

# Heterogeneity, Race, and Critical Thinking

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## EXECUTIVE SUMMARY

The Supreme Court rulings in the “Michigan” cases suggest that institutions of higher education should periodically assess both the contributions of diversity to educational outcomes and levels of diversity among campus populations. This paper addresses a number of issues. The first portion of this analysis reviews (1) academic literature suggestive of the contributions of heterogeneity to thought processes, and (2) the contributions of race to heterogeneity of stimuli. The second part of this paper examines the concept of “critical mass” and its use in the establishment of the minimal levels of racial/ethnic heterogeneity required to promote the benefits of diversity just cited. Finally, this paper proposes an index by which diversity can be measured. The implications of this index for changes in the demographic composition of the University of Maryland’s undergraduate population are discussed.

### Heterogeneity and thought processes

Researchers have linked heterogeneity of experience to benefits in mental processes. Heterogeneity of participants and perspectives contributes to the avoidance of “groupthink” and “mindlessness.” Heterogeneity of stimuli has been linked to cognitive development. Individuals develop organized bodies of knowledge (‘schemas’) in order to process events. The assimilation and reconciliation of new stimuli to existing stimuli is associated with cognitive development.

### Race and Heterogeneity

Racial diversity on a campus contributes to heterogeneity of perspectives. The contribution of racial diversity to heterogeneity of perspectives extends beyond those elements that can be captured by other socio-economic variables such as income and

geography. Phenomena such as intergenerational transmission of experiences with discrimination and cultural orientations lead to differences in perspectives that cannot be captured by excluding race from consideration when measuring campus heterogeneity.

### “Critical Mass” and Race

The benefits of racial heterogeneity require a “critical mass” of minority students. Minority populations (of either race or gender) below approximately one-third of the population are associated with a phenomenon of “tokenism.” Among numerical minorities, token behavior includes acts such as avoiding conflict, reduced participation in group activities, and assuming and enacting roles that meet the majority’s expectations. This critical mass can be ensured via the periodic measurement of heterogeneity among the campus population.

### The Student Interaction Diversity Index

The social science literature contains a number of indices that can be employed to measure the variation or heterogeneity of a population. The racial diversity index we have selected represents the probability that two individuals, selected at random, will differ along the dimension of race/ethnicity. The index was developed by Phillip Meyer and Shawn McIntosh (1992) and is based on calculating the likelihood that two people in a pool will have a similar characteristic. Equal values of the index can represent differing underlying population distributions, and the index is maximized when there are equal proportions of each racial category within the population. When subpopulations are not evenly distributed, upward movement of the index is most sensitive to growth in the smallest subgroup.

The index was calculated for two populations. The first measure was done for the

2004 College Park undergraduate population. The second measure was calculated for the population in the zip code of the permanent address for each new freshman in the 2004 class. Thus each incoming freshman had the diversity index for his or her zipcode attached to their record. The findings suggest that the campus contains more racial heterogeneity than that found in the new freshmen's home environments.

In addition to relative measures, however, there is an absolute standard by which to measure campus progress. In order to minimize phenomena associated with "tokenism", the University of Maryland can ensure that its undergraduate minority presence never falls below a 'critical mass' of thirty-five percent. Attaining the benefits of racial/ethnic diversity, however, also requires that the 'critical mass' be comprised a relatively equal proportions of various racial/ethnic minorities. The use of a diversity index can help ensure that the campus maintains both a critical mass and a desirable distribution of all racial/ethnic populations.

## Heterogeneity, Race, and Critical Thinking

The recent Supreme Court rulings in the “Michigan” cases are instructive when they suggest that institutions of higher education should periodically assess both the contributions of diversity to educational outcomes and levels of diversity among campus populations. To that end, this paper will address (however broadly) a number of issues. The first portion of this analysis will touch upon (1) academic literature suggestive of the contributions of heterogeneity to thought processes, and (2) the contributions of race to heterogeneity of stimuli.

The second part of this paper examines the concept of “critical mass” and its use in the establishment of the minimal levels of racial/ethnic heterogeneity required to promote the benefits of diversity just cited. The last segment of the paper proposes an index by which diversity can be measured. Additionally, the implications of this index for changes in the demographic composition of the University of Maryland’s undergraduate population are discussed. This paper will present a method for measuring the level of racial diversity among the undergraduate population at the University of Maryland.

### Heterogeneity and thought processes

Researchers have linked heterogeneity of experience to benefits in mental processes. Janis (1972) suggested that homogeneity of group participants contributes to “groupthink.” This phenomenon is defined as poor decision-making as a consequence of

insufficient search for alternative solutions and uncritical acceptance of a narrow set of opinions. The narrow set of alternative viewpoints is, in part, a consequence of homogeneity of the group. Others have also examined the events associated with the absence of sufficient critical thinking. Langer (1978) refers to the “mindless” state. Bargh (1997) cites the existence of “automaticity.” These authors are referring to certain processes and problem solving routines, some of which are complex, that become standardized due to homogeneity of inputs and stimuli. Heterogeneity of participants and perspectives contributes to the avoidance of “groupthink” and “mindlessness.”

Heterogeneity of stimuli has been linked to cognitive development. Piaget’s (1971) explanation of cognitive development suggests that individuals develop organized bodies of knowledge (‘schemas’) in order to process events. The assimilation and reconciliation of new stimuli to existing stimuli is associated with cognitive development. More recently, Hurtado, Mayhew, and Enberg (2003) and Gurin, Hurtado, and Gurin (2002) suggest that Kohlberg’s (1976) stages of moral growth (from development of moral systems that serve the individual to systems which serve society) are transited more efficiently when students are exposed to varying perspectives and have the opportunity to engage in person with individuals different from themselves. Similarly, Killen, Crystal and Rock’s (2005) work with elementary and high school students found that, when analyzing conflicts in social situations, students with higher levels of interracial contact exhibited higher levels of moral reasoning.

Theory has also suggested that within the “life course” the timing of exposure to divergent opinions is of some consequence. Erikson (1946) suggested that identity development in late adolescence is aided when individuals have an opportunity to place

certain tenets and beliefs in abeyance and engage in experimentation. This would suggest particular benefits of the introduction of heterogeneity into the lives of the traditional college-age population. In addition, Terenzini et al. (1994) and Pascarella & Nora (1996) suggest that cognitive development (particularly in the first year of college) is strongly influenced by experiences outside of the classroom. Moreover, the alterations in perspectives gained in college endure decades after the college experience (Newcomb et al., 1967).

### Racial diversity and educational outcomes

Recent litigation on issues of affirmative action and diversity in higher education has prompted a series of studies. Broadly speaking, these studies have found that racial diversity has led to better citizens, individuals more satisfied with their college experience, and students with better complex thinking skills.

Citizenship: Deppe (1989) reported higher levels of humanitarian values as a consequence of racial diversity in college populations; Engberg, Meader and Hurtado (2003) refer similarly to the development of a “pluralistic orientation.” As a consequence of interracial interaction, individuals are able to understand the world from someone else’s perspective, tolerate differences, and accept one’s views being challenged. In particular, they note that minority students from mixed racial environments may have more experience than white students (from homogeneous neighborhoods) in educating others regarding social issues and differences in perspectives. Consequently, they contend, minority students may have a more mature development of pluralistic orientation. Bown and Bok (1998) provide empirical evidence that among the alumni of

28 selective institutions, blacks exhibited higher levels of civic participation than their white counterparts with similar grades and test scores.

Astin's (1993) study of 25,000 students from 217 colleges revealed that commitment to a "meaningful philosophy of life" was positively correlated with the frequency of discussion of racial and ethnic issues. Astin suggested that "issues of race, culture and ethnicity may prompt students to confront existential dilemmas that many contemporary students seem to be avoiding" (Astin 1993; p46).

Student satisfaction: Astin (1993) found higher levels of student satisfaction with their educational experience among individuals reporting higher levels of interracial contacts. This result has been buttressed by similar findings by Gurin (2002) and White-Betz and Laurent. Astin (1993) and Gurin (2002) employed large datasets in a longitudinal study: White-Betz and Laurent came to similar results using a small cross-sectional analysis.

Complex thinking: Watson, Kumar and Michaelson (1993), in an experiment employing 200 undergraduates, found that racially heterogeneous groups generated a more extensive set of alternative solutions to a structured problem than homogeneous groups. Cady and Valentine (1999) also found that racial diversity contributed to the number of alternative solutions identified by groups. And, Springer (1995) argues that interracial friendships are associated with more frequent discussion of complex social issues.

Discussion of complex issues requires both the ability to differentiate among various positions (the simpler task) and a capacity to integrate these ideas and identify interrelationships (White-Betz and Laurent). Greene and Kamimura (2003) note Perry's



(1976) thesis that, when presented with perspectives differing from one's own, students gain the ability to adopt different perspectives, while holding their own beliefs in abeyance. They refer to this as "perspective-taking skills." This, in turn, is associated with greater skills in self-reflection. Hurtado, Mayhew and Engberg (2003) suggest that King and Mayhew (2003) provided the link between cognitive development and the focus on social issues when they note that "the development of cognitive complexity that underlies higher level of critical thinking may enable students to see multiple social perspectives inherent in complex moral problems" (Hurtado, Mayhew and Engberg; 2003, p.10). Hurtado et al. employed formal tests (as compared with self assessments) and determined that students taking a diversity class, with a component of active learning, had higher moral reasoning skills than other students taking a traditional class which had neither a diversity component or an active learning component. Students taking the diversity class began with higher moral reasoning skills than those taking the traditional class, so to some degree this subset may be described as self-selected. The diversity course did, however, add to moral reasoning skills.

### The Contributions of Race to Heterogeneous Perspectives

Racial diversity on a campus contributes to heterogeneity of perspectives. The contribution of racial diversity to heterogeneity of perspectives extends beyond those elements that can be captured by other socio-economic variables such as income and geography. Phenomena such as intergenerational transmission of experiences with discrimination and cultural orientations lead to differences in perspectives that cannot be captured by excluding race from consideration when measuring campus heterogeneity.

Transmission of experiences with discrimination: Several authors (Feagin, 1991; Cose, 1993; Feagin and Sikes, 1994) have documented both the persistence of discrimination in the life experiences of middle and upper income blacks, and the transmission of these experiences to their children. Feagin and Sikes, after interviews with numerous respondents, suggested that the frequency of discriminatory acts directed towards blacks leads to development of an ability (a “second eye”) to discern between rude behavior and behavior that is evoked as a consequence of an individual’s race. Similarly, Cose (1993) documents discrimination against middle class blacks both in, and outside of, the workplace. He suggests that these acts result in both rage and enervation among successful blacks.

These life experiences create collective memories across generations of middle-class blacks and their children. The transmission process is often the consequence of the parenting strategies of middle-class blacks. These parents must walk a fine line in socializing their children to recognize and react to discriminatory behavior. This socialization, however, must take place in such a manner that the aspirations of children are not circumscribed because of the existence of barriers (Cose, 1993; Feagin, 1991; Feagin and Sikes, 1994).

Ethnicity and Culture: The Bureau of the Census treats Hispanic/Latino origin as an ethnicity rather than a race. Hispanic Census respondents, however, saw the issue somewhat differently; their responses on racial classification were indicative of assimilation within American society. Among Hispanics, racial/ethnic identity captures a myriad of differences in income, employment, and tenure in the United States. Many of

these differences do not lend themselves to an income proxy.

Forty-two percent of all Hispanics treated their ethnicity as a race by foregoing selection of one or more racial categories provided in the 2000 Census. Rather, these individuals selected the category of “other race” and stated that they were “Hispanic”. Forty-eight percent of Hispanic respondents stated that they were white. Tafoya (2004) found significant differences in integration within American society when white-Hispanics were contrasted with those who deem Hispanic origin to be a race. For example, individuals who deemed Hispanic origin to be a race were younger, less likely to vote, and more likely to cite discrimination as a problem within the United States.

The forgoing illustrates some of the contributions of racial/ethnic diversity to heterogeneity. Some ‘lived experiences’ are only captured by core identities such as race, gender, or ethnicity.

#### “Structural Diversity” and “Critical Mass”

Racial heterogeneity within a college campus requires a “critical mass” of minority students. This “critical mass” (expressed as a proportion of minorities on campus) will influence the number of opportunities for interracial interaction (Hurtado, Dey, & Trevinno, 1994), the ability to discuss racial issues (Chang, 1996) and the number of interracial friendships (Springer, 1995). Kanter (1977) suggested a threshold of critical mass of about thirty-five percent. Minority populations (of either race or gender) below approximately one-third of the population are associated with a phenomenon of “tokenism.” Among numerical minorities, token behavior includes acts such as avoiding conflict, reduced participation in group activities, and assuming and enacting roles that

meet the majority's expectations. Conversely, members of the majority have higher levels of influence and rate their own contributions and performance more favorably (Kanter 1977, Izraeli, 1983). While Kanter's investigations focused on bifurcated populations, we reframe her findings by aggregating all minorities and suggesting that when a majority (white students) is less than approximately two-thirds of the population, social interactions will not be characterized by "tokenism." This critical mass can be ensured via the periodic measurement of heterogeneity among the campus population.

### The Student Interaction Diversity Index

The social science literature contains a number of indices that can be employed to measure the variation or heterogeneity of a population. Measures such as the Index of Dissimilarity and Theil's measure of entropy were considered and dismissed. Though widely accepted in the academic community, these indices are not intuitively appealing to the layperson. We selected the diversity measure adopted by U.S. News and World Report for two reasons: (1) the index is intuitively appealing, and (2) U.S. News rankings allow for comparisons with other institutions.

The racial diversity index we have selected represents the probability that two individuals, selected at random, will differ along the dimension of race/ethnicity. The index was developed by Phillip Meyer and Shawn McIntosh (1992) and is based on calculating the likelihood that two people in a pool will have a similar characteristic. The methodology is similar to calculating the probability that two independent flips of a coin will result in 'heads' both times. The probability of the same event happening twice (or two people meeting each other and having the same characteristic) is the probability

of one event occurring multiplied by itself. In the case of getting two results of 'heads', this would be  $.5 * .5$  or  $.25$ . 'Diversity' is defined as the likelihood that any two individuals, selected at random, would NOT be of similar race or ethnicity. Thus, subtracting the sum of squared proportions from unity generates this index.

Equal values of the index can represent differing underlying population distributions, and the index is maximized when there are equal proportions of each racial category within the population. The maximum value of the index varies as a function of the number of categories or subgroups within a population: the greater the number of subpopulations, the higher the maximum value of the index. A population with four evenly distributed subgroups would generate the maximum index value of  $.75 [1 - (.25^2 + .25^2 + .25^2 + .25^2)]$ . A population with five evenly distributed subgroups would generate the maximum index value of  $.8 [1 - (.20^2 + .20^2 + .20^2 + .20^2 + .20^2)]$ . When subpopulations are not evenly distributed, upward movement of the index is most sensitive to growth in the smallest subgroup.

The index was calculated for two populations. The first measure was done for the 2004 College Park undergraduate population. The second measure was calculated for the population in the zip code of the permanent address for each new freshman in the 2004 class. The same method was employed for both populations: we estimated the proportion (or probability) of each of four groups- white, black, Native American, Asian, or Hispanic/Latino-appearing within a zip code or on campus. Each of these proportions was squared and the results summed to derive the likelihood that any two individuals, selected at random, would be of similar race or ethnicity. Subtracting the sum of squared proportions from unity generated an overall diversity index for the campus. In addition,

each incoming freshman had the diversity index for his or her zipcode attached to their record. This procedure results in the following diversity indices:

Undergraduate campus population:	0.51
Freshmen zip codes (permanent address – all students)	0.36

In other words, selecting any two undergraduates at random, there was about an even chance (.51) that they would not be of the same race. Moreover, this value (.51) was higher than the aggregate value for the zipcodes of any racial group.

Freshmen zip codes (permanent address – Asian students)	0.43 N= 586
Freshmen zip codes (permanent address – black students)	0.41 N= 480
Freshmen zip codes (permanent address – Hispanic students)	0.40 N= 203
Freshmen zip codes (permanent address – white students)	0.28 N= 2489

The foregoing suggests that the campus contains more racial heterogeneity than that found in the new freshmen's home environments. A more refined comparison would be that of contrasting the demographic characteristics of each incoming student's high school with the campus undergraduate population. While this comparison is forthcoming, we do note Frankenberg, Lee and Orfield's (2003) finding that as of 2000 Maryland is among the states with the highest level of segregation of black students in its schools (#5). With respect to Hispanic students, Maryland ranks only marginally better, as the 11<sup>th</sup>- most segregated state (Frankenberg, Lee, and Orfield; 2003).

Selection of the U.S. News index also allows for easy comparison with our peers. The indices for our peers are shown below.

University of California at LOS ANGELES	0.64
University of California at BERKELEY	0.62
<b>University of MARYLAND</b>	<b>0.51</b>
University of Illinois at URBANA-CHAMPAIGN	0.44
University of MICHIGAN	0.43
University of NORTH CAROLINA	0.33

The University of Maryland's student interaction diversity index is in line with that of its peers. In addition to relative measures, however, there is an absolute standard by which to measure campus progress. In order to minimize phenomena associated with "tokenism" (Kanter, 1977), the University of Maryland can ensure that its undergraduate minority presence never falls below 35% of the total undergraduate population. An undergraduate minority presence of 35 percent reflects an interaction index in excess of fifty percent.<sup>1</sup>

The index can also be calculated at levels below that of the campus, such as at the level of course, major or college. This provides another measure of "added value" provided by the University of Maryland. Each new freshman from the fall 2000 class had a diversity index calculated for every course section of every class taken between matriculation and graduation. These indices were summed such that each student had an aggregate value reflecting the racial diversity of enrollments of all courses taken. These values were compared to responses from our 2005 alumni survey. This survey asks respondents of a number of self-assessments regarding their capacity to function in workplace and educational settings that are racially diverse. In most instances there was a positive relation between the individual's diversity index and self assessments of ability to function in racially diverse settings. These associations are shown below:

Self Assessments positively associated with diversity index \*

- Frequency of interracial interaction
- Problem-solving skills in diverse group setting
- Ability to assume other person's perspective
- Comfort in interracial settings

\* From 2005 Survey of UM Alumni

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<sup>1</sup> The actual student interaction diversity index value is .53.



## Conclusion

This review has touched on a number of topics, any one of which could warrant its own literature review. In limited space however, this review has documented the following: (a) the links between heterogeneity of stimuli and complex thinking; (b) the heterogeneity of perspectives that are linked with racial identity; (c) the contributions of racial diversity to educational outcomes, and; (d) a manner of determining a minimum level of campus racial diversity to ensure beneficial educational outcomes.

Heterogeneity of stimuli leads to more complex thinking. Research has shown that the age of traditional college students is an optimum point for the incorporation of new perspectives. Heterogeneity of perspectives is formed, in part, by dissimilar life experiences that are a consequence of race and ethnicity. The incorporation of racial heterogeneity on a college campus has been linked to beneficial educational outcomes such as higher levels of citizenship, moral development, and more complex thinking.

Yet we know that the contributions of racial diversity require a critical mass of minorities so as to ensure minimal threshold levels of social interaction. We have deemed this threshold to be 35% of the undergraduate population. Additionally, it is suggested that at the University of Maryland, the odds of selecting any two undergraduates at random and having them differ by race should exceed .5.

Methodological improvements in the calculation can be undertaken. Comparing the campus distribution with that of the undergraduate's high school can refine the measure of the differences in levels of interracial contact in high school as compared to college. The index can also be applied at levels below that of the campus, such as at the

level of course, major or college. When the index is combined with other data elements, such as those from Maryland's alumni survey, measures of "added value" provided by the University of Maryland can be established.

Given the contributions of heterogeneity of stimuli, the University of Maryland, can offer an environment that is more diverse -- and thus more conducive to the development of critical complex thinking skills -- than that from which its students originate. We note that comparisons between the racial heterogeneity of the campus and of the undergraduate's former learning environment should periodically be revisited. It is our hope, however, that in time, racial identity will no longer be helpful in capturing heterogeneity of perspectives and life experiences.

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