation since then up to this day. Soft copies of both these magazines have been archived from 1960 onwards in Google Books. We restricted our study to the time frame of 16 years (1961-1976) when both *Negro Digest/Black World* and *Ebony* were in circulation.

For each magazine, we legally obtained its Google Book version (<https://support.google.com/websearch/answer/43729?hl=en&rd>), then used Optical Character Recognition (OCR) to extract the

text (in `.txt`) from these files. This was followed by manual inspection of OCR quality, which was reasonably high, followed by correction of OCR errors. Next, we converted all the text to lowercase letters and removed any special characters and numbers from the extracted text. Some of the bigrams, say *civil rights*, were then converted into single word (“*civil-rights*”) so that we can demonstrate how the phrase as a whole shapes the narrative instead of the component words (“*civil*” and “*rights*”). Other examples of phrases that were converted into single words were *martin luther king* (*dr king*), *black power*, *black panther* and *malcolm x*. The monthly processed text data were aggregated into a yearly text file and these yearly text data were ultimately used as input in all our statistical modeling frameworks. See **Figure 1** for an illustration of the data collection and pre-processing steps.

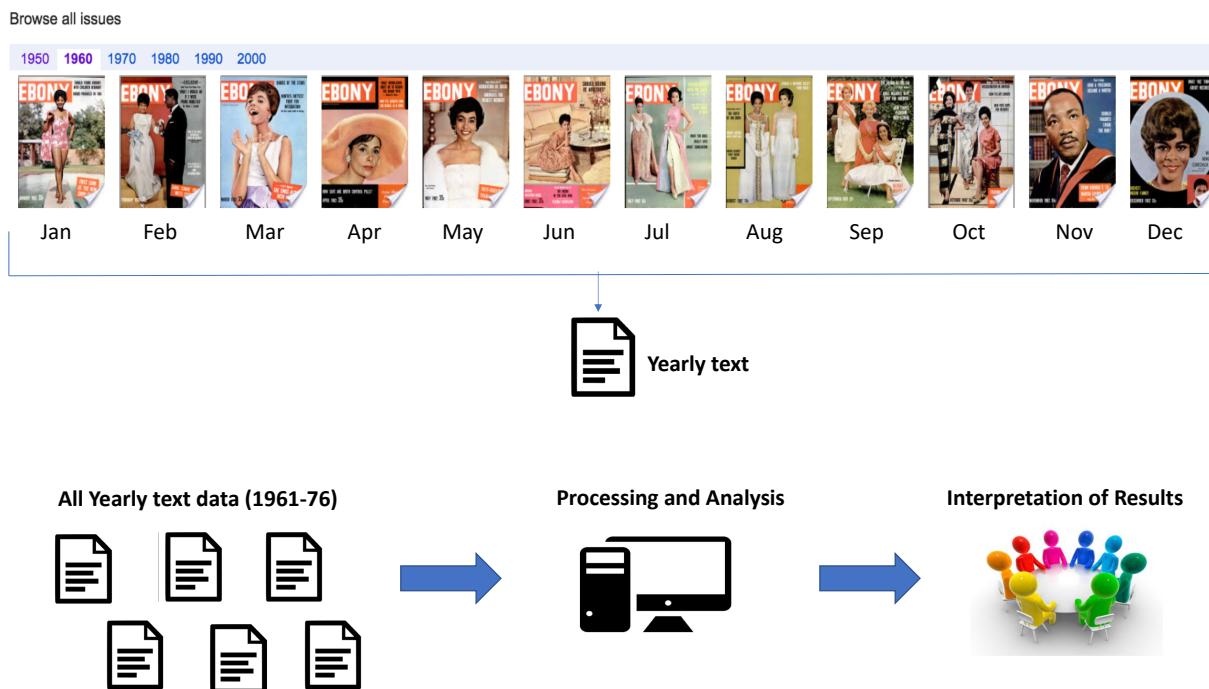


Figure 1: A demo of the entire workflow involving data collection, processing and analysis of the magazine data. The monthly issues of the magazines for a year are extracted from Google Books, then aggregated into a single yearly text. The yearly texts for 16 years of study (1961-1976) are processed and analyzed.

We employ two approaches to defining narratives and analyzing narrative shifts – one based on word frequency changes over time and the other accounting for changes in contextual similarity and co-occurrence patterns of different words over time.

Word Frequency Analysis

For this approach, we first compile the frequencies of occurrence of each word in the yearly magazine texts into a matrix of counts $C = ((c_{ng}))$ for each magazine. The rows of this matrix represent the year of publication, the columns represent the words in the vocabulary and each entry c_{ng} denotes the number of times word g occurs in the yearly text of year ($1960+n$).

Next we employ an unsupervised clustering framework that can identify narrative groups purely based on the word frequency matrix C for each magazine. The model we propose here is popularly known as topic models in natural language processing (Blei, et al., 2003; Blei & Lafferty, 2009). This model fits a multinomial model to each row n of the matrix C .

$$(c_{n1}, c_{n2}, \dots, c_{nG}) \sim \text{Mult}(c_{n+}, p_{n1}, p_{n2}, \dots, p_{nG})$$

where c_{n+} is the row sum of n th row of C . We assume a lower dimensional structure for the matrix $P = ((p_{ng}))$.

$$p_{ng} = \sum_{k=1}^K \omega_{nk} \theta_{kg} \text{ with } \sum_{k=1}^K \omega_{nk} = 1 \forall n \text{ and } \sum_{g=1}^G \theta_{kg} = 1 \forall k$$

Here K is the number of topics or *frequency narratives*, where each topic/narrative k is defined by the vector of θ_{kg} values, where θ_{kg} is the relative contribution of word g to narrative k . ω_{nk} denotes the proportional contribution or *grade of membership* of narrative k

in the yearly text for year (1960+n). The estimated ω_{nk} are plotted using a stacked bar chart, also called a STRUCTURE plot (Rosenberg, 2002; Dey, et al., 2017). The estimated θ_{kg} are used to identify the top words that distinguish one topic/narrative from the other (using *ExtractTopFeatures()* in R package *CountClust*, Dey, et al., 2017).

Word Context Analysis

The word frequency approach does not account for the semantic structure of the sentences and the contextual relationship between words. For example, words like “*music*” and “*songs*” are contextually close as they will likely have similar words as neighbors where they occur in the text. A machine learning approach that can quantify this contextual relationship between each pair of words is *word2vec* (Mikolov, 2013; Goldberg & Levy, 2014). As the name suggests, this method projects each word to a vector in a D dimensional space (for a user specified D) using a neural network modeling framework. The projection mechanism entails if two words are contextually close, the angular distance between their projections would be proportionately close and hence the cosine of the angular distance can be used as a measure of the contextual similarity of the word pairs.

Here we fit the *word2vec* model on the yearly text data of a magazine to estimate the contextual (cosine) similarity of word pairs for that specific year. These similarity scores were further refined using the *CorShrink* approach that accounts for the standard error in these scores (Dey & Stephens, 2018). For each pair of words or word sets, we investigate the trends of contextual similarity over time. For our application, we used the Continuous Bag of Words (CBOW) version of the *word2vec* model. The dimension of projection space D was chosen to be 100, and the context for each word was defined by 10 words immediately next to it in the processed text (without special characters and numbers).

Words that occur less than or equal to 3 times in the text were removed from consideration in the word2vec model fit.

Results

Figure 2 shows trends in relative frequencies of the identity words “*black(s)*” and “*negro(s)*” in the two magazines. We use the notation “****(s)*” to denote both singular and plural forms of the word “***” and here, frequencies are averaged over both singular and plural forms of the word. We observe that “*negro(s)*” as an identity term gradually falls out of favor while “*black(s)*” becomes the more pronounced identity word in the post civil-rights era – a shift that has been extensively studied already (Cross, 1979; Martin, 1991; Smith, 1992).

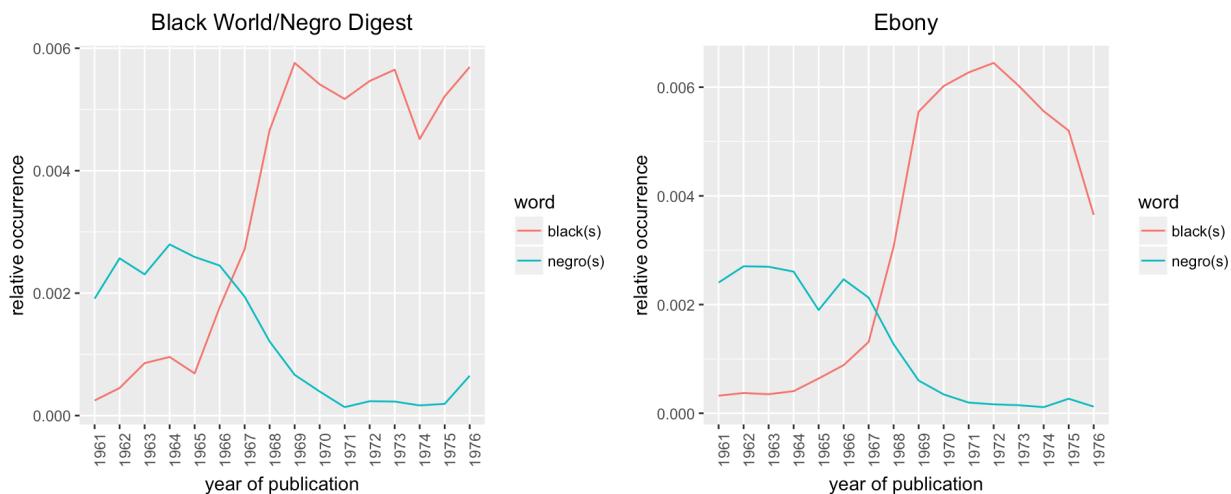


Figure 2: Yearly trends in relative occurrences of the words *black(s)* and *negro(s)* for the two magazines – Black World/Negro Digest and Ebony. The identity “*negro*” appears to fall out of favor as “*black*” becomes the more popular identity word.

We applied the topic model to the counts matrix C for each magazine separately . To remove the clear identity bias as evident in **Figure 2**, words “*black(s)*”, “*negro(s)*”, “*afro-american(s)*”, “*african(s)*”, “*american(s)*” were removed from the analysis.

Figure 3 shows results from topic model fits with K=2 on yearly texts of each of the two magazines. In both the magazines, the pre-1968 (civil-rights era) issues show high membership in one narrative group whereas the post 1968 issues show high membership in the other narrative group.

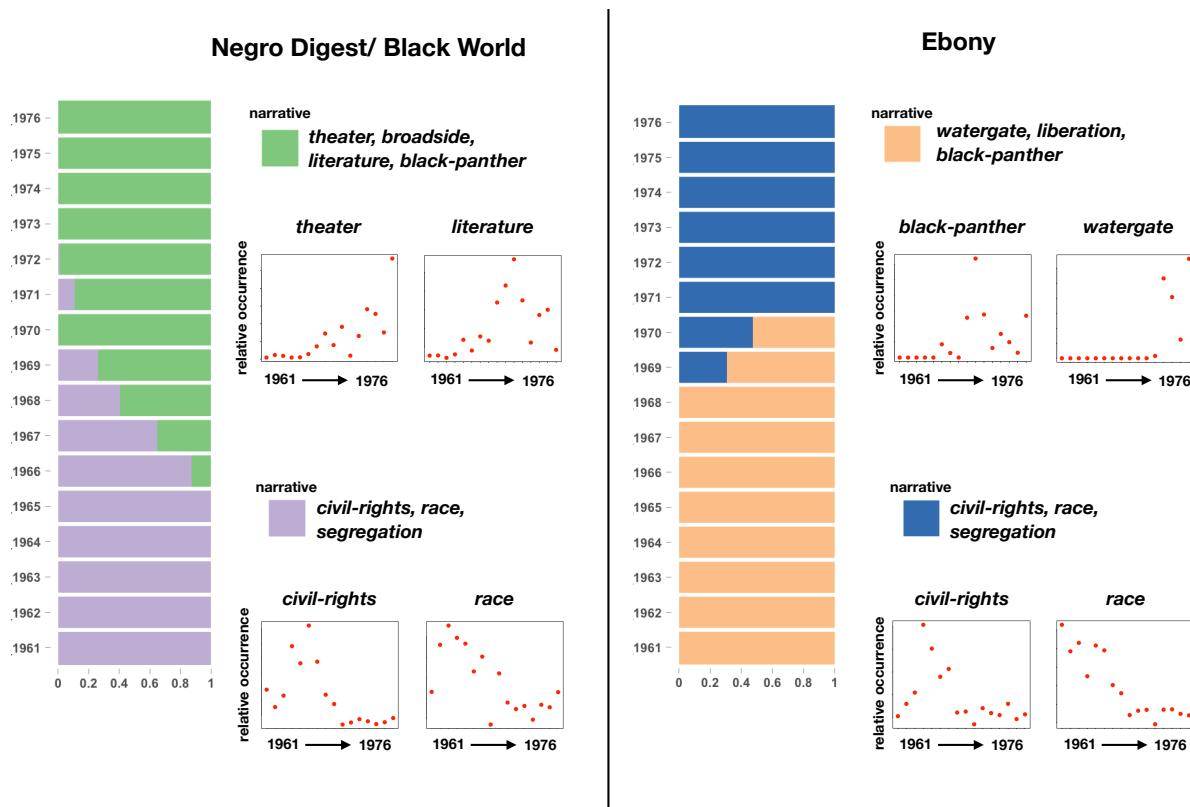


Figure 3: Topic model fits, with K=2, of the yearly text data from Negro Digest/ Black World (left) and the Ebony (right) magazines. Top distinguishing words of relevance from our studyperspective (devoid of names of individuals, places etc) for each topic/narrative are reported along with scatter plots of relative use of some of these words. The trends in scatter plots are a validation of why these words were picked by our clustering method as major driving forces behind narrative shifts.

The pre-1968 narrative appears to be similar for both the magazines with words like *civil-rights*, *race* and *segregation* among the top 10 driving words of this narrative. The post-1968

narrative in *Negro Digest/Black World* magazines appears to be greatly influenced by the Black Arts movement, with words like “*theater*”, “*literature*”, “*broadside*” showing up among the top 10 driving words for this narrative. The same, however, cannot be said about the post 1968 narrative of the *Ebony* magazine, which is driven more by the contemporary events. The Black Panther party, founded in late 1966, gets heavy mention in the post 1968 issues of both the magazines and hence shows up as a top distinguishing word. **Supplementary Figure S2** shows the results of topic model fits for higher values of K ($K=3, 4, 5$). For $K=3$, the years marking the transition from one narrative to another in **Figure 3** now form a separate out into a new narrative group . For higher values of K , we start encountering narratives showing strong memberships in only one or two issues. These narratives are primarily driven by specific contemporary events at one or two years scale and are not broad enough to be interesting from our perspective.

For further validation of the above results, we combined the counts matrices C for the two magazines and then ran topic model for $K = 2$ and $K=3$ on the combined data (see **Supplementary Figure S3**). For $K=2$, the two narratives separated out the two magazines, highlighting overall narrative biases between these portals. The top distinguishing words in the *Ebony* narrative are sports related – “*teams*”, “*coach*”, “*baseball*”, “*football*”, “*basketball*” – implying overall greater coverage of sports related news in *Ebony*. The top distinguishing words in the *Negro Digest/Black World* narrative are arts related – “*literature*”, “*drama*”, “*poetry*”, “*arts*”, “*music*” – implying overall greater coverage of arts and culture in *Negro Digest/Black World*. For $K=3$, the civil-rights era issues of the two magazines formed one narrative cluster, while the post civil-rights era issues for the two magazines formed two separate clusters. This conforms with our findings in **Figure 3**, where we show that the civil-rights era issues in both magazines had a similar narrative focusing on broad socio-political issues of the time but post 1968,

the *Negro Digest/Black World* narrative leant more towards covering the Black Arts movement, compared to *Ebony*.

Next, we applied word2vec on yearly text for each of the magazines and computed contextual similarity score between any pair of words for each year. This association score lies between -1 and 1. More positive the association score, higher is the contextual relationship between the word pair. Negative association score implies repulsive effect of the context of one word on another – which is rare. An association score close to 0 implies no contextual relationship between the word pair and is the case for most word pairs.

We observe trends in the contextual similarity score for each pair of words across time. **Supplementary Figure S4** plots this trend for the word pair (“*martin-luther-king*”, “*assassination*”). Expectedly, we find this association score jump after Dr. King’s assassination in 1968 - the jump being more pronounced in the *Negro Digest/Black World* magazine compared to *Ebony*.

Supplementary Figure S5 (Panel A) reports word pairs with the highest median association score throughout the period of 16 years (1961-1976). These word pairs seem to comprise of generic socio-political words – (*civil rights, movement*), (*power, structure*), (*political, power*), (*economic, social*), (*race, relations*) etc. Panel B (Panel C) reports word pairs with highest positive (negative) difference in median association score between pre 1968 and post 1968 issues. Panel B word pairs, demonstrating consistently higher association in pre-1968 issues than in post 1968 issues, comprised of words related to *race, struggle and oppression*, indicative of the social and political climate of the civil rights era. Panel C word pairs, demonstrating consistently higher association in post-1968 issues than in pre -1968 issues, comprised of words related to healthcare, education, indicative of narratives related to socio-economic development.

As *black* (*negro*) becomes more (less) popular as an identity word, with time (see **Figure 1**), its context keeps expanding (shrinking) and so its association score with another random word is likely to increase (decrease) with time even if the contextual relationship of the latter word with the overall identity of “*black(s)*” and “*negro(s)*” does not change. For words with both singular and plural forms, as in “*black*” and “*blacks*”, we average over the association scores for both the singular and plural forms of the words. In order to address this issue, we rerun the word2vec model on a modified yearly text data where the words “*black(s)*” and “*negro(s)*” are replaced by generalized identity word (say “*black/negro(s)*”). We then compute the association score of each word with the word “*black/negro(s)*” from the newly fitted model and the trends of these association scores are compared with those of the same word with “*black(s)*” and “*negro(s)*” from the previously fitted word2vec model on the original data.

Figure 4 shows these association trends for 3 words – “*civil-rights*”, “*education*” and “*muslim(s)*”. “*civil-rights*” did not show much change in association score with the general identity (“*black/negro(s)*”), but showed increasing (decreasing) trend with “*black(s)*” (“*negro(s)*”). “*education*” also showed a similar trend except for an increasing trend in association with general identity “*black/negro(s)*” for the Ebony magazine. Many generic social, political and economic terms – “*righters*”, “*votes*”, “*economy*”, “*leaders*”, “*opportunities*”, “*jobs*”, “*progress*” – showed trending similar to “*civil-rights*” and “*education*”. However the word “*muslim(s)*” showed opposite trending implying it had strong contextual connection with identity “*black(s)*” even when “*negro(s)*” was the more popular identity word, and this association gets diluted over time as “*black(s)*” became the more popular identity and started expanding its context. **Supplementary Figure S6** validates this finding by presenting examples of the usage of the word “*black*” in reference to

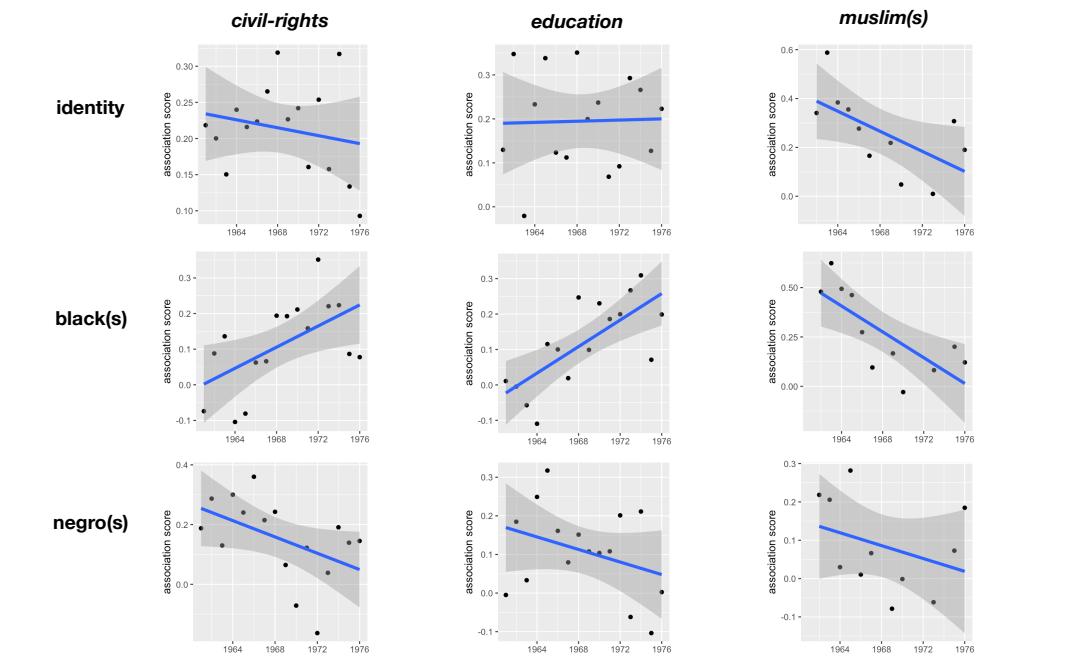
“muslim(s)” during the early 1960 issues of the magazines, often, but not always, in reference to Malcolm X and Elijah Muhammad.

Conclusion and Future Works

Digital humanities is a growing field and the computational and technological advances in the recent times allow us to handle extremely large scale data spanning years of study, as in case of the *Negro Digest/Black World* and *Ebony magazines*. Our paper demonstrates how some of the state-of-the-art statistical and machine learning tools can be used to objectively analyze and interpret the media narratives through purely text based data. However, these methods are still limited in their abilities to glean information from the texts, and require some measure of subjective knowledge and interpretation to support them.

Our analysis points to a shift in narrative from issues of race, segregation, discrimination and civil rights movement in the civil rights era (pre-1968) to a narrative driven by the Black Arts movement and socio economic development in the later years. Parallel with this shift was the change in identity from “negro” to “black”. We also assess contextual relationship of words with respect to identity words “black” and “negro”. For some words, positive or negative trends of association with the word “black” however are largely driven by the association with the color “black” instead of the identity “black”. This is why it is important to validate the findings through post-hoc inspection and interpretation of the analytical results, as we did in **Supplementary Figure 6**.

Negro Digest/Black World



Ebony

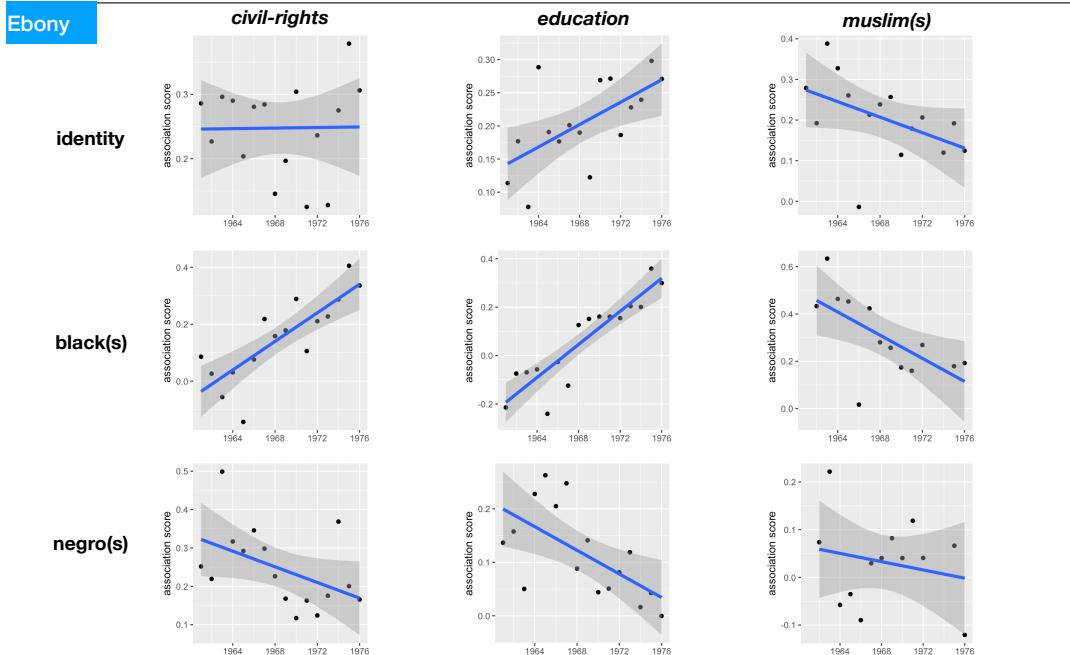


Figure 4: Trend plot of association of 3 words – *civil rights*, *education* and *muslim(s)* with the generalized identity word (“black/negro”), besides original identity words “*black(s)*” and “*negro(s)*”. The blue line and the band around it denote the average linear trend and the confidence interval for the trend. The trend plot of *muslim(s)* has some missing points, corresponding to years where the word *muslim(s)* did not occur in the text.

One future goal is to analyze the entire collection of Ebony magazines from 1950s up until present day, so as to be able to compare modern day narratives with those of the past and also track the changes in narratives over the past 60-70 years. Also, here we focused on only magazine data from the 1960-70s era. We intend to use other resources – newspapers, articles and music of the time to learn more about how these different medium of communication and culture covered the era.

The codes and data used in this paper for generating the figures are available on Github at

https://kkdey.github.io/Black_magazines/. For fitting and subsequent post-hoc analysis and visualization of the topic models, we used the R package *CountClust* (Dey, et al., 2017), which is built on the R package *maptpx* (Taddy, 2012). For fitting the word2vec model, we used the R package *wordVectors* (Schmidt & Li, n.d.).

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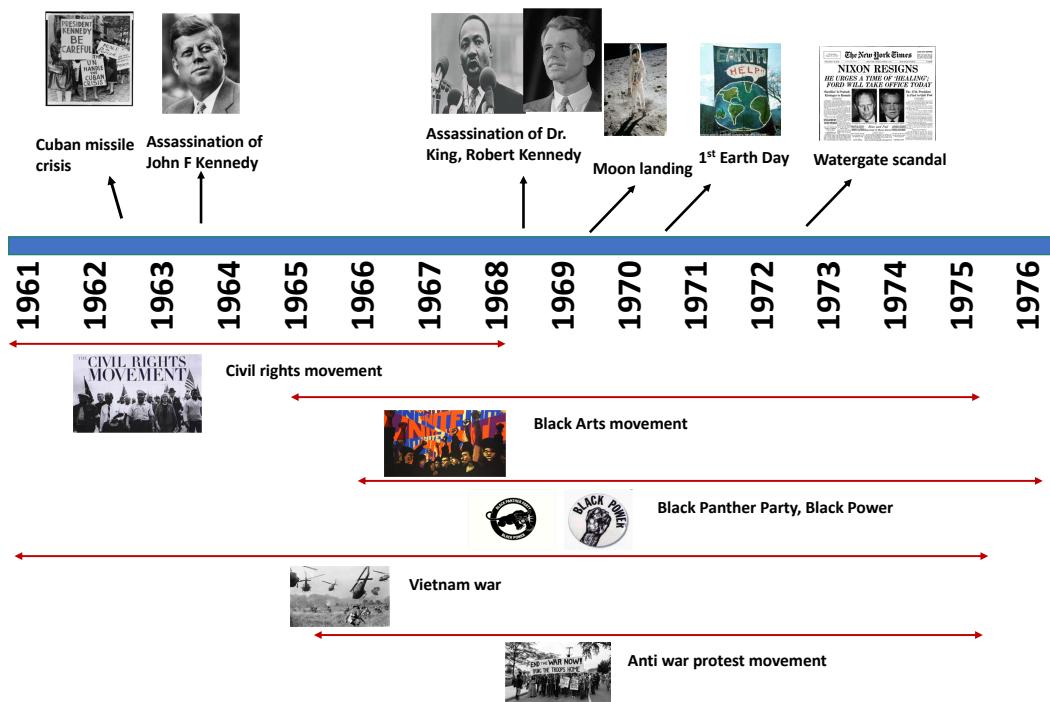
This work has been funded by 2017-18 Graduate Arts, Science and Culture Fellowship grant by The University of Chicago.

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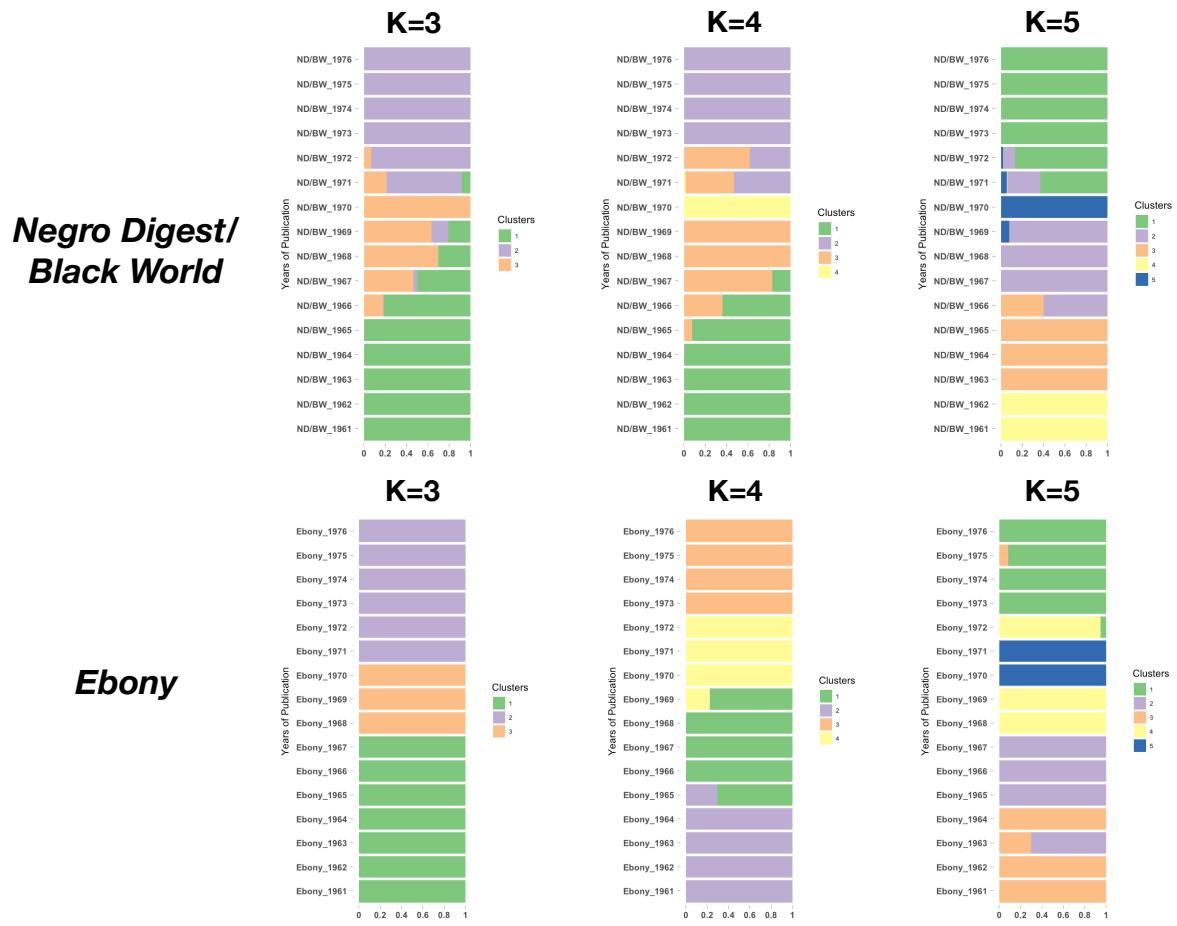
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Supplementary Figures



Supplementary Figure S1: A timeline of the important movements and events in America during our study period of 16 years (1961-1976).



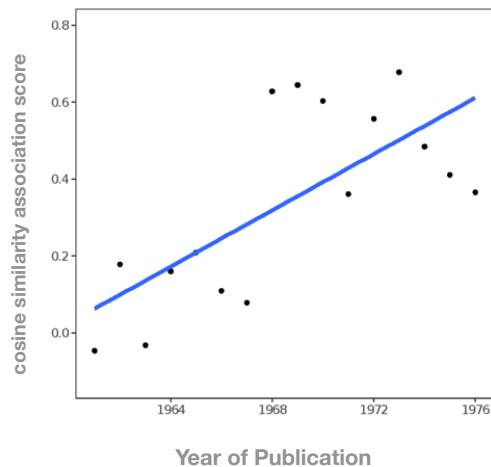
Supplementary Figure S2 : Topic model fits of the yearly text data from *Negro Digest/Black World* and *Ebony* for different choices of the number of narratives/topics, K ($K = 3, 4, 5$).



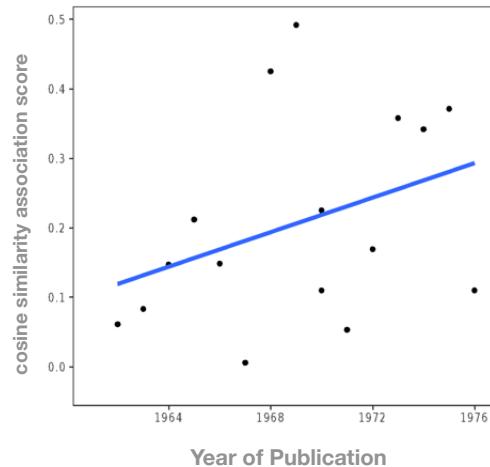
Supplementary Figure S3: Topic model fits of the combined yearly text data from *Negro Digest/Black World* and *Ebony* magazines for K (the number of narratives/topics) equal to 2 or 3. The top driving words of relevance from our study perspective (devoid of names of individuals, places etc) for the respective narratives/topics are also provided.

(Martin Luther King, Assassination)

Ebony



Negro Digest/ Black World

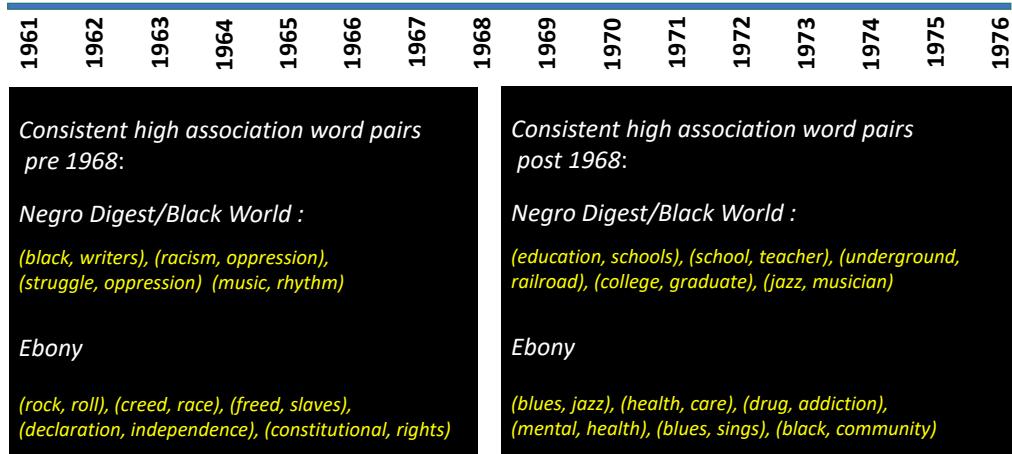


Supplementary Figure S4 : Trends in contextual association score between the phrase *martin-luther-king* and *assassination* for the two magazines of study - *Negro Digest/Black World* and *Ebony*. The association score jumps 1968 onwards after Dr. King's assassination, with the jump being more clear in the *Ebony* magazine. The association scores were computed by first cosine similarities of the word projections from the *word2vec* model (Mikolov, 2013), with subsequent refinement of these similarity values by the *CorShrink* method (Dey & Stephens, 2018).

Consistent high association word pairs across all years:

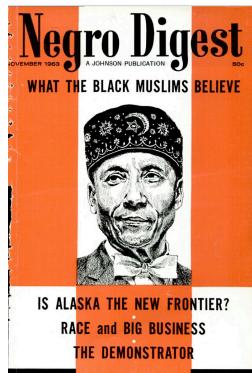
Negro Digest/Black World: (civil war), (civil rights, movement), (jazz, music), (economic, social), (political, power), (discrimination, segregation), (race, relations), (power, structure)

Ebony: (racial, discrimination), (discrimination, segregation), (civil rights, movement), (jazz, music), (power, structure), (political, power), (economic, social)



Supplementary Figure S5: Word pairs - presented here as $(word_1, word_2)$ - that show (A) consistently high association score throughout the period of 16 years of study (B) much higher score pre-1968 compared to post 1968 and (C) much higher score post-1968 compared to pre-1968 . To obtain the word pairs for panels B and C, we compute the difference in median association score between post 1968 and pre 1968 texts and extract the top 10 word pairs with the highest positive and negative values of the differences. Of these 10 word pairs, we only report the ones that are meaningful from our study perspective (for e.g. - devoid of names of individuals, places etc). For panel A, we report the meaningful word pairs out of the top 10 pairs with the highest median association score over the period of 16 years.

cover of *Negro Digest* (Nov 1963)



excerpt from *Negro Digest* (Jan 1963)

The **Black Muslims**—growing steadily in power and influence—are telling Negroes to beware the nonviolent movement: “Those Negroes and that Martin Luther King are actually forgiving white folks for centuries of sins! They are appeasers ready to settle for integration. Well, we are not! We want **black** supremacy and are going to get it. Someday, we’ll make the whites pay for their sins.” But the whites are not listening to the **Black Muslims**; they are resenting, wasting precious time resenting the firm, quiet offers made by Dr. King and

excerpt from *Ebony* (Nov 1962)

A complicating factor in the Northern protest movement is the presence of post-Garvey **black** nationalist groups like Elijah Muhammad's **“Black Muslims”**. Muhammad, a slightly-built, Georgia-born organizer and religious exhorter, has fashioned a nationalist movement remarkably similar to Marcus Garvey's movement of the 20's. Like Garvey, Muhammad glorifies blackness and deprecates whiteness. Like Garvey, he has organized a string of cooperative business ventures. Muhammad, like Garvey, says there is no hope of justice for a **black** man in America. And, like Garvey, he has shrewdly exploited the pessimism, cynicism and despair of the masses in large urban centers. Muhammad champions separateness and a **black** state—in America. His followers are adherents of the religion of Islam. To indicate their distaste for the traditions of slavery, **“Black Muslims”** abandon their “slave-given” names (John Jones, Sam Washington) and adopt the letter X (John X, Sam X). The group has attracted national attention and the fiery devotion of an undetermined number of Negroes, principally in the large cities of the North and West.

excerpt from *Ebony* (Sep 1964)

Fired Black Muslim denounces cult, vows to take part in rights revolt

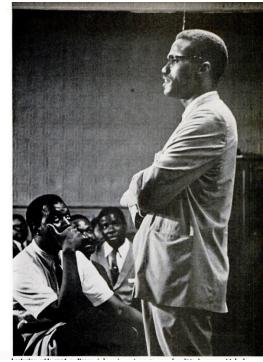
BY HANS J. MASSAQUOI

A HEAVY, dark blue sedan stops at the curb on Seventh Avenue where a small group of men, women and children stand in silent silence around a pile of shabby furniture—the worldly possessions of family without home or job. This is the scene in one of the slums of Newark where poverty has forced thousands of humans being to co-exist with evictions and beatings. It is as familiar and hated as the squads of white rokkes who beat up Negroes in the South and other cities bewailing with suggestive ease.

At the wheel of the driver, the expression of hopeless rage on the face of the little crowd melt into broad, deferential smiles. “Salam aleikum, Brother Malcolm.” “Salam aleikum.”

With a wide, goodnatured grin bare, flawless set of large teeth, the credulous, idealistic scholar, Malcolm X, has been behind the wheel returns the Muslim greeting. With deep-set, penetrating eyes he scans the scene, his gaze gliding over surveying the people in the crowd. His voice sounds deep and reverberating, commanding the people to attend “a very important meeting tonight.” After another exchange of “Salam aleikum,” the crowd is soon swallowed up by the dense traffic and the glare of the sun.

Around the nation, the name Malcolm X triggers mixed emotions but among Negroes it is one of awe, respect, impulsive devotion and hope. Since his ouster from the **Black Muslim** cult early this year—ostensibly for calling President Kennedy's assassination a case of “chickenshit”—Malcolm X has become a symbol of the independence of his former chief, Elijah Muhammad, in building a following of his own. In the process, he has ripped the **Black Muslim** movement into two irreconcilable factions. He is the most powerful man in the order of the day. Puffed from the No. 2 spot he used to occupy in the **Black Muslim** hierarchy, he is now reaching for higher stakes—participation in the Negro revolt.



Supplementary Figure S6: Examples of excerpts referring to *black muslims*, which validates the strong connection between the word “*muslim(s)*” and “*black*” we see in early 1960 texts even when “*negro*” was the popular identity term. Many of these examples, but not all, were in reference to Elijah Muhammad and Malcolm X.