

# Quantification of Gentrification

Alex Malnaa, Fall 2017  
NDSU - Advanced Architectural Design Studio

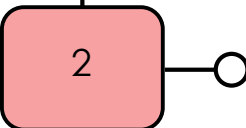
The philosophical framework for this research is both quantitative and qualitative, with abductive reasoning; a fully realized, urban setting is known as a product, however the details of what to build and how to apply typologies is not exactly known. The main body of research will contribute to the identification and classification of diverse types of gentrification versus general, healthy urban growth. The philosophical framework of intersubjective consensus, where multiple realities exist from different perspectives yet can be understood as a network, will be used to allow the varying experiences from socio-economic viewpoints their own validity.

To ensure quality standards are being met, several factors have been put in place. The credibility of the study is ensured through the gathering of information from multiple sources and viewpoints, through academic journals, existing research and other supplemental sources. This will help to capture the holistic nature of such an abstract thought of gentrification. The transferability of this research will consider both the specifics of the context it will be applied to and for a broader usage beyond the short-term application. Specifically, the research is aiming to be applied to the Downtown Moorhead, MN area, however for the sake of broader usage, the defining applicable region will be urban settings in the United States as confined by census districts. Historically, American urban areas have undergone similar forces and regional specifics can be adapted on a case by case basis. The dependability of the results relies on a plethora of factors, some of which are quite nuanced and vary widely not only when compared from metro to metro, but even bordering neighborhoods. By allowing generalized consensus, broad factors which are common amongst urban settings will be analyzed, rather than site specifics which will hinder replicability of the results. Confirmability will be achieved using triangulation to verify research validity, and reflexivity to correct for observer bias. Triangulation will be supported by gathering at least three sources with correlating information amongst comparable contexts. Reflexivity requires myself to reveal my own epistemological assumptions I have, their influence on the framing and potential changes in perspective throughout the research period. My assumptions on the effects of Gentrification lean towards a negative representation, as I see the displacement of people/businesses and the accumulation of wealth by the upper-class as a divisive and manipulative scheme. As I will be using an intersubjective philosophical framework, multiple realities will be acknowledged from various perspectives and mine must be accounted for.

This research aims to provide a concise way to quantify gentrification for the purpose of application in the design professions to help mitigate and reduce negative effects seen with gentrification. First, by researching into the major types of gentrification and understanding the factors that contribute to them, a core model can be created. Then, by utilizing case studies of urban areas undergoing urban redevelopment in their cores and analyzing major factors, we can cross-reference expected forms of gentrification from actual results. By honing in on the factors leading to gentrification issues, we can then apply a quantifiable factor to such contexts which can be used to compare to other like contexts and compare design strategies.

Gentrification of urban cores since the turn of the millennia has brought about both a new sense of revitalized cities and socio-economic strains on the individuals who reside within them. As the rate of new and redevelopment increases, property values, and subsequently cost of living, inflates. By analyzing the pros and cons of development at various rates, the optimum growth rate that benefits the working class and economic mobility can be found. This research is being conducted for an advanced architectural design studio. The intended audience in the long term is the design community, specifically city planners and design firms specializing in urban design. This research aims to provide design professionals with information on how to reduce socio-economic inequality caused by new developments. The information and application of the research on gentrification is formed under abstract thoughts and speculation. Quantifiable facts and subsumed norms will be used for support, gathered through literary research and existing experimental models found.

The term gentrification itself was first coined by Ruth Glass, a British Sociologist, in her 1964 book, *London: Aspects of Change*. She primarily focused on the residential aspect of the process, noting, "...once this process of 'gentrification' starts in a district it goes on rapidly until all or most of the working-class occupiers are displaced and the whole social character of the district is changed." (Glass, R.)



In 1979, Phillip Clay of MIT proposed four distinct phases of gentrification; in his 2017 book, *How to Kill a City*, Peter Moskowitz updates the existing model by providing outlines for a primer phase and a final phase. (Moskowitz, 32-37)

# 1

The primer phase added by Moskowitz, city governments pave the way for urban redevelopment. This can be accomplished through a variety of policy changes, tax incentives, and mass re-zoning and alterations to codes for a district. Moskowitz argues that such changes are made to unequally benefit large corporations, development companies and ultimately, the upper-class.

# 2

Individuals come into a community with intentions on renovating spaces to improve their community. Throughout the 1960's to late 1990's, LGBT communities developed in urban cores as people fled to the suburbs. By putting forth the effort to maintain the neighborhoods, they retained a sense of community that was welcoming and enticing for people to move into.

# 3

Clay argues now that the neighborhood has a desirable character, word of mouth and the media take hold and begin to advertise about the community being developed. Moskowitz adds that many people come into the community with a benevolent mindset, hoping to take part of the new cultural phenomena occurring, while others are hoping to capitalize on it. Symptoms of gentrification begin to show as vacancy rates plummet, rents escalate and new restaurants, bars, and boutiques begin to open at a faster rate.

# 4

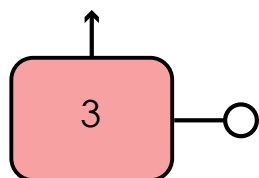
Gentrifiers, both individuals and entities such as development companies, begin to hold more power in the district. Both by their mere presence and by holding a larger share of city government positions, planning committees, neighborhood housing associations, etc. they drive their goal forward. Key elements to this phase include a switch to more entity drivers than individuals, banks investing in previously disinvested areas and growing tensions between 'old' and 'new' district populations.

# 5

With the gentrifiers in more positions of power and a larger influx of people, the neighborhood becomes wealthier; however, this is not an equal distribution. Those who invade the neighborhood bring the wealth in with them and increase cost of living in the area. The main symptom of this phase is high end housing comprising a much larger share of developments than what demographics of the overall city predicts.

# 6

The final phase proposed by Moskowitz, is the lack of concern for humans but rather using property to store capital. Major international hubs are seeing neighborhoods expressing this with high rises that are filled with owned multimillion homes, yet occupied less than 50 percent of the time. New York City, London, Tokyo, Los Angeles, etc. are all finding districts with vacant buildings, simply used as an investment account by individuals and entities, rather than providing space for humans to inhabit and utilize.



## PERPETUATION OF THE CYCLE

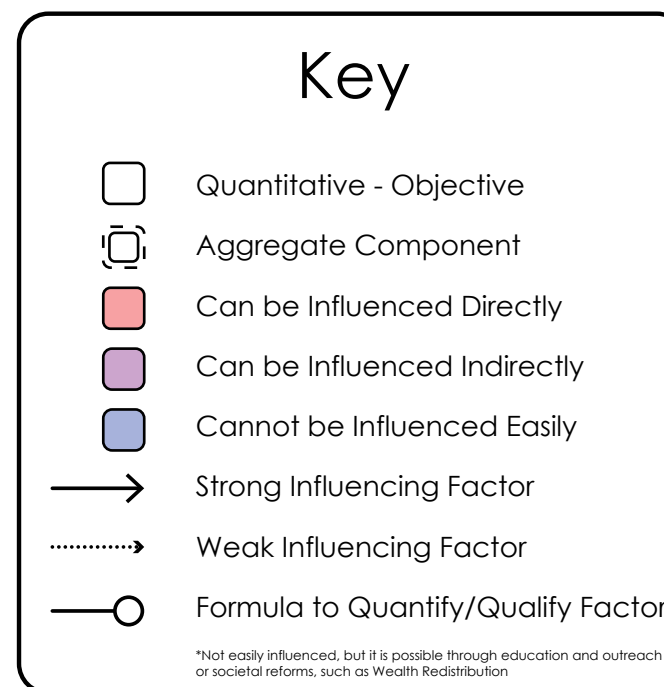
Displacement of people causes a new representation of groups, favoring the gentrifiers. Unequal representation causes a Reduction in City Services due to a lack of voice by those who need city services to remain competitive. Reduction in city services causes a reduction in economic mobility, requiring individuals to focus on paying for necessities rather than self improvement, education and upward mobility. Displaced persons with low economic mobility congregate in a new district to pool resources for survival. According to Rent Gap Theory, the new district created by the displaced, low income individuals will become a future target of gentrification as its value decreases and profit margins increases of mass development. (Smith, N. 538-548, Moskowitz, 37-40)

## METHODOLOGY

In order to understand and quantify gentrification, case studies were utilized to help contextualize a hypothetical, perfect example of the process in its negative components. The negative factors of gentrification were compiled and entered into a web flow to determine cause and effect between them along with initiating factors. Due to the quantity of variables to investigate, several variables were selected to focus on to provide the framework of interplay between them. Literature delving deeper into the remaining variables was found to help compile algebraic formulas to quantify them. For simple variables, the quantity was then applied to an index quantity to be used to formulate the overall score. Composite variables were formulated together, using the interplay between variables from the original web as a guide. Once the overall composite quantity was calculated, it was put into an index quantity. To verify results, case studies were used to correct various inaccuracies in the algebraic formulas.

## RESEARCH RESULTS

At the onset of research, the intent was to find a way to classify and provide design solutions for the various index numbers assigned to a district. It was ultimately considered unethical to claim a simple algebraic formula that was only tested for one month instead of several years to a decade, could potentially point to a design solution when the quantity of variables was reduced. After approaching the research literature and all the variables in the process of gentrification, the goal was honed to indexing alone, and allowing the index quantity to be readable for the designer to see which component is causing the most stress and if a demographic shift is occurring.



## Reduction in City Services Index

Figure 1.1 and 1.2 in Spreadsheet

$I_p$  Investment in Public Funds in Previous Year\*  
 $C$  Inflation Coefficient of USD  
 $P_p$  Population affected in Past  
 $I_c$  Investment in Public Funds in Current Year\*  
 $P_c$  Population Current

Public funds can be defined as total budget, transit budget, infrastructure, etc. This can be determined by the context of the site and which points are most important to account for.

$$RCS = \frac{I_c P_p}{I_p C P_c}$$

RCS > 105%,	RCSI = 0
100% < RCS < 105%,	RCSI = 1
95% < RCS < 100%,	RCSI = 2
90% < RCS < 95%,	RCSI = 3
85% < RCS < 90%,	RCSI = 4
80% < RCS < 85%,	RCSI = 5
75% < RCS < 80%,	RCSI = 6
70% < RCS < 75%,	RCSI = 7
65% < RCS < 70%,	RCSI = 8
60% < RCS < 65%,	RCSI = 9
RCS < 60%,	RCSI = 10

Definition:  $\frac{\text{Investment per Person Current Year}}{\text{Investment per Person Previous Year}}$

$$\frac{I_c / P_c}{(I_p C) / P_p} = \frac{I_c}{P_c} \times \frac{P_p}{I_p C} = \frac{I_c P_p}{I_p C P_c}$$

Units: Dollars per Person

# Displacement Factor of Redevelopment Index

# Racial Composition

Figure 5.1 and 5.2

- I Income Bracket Households
- U Units Affordable for Income Bracket
- E Existing Units Remaining Affordable
- R Renovated Units Remaining Affordable
- N New Units Affordable
- D Demolished Units which were Affordable
- V<sub>rate</sub> Vacancy Rate in Percentage
- V<sub>units</sub> Vacant Units as found by the V<sub>rate</sub>

$$\text{Index} = 2D_i + G_{\text{rate}} + C_{\text{rate}}$$

- |    |  |                |               |
|----|--|----------------|---------------|
| C  | Rate of Change: Caucasian                        | 0 if decrease, | 2 if increase |
| B  | Rate of Change: Black/African American           | 2 if decrease, | 0 if increase |
| A  | Rate of Change: Asian                            | 2 if decrease, | 0 if increase |
| HL | Rate of Change: Hispanic/Latino                  | 2 if decrease, | 0 if increase |
| N  | Rate of Change: Native American/Alaskan Native   | 1 if decrease, | 0 if increase |
| P  | Rate of Change: Native Hawaiian/Pacific Islander | 1 if decrease, | 0 if increase |
| M  | Rate of Change: Multiracial                      | 1 if decrease, | 0 if increase |

\*The first four race categories are weighted as they are more prevalent in urban cores of US cities.  
 \*\*1 is subtracted from the total to correct for circumstantial correlation.

$$\text{Index Quantifier} = C+B+A+HL+N+P+M-1$$

## Demographic Composition Work

Based on the work of Douglas Massey and Nancy Denton in American Apartheid, I compiled a format to see dissimilarity over time. (Denton, N. A. & Massey, D. S., 1995) Two of the major factors that imply gentrification in an area include a growth in White individuals and a higher ratio of individuals within the age range of 25-45, with a weaker influence of gender showing bias towards males. (Florida, Moskowitz, and Gentrification Index)

Caucasian, Black/African American, Asian and Hispanic/Latinx are weighted as they are more prevalent in inner city cores where gentrification occurs most. Caucasian has index value when increased as a gentrifying neighborhood tends to have an increase in Caucasian descent. All other races have index value when decreased as it indicates a trend of being forced out.

## Race Composition Index:

$$RCI = C_{\text{RoC}} + B_{\text{RoC}} + A_{\text{RoC}} + HL_{\text{RoC}} + N_{\text{RoC}} + P_{\text{RoC}} + M_{\text{RoC}} - 1$$

The total is corrected by subtracting one to bring a perfect score to a total of ten and to correct for circumstantial correlation.

## Displacement Factor of Redevelopment

Figure 2.1 and 2.2

$V_{\text{units}} = (1 - V_{\text{rate}})(E + R + N)$	$1 \geq \text{DFR},$	$D_i = 0$
	$1 < \text{DFR} \leq 1.1,$	$D_i = 1$
$U = E + R + N - V_{\text{units}}$	$1.1 < \text{DFR} \leq 1.3,$	$D_i = 2$
	$1.3 < \text{DFR} \leq 1.5,$	$D_i = 3$

$$\text{DFR} = I/U$$

\*Displacement Factor is weighted at 60% of total index

## Growth Rate

Figure 3.1 and 3.2

$G = \frac{N - D}{E + R}$	If $G \geq 1,$	$G_{\text{rate}} = 0$
	If $G < 1,$	$G_{\text{rate}} = 1$

\*Growth Rate is weighted to 10% of total Index

## Construction Rate

Figure 4.1 and 4.2

$C_{\text{rate}} = \frac{N + R}{E}$	If $C_{\text{rate}} < .05,$	$C = 0$
	If $.5 < C_{\text{rate}} \leq .1,$	$C = 1$
	If $.1 < C_{\text{rate}} \leq .2,$	$C = 2$
	If $.2 < C_{\text{rate}},$	$C = 3$

\*Construction Ratio is weighted to 30% of total Index

**Age Composition**  
Figure 6.1 and 6.2

A	Rate of Change: <5	1 if decrease, 0 if increase
B	Rate of Change: 5-9	1 if decrease, 0 if increase
C	Rate of Change: 10-14	1 if decrease, 0 if increase
D	Rate of Change: 15-19	1 if decrease, 0 if increase
E	Rate of Change: 25-29	0 if decrease, 1 if increase
F	Rate of Change: 30-34	0 if decrease, 1 if increase
G	Rate of Change: 35-39	0 if decrease, 1 if increase
H	Rate of Change: 40-44	0 if decrease, 1 if increase
I	Rate of Change: 65-69	1 if decrease, 0 if increase
J	Rate of Change: 70-74	1 if decrease, 0 if increase
K	Rate of Change: 75-79	1 if decrease, 0 if increase
L	Rate of Change: 80-84	1 if decrease, 0 if increase
M	Rate of Change: 85+	1 if decrease, 0 if increase

\*Ages 20-24 are statistically insignificant due to higher education attendance.  
 \*\*Ages 45-64 are statistically insignificant as individuals are less likely to follow popular districts and have the funds to move relatively easily.  
 \*\*\*3 is subtracted from the total to correct for circumstantial correlation.

$$\text{Index Quantifier} = \sum_A^M - 3$$

\*Demographics to be gathered from Census Data for defined site (US. Census Bureau)

\*\*Age brackets 20-24, 45-49, 50-54, 55-59, 60-64 were omitted as they are statistically insignificant for assorted reasons. Ages 20-24 are majority college age young adults, which are more closely associated to the location of their university than based on neighborhoods on gentrification. Ages 45-64 are late age adults before retirement, on average are less likely to be confined to a neighborhood than a retired individual, yet they are less likely to be motivated to travel with a trend.

**Gender Composition**  
Figure 7.1 and 7.2

RoC Rate of Change: Males 1 if increase, 0 if decrease  
 R Current Ratio M:F 1 if >1, 0 if <1

$$\text{Index Quantifier} = \text{RoC} + \text{R}$$

**Demographic Composition Index**

$$\text{DCI} = \frac{2(A_c + R_c)}{5} + G_c$$

A<sub>c</sub> is weighted to 40% of the total index  
 R<sub>c</sub> is weighted to 40% of the total index  
 G<sub>c</sub> is weighted to 20% of the total index



# Gentrification Index

Average : RCSI : DFRI : DCI

The final index is designed to show the various aspects of the gentrification process. The average is calculated to be able to compare various neighborhoods based on one quantity; however the other indexes alone were included to show more detail regarding the area of issue within the district.

Reduction in City Services Index:

Variable:	Weight:
1: RCS	100%

Displacement Factor of Redevelopment Index:

Variable:	Weight:
2: $D_i$	60%
3: $G_{rate}$	10%
4: $C_{rate}$	30%

Defined:

$$DFRI = 2D_i + G_{rate} + C_{rate}$$

Demographic Composition Index:

## CONCLUSIONS

Overall, the final decision for design interventions will be best decided upon by designers within the community and regarding the community as a whole and not where the capital flow comes from. This index is meant to be used as an indicator, not a predictor.

The Reduction of City Services or priming of a district cannot be influenced directly by design of individual buildings, yet can be addressed in the design community at a larger scale. Master planning and larger scale developments with forethought into the demographics of the area can be utilized, which would bring the scale of focus from individual buildings to the neighborhood level. While designing tailor-fit buildings is important, more attention needs to be paid into how the area affected is being designed for. We as designers fail when we ignore demographics in search for more capital. By showing how the investment of public funds per person is expressed, we can see two

details. First, if investment needs to be increased or if the amount of infrastructure is too much to maintain with the base of individuals who are paying into it. Second, it shows the change over time, correcting for inflation of both currency and populations. If a city grows in population and the budget remains the same, there is a decrease in investment per person and more usage of the infrastructure. The index was designed to allow for overall budget studies or specific elements, such as transit, high speed internet, low income housing structures, etc.

The Displacement Factor of Redevelopment Index is the major component of the index created that can be easily influenced by a designer. By simply showing quantities of housing stock compared to demographics who can afford such units, designers can see where their investment in design needs to be, not where the building owner wants. A design fails when we do not accommodate them for the individuals present to utilize them.

The Demographic Composition Index, although a strong indicator of a gentrifying district, is more indicative of failed design work, producing an environment the old demographics cannot live within and only individuals with more capital can survive. It is the shame factor, when we did not provide for those who were already in the area, but provided a vacuum that only individuals with enough capital could fill. By focusing design work on truly affordable housing that reflects the demographics of a district, including public transportation options and a public realm that is produced for the users already present, the effects of gentrification will be theoretically lessened. Even if the process of gentrification would still continue, a potential outcome in this hypothetical reality, we as designers should be designing for the public who will use the client's spaces, not the client and their sole wants.

## REFERENCES

- Clay, P. L. (1979). *Neighborhood renewal: middle-class resettlement and incumbent upgrading in American neighborhoods*. Lexington, MA: D.C. Heath and Co.
- Denton, N. A., & Massey, D. S. (1995). *American apartheid*. Paris: Descartes & Cie.
- Florida, R. (2017). *The New Urban Crisis*. New York, NY: Basic Books.
- Florida, R. (2017, April 14). *The Geography of the New Urban Crisis*. Retrieved September 10, 2017, from <https://www.citylab.com/equity/2017/04/new-urban-crisis-index/521037/>
- Glass, R. (1965). *London Aspects of Change*. Place of publication not identified: MacGibbon & Kee
- Groat, L., & Wang, D. (2013). *Architectural Research Methods* (2nd ed.). Hoboken, NJ: Wiley.
- Jacobs, J. (1961). *The Death and Life of Great American Cities*. New York, NY: Random House.
- Lees, L., Slater, T., & Wyly, E. (2010). *The Gentrification Reader*. New York, NY: Routledge.
- Moskowitz, P. (2017). *How to Kill a City*. New York, NY: Nation Books.
- Smith, N. (1979). *Toward a Theory of Gentrification A Back to the City Movement by Capital, not People*. *Journal of the American Planning Association*, 45(4), 538-548.
- US Census Bureau. (n.d.). Retrieved October 02, 2017, from <https://www.census.gov/en.html>

