Evolution of Cultural Identity Terms in Lay and Academic Sources:
Implications for Research and Public Policy

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Abstract

Increasingly, individuals identify as bicultural and multicultural, yet are sometimes externally misclassified, contributing to experiences of invisibility within U.S. society. Using computational techniques, we examined the transmission of cultural identity terms through time, providing some evidence for the changing representation of social identity. We examined the usage patterns of cultural identity terms with the prefixes (*mono-*, *bi-*, *multi-*), modifying the social identity terms: *culture*, *ethnicity*, and *race* (e.g., comparing *monocultural*, *monoethnic* and *monoracial*). For bicultural and multicultural terms, those with *-racial* suffixes were the earliest used terms, while those with *-cultural* and *-ethnic* suffixes gained more popularity recently. We examined the evolution of the higher frequency social identity terms in lay sources (NY Times, Reddit), and found that *interracial* and *multicultural* were the most popular over time, peaking recently. We examined the potential time lag in the sequence of identity terms amongst academic (PsycINFO, NIH and NSF Databases), lay (NY Times) and mixed sources (Google Books N-Grams), supporting our hypothesis that newer terms (e.g., *multicultural*) are first used and gain prevalence in lay sources, then mixed sources, and eventually academic sources. The implications of these findings for research, public policy and psychosocial experiences of individuals are discussed.

Keywords: cultural psychology, computational linguistics, multicultural

Evolution of Cultural Identity Terms in Lay and Academic Sources: Implications for Research and Public Policy

According to the United States (U.S.) Census Bureau, the American population has grown increasingly diverse in recent decades with more people identifying with two (bicultural) or more (multicultural) cultural identities (Hixson, Hepler & Kim, 2011). This increase in diversity demonstrates the growing relevance of accurately identifying individuals' cultural identities. Unfortunately, individuals are often mislabeled, and consequently, misrepresented in terms of their social identities (Barreto & Ellemers, 2003).

For instance, some individuals with multiple cultural identities experience a form of forced identification or limited expression, known as *identity denial*, whereby they are unable to fully express all of their social identities due to constraints imposed by an individual, organization or society at large; for instance, being limited by the number of “boxes” one can check on a racial identity questionnaire (Sanchez, 2010; Townsend, Markus & Bergsieker, 2009) used for employment, educational or health-related benefits (Hebert, Scherr, Bienias, Bennett & Evans, 2003; Renn, 2009). Such experiences of limited or forced identity expression engender feelings of invisibility or misrepresentation, which may negatively impact one's mental health, leading to lower self-esteem and higher levels of anxiety and depression (Townsend et al., 2009). Further, the long-term effects of the discrepancy between an individual's self-identification and external classification on social identity representation is an issue that has received some media attention (Doyle & Kao, 2007). Some biculturals, including noted figures, such as President Obama, Frederick Douglass and Kamala Harris, are often categorized as monoculturals, and thus, are externally constrained from celebrating and identifying with all aspects of their identities. For instance, in the case of President Obama who is of mixed racial and geographic origins, but himself

identifies as African American, while also acknowledging his European (Irish and German) and Kenyan ancestry (Arogundade, 2016), there is often a mismatch between self-identification and external identification. Experiences with cultural identification, such as misclassification and freedom of cultural identity expression for biculturals and multiculturals are important issues, which should be addressed with both further research and corresponding changes in public policy (Hebert et al., 2003; Newman & Schnare, 1997; Renn, 2009).

Being able to freely and accurately communicate one's cultural identification is important to one's self-concept, as it relates to an individual's membership in a relevant social group and to one's fundamental need for social belonging (Baumeister & Leary, 1995; Molix & Bettencourt, 2010; Tajfel & Turner, 1979) based on a shared set of common characteristics (Ashmore et al., 2004). Further, cultural self-identification and social belonging are also critical factors for one's personal self-esteem via connection to others in one's social group or "ingroup" (Luhtanen & Crocker, 1992). As such, it is crucial that an individual is able to self-identify with a specific group as opposed to being prescribed a social identity by a third party (Phinney, 1992). Cultural misclassification of individuals perpetrated by the media, academics or governmental institutions can lead persons to exhibit both lower levels of social belonging and self-esteem.

Given both the increase in the number of people identifying as biculturals and multiculturals in the U.S. and the psychosocial effects of misclassification, it is crucial to understand the nature of cultural categorization. We suggest that an important step forward is to document the trends in social identity categorization over time, which has been relatively unexplored in the literature, particularly in terms of comparisons between the lay, academic and media usage of cultural identity terms. The present investigation aimed to explore the shifting terminology and usage patterns of complex cultural identity terms (e.g., *monocultural*, *bicultural*

and *multicultural*) across lay and academic sources to reflect the dynamic changes in diversity. Specifically, for the first time in the literature, we employed computational techniques, consistent with natural language processing methodology, to explore the usage and evolution of cultural identity terms in multiple U.S. media sources across time. We drew on existing research and theory related to diversity, social identity and categorization to motivate and guide our investigation.

Challenges of Capturing Increasing Diversity

In the last several decades, the U.S. population has become more culturally diverse in terms of an increased representation of both specific racial groups and individuals with multiple racial identities (biracials and multiracials) (Hixson et al., 2011). The U.S. Census Bureau, which calculates national demographics on a variety of dimensions (e.g., age and socioeconomic status), is also the primary source for information on the racial diversity of the U.S. This information is used to inform policy decision-making by aiming to ensure equal access to resources, such as housing and educational opportunities (Newman & Schnare, 1997; Renn, 2009).

The U.S. Census Bureau projected that by 2020, Hispanics and Latinos (termed by the U.S. Census Bureau), will outpopulate the number of European Americans (Hixson et al., 2011). Additionally, from 2000 and 2010, there was a 43.3% increase in the Asian American population, another historically large cultural community in the U.S. that will experience future population growth (Hixson et al., 2011). Moreover, Hixson and colleagues (2011) reported a shift in the number of biculturals and multiculturals, as the proportional number of individuals who reported identifying with more than one race increased by 37 percent from 2000 to 2010.

Despite the increasing diversity and racial complexity of the U.S. population, the current methods employed by the U.S. Census Bureau have not yet been able to suitably classify culturally complex individuals. Namely, it has limitations in terms of fully capturing the racial identification

of the U.S. population, as it constrains the number of racial options individuals are provided to identify themselves. In this way, it may perpetuate identity inaccuracies by limiting the racial information that individuals present. Further, the complexity of developing standard methods of accurately ascertaining racial identification is a global issue that is not limited to its effect on Americans, impacting accurate polling of small racial communities in other countries as well. For instance, the Brazilian Census struggles to incorporate populations of biracial and mixed-race individuals with differing combinations of African, Japanese, Portuguese and indigenous descent into their classification scheme, each of which represents a distinct social class within society, unlike in the U.S. (Loveman, Muniz & Bailey, 2012).

While the Census simultaneously grapples with the intricacies of racial classification, the complexities of individuals' social identity expression are also evident in the mass media. A notable example is one that was reported by a popular lay source, *the New York Times*, in which President Obama highlighted his identity and societal discussions of his racial categorization by recounting, "I am the son of a black man from Kenya and a white woman from Kansas...some commentators have deemed me either 'too black' or 'not black enough'" (Obama, 2008). The President's description of his biracial background reflects both his self-perception as well as the external constraints placed on him by others, prescribing him as a monoracial black man. Stemming from the discussion of conflicts between categorization and identification in the mass media, researchers conducted an examination of individuals' perceptions of the President's racial background when under identity constraint. Citrin and colleagues (2014) investigated how Americans would categorize President Obama on the U.S. Census, asking participants to complete the racial questionnaire under differing conditions as if they were President Obama, varying the President's own racial self-perception between *black* and *mixed race*. Results demonstrated that

Americans feel multiracials should embrace their mixed heritage, identifying with all aspects of their cultural background rather than identify as monoracials as in the case of President Obama. Social identity categorization is a complex issue, particularly as individuals may have a differing perspective of identity than do media or academics, as in the illustrated example of President Obama.

Social Identity Terms and Their Transmission

In the present investigation, as we address the usage of complex cultural identity terms, such as *monocultural*, *bicultural* and *multicultural*, it is first critical to examine the root terms (e.g., *race*, *culture*, and *ethnicity*) of those we seek to study (e.g., *monoracial* is derived from single race). Ongoing discourse and debate has surrounded the specific terminology at the roots of all cultural identity terms, which have been used to describe the cultural origins of individuals: *culture*, *race* and *ethnicity*. After a review of the cultural psychological literature, Betancourt and Lopez (1993) determined that *race* is often used for demographic purposes in the academic literature or to inform public policy. However, *culture* is a term frequently used by lay individuals and the media to describe foreign customs, traditions and engagement that differ from those experienced in American daily life. Finally, *ethnicity*, the most recently adopted base term, focuses specifically on an individual's family background and place of origin (Betancourt & Lopez, 1993). Further, it is important to note that although both *race* and *ethnicity* denote the origin of an individual, *race* constitutes a biological origin, whereas *ethnicity* connotes belonging to a social group based on a shared geographical origin (McKenzie & Crowcroft, 1994). McKenzie and Crowcroft (1994) add to their analysis that *culture* is not only constituted by a set of shared behaviors in a social (or ethnic) group but is also composed of shared attitudes amongst individuals in the same ethnic social networks. In this paper, we examine the application of the terms *culture*,

race and *ethnicity* across sources (lay, academic and mixed sources), and whether historical trends of these terms are paralleled by that of cultural identity terms (e.g., *monocultural*) containing the same roots (e.g., *-cultural*).

Adding to the debates about the differential meanings of fundamental cultural identity terms, we seek to understand the trends in and transmission of these terms across lay and academic sources. In the modern technological world, media broadcasts the majority of information and inter-communication between groups on a global scale. Moreover, traditional media (all but social media) often caters to its readers and listeners with audience design (paralleling language, such as cultural identity terms produced by audience members; Bell, 1984). Although partially altered by the individual media outlet, information is often sourced by either laypersons or from research (Bell, 1991). However, researchers frequently take issue with the inaccurate portrayal of their findings in the media, as limitations of their results and the specific terminology used in their work is often misrepresented or absent from media coverage (McCall & Stocking, 1982). Overall, it would appear that the original transmission of information from laypersons and researchers to the media is modified from its original form due to either audience design or misrepresentation of information.

Further, the patterns in usage of cultural identity terms can be partially attributed to *accommodation theory* (McQuail, 1969) in which audience members conform to the style of information presented through media. The foundations of the communication accommodation theory and its predecessor, speech accommodation theory, are both rooted in social identity theory (Krauss & Pardo, 2006; Pardo, Gibbons, Suppes & Krauss, 2012), as these theories dictate that individuals accommodate or adapt to the language of their perceived ingroup members (individuals from the media with whom they perceive to share a group membership; Turner & West, 2010).

One of the ways in which individuals may distinguish their group membership is by marking their language and adopting the language of their group members, as indicated by accommodation theory and as exemplified in the case of the media (Rajnović, 2015). Finally, once this information is transmitted to its target audience, individuals can use this content in interpersonal communication or as future inspiration for research (Bell, 1991). Accordingly, transmission of cultural identification terms through the media, laypersons and research impacts the usage and evolution of cultural identity through time.

Study Overview

The U.S. Census Bureau's findings point to growing racial diversity, including the numbers of biracials and multiracials in the last two decades who have expressed multiple identities (Hixson et al., 2011; Tajfel & Turner, 1979). Unfortunately, self-identification does not always map onto external cultural categorization (Barreto & Ellemers, 2003). Yet, society needs to be able to accurately identify individuals and groups to inform policy (Hebert et al., 2003; Newman & Schnare, 1997; Renn, 2009). Research demonstrates that when the perception of individuals' cultural identification is inaccurate or when the identity expression of monoculturals, biculturals and multiculturals is limited, negative consequences result (Lee Wilton & Kwan, 2014; Remedios & Chasteen, 2013; Sanchez, 2010; Townsend et al., 2009). Therefore, the specific cultural identity terms employed by society, societal institutions and individuals to describe themselves and others are significant in terms of their impact.

Despite the importance of social identification to individuals and to society (Tajfel & Turner, 1979), to our knowledge, no prior studies have examined cultural identity term usage. The present investigation aimed to expand on the existing literature concerning monocultural, bicultural and multicultural label categorization by exploring the shifts in terminology and usage

across sources with a novel computational approach. Within the literature relating to the growing diversity in American society are the terms that have been used to describe individuals with one (e.g., *monocultural*), two (e.g., *bicultural*) or more (e.g., *multicultural*) cultural identities and the relevant cultural phenomena (e.g., *multiculturalism*) that describe the celebration or intersections of individual identities. In order to analyze these terms, we conducted a comparative analysis between several corpora, stemming from psycholinguistic research and employing computational techniques originating in natural language processing. In our analysis, we tested four exploratory hypotheses concerning the usage of cultural identity and theory terms across different sources (corpora) through time. We employed several corpora that were new to the field of social psychology (e.g., Reddit N-Grams) and adapted several research databases for use as corpora (i.e., PsycINFO, NIH and NSF grant databases).

First, we hypothesized that, at differing timepoints and within same-culture term clusters (i.e., terms with the same prefix; e.g., *-mono*), labels with differing suffixes, representing *ethnicity* (i.e., *-ethnic*), *race* (i.e., *-racial*), and *culture* (i.e., *-cultural*), would become more frequently used in the NY Times due to the usage trends attributed to *ethnicity*, *race* and *culture*, respectively. The NY Times was chosen to test this hypothesis, as it is a noteworthy, American print media source known for its use of varied verbiage and reflection of lay opinion (New York Times, 2016; Baquet, 2015). We then examined the evolution of the most commonly occurring ethnic, racial and cultural identity terms trending across time, drawing a comparison between those in the popular news source, the NY Times (1800-2015), and the social networking (or link aggregation) site, Reddit (2007-2015), to consider the combined effects of cultural identity prefixes (*mono-*, *bi-*, and *multi*) and their social identity suffixes (*-ethnic*, *-racial*, and *-cultural*). Next, we explored differences across corpora. We sought to investigate the potential time lag in the adoption of identity terms

from a source intended for lay audiences (NY Times) to a source intended for mixed (both lay and academic) audiences (Google Books N-Grams; developed from Google Books, containing scanned copies of books) to academic sources, including PsycINFO (the most popular psychology research database) and NIH and NSF Grant Databases (open source government databases for NIH and NSF grant meta data, respectively). Consistent with theories of language transmission (Bell, 1984; Bell, 1981; McQuail, 1969), cultural classification terms are expected to be first used by lay individuals, then incorporated by members of the media, and finally, utilized by scholarly individuals, such as psychologists to conduct research on social identity or culture.

Method

Materials

Overview. We analyzed the frequency and evolution of as well as the relationships between cultural identity terms in online social networks, newspapers, books, psychology publications and nationally funded grants over time. The data we sought varied on two dimensions: (a) the intended audience for whom the material was written: lay audiences represented by NY Times and Reddit content, mixed (lay and academic) audiences addressed by Google Books N-Grams, and academic audiences characterized by content from PsycINFO and the National Science Foundation and National Institute of Health grant databases; and (b) the terminology categories employed: variations of terms that reflect identity configurations, pairing prefixes indicating the number of cultural identities (*mono-*, *bi-*, and *multi-*) with suffixes describing social identity categorizations, such as *ethnicity*, *culture* and *race* (*-ethnic*, *-racial*, *-cultural*). Terms were manually grouped based on semantic meaning (see term group categorization in Table 1) or by conceptual relevance, such as in the case of cultural identity theory (Group E).

Corpora Sources. In selecting corpora, we sought to incorporate an array of sources,

which included a lay source cataloguing online trends through a social network, Reddit; a written source chronicling recent events, the NY Times; a mixed source combining both lay and academic writing, Google Book N-Grams; and meta data from the following academic databases: National Science Foundation Grant Database, National Institute of Health Grant Database (i.e., NIH Research Portfolio Online Reporting Tools) and PsycINFO. Consistent with methodology used in previous research (Ng, Allore, Trentalange, Monin & Levy, 2015), we employed thesauruses (Webster's Thesaurus and the Thesaurus of Psychological Index Terms) to develop a comprehensive list of cultural psychology terms that describe monoculturals, biculturals and multiculturals as well as relevant theoretical constructs (*multiculturalism*, *polyculturalism* and *cultural pluralism*). The full list of terms and term group categorizations are in Table 1. For each term, six systematic variations were included in the analysis to account for differences in spelling when spaces or hyphens were added to the word (e.g., *multi racial* or *multi-racial*) or when the term was in its plural form (e.g., *multiracials*). After identifying all the terms of interest, we then obtained relevant usage information, utilizing various sources in both public and academic spheres. We describe each corpus in greater detail below in order from the most lay to the most academic source.

Reddit N-Gram Viewer. The Reddit N-Gram Viewer is a comment corpus (a linguistic corpus devised from the comments of an online post, i.e., subreddit), spanning from 2008 to 2015, based on the highly popular link aggregation website, Reddit.com (Olson, 2015). This website serves approximately 200,000,000 unique visitors (or *Redditors*) every month who comment on *subreddits* (current events topics) in a conversational manner, deeming Reddit N-Gram Viewer a lay corpus. Approximately 6% of all Internet users are Redditors (Duggan & Smith, 2013). In 2015, Reddit estimated that their users were 53% male and 54% American. Redditors are also

racially diverse with 12% identifying as Hispanic/Latino, 70% as White, 7% as Black and 11% as Other (Barthel, Stocking, Holcomb & Mitchell, 2016).

Any Reddit user (individual with a Reddit account, totaling 36 million in 2015; Reddit Blog, 2015) can initiate a subreddit on an array of topics ranging from the top 50 places to visit to U.S. presidential candidates' most recent media appearances. The comments on these subreddits were used to determine the *n-grams* (word subsequences), which later constituted the corpus. Links, special characters and n-grams exceeding forty characters (beyond the scope of most words in the English language) were removed from the raw data, and thus, excluded from the corpus. Additionally, any n-gram that was mentioned fewer than 50 times in one day (considered rare words) was omitted from the analysis (Olson, 2015).

New York Times Chronicle Project. We employed the New York Times Chronicle Project, a corpus of terms originating from NY Times articles published between 1851 and present (Lloyd, 2015), to capture a source intended for lay audiences that contains varying writing styles. As one of the leading newspapers in the U.S., *The New York Times* reached 423,306 readers through print newspapers in 2014 (New York Times, 2016) and one million online subscribers in 2015 (Baquet, 2015). Of the NY Times subscribers to print newspapers surveyed (during air travel) and represented globally, 54.02% were from the Atlantic region, while 45.98% were from the Asia/Pacific region (New York Times, 2016). Further, according to a study conducted by the Pew Research Center (2013), the NY Times maintains a readership that is predominantly male (56%) and highly educated, holding one university degree at minimum (56%; Mahapatra, 2013). Additionally, 32% of NY Times readers range in age from 18 to 29 and 31% of readers are between 30 to 49 years old, indicating a relatively young readership (Mahapatra, 2013). However, it is important to note that many nonsubscribers have access to NY Times articles online, although

exact figures are unknown for this population.

The NY Times Chronicle Project is a unique corpus in several ways. First, this corpus contains frequently updated language, often incorporating new sources of text (news articles every day). Second, the NY Times Chronicle Project displays its frequencies in terms of the number of articles that contain the selected cultural identity term, rather than the number of times that a term is mentioned in that year. Further, data may be extracted in a raw count or in a proportional frequency, calculated by dividing the frequency of articles that contain the selected cultural identity term by the total number of articles in the given year.

Google Books N-Grams. Google Books N-Grams is an interactive corpus, originally trained on Google Books, containing scanned text spanning in publication from 1500 to 2012. Google Books constitutes approximately 15 million digitized works or 12% of all the books ever published and has been used as an online academic resource by scholars and students to conduct research on a milieu of topics ranging from the Civil Rights Movement to Egyptology (Michel et al., 2011). However, less is known about the demographic profile of Google Books readers compared to that of other sources used in this analysis. Further, it is worth noting that the majority of written works for this digitization project were chosen from university libraries and major publishers (Michel et al., 2011).

Linguists and computer scientists have employed Google Books N-Grams as a standard corpus to better understand language in a range of contexts. It represents an array of language used by laypersons and academics in published text, and has been employed previously to conduct large-scale studies on usage and co-occurrence of terms (Mohammad, 2011). More specifically, Google Books N-Grams focuses on subsequences of words (n-grams) often parallel to one word in speech (e.g., *race*). The latest version of this corpus was developed in July 2012 (Michel et al.,

2011) and compares a selected term (or n-gram) in proportion to the frequency of all terms (or n-grams) used in a given year.

PsycINFO Database. PsycINFO is the leading database of psychological research that is widely used by the academic community (university students and faculty members), particularly by those who study psychology and mental health. This database contains nearly four million records, spanning from 1800 until present, most of which are written in English and are published in the U.S. (PsycINFO, 2015). After Yi and colleagues (2006) conducted a comparative user study between PsycINFO and the historical, ABC-Clio database, they concluded that PsycINFO user queries more often mapped onto its classification scheme than did its competitor, particularly for multi-word search terms. As such, PsycINFO was considered a superior database due to its highly accurate retrieval of psychological academic sources.

PsycINFO was employed to track the usage of selected identity terms (see Table 1) in academic publications and dissertations in the field of psychology and in related interdisciplinary fields. The Ovid platform was utilized for all PsycINFO searches and the extraction of *metadata* (descriptive information regarding publications, e.g., title and abstract), which represented raw frequencies of publications. The proportional frequencies which were used for all subsequent data analyses were calculated by dividing the raw frequencies by the total count of publications per year.

The National Institute of Health (NIH) Grant Database. The NIH is a well-respected institution in the academic community that contributes to the support of U.S. laboratories and funding for American researchers, graduate students and post-doctoral students, focusing primarily on the health of Americans since 1930 (U.S. Department of Health and Human Services, 2016). The National Institute of Health Grant Database, named the NIH Research Portfolio Online

Reporting Tools (RePORT), contains records of funded NIH grants spanning the most current 25 years from 1991 to 2015. This database was selected as a representative source intended for academic audiences, concerning U.S. grants awarded to fund scientific research. Metadata from the NIH grant database were utilized to analyze the frequency of selected cultural identity terms (see Table 1). Search results (grant records containing selected cultural identity terms) from the NIH Grant Database were extracted as metadata for comparison to trends in other corpora.

The National Science Foundation (NSF) Grant Database. The National Science Foundation (NSF), founded in 1950, is a similarly respected organization known for its support of multidisciplinary science research in the U.S. (National Science Foundation, 2016). For the purposes of this study, the NSF Grant Database was utilized as a secondary source of national grant metadata spanning from 1950 to present (with more complete records from 1976). This database was employed to capture the frequency of selected cultural identity terms (see Table 1). Results from manual searches conducted on the NSF Grant Database yielded results only when the search term was included in either the title or the abstract of the grant proposal.

Procedure

The NY Times Chronicle Project was selected as a contemporary corpus with language appealing to a lay audience. For the purposes of this study, the comparative frequencies of terms were extracted and plotted in a time-series from 1850 to 2015. For these comparisons, a minimum threshold of 1 over 10,000 articles per year was set, as the mean number of annual publications from 1850 to present for the NY Times is 89,859. Each plot represented a group of related terms (e.g., *bicultural*, *biracial*, *biethnic* and *interracial*) for direct comparison. The terms with the highest proportional frequency in each group (Group A – E) were also plotted to draw a comparison between the most frequently used terms across groups.

Further, academic use of the selected cultural identity terms in the field of psychology were compared and analyzed by employing three primary sources: PsycINFO, the NIH Grant Database and the NSF Grant Database. For the purposes of this study, the Ovid platform was employed to manually search PsycINFO for all selected cultural identity terms (see Table 1). All metadata were extracted from each manual search, and all extracted data were merged. Of the information gathered via PsycINFO, only data necessary for analyzing trends in term usage and frequency across sources were preserved, including: (1) search term (e.g., *monocultural*), (2) abstract (paper abstract), (3) title, and (4) date (date of publication). Also, database queries were employed to determine if the search term was in either the title or the abstract. As PsycINFO only provides raw frequencies for each search term, the total number of publications for each year was determined via database search. These figures were then used to compute the proportional frequencies for each term by dividing the raw scores by the total number of publications for each year, comparable to frequencies reported by aforementioned corpora.

Similarly, the NIH and NSF Grant Databases were utilized to better understand the usage and influence of the selected cultural identity terms (Table 1) in U.S. grant funding. For both open source databases, terms were searched as keywords, and metadata were downloaded and compiled once all terms were manually searched. For the NIH Grant Database, all search terms were queried via text search, while the fiscal year option was modified to include all years (as opposed to active projects only) to capture a wide time range. Similarly, for the NSF Grant database, all identity terms were queried via keyword search (searching all project titles and abstracts) with both active and expired grant options selected to parallel the query conducted on the NIH Grant Database.

Once the manual searches were conducted and data were compiled for each national agency, variables were selected for data analysis and operationalized. The following NIH grant

metadata were extracted and operationalized for data analysis: (1) search term, (2) fiscal year, (3) project title, and (4) support year. Accordingly, we queried the data to determine if each search term was in the title (“Term in Title”) of the grant proposal.

Similar to the aforementioned process of extraction and recoding undergone for the NIH grant dataset, data were extracted from the NSF Grant database. The following metadata were extracted from the NSF Grant database and later recoded for the purposes of data analysis: title (“Project Title”), start date (“Start Year”), and abstract (“Project Abstract”). Next, the dataset was modified to operationalize variables and optimize the dataset for further analysis. Then, to calculate the length of grant funding (in years), the “Start Year” was subtracted from 2015 (the year the data were extracted). Finally, the title and abstract were queried to determine if the search term was in either the title (“Term in Title”) or in the abstract (“Term in Abstract”) of the grant proposal.

After both the NIH and NSF grant datasets were processed and variables were matched, data were further cleaned with the aim of creating a merged dataset that combines comparative metadata from both NIH and NSF sources. Additionally, the abstract was eliminated from the NSF metadata for the purposes of merging the two datasets, and labels were added to each variable to indicate the dataset from which they originated.

Computational Models. In order to test study hypotheses, two major computational methods were applied. First, to test the hypothesis concerning the time lag of cultural identity term usage between sources, we plotted the frequency of the target terms and followed a standardized computational method to draw comparisons between corpora. Next, to make all extracted data comparable across each of our five sources (NY Times, Google Books N-Grams, NIH Grant Database, NSF Grant Database and PsycINFO), we normalized all data by using proportional

frequencies. From the NY Times Chronicle Project and Google Books N-Grams, we extracted proportional frequencies; as such, these values remained unchanged. However, for academic sources, each database was queried for all available years (e.g., NIH contains only the most recent 25 years of grant metadata). Then, cultural identity term frequencies from these databases were normalized by dividing them by the total number of grants or publications in each given year. Next, to standardize our sources and deem them comparable in an overarching analysis (Baron, Rayson & Archer, 2009; Kilgarriff, 2001), all proportional frequencies within each source were divided by their respective *historical averages* (corpora's averages for each term across time). In essence, the resulting values were calculated by taking the average probability of each cultural identity term appearing in the corpus. Then, each group of cultural identity terms was clustered for analysis by using a weighted sum of frequencies to maintain respective differences between prevalence of terms. Finally, each source was then ranked within each group categorization based on the year that the earliest term's proportional frequency first passed its historical average.

Results

First, we posited that, based on the etiology and corresponding frequencies of the terms *ethnicity*, *race* and *culture* over time, cultural identity terms with the suffixes: *-ethnic*, *-racial* and *-cultural* would all exhibit similar trends in the NY Times. For comparative frequencies of cultural identity terms by classification group (e.g., Group A), see Figures 1 through 5. More broadly, across term classification groups (with the exception of Group A), there were several consistent findings (see Figures 2-5): (1) terms with the suffix *-racial* had an earlier adoption date and became more popular over time than did most comparative terms in the same group; (2) terms with the suffix *-ethnic* were the newest in use and the least popular in terms of frequency; and (3) terms with the suffix *-cultural* were comparatively new in popular usage, and in most cases, maintained

a higher frequency at present than did terms with either *-racial* or *-ethnic* suffixes. However, for terms in the monocultural classification group, inconsistent trends were observed in the NY Times, as *monocultural* was the most frequently used term over time, followed closely by *monoethnic*. Further, *monoracial* was the newest term, and the most infrequently used term of its group (see Figure 1).

Second, in an exploratory analysis in which we theorized that bicultural and multicultural identification terms would become more frequently used in lay sources, such as Reddit and the NY Times, we considered the evolution of cultural identity terms (e.g., *multicultural*) resulting from the union between cultural identity prefixes (e.g., *multi-*) and social identity suffixes (e.g., *-cultural*). As predicted, when comparing the proportional frequency of the most common cultural identity terms in the NY Times (see Figure 6), terms which characterize multicultural individuals, including *multicultural*, *mixed race* and *multiracial* (in order from highest to lowest frequency in 2015), were used most often. Moreover, *interracial*, a term employed to describe bicultural individuals, is an increasingly prevalent term in the NY Times since the late 1800s, second only in usage to *multicultural* in 2015. Similarly, as hypothesized, *interracial* has the highest comparative frequency on Reddit (see Figure 7). However, *biracial* was not employed as frequently as was *interracial* or other cultural identity terms describing bicultural individuals, although it references *race*. Additionally, as hypothesized, Reddit n-grams containing the *-cultural* suffix, (e.g., *multicultural* and *multiculturalism*) were second most frequent to those with a *-racial* suffix. In sum, there is a clear pattern in the evolution of social identity terms through time, fundamentally based on terms' combinations of prefixes and suffixes communicated through lay sources, such as the NY Times and Reddit.

Third, we hypothesized that there would be a time lag in the adoption of cultural identity

terms between sources aimed at lay audiences and those targeted at academic audiences. In our analysis, the only source generated solely by laypersons (Reddit) was not included in this analysis, as it included an insufficient number of cultural identity terms (35% of all terms), and therefore, could not be compared to the other corpora. In line with our hypotheses, there was a time lag in the transmission of cultural identity terms across categorization clusters (see Table 1) concerning their usage and implementation in specific corpora (see Table 2). More generally, according to our analysis, cultural identity terms were adopted by sources in the following order (with some exceptions for specific term clusters): Google Books N-Grams, the NY Times, PsycINFO, the NSF Grant Database, and the NIH Grant Database. It is important to note that, within each cultural identity term classification, these rankings reflect the year that the first cultural identity term (within the term classification) surpassed its historical average (a term's average proportional frequency by source across time). Although this trend was relatively consistent across cultural identity term classifications, there were two primary exceptions. PsycINFO was ranked first for the bicultural term cluster (Group B), as it contained both the earliest occurrences of bicultural terms amongst all of the corpora, and the first instance of such term frequencies surpassing their historical average. Further, PsycINFO was ranked second for the monocultural term cluster (Group A), which demonstrates that the terms *monocultural*, *monoethnic* and *monoracial* were also adopted earlier and were employed more frequently in academic sources than in sources intended for lay audiences, such as the NY Times. However, overall, results support the hypothesis that the selected cultural identity terms were first adopted by sources or corpora with lay audiences before their adoption and frequent usage in academic sources, such as NIH grants.

Discussion

The U.S. is experiencing an increase in diversity, and there is a growing number of

individuals who identify as bicultural and multicultural. Yet, the ability to identify as bicultural or multicultural is often restricted by society. As a result of the differences between self-categorization and external classification, there are often errors in the documentation of diversity and potential for symptoms of negative mental well-being for biculturals and multiculturals who are miscategorized (Townsend et al., 2009; Sanchez, 2010). Accordingly, greater attention to the social identity terms people employ in their everyday life is warranted. As a first step, the present investigation explored the shifting terminology and usage patterns of social identity terms across sources, aimed both at lay and academic audiences. We aimed to better understand the transmission of language through time to inform future research and public policy corresponding to increases in diversity.

Consistent with the first hypothesis, the pattern of cultural identity term usage and frequency in the NY Times (a popular news source aimed at a lay audience) can be predicted by the historical trends of related root social identity terms (e.g., *race*) from which term suffixes originate (e.g., *-racial*). According to prior analyses of the broader social identity terms, *race* connotes a biological origin, *ethnicity* suggests a geographical origin, and *culture* is defined by a set of behaviors collectively adopted by a social group with a common set of characteristics (Betancourt & Lopez, 1993; McKenzie & Crowcroft, 1994). For bicultural and multicultural terms, terms with *-racial* suffixes originated first, followed by those with *-cultural* and *-ethnic* suffixes. These suffixes parallel the usages of the terms: *race*, *culture* and *ethnicity* in popular culture, which were historically used to describe or categorize cultural groups, such as Latinos and African Americans. However, cultural identity terms, which begin with the prefix *mono-* follow a different trend. In this case, *monocultural* was the first and most prevalent term used to describe individuals with one cultural identity, followed by *monoethnic* and *monoracial*. This inverse trend, when

compared to the patterns evident for bicultural and multicultural terms, may be, in part, explained by the association between *race* and minority identity categorizations. Further, there is a disassociation between these concepts and European American identity that epitomizes a monocultural individual (Devos & Banaji, 2005). In line with this rationale, *monoracial* would be the least likely (of its classification group) to be represented with an image of a European American. Accordingly, it would be the most recently introduced and most infrequently used term to describe monoculturals. As per the lay association between *monocultural* and whiteness, stigmatized minorities who exhibit negative psychosocial well-being due to historical stereotypes of their groups in society may be buffered from consequences of identity denial when they identify as *monocultural* (Smith, 2014; Townsend, Fryberg, Wilkins & Markus, 2012).

As demonstrated in an exploratory analysis, when cultural identity terms with differing prefixes (e.g., *mono-* v. *multi-*) are compared across sources intended for lay audiences, terms representing bicultural and multicultural identities are more contemporary and highly frequent in usage than those representing monocultural identities. Similar trends were established in both Reddit and the NY Times, illustrating that popular terms identifying biculturals and multiculturals have become more often employed among lay audiences as of late, as expected considering the recent increase in the racial diversity of the U.S. (Hixson et al., 2011).

Furthermore, another consequence of the increased racial diversification of the U.S. population is the upsurge in the usage and popularity of the terms, *multicultural* and *multiculturalism*. Multiculturalism in academia, however, is not typically used to describe people who identify with more than two cultures, but rather, is an ideology or approach to diverse environments in which many groups are each recognized, celebrated and appreciated (e.g., African American History Month) (Banks & Banks, 2013; Rosenthal & Levy, 2010). Multiculturalism also

relates to public policy, as the endorsement of multiculturalism has been associated with reductions in prejudice toward target groups and the support for social policies impacting these groups (Urbiola, Willis, Ruiz-Romero, Moya & Esses, 2017). Overall, these trends in both lay and academic sources suggest that our society is becoming culturally complex, suggesting that both journalists and academics will need to respond to the changing demographics within the U.S. to relate to future generations of multicultural Americans.

In addition to theorizing about the evolution of selected cultural identity terms, we theorized that the transmission of these terms would begin in sources intended for lay audiences, be relayed to mixed sources, and would be, finally, transmitted to academic sources. While our methodology does not allow for us to study actual transmission of terms, the trends seem consistent with our expectations. The results were in large part consistent with the first hypothesis that the NY Times, a source intended for lay audiences, would be the first source to incorporate cultural identity terms. The second hypothesis was that Google Books N-Grams would incorporate the selected cultural identity terms followed by academic sources, namely PsycINFO, the NSF Grant database and the NIH Grant database. However, surprisingly, although most trends were consistent with apriori hypotheses, Google Books N-Grams was most often the first to incorporate cultural identity terms, except in the case of the bicultural term cluster for which PsycINFO was ranked first. We attributed this finding primarily to the size of the corpus and the time span of the data therein, as Google Books N-Grams is the largest of all the corpora included in our analysis and also has the longest time span, dating back to 1800. Additionally, as mentioned, PsycINFO was ranked first for the bicultural term cluster and ranked second for the monocultural term cluster, deviating from the consistent trends appearing across term clusters and corpora. These divergences may be attributed to the current research trends in the literature, which have been more focused on

biculturals (than multiculturals), often using monoculturals as a comparison group (e.g., Nguyen & Benet-Martinez, 2012). However, as predicted, cultural identity terms were first employed, and exhibited at a high proportional frequency in sources intended for lay audiences before being utilized in academic sources. As researchers who study these culturally complex individuals, it is worth noting that social identity terminology is not first being used by researchers to understand these individuals, but are first popularized by journalists and authors, some of whom may be academics. Academics frequently diverge from conceptions of biculturals and multiculturals, as they often study culturally complex individuals in a way that is: (1) not representative of common belief (e.g., biculturals are studied more by academics than by the media, artificially elevating their importance beyond that of monoculturals and multiculturals), and (2) not consistent with their lay definitions (e.g., operational definitions of biculturals sometimes rely on convenience samples, such as Asian-American college students, e.g., Nguyen & Benet-Martinez, 2012).

As researchers seek to study everyday challenges associated with identification and classification in a diverse society, a shift in current practices may be necessary to better match the lay perceptions of cultural identity reflected in the media, such as in the NY Times. For instance, research conducted on the importance of diversity in the workplace, focusing only on select racial groups during the Civil Rights Movement impacted the eventual adoption of the Equal Opportunity Act at the Federal Communications Commission (head of national media), affecting not only the diversity of media representation but also that of all workplaces nationwide (Fife, 1987). Academics often distinguish their work from lay beliefs and media trends. However, in this field, the overrepresentation of studies on a specific cultural group (e.g., Asian-American biculturals) and the underrepresentation of studies focusing on multiculturals from various backgrounds benefit neither the academic literature nor public policy.

Limitations

Although the present study explored new frontiers, illuminating longitudinal trends in cultural identity term usage in both public (e.g., social networks such as Reddit) and academic spheres (e.g., academic databases such as PsycINFO), there remain several limitations to its conclusions. These limitations are common to research on corpora. First, the NY Times Chronicle Project, which was the primary corpus employed to analyze the comparative trends in terms across time, operationalized term frequency as the number of articles that included target terms, rather than the number of times that a term was used in that year across articles. This may have had some impact on the trend analysis, deeming the test of our hypothesis more conservative, overall.

Additionally, not all of our sources had the same timeline, as some corpora dated back to only 1991 (NIH database), while others spanned from 1800 to present (Google Books N-Grams). These differences between corpora bring complexity to the comparison of trends across sources. Accordingly, these span differences may have influenced trends in cultural identity term usage in all corpora, impacting results, concerning the transmission of cultural identity terms across sources. Moreover, we cannot conclusively determine the cause of differences in the implementation of terms or in term frequencies among sources with lay or academic audiences. However, we posited that a lag existed in the academic sphere when studying individuals with complex cultural identities, as they were influenced by lay usage of terminology. The present investigation is the first step of exploring the trends and usage of social identity and classification terms, which describe a diverse society.

Implications and Future Directions

Academic Research. One conclusion from the present investigation is that academics and members of the media often have discrepant views on the classifications of biculturals and

multiculturals. As academics often create categories for biculturals and multiculturals (by providing biracial/multiracial or other options) rather than allowing them to freely self-identify (by allowing individuals to identify all of their cultural identities), there may be negative consequences for the mental well-being and social interactions of these culturally complex individuals (e.g., Townsend et al., 2009). Although the terms *bicultural* and *multicultural* are broadly defined to include any number of cultural identity combinations and may be represented in lay sources as a more accurate reflection of individuals' identification, in psychology research, some researchers find it valuable to simplify the operational definition of these terms when determining who is eligible to participate in their studies. In this way, individuals who are chosen to participate in these studies may not be able to fully express all of their cultural identities, as only some of their cultures may be highlighted for the purposes of the study in which they are recruited to participate. Moreover, oftentimes, psychological studies examining bicultural individuals are conducted on college campuses with convenience samples of either a populous bicultural population (e.g., Hispanic Americans) or a cultural group that has been extensively studied for which measures and constructs already exist (i.e., Asian Americans). In reference to the latter sample, researchers often choose to study East Asian American biculturals, as East Asian culture is the classic illustration of a *collectivistic* or communal society, while American culture is the icon of individualistic culture, a society comprised of highly independent individuals (Markus & Kitayama, 1991).

Further, an additional implication of this research is that, despite the increase in the lay usage of *bicultural* and *multicultural* terms, in research, biculturals and multiculturals may be disqualified from participation (not permitted to participate due to their cultural identification on a prescreening questionnaire) or may be removed from study samples during data analysis (if they do not fit into any ascribed or primary racial categories) (Gillen O'Neel et al., 2015). Some

academics may not provide the appropriate labels for biculturals and multiculturals to racially self-identify their biracial or multiracial backgrounds, and as such, may remove them from their sample (Gillepsie, Howarth & Cornish, 2012; Illovsky, 1994). These methods in psychological research might be attributed to the inability to correctly classify biculturals and multiculturals into group classifications, which are comparable to that of other cultural subgroups, such as African Americans. Additionally, academics may not know which scientific conclusions to draw about individuals whose demographic information is not confined to well-defined cultural categories, such as biculturals, multiculturals and individuals belonging to unrepresented cultural groups. Researchers may oversimplify categories and limit categories by employing post-study race or ethnicity questions, which display limited options, constraining a participant's ability to identify with all possible cultural identities (e.g., "Which of the following best describes your race?"). Across studies, these questions have multiple variations, which include: instructions that allow single or multiple category selection ("Choose only one" versus "Mark all that apply"), a *multiracial* or *mixed race* category, a *biracial* or *interracial* category, and an *other (please specify)* category (Townsend et al., 2009). Further, as demonstrated, numerous terms exist for peoples belonging to the same subgroup, consisting of individuals who identify with the same number of cultural identities (e.g., *bicultural*, *biethnic*, *interracial* and *biracial*). Some individuals may prefer to identify with one cultural identity term from prior experience or due to the historical association of the term itself (e.g., *interracial* is historically associated with the illustration of half-white, half-black individuals born into "mixed marriages" during the aftermath of the Civil Rights Movement; Brown, 2001). In conclusion, these post-study race or ethnicity questions may pose a potential risk to bicultural and multicultural individuals, as they limit the expression of their cultural identities, increasing the propensity for negative mental well-being and social behavioral outcomes.

Yet another implication of the findings from the present investigation is that a greater number of research studies that focus on multiculturals is required. As *multicultural* terms have become increasingly used in lay sources, there has become a pressing need for more research studies that focus on multiculturals rather than on monoculturals and biculturals; particularly in light of the overrepresentation of studies in cultural psychology centered upon the comparison between biculturals and monoculturals. In some cases, academics employ certain cultural identification terms (e.g., *bicultural*) with greater frequency than do members of the media. Biculturals' mental well-being and social behavioral outcomes are frequently studied (e.g., 83 studies were included in a meta-analysis on biculturals and adjustment; Nguyen & Benet-Martinez, 2013) in comparison to those of multicultural individuals. Moreover, *bicultural* appears more frequently in academia than it does in texts aimed at lay individuals. As such, we theorize that researchers may be placing too great a focus on biculturals due to their well-defined characterization in research and the precedence of prior work. However, multicultural individuals are more complex to categorize, as they display increased variation in regard to ethnic identification, as compared to bicultural populations, and therefore, are difficult to operationalize in terms of psychological research. In sum, the discrepancy between the usage of cultural identity terms in academia and in lay sources is likely to influence both public policy and lay perspectives on relevant subject matter. In this case, if academics disproportionately focus their research on biculturals (opposed to multiculturals), policies (e.g., mandatory healthcare providers addressing the concerns of diverse and intercultural racial groups) would primarily be adapted to meet the needs of biculturals, although they only represent a portion of individuals with multiple cultural identities.

For the future directions of the present investigation, experiments and further computational analyses are needed to measure the comparative differences between

monoculturals', biculturals' and multiculturals' sense of identification with their prescribed racial labels. There is a great value in determining whether individuals personally ascribe these labels to themselves or if these terms have been developed by external entities (e.g., standardized testing institutions) to culturally categorize individuals. This future research could enhance the ways in which cultural identity can be captured for societal needs, such as for the US Census. Once there is a common understanding via experimentation of which labels or terms individuals prefer to ascribe to themselves, we would encourage the implementation of these terms in future experiments, studying the effects of identity denial or forced expression of cultural identity by providing open-ended questions as an alternative to the standard racial demographic question as an identity manipulation. These proposed studies would differ from those in the literature in several ways: (1) they would add multicultural individuals to the comparison between monocultural and bicultural individuals, (2) they would increase the diversity of the sample to better understand the full spectrum of cultural classification, and (3) they would test the effects of a potential alternative to identity-constraining racial demographic questions by employing open-ended questions about multiculturals' race as a manipulation in an identity denial experiment.

Public Policy. The present investigation can also inform public policy. The forms of categorization implemented by academics in published research are typically utilized to inform public policy, although these academic categorizations differ greatly from the lay perspectives on cultural identification and classification, such as the disparity between the increasing lay usage of *multicultural* terms and the insufficient quantity of research being conducted on multicultural individuals. For example, based on popular lay usage of racial identity terms and racial self-identification, the U.S. Census Bureau has recognized the need for better categorization of small minority populations, such as Middle Easterners and North Africans (MENA) (Henderson, 2014).

These changes that will be implemented in the 2020 U.S. Census are based on research that was conducted on these minority populations after advocacy groups representing MENA highlighted the importance of this issue (Henderson, 2014). Similar to the motivations for including a specific item on the Census aimed at Hispanic/Latinos (the majority of whom previously self-categorized as *Some other race*), civil rights advocates have urged the U.S. Census Bureau to create a MENA category, as the plurality of Middle Eastern and North African Americans currently identify as *White* on the U.S. Census. These considerations to modify the U.S. Census signify an attempt to match the U.S. Census' current broad racial categorizations to the increasing diversity of individuals and their cultural self-perception to better serve the public needs of all Americans (Henderson, 2014). As diversity continues to increase in the U.S., the U.S. Census Bureau and research organizations will be required to provide specific and nuanced cultural categories as well as multiple choice or open-ended options for multiracial individuals in an effort to more accurately capture the full diversity of the U.S.

In addition to its misrepresentation of specific racial groups on the U.S. Census Race Questionnaire, the U.S. Census also constrains the cultural identification of bicultural and multicultural individuals, leading to several proposals for modifications to the race questionnaire (Henderson, 2014). For instance, officials have considered collecting open-ended ethnicity subgroup data for all Americans to classify them into ethnic subgroups more accurately (Henderson, 2014). These considerations to modify the U.S. Census signify an attempt to better match the U.S. Census' current broad racial categorizations to individuals' self-perception of their own cultural identities to better serve the needs of all Americans in terms of public policy (Henderson, 2014). As diversity continues to increase in the U.S., more efforts on behalf of the U.S. Census Bureau and research organizations will be required to provide more specific and

nuanced cultural categories as well as multiple choice options for multiracial individuals or alternatively, provide open-ended questions about racial, ethnic or cultural identity, the answers to which will then be categorized based on the pre-existing racial categories as well as their subcategories.

A further implication of our findings indicate that public policies should also cater to bicultural and multicultural populations that have become more identifiable in the media, indicating both an increase in the number of culturally complex individuals in the U.S. and in their identification with *bicultural* and *multicultural* labels. As a consequence of this growing diversity in the U.S., government agencies seeking to serve the needs of the American public are recommended to accurately classify and account for bicultural and multicultural individuals (Renn, 2009). For instance, the U.S. Department of Housing and Urban Development (2016) utilizes a Race and Ethnic Data Reporting Form, based on the U.S. Census Race Questionnaire, to ensure the maintenance of diversity and to guarantee that services are appropriately provided based on the needs of represented cultural groups within the U.S. However, as this form is a modified version of the U.S. Census Race Questionnaire, subsisting of two parts that inquire about individuals' (1) Latino/Hispanic origin and (2) race with six limited categorical terms (including *Other*), not all racial groups and racial combinations (i.e., biculturals and multiculturals) may be addressed by policy. Further, the racial labels used in this questionnaire to inform policy are both misrepresentative of their populations (e.g., *White* is classified as peoples originating from Europe, the Middle East and North Africa) and outdated (e.g., *American Indian*) (U.S. Department of Housing and Urban Development, 2016). Similarly, the U.S. Department of Education is required to record racial information at a local level and aggregate these figures for further analysis to improve the national education system. The majority (55%) of U.S. public school systems only

collect data on students' racial identification (once) during initial registration to school, however, one quarter of public schools records this information on an annual basis (Carrey, Farris & Carpenter, 1995). Further, although 10% of schools include an "other (please specify)" category, 5% contain an "other" non-specified category, and 5% incorporate a general "multiracial" option, the majority (73%) of schools only employ the basic, five category race form imported from the U.S. Census Race Questionnaire (Carrey et al., 1995). When asked in 1995, more than half (54%) of public schools identified the need for a "multiracial" option on their racial classification form as an issue of minor to significant importance (Carrey et al., 1995). Finally, parents and legal guardians of children are most often (73%) asked to identify the race of the student (with only 12% being able to make their own specifications); however, in 22% of schools, teachers are solely chosen to identify the race of their pupils (with the national average of this policy being twice that in the Northeast than in any other region; Carrey et al., 1995). As such, racial identification, in some cases, may be conducted on a racially phenotypic basis and can be wholly inaccurate. Consequently, schoolchildren will not be accurately classified due to the inability of most parents/guardians or teachers to racially identify "other" or "multiracial" children (Carrey et al., 1995). This may be because of issues with both identity assessments (e.g., racial questionnaire) and the methodology used to identify children's racial identities (e.g., teachers judging pupils' race by phenotype), leading to differences in resource distribution (Carrey et al., 1995).

In conclusion, with the increasing racial and cultural diversity of the United States, there is a greater need for more accurate and encompassing racial and cultural identification and classification, as individuals often face identity miscategorization. In this study, a novel computational approach was employed to ascertain the frequency of social identity terms used across lay and academic sources, contributing to the cultural psychology literature. The results of

this investigation, demonstrated that the use of complex cultural identity terms, such as *bicultural* or *multicultural*, have increased over time, although there has been a lag in their usage from lay to academic sources. As such, we can conclude that the transmission of social identity terms via lay and academic sources can have a lasting impact on the perception and categorization of bicultural and multicultural individuals, informing both research and public policy in this domain.

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Table 1

Identity Terms & Group Classifications

Cultural Identity Term Classification	Cultural Identity Terms
Group A: Monocultural	<i>monoracial, monoethnic, monocultural</i>
Group B: Bicultural	<i>interracial, biracial, biethnic, bicultural</i>
Group C: Multicultural	<i>multiracial, polyracial, multiethnic, polyethnic multicultural, polycultural</i>
Group D: Mixed/Other Race	<i>mixed race, other race, mixed ethnicity, other ethnicity</i>
Group E: Cultural Psychological Theory	<i>multiculturalism, polyculturalism, cultural pluralism</i>

*Note: *colorblind* and *colorblindness*, terms typically referring to an ideology that describes individuals' world perspective of "blindness" to the characteristics of race or ethnicity (Rosenthal & Levy, 2010), were excluded from these analyses due to their secondary meaning in medicine as a condition leading to the inability to perceive specific hues of color.

Table 2

The Inclusion Time Course for Cultural Identity Terms Across Corpora

Cultural Identity Term Classification	The New York Times	Google Books N-Grams	PsycINFO Database	NIH Grant Database	NSF Grant Database
Group A: Monocultural	3	1	2	5	4
Group B: Bicultural	3	2	1	5	4
Group C: Multicultural	2	1	3	5	4
Group D: Mixed/Other Race	2	1	3	5	4
Group E: Cultural Psychological Theory	2	1	3	5	4

*Note: For each group of terms collectively (weighting each term's historical average by its frequency in the corpus), corpora were ranked based on the point at which the collective group of terms (e.g., Group A: Monoculturals) surpassed its historical average threshold in each corpus. Also, it is important to note that Reddit N-Gram Viewer, although evaluated for lay language, was not included in this analysis, as it had an insufficient number of the selected cultural identity terms (less than 50%). Overall, consistent with Hypothesis 3, selected cultural identity terms were first introduced to Google Books N-Grams, followed by *The New York Times* and academic sources, including PsycINFO, NSF and NIH grant databases.

Appendix A

Figure 1. Comparative trends in the usage of monocultural terms (Group A) in *New York Times* articles from 1885 to present. The first and second mentions of *monocultural* occurred circa 1973 and 1978, although the frequency of articles containing this term did not surpass the annual minimum threshold (10^{-4}). The annual minimum threshold was set at 1 out of 10,000 articles per year, as the total number of articles produced by *The New York Times* in a given year has never historically approached or exceeded ten thousand. Contrary to predictions made in Hypothesis 1, among terms using the *mono-* prefix, *monocultural* was the earliest introduced and the most frequently used in *The New York Times* across time. However, there was an increase in the use of *monoethnic*, narrowing its gap with *monocultural* over time, approaching a similar frequency of 1 out of 1,000 articles in 2015. Finally, *monoracial* was the most recent term to be introduced to *The New York Times* in 2007, maintaining its usage until the present.

Figure 2. Comparative trends in the usage of bicultural terms (Group B) in *New York Times* articles from 1890 to present. Among terms using the *bi-* prefix or indicating two cultural identities (e.g., *interracial*), the term *bicultural* is first mentioned in *The New York Times* during a period from 1920 to 1940 with a small increase in frequency (above the minimum threshold [10^{-4}]) in 1930 after which the term disappears altogether from articles until 1950. Additionally, *biethnic* was mentioned below the minimum threshold from 1995 to 2005 at a relatively low and constant rate. Even though *interracial* was introduced earliest and is used most frequently in *The New York Times* compared to other synonymous terms, the trends in usage for *bicultural* and *biracial* are similar to that of *interracial*, although at a lower rate. As predicted in Hypothesis 1, bicultural terms, which include suffixes derived from *race*, were introduced first and were most frequently followed by terms with roots from *culture* and *ethnicity*.

Figure 3. Comparative trends in the usage of multicultural terms (Group C) in *New York Times* articles from 1950 to present. As predicted by Hypothesis 1, for terms using the prefix *multi-*, *multiracial* was the preferred term in *The New York Times* from 1950 until 1990. However, *multicultural* surpassed it in popularity until the present time; *multiethnic* presently ranking second in term usage. Newer terms that describe individuals or societies with multiple racial identities, which use the prefix *poly-*, such as *polyracial*, *polyethnic* and *polycultural*, were comparatively less popular and less widely adopted in *New York Times* articles across time. Patterns for these terms also supported the trends predicted in Hypothesis 1 with the exception of *polyracial*, which had low frequency usage for a decade starting in the late 1990s.

Figure 4. Comparative trends in the usage of mixed/other culture terms (Group D) in *New York Times* articles from 1860 to present. Consistent with Hypothesis 1 that terms containing *race* would predate those containing *ethnicity*, both *mixed race* and *other race* have been used earlier, more frequently and more consistently in *The New York Times* than have been *mixed ethnicity* and *other ethnicity*, which were introduced in the late 20th century. Although *mixed race* significantly dropped in popularity around 1950, it immediately recovered as a term in recurrent use, eventually becoming the most frequently used term in this category.

Figure 5. Comparative trends in the usage of cultural psychological theory terms (Group E) in *New York Times* articles from 1940 to present. In support of Hypothesis 1, trends in this figure illustrate that terms that include *culture* are relatively new in usage, experiencing growing popularity in recent years. As *polyculturalism* is the newest term to be introduced to the literature, its frequency in *New York Times* articles did not meet the minimum threshold (10^{-4}). Additionally, as depicted in the figure, *cultural pluralism* has been recognized in this newspaper since 1935 and has steadily increased in usage until recent years when it experienced a slight decline. However, *multiculturalism*, a theory only recently introduced, increased exponentially in usage from 1980 until 2002 in *The New York Times* after which it experienced a slight decline in frequency.

Figure 6. Comparative trends in the usage of monocultural, bicultural, multicultural and mixed-race terms (Groups A - D) in *New York Times* articles from 1860 to present.

Figure 7. Comparative frequencies of monocultural, bicultural, multicultural and cultural psychological theory terms (Groups A – E) on Reddit comments from 2007 to 2015. For the purposes of this figure and resulting analysis, all terms that were tracked on Reddit and demonstrated a frequency greater than 1 out of 1,000,000 were plotted.

Figure 8. Exponential trends in the number of cultural psychology publications on PsycINFO over time. These trends can be compared to those of the total number of psychology publications in PsycINFO, which have increased steadily from 1850 to 1900 (see comparative trends in the magnified portion of the graph). These trends led to an eventual exponential increase in psychology publications until present, as shown by the curve of best fit. The exponential trend displayed in the figure demonstrates that the total number of psychology publications doubled approximately every 15.5 years, represented by the following equation: $y = 2^{\frac{13x}{200}} - 122.79$. Similarly, the number of psychology publications on PsycINFO that include target cultural identity terms has exponentially increased over time, signified by the equation: $y = 2^{\frac{23x}{200}} - 283.06$. Consistent with Hypothesis 3, this trend illustrates that psychology publications with selected cultural identity terms have doubled in number every 6.8 years, a figure twice that of the overall rate of total psychology publication production.