Geographic Distributions of Psychological Characteristics across Diverse Social and Physical Environments

Kevin Bennett

Thesis submitted for the degree of Doctor of Philosophy

City, University of London

Department of Psychology

May 2018

TABLE OF CONTENTS

PART II Geographic Distributions of Personality Traits and Attachment

PART III Geographic Distributions of Jealousy, Mate Poaching, and Sex Differences in Sexual Variety

PART IV General Discussion

LIST OF FIGURES

This content has been removed for copyright protection reasons

ACKNOWLEDGEMENTS

Dedicated to Natalie and Olive

I owe thanks to so many people. First, and most of all, I would like to thank my beautiful wife and equally beautiful daughter. Throughout this project, Natalie and Olive, the two most important people in my world, have provided amazing support and love. Every single day they reminded me of what matters most.

To my parents, Steve and Alice, and my sister, Amy, you have been a great source of motivation by cheering me on through life's challenges. I could not have accomplished this without all of you.

The Penn State Beaver Campus where I work is home to many great people who have supported me. Dr. Robert Szymczak and Dr. Donna Kuga, in particular, provided invaluable help and guidance. I enjoyed the daily chats with Bob in my office that ranged from politics to baseball, and academic guidance to parenting tips. Donna, who passed away during the course of working on this was, more than anyone else, responsible for my success at Penn State. She was an irreplaceable person in the timeline of my professional career and offered advice, solicited and unsolicited, at critical times. She continues to guide me even today.

Digging deeper into the past, I owe a debt of gratitude to all the scholars who helped me in my undergraduate and graduate school years. Dr. David Buss opened the doors for me as a young psychology major at the University of Michigan by allowing me to work in his lab. At the University of New Mexico, Dr. Steve Gangestad routinely went out of his way to mentor me both professionally and personally. I am indebted to so many others including Dr. David Schmitt, Dr. Todd Shackelford, and Dr. Randy Thornhill. I would not be where I am professionally without them.

Finally, I would like to extend much gratitude to Dr. Philip Corr who guided me through this process as supervisor of my PhD.

THESIS DECLARATION

The author grants powers of discretion to the University Librarian to allow this thesis to be copied in whole or in part without further reference to the author. This permission covers only single copies made for study purposes, subject to normal conditions of acknowledgement.

ABSTRACT

Over the past decade, interest in geographical approaches to psychology has flourished and a large literature has accumulated. The emerging perspective of geographical psychology is an interdisciplinary approach to human activity that focuses on the spatial organization of psychological experiences (e.g., Rentfrow, 2010, 2014; Rentfrow, Gosling, & Potter, 2008; Rentfrow & Markus, 2016). In recent years, this view has successfully integrated research across epidemiology, political science, urban design, economics, and geography by promoting the tradition of studying behaviour in the context of physical space. In a broad sense, the goal of this thesis is to provide additional evidence of the benefits of exploring psychological phenomena using a geographical perspective. Two streams of information provide support for this position: (1) a review of the relevant literature in geographical, evolutionary, and personality psychology; (2) six peer-reviewed published studies, all co-authored by the current author, that address individual differences in personality, attachment, and romantic behaviour across cultural and geographic regions. The total composition is divided into four major sections that provide a detailed overview of geographical, evolutionary, and personality psychology before presenting prior publications and future research directions. Part I introduces the rationale for the dissertation and includes a critical review of research on geographic distributions of psychological variables. Part II covers evolutionary and personality approaches and presents three empirical studies dealing with personality patterns and romantic attachment. Part III contains a chapter on emotions in romantic relationships and three cross-cultural prior publications. The work concludes with a general discussion in Part IV wherein a general model, future research directions, and limitations are considered.

PART I

Mapping Behaviour and Individual Characteristics

CHAPTER 1: INTRODUCTION

1.1 Background to Current Project

As part of my programme of research over the past 15 years, I have been fortunate to co-author a number of papers in highly respected research journals. Much of this work analysed the individual differences found in traits, behaviours, and preferences across different cultures. I worked with David P. Schmitt on several projects as part of the International Sexuality Description Project (ISDP) where I served as co-collaborator and site coordinator on this large cross-cultural data set involving over 50 nations and 6 continents. The work resulted in the publication of multiple articles dealing with the world-wide distribution of personality traits, romantic attachment, and sexual behaviour. I was also a co-author on a smaller cross-cultural study that examined the psychology of jealousy in the United States, Korea, and Japan. These studies combined include over 88,000 participants and provide an excellent vehicle for exploring the general theme of this paper: the geography of psychology.

1.2 The Intersection of Psychology and Geography

Broadly, the work presented here stands as an examination of the ways in which we interact with the physical world. Out of the many of questions concerning the connection between human activity and physical spaces, several will be addressed here. How do people make choices about geographical locations and distribute themselves spatially across areas? Why do some people prefer crowded urban areas while others find satisfaction in rural settings?

Can we map out the distribution of psychological variables across diverse social and physical environments?

An appreciation of both *macro* and *micro* levels of geography provides necessary organization for the analysis of preferences, choices, and distributions of psychological characteristics. Using a macro-geographic approach, for example, researchers found differences in landscape preferences as a function of personality traits: mountain-lovers tend to be more introverted than ocean-lovers (Oishi, Talhelm, & Lee, 2015). A micro-geographic view targets smaller outdoor areas and built interior designs. For instance, within individual work spaces, extroverts display more photos of people compared to introverts (Gosling, Ko, Mannarelli, & Morris, 2002). Also, preliminary data suggest that personality traits and demographic variables are not randomly distributed throughout large classrooms (Bennett, under review).

1.2.1 Ancient Geography and the Arrival of Maps

Questions about the nature of Person x Environment (henceforth, P x E) interactions stretch back in history and span many academic disciplines. The *Babylonian Map of the World*, a sparsely detailed Mesopotamian clay tablet created around 700 to 500 B.C. depicting the Euphrates River and Babylon, represents one of the earliest attempts at visualizing human navigation through physical space (Raaflaub & Talbert, 2009). Modern hand held Global Positioning System (GPS) tools effectively serve the same function as the Babylonian Map, but the two are separated by a period of almost three thousand years.

In the second century A.D., Claudius Ptolemy, inspired by a desire to make accurate horoscopes, invented a technique he called "geography" which allowed him to take the round world and flatten it down to a two-dimensional space. He plotted 10,000 locations across Europe and Britain because for the zodiac system to work properly he had to know the precise location

of each person's birth town (Karrow, Ortelius, & Bagrow, 1993). His maps were largely ignored after the fall of the Roman Empire, only to be replaced by less realistic and more artistic maps for the next one thousand years. Driven mainly by shipping, commerce, empire building, and the emergence of reliable compasses, the work of Ptolemy was rediscovered during the Renaissance. Ptolemy even had a hand in Christopher Columbus locating America. The errors in his map (Ptolemy used Arabian miles, not Italian ones) led Columbus to believe his voyage to Asia would be much shorter (Karrow, Ortelius, & Bagrow, 1993).

Life on the ocean changed forever in 1569 when Gerardus Mercator revealed his *Mercator Projection*, which proved to be one of the most significant advances in the history of cartography (Karrow, 1993). Landmasses such as Antarctica and Greenland appear larger than they actually are because the map increasingly distorts size moving north and south from the equator to the poles. Two-dimensional representations of geographical space have advanced considerably since the earliest days of mapmaking. In between Ptolemy and Mercator, map accuracy was secondary to the primary function of religious themed storytelling. When Mercator unveiled his famous distorted map his intention was to make ocean navigation easier, but he was also reinforcing a tradition that predates Ptolemy and continues to this day. No map entirely tells the truth and they are often intended to be visual persuasive. Some cartographers even include fictional roads, or "trap streets", to expose anyone copying their work. Moat Lane is a noteworthy example in North London that first appeared in the TeleAtlas directory and was temporarily marked on Google Maps (Holdsworth, 2015).

1.2.2 Person x Environment Interactions across Modern Disciplines

An array of disciplines spanning the modern academic terrain from demography to architecture, share an interest in understanding both the synergy and discord produced by

collisions between people and places. The volume and breadth of research across these fields is remarkable. Numerous peer-review journals (e.g., *Landscape and Urban Planning, Journal of Emotion, Space and Society*) feature reports on P x E interactions. The set of topics includes wasteful consumption, recycling, sustainability, urban energy, the use of mobile devices in multiple environments, and residential satisfaction of different dwellings.

Interest in P x E interactions is revealed in some of the common research questions addressed by different fields. Political Scientists draw connections between voting preferences and migration patterns. Work done by economists examines the impact of unemployment on home prices and financial markets. Research in public health policy evaluates the success of sex education programs in schools. Proof of a widening enthusiasm in how psychological processes are nested within in a person's surroundings can be seen across several sub-domains of psychology. Environmental psychology, for example, is an entire sub-field dedicated to exploring issues like pro-environmental interventions, sustainability, and the development of policies that promote public engagement. Another subfield in psychology, known as ergonomics in Europe and human factors in the United States, emerged during World War II when governments enlisted experts to help train soldiers and pilots (Moray, 2008).

The unifying theme that emerges from this diverse mix of research is geography. Published data support the idea that the regions in which people live and work are linked with important quality of life issues (Rentfrow, 2014; Rentfrow, Gosling, & Potter, 2008; Oishi & Hoffman, 2014; Florida, 2009; Jokela, Bleidorn, Lamb, Gosling, & Rentfrow, 2015; Bleidorn, Schönbrodt, Gebauer, Rentfrow, Potter, & Gosling, 2016). In psychology, although there has long been a notion of the importance of "environment", the empirical study of the subject is often limited to a relatively small radius around the individual (e.g., the environment of family,

friends, school, etc.). Following the recommendation of Rentfrow (2014), psychology should broaden its conceptualization of the environment to include geography, thus allowing for a different level of analysis and a deeper understanding of human behaviour. The primary aim of this dissertation is to organize many of the findings in this area, along with the included prior publications, by using a framework that allows for proper distillation of this knowledge.

1.2.3 Brief Introduction to Geographical Psychology

Although place and geography play a vital role in social epidemiology, economic geography, and political geography, they have been notably absent from conventional psychological science. This is unfortunate, because more than just places on a map, geography is essential to advancing our knowledge of human social behaviour (Rentfrow, 2014). Relatively new and intensely interdisciplinary, geographical psychology is an approach that seeks to understand human activity by examining the interaction between individual characteristics and physical space. This subfield of psychology shares research questions with a diverse group of disciplines including urban studies, cartography, the science of built environments, architecture, interior design, landscaping, geography, environmental science, and environmental psychology. Perhaps the most articulate description can be found here: "Geographical psychology attempts to bridge research across areas of psychology and other disciplines by investigating the spatial organization and geographical representation of psychological phenomena and the mechanisms guiding those processes" (Rentfrow, 2014, p. 5).

All meaningful human activity – psychological, emotional, behavioural, etc. – happens within some kind of physical environment. We work, play, eat, and engage in solitary reflection in physical places. We select places based on the mood we are in or the emotional state would like to shape. Over the past decade, a sizable collection of articles has been published that

feature examples of how physical environments give rise to social behaviours and attitudes. Murray and Schaller (2010) argued that part of the geographical variation in psychological characteristics is due to the prevalence of disease-causing pathogens. Other recent research in geographical psychology has provided clues about U.S. regional differences in terms of personality (Rentfrow, 2010), political conservatism (McCann, 2011), happiness and life satisfaction (Lawless & Lucas, 2011), character strengths (Park and Peterson, 2010), and personal values (Chung, Rentfrow, & Pennebaker, 2014). These findings, and many others, will be explored in detail in the next chapter.

1.3 Significance of the Research

This project focuses on the spatial underpinnings of psychology. It is an exploration into how the places we live influence our social activity, preferences, and desires. At the same time, it is a deep dive into how people with specific psychological characteristics and personality traits tend to migrate and settle both regionally and culturally. Geographic space is a concept fundamental to our psychology; it shapes the way we think about the world and other people by separating groups in ways that are psychologically meaningful. Using territory as a cognitive shortcut, we may perceive, for example, that individuals living in different areas within one city might not be in agreement on issues of politics, religion, and civic duties. We classify locations, good or bad, by who inhabits those spaces, by asking, "Are you one of us?" We treat places where the people are not like us—cities versus suburbs, affluent areas versus economically disenfranchised communities—as different from places that are like us. The resulting dynamic tension between individual psychology, social processes, and physical places plays out in multiple domains, including education, politics, and society as a whole.

Every day we face two fundamentally different worlds. The *physical world* of landscapes, geographic spaces, and maps. And the *psychological world* of impulses, intense emotions, and deeply personal relationships. Elements from those worlds are constantly colliding, converging, and interacting to shape us. We live in physical places, constantly moving through interior spaces and exterior landscapes as part of work and leisure while we stamp our personal identities on these environments. In return, the concept of *place* is woven into the fabric of personality. The physical spaces that inspire, unite, and divide us come in many forms including rooms, houses, neighbourhoods, cities, countries, and cultures. Geographic space is inextricably fused to us in ways we do not always see and this dissertation is a quest to explore those deep connections.

Historically, the study of the physical has been a separate enterprise from the study of the psychological. As part of their occupations, mapmakers, geographers, and architects chart rivers, measure changes in elevation, and design structures using earthly materials. By contrast, those in the social sciences, humanities, and medicine direct time and energy toward figuring out human development, perception, and, relationships. Recently, the burgeoning fields of social cartography and geographical psychology have attempted to bridge the gap between the physical and psychological worlds. This trend can be explained in part by the ease with which vast amounts of psychological data can be collected and visualized on digital maps. Much of the current research in this area would have taken much longer, or not have been possible at all, a generation ago.

A decade ago, educators began to realize the value in incorporating technologies that reflect the new ways in which children think about physical space, maps, and behaviour. The United States National Research Council (2006) suggested in a consensus study, *Learning to*

Think Spatially, that incorporating Geographic Information System (GIS) and other spatial technologies in K-12 curriculum (primary and secondary education in the U.K.) would promote spatial thinking and reasoning. Spatial thinking is a special kind of thinking based on three key features: concepts of space, tools of representation, and processes of reasoning (National Research Council, 2006). Perhaps this is an indication that the disciplines of psychology and geography will find their necessary points of synergy at some time in the future.

1.4 Overview of Topics and Research Aims

My central goal is to contextualize the published studies included in this work using a geographical psychology approach. This thesis explores the reciprocal relationship between geography and psychology by spotlighting the causal and derivative roles of each. Specifically, three research questions are guiding the current work: (1) How are psychological variables distributed across diverse social and physical environments? (2) How does geography impact the expression of personality and social behaviour? (3) What role do psychological characteristics play in decision making about geographical spaces? The bulk of this thesis is concerned with questions one and two. I will turn my attention to question three in the final discussion chapter and offer several avenues for future investigation.

1.4.1 Structural Outline

The organizational framework for the presentation of research is conveyed in the following outline. I will include brief remarks here, and then articulate greater detail in the sections and chapters ahead.

(1) ***The Geography of Medicine and Epidemiology*.** Epidemiologists have been engaging maps to treat disease for over a century and a half. Medical specialists recognized that a bird's eye view of sickness can facilitate discovery of the mechanics of transmission. I will

illustrate through selected diseases how geographic distributions are used in treating and understanding illness.

(2) ***Demographic, Economic, and Behavioural Clusters*.** Values, beliefs, and behaviours are geographically clustered. Examples from education, poverty, disciplinary attitudes, and linguistics are included as evidence.

(3) ***Research Findings in Geographical Psychology***. The previous sections stress the indispensability of maps in boosting our awareness of epidemiological and demographic issues. Psychology, in contrast, has not historically utilized maps to the same extent. This chapter presents exceptions to that trend by reviewing research over the past decade on geographic clusters of psychological variables. A body of research has developed over this time that underscores the value in studying behaviour through the panoptic lens of spatial analysis. Collectively, this work supports the notion that *environment*, as a concept in psychology, should be amplified to include larger geographic areas.

(5) ***Regional Distributions of Psychological Variables***. In the upcoming chapters contained in Part II and Part III, I will use my prior publications to illustrate how personality traits, attachment styles, jealousy, and mating preferences are geographically distributed across different world regions. Each part begins with a chapter to orient the reader and raise attention to relevant background information.

(6) ***Discussion and Conclusions*.** Although in its infancy, geographical psychology shows great potential to explain psychological variation through the use of maps and spatial analysis. In the final chapter, I will consider the role of geographical psychology as a sub-field within psychology by covering three content areas: (1) A General Model; (2) Future Research Directions; and (3) Limitations and Caveats.

Cartography is a common thread that runs through a diverse group of topics that includes environmental science, geography, urban planning, and political science. Therefore, it is necessary to provide a brief review of how maps have been employed in behavioural science. Before turning to a detailed review of geographical psychology research findings in chapter 2, I will highlight cases from epidemiology, education, demography, and linguistics.

1.5 The Geography of Medicine and Epidemiology

The partnership between maps and epidemiology was born of necessity, but has since developed into an indivisible and mutually beneficial relationship. Examples that highlight a medical geography approach will be illustrated here. They include cholera, plague, Hantavirus, Lyme disease, the common cold, and influenza.

1.5.1 Cholera

Out of the multitude of theories proposed to end the cholera crisis of the 19th century, it was, of all things, a map that ultimately provided the solution for understanding the spread and transmission of the disease. In the late summer months of 1854, London was fighting a dangerous battle against cholera, an often fatal bacterial disease that settles in the small intestine and quickly dehydrates the body. Previous episodes of cholera beginning in 1831 and 1849 claimed 70,000 lives in England and Wales. By 1854, residents at the centre of the outbreak in the Soho district were desperate for a solution (Johnson, 2006).

The leading satirical publication of the day, *Punch*, provided entertaining stories, poems, and cartoons laced with scathing political commentary. Here is an excerpt from *The Water That John Drinks* (Punch, 1849): "This is the water that JOHN drinks. This is the Thames with its cento of stink, that supplies the water that JOHN drinks… This is the price that we pay to wink, at the vested int'rests, that fill to the brink, the network of sewer from cesspool and sink, that

feed the fish that float in the inky stream of the Thames with its cento of stink, that supplies the water that JOHN drinks."

The solution that ultimately solved the cholera crisis, and part of the inspiration for undertaking this work, was the development of a map (see Figure 1.5.1). John Snow, considered by many the father of modern epidemiology, conducted a survey of the affect area, along with the often overlooked Rev. Henry Whitehead, and mapped out all the cases of cholera in a bird's eye view illustration. From there, it became apparent that the water pump at Broad Street was the source of the bacteria. Most, but not all, of the cholera cases were concentrated around the Broad Street pump. Snow and Whitehead gathered, through interviews with sick families, that many of the deaths of people further away were people who walked to the pump. Despite living closer to one of the other city's wells, many travelled to Broad Street to enjoy the better tasting, cleaner looking, less smelly water. Neighbouring wells, most notably Carnaby Street/Little Marlborough Street, were known to have water with a peculiar and unpleasant aroma. Cholera bacteria cannot be identified with the naked eye or by olfaction, which unfortunately helped to confirm that they were drinking the healthiest water they had access to.

Additional support for Snow's water theory came from the brewery one block east of the Broad Street pump. Not a single brewery worker contracted cholera because they were allowed to drink all the beer they desired and the harmful bacteria were killed off in the fermentation process.

Figure 1.5.1 A Portion of John Snow's Original Cholera Map. The map illustrates the spatial clustering of cholera deaths around the Broad Street pump and provided support for his theory that cholera was a water-borne illness. Each black line represents one death at a dwelling. Source: Johnson (2006)

Because many consider maps to be a common sense approach to studying disease outbreaks today, it seems surprising that this solution wasn't found until the middle of the 19th century. Part of the problem stems from the fact that many diseases, it was commonly accepted at the time, were transmitted by means of inhaling vapours that wafted through the air. In opposition to the "miasma theory", as it came to be known, Snow maintained that the bacteria *Vibrio cholerae* was transmitted by the drinking water. Then logical next step was to investigate the water supply for affected residents.

It certainly makes sense for epidemiologists to use maps, but why has psychology been so slow to embrace a geographical approach? The work I am presenting here is dedicated to the idea, inspired partly by John Snow, that personality traits and other psychological variables can be mapped out. Snow's classic epidemiological study offers one of the most persuasive arguments for the profitability of studying psychological variables through the use of spatial analysis.

1.5.2 Plague in the United States and Worldwide

Most current human cases of the plague in the United States occur in the "four corners" area where the states of New Mexico, Arizona Colorado, and Utah all come together (see Figure 1.5.2a). Fewer cases are spread out in the western states of California and Oregon. According to the Center for Disease Control (2017), plague is mostly a rural disease today. The last urban epidemic in the U.S. occurred in Los Angeles 1924-1925. Prior to this, epidemics were centred in port cities as a result of rat-infested steamships that arrived from affect areas mostly in Asia.

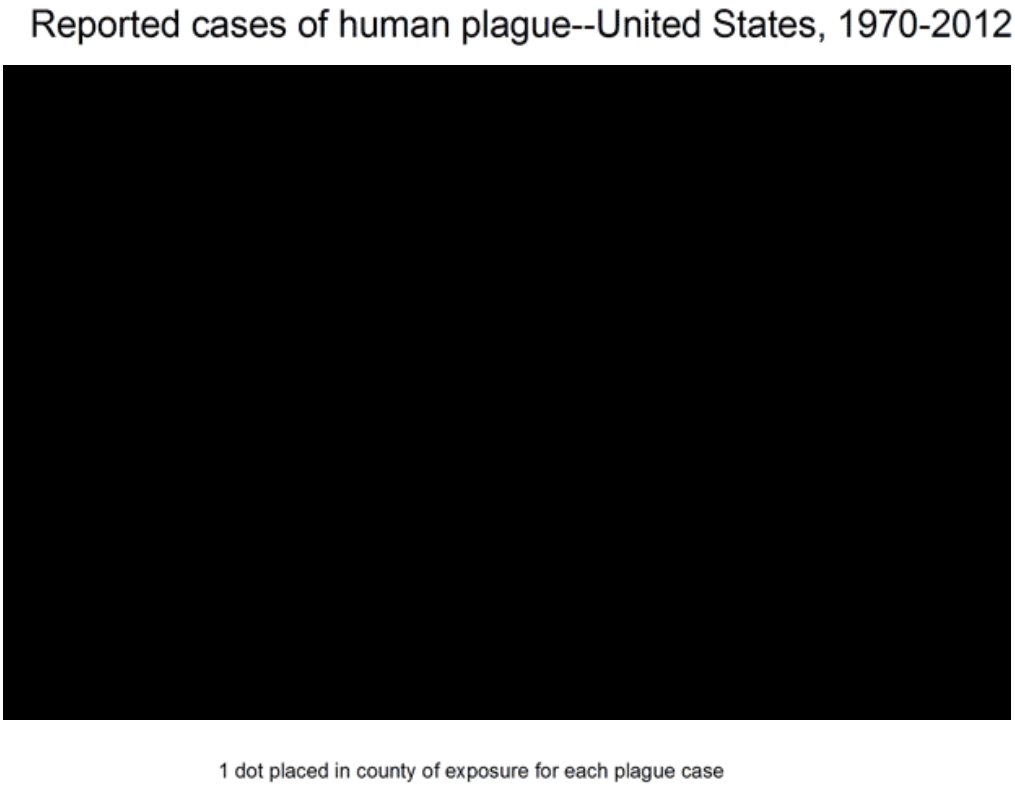

Figure 1.5.2a Plague Cases in the United States, 1970–2012. Cases of the Plague in the U.S. have occurred mostly in the rural West. One anomaly is a lab-associated case shown in Illinois. Source: Center for Disease Control and Prevention (2017)

Plague is a bacterial infection transmitted by fleas from affected rodents to humans and other animals. Except in the case of pneumonic plague, direct transmission person-to-person

does not occur. In the case of pneumonic plague, respiratory droplets may transfer the bacteria to others.

Worldwide, most cases of the plague since the 1990s have occurred in Africa with nearly all affecting agricultural areas rather than large cities (Figure 1.5.2b). Past epidemics have occurred in Africa, Asia, and South America. Estimates range from 1,000 to 2,000 cases per year, although the true number is likely higher given the lack of diagnostic reliability and reporting to health authorities (Center for Disease Control, 2017).

Figure 1.5.2b Reported Plague Cases by Country, 2000-2009. Most cases in the past twenty years have come rural areas in Africa. Source: Center for Disease Control and Prevention (2017)

1.5.3 Hantavirus Pulmonary Syndrome (HPS)

Like the plague, Hantavirus is concealed within rodents and transferred to humans. Unlike most cases of plague, however, the mode of transmission for Hantaviruses is airborne. The virus is carried in rodent stool, urine, and saliva. When these vehicles of transmission dry out, the virus remains viable in dust. The risk of transmission increases when human activity disturbs the dust. A typical example involves using a broom to sweep up an enclosed area where

infected rats have left droppings (e.g., garage or shed). Hantaviruses are not transmissible from person-to-person (Walsh, 2012).

Figure 1.5.3a Geographic distribution of incidence of haemorrhagic fever with renal syndrome (HFRS) in the People's Republic of China and relationship with capture points of *Apodemus agrarius*. Black dots show the capture points of *A. agrarius*. Internal borders indicate provinces. Source: Emerging Infectious Diseases, Sep2007, Vol. 13 Issue 9, p.1301-1306; map found on p.1303

The map in Figure 1.5.3a depicts the geographic distribution of Hantavirus across China as well as the primary rodent carrier, *Apodemus agrarius* (Yan, et al., 2007). The simplest way to characterize any Hantavirus infection, whether it is in the eastern or western hemisphere, is a landscape in which human and rodent habitats intersect, creating a zone of transmission.

A cluster of Hantavirus cases surfaced quickly in the Southwestern U.S. in the spring of 1993. The Center for Disease Control (2017) attributes the outbreak to the sudden increase in the mice populations. For several years, the region had been in a drought. Then, in 1993, drought

affected plants and animals were able to grow in larger-than-usual numbers due to heavy snows and rainfall. The reproductive rate of deer mice produced 10 times more mice than the year before. Thus, the probability of mice and human contact was significantly higher. As of 2016, at total of 690 cases of Hantavirus pulmonary syndrome (HPS) had been reported across 35 states. Figure 1.5.3b shows the number of cases in New Mexico by county. The majority of cases are found in San Juan and McKinley counties, both in close proximity to the four corners area in the northwest corner of the state.

Figure 1.5.3b HPS Cases in New Mexico by County, 1975-2016. Source: New Mexico Department of Health (2017)

1.5.4 Lyme Disease

Lyme disease is transmitted to humans through the bite of infected blacklegged ticks. Symptoms often include fatigue, headache, fever, and skin rash. The tick must be attached to a host for 36-48 hours to transmit the bacteria *Borrelia burgdorferi.* The disease is entirely preventable, however, prevention is more challenging in geographic regions where the tick population is great.

Figure 1.5.4 Reported Cases of Lyme Disease, by County – United States, 2008. Approximately 90% of cases are reported from the Northeast and upper Midwest. Source: Center for Disease Control (2010)

According to the *Morbidity and Mortality Weekly Report for 2008,* published by the CDC (2010), nearly all Lyme disease cases (about 90%) are reported from the Northeastern and Midwestern regions of the U.S. Ticks that commonly bite humans in the southern U.S. often cause rashes that can be confused with early Lyme disease, but are not as dangerous (Figure 1.5.4).

1.5.5 Cold and Flu Symptoms

The cold and flu map featured on the WebMD internet site (see Figure 1.5.5) allows users to zoom in on any area in the United States and view current (within past seven days) cold and flu conditions for each county. Visitors can see how people in a given area are feeling based on the submissions of WebMD users. The site cautions that is intended only to provide general information and does not provide medical advice, nor is it a substitute for professional medical advice.

Figure 1.5.5 Cold and Flu Symptoms across the U.S. Source: WebMD (2016)

1.6 Demographic, Economic, and Behavioural Clusters

The previous section identified a number of epidemiological examples where a geographical approach improves our understanding of the nature of the illnesses. These maps provide detailed information about the concentration of diseases across regions. Individuals can use this information to alter behaviour to prevent infection. For example, one might avoid Lyme disease by staying away from the Northeastern U.S., but if it is necessary to spend time in the region there are precautions one can take. Stay out of tall grass or other wooded areas inhabited by ticks and always wear clothes that cover as much skin as possible. Finally, be sure to conduct a thorough inspection after returning indoors. Thus, the maps provide a useful geography-

behaviour-illness connection. In this section, I will discuss examples from education, poverty, discipline, and linguistics that appear on maps as patterns of geographical clustering.

1.6.1 Education: Gaps in Achievement

Data from demographic and sociological studies show that the neighbourhood in which one grows up can alter future earnings (Chetty, Hendren, & Katz, 2016), longevity (Chetty, Stepner, Abraham, Lin, Scuderi, Turner, Bergeron, & Cutler, 2016), and educational outcomes (Kucsera, Siegel-Hawley, & Orfield, 2015; Ayscue, & Orfield, 2015)—all of which are interconnected. The association between educational achievement and geography, depicted by the maps of Chicago, New York City, and Manhattan seen in figures 1.6.1a – 1.6.1c, is striking (Walker, 2016). Each dot represents between 25 and 500 people, depending on the level of zoom. The dots are color-coded based on five education categories (blue = graduate degree, green = bachelor's degree, yellow = some college, orange = high school, red = less than high school). The coloured bars on the left represent the proportional share of each category for the geographic area displayed on the screen.

Figure 1.6.1a Educational Attainment in America, Chicago. This map of the Chicago metropolitan area shows a well-defined cluster of graduate degrees (blue) in the city centre. Source: Walker (2016)

Figure 1.6.1b Educational Attainment in America, New York City. Map of metropolitan New York City including most of the area in four of the five boroughs (Staten Island to the south is not in the frame. Source: Walker (2016)

Figure 1.6.1c Educational Attainment in America, Manhattan. Map of Manhattan from the Upper West side extending to W 155th St in Upper Manhattan. The rectangular area near the centre of the island with no dots is Central Park. Source: Walker (2016)

In each of these cities residents of the inner hub are more likely to have graduate degrees. Income is positively related to education level, consistent with the affordability of those city spaces. These maps colourfully illustrate distinct clustering patterns of scholarly achievement

that extend into the political and social realms. Similar maps on a national scale show an educational divide among rural and urban areas. Degree holders at bachelor's and graduate levels tend to cluster in cities, as opposed to rural areas where education beyond high school is less common.

The maps of Chicago and New York are compelling because they highlight the variation within crowded urban areas. In some instances, the contrast between bordering neighbourhoods is unmistakable, reflecting gaps in achievement related to racial and economic partitioning. Manhattan is almost entirely an island of degree holders with some blue areas extending into Brooklyn, Queens, and the New Jersey side across the Hudson River. The largely working-class neighbourhood of East Harlem, dappled red and yellow on the map, provides a stark contrast to the rich blue of the Upper East Side.

1.6.2 Poverty: Food Insecurity and Longevity

Despite improvements in recent years, rates of "food insecurity," defined by the United States Department of Agriculture (USDA) as being "unable to acquire, at some time during the year, enough food to meet the needs of all their members because they had insufficient money or other resources for food" (USDA, 2018), remain higher than before 2007. Households meeting the criteria for food insecurity may need to make trade-offs between housing, medical bills, or other vital essentials, and purchasing nutritionally suitable foods. The USDA estimates that 42 million Americans, including 13 million children were food insecure in 2015.

According to Feeding America, the nation's largest domestic hunger-relief organization dedicated ending hunger through a network of 200 food banks and 60,000 food pantries, food insecurity varies by geographic region and metropolitan status as well. Since 2010, they have published annual maps that show the distribution of food insecurity across counties in the United

States. Counties in the South have highest mean rate (16.1%), compared to regional county averages in the West (13.7%), Midwest (12.1%), and Northeast (11.8%) (Feeding America Annual Report, 2017). Food insecurity is also disproportionately rural: 63% of all counties in the United States are rural, but account for 76% of the counties with food insecurity rates that rank in the top 10% of all counties (see Figure 1.6.2).

Figure 1.6.2 Food Insecurity Rates for the United States by County. Food insecurity rates of 20 percent and higher are concentrated in the coastal areas of the Carolinas, Appalachia, northern California, the Ozark Valley along the border of Arkansas and Mississippi, and parts of the Southwest, especially Navajo nation. Source: map.feedingamerica.org (2017)

From 2001 to 2014, the gap in life spans between the wealthy and poor in the United States widened (Chetty, et al., 2016). Analyses of income reveal that, among American men, the top one percent live 15 years longer compared to the poorest one percent; the gap is 10 years for women. This accelerated gain in longevity for the rich is not confined to certain regions of the country. It seems that everywhere in the United States the wealthiest are living longer. As a whole, the poorest had very little gain, with large disparities among different locations. Geography, from what these data suggest, matters more for the poor.

1.6.3 Discipline: Corporal Punishment for Children

Corporal punishment is the deliberate infliction of physical pain upon a student with intention of causing bodily pain as a means of discipline (Bitensky, 2008). According to the United States Department of Education, as of 2017, the District of Columbia and 27 other states prohibit corporal punishment. The remaining 23 states permit it or do not have specific restrictions.

Figure 1.6.3 Corporal Punishment, by School District. A white border around a state indicates corporal punishment is explicitly permitted or not referenced by state law. Source: The 2013-2014 Civil Rights Data Collection. Map created by the U.S. Department of Education.

Despite the evidence that corporal punishment may lead to alcohol abuse, mood disorders, anxiety disorders, personality disorders (Afifi, Mota, Dasiewicz, MacMillan, & Sareen, 2012) and make a child more aggressive, defiant, oppositional (Sheehan & Watson, 2008), the practice remains widespread in the United States. Nationally, 110,000 students were

subject to corporal punishment in school during the 2013-2014 academic year (Civil Rights Data Collection, CRDC, U.S. Department of Education, 2013-14). The accompanying Figure 1.6.3 shows that rates are higher in the southern United States.

1.6.4 Linguistics: Variation in Regional Expressions

In the United States, preferences for generic names of soft drinks vary regionally. Individuals in New England and California prefer the term "soda." The upper Midwest extending out to the Pacific Northwest favours "pop." While southern states tend to say "Coke" when referring to the entire category of soft drinks that includes Sprite, Dr. Pepper, and Mountain Dew (Mundigl, 2009). The world headquarters for Coca-Cola are located in Atlanta. This might explain part of the preference that dominates the south (Figure 1.6.4a). It is not unusual for servers in restaurants to ask, "What kind?" when a customer orders a coke. An equally appropriate response might be, "I'll have a Sprite."

Figure 1.6.4a Regional Preferences for Generic Names of Soft Drinks. Source: Mundigl (2009).

Twitter, the social media platform that allows user to type out messages with a maximum 280 characters in most languages, is overflowing with personal, emotional, and behavioural content. Data from "tweets" that can be turned into exciting geographic distribution illustrations (see Figures 1.6.4b and c). One linguistic analysis revealed that tweets originating from the upper mid-west (Ohio, Iowa, Minnesota) were more likely to contain the word "buddy" compared to tweets from other regions (Huang, Guo, Kasakoff, & Grieve, 2016).

Figure 1.6.4b The Dude Map: How Americans Refer to Their Bros, Buddy. Source: Sonnad (2014)

Figure 1.6.4c The Dude Map: How Americans Refer to Their Bros, Dude. Source: Sonnad (2014)

The term "dude" was popular in Michigan, Indiana, Ohio, and parts of the south and southwest, including Louisiana, portions of Texas, New Mexico, Arizona, and Southern California. The region in central Texas extending roughly from Dallas to San Antonio preferred "bro" over "dude".

1.7 Summary

Without maps, the modern discipline of epidemiology would likely look very different from the one we know. From cholera to Lyme disease, and plague to the common cold, maps have played an important role in understanding the spread and transmission of those diseases. The notion that an overhead perspective can be illuminating outside the context of epidemiology has also gained traction. Collectively, the maps showcased here support the idea that regional affiliation is intimately linked with disease, health indicators, educational success, economic

issues, and language use. In the chapters ahead, the focus will shift to the geographical distributions of psychological variables. Among these are personality traits, patterns of romantic attachment, jealousy, mate poaching, and sex differences in the desire for sexual variety. Before presenting my prior publications in Parts II and III, the next chapter will contextualize them within a geographical psychology framework by providing a review of research findings.

CHAPTER 2: GEOGRAPHICAL PSYCHOLOGY

2.1 Introduction

The material covered in the previous chapter was organized around two principal ideas. First, there is a tradition of using maps in fields like medicine and epidemiology. Second, there is evidence that values, beliefs, and behaviours are geographically clustered. The attention given to geographical approaches in psychology, until very recently, has been inadequate. In this chapter I review the research in this burgeoning area.

2.1.1 Chapter Goals

There is increasing evidence that psychological traits are spatially clustered within cities, regions, and countries. In this section, I will investigate how traits are geographically dispersed, the significance of those spatial patterns, and the role of geographical psychology as a sub-field of psychology. The discussion will unfold along several themes:

(1) *Geographical Psychology Research.* The geography of psychology is emerging as a new sub-discipline that offers a fresh and productive lens through which to view human behaviour. Advances in digital cartography and big data have made this new approach possible. A growing body of research has demonstrated how psychological characteristics can be mapped out across metropolitan areas, regions, and countries. In this section, I provide a review of geographical psychology structured to address three content areas. What findings are associated with geographic difference in personality and political attitudes? How is happiness and well-being affected by location and migration? Why are landscapes, climates, and pathogens important?

(2) *Psychopathology on the Map.* Geographical psychology has yielded maps that chart distributions of happiness, life satisfaction, personality etc., but few studies examine distributions of mental illness. Is it possible to create similar maps for psychological disorders?

2.2 Key Features of Geographical Psychology

Geographical psychology, relatively new and interdisciplinary, is an approach that seeks to understand human activity by examining the interaction between individual characteristics and physical space. Research in this field is dedicated to understanding the spatial organization of psychological phenomena and how features of the environment contribute to their organization (Rentfrow & Jokela, 2016). The notion of studying human behaviour across different environments is certainly not new – this tradition dates back centuries – however, models of human behaviour can be improved by incorporating more realistic assumptions about personality traits and decision making algorithms. In this sense, it is a distinct approach that adds layers of psychological information beyond that of traditional person-environment interactions.

Research in geographical psychology should endeavour to answer one or more of three essential questions about human activity. One, what are the meaningful ways in which people differ psychologically as a function of location (i.e., the evidence that psychological phenomena are geographically clustered)? Two, what are the underlying causes behind those meaningful differences. A goal should be to identify the driving force behind the design of psychological preferences for locations (e.g., evolutionary pressures, neural substrates). Also, what are the causal mechanisms in the environment responsible for psychological changes in the individual (i.e., why has geographical space played a role in shaping critical psychological features?). Three, what are the consequences of interacting with different physical environments (i.e., the

cognitive, emotional, or behavioural outcomes). In sum, *what* differences are related to geography, *where* did they originate, and *how* are they consequential?

Environmental, cultural, and geographical perspectives in psychology share an interest in location data and spatial organization, however the three differ in terms of focus (Rentfrow, 2014). Environmental psychology assigns less consideration to the extended environment (e.g., neighbourhoods, cities, states, regions). Instead, much of the focus is on the nearby surroundings (e.g., homes, offices, public places). Research in cultural psychology most often explores cross cultural variation in the processes that give rise to symbols, customs, and social norms (Oishi & Graham, 2010).

2.2.1 Interdisciplinary

Geographical psychology – a new perspective on human activity concerned with the psychological processes linked to spatial organization – is inherently interdisciplinary, drawing on research from a collection of perspectives including, geography, cartography, anthropology, economics, linguistics, architecture, urban planning, and environmental sciences. Murray and Schaller (2010) argued that part of the geographical variation in psychological characteristics is due to the prevalence of disease-causing pathogens. Other research in geographical psychology has provided clues about U.S. regional differences in terms of personality (Rentfrow, 2010), political conservatism (McCann, 2011), happiness and life satisfaction (Lawless & Lucas, 2011), character strengths (Park and Peterson, 2010), and personal values (Chung, Rentfrow, & Pennebaker, 2014). More than just features on a map, geography is essential to advancing our knowledge of human social behaviour and represents the centrepiece of several academic disciplines including social epidemiology, economic geography, and political geography (Rentfrow, 2014).

2.2.2 Focus on the Individual

In many respects, the geographical perspective represents a very old approach. Informal inquiries about how human nature interacts with the environment likely go back to the earliest days of our ancestors, and the earliest known maps date back several thousand years. On the other hand, this perspective seems very new because what was impossible in the past is now a realistic goal. Researchers using hand held Global Positioning Systems (GPS) to collect digital location data have opened the doors for human activity to be study in exciting new ways.

The feature that most separates it from other human-environment interaction research is the emphasis on the individual, or what Montello (2013) described as a disaggregate level of analysis. Behavioural geographers analyse data on the behaviour of individual people, recognizing that individuals vary from each other. Distance, for example, can be measured objectively as travel time or physiological effort. The disaggregate study of human geography maintains that it is the subjective rather than the objective distance that is most valuable because people's beliefs about distance may vary from one another. Thus, people engage in activities because of what they think is true, not necessarily what is objective about the world.

2.2.3 Bi-Directional

Human-environment relations are dynamic and bidirectional. The actions and mental states of individuals cause, and are caused by, physical and social environments, within the context of ongoing and changing interactions. Rentfrow (2014) characterizes the bidirectional nature as "mutually complimentary bottom-up and top-down processes." The congruous relationship between geography and psychology also extends into built environments such as office buildings and classrooms (Gosling, Ko, Mannarelli, Morris, 2002). When you enter a new geographical space, such as an empty auditorium with any seat available to you, where do you

prefer to sit? What role does personality play in making decisions about seat location? Are there key psychological factors that motivate the decision to sit near the front of the room? Near the back? Next to a window? The specific selections we make – and geographic preferences more generally – are not random. There is discernible structure underlying the relationship between geography and psychology. Research on geographical decision making can focus on choices at both the macro and micro levels. Most of the research noted in this chapter would be classified as *macro*. In chapter 11, I will discuss the how personality and emotional factors are connected to home and office spaces, and highlight future research questions about micro-geographic decision making inside built environments.

2.3 Geographic Distributions of Personality and Politics

Accumulating evidence suggests that values and beliefs are shaped, in part, by the places in which people live. A little over four decades ago, researchers began exploring how psychological characteristics are expressed on a geographic level. Krug and Kulhavy (1973), in possibly the first study to explore personality on a regional scale, published marked differences in creativity and conscientiousness when comparing individuals in urban vs. rural settings. Specifically, Midwesterners in the United States were higher in conscientiousness than individuals in the West Coast and Southwest. People living in urban, industrial regions (Northeast, Midwest, and West Coast) appeared higher in creative productivity (e.g., creativity, imagination, intelligence, and unconventionality) compared to those living in rural regions. The Northeastern United States also showed higher extraversion scores than the Western Mountain States.

After Krug and Kulhavy (1973) the exploration of state-level personality traits remained quiescent for the better part of three decades with few exceptions (e.g., Plaut, Markus,

and Lachman, 2002). However, following the work of Rentfrow, Gosling, and Potter (2008) there was an appreciable increase in the number of articles showing that state-level personality traits are linked to makers of political orientation, health, crime, economic innovation, and social tolerance (see Rentfrow 2010; Rentfrow 2014). The enterprising research by Rentfrow et al. (2008) used data from a large internet personality project to examine state-level differences in personality and produce a detailed regional map. Consistent with previous empirical work, openness scores were comparatively higher in the Northeast and West Coast. Neuroticism was lower in the West compared to the Northeast and Southeast.

Rentfrow, Jost, Gosling, & Potter (2009) studied the role of personality as a state-level factor in explaining some of the regional variation in presidential election voting patterns in the United States. They demonstrated that modal personality can be integrated with political science and cultural geography to help understand voting patterns. Specifically, mean levels of openness and conscientiousness within a state predict the percentage of votes for Democratic and Republican candidates. The view that political attitudes vary with geographic diversity has existed for some time, however, these differences have been previously attributed to historical settlement patterns, social class, economic conditions, and racial diversity (see Elazer 1994, Heppen 2003, Hero 1998).

Self-report measures of political orientation suggest a connection between liberalism and several aspects of the openness personality dimension, including curiosity, imaginativeness, novelty, and creativity (Jost, et al., 2003; Gosling Rentfrow, & Swann, 2003). The personality component, Conscientiousness, is linked with being orderly, self-disciplined, persistent, responsible, hard-working, and organized. State-level Conscientiousness scores were associated with voting Republican in the 1996, 2000, and 2004 elections. In sum, states with higher

average levels of openness and lower levels of conscientiousness were more likely to vote for the Democratic candidates than for the Republican candidates.

Krug and Kulhavy (1973) argue that immigration patterns are the primary cause of regional personality differences. But, as Rentfrow, Gosling, and Potter (2008) point out, the emergence of geographical differences is probably due to multiple factors. They go on to focus more on the *persistence*, as opposed to the *emergence*, of personality differences by offering three mechanisms (self-selection, social influence, and environmental influence) for maintaining regional variation. Systematic variability in mean personality scores on the Big Five has been documented across countries (discussed in chapter 4) and in comparisons between regions the United States, Great Britain, and Europe (Rentfrow, et al., 2013; Rentfrow, Gosling, & Potter, 2008; Rentfrow, Jokela & Lamb, 2015). Most of the research into geographical distributions of personality traits has examined self-report data. In a study that used natural language to assess variation in personal concerns, Chung, Rentfrow, and Pennebaker (2014) analysed essays that were written for a national radio station. Personal values indicating concern over economic prosperity, community commitment, crime, and health issues, differed by region.

Self-report measures of political orientation suggest a connection between liberalism and several aspects of the openness personality dimension, including curiosity, imaginativeness, novelty, and creativity (Jost, et al., 2003; Gosling Rentfrow, & Swann, 2003). This research, and many others cited here, used the most widely accepted contemporary personality model, the "Big Five" (e.g., Costa & McCrae, 1995; Goldberg, 1990). It measures five predominant, broad, and relatively independent trait dimensions: openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism (for a more detailed discussion on personality measurement, see chapter 3). Conscientiousness, one of the Big Five factors, is linked with being orderly, self-

disciplined, persistent, responsible, hard-working, and organized. State-level conscientiousness scores were associated with voting Republican in the 1996, 2000, and 2004 elections. In sum, states with higher average levels of openness and lower levels of conscientiousness were more likely to vote for the Democratic candidates than for the Republican candidates. Openness and conscientiousness appear to be the two most important factors (Rentfrow, Jost, Gosling, and Potter, 2009). The evidence connecting extraversion, agreeableness, and neuroticism to political orientation is less clear.

Conservatism – as a social, political, and economic orientation – is connected to geography and personality. Research on political perspectives and personality shows links between the Big Five domains of personality and conservatism in the United States (McCann, 2011). In states with large proportions of open and emotionally unstable residents there are lower rates of conservatism. The results of this state level analysis are consistent with research at the individual level.

In the United States volunteer behaviour is not consistent across all states, with self-report estimates varying from 46% to 17.4%. In four studies that examined the tendency to volunteer across the United State, McCann (2017) found that state resident neuroticism correlated highly (r=-.55) with state volunteering. State volunteering rates can be predicted from state resident neuroticism, where high levels of neuroticism are associated with low volunteer rates. Social anxiety, triggered in part by neurotic tendencies, likely discourages formal volunteering.

Because regional differences in personality are related to differences in political orientation – that is, political attitudes and personalities tend to cluster in geographic space in the United States and Europe – perhaps a similar effect exists within smaller built environments? In

other words, do similar trends exist on a micro scale when making short term decisions about locations? I will examine this issue and other future research ideas in chapter 11.

2.4 Mobility, Happiness, and Creativity

Occupational and social desires often drive people to relocate to areas that offer an abundance of those items. Recent trends in domestic migration, mobility, and globalization, especially among younger individuals, makes the question of where to live a crucial one. Florida (2004) refers to it as "the most important decision of your life." Location is connected to a host of life satisfaction variables including employment opportunities, education, concentrations of skilled and creative people, and availability of romantic partners (Florida, 2008). The factors that influence geographic preferences and choices are numerous and include personality, social, emotional, political, religious, and physical variables.

The study of residential mobility can offer insight as to why people move from one community to another and delineate the psychological and geographical consequences of migration. There is mounting evidence that individual personality differences are associated with preferences and decisions about relocating (Jokela, 2014; Jokela 2009). High openness and low agreeableness personality scores were associated with between state and within state migration in the United States, while high extraversion increased within state migration, but not between states. Probability of migration was not linked with conscientiousness and neuroticism. These findings start with the broad assumption that selective migration is motivated by the drive to find psychological satisfaction and reinforcement of individual needs. In some sense, this makes it necessary to match individual personalities with individual cities. The decision about where to live is among the biggest we make in life – perhaps as consequential as choosing a romantic partner or career (Bleidorn, Schönbrodt, Gebauer, Rentfrow, Potter, and Gosling,

(2016). Cost of living, proximity to work, access to cultural events and education are often considered, but a factor that is often overlooked is the personality of the city, or the traits of the people who live there (Florida, 2009).

Do cities have personalities? If so, is there such a thing as a match between an individual's personality and a city's personality? Using a vast online survey of more than 500,000 participants, Bleidorn, et al. (2016), profiled 860 cities across the U.S. in a study aimed at identifying links between self-esteem, individual personality traits, and the average personality of a city. They found significant although small effects for three of the Big Five traits: openness, agreeableness, and conscientiousness – meaning that variation in self-esteem scores was best explained when there was a person-city match between those three traits. Similar effects were found for religiosity, but not for extraversion or emotional stability.

Research has consistently demonstrated that life satisfaction and happiness are clustered within the United States and those regional differences are connected with other important economic, political and social factors. Traditionally, the study of happiness has focused at the level of the individual, however, there is a growing trend of examining happiness at regional levels (Lucas, Cheung, & Lawless, 2014; Lucas, 2014). Like personality, subjective well-being – a self-report of overall quality of life – also shows regional variation. One study found that subjective well-being was an indicator of migration and population growth, both of which are markers of regional success (Lucas, 2014). Compared to U.S. counties with low life satisfaction, those with high life satisfaction grew at faster rates and this difference was due to domestic migration, not birth or death rate differences. According to this research that used U.S. population data from the first decade of this century, along with data on subjective well-being from over two million residents, life satisfaction predicts population growth.

The driving force behind the effect is migration, not regional variation in birth and death rates. One possibility is that when locations experience consistent growth they engender a greater sense of vitality and spirit. It could also be the case that people migrate intentionally to happy areas, and the same factors that attract people are also contributing, directly or indirectly, to well-being. It is not entirely clear why the association exists, but there seems to be something about happier places that entices people.

As far back as 40 years ago, psychologists recognized that one of the most reliable research findings was that two of the big five dimensions of personality are very strongly linked to measures of well-being– extraversion (positively) and neuroticism (negatively) (Costa & McCrae, 1980). The tendency for extraversion to be associated with positive affect is due in part to sensitivity of extraverts to reward cues in the environment. As a result of having low thresholds for the detection of reward cues, extraverts are likely to experience positive arousal in social encounters (Argyle & Lu, 1990; Lucas, Le, & Dyrenforth, 2008). Neurotic individuals are highly sensitive to punishment cues, in contrast with stable individuals who are less sensitive to such cues (Gray, 1982). Therefore, extraverts and neurotics may be actively seeking out different social environments both in the short term and long term.

Memorable events from the year 1927 include the release of the first talking picture – *The Jazz Singer*, Charles Lindbergh's solo transatlantic flight, and the New York Yankees winning the World Series with the legendary "murderer's row" lineup that included Babe Ruth and Lou Gehrig. The year was also witness to a lesser known milestone. For the first time in American history, more people were living in cities than on farms (Bryson, 2013). The transformation from a predominately rural agrarian society to an urban industrialized economy began in the 1880s, reached a tipping point in 1927, and continued to the present day. Prior to the industrial

revolution, most Americans lived in isolated agricultural households and small towns that were connected to the outside world by horse drawn wagons (Olmstead and Rhode, 2000). The pace of urban growth picked up tremendously from 1880 to 1920 due to the increase in manufacturing jobs enticing rural residents in to cities as well as the number of foreign born immigrants settling in communities inside metropolitan areas.

In addition to the sweeping historical significance of shifts in residential patterns, there are crucial psychological and social consequences. Residential mobility is closely linked with self-concept, group support, and well-being Talhelm and Oishi (2014). In a review that focused on the ways in which regional characteristics affect residents and communities, the authors explored patterns and consequences of mobility on helping behaviour and happiness. Those who relocate frequently are less likely to engage in community activities than are individuals who do not move. Communities with large proportions of transplant residents show lower levels of social capital because they are less invested in the community.

Despite the abundance of evidence documenting the connection between residential location and well-being, the exact nature of personality-neighbourhood interactions is less clear. For example, within the UK London metropolitan area the strength of connections between personality traits and life satisfaction vary by neighbourhood. In a study that included 56,000 participants in 216 postal districts, the researchers found that higher openness to experience was more positively associated with life satisfaction in districts with higher average openness, population density, and ethnic diversity. Higher agreeableness and conscientiousness were associated with life satisfaction in areas with lower levels of life satisfaction. Extraversion and emotional stability did not show significant patterns.

Drawing upon findings in psychology, geography, and economics researchers have developed ideas that shed light on the factors that underlie economic innovation and creativity (Florida, 2004; Florida & Mellander, 2014). The theory proposes that creative an open minded people are attracted to areas that embody a certain social identity that emphasizes cultural diversity, youth, and mobility – the same characteristics of the individuals who show an interest in migrating there. The features of person and place essentially reinforce each other.

Geography can be used to understand other psychological and economic factors. Research by Landis and Gladstone (2017) explored the relationship between personality, income, and shopping patterns. They found that among low-income households, extraverts were more likely than introverts to spend money in ways that promote status. That means spending money you do not have to create the perception of living in a higher socioeconomic group. Although the study did not look specifically at geography and personality, it is reasonable to assume that this effect could be mapped out by looking at purchase patterns of extroverts within geographic spaces where the average income is low.

In sum, the previous two sections reinforce the position that P x E interactions are central to understanding personality clusters, political behaviour, mobility and migration, self-esteem and happiness, innovation and creativity, and community engagement.

2.5 Landscape, Climate, and Disease

Variation in landscape, disease, and climate all have an impact on the organization of psychological phenomenon. Some cities, towns, and regions may have a geography that is more accommodating for some personalities than for others. Oishi, Talhelm, and Lee (2015) reported in a multi-study paper that when people wanted to socialize they preferred the ocean over mountains, but overall, mountain-lovers were more introverted than ocean-lovers. The

introversion-extroversion disparity was further assessed using photographs of mountains and oceans. Part of the difference can be explained by extroverts' perception that they would have to put forth greater effort to enjoy themselves in the mountains. Extroverts believe that they will have an *easier time* having fun at the ocean.

An analysis of non-students showed that residents of mountain regions in the U.S. were more introverted than those living in flat states. Also, in a clever experimental test, the authors sent participants out to flat open areas or secluded wooded areas. The environment did not cause changes in personality scores, but introverts were happier in the secluded area than in the flat terrain. In chapter 3, I will continue the theme of exploring psychological phenomena at they interact with landscapes in a discussion of the Savannah hypothesis, an evolutionary hypothesis about how we form preferences and attachments to natural environments.

The human tendency to classify individuals as either "ingroup" or "outgroup" can be demonstrated along a continuum. At one end, *individualists* are motivated more by the boundaries between ingroups and outgroups compared to *collectivists* at the other end of the spectrum. The climato-economic theory (Van de Vlier & Yang, 2014; Van de Vlier, 2011) proposes that collectivism may be an adaptive solution to the existential problem that atmospheric climate can cause human death. They suggest that financial resources enable people to cope with the harsh climate demands of winter and summers. In a study that included measures of ingroup love and outgroup hate across 85 nations, they found that more demanding climates are correlated with stronger collectivism in relatively poor countries but weaker collectivism in relatively rich countries.

These data suggest that economic prosperity influences the impact of atmospheric climate on collectivist culture in that monetary resources enable people to cope with climatic demands of

winters and summers. Climate and environmental pressures give rise to solutions that lead to geographical variation in cultural value systems. Collectivism is promoted in countries with demanding climates and economic difficulties. The analysis indicates that the driving force behind the process is ingroup love more so than outgroup hate. The authors argue further that the climato-economic explanation does a better job of accounting for the variance in ingroup-outgroup bias compared to theories of parasitic disease burden.

Regional differences in disease prevalence are correlated with a number of important cross-cultural differences. (Murray and Schaller, 2010; Murray and Schaller, 2014). According to this view, ecological variation in the prevalence of infectious diseases gives rise to geographic differences in psychological traits. Thus pathogens are mechanisms that contribute to regional differences in human behaviour. Over evolutionary time, the risk of exposure to parasitic diseases has shaped the way humans interact with the physical and social environments. Murray and Shaller (2014) discuss evidence that disease-causing pathogens contribute to geographic variation in sexual behaviour, sociosexual attitudes, value systems, conformity, personality, family relations, ethnocentrism, moral judgments, and political ideology. Several studies have attempted to rate the prevalence of disease-causing pathogens across countries and regions. Gangestad and Buss (1993) used epidemiological atlases to create a single measure indicating the historical prevalence of pathogens in 29 countries. Employing a similar procedure, Murray and Shaller (2017) calculated an index of the historical prevalence of infectious diseases within 230 geopolitical regions around the world.

There is evidence that physical topography also plays a role in building culture and the development of value systems. In frontier regions with formidable terrain levels of individualism are higher than less menacing and more cultivated regions (Conway, Houck, & Gornick, 2014).

Over time, this type of demanding environmental niche likely attracted tenacious individuals with personality traits conducive to surviving in such harsh habitats (i.e., independent and individualistic people). Other research has concentrated on the effect of ecological stressors (climate stress, pathogen stress, and frontier topography) on vertical and horizontal governmental restriction (Conway, et al., 2017). Vertical restriction describes a condition in which select individuals impose asymmetrical laws on others, while horizontal restriction involves laws that restrict most members of a society equally. Across three studies, the authors validated the measurement of restrictions and concluded that ecological stress creates opposing pressures that simultaneously push freedom in two different directions. Ecological stressors tend to inspire more vertically restrictive societies and less horizontally restrictive societies.

2.6 Psychopathology on the Map

The previous section shows how geographic distributions can be used to capture details about meaningful psychological variables. This perspective has successfully depicted such variables as happiness, life-satisfaction, and personality on a regional scale, but has yet to address topics that broach the concept of mental illness. Is it possible to include features of psychopathology on a map alongside traditional cartographic data (i.e., roads, rivers, territorial boundaries, etc.)? While mapping has become a tool of necessity in medical geography and epidemiology, psychologists do not normally turn to geographical analysis to help delineate individual personality and psychopathology. There are two reasons why this might be the case. First, mapping and spatial statistical techniques support our understanding of the diffusion of diseases across geographical space, but psychological traits do not follow the same rules of "spreading" as contagious disorders. Second, the technology to do this kind of work has not been available until recently.

2.6.1 Geographic Clustering of Mental Illness

The idea of putting psychological disorders on a map has been put forward in various ways over the past 100 years. Prior to the publication of DSM-1 in 1952, the psychiatric classification scheme used in the U.S. was something like a mental disease census (Clegg, 2012). The *Statistical Manual for the Use of Institutions for the Insane* (National Committee for Mental Hygiene, 1918) was little more than a lengthy pamphlet that described 22 diagnostic categories along with demographic information for patients in mental institutions around the country. Table 10 of the manual asks every hospital to classify patients as either "rural" or "urban" using a population cutoff of 2,500 to divide those two categories. These data were then be used to paint a picture of the proportion of "Dementia Praecox" (Schizophrenia) cases coming from rural environments or the number of urban patients suffering from "Psychoses with Constitutional Psychopathic Inferiority." Due to the crude nature of the measure (rural vs. urban) this certainly would not be a detailed city-by-city account of schizophrenics or psychopaths. Nevertheless, it does illustrate one of the first known attempts at mapping psychological disorders by way of regional membership.

For many residents of urban areas around the world, cities represent the promise of a rewarding life that allows them, more than their rural counterparts, to reap the benefits of economic growth, developments in mass transit, and technological innovation. As a byproduct of this progress, however, metropolitan landscapes pose unique psychological challenges less likely to be found in other environments. In a classic study of urban-rural differences in psychiatric disorders across nine setting, Dohrenwend and Dohrenwend (1974) concluded that there are higher rates of disorders in urban areas, but there is significant variation between

diagnostic categories. Rates for personality disorders were higher in urban areas, while rates of bipolar disorder were higher in rural areas.

Although Dohrenwend and Dohrenwend (1974) found no trend in schizophrenia, a number of studies since show considerable evidence in support of the link between urbanicity and risk of schizophrenia (Vassos, Pederson, Murray, Collier, Lewis, 2012; Heinz, Deserno, Reininghaus, 2013). Greater levels of urbanicity, measured in overall population or density, are correlated with the incidence of schizophrenia. The risk for schizophrenia in the most urban environment is 2.37 times higher than in the most rural environment (Vassos, et al., 2012). In general, environmental and social stressors are more prevalent in urban than rural areas. Environments with high population densities face higher rates of noise, mortality, criminality, air pollution, and social isolation (Peen, Schoever, Beekman, Dekker, 2010).

Recent research has explored potential mechanisms linking social exclusion in urban environments to psychosis. Evidence suggests that factors such as social fragmentation and deprivation may play direct or indirect roles (Heinz, Deserno, Reininghaus, 2013). A meta-analysis of psychiatric disorders in rural vs. urban environments within developed countries found higher rates of mood and anxiety disorders in urbanized areas (Peen, Schoever, Beekman, Dekker, 2010).

These mental health findings underscore the dual nature of cities - rapid urban growth can be viewed simultaneously as one of the greatest opportunities for humanity and one of the greatest complications. Similar to the preference that introverts show for the isolation of mountains Oishi, Talhelm, & Lee, 2015) psychopaths may be drawn to crowded urban areas. These settings provide the necessary anonymity to move from one relationship to another with very little social accountability compared to small rural settings. Despite living inside crowded

urban areas, residents often feel socially isolated – an emotional state that partially mimics what is seen in prisoners who are intentionally isolated as punishment (Bennett, Gualtieri, & Kazmierczyk, 2018).

Compounding the problem is the harsh reality that the mentally ill often have few safe havens after healthcare facilities close. The resulting "psychiatric ghettos" are the legacy of systemic failures in public policy, economics, and education (Lord & Smydo, 2016). Often, those communities already carried a heavy burden of law-enforcement and fiscal challenges. They cannot properly manage "free-range mental health institutions," as some have described them. The call volume for ambulance service varies by municipality, with the poorer, more densely populated communities producing the bulk of mental health calls. Wealthy areas do not have to deal with the steady stream of mental health crisis class that poor communities do. In Pittsburgh, for example, one emergency medical crew annually averages 96 calls in McKees Rocks, 88 in Bellevue, 76 in Stowe, four in Emsworth, and no calls in Ben Avon (Lord & Smydo, 2016). Although economically diverse, all of those municipalities are contained within a five mile radius. Not surprisingly, most indices of prosperity, health, and education rank Ben Avon and Emsworth higher than McKees Rocks. A fine resolution map that documents this example would be compelling and constructive.

At best, many of the current maps portraying psychological disorders are a mix of reputable and not-so-reputable data. These cartographic illustrations are lacking for two reasons. First, the data may not come from credible sources. A google search of "PTSD Maps" and "Phobia Maps" turns up a number of suspect non peer-reviewed internet posts. Second, the region of coverage is much too wide in many of these maps to convey useful information. A map of the U.S. showing the most common phobia in each state is intriguing, but not exact

enough to be useful for analysis and research. A more successful map would zoom in with surgical precision giving information at municipality level or even closer. Using data gathered from the World Health Organization, it is possible for a cartographer to construct a colour coded map indicating rates of PTSD by country. Maps like this do exist, however, they often end up revealing very little about the geography of the disorder. In one map, for example, Canada and India are bright red, while the entire continent of South America is yellow. This is not a very detailed description covering just under two billion people.

Recall from chapter 1 the detailed depictions of educational attainment mapped out across small neighbourhoods in Chicago and New York City. Is it possible for psychological science to move in a similar direction? Psychiatric disorders tied to geographic space, similar to the cancer example above, can be explained in at least ways. One, the region itself, or some combination of elements in the region, is giving rise to the disorder. Two, individuals with the disorder are drawn to the region because they feel more comfortable and can enjoy a successful existence. Here I discuss some issues with geographically displaying diagnostic categories of mental illness.

2.6.2 Clusters of Antisocial Personality

Cases of Antisocial Personality Disorder (ASPD) in the United States are highly concentrated inside the dotted areas in Figure 2.6.2. Why would this be? The rates of ASPD are approximately 20 times greater inside the dots, each one covering less than 50 square miles (80 km), than in regions immediately outside the dots. Some dots are close to major metropolitan areas. Some are not. Many states have multiple dots while others have none. A few dots are very close to an ocean, but most are not. The answer has nothing to do with these factors.

Figure 2.6.2. Map of U.S. Federal Prisons. Source: Federal Bureau of Prisons (2017)

Anyone familiar with the United States Department of Corrections might recognize names like Big Sandy, Kentucky or Beaumont, Texas – all of them federal prisons represented by a dot on the map. This is essentially a map of ASPD by way of federal prisons. Epidemiological surveys show the prevalence of ASPD in U.S. community samples to be 2-3% (Moran, 1999). This means that about 2 or 3 out of 100 people from a non-prison population you see walking around in ordinary life meet the diagnostic criteria for APD. However, rates of ASPD in prison populations range from 30-60% across a number of studies from North America and Europe (Moran, 1999; Black, Gunter, Loveless, Allen, & Sieleni, 2010).

Notable federal prisons include Leavenworth in eastern Kansas, Marion penitentiary in southern Illinois, and ADX supermax in Florence Colorado. This last one, known as Alcatraz of Rockies (Fernandes, 2006), is considered by some to be the most secure prison in the world. ADX is the home of serial killers, terrorists (foreign and domestic), CIA and FBI double agents, cartel leaders, and members of organized crime. Current inmates include, Richard Reid (also known as the "shoe bomber"), Dzhokhar Tsarnaev (one of the 2013 Boston Marathon bombers),

domestic terrorist Terry Nichols, and former FBI counterintelligence agent Robert Hanssen, now serving 15 consecutive life sentences for espionage with the Soviet Union and Russia (Federal Bureau of Prisons, 2017). Former inmates include Timothy McVeigh (co-conspirator in the 1995 domestic terrorist attack on the Federal Building in Oklahoma City), serial child molester and rapist, Joseph Duncan III, and Salvatore Gravano, mafia underboss in the Gambino crime family better known as Sammy "the Bull" Gravano. (Federal Bureau of Prisons, 2017).

Of course, what differentiates this example with research on city-personality fit is that convicted felons do not get to choose where to live. This is an extreme example of man-made geographical clustering where inmates are stuck with an assigned prison. Never the less, it represents an attempt to analyse geographic clusters of mental health across a large geographic space. Ultimately, it was the combined forces of behaviour and personality disorder that indirectly determined geographic location for these individuals. Though the analogy to federal prisons is hardly perfect – convicted felons do not choose where to live - it is true that there is a connection between psychological traits and geographical clustering. Is it possible to create the same map for other psychological disorders from the DSM-5 or ICD-10? For example can we pinpoint on a map cases of depression, bipolar, etc. etc.? I shall revisit the issue in chapter 11 as part of a discussion on city consciousness – the belief that technology can respond in real-time to our emotional and psychological needs.

2.6.3 Post Traumatic Stress Disorder (PTSD)

To assume that individuals predisposed to Post Traumatic Stress Disorder (PTSD) are drifting in to particular areas over others would be senseless. Elevated rates of PTSD found in war zones are certainly an outcome of living in that environment. Creating regional maps of PTSD would be arduous due to diagnostic challenges in war torn environs. Logistic problems

notwithstanding, maps of PTSD and other anxiety problems could provide a unique view of mental health features otherwise inaccessible.

Recent work on the link between depression, anxiety, and strategic bombing of German cities during World War II highlights the potential of using historical data to make geographical predictions about mental health (Obschonka, Stuetzer, Rentfrow, Potter, & Gosling, 2017). Despite the persistent stereotype that Germans are renowned worriers, a comparison of over 100 countries found little support for the widespread assumption of German angst. On measures of depression, anxiety, and neuroticism, Germany ranked 20th, 31st, and 53rd, respectively. Further analyses focused on the 89 German cities that were targeted by bombs during the war and found a negative relationship on regional trait depression after controlling for economic and social factors. Among the cities that were targeted, those who were more severely bombed show lower levels of neuroticism in the face of stressful life events today (i.e., they show more "resilience"). This work not only illustrates how clinical psychology is intricately linked with history, it also serves as a reminder of the illuminating effects of connecting data from diverse bailiwicks.

2.7 Conclusions

Prior to Snow's 1854 epidemiological breakthrough, medical investigations were typically conducted by walking through an affected area to resolve the cause of transmission. John Snow and his colleague, Reverend Henry Whitehead, would make notes as they ventured through impoverished city zones stricken with cholera. Street level monitoring allowed them to create detailed records documenting each encounter with a sick individual. Their work is something of a precursor to the "psychogeographic" walking performances made famous by the Situationist art movement of the 1960s (see chapter 11). Snow's monumental breakthrough was the delivery of a map illustrating the geographic spread of cholera cases. This bird's eye view

represented a radical new approach to studying and managing disease. Ultimately, it helped confirm his theory that transmission of cholera was not through the air, but via water (Johnson, 2006).

Figure 2.7. Major Depressive Episode in the Past Year among Adults Aged 18 or Older in California, by Substate Region: Percentages, Annual Averages, Based on 2012, 2013, and 2014 NSDUHs. Source: SAMHSA, Center for Behavioural Health Statistics and Quality, National Survey on Drug Use and health 2012, 2013, and 2014. Note: The legend's ranges were created by dividing 362 substate regions, nationally, into 7 groups based on the magnitude of their percentages.

Similar to epidemiology in the 1800s, a compulsory upgrade may be in order for contemporary psychology. Researchers now have access to state-of-the-art technology that is

more powerful than ever yet simple to use, and elegantly suited to answer nuanced research questions once considered too formidable. Spatial approaches that utilize maps, person-location methodologies, and other refined geographic techniques, may help elucidate issues in personality, emotion, motivation, preferences, and decision making.

Researchers at the Substance Abuse and Mental Health Service Administration (SAMHSA) have recently designed a collection of impressive maps (Lipari, Van Horn, Hughes, &Williams, 2017). What they lack in topic breadth, they make up for in detail. Short of covering a multitude of psychological illnesses, they collected data on general mental health factors. For example, they have maps for each state covering the following categories: In the past year have you had… "a serious mental illness," "any mental illness," "thoughts of suicide," and "a major depressive episode?" The data were displayed as fairly detailed county level maps for each state. Figure 2.7 shows rates of depressive episodes for California. (Lipari, Van Horn, Hughes, &Williams, 2017). I view this as a very auspicious development that is, hopefully, indicative of things to come.

The research outlined in this thesis is just the tip of the iceberg. What I expect will happen next is a radical expansion of the methodology that was used by John Snow in one of the most successful public health studies ever. His artful insight was to map every case of cholera in the city to discover the clustering pattern of cases around one water pump. Digital cartography, big data, and mobile devices make this kind of study seem effortless today. The combination of methodology and technology allows scientists to hover over social science questions at 30,000 feet or to zoom all the way in to a just a few feet. The analysis that Snow did could easily be conducted 200 times over a short period of time. As Stephens-Davidowitz (2017) points out, the methodologies taught to graduate students in the social sciences, for the most part, have been

untouched by the digital revolution. Only a small number of rebellious professors and graduate students are exploring the largely uncharted ground opened by the data explosion. "We might call this – taking a simple method and utilizing big data to perform an analysis several hundred times in a short period of time – science at scale" (Stephens-Davidowitz, 2017, p.275).

2.8 Summary

Geographical psychology is an interdisciplinary approach to human activity that covers an academic space both wide and deep. Collectively, the research reviewed here supports the idea that regional affiliation is intimately personality traits, well-being, life satisfaction…. Etc. Geographical psychology is dedicated to the idea that we can understand human activity by exploring the interaction between individual characteristics and physical space. The notion of studying human behaviour across different environments is certainly not new – this tradition dates back centuries – however, models of human behaviour can be improved by incorporating more realistic assumptions about personality traits and decision making algorithms.

The essential goal of a geographical approach is to use spatial components to help understand psychological phenomena. For example, there is considerable evidence that personality traits are found in clusters at the national and regional levels. Those clusters are also related to differences in political orientation (Rentfrow, Jost, Gosling, & Potter, 2009). Physical and social features of the environment – including topography, climate, demography, and politics – interact with individual psychological processes.

The geographical approach is designed to "compliment and extend theory and research in several areas of psychology, including social, personality, cultural, environmental, evolutionary, and comparative" (Rentfrow, 2014, p. 4). In this sense, it is an original and dynamic frame of

reference that augments our understanding of human activity by including layers of geographically relevant psychological detail.

PART II

Geographic Distributions of Personality Traits and Attachment

CHAPTER 3: EVOLUTIONARY SCIENCE AND PERSONALITY PSYCHOLOGY

3.1 Introduction

This section will address issues of ecological fit and psychological traits in the context of evolutionary science and personality psychology. The upcoming chapters in Part II and Part III present six prior publications that illustrate how personality traits, romantic attachment styles, jealousy, mate poaching, and sex differences in sexual variety are distributed across world regions.

Differential reproduction is at the heart natural selection, the driving force behind the evolutionary process. Modern humans live in a world that offers protection against many of the hostile forces that diminished ancestral survival and reproductive success. Yet, the list of challenges posed by the current environment is still quite long and includes food shortages, climate, weather, diseases, pathogens, and predators. Many of the preferences we carry today for physical places were shaped by natural selection. Thus, a reasonable starting point for evolutionary psychology is an exploration of survival problems posed by the environment and the resulting adaptive solutions.

Guided largely by questions of human uniqueness, personality researchers have extracted ideas from perspectives that range from genetics to narrative theory. What are the causal roots of individual differences? What are the major ways in which individuals differ (Corr, 2015)? What are the outcomes of individual differences for social interaction, mental

illness, and life span development (Buss, 2015)? Evolutionary psychology is wrestling with ways to consolidate individual differences and species-typical psychological mechanisms under the umbrella of a single conceptual framework. A number of researchers have argued that the potential for convergence between the personality and evolutionary perspectives in the future seems strong (e.g., Gangestad & Simpson, 1990; Nettle & Penke, 2010).

3.2 Evolutionary Science

Around the same time that John Snow was developing maps that launched the field of epidemiology and changed how medical practitioners address the issue of infectious diseases, Charles Darwin was formulating a theory that would fundamentally alter our understanding of how humans came to be (Darwin, 1859). Evolutionary psychology, an approach organized around Darwin's core ideas, offers an adaptationist perspective on human behaviour. That is, from the standpoint of an evolved design for solving problems associated with survival and reproduction (Gangestad & Simpson, 2007). This perspective holds the promise of an integrative personality theory that includes core premises about human nature and an explanation of how individuals differ (Buss, 2015). It is not really a sub field of psychology, like cognitive or social psychology, but rather an *approach* to human activity that can be applied to psychology or any number of disciplines. "Evolutionary psychology is simply psychology that is informed by the additional knowledge that evolutionary biology has to offer, in the expectation that understanding the process that designed the human mind will advance the discovery of its architecture" (Barkow, Cosmides, & Tooby, 1992, p. 3).

Rooted in Darwinian theory, modern evolutionary psychology is arranged around a core set of assumptions and guiding principles: (1) Humans come from an uninterrupted line of ancestors who survived to reproductive age *and* they reproduced; (2) Humans today carry the

adaptive physiological and psychological mechanisms that led to our ancestors' success; (3) Human nature and personality are made up of a collection of evolved mechanisms; (4) Even before Darwin, *change over time* and *apparent adaptation to environment* had been recognized as features of evolution.

Woven into this theoretical organization is the belief that humans have evolved cognitive structures, or computational algorithms, shaped by natural selection to help us adapt to local environments. These highly specialized, context-dependent mechanisms are designed to activate specific behavioural instructions when triggered by social and physical cues from the environment.

3.2.1 Savanna Hypothesis

Recall from chapter 2 that Oishi, Talhelm, and Lee (2015) reported personality differences in preferences for landscape features in one of the first studies to directly examine the link between specific ecological features and core personality traits. Because the underlying mechanisms that control the association are not entirely clear, a presentation of the savanna hypothesis (Orians, 1980; Orians, 1986) might be illuminating,

Current habitat preferences were shaped by selection pressures in our ancestral past, according to the *savanna hypothesis* (Orians, 1980). The theory argues that selection favoured preferences, motivations and decision rules that attract us to resource rich environments while avoiding environments populated with survival threats and lacking resources. The African savanna, widely believed to be the site in which humans originated, fulfils these requirements. Two perspectives are helpful in addressing evolved responses to landscapes, one spatial and the other temporal. The spatial frame of reference points out particular stages of exploration in

novel landscapes. The temporal dimension concerns short-term and long-term habitat variation in critical survival factors (e.g., weather patterns and seasonal transitions).

Support for the savanna hypothesis can be found in a studies of landscape preferences. One study asked subjects to rate a series of standardized photographs of trees taken in Kenya. Pictures were taken under similar daylight and weather conditions. Each photo focused on a single tree and varied along four dimensions – canopy shape, canopy density, trunk height, and branching pattern. Subjects from Australia, Argentina, and the United States all showed similar taste in the photos depicting trees. The trees that made a moderately dense canopy with trunks that separated in two near the ground – the savanna-like trees – were preferred by participants across the three cultures. (Orians & Heerwagen, 1992).

Modern technology, structural designs, and construction materials allows us to comfortably inhabit climates that would have required intense effort just a few generations ago. Still, we carry with us the psychological preferences shaped by of generations of ancestors living in a much different world and often customize our environments to resemble that ancient habitat. Most of us prefer physical spaces that offer views of green vistas over windowless basements. Looking at trees might even have a real health benefit: Patients who viewed trees outside the window recovered more quickly from hospital stays (Ulrich, 1984). Flowers also appear to have a positive impact on hospital patients. Bringing flowers increases optimism and actually improves the rate of recovery (Watson & Burlingame, 1960).

The relationship between stress and uncultivated outdoor settings may play a role in this. When placed in uncertain and stressful situations, individuals who viewed pictures of nature scenery showed less physiological distress (Ulrich, 1986). Contact with vegetation need not be active, such as gardening, to provide health benefits. Passively viewing vegetation through a

window can produce desirable effects as well. Studies in biophilic design demonstrate that people living and working in spaces with vegetation compared to those without vegetation show improved performance on mental tasks, more positive moods, greater ability to re-focus attention, stress reduction, and diminished perceptions of pain in health care settings (Kellert, Heewagen, & Mador, 2008).

Additional support for the savanna hypothesis comes from the body of evidence showing that humans often prefer natural environments over built environments (Kaplan & Kaplan, 1982). Using data from thirty studies, Kaplan (1992) summarized the results of participant ratings of photographed scenes of Western Australia, Egypt, Korea, British Columbia, and the United States. Across these varied geographic regions, participants preferred natural environments over built environments. Other data suggest that the addition of trees and vegetation increases positive evaluations of built environments, thus demonstrating the transformative power of foliage (Ulrich, 1983).

One of the earliest studies to test the idea that people have a generalized bias toward savanna-like environments hypothesized that "innate predispositions" for the savanna should be more likely to be revealed in children than in adults, given that adults have had greater opportunity to experience non-savanna ecosystems (Balling & Falk, 1982). In a study that included six age groups (8, 11, 15, 18, 35, and 70 or over), subjects were asked to rate photos from five natural biomes on scales that measured how much they would like to "live in" and "visit" each one. The researchers found that the youngest group (8-year-old children) preferred the savanna over the other habitats on both scales. The deciduous forest, coniferous forest, and savanna were equally liked among ages 15-70, with ratings for the desert and rainforest coming in lower at all ages. The study also implies that people have an aversion to drought conditions

and arid landscapes. Photos depicting greener savanna were rated higher than similar savanna photos taken during the dry season. Finally, all age groups gave the lowest ratings to the desert environment (Balling & Falk, 1982).

The details of the savanna hypothesis have been unfolded to include three stages of habitat selection: *selection*, *information gathering*, and *exploitation* (Orians & Heerwagen, 1992). The primary decision faced in stage 1 is whether to canvass or flee a landscape upon initial encounter. Completely closed forest canopies are rejected because they inhibit viewing and mobility. Wide open environments lacking cover and protection are also abandoned. Initial preferences and choices made during the selection stage are often emotional rather than intellectual. They do not usually involve an exhaustive cognitive evaluation of all the benefits and disadvantages of the landscape. It is something closer to sensing a vibe or having a hunch.

Assuming the experience in first stage is decent, individuals begin exploring the environment for resources and possible hazards. Stage 2, *information gathering*, involves mentally mapping the area for hidden places to harbour oneself, family, and allies. One can also evaluate possible routes for escape in the event of danger. At this stage, people show a preference for hills and pathways that change elevation and wind around, hinting at the potential of something promising around the corner. One study found that people have an affection for mystery and intrigue at this stage (Kaplan, 1992). In sum, great effort is put in to risk assessment and resource estimation at this stage.

The decision of whether to stay or leave is at the heart of stage 3, *exploitation*. This final stage involves elaborate mental calculations that help to determine if one should stay long enough to enjoy the full bounty of resources available in the habitat. All humans face decisions about how much time and energy to allocate to competing demands. The solutions to these

decisions involve trade-offs. A lofty rock ridge brings benefits (e.g., easy observation of competitors below), but they may not outweigh the risk of death that comes from falling. Likewise, a clear and exposed area good for foraging may open the door to predators (Orians & Heerwagen, 1992).

An additional layer of the savanna hypothesis involves decision making over different time frames (Orians & Heerwagen, 1992). Light availability and weather patterns are two time-related factors that impact choices. Long shadows at the end of the day may elicit the desire to set up campsite instead of continuing to move through the environment in darkness. Likewise, daily weather issues can force one to seek shelter quickly. Dark clouds, winds, thunder, and lightning are cues that may initiate the decision making process.

Along with daily fluctuations, humans are sensitive to environmental changes on a seasonal scale. In general, natural selection favours traits that maximize benefits and minimize costs. People will show preferences for long term signs of robust prosperity because the algorithms that make habitat related decisions were shaped over time in response to specific positive and negative features of the environment. Indicators of harvest, such as fruit, budding flowers, and verdure, are favoured over bare trees and impoverished fields.

3.2.2 Environment of Evolutionary Adaptedness (EEA)

The Environment of Evolutionary Adaptedness (EEA) is the ancestral environment to which a species is adapted, or the set of selection pressures that shaped an adaptation. A central premise of evolutionary science is that forces in our distant past helped make us who we are today. The EEA refers to a group of selection pressures occurring during an adaptation's period of evolution responsible for producing the adaptation (Tooby & Cosmides, 1992). A selection pressure can be any factor in a population that impacts reproductive success. Physical, social,

and intrapersonal pressures from our ancestral past help to shape our current human design because all animals have heritable variations that are selectively favoured or disfavoured in accordance with reproductive success (Buss, 1999). Each adaptation has its own EEA, or set of adaptive problems, that shaped it over evolutionary time.

3.2.3 Modern Attachment and the EEA

The idea of EEA was first proposed by John Bowlby (1969) in the context of attachment theory. He described it as conceptual space - not a specific place - that describes the conditions and properties in which adaptation occurs: "In the case of biological systems, structure takes a form that is determined by the kind of environment in which the system has been in fact operating during its evolution…This environment I propose to term the system's 'environment of adaptedness.' Only within its environment of adaptedness can it be expected that a system will work efficiently" (p. 47).

The EEA does not exist as a single geographical location during a discrete period of time during human evolution. Rather it is a set of selection pressures that formed a given adaptation. For example, ancestral humans faced the adaptive problem of securing and digesting food to maximize energy. Taste buds were shaped in response to this adaptive problem. Our ancestors who showed a preference for salt, fat, and sugar were selectively favoured over those individuals who did not have similar preferences. The acquisition of salt, fat, and sugar would have been challenging for our ancestors given the absence of agriculture and the inability to mass produce high concentrations of those items. The probability of survival and reproduction for individuals who showed a preference for those foods would have been greater than for those who did not. Our taste preferences were shaped in response to the problems posed by this environment.

Organisms living in different environments faced different sets of adaptive problems. Every species has a unique EEA - this is why not all animals are the same. Humans and turtles, for example, faced different reproductive problems and therefore have different adaptations. Even animals that co-existed in the same geographic space during a similar time period have different EEAs because they faced different reproductive challenges.

3.2.4 EEA and Current Environment Mismatches

An adaptationist approach to studying behaviour involves examining the environment in which the brain evolved, at the same time, the modern industrialized world of today differs in many important respects from the EEA. This mismatch serves as a useful starting point for understanding the function and design of current psychological mechanisms. The list of novelties offered by our modern world but not present in the EEA includes agriculture, electricity, refrigeration, large scale weapons, medicines, mass communication, effective contraceptive devices, and virtually unlimited access to all types of proteins and carbohydrates. We are navigating our current social and physical world with psychological mechanisms designed to solve problems associated with survival and reproduction in an ancestral environment much different than the one we live in now.

Our ancestors lived in conditions very different from the modern world in which we currently live. For example, the population of the planet today is considerably larger than at any other time in human history. Figure 3.2.4 provides some perspective on this time frame by graphically displaying the relatively recent explosion in world population. Our mental machinery, including emotions, decision making algorithms, and mate preferences, evolved under conditions that existed more than 10,000 years ago. Since the mid-1800s the global population has increased tremendously – the blink of an eye on an evolutionary scale. These

numbers dramatically illustrate just one of many features of our currently environment that is radically different from previous generations going back to the beginning of human history. Between 1959 and 2042 the world population will grow from 3 billion to an estimated 9 billion (U.S. Census Bureau, 2016). In contrast, the prior five million years of human history saw almost no significant population increases during any comparable span of time.

Figure 3.2.4. Graph of the global population from 10,000 BCE to 2020 CE, adapted from the US Census Bureau data. The graph shows very rapid growth since the 18th century. In the span of 40 years, from 1959 to 1999, the world population doubled from 3 billion to 6 billion. According to US Census Bureau projections, the world total will reach 9 billion by 2042. Source: U.S. Census Bureau, International Database, August 2016 Update

Because adaptations evolved over many generations they are said to be "in tune" with reliable features of the environment. It is possible for an adaptation to fail to perform properly (i.e., fall "out of tune") if the environment changes. A behaviour that is maladaptive in one environment may not be maladaptive in other environments. Returning to an earlier example, one could make the case that salt, fat, and sugar negatively impact health when consumed in large quantities over long periods of time. However, this is not evidence of maladaptivity in the EEA. Moreover, the "lack of fit" to the current environment does not change the intense desire for those substances formed in the EEA.

3.2.5 Reverse Engineering Emotions

One approach to uncovering the selection pressures responsible for a trait is to use "reverse engineering" to figure out the adaptive problems the trait was designed to solve (Pinker, 1997). In other words, "what in the EEA was this behaviour designed to solve? The function of a trait provides an indirect historical record of the selection pressures involved in shaping the trait.

The current universality of certain emotions can provide insight into the adaptive problems confronted by our ancestors. For example, the concepts of anger and aggression appear in every culture. This suggests that evolutionary pressures in our distant past selected and shaped the emotion of anger and the behaviour of aggression in response to specific adaptive problems posed by the environment. Parental anger, for instance, can be triggered in a mother or father if offspring are threatened. This emotional/behavioural response is adaptive in current environments and can be traced back to ancestral ones.

For the first five million years of hominid history, our ancestors lived in small, nomadic bands of hunter-gatherers. On average, group size was likely maintained around 100-250 individuals. Based on correlations between primate brain size and social networks, Dunbar (1992) proposed that humans can comfortably maintain relationships with approximately 150 people. Because neocortex size effectively limits group size, many of our social adaptations are in tune with small cohesive groups with this capacity (Dunbar, 1993). This psychological design poses a problem for tackling modern day large scale global issue like environmental destruction, mass migration, and geo-political conflict. Agriculture and modern city environments were non-existent for 99% of human history (Cosmides & Tooby, 1987). Because these human inventions

emerged only in the past 10,000 years we are relying on psychological mechanisms shaped in our ancestral past to help us navigate the social and physical complexities of the world today.

There is a competition between the demands of selfish decision making shaped in the EEA and the less selfish altruistic desire required to ensure long lasting peace and cooperation on a global stage. The needs of the individual end up competing against the needs of the larger group. Our psychological structure was designed to benefit the propagation of our genes through direct and indirect means and to promote non-kin reciprocal alliances in close proximity (i.e., the people we interact with frequently). For almost all of human history we have not had to solve massive global population problems. Simply put, the EEA did not design efficient mental machinery for solving problems involving large groups of strangers we will never meet or see.

The EEA for any species is the amalgamation of reproductive problems faced by members of that species over evolutionary time and is an important concept for understanding the functional properties and organization of the brain. Many human preferences and behavioural decision making algorithms are adapted to the EEA and not necessarily the modern environment.

3.3 Personality Psychology

Personality psychology emerged as an academic discipline in the 1930s. Often referred to as one of the founding figures in the field, Gordon Allport (1937) described *nomothetic* and *ideographic* approaches in response to the shortcomings of the perspectives of psychoanalysis and behaviourism. However, the roots of personality psychology can be traced back to the 4th century B.C.E. Hippocrates, Galen, and other Greek thinkers, were proponents of a bodily fluid model of personality known as *humourism* that made a connection between observable behaviour and blood, mucus, and bile. We still hang on to the notion of "personality types" despite the

original humours - sanguine, melancholic, choleric, and phlegmatic - being completely discredited.

3.3.1 Measuring Personality

A century ago, Robert Woodworth developed the Personal Data Sheet (PDS) as a tool to screen United States Army recruits for shell shock risk. The test consisted of 116 yes or no questions that covered somatic, medical, family, and social issues. Published in 1917, the test is widely considered the earliest personality instrument (Goldberg, 1999). The administration of the test is straightforward and follows closely the procedures used by many tests today. For example, the questionnaire can be given individually or in groups and participants are instructed to underline "Yes" or "No" for each question. The norms for the test were established by giving the questions to two groups of people: normal individuals and a group of known abnormal individuals. Woodworth reported that individuals in the normal groups were likely to answer 10 or fewer questions incorrectly. A score of 30 or higher is indicative of psychoneurosis (Pescor, 1934).

World War I ended before the test could be implemented for its intended purpose of predicting shell shock, however it was used in the early days of personality research as a diagnostic adjunct for assessing "psychoneurotic tendencies" in delinquents (Pescor, 1934). The PDS was later revised in several ways to make it functional with different populations of individuals. Some of the original questions rendered the test unsuitable for women and juveniles. The Richmond Modification and the Woodworth-Cady Questionnaire respectively fixed these issues.

In contemporary psychological parlance, the PDS exclusively measures *emotional stability*. As such, it stands out as a prime example of what Goldberg (1999) would classify as a

narrow-bandwidth instrument, measuring just one, two, or at most three traits. Thousands of tests have been designed since the publication of the PDS and most of them fall into this category. Attributes measured by narrow-bandwidth tests include Optimism, Narcissism, Guilt, and Locus of Control. By contrast, a *broad-bandwidth* instrument (e.g., MMPI, 16PF, and NEO-PI) capture multiple dimensions and behavior and emotion. The distinction between the two approaches is critical because most broad-bandwidth instruments are proprietary, with test items copyrighted by the authors. However, most of the narrow band-width instruments, including their scoring keys, have been published in scientific journals and books. They are part of the public domain and freely used by other researchers who can contribute to their further refinement.

Goldberg (1999) outlines some of the issues with keeping broad-bandwidth instruments out of the public domain. For one, there is the threat that scientific pursuits may be dominated by commercial interests. Comparative validity studies that would challenge one test against another as predictors of the same crucial benchmarks are not always exhorted. For many commercially owned inventories, the revisions and changes that would otherwise follow from free and open use by the scientific community are few in number or entirely non-existent.

3.3.2 Personality Traits

A great debate between personality trait theorists and social psychologists began in 1968 following the publication of *Personality and Assessment*, Walter Mischel's influential book in which he argued against conventional conceptions of personality. His conclusions cast doubt on trait theory by questioning traditional assumption that people are motivated by fixed characteristics that generalize across diverse situations. Consequentially, an entire generation of

personality and social psychologists were taught that the trait approach was unsound (Little, 2014).

Many researchers view the person-situation debate as a controversial period in psychology, but also a beneficial one because it helped to narrow down competing hypotheses (Kenrick & Funder, 1988) and paved the way for a synthesis between traits and behaviour consistency (Fleeson & Noftle, 2009). Across situations traits do not robustly predict behaviour, but rather they are predictive of consistency for a wide range of actions over time. The mean level of a trait may be anchored within a person, but can vary around this mean depending on the situation (Fleeson & Noftle, 2009). Some have also suggested that situational factors (e.g., social roles) produce situation-specific goals which, in turn, influence the development of personality traits (Heller, Perunovic, & Reichman, 2009).

Although a number of resolutions emerged from the often acrimonious debate, one of the most crucial ideas emphasized the interactionist nature of traits and situations. Such an approach allows psychologists to apply the strength of both personality and social psychological analysis. Interactionism recognizes that people often choose situations because of their personalities, people can change situations by their own actions, and situations can alter the expression of personality (Buss, 1977). Interactions between person and situation can be interpreted throughout the classic Stanford Prison Experiment (Haney, Banks, & Zimbardo, 1973). Historically, the research has been held up as an illustration of how the situation can transcend personality traits when people quickly adapt to the randomly assigned roles of prisoner and guard in a simulated prison environment. More recently, however, it has been suggested that the appeal of a "prison life" study may be greater for people with certain personality characteristics (Carnahan & McFarland, 2007).

As a result of the trait debate, and the fact that the study of stable characteristics entered into a lengthy and productive time period, there is now consensus that human personality comprises five major factors: Extroversion, Openness to Experience/Intellect, Agreeableness, Conscientiousness, and Neuroticism/Emotional Stability.

Extraversion: This trait describes energy, cheerfulness, and initiative. Individuals who score high show a tendency to seek social stimulation with others. Those who score low are often introverted, quiet, and submissive to authority.

Openness/Intellect: Individuals with high scores on Openness enjoy novelty and may exhibit creative tendencies. Conventional thinking, a well-defined sense of right and wrong, and a preference for routines characterizes people on the other end of the spectrum.

Agreeableness: This trait reflects compassionate and cooperative we are towards others. Adjectives like warm, friendly, and empathetic describe those who score high. On the other end of the agreeableness dimension are individuals who are antagonistic, suspicious, and egocentric.

Conscientiousness: This factor estimates self-discipline and organization. Those with high scores are trustworthy, dependable, and motivated. The low end of the scale indicates unreliable and easily distracted people.

Neuroticism/Emotional Stability: Neuroticism describes a bias towards unpleasant emotions like depression, anxiety, and anger. Emotional instability describes people who may be moody or take a long time to get back on an even keel after a slightly difficult situation. Emotional stability, on the other hand, describes calm, control, and satisfied individuals.

The story of these five personality dimensions involves two research programs with separate histories. Two research groups in the 1970s, one lead by Warren Norman and Lewis

Goldberg and the other by Paul Costa and Robert R. McCrae, pushed forward the view that the most meaningful aspects of human personality can be captured using five dimensions.

3.3.2.1 Lexically Derived Big-Five

One research program, guided by a lexical approach, and started in the 1930s by Gordon Allport and Henry Odbert, paved the way for the eventual conclusion that personality can be described by five largely independent dimensions. The "lexical hypothesis" assumes that most significant differences between individuals eventually become encoded in the natural language (Goldberg, 1981). Allport and Odbert (1936) curated a list of approximately 18,000 unabridged dictionary adjectives describing personality. In the years that followed, the list of terms was factor analysed, reduced, and reanalysed by a number of researchers (Cattell, 1947; Cattell, 1957; Tupes & Christal, 1958; Tupes & Christal, 1961). The findings were ultimately published with factor labels Extroversion/Surgency, Agreeableness, Conscientiousness, Emotional Stability, and Culture (Norman, 1963). In one of the most scientifically compelling early examples of what is now known as the Big-Five factor structure, Norman adroitly articulates the logic behind the lexical approach: "Attempts to construct taxonomies of personality characteristics have ordinarily taken as an initial data base some set of perceptible variations in performance and appearance between persons or within individuals over time and varying situations. By far the most general efforts to specify the domain of phenomena on which to base such a system have proceeded from an examination of the natural language" (Norman, 1963, p. 574). The phrase "Big Five" was coined by Goldberg (1981) and Culture was exchanged for Intellect as the fifth factor label.

A number of trait adjective scales have been developed by personality psychologists to measure Big-Five dimensions. These lexical Big-Five inventories include Goldberg's Big-Five

Factor Markers (1992), the Abridged Five-Factor Circumplex (AB5C; Hofstee, De Raad, & Goldberg, 1992), 10 Aspects of the Big Five (DeYoung, Quilty, & Peterson, 2007), Saucier's 7 Factor Scales (1997), and the Interpersonal Circumplex (Markey & Markey, 2009). These scales vary in length with some including shorter and longer versions (e.g., 50 and 100-item versions of Goldberg, 1992). Based on the list of scales presented here, it should be evident that there are many different inventories that allow for measurement of Big-Five factors, not just one "Big-Five Personality Inventory." To avoid any confusion, the expression "Big-Five Inventory" (BFI) refers to a copyrighted inventory that consists of 44 short phrases and is available through the author's website (John, Donahue, & Kentle, 1991). It is among the many ways to evaluate personality along five major variables.

3.3.2.2 Five-Factor Model

The second history of the five personality factors was informed by earlier lexical research and relies on comparisons with other major personality questionnaires. The logic is that scales in existing personality questionnaires are all essentially related to the Five Factor Model (henceforth, FFM). Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience comprise the five basic factors underlying personality.

The differences between the Big-Five and FFM are minimal. Other than Emotional Stability replacing the name and measuring the opposite of the Neuroticism scale, the first four factors are the same. The contrast between Intellect and Openness to Experience is the greatest difference between the two approaches. Openness to Experience measures imagination, an interest in new activities, and creativity, while Intellect measures a tendency toward intelligence and an intellectual style.

Developed from research on Cattell's 16 Personality Factor Questionnaire (16PF), the scale most widely associated with the FFM is the NEO-PI-R (Costa & McCrae, 1992). Neuroticism, Extraversion, and Openness to Experience (NEO) were found to be three primary factors that emerged from analyses of Cattell's 16PF. From this, the NEO-PI Neuroticism Extraversion Openness Personality Inventory (NEO-PI) was constructed and later revised (NEO PI-R). The NEO PI-R is not the only questionnaire derived from the FFM approach. Several researchers have designed measures based on the FFM with 120-items (NEO-120, Johnson, 2014; 120-Item IPIP NEO-PI, Maples, Guan, Carter, & Miller, 2014).

Although there is general agreement among personality psychologists concerning the value in using an approach that has five core dimensions, the acceptance is not universal. A number of researchers have taken up positions that favour trait models with greater than five factors. For example, the HEXACO-PI includes factors that map onto the traditional five factors with the addition of Honesty/Humility as the sixth factor (Lee & Ashton, 2004). The Hogan Personality Inventory (HPI) is comprised of seven primary scales, six occupational scales, and 42 subscales (Hogan & Hogan, 1992). Jackson, Paunonen, and Tremblay (2000) developed the Six Factor Personality Questionnaire (6FPQ) to measure six domains and 18 facets. In this model, Conscientiousness is separated into Methodicalness and Industriousness. The Independence factor is related to low scores on Neuroticism. Each of these six factors contains three narrower facets.

3.3.3 Bridging the Gap from Personality to Evolutionary Psychology

Most truly integrative theories of personality, include both central assumptions about human nature and account for the essential ways in which individuals differ. "Big-picture" theorists like Freud (sexual and aggressive urges), Adler (superiority striving), and Maslow (self-

actualization) all have expansive ideas concerning human nature at the core of their work. In addition, personality theories are often constructed around the goal of describing individual differences in emotion, cognition, and behaviour, over time and across situations (Corr, 2015). Personality researchers have extracted ideas from domains ranging from genetics to narrative theory, driven largely by the desire to answer key questions about human uniqueness. What are the causal roots of individual differences? What are the major ways in which individuals differ (Corr, 2015)? What are the outcomes of individual differences for social interaction, mental illness, and life span development (Buss, 2015)?

The tradition of research in personality has been one of psychology's central concerns stretching back at least 100 years. The simple question of what is a personality trait is complicated by the observation that the situation a person is in is often a better predictor of behaviour than their personality characteristics are. The great trait debate discussed earlier began largely because the most rudimental definition of a personality trait – the tendency of an individual to behave in a certain way – discounts the role of the situation. A more sophisticated perspective on personality traits views them as interactions between a person and a situation. A reaction norm, to borrow a term from biology, describes the relationship between environmental input and phenotypic output (van Oers, de Jong, van Noordwijk, Kempenaers, & Drent, 2005).; Denissen & Penke, 2008; Dingemanse, Kazem, Réale, & Wright, 2010). It is possible to identify a score for each major personality trait and to predict a behavioural response within a natural class of situations. To be clear, a person high on trait X has a probability of reacting in a certain way to situations of class Y. For example, the fit between actual personality and the personality demands of a given job can predict income. Individuals can earn more salary per year if they

hold a job that fits their personality traits (Denissen, Bleidorn, Hennecke, Luhmann, Orth, Specht, & Zimmerman, 2017).

Personality research has sometimes been consumed with debating the relative importance of situational and personal factors. The sensible answer is that personality becomes most relevant when the situation is stable, or behaviour is aggregated across many situations. Meanwhile, evolutionary psychologists, have tended to focus on species-typical adaptations, ignoring individual differences or confining them to subsidiary position. At the same time, a growing number of researchers are beginning to recognize the value in incorporating individual differences into a framework of evolutionary psychology (Gangestad & Simpson, 1990; Nettle & Penke, 2010). Personal differences can arise from selecting or simply occupying alternative niches that recurrently activate a specific adaptation. For example, the presence or absence of a father, and other early environmental experiences, can result in individual variation in the development of different adaptive strategies (Buss, 2015).

The case for evolutionary psychology as a useful personality framework is buoyed by the fact that individual differences are consistently related to activities closely aligned with reproductive success, such as survival and sexuality. For example, extramarital affairs are linked with impulsivity (Buss & Shackelford, 1997) and narcissism (Schmitt et al., 2017). Eysenck (1976) noted that individual differences in extraversion are associated with sexual access to romantic partners. Regarding the connection between personality and evolutionary psychology, Buss notes, "If the individual differences studied by personality psychologists are reliably linked with reproductively relevant phenomena such as status, sexuality, and survival, perhaps they play a more important role in human evolutionary psychology than previously assumed" (2015, p.414). Nettle and Penke (2010) conclude, in a paper comparing psychology and behavioural

ecology, that the two fields may be able to pursue a unified set of questions as they converge towards a notion of personality trait as behavioural reaction norm.

3.4 Geographic Distribution of Narcissism

Narcissism, a psychological descriptor involving abnormal levels of self-admiration, lower capacity for empathy, and an aversion to criticism, comes in two varieties: *personality disorder* (Narcissistic Personality Disorder, NPD – as measured by the Diagnostic and Statistical Manual of Mental Disorders, DSM) and *sub-clinical narcissism* (these individuals exhibit narcissistic behaviours but do not meet diagnostic criteria for a DSM diagnosis). One of the most widely used tests, the Narcissistic Personality Inventory, or NPI, evaluates sub-clinical narcissism along seven facets such as Vanity, Authority, and Exhibitionism (Raskin & Hall, 1979). Previous studies have found relationships between NPI scores and behavioural indicators of short term mating activity; specifically, marital infidelity, unrestricted sociosexuality, and mate poaching. (Schmitt et al., 2017)

3.4.1 WEIRD Research

A critique of much of the psychological research that comes out of the United States, Canada, and Western Europe is that participants tend to be a rather homogeneous group. Henrich, Heine, and Norenzayan (2010) coined the acronym WEIRD in to describe Western, Educated, Industrialized, Rich, and Democratic cultures. WEIRD people represent less than 13% of the world's population, yet more than 96% of research findings in psychology journals are based in studies from WEIRD-only cultures. Hence the need to study narcissism and many other psychological traits in countries worldwide.

The ties between narcissism, infidelity, uncommitted sex, and mate poaching are not limited to WEIRD cultures. Schmitt et al. (2017) examined NPI scores of 30,000 people in over

50 nations including Africa, Southeast Asia, Southern Europe, and the Middle East. They found worldwide patterns similar to the western samples in that high NPI scores were associated with active pursuit of short-term mating and sexual aggression. Narcissists also showed elevated levels of extraversion and openness to experience, two sex-related personality traits.

3.4.2 Different Features of Narcissism

Not all aspects of narcissism are bad. The narcissistic personality is likely to be self-confident and socially assertive (desirable qualities in many situations). Across cultures, they tend to score high on measures of subjective well-being, indicating that they are enjoying a high quality of life both emotionally and cognitively. On the other hand, narcissists also tend to be exploitative, manipulative, ultra-competitive, self-absorbed, and owning a sense of entitlement to the point where it erodes friendships and romantic relationships. These social maladaptive elements were universally associated with short-term sexual activity.

Narcissism, as measured by the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979; Raskin & Terry, 1988), was positively correlated with self-esteem across all 11 world regions that were included in the large study. Major dimensions of personality connected with narcissism also show patterns on a global scale similar to the patterns found in western samples. The factors of Extraversion, Conscientiousness, and Openness – dimensions on the Big Five Inventory (BFI; Benet-Martinez & John, 1998) - were positively associated with NPI scores, while Agreeableness and Neuroticism were negatively correlated.

3.5 Summary

The research studies in forthcoming chapters rely greatly upon rationale drawn from evolutionary and personality psychology approaches. Accordingly, I reviewed several key ideas in those fields in order to provide sufficient context and properly set up the next material.

A key assumption of evolutionary psychology is that the mechanisms comprising human mental machinery were designed by natural selection as solutions to specific problems posed by the environment. Research on landscape preferences reveals considerable cross-cultural evidence that people have a general bias toward savanna-like environments.

The other avenue of review in this chapter focused on the range of instruments that personality researchers rely on to measure traits and individual differences. One of the most widely used approaches, based on five major factors of personality, was the product of two self-directing research programs (Big Five and FFM) using entirely different kinds of data. The Big-Five was developed through factor analytic research on individual trait words found in the dictionary (i.e., a lexical approach). The important assumption is that relevant personality differences between individuals are encapsulated in the language. The ensuing FFM perspective used knowledge of the factors as a starting point to generate items for questionnaires. That is, awareness of the lexical structure of the five factors allowed for the assembly of inventories that could validly measure the five domains of personality.

This content has been removed for copyright protection reasons

PART III

Geographic Distributions of Jealousy, Mate Poaching, and Sex Differences in Sexual Variety

CHAPTER 7: EMOTION, STRATEGY, AND DESIGN IN ROMANTIC RELATIONSHIPS

7.1 Introduction

I will discuss in Part III key issues in the domains of mating psychology and romantic relationship behaviour. The upcoming four chapters will examine jealousy, mate poaching, desire for sexual variety, and standards of evidence for evolutionary adaptations, in addition to the presentation of three peer reviewed publications.

7.2 Jealousy

Evolutionary accounts of jealousy seek to identify specific function and adaptive design. Prior to the rise of these explanations, research on this topic was largely confined to studies that tapped into jealousy only at a very broad level. Questions such as "how jealous do you get?" and "how jealous of a person do you think you are?" represent the level of generality that this emotion has been probed (White, 1981). Other researchers have looked at double standards in jealousy (Paul, Foss, & Baenninger, 1996), the emotions communicated in jealous situations (Zammuner & Fisher, 1995; Peretti & Pudowski, 1997), and the relationship between jealousy and self-esteem (Stewart & Beatty, 1985). These studies examined variables believed to be related to jealousy, yet they have yielded little insight except to say that some individuals are "more or less" jealous than others.

Many researchers have approached the topic of jealousy from the perspective that it is a combination of emotions including distrust, anger, and fear of loss (Haslam & Bornstein, 1996; White, 1981). It has also been described as a "multiplicity of emotions" and a "blended emotion" (Zammuner & Fisher, 1995). Traditionally, jealousy has been considered a secondary emotion, unlike primary emotions such as anger and disgust. Betrayal and rejection are believed to be particularly distinctive features of jealousy and receive intense ratings from both women and men (Haslam & Bornstein, 1996). One study asked subjects to rank emotional terms based on how well they related to feelings of jealousy. Men considered loss of affection and rejection significantly more in their responses than did women. Insincerity, inadequacy, low self-esteem, and rivalry were greatly expressed by women but not by men (Peretti and Pudowski, 1997).

There is some support for the notion that jealousy has its own typical appraisal structure that sets it apart from other emotions. Jealousy has distinct features that allow it to be differentiated from envy, although these two terms are often used interchangeably by much of society (Haslam & Bornstein, 1996). Jealousy is best understood in the context of threats to romantic relationships, whereas envy is related to social comparison. At times, jealousy can be a very powerful emotion with harmful effects. Indeed, male sexual jealousy is the most common trigger for wife beating in the United States and cross culturally (Daly & Wilson, 1988). Given the importance of this emotion, and the impact that it can carry, further examination of this topic is needed.

7.2.1 Adaptive Design of Jealousy

At a macro level, the question of interest involves exploring the function and design of emotions in the context of the human organism. We have a limited number of responses available to us in our emotional arsenals and each option should be tailored to a particular social

problem. Evolutionary psychology approaches emotions as adaptations shaped by natural selection and specially designed to motivate fitness enhancing behaviour that is directed at resolving the problem.

Buss, Larsen, Westen, and Semmelroth (1992) tested the evolutionary hypothesis that the events that activate jealousy would differ for men and women because of the different adaptive problems that each sex confronted throughout human history. Because fertilization occurs internally within women, men have faced the adaptive problem of paternity certainty. Women can always be absolutely certain of maternity, but men can never be 100% confident. This uncertainty can be costly in terms of reproductive success because males must face the risk of investing in genetically unrelated offspring (cuckoldry). Time, energy, and investment that could have been directed toward other mating efforts are now lost. Women, on the other hand, do not face the problem of maternity uncertainty. However, they do risk the potential loss of time, commitment and resources from a male if he deserts his partner or diverts those investments to alternative mates. An abandonment of this sort would be reproductively costly to women, "especially in environments where offspring suffer in survival and reproductive currencies without investments from both parents" (Buss et al., 1992, p.251).

Symons (1979) and Daly, Wilson, and Weghorst (1982), hypothesized that male sexual jealousy evolved as a solution to paternity uncertainty and female emotional jealousy evolved as a solution to abandonment or desertion. Men and women evolved jealousy mechanisms that are most sensitive to the events that interfere with reproductive success. The costs related to paternity uncertainty for males should have imposed strong natural selection pressures favouring males who guard against sexual infidelity. The costs to females should have produced selection pressures to protect against emotional infidelity. Empirical tests of this hypothesis have provided

support for the existence of features in men and women that are differentially sensitive to infidelity. When men and women are asked to indicate which aspect of infidelity is more upsetting, men express more distress toward sexual infidelity and women find emotionally infidelity more upsetting (Buss et al., 1992). In addition to samples from the United States, these predictions have been supported in European samples (Buunk, Angleitner, Oubaid, & Buss, 1996) and Asian samples (Buss, Shackelford, Kirkpatrick, Choe, Hasegawa, Hasegawa, & Bennett, 1999).

Further evidence for the adaptive function of jealousy comes from research that looks at the probable behaviours in the aftermath of infidelity detection. Which individuals are likely to choose to break-up with a romantic partner, rather than forgive, when cheating has been revealed? The answer depends on the gender of the victim and the type of infidelity transgression. Shackelford, Buss, and Bennett (2002) showed that men, relative to women: (a) find it more difficult to forgive a sexual infidelity than an emotional infidelity; and (b) are more likely to terminate a current relationship following a partner's sexual infidelity than an emotional infidelity.

7.2.2 Forced-Choice Format

It is important to note that the theory does not imply that men and women will be indifferent to one type of infidelity while the other infidelity elicits rage. In fact, men and women are greatly distressed over both types of infidelity (Buss et al., 1992). This is why a forced choice format – sexual vs. emotional infidelity – is most commonly used to measure jealousy. A Likert type scale would result in ceiling effects for both types of infidelity for both sexes.

Finally, making a distinction between sexual infidelity and emotional infidelity is a tactic some have criticized. DeSteno and Salovey (1996) argue that sex differences found in jealousy are not the product of evolved mechanisms, instead they reflect the conditional probabilities that one type of infidelity implies the other.

Careful empirical work (Buss, et al., 1999) has shown that this is probably not the case, but the idea that sexual and emotional infidelities are somehow tied together is intriguing. Buss and others argue that one type of infidelity can occur without the other (e.g., one night stand without commitment, or deep personal commitment without sex), but in some sense this is like trying to tease apart nature and nurture. It would literally require a cyborg or droid to perform the mechanics of sexual activity with an absolute absence of emotional appraisal. The publication presented in the next chapter addresses this very issue.

In sum, male and female sensitivities are the result of evolved strategies that were specially designed to solve different adaptive problems. Within this framework, jealousy (1) is viewed as an emotional state that was shaped by natural selection; (2) is aroused by a threat or perceived threat to a relationship; and (3) motivates actions directed at countering or removing the threat (Daly et al., 1982). Thus, it serves an adaptive purpose in the romantic and reproductive lives of humans.

7.3 Mate Poaching

Mate poaching – the process of romantically attracting someone who is already in a relationship (Schmitt and Buss, 2001) – is filled with many unique challenges and potential complications. Because many of the direct tactics often used in romantic attraction are less effective in the context of mate poaching (e.g., derogating competitors), many would-be mate poachers are forced to use indirect means. For example, gaining favour through clandestine eye

contact, cautiously penetrating the target's social networks, and subtle indications that the existing relationship is less than perfect. In practice, poachers may seek out a brief seduction or sexual desertion by the coupled partner. Or they may try to grow a long lasting relationship from the poaching defection.

Despite these difficulties, there is evidence that mate poaching does occur. Most people report that they have experienced some form of mate poaching. Schmitt and Buss (2001) argued that mate poaching has been a regular feature of romantic attraction over human history and found that 15% of people in romantic relationships reported that their current relationship was connected with a mate poaching because they poached or were poached by their mate. The sample also included couples where both partners poached each other out of relationships (3%), a relatively rare form the authors termed the "copoached" relationship. Overall, the study suggests that mate poaching plays an active part in the world of human mating.

Prior to the published study included in this work (chapter 9), it was unclear if how widespread mate poaching was. Research on small samples of American college students shows that most (64% of men and 49% of women) have attempted to lure mates out of partnerships for short-term encounters (Buss and Schmitt, 2001). Similar rates were found in a sample of older individuals (60% men vs. 38% women). Despite the high occurrence of mate poaching found in previous research, it remained unclear whether this activity was limited to a small set of idiosyncratic American samples – the Schmitt and Buss (2001) samples were limited to the Midwest region of the United States – or whether poaching behaviour is found consistently across cultures.

Although direct evidence of short-term and long-term mate poaching is limited, theoretical rationale (e.g., sperm competition, polygyny, and adaptive problems of widowhood)

and indirect pieces of evidence (e.g., cuckoldry, infidelity, and remarriage rates) indicate that poaching has been a recurrent mating strategy through much of human history. In terms of mating strategies across all people, there is no reason to theorize that poaching is the most prevalent approach, but the adaptive edge for those who engage in such behaviour may have been great enough for it to become a pancultural component of mating.

Chapter 9 presents a prior publication that examined the psychology of mate poaching from a cross-cultural perspective. We found that mate poaching was most common in Southern Europe, South America, Western Europe, and Eastern Europe and was relatively infrequent in Africa, South/Southeast Asia, and East Asia. Men were more likely than women to report having attempted and given in to short-term poaching across all regions, but sex differences were attenuated in more gender-egalitarian regions. Across all regions, people who attempt to mate poach as well as those who succumb to the offers tend to possess similar personality traits. Mate poachers tended to describe themselves as extraverted, disagreeable, narcissistic, unfaithful, erotophilic, and, though somewhat less consistent, lower in conscientiousness.

7.4 Desire for Sexual Variety

Pluralistic evolutionary theories of human mating argue that Darwinian sexual selection favoured strategies that offered flexibility in response to a wide range of contexts (Gangestad & Simpson, 2000; Belsky, 1999). This pluralistic approach suggests that people possess both long-term and short-term mating strategies (Buss & Schmitt, 1993; Lancaster, 1989). This view proposes that men and women carry different design features of sexual desire that generate multiple forms of human mating. When men pursue short-term mates, for example, the underlying motivation appears to be the desire for sexual variety. When women pursue short-

term partners, on the other hand, the driving force is not passion for large numbers, but seems based on in securing males with genetic quality (Gangestad & Simpson, 2000).

Because short-term strategies for men and women appear to solve different adaptive problems, pluralistic approaches predict that men will report, on average, greater preference for sexual variety than women will. Empirical support for this is provided in the prior publication included here in chapter 10. In this article, we demonstrate the cross cultural universality in sex differences in the desire for sexual variety with findings from a cross-cultural survey of 16,288 people across 10 major world regions (including North America, South America, Western Europe, Eastern Europe, Southern Europe, Middle East, Africa, Oceania, South/Southeast Asia, and East Asia)

7.4.1 Parental Investment Theory

The seminal logic of parental investment theory (Trivers, 1972) serves as the foundation for nearly all evolutionary theories of human mating. In many species (e.g., most mammals), females provide more parental investment – directing time and energy at offspring care – than do males. In some species, males provide the bulk of parental care (e.g., seahorses, pipefish: Wilson, Vincent, Ahnesjö, & Meyer, 2001; Mormon crickets: Gwynne, 1984). The theory of parental investment argues that the relative proportion of parental investment varies across species because the onus of parental investment is tied to male-female differences in mating strategies. Specifically, within a species, the sex that invests more shows greater discrimination in selecting mates. The sex that invests less is willing to mate with more partners and with less courtship than the heavier investing sex (Andersson, 1994; Bateson, 1983; Clutton-Brock & Parker, 1992; Maynard Smith, 1977).

The psychological mechanisms that guide female decision making about sexual partners were shaped in response to the costs associated with poor mate choices. Among humans, females across cultures are considerably more active in parenting than males, despite the fact that, compared to other mammals, human males invest heavily in offspring (Low, 1989).

Nowhere are sex differences in parental investment more visible than in the minimum commitment required to produce viable progeny (Symons, 1979). In a purely biological sense, women are obligated to pay the physical, emotional, and time costs associated with a lengthy gestation period in order to produce. The only biological imperative for men, in contrast, is the contribution of sperm. In addition, women but not men have historically incurred the cost of lactation in the months that follow birth. During this time, it is more difficult for women to pursue mates, reproduce, and invest in additional offspring that it is for men.

When viewed through the lens of parental investment theory (Trivers, 1972), the differences in minimal parental investment should result in men (i.e., the lesser investing sex) displaying lower levels of choosiness in mate selection and greater intrasexual competitiveness (i.e., male-male competition). Accordingly, research has shown that men experience earlier death than women across cultures (Alexander & Noonan, 1979), delayed maturation (Geary, 1998), riskier life history strategies (Daly & Wilson, 1988), and greater aggression and physical size (Archer & Lloyd, 2002). In the context of short term mating, females are almost always more discriminating with respect to partner preferences (Simpson & Gangestad, 1992; Buss & Schmitt, 1993).

7.4.2 Narcissism across Cultures

The study in chapter 10 also suggests relationships between Narcissism and self-reported intimate partner violence, sexual aggression, HIV risk-taking, mate poaching, and marital

infidelity in many, but not all, of the cultures evaluated. The Socioexuality Orientation Inventory (SOI; Simpson & Gangestad, 1991) is an index of the level of commitment one requires before entering into the sexual aspects of a romantic relationship. NPI scores were positively associated with scores on the SOI measure, especially the socially maladaptive narcissism factor of Exhibitionism/Entitlement (Corry et al., 2008). Thus, narcissism appears to be strongly associated with multiple behavioural expressions of short term mating in most of the world regions included in the analyses.

It turns out the ties between narcissism, infidelity, uncommitted sex, and mate poaching are not limited to western cultures. Schmitt and the ISDP-2 team (2017) examined the link between narcissism and multiple indicators of short term sexual strategies across cultures. The International Sexuality Description Project-2 team measured NPI scores of 30,000 people in over 50 nations including Africa, Southeast Asia, Southern Europe, and the Middle East. They found worldwide patterns similar to the western samples in that high NPI scores were associated with active pursuit of short-term mating and sexual aggression. Narcissists also showed elevated levels of extraversion and openness to experience, two sex-related personality traits.

Infidelity

Levels of narcissism are significantly higher among unfaithful married participants. This study classified "faithful" individuals as those married for more than one year who reported zero extramarital sexual partners. The percentages of individuals who self-report being "unfaithful" vary greatly between world regions: North America 26%, Central/South American 8%, Africa 27%, and 5% in East Asia, just to name a few.

SOI

Individuals with an *unrestricted* sociosexuality share a willingness to have sex with little or no commitment. The Sociosexuality Orientation Inventory (SOI; Simpson & Gangestad, 1991) is an index designed to capture behavioural expressions of short-term mating (e.g., one-night stands, a history of multiple sexual partners, and the desire to have sex on one and only occasion with others).

Mate Poaching

Narcissists are more likely than non-narcissists to have personal experiences with mate poach, or romantically attracting someone else's partner. Mate poachers answer *yes* to questions like, "Have you ever tried to attract someone who was *already in a romantic relationship with someone else* for a short-term sexual relationship with you?"

7.5 Special Design and Psychological Adaptations

The scepticism that sometimes accompanies evolutionary approaches to human behavioural science stems largely from the perception that evolutionary theories are less verifiable than traditional psychological theories (Conway & Schaller, 2002). The concepts of adaptation and natural selection are central to the science of evolutionary psychology, but most psychologists receive no formal training in evolutionary biology (Buss, Haselton, Shackelford, Bleske, & Wakefield, 1998). Williams (1966) introduced the idea that adaptations and the selection pressures that gave rise to them should be identified on the basis of adaptive design for a particular function (i.e., "special design"). It is therefore necessary that a set of criteria for standards of evidence be used to determine special design. In this section, I will briefly address some issues of special design and the standards of evidence used to evaluate psychological adaptations.

7.5.1 A Framework for Adaptationism

Evolutionary psychology can be defined as the process of understanding human behaviour from an adaptationist perspective. That is, human behaviour arises from an evolved design that is specially structured to solve problems associated with survival and reproduction. All organisms, not just humans, came about due to evolutionary processes. Adaptationism is an approach used in biology for understanding evolutionary outcomes. Evolution can be most simply described as changes in gene frequencies in a population. Gene frequencies in a population can change through four known evolutionary forces: mutation, migration, chance, and selection. Selection is the process through which some genetic variants replicate more than other genetic variants. Usually, the replication of genetic variants is associated with how they affect the phenotype of the individual in which they reside. Stated another way, all animals have heritable variations that are selectively favoured or disfavoured in accordance with their reproductive success. Individuals who out-reproduce other individuals in a population will have more of their gene combinations passed on to offspring. An adaptation is an outcome of natural selection – any trait that has been shaped by natural selection because of the advantage it confers on the organism. For example, the human heart, like many organs in the human body, shows functional design for solving particular problems posed by the environment (in this case, pumping blood).

The process of identifying an adaptation has been described as an exercise in "reverse-engineering." According to Pinker (1997), psychology is engineering in reverse. In traditional engineering, or "forward-engineering," one faces a problem and builds a machine to solve that problem. In reverse-engineering, one is presented with a machine and must figure out what it was designed to do. Similarly, the human body is a complex machine filled with mysterious parts. Each bodily system, including the mind, can be analysed from this perspective in an

effort to figure out what it was designed to do. In essence, this is what evolutionary psychologists do. The challenge posed by this approach is in determining whether the psychological output in humans we see today is, in fact, specially designed for doing what we think it is. In order to more convincingly demonstrate that we have discovered or uncovered an adaptation we need a set of rules to guide this process. Taking into account the available arguments on special design, I can offer two recommendations.

First, the mind is best described as a system of computational organs designed by natural selection to solve the kinds of problems our ancestors faced throughout human history. Some evolutionary psychologists (see Buss 1995 for example) emphasize the discrepancies between modern and ancestral environments. This mismatch between the novel environments of today and the conditions of the environment of evolutionary adaptedness (EEA) make the quest for finding direct connections between psychological adaptations and problems posed by the environment more difficult. This does not mean that a program rooted in adaptationism is impossible. At worst, it just means that the task of identifying adaptations is complicated instead of easy. The business of finding the function or purpose of a trait would be convenient if we could just read it off the adaptation or visually inspect it and have all the answers.

Second, a brief outline of the goals of an adaptationism program should be: (1) identify the evolutionary forces responsible for a trait; (2) determine if the trait was shaped by selection (as opposed to other evolutionary forces such as mutation, migration, or chance); (3) identify and describe the function of the trait. Evidence of special design is compelling when one can demonstrate that the trait shows precision for a particular function, efficiency, and economy. Functional design is critical because it rules out other explanations such as genetic drift, incidental effect, phylogenetic legacy, and mutation (Thornhill, 1998).

In his classic book on natural selection, Williams (1966) laid out a framework for a set of criteria for recognizing adaptations and at the same time warned, "adaptation is a special and onerous concept that should be used only where it is really necessary" (p. 4). Adaptation, he argues, is a uniquely biological principle that should not be invoked unnecessarily, but when it must be recognized it should be used only as far as the evidence can support it. Confusion and misuse of the term "adaptation" is fairly widespread, especially in psychology. Thornhill (1998) made note of this issue and criticized those who inappropriately equate Darwinian adaptation with "current adaptiveness." Darwinian adaptation can be maladaptive, neutral, or currently adaptive. The key point is that an adaptation is an evolved feature of an organism that was formed through past selection pressures. Williams (1966) spoke somewhat generally about the criteria necessary to demonstrate that a trait shows special design, but he did emphasize the notion of "purpose." That is, mechanisms on organisms that serve a purpose were fashioned by selection for that purpose.

The social sciences could benefit greatly from a set of specific criteria that researchers could agree upon and maintain allegiance to. Building explicit criteria from William's general ideas, Thornhill (1990) argued that special design must feature three properties: precision, efficiency, and economy. Precision means that adaptations must serve some purpose in particular. Efficiency means that adaptations effectively perform the function for which they were designed. The human eye, for example, is efficient at seeing under the naturally occurring light conditions imposed by the environment. The human elbow, by contrast, is very inefficient for vision. Economy implies that adaptations do not include costs that are unnecessary or wasteful.

7.5.2 Spandrels and Exaptations

The importance of adaptation and natural selection as mechanisms that shape human behaviour has been questioned by some. Gould (1991), in particular, suggested that exaptations might be more important than adaptations in explaining how organisms achieved their current structures. Gould's arguments fit into the current discussion by following the logic that traits emerge in organisms only through an interaction between genes and environment. Genes cannot produce traits without an environment in which to manifest. Likewise, an environment with no genes will not produce traits. Selection pressures can generate traits in three different ways: adaptation, spandrel, and exaptation.

Although there is some confusion about the exact definitions of spandrel and exaptation, an issue that was not cleared up by Buss, et al. (1998), the following statements can be made. A spandrel is an architectural term that describes the spaces left over between the structural features of a building. Spandrels were carried through the evolutionary process because they were inextricably tied to a trait that was favoured by selection. By themselves, spandrels are not advantageous but can be maladaptive. Examples of human spandrels are the chin, the white colour of bones, and the red colour of blood. An exaptation can be an existing spandrel or adaptation that takes on new beneficial effects without being modified. Gould (1991) cites the large size of human brains as an example of an adaptation. Large brain size supposedly evolved as an adaptation for certain ancestral problems. But due to its complexity, the human brain gave rise to spandrels by the thousands such as language, religion, writing, and the fine arts. For a different perspective that emphasizes the sexual selection pressures that gave rise to these human capacities, see Miller (2000).

7.5.3 Origins and Past Environments

Complications due to spandrels and exaptations aside, another challenge that faces adaptationism is the question of origins. Designs can sometimes lack specificity or they may not appear completely precise, efficient or economical. Darwin's concept of natural selection as the mechanism for evolutionary change replaces God as the divine shaper of all perfection. The difference is that natural selection, unlike divine creation, cannot start from scratch. The idea that human traits can be reverse-engineered is great, but the metaphor about engineers building machines to fit a purpose may leave some thinking that human traits are assembled by selection separately and then attached to the body. In reality, selection works from pre-existing hardware. This means that the genetic architecture of an organism's old design poses a constraint on the modifications that can be made on the new design. Some have compared an organism to a ship afloat at sea. To make modifications to the ship one can only use the materials that are already being carried aboard.

In addition, there is the criticism that the environment of evolutionary adaptedness is unknowable. Thus, we do not have access to the environmental problems posed to our human ancestors. Critics claim that if you cannot make a connection between past environments and current design features there is no evidence to say that a trait is an adaptation for solving a specific problem. Thornhill (1998) takes a different view by arguing that the EEA is not actually a position on the globe or in time. Rather, it is a statistical amalgam of environmental features that generated the selection that made adaptations. Moreover, the EEA is a part of the functional design of adaptation. An adaptation serves as an indirect historical record of problems posed by past environments.

Despite these criticisms, the adaptationist model is in good standing. The message being sent by Gould and others is that adaptationism does not always highlight the correct natural

history of traits. In other words, it can be wrong and misleading. However, this criticism is appropriate only when directed at those who do not employ standards of evidence or are very "loose" with them. Indeed, there are those in evolutionary psychology who seem to throw around the terms "adaptation" and "evolved mechanism" quite freely. Recall, however, William's (1966) message that adaptation is an "onerous concept" that should be used only when "really necessary." If the standards of evidence are applied appropriately, the criteria are stringent. Thus, the approach to adaptationism should be conservative, allowing for "true adaptations" to go unclaimed more often than "false adaptations" are accepted. This idea is analogous to setting the alpha level very low in statistical hypothesis testing.

7.5.4 Applying Special Design to Emotions

The domain of human emotions is one of the most promising areas of human functioning in which to apply these special design criteria. This is true because cross-culturally emotions are intricately woven into the fabric of our everyday lives. They are good candidates for adaptations because they show special design in terms of precision, efficiency, and economy. Furthermore, they allow one to meet head-on the challenge of applying special design criteria to psychological traits instead of morphological ones.

Through the lens of evolutionary psychology, emotions can be described as adaptations that were shaped by natural selection in response to particular adaptive problems. Take, for example, the emotion of guilt. Guilt is described by some as an evolved mechanism designed to motivate the cheater to compensate for his or her misdeeds (Trivers, 1971). Complexity and costliness are two criteria mentioned by Williams (1966), yet these alone are not enough to constitute adaptation. Complexity and costliness may imply many things about a trait, including the suspicion that natural selection had a hand in forming it, but that evidence alone is not

enough for the adaptation stamp of approval. Guilt is considered by many to be a non-primary emotion that taps into, or is at least related to, other feelings (e.g., embarrassment, humiliation, and empathy) rendering it very complex. The energetic demands imposed by guilt can be costly, especially if the cheater has absolutely minimized his partner's inclusive fitness. In general, guilt level should increase as a function of the inclusive fitness costs incurred by the other person as a result of the cheating or misdeed.

To establish the adaptive value of guilt one must prove precision, efficiency, and economy. Guilt seems to be precise in that it has a purpose (it motivates one to make fitness adjustments between oneself and a partner or group). It is efficient. Aside from those individuals who feel perpetually guilty, this emotion operates in a limited context that is triggered by specific and predictable environmental inputs. Finally, guilt is economical in the sense that it is not unnecessarily costly. Careful modelling could show that guilt is optimally engineered to balance out the costs of never feeling guilt vs. feeling too much guilt. Ultimately, these costs are measured in inclusive fitness units, though they may be more recognizable and measurable in other currencies such as energy or even nutritional intake. If guilt shows precision, efficiency, and economy then it is almost implied that guilt shows specificity of design. Specificity means that guilt does not show precision, efficiency, and economy in some other functional capacity.

According to Pinker (1997), the goal of evolutionary psychology is to acquire a special kind of insight: "the task of evolutionary psychology is not to weigh in on human nature, a task better left to others. It is to add the satisfying kind of insight that only science can provide; to connect what we know about human nature with the rest of our knowledge of how the world works, and to explain the largest number of facts with the smallest number of assumptions" (p.

517). The application of the standards of evidence presented here, combined with rigorous testing, should keep evolutionary psychology on track toward meeting this goal.

7.6 Summary

The next three chapters will provide empirical support for the ideas presented in this section: (1) Jealousy serves a particular adaptive function in the domain of human mating and sex differences in this emotion are real. Across cultures, men and women are differentially sensitive to the cues that trigger jealousy. (2) Human mate-poaching experiences are universally linked to sex, culture, and the robust influence of personal dispositions. Active mate poachers tend to describe themselves as extraverted, disagreeable, narcissistic, unfaithful, erotophilic, and, though somewhat less consistent, lower in conscientiousness. These characteristics also define the individuals most likely to give in to mate poachers. (3) There is considerable evidence that when men pursue short-term mates they desire large numbers of sex partners and are generally quick to consent to sex, whereas when women pursue short-term mates they appear motivated more by partner quality than by partner quantity. This research also suggests that pluralistic theories of human mating are more likely to be correct than competing alternatives in which all humans are equipped with a singular (either long-term or short-term) mating strategy. (4) The adaptationist perspective in psychology rests on the notion of special design. The standards of evidence necessary to determine psychological adaptations have historically ranged from very general to specific. An explicit set of agreed upon criteria for identifying special design would benefit those pursuing questions of traits and adaptations related to human activity.

This content has been removed for copyright protection reasons

PART IV

General Discussion

CHAPTER 11: BEYOND GEOGRAPHIC DISTRIBUTIONS

11.1 Introduction

In a broad sense, these chapters address the issue of how geography interacts with psychology. Researchers using a geographical approach are keenly interested in how physical spaces, both designed and natural, shape psychological well-being and identity. One of the greatest challenges of this project is to bridge together somewhat disparate areas of research. In this chapter, I describe a general model to guide future research, suggest several research areas to pursue, and discuss limitations and caveats of this kind of work.

11.2 Bringing Together Disparate Research Areas

This program of research is important for at least two reasons. (1) Everything meaningful we do happens in a physical space. Therefore, anything worthy of systematic psychological examination occurs in some type of geographic spot. For too long researchers studying personality, emotions, and choices have downplayed, or ignored entirely, the role of physical place. (2) Psychology has been sluggish, relative to other fields, to utilize maps in ways that could foster insight by exploring decisions and preferences from a bird's eye perspective.

11.2.1 Romantic Behaviours, Geography, and Causal Mechanisms

In the previous four chapters I spent time discussing regional variation in sex differences with mate poaching, jealousy, and other behaviours. These were presented in the context of Darwinian theory with little attention given to the important mechanisms underlying the

geographic variation. Three causal mechanisms – social influence, selective migration, and ecological variation – may help to explain the uneven geographical distribution of mating behaviours, values, and attitudes discussed in earlier sections.

Social Influence

People who live in different countries, different regions, or even different neighbourhoods often follow different customs and norms which, in turn, influence attitudes and behaviours. In Montana, for example, local norms encourage owning a gun and being emotionally reserved, two factors which appear to be partly responsible for the high suicide rate among Montanans (Renfrow & Jokela, 2016).

Social factors may similarly exert themselves in the context of romantic relationships. For instance, the sex differences in jealousy documented in the previous chapters have been replicated numerous times and in different cultures, yet the geographic variation is still not fully understood. Nearly half of the males in every sample select *emotional* infidelity as more distressing than sexual infidelity, and about 20% of the females endorse *sexual* infidelity – the opposite pattern predicted by evolutionary psychology. Why is it that not all men get violent at the thought of a partner's sexual infidelity? Why do some women get extremely hostile and vengeful after a partner's sexual infidelity? Why is the sex difference in sexual vs. emotional jealousy attenuated or nonexistent in some cultures? The size of sex differences in jealousy (sexual vs. emotional) across cultures is at least partly influenced by egalitarian attitudes and beliefs. For example, in Scandinavian countries where gender equality attitudes seem to be embraced by large percentage of the population, the sex differences in jealousy are minimal.

Selective Migration

People who choose to migrate to a new region or country are often psychologically different from their counterparts who choose to stay behind. There is mounting evidence that individual personality differences are associated with preferences and decisions about relocating (Jokela, 2014; Jokela 2009). High openness and low agreeableness personality scores were associated with between state and within state migration in the United States, while high extraversion increased within state migration, but not between states.

There are at least several current environments that might prove useful as laboratories for studying the impact of selective migration. For example, military bases are filled with individuals who intentionally signed up for a transient lifestyle. What are the personality differences between those military and non-military personnel? This may seem like an interesting question, but because the psychological differences that exist between those two groups may not be related to migration, it might not be the most appropriate question. A better one might involve looking at the various ways that psychological phenomena change over time for these folks as a result of many migrations over a short period of time.

Another avenue of exploration would focus on major cities that have seen recent significant changes in population. Over the past several decades, Detroit, Michigan has experienced a mass exodus of individuals fuelled mainly by an enormous economic collapse. Those who remain are struggling to hang on in a city with crumbling infrastructure, dwindling tax base, and a sharp reduction in basic community services like police, fire, and salt trucks for winter driving. Is there something that is keeping them there other than general economic constraints? Perhaps there are personality traits associated with sticking it out in tough times instead of jumping ship? If so, the region may show higher than average levels of certain traits compared to comparable cities that did not experience a severe loss of population.

Ecological Factors

Features like climate, the prevalence of disease, and urban crowding can affect the psychological processes of individuals. Regional differences in disease prevalence are correlated with a number of important cross-cultural differences. (Murray and Schaller, 2010; Murray and Schaller, 2014). According to this view, ecological variation in the prevalence of infectious diseases gives rise to geographic differences in psychological traits. Thus, pathogens are mechanisms that contribute to regional differences in human behaviour. Over evolutionary time, the risk of exposure to parasitic diseases has shaped the way humans interact with the physical and social environments. Murray and Shaller (2014) discuss evidence that disease-causing pathogens contribute to geographic variation in sexual behaviour, sociosexual attitudes, value systems, conformity, personality, family relations, ethnocentrism, moral judgments, and political ideology.

Several studies have attempted to rate the prevalence of disease-causing pathogens across countries and regions. Gangestad and Buss (1993) used epidemiological atlases to create a single measure indicating the historical prevalence of pathogens in 29 countries. Employing a similar procedure, Murray and Shaller (2017) calculated an index of the historical prevalence of infectious diseases within 230 geopolitical regions around the world. Future research could look for ways to unite jealousy, mate poaching, and other sexual relationship data with the various epidemiological indices.

11.3 Future Research Directions

I have tried to demonstrate that personality traits are found in clusters across cultures, nations, and regions. Beyond these large scale investigations, research possibilities exist in other areas of human activity, most of them smaller in geographic area. In the pursuit of intellectual

fecundity, psychologists should point their antennae at three promising investigative spaces: (1) the rise of conscious cities; (2) mapping subjective experience; and (3) location intelligence in business and government. These ideas are best understood in the context of Person x Environment interactions as described in chapter one. They are tied to our sense of physical space – but not necessarily "geographic" space.

11.3.1 The Rise of Conscious Cities

Many of us are familiar with fictional stories in which inanimate bodies are infused with life. Pinocchio, the Velveteen Rabbit, Dr. Frankenstein's creation, the talking trees in The Lord of the Rings, and Seth MacFarlane's Ted are just a few examples of things becoming conscious - the mental state of being aware of ourselves. Could we achieve a similar goal with our cities? Can we inject life into urban landscapes made out of concrete, steel, and glass? For many years, businesses and governments have been working to make organizations and communities as productive as possible. We have smart technology that allows us to move massive quantities of data globally in seconds. Our cars talk to us, we map out routes on our phones, tweet ideas, blog our adventures, and post photos. The cumulative effect of this is an endless tide of personal expression.

What happens when a city becomes aware of this information and begins to use it to make changes that impact our social lives? In many ways, modern cities are becoming like living, breathing organisms capable of self-awareness and self-modification. To achieve this level of consciousness, a community combines streams of data with knowledge about how we interact with built environments. That knowledge base is expanding because new research in personality, behavioural, and brain science is constantly being added. Cities, like people, are becoming smart and responsive, and there is no reason to expect this trend will slow.

A recent study revealed, for example, that some city streets, due to excessive noise, lights, and crowding, and smells, cause an increase in "cognitive load" (Berman, Jonides, & Kaplan, 2008). The human brain and nervous system can be overwhelmed when incoming stimuli levels spike too high. The negative psychological results of this include weakened self-control and reduced capacity for attention. A conscious city could realize the times when inhabitants in a specific area are being bombarded with stimuli and engage in adaptive, self-correcting behaviour to reduce the unnecessary distractions. The desired outcomes are increased workplace efficiency in work and improvements in overall psychological well-being.

Such adjustments can be instantaneous or unfold slowly over time. Based on patterns of behaviour, a "smart" or "responsive" city could make adjustments that would motivate playful learning for children after school or offer more social interaction opportunities in places where depression rates are high. We are quickly moving into a world filled with responsive cities that place the citizen at the centre of the planning, design, and management processes of the city. Conscious cities are superior to smart cities because the focus is on the person rather than just the technology or algorithm. As a result, psychology represents the backbone of the concept of responsive cities (Bennett, Guiltier, & Kazmierczyk, 2018).

Because landscape features change very little over time, Google's digital mapping tools are superb for charting outdoor areas. Complications arise for indoor spaces, however, where millions of products inside thousands of stores are constantly in flux. Although floor plans remain unchanged over time, items on the shelves do not. Without taking the time to update location inventory records, a store clerk might move seasonal items to the front entrance area, shift products down the aisle, or replenish sold-out goods. Smart phone apps like Aisle411 and

Walmart's Search My Store offer retail businesses a solution to the problem of keeping product location information current for customers.

As early as 2025, the first fully mobile augmented reality glasses could help shoppers navigate superstores to find preferred items without even touching a device. Customers will simply look at the shelf through glasses and a layer of additional information will come into view (Scoble and Israel, 2017). The technology will most likely include recommendations for products in close proximity in the store as well as "customers who purchased this were also interested in…" These technological innovations will likely lead to many questions about preferences, decision-making, usability, ethics, and persuasion.

11.3.2 Mapping Subjective Experience

From the clay etchings of antediluvian cartography to the digital GPS devices of today, maps have been used to understand how we interact with physical spaces. One of the earliest entries on the timeline of mapmaking is the *Babylonian Map of the World*, a sparsely detailed Mesopotamian tablet likely created somewhere between 700 and 500 B.C.E. One of the first attempts at visualizing human navigation through physical space, it depicts the world as a disc and prominently features the Euphrates River and the city of Babylon (Raaflaub & Talbert, 2009). The GPS technology found in modern smart phones satisfies the same fundamental needs as the Babylonian Map, but the two devices – nearly identical in size, incidentally – are separated by a period of almost three thousand years.

Cartography has always afforded the depiction of objective terrestrial data like rivers, mountains, and roads. Compared to muddier information like perceptions and attitudes, maps of unfeeling physical formations are abundant and easy to access. A truly social map would contain sounds, smells, and emotions, reminiscent of the Parisian "psychogeographers" of the 1960s.

Ushered by Guy Debord and the Situationsists, this anti-authoritarian avant-garde Marxist movement was driven by the desire to explain how the environment of geography impacts individual behaviour and emotion. (Self & Steadman, 2007). Today's disciples of Guy Debord carry on the psychogeographic traditions, according to Self and Steadman (2007), "armed with notebooks and cameras, stamping our boots on suburban station platforms, politely requesting the operators of tea kiosks in mossy parks to fill our thermoses, querying the destinations of rural buses (p. 12). Some prefer newer terms like "deep topography" and "city phrenology" but they all share the same raison d'être: to contemplate the manner in which the modern world warps the relationship between psyche and place.

By 2020, there will be close to 20.4 billion connected "things" in use, up from 8.4 billion in 2017 (Scoble and Israel, 2017; Xu, Lyn, Akella, & Hopkins, 2017). From smartphones to body sensors to autonomous vacuum cleaners, the exponential growth of connected devices is creating an overwhelming amount of data about what we do, how we do it, and where it happens. In the future, maps may contain information relevant to personal character, affective states, and social bonds. As a result, maps will start to look more like us, but the field of subjective cartography is still at its inception.

Future research using big spatial data, in combination with careful analysis, has the capacity to deepen our understanding of how people use community space. Although there is not yet a clear platform for mapping out subjective experience, several approaches are breaking new ground. By clustering data (e.g., mobile GPS data) we can begin to understand activity in different regions. This big spatial data approach has the potential to identify shared experiences in public spaces. For example, behavioural cartographers have identified clusters of people based on what percentage of their time is shared with others in that same space. The research

team visualized over a million anonymized data points from mobile GPS data, looking specifically at how people spend time and interact with other people in Manhattan's Central Park and Brooklyn's Prospect Park (Xu, Lyn, Akella, & Hopkins, 2017). Data like these are crucial for urban designers trying to understand how public spaces are used and make investment decisions about prioritizing improvements.

11.3.3 Location Intelligence in Business and Government

Businesses worldwide are starting to realize the potential of location intelligence – an emerging methodology for turning location data into business outcomes (de la Torre & Giraldo, 2017). Behaviour tied to a specific location can be mapped out in near real-time all on a smart phone. Neighbourhood apps such as Nextdoor rely on a combination of location intelligence and Facebook to connect users in a geographically limited area. The runaway success of Uber, a peer-to-peer ridesharing network, can be partly attributed to the user-friendly digital maps that give the current location of the driver, a face picture, and a predicted arrival time. There is something comforting about knowing who your ride is and when they will arrive.

Location data are also collect by Twitter, Pokémon Go, and Roomba. Twitter has a personalization option based on the places the user has been. The option reads, "Twitter always uses some information, like where you signed up and your current location, to help show you more relevant content. This setting lets Twitter personalize based on other places you've been." By 2017, Pokémon Go, a location-based augmented reality game, had been downloaded over 650 million times. While the game is immensely popular among teens, it enjoys favourable reviews from adults too because it promotes physical activity and increases foot traffic to local businesses. At the same time, it has been attacked for causing auto accidents and being at the centre public nuisance complaints. (Sarkar, 2017). The IRobot Corporation is facing its own

controversy with Roomba, the self-cleaning vacuum that can map rooms more efficiently to gobble up dust and dirt. There is an entire ecosystem of household devices like these that are connected through a network known as the Internet of Things (IoT). Roomba acknowledges that the prospect of selling detailed interior maps of people' living spaces raises privacy concerns, but is convinced that this information will help the smart home work better in the future (Shaban, 2017).

The Pizza Hut Corporation announced in 2017 that they would bring the total number of deliver drivers up to 50,000 thanks to an addition of 14,000 positions by the end of the year. The company attributed the hiring to a new delivery system and enhanced online mapping (McCoy, 2017). A recently developed "Delivery Network Algorithm" will be used to predict delivery times after making adjustments for construction, traffic, weather, and other factors that would interfere with safe and timely deliveries. Pizza Hut has also enhanced its online mapping and location services to locate customers more accurately and determine the most convenient restaurant locations for speedy delivery and carry-out options.

Local governments and municipalities are getting in on the act as well. Many communities now use Geographic Information Systems (GIS) to put everything they possibly can on to a map. The municipality of Mt. Lebanon, Pennsylvania, for instance, has maintained a GIS database since 1996. The creation of it involved digitizing more than 1,700 paper maps of street trees, fire hydrants, traffic signals, sewer lines and more (Jantz, 2017). The database stores "layers" of information that can be combined for spatial analysis to extract specific information. Among the 45 layers of information are zoning districts, topography, bikeways, parks, building footprints, roads, street signs, and wooded areas. GIS systems like these allow communities to create specific solutions to problems that demand an overhead snapshot. A park advisory board

can implement a schedule of invasive plant removal after obtaining an up-to-date bird's eye view of the community ecosystem. Layers of data could answer questions about several thousand properties in National Register Historic District. Road signs warning of deer crossing could be strategically placed where deer traffic is most unmanageable.

11.4 Limitations and Caveats

As the growing sub-discipline of geographical psychology continues to delve in to human activity from unique and exciting perspectives, it is important to maintain awareness of the limitations. I address two in this section: (1) issues of cause and effect; and (2) issues of visual presentations of spatial data.

11.4.1 Issues of Cause and Effect

Two directions are important in the study of geographical distributions: One, geography may give rise to specific behaviours. For example, geography and culture collide to produce regional variation in language, cuisine, and mate preferences. Two, psychological differences at the individual level can result in geographical biases that are expressed as preferences and decisions about locations. For example, why do some people prefer hot humid climates over mild arid ones?

According to the U.S. Department of Health and Human Services (2004), the probability of being a teenage girl who is also pregnant depends a great deal upon location of home. Rates of teenage pregnancy in parts of the south are more than twice as high compared to parts of the north. Northern States show lower proportions of pregnant girls between the ages of 15-19 compared to Southern and Southwestern states. Recently impregnated teenage girls from across the country are not migrating to the southern states during the process of gestation. No. They live in the south already (See figure 11.4.1). Just to be clear, teenage girls are not getting

pregnant and then moving to the south. Likewise, most people who move to Minnesota do not do so as a direct result of their habit of using the word "buddy."

Figure 11.4.1 Teenage Pregnancy (per 1,000 girls age 15-19), 2004. Source: U.S. Department of Health and Human Services.

11.4.2 Issues in Visually Presenting Spatial Data

Not all psychological variables can be mapped out. In some cases, the area is too big and the desired level of detail is just not possible. If we know that a region has a relatively high mean value on some measure of a psychological trait, we should not assume that a random person sampled from that area has the same above average score. We must remember that individual differences are important and we cannot say that an entire state or region is populated with optimists, while another area is made up almost exclusively of introverts. Psychological traits are not distributed in that way; they do not follow the same distribution rules as diseases or some

social behaviours. This is largely because personality traits are not "transmitted" the same way as Lyme disease nor are they socially contagious as in trends in language or fashion, etc.

As is often the case with political analyses, taking a wide view of results across geographic space can be misleading. State by state comparisons of the U.S. presidential election of 2016, for example, show what looks like a sea of red, indicating endorsement of the Republican party candidate, but we can't assume that the state was entirely red. Many of the states had results much closer to 50-50. Only when we are able to zoom in can we begin to understand voting patterns within communities.

11.5 Summary

Geography is important. More than anything else, this is the broad theme that runs through these chapters. Psychology has, at best, undervalued the connection between geographical space and human activity, and, at worst, altogether ignored it. Outside of urban design, cartography, and a few specialty areas, the role of geography has historically been minimized in the larger field of social science. Fortunately, psychologists are now beginning to embrace geographical models, thus conveying a sense of optimism that this approach will continue to shed light on personality, social, and emotional processes.

The main thrust of this chapter was the articulation of future research directions using a geographical psychology model. To that end, three areas of inquiry were identified: (1) the rise of conscious cities; (2) mapping subjective experience; and (3) location intelligence in business and government. From monuments that inspire awe in everyone, to casinos that disconnect us from the outside world, we have begun to use advances in psychology and neuroscience to improve environments like hospitals and schools. And this is possible at any scale. Moving forward, we have an opportunity to improve our well-being through architecture and urban

design that takes into account our needs by using knowledge from personality and behavioural science. We have a duty to make sure that new information is used ethically and effectively so that as our communities develop they become more democratic, inclusive, happier, and healthier.

CHAPTER 12: REFERENCES

REFERENCES

Abbey, A. (1982). Sex differences in attributions for friendly behavior: Do males misperceive females' friendliness? *Journal of Personality and Social Psychology, 32,* 830-838.

Afifi, T. O., Mota, N. P., Dasiewicz, P., MacMillan, H. L., & Sareen, J. (2012). Physical punishment and mental disorders: Results from a nationally representative US sample. *Pediatrics, 130*(2), 184-192. doi:10.1542/peds.2011-2947

Ainsworth, M. D. S. (1991). Attachments and other affectional bonds across the life cycle. In C. M. Parkes, J. Stevenson-Hinde, & P. Marris (Eds.), *Attachment across the life cycle* (pp.33-510). London: Routledge.

Ainsworth, M. D. S., Blehar, M., Waters, E., & Wall S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Hillsdale, NJ: Erlbaum.

Ainsworth,M. D. S., & Marvin, R. S. (1995). On the shaping of attachment theory and research: An interview with Mary D. S. Ainsworth. *Monograms of the Society for Research in Child Development, 60,* 3-21.

Alcock, J. (1993). *Animal behavior* (5th ed.). Sunderland, MA: Sinauer Associates.

Alcock, J., & Gwynne, S. T. (1991). Evolution of insect mating systems: The impact of individual selectionist thinking. In W. J. Bailey & J. Ridsdill-Smith (Eds.), *Reproductive behavior in insects: Insects and populations* (pp. 10–14). New York: Chapman & Hall.

Alexander, R. D., & Noonan, N. M. (1979). Concealment of ovulation, parental care, and

human social interaction. In N. A. Chagnon & W. Irons (Eds.), *Evolutionary biology and human social behavior: An anthropological perspective* (pp. 402–435). North Scituate, MA: Duxbury.

Alexander, R. D. (1990). Epigenetic rules and Darwinian algorithms: The adaptive study of learning and development. *Ethology and sociobiology*, 11, 1-63.

Allen, J., & Walsh, J. A. (2000). A construct-based approach to equivalence: Methodologies for cross- cultural/multicultural personality assessment research. In J. H. Dana (Ed.), *Handbook of cross-cultural and multicultural assessment* (pp. 63-85). Mahwah, NJ: Lawrence Erlbaum.

Allen, J. P., & Land, D. (1999). Attachment in adolescence. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of* attachment (pp. 319-335). New York: Guilford.

Allik, J., & McCrae, R. R. (2004). Towards a geography of personality traits: Patterns of profiles across 36 cultures. *Journal of Cross-Cultural Psychology, 35,* 13-28.

Allport, G. W. (1937). *The American Journal of Psychology, 50,* 141-156.

Allport, G. W., & Odbert, H. S. (1936). *Trait-names; a psycho-lexical study. A study from the Harvard psychological laboratory*

Andersson, M. (1994). *Sexual selection.* Princeton, NJ: Princeton University Press.

Andersen, B. L., & Broffitt, B. (1988). Is there a reliable and valid self-report measure of sexual behavior? *Archives of Sexual Behavior, 17,* 509-525.

Angleitner, A., & Ostendorf, F. (2000, July). *The FFM: A comparison of German speaking countries (Austria, Former East and West Germany, and Switzerland).* Paper presented at the XXVIIth International Congress of Psychology, Stockholm, Sweden.

Archer, J., & Lloyd, B. (2002). *Sex and gender* (2nd ed.). Cambridge, England: Cambridge

University Press.

Ashton, M. C., Lee, K., & Paunonen, S. V. (2002). What is the central feature of extraversion?: Social attention versus reward sensitivity. *Journal of Personality and Social Psychology, 83,* 245–251.

Atari, M., Barbaro, N., Sela, Y., Shackelford, T. K., & Chegeni, R. (2017). The big five personality dimensions and mate retention behaviors in iran. *Personality and Individual Differences, 104,* 286-290. doi:10.1016/j.paid.2016.08.029

Au, K., & Cheung, M. W. L. (2004). Intra-cultural variation and job autonomy in 42 countries. *Organization Studies, 25,* 1339-1362.

Ayscue, J. B., & Orfield, G. (2015). School district lines stratify educational opportunity by race and poverty. *Race and Social Problems, 7*(1), 5-20. 10.1007/s12552-014-9135-0

Bailey, J. M., Gaulin, S., Agyei, Y., & Gladue, B. A. (1994). Effects of gender and sexual orientation on evolutionary relevant aspects of human mating psychology. *Journal of Personality and Social Psychology, 66,* 1081–1093.

Bailey, J. M., Kirk, K. M., Zhu, G., Dunne, M. P., & Martin, N. G. (2000). Do individual differences in sociosexuality represent genetic or environmentally contingent strategies? Evidence from the Australian twin registry. *Journal of Personality and Social Psychology, 78,* 537–545.

Baker, R. R., & Bellis, M. A. (1995). *Human sperm competition.* London: Chapman & Hall.

Balling, J. D., & Falk, J. H. (1982). Development of visual preference for natural environments. *Environment and Behavior, 14(1),* 5-28.

Banfield, S., & McCabe, M. P. (2001). Extra relationship involvement among women: Are

they different from men? *Archives of Sexual Behavior, 30,* 119–142.

Barash, D. P., & Lipton, J. E. (2001). *The myth of monogamy.* New York: Freeman.

Barber,N. (2002). On the relationship between fertility and geographic latitude: A cross-national study. *Cross-Cultural Research, 36,* 3-15.

Barber, N. (2003). Paternal investment prospects and cross-national differences in single parenthood. *Cross-Cultural Research, 37,* 163–177.

Barrett, P., & Eysenck, S. B. G. (1984). The assessment of personality factors across 25 countries. *Personality and Individual Differences, 5,* 615-632.

Barrett,P.T., & Paltiel, L. (1996). Can a single item replace an entire scale? POP versus the OPQ 5.2. *Selection and Development Review, 12,* 1-4.

Bartholomew, K. (1990). Avoidance of intimacy: An attachment perspective. *Journal of Social and Personal Relationships, 7,* 147-178.

Bartholomew, K. (1994). Assessment of individual differences in adult attachment. *Psychological Inquiry, 5,* 23-27.

Bartholomew, K., & Horowitz, L.M. (1991). Attachment styles in young adults: A test of a four category model. *Journal of Personality and Social Psychology, 62,* 226-244.

Bartholomew, K., & Shaver, P. R. (1998). Methods of assessing adult attachment: Do they converge? In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 25-45). New York: Guilford.

Bateman, A. J. (1948). Intra-sexual selection in Drosophila. *Heredity, 2,* 349–368.

Bateson, P. (Ed.). (1983). *Mate choice.* Cambridge, England: Cambridge University Press.

Belsky,J. (1997). Attachment, mating, and parenting: An evolutionary interpretation. *Human Nature,8,*361-381.

Belsky,J.(1999).Modern evolutionary theory and patterns of attachment. In J. Cassidy & P.R. Shaver (Eds.), *Handbook of attachment* (pp. 141-161). New York: Guilford.

Belsky, J., Steinberg, L., & Draper, P. (1991). Childhood experience, interpersonal development, and reproductive strategy: An evolutionary theory of socialization. *Chill Development, 62,* 647-670.

Bem, S. L. (1974). The measurement of physiological androgyny. *Journal of Consulting and Clinical Psychology, 42,* 155-162.

Bem, S. L. (1993). *The lenses of gender.* New Haven, CT: Yale University Press.

Benet-Martinez, V., & John, O. P. (1998). Los Cino Grandes across cultures and ethic groups: Multitrait-multi method analyses of the Big Five in Spanish and English. *Journal of Personality and Social Psychology, 75,*729-750.

Bennett, K. (manuscript under review). The personality of micro-geographic decisions: Mapping the distribution of big five traits and location choices inside built environments.

Bennett, K., Gualtieri, T., & Kazmierczyk, B. (2018). Undoing solitary urban design: A review of risk factors and mental health outcomes associated with living in social isolation. *Journal of Urban Design and Mental Health, 4,* 1-7.

Berman, M. G., Jonides, J., & Kaplan, S. (2008). The cognitive benefits of interacting with nature. *Psychological Science, 19*(12), 1207-1212. doi:http://dx.doi.org.ezaccess.libraries.psu.edu/10.1111/j.1467-9280.2008.02225.x

Berry, J. W. (1969). On cross cultural comparability. *International Journal of Psychology, 4,* 119-128.

Bess, B. E., & Janus, S. S. (1976). Prostitution. In B. J. Sadock, H. I. Kaplan, & A. M. Freedman (Eds.), *The sexual experience* (pp. 594 – 610). Baltimore: Williams & Wilkins.

Betzig, L. (1989). Causes of conjugal dissolution: A Cross-cultural study. *Current Anthropology, 30,* 654-676.

Birkhead, T. (2000). *Promiscuity: An evolutionary history of sperm competition.* Cambridge, MA: Harvard University Press.

Bitensky, S. H. (2008). The poverty of precedent for school corporal punishment's constitutionality under the Eighth Amendment. *University of Cincinnati Law Review, 77,* 1331.

Bjorklund, D. F., & Shackelford, T. K. (1999). Differences in parental investment contribute to important individual differences between men and women. *Current Directions in Psychological Science, 8,* 86 – 89.

Black, D. W., Gunter, T., Loveless, P., Allen, J., & Sieleni, B. (2010). Antisocial personality disorder in incarcerated offenders: Psychiatric comorbidity and quality of life. *Annals of Clinical Psychiatry : Official Journal of the American Academy of Clinical Psychiatrists, 22*(2), 113.

Blatt, S. (1995). Representational structures in psychopathology. In D. Cicchetti & S. L. Toth (eds.), *Rochester symposium on developmental psychology: Emotion, Cognition, and representation* (Vol. 6), pp.1-33, Rochester, NY: University of Rochester Press.

Bleidorn, W., Klimstra, T. A., Denissen, J. J. A., Rentfrow, P. J., Potter, J., & Gosling, S. D. (2013). Personality maturation around the world: A cross-cultural examination of social-investment theory. *Psychological Science, 24*(12), 2530-2540. doi:http://dx.doi.org.ezaccess.libraries.psu.edu/10.1177/0956797613498396

Bleidorn, W., Klimstra, T. A., Denissen, J. J. A., Rentfrow, P. J., Potter, J., & Gosling, S. D.

(2014). Let the data speak: A response to Terracciano (2014). *Psychological Science, 25*(4), 1051-1053. doi:http://dx.doi.org.ezaccess.libraries.psu.edu/10.1177/0956797614521015

Bleidorn, W., Schönbrodt, F., Gebauer, J. E., Rentfrow, P. J., Potter, J., & Gosling, S. D. (2016). To live among like-minded others: Exploring the links between person-city personality fit and self-esteem. *Psychological Science, 27*(3), 419-427. doi:http://dx.doi.org/10.1177/0956797615627133

Bleske, A. L., & Shackelford, T. K. (2001). Poaching, promiscuity, and deceit: Combating mating rivalry in same-sex friendships. *Personal Relationships, 8,* 407–424.

Blumstein, P., & Schwartz, P. (1983). *American couples.* New York: Morrow.

Bogaert, A. F., & Sadava, S. (2002). Adult attachment and sexual behavior. *Personal Relationships, 9,* 191-204.

Bond, M. H. (2001). Surveying the foundations: Approaches to measuring group, organizational, and national variation. In M. Erez & U. Kleinbeck (Eds.), *Work motivation in the context of a globalizing economy* (pp. 395-412). Mahwah, NJ: Lawrence Erlbaum.

Bowlby, J. (1969). *Attachment and loss*. New York: Basic Books.

Bowlby, J. (1973). *Attachment and loss: Separation: Anxiety and anger* (Vol. 2). New York: Basic Books.

Bowlby, J. (1980). *Attachment and loss: Loss* (Vol. 3). New York: Basic Books.

Bowlby, J. (1982). *Attachment and loss: Attachment* (Vol. 1). New York: Basic Books (Original work published 1969)

Bowlby, J. (1988). A *secure base: Parent- child attachment and healthy human development.* New York: Basic Books.

Brennan, K. A., Clark, C. L., & Shaver, P. R. (1998). Self-report measurement of adult attachment: AN integrative overview. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 46-76). New York: Guilford.

Brennman, A., & Shaver, P. R. (1995). Dimensions of adult attachment, affect regulation, and romantic relationship functioning. *Personality and Social Psychology Bulletin, 21,* 267-283.

Bretherton, I., & Munholland, K.A. (1999). Internal working models in attachment relationships: A construct revisited. In J. Cassidy & P.R. Shaver (Eds.), *Handbook of attachment* (pp.89-111). New York: Guilford.

Brislin, R. W. (1980). Translation and content analysis of oral and written material. In H. C. Triandis & J. W. Berry (Eds.), *Handbook of cross-cultural psychology (*Vol. 1, pp. 389-444). Boston: Allyn & Bacon.

Brislin, R. W. (1986). The wording and translation of research instruments. In W. J. Lonner & J. W. Berry (Eds.), *Field methods in cross-cultural research* (pp. 137-164). Beverly Hills, CA: Sage.

Brislin, R. (1993). *Understanding culture's influence on behavior.* Fort Worth, TX: Harcourt Brace Jovanovich.

Brody, L. R., & Hall, J. A. (1993). Gender and emotion. In M. Lewis & J. M. Haviland (Eds.), *Handbook of emotions* (pp. 447-460). New York: Guilford.

Broude, G. J., & Greene, S. J. (1976). Cross-cultural codes on twenty sexual attitudes and practices. *Ethnology, 15,* 409 – 438.

Brown, D. E. (1991). *Human universals.* New York: McGraw-Hill.

Bryson, B. (2013). *One summer: America, 1927* (First ed.). New York: Doubleday.

Buday, R. (2017, August 2). The Confused and Impoverished State of Architectural Research. Retrieved February 18, 2018, from http://commonedge.org/the-confused-and-impoverished-state-of-architectural-research/

Burley, N., & Symanski, R. (1981). Women without: An evolutionary and cross-cultural perspective on prostitution. In R. Symanski (Ed.), *The immoral landscape: Female prostitution in western societies* (pp. 239 – 274). Toronto, Canada: Butterworth-Heineman.

Burton, L. M. (1990). Teenage childbearing as an alternative life-course strategy in multigenerational black families. *Human Nature, 1,* 123-144.

Buss, A. R. (1977). The trait-situation controversy and the concept of interaction. *Personality and Social Psychology Bulletin, 5,* 191-195.

Buss, D. M. (1988). From vigilance to violence: Tactics of mate retention. *Ethology and Sociobiology, 9,* 291-317.

Buss, D. M. (1989a). Conflict between the sexes: Strategic interference and the evocation of anger and upset. *Journal of Personality and Social Psychology, 56,* 735-747.

Buss, D. M. (1989b). Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences, 12,* 1-49.

Buss, D. M. (1994). *The evolution of desire*. New York: Basic Books.

Buss, D. M. (1995). Evolutionary psychology: A new paradigm for psychological science. *Psychological Inquiry, 6,* 1-30.

Buss, D. M. (1997). Sexual strategies theory: Historical origins and current status. *Journal of Sex*

Research, 34, 19 –31.

Buss, D. M. (2000). *The dangerous passion*. New York: The Free Press.

Buss, D. M. (2015). Evolutionary psychology: The new science of the mind (5th ed). New York: Allyn & Bacon.

Buss, D. M., Larsen, R. J., & Westen, D. (1996). Sex differences in jealousy: Not gone, not forgotten, and not explained by alternative hypotheses. *Psychological Science, 7,* 373-375.

Buss, D. M., Larsen, R. J., Westen, D., & Semmelroth, J. (1992). Sex differences in jealousy: Evolution, physiology, and psychology. *Psychological Science, 3:4,* 251-255.

Buss, D. M., & Schmitt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychology Review, 100,* 204-232.

Buss, D. M., & Shackelford, T. K. (1997). From vigilance to violence: Tactics of mate retention in married couples, *Journal of Personality and Social Psychology, 72,* 346-361.

Buss, D. M., Shackelford, T. K., Kirkpatrick, L. A., Choe, J., Hasegawa, M., Hasegawa, T., & Bennett, K. (1999). Jealousy and the nature of beliefs about infidelity: Tests of competing hypotheses about sex differences in the United States, Korea, and Japan. *Personal Relationships, 6:1,* 125-150.

Butcher, J. N., Lim, J., & Nezami, E. (1998). Objective study of abnormal personality in cross-cultural settings. The Minnesota Multiphasic Personality Inventory (MMPI-2). *Journal of Cross-Cultural Psychology, 29,* 189-211.

Buunk, B. P. (1981). Jealousy in sexually open marriages. *Alternative Lifestyles, 4,* 357-372.

Buunk, B. P. (1995). Sex, self-esteem, dependency, and extradyadic sexual experience as related to jealousy responses. *Journal of Social and Personal Relationships, 12,* 147-153.

Buunk, B. P., Angleitner, A., Oubaid, V., & Buss, D. M. (1996). Sex differences in jealousy in evolutionary and cultural perspective: Tests from the Netherlands, Germany, and the United States. *Psychological Science, 7:6,* 359-363.

Byrne, B. M., & Campbell, T. L. (1999). Cross-cultural comparisons and the presumption of equivalent measurement and theoretical structure: A look beneath the surface. *Journal of Cross-Cultural Psychology, 30,* 555-574.

Campbell, D. T., & Fiske, D. W. (1959). Covergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56,* 81-105.

Caprara, G. V., Barbaranelli, C., Bermudez, J., Maslach, C., & Ruch, W. (2000). Multivariate methods for the comparison of factor structures in cross-cultural research: An illustration with the Big Five Questionnaire. *Journal of Cross-Cultural Psychology, 31,* 437-464.

Carnahan, T. & McFarland, S. (2007). Revisiting the Stanford Prison Experiment: Could participant self-selection have led to the cruelty? *Personality and Social Psychology Bulletin, 33,* 603–614.

Carroll, J. L., Volk, K. D., & Hyde, J. S. (1985). Differences between males and females in motives for engaging in sexual intercourse. *Archives of Sexual Behavior, 14,* 131–139.

Carver, C.S. (1997). Adult attachment and personality: Converging evidence and a new measure. *Personality and Social Psychology Bulletin, 23,* 865-883).

Casasanto, D. (2009). Embodiment of abstract concepts: Good and bad in right- and left-handers. *Journal of Experimental Psychology: General, 138*(3), 351-367.

Cassidy,J., & Shaver, P. (1999). (Eds.). *Handbook of attachment: Theory, research, and clinical applications.* New York: Guilford.

Cattell, R. B. (1947). Confirmation and clarification of primary personality factors. *Psychometrika, 12*(3), 197-220.

Cattell, R. B. (1957). *Personality and motivation structure and measurement*. Yonkers-on-Hudson, N.Y: World Book Co.

Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research, 1*, 245-276. Chan, D. K. S., Gelfand, M. J., Triandis, H. C., & Tzeng, O. (1996). Tightness-looseness revisited: Some preliminary analyses in Japan and the United States. *International Journal of Psychology, 31*, 1-12.

Canter for Disease Control (2010). Morbidity and mortality weekly report: Summary of notifiable diseases – United States, 2008.

Center for Disease Control and Prevention (2017, January). Retrieved from www.cdc.gov

Cerda-Flores, R. M., Barton, S. A., Marty-Gonzalez, L. F., Rivas, F., & Chakraborty, R. (1999). Estimation of nonpaternity in the Mexican population of Nuevo Leon: A validation study of blood group markers. *American Journal of Physical Anthropology, 109*, 281–293.

Charpentier, C., De Neve, J., Li, X., Roisier, J.P., & Sharot, T. (2016). Models of affective decision making: How do feelings predict choice? *Psychological Science*, 1-13.

Cheung, F. M., & Leung, K. (1998). Indigenous personality measures: Chinese examples. *Journal of Cross- Cultural Psychology, 29*, 233-248.

Cheung, F. M., Leung, K., Zang, J. X., Sun, H. F., Gan, Y. Q., Song, W. Z., et al. (2001). Indigenous Chinese personality constructs: Is the five-factor model complete? *Journal of Cross-Cultural Psychology, 32*, 407-433.

Cheung, G. M., & Rensvold, R. B. (2000). Assessing extreme and acquiescence response sets in

cross-cultural research using structural equations modeling. *Journal of Cross-Cultural Psychology, 31,* 187-212.

Chetty, R., Hendren, N., & Katz, L. F. (2016). The effects of exposure to better neighborhoods on children: New evidence from the moving to opportunity experiment. *The American Economic Review, 106*(4), 855-902.

Chetty, R., Stepner, M., Abraham, S., Lin, S., Scuderi, B., Turner, N., Bergeron, A. & Cutler, D. (2016). The association between income and life expectancy in the United States, 2001-2014. *Jama, 315*(16), 1750-1766. doi:10.1001/jama.2016.4226

Chisholm, J. S. (1996). The evolutionary ecology of attachment organization. *Human Nature, 7,* 1-38.

Chisholm, J. S. (1999). Steps to an evolutionary ecology of the mind. In A. L. Hinton (Eds.), *Biocultural approaches to the emotions* (pp. 117-149). Cambridge, UK: Cambridge University Press.

Chung, C. K., Rentfrow, P. J., & Pennebaker, J. W. (2014). Finding values in words: Using natural language to detect regional variations in personal concerns. In P. J. Rentfrow (Ed.), *Geographical psychology: Exploring the interaction of environment and behavior (pp. 195-216).* Washington, DC: American Psychological Association.

Church, A. T. (2000). Culture and personality: Toward an integrated cultural trait psychology. *Journal of Personality*, *68*, 651-703.

Church, A. T. (2001). Personality measurement in cross cultural perspective. *Journal of Personality, 69,* 979-1006.

Church, A. T., & Lonner, W. J. (1998). The cross-cultural perspective in the study of personality. Rationale and current research. *Journal of Cross-Cultural Psychology, 29,*

32-62.

Civil Rights Data Collection. (2014). Civil Rights Data Collection. Retrieved February 04, 2018, from https://ocrdata.ed.gov/

Clanton, G., & Smith, L. G. (1998). *Jealousy* (3rd ed.). New York: Prentice-Hall.

Clark, R. D. (1990). The impact of AIDS on gender differences in willingness to engage in casual sex. *Journal of Applied Social Psychology, 20,* 771–782.

Clark, R. D., & Hatfield, E. (1989). Gender differences in receptivity to sexual offers. *Journal of Psychology and Human Sexuality, 2,* 39–55.

Clegg, J. W. (2012). Teaching about mental health and illness through the history of the DSM. *History of Psychology, 15*(4), 364-370.

Clutton-Brock, T. H. (1991). *The evolution of parental care.* Princeton, NJ: Princeton University Press.

Clutton-Brock, T. H., & Parker, G. A. (1992). Potential reproductive rates and the operation of sexual selection. *The Quarterly Review of Biology, 67,* 437–456.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Cohen,D. (1998). Culture, social organization, and patterns of violence. *Journal of Personality & Social Psychology, 75,* 408-419.

Collins, N., & Read, S. (1994). Cognitive representations of attachment: The structure and function of internal working models. In K. Bartholomew & D. Perlman (eds.), *Advances in personal relationships* (Vol. 5, pp. 53-90). London: Jessica Kingsley.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Collins, N., & Read, S. (1990). Adult attachment relationships, working models and relationship quality in dating couples. *Journal of Personality and Social Psychology, 58,* 644-683.

Collins, N., & Read, S. (1994). Cognitive representations of attachment: The structure and function of internal working models. In K. Bartholomew & D. Perlman (Eds.), *Advances in personal relationships* (Vol. 5, pp. 53-90). London: Jessica Kingsley.

Conway, L. G., Bongard, K., Plaut, V., Gornick, L. J., Dodds, D. P., Giresi, T., . . . Houck, S. C. (2017). Ecological origins of freedom: Pathogens, heat stress, and frontier topography predict more vertical but less horizontal governmental restriction. *Personality and Social Psychology Bulletin, 43*(10), 1378-1398. 10.1177/0146167217713192

Conway, L. G., Houck, S. C., & Gornick, L. J. (2014). Regional differences in individualism and why they matter. In P. J. Rentfrow (Ed.), *Geographical psychology: Exploring the interaction of environment and behavior* (pp. 31-50). Washington, D.C: American Psychological Association.

Corr, P. J. (2008). *The reinforcement sensitivity theory of personality*. Cambridge, UK; New York: Cambridge University Press.

Corr, P. J. (2010). The psychoticism–psychopathy continuum: A neuropsychological model of core deficits. *Personality and Individual Differences, 48*(6), 695-703.

Corr, P. J. (2015). Personality, biological models of. In James D. Wright (Ed.), *The international encyclopedia of social & behavioral sciences,* (pp.857-862). Oxford: Elsevier.

Corr, P. J. (2016). Reinforcement sensitivity theory of personality questionnaires: Structural survey with recommendations. *Personality and Individual Differences, 89,* 60-64.

Corr, P. J., & Matthews, G. (2009). *The Cambridge handbook of personality psychology*. Cambridge, UK; New York;: Cambridge University Press.

Corry, N., Merritt, R. D., Mrug, S., & Pamp, B. (2008). The factor structure of the narcissistic personality inventory. *Journal of Personality Assessment, 90*(6), 593-600.

Cosmides, L. & Tooby, J. (1987). From evolution to behavior: Evolutionary psychology as the missing link. In J. Dupre (Ed.), *The latest on the best: Essays on evolution and optimality.* Cambridge, MA: The MIT Press.

Costa, P. T., Jr., & McCrae, R. R. (1985). *Revised NEO Personality Inventory (NEO PI-R) and NEO Five-Five Factor Inventory (NEO-FFI).* Odessa, FL: Psychological Assessment Resources.

Costa, P. T., Jr., & McCrae, R. R. (1995). Primary traits of Eysenck's P-E-N system: Three- and five-factor solutions. *Journal of Personality and Social Psychology, 69,* 308-317.

Costa, P. T., Jr., Terracciano, A., & McCrae, R. R. (2001). Gender differences in personality traits across cultures: Robust and surprising findings. *Journal of Personality and Social Psychology, 81,* 322-331.

Costa, P. T., Jr., & Widiger, T. A. (Eds.). (1994). *Personality disorders and the five-factor model of personality*. Washington, DC: American Psychological Association.

Craik, K. H. (1973). Environmental psychology. *Annual Review of Psychology*, *24*(1), 403-422. 10.1146/annurev.ps.24.020173.002155

Craven, I., Gray, M., & Stoneham, G. (1994). *Australian popular culture*. New York: Cambridge University Press.

Cronbach, L. J., & Meehl, P. E. (1955). Construct validity in psychological tests. *Psychological Bulletin, 52,* 281-302. De Raad, B. (2000). *The Big Five personality factors: The psycholexical approach to personality*. Seattle, WA: Hogrefe & Huber.

Cronk, L. (1999). *That complex whole: Culture and the evolution of human behavior*. Boulder,

CO: Westview.

Daly, M., & Wilson, M. (1988a). *Homocide.* Hawthorne, NY: Aldine de Gruyter.

Daly, M., & Wilson, M. (1988b). Evolutionary social psychology and family violence. *Science, 242*, 519-524.

Daly, M., & Wilson, M., & Weghorst, S. J. (1982). Male sexual jealousy. *Ethology and Sociobiology, 3*, 11-27.

DeKay, W. T., & Buss, D. M. (1992). Human nature, individual differences, and the importance of context: Perspectives from evolutionary psychology. *Current Directions in Psychological Science, 1,* 185-189.

de la Torre, J., & Giraldo, S. (2017). *Location intelligence for dummies*. Hoboken, New Jersey: John Wiley & Sons, Inc.

Denissen, J. J. A., Bleidorn, W., Hennecke, M., Luhmann, M., Orth, U., Specht, J., & Zimmermann, J. (2018). Uncovering the power of personality to shape income. *Psychological Science*, *29*(1), 3-13. 10.1177/0956797617724435

Denissen, J. J. A., & Penke, L. (2008). Motivational individual reaction norms underlying the five-factor model of personality: First steps towards a theory-based conceptual framework. *Journal of Research in Personality*, *42*(5), 1285-1302. 10.1016/j.jrp.2008.04.002

DeSteno, D. A., & Salovey, P. (1996a). Evolutionary origins of sex differences in jealousy? Questioning the "fitness" of the model. *Psychological Science, 7*, 367-375.

DeSteno, D. A. & Salovey, P. (1996b). Genes, jealousy, and the replication of mispecified models. *Psychological Science, 7,* 376-377.

de Vries, R., Gosling, S., & Potter, J. (2011). Income inequality and personality: Are less equal

U.S. states less agreeable? *Social Science & Medicine, 72*(12), 1978-1985. doi:http://dx.doi.org.ezaccess.libraries.psu.edu/10.1016/j.socscimed.2011.03.046

DeYoung, C. G., Hirsh, J. B., Shane, M. S., Papademetris, X., Rajeevan, N., & Gray, J. R. (2010). Testing predictions from personality neuroscience: Brain structure and the big five. *Psychological Science, 21*(6), 820-828.

DeYoung, C. G., Quilty, L. C., & Peterson, J. B. (2007). Between facets and domains: 10 aspects of the Big Five. *Journal of Personality and Social Psychology, 93*, 880-896.

Diener, E., & Suh, E. M. (2001). *Culture and subjective well-being.* Cambridge, MA: MIT Press.

Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology, 41*, 417-440.

Dingemanse, N. J., Kazem, A. J. N., Réale, D., & Wright, J. (2010). Behavioural reaction norms: Animal personality meets individual plasticity. *Trends in Ecology & Evolution, 25*(2), 81-89. 10.1016/j.tree.2009.07.013

Doherty, R. W., Hatfield, E., Thomson, K., & Choo, P. (1994). Cultural and ethnic influences on love and attachment. *Personal Relationships, I,* 391-398.

Dohrenwend, B. P., & Dohrenwend, B. S. (1974). Psychiatric disorders in urban settings. In G. Caplan (Ed.), *American handbook of psychiatry* (pp. 424 – 447). New York: Basic Books.

Dozier, M., Stovall, K. C., & Albus, K. E. (1999). Attachment and psychopathology in adulthood. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment* (pp. 497-519). New York: Guilford.

Dijkstra, P., & Buunk, B. P. (1998). Jealousy as a function of rival characteristics. *Personality & Social Psychology Bulletin, 24*, 1158-1166.

Draper, P., & Harpending, H. (1982). Father absence and reproductive strategy: An evolutionary perspective. *Journal of Anthropological Research, 38,* 255-273.

Drigotas, S. M., & Barta, W. (2001). The cheating heart: Scientific explorations of infidelity. *Current Directions in Psychological Science, 10*, 177-180.

Dunbar, R. I. M. (1992). Neocortex size as a constraint on group size in primates. *Journal of Human Evolution. 22 (6): 469–493.*

Dunbar, R. I. M. (1993). Coevolution of neocortical size, group size and language in humans. *Behavioral and Brain Sciences. 16 (4): 681–735.*

Eagly, A. H. (1987). *Sex differences in social behavior: Asocial-role interpretation.* Hillsdale, NJ: Erlbaum.

Eagly, A. H., & Wood, W. (1999). The origins of sex differences in human behavior: Evolved dispositions versus social roles. *American Psychologist, 54,* 408-423.

Eibl-Eibesfeldt, I. (1989). *Human ethology.* New York: Aldine de Gruyter.

Eid, M., Langeheine, R., & Diener, E. (2003). Comparing typological structures across cultures b multi group latent class analysis: A primer. *Journal of Cross-Cultural Psychology, 34,* 195-210.

Ellis, B. J. (1992). The evolution of sexual attraction: Evaluative mechanisms in women. In J. H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind* (pp. 267–288). New York: Oxford University Press.

Ellis, B. J., McFadyen-Ketchum, S., Dodge, K. A., Pettit, G. S., & Bates, J. E. (1999). Quality of early family relationships and individual differences in the timing of pubertal maturation in girls: A longitudinal test of an evolutionary model. *Journal of Personality and Social Psychology, 77,* 387-401.

Elsevier (2017, January). Retrieved from https://www.elsevier.com/social-sciences/geography-planning-and-development/geography-planning-and-development-journals

Evans, G. W. (1980). Environmental cognition. *Psychological Bulletin, 88*(2), 259-287. doi:10.1037/0033-2909.88.2.259

Eysenck, H. J. (1976). *Sex and personality.* London: Open Books.

Eysenck, H. J., & Eysenck, S. B. G. (1975). *Eysenck Personality Questionnaire manual*. San Diego, CA: Educational and Industrial Testing Services.

Federal Bureau of Prisons. (2017). Retrieved from https://www.bop.gov

Feeding America (2017). *Overall food insecurity report 2017* (pp.1-43). Retrieved from map.feedingamerica.org

Feeney, J. A. (1994). Attachment style, communication patterns, and satisfaction across the life cycle of marriage. *Personal Relationships, 1,* 333-348.

Feeney, J. A. (1999). Adult romantic attachment and couple relationships. In J. Casidy & P.R. Shaver (Eds.), *Handbook of attachment* (pp. 355-377). New York: Guilford.

Feeney. J.A., Noller, P., & Patty, J. (1993). Adolescents' interactions with the opposite sex: Influence of attachment style and gender, *Journal of Adolescence, 16,* 169-186.

Feingold, A. (1994). Gender differences in personality: A meta-analysis. *Psychological Bulletin, 116,* 429-456.

Ferguson, E., Heckman, J. J., & Corr, P. (2011). Personality and economics: Overview and proposed framework. *Personality and Individual Differences, 51*(3), 201-209. doi:http://dx.doi.org.ezaccess.libraries.psu.edu/10.1016/j.paid.2011.03.030

Fernandes, E. (2006, May 4). Supermax prison, the Alcatraz of the Rockies. *London: The Times.*

Fisher, H. (1987). The four year itch. *Natural History, 10,* 22-29.

Fisher, W. A., Byrne, D., White, L. A., & Kelley, K. (1988). Erotophobia-erotophilia as a dimension of personality. Journal of Sex Research, 25, 123-151.

Fleeson, W. & Noftle, E. E. (2009). The end of the person-situation debate: an emerging synthesis in the answer to the consistency question. *Social and Personality Psychology Compass, 2* (4), 1667–1684.

Florida, R. L. (2004). *The rise of the creative class: And how it's transforming work, leisure, community and everyday life*. New York, NY: Basic Books.

Florida, R. (2009). *Who's your city?: How the creative economy is making where to live the most important decision of your life*. New York: Basic Books.

Florida, R., & Mellander, C. (2014). The psychogeography of creativity. In P. J. Rentfrow (Ed.), *Geographical psychology: Exploring the interaction of environment and behavior* (pp. 261-274). Washington, D.C: American Psychological Association.

Foley, R. (1996). The adaptive legacy of human evolution: A search for the environment of evolutionary adaptedness. *Evolutionary Anthropology, 5,* 194–203.

Foster, J. D., Shrira, I., Campbell, W. K., & Stone, E. A. (2002, June). *Mate poaching, narcissism, and empathy.* Poster session presented at the 14th Annual Meeting of the Human Behavior and Evolution Society, New Brunswick, NJ.

Frayser, S. (1985). *Varieties of sexual experience: An anthropological perspective.* New Haven, CT: HRAF Press.

Galinha, I. C., Garcia-Martin, M., Oishi, S., Wirtz, D., & Esteves, F. (2016). Cross-cultural comparison of personality traits, attachment security, and satisfaction with relationships as predictors of subjective well-being in india, sweden, and the united states. *Journal of*

Cross-Cultural Psychology, 47(8), 1033-1052. doi:http://dx.doi.org.ezaccess.libraries.psu.edu/10.1177/0022022116658262

Gangestad, S. W. (2001). Adaptive design, selective history, and women's sexual motivations. In J. A. French, A. C. Kamil, & D. W. Leger (Eds.), *Evolutionary psychology and motivation* (pp. 37-74). Lincoln: University of Nebraska Press.

Gangestad, S. W., & Buss, D. M. (1993). Pathogen prevalence and human mate preferences. *Ethology and Sociobiology, 14,* 89-96.

Gangestad, S. W., & Simpson, J. A. (1990). Toward an evolutionary history of female sociosexual variation. Special Issue: Biological foundations of personality: Evolution, behavioral genetics, and psychophysiology. *Journal of Personality, 58,* 69–96.

Gangestad, S. W., & Simpson, J. A. (2000). The evolution of human mating: Trade-offs and strategic pluralism. *Behavioral and Brain Sciences, 23,* 573-587.

Gangestad, S. W., & Simpson, J. A. (2007). Wither science of the evolution of mind? In S. W. Gangestad and J. A. Simpson (Eds.), *The evolution of mind: fundamental questions and controversies* (pp.397-438). New York: Guilford Press.

Gangestad, S. W., & Thornhill, R. (1997). Human sexual selection and developmental stability. In J. A. Simpson & D. T. Kenrick (Eds.), *Evolutionary social psychology* (pp. 169–195). Mahwah, NJ: Erlbaum. Geary, D. C. (1998). *Male, female: The evolution of human sex differences.* Washington, DC: American Psychological Association.

Gardner, H. W., & Kosmitizki, C. (2002). *Lives across cultures: Cross-cultural human development* (2nd ed.). Boston: Allyn & bacon.

Gaulin, S.J.C.(1997). Cross-cultural patterns and the search for evolved psychological

mechanisms. In G.R. Bock & G. Cardew (eds.), *Characterizing human psychological adaptations* (pp. 195-207). Chicherster, UK: Wiley.

Geary, D. C. (1998). *Male, female: The evolution of human sex differences.* Washington, DC: American Psychological Association.

Geary, D. C. (2000). Evolution and proximate expression of human paternal investment. *Psychological Bulletin, 126*, 55-77.

Geary, D. C., Rumsey, M., Bow-Thomas, C. C., & Hoard, M. K. (1995). Sexual jealousy as a factultative trait: Evidence from the pattern of sex differences in adults from China and the United States. *Ethology and Sociobiology, 16,* 255-283.

Gebauer, J. E., Bleidorn, W., Gosling, S. D., Rentfrow, P. J., Lamb, M. E., & Potter, J. (2014). Cross-cultural variations in big five relationships with religiosity: A sociocultural motives perspective. *Journal of Personality and Social Psychology, 107*(6), 1064-1091. doi:http://dx.doi.org.ezaccess.libraries.psu.edu/10.1037/a0037683

Gelman, S., & Hirshfeld, L. (Eds.). (1994). *Mapping the mind.* New York: Cambridge University Press.

George, C., & Solomon, J. (1999). Attachment and caregiving: The caregiving behavioral system. In J. Cassidy & P. R. Shaver (eds.), *Handbook of attachment* (pp. 649-670). New York: Guilford.

Glass, S. P., & Wright, T. L. (1985). Sex differences in type of extramarital involvement and marital dissatisfaction. *Sex Roles, 12,* 1101–1120.

Goldberg, L. R. (1981). Language and individual differences: The search for universals in personality lexicons. In L. Wheeler (Ed.), *Review of Personality and Social Psychology: Vol. 2* (pp. 141-165). Beverly Hills, CA: Sage.

Goldberg, L. R. (1982). From Ace to Zombie: Some explorations in the language of personality. In C. D. Spielberg & J. N. Butcher (Eds.), *Advances in personality assessment* (Vol. 1, pp. 203-234). Hillsdale, NJ: Lawrence Erlbaum.

Goldberg, L. R. (1990). An alternative "description of personality": The Big-Five factor structure. *Journal of Personality and Social Psychology, 59,* 1216-1229.

Goldberg, L. R. (1992). The development of markers for the Big-Five factor structure. *Psychological Assessment, 4,* 26 – 42.

Gomez, R. (2015). Great Britain and Ireland drawn from pubs. ramiro.org. Data: *Open Street Map, openstreetmap.org*

Gosling, S. D., Gifford, R., & McCunn, L. (2013). The selection, creation, and perception of interior spaces: An environmental psychology approach. In G. Brooker & L. Weinthal (Eds.), *The Handbook of Interior Architecture and Design* (pp. 278-290). Oxford, UK: Berg.

Gosling, S. D., Ko, S. J., Mannarelli, T., & Morris, M. E. (2002). A Room with a cue: Judgments of personality based on offices and bedrooms. *Journal of Personality and Social Psychology, 82,* 379-398.

Gosling, S. D., Rentfrow, P. J., & Swann, W. B., Jr. (2003). A very brief measure of the big-five personality domains. *Journal of Research in Personality, 37*(6), 504-528.

Graham, L. T., Gosling, S. D., & Travis, C. K. (2015). The psychology of home environments: A call for research on residential space. *Perspectives on Psychological Science, 10*(3), 346-356.

Graziano, W.G., & Einsenberg, N.H. (1997). Agreeableness: A dimension of personality. In R.

Hogan, J. Johnson, & S. Briggs (eds.). *Handbook of personality psychology* (pp. 795-824). San Diego, CA: Academic Press.

Greenberg, M. T. (1999). Attachment and psychopathology in childhood. In J. Cassidy & P. R. Shaver (Eds.), Handbook of attachment (pp. 469-496). New York: Guilford.

Greiling, H. & Buss, D. M. (2000). Women's sexual strategies: The hidden dimension of short-term mating. *Personality and Individual Differences, 28,* 929-063.

Grice, J. W., & Seely, E. (2000). The evolution of sex differences in jealousy: Failure to replicate previous results. *Journal of Research in Personality, 34,* 348-356.

Griffin, D., & Bartholomew, K. (1994a). Models of self and other: Fundamentals dimensions underlying measures of adult attachment. *Journal of Personality and Social Psychology, 67,* 430-445.

Griffin, D., & Bartholomew, K. (1994b). The meta-physics of measurement: The case of adult attachment. In K. Bartholomew and D. Perlam (eds.), *Attachment processes in adulthood: Advances in personal relationships* (Vol. 5, pp. 17-52). London: Jessica Kingsley.

Grimm, S.D., & Church, A.T. (1999). A cross-cultural study of response biases in personality and measures. *Journal of Research in Personality, 33,* 415-441.

Gross, M. R. (1996). Alternative reproductive strategies and tactics: Diversity within the sexes. *Trends in Ecology and Evolution, 11,* 92–98.

Grosskopf, D. (1983). *Sex and the married woman.* New York: Simon & Schuster.

Guanzon-Lapeña, M. M., Church, A. T., Carlota, A. J., & Katigbak, M. S. (1998). Indigenous personality mea- sures: Philippine examples. *Journal of Cross-Cultural Psychology, 29,* 249-270.

Guttentag, M., & Secord, P. F. (1983). *Too many women? The sex ratio question.* Beverly Hills,

CA: Sage.

Gwynne, D. T. (1984). Sexual selection and sexual differences in Mormon crickets. *Evolution, 38,* 1011–1022.

Haney, C., Banks, C., & Zimbardo, P. (1973). Interpersonal dynamics in a simulated prison. *International Journal of Criminology and Penology, 1,* 69–97.

Hansen, G. L. (1985). Perceived threats and marital jealousy. *Social Psychology Quarterly, 48,* 262-268.

Hardy, S. B. (1981). *The woman that never evolved.* Cambridge, MA: Harvard University Press.

Harvey, P. H., & Reynolds, J. D. (1994). Sexual selection and the evolution of sex differences. In R. V. Short & E. Balaban (Eds.), *The difference between the sexes* (pp. 51–66). Cambridge, England: Cambridge University Press.

Haselton, M. G., & Buss, D. M. (2000). Error management theory: A new perspective on biases in cross-sex mind reading. *Journal of Personality and Social Psychology, 78,* 81–91.

Hassebrauck, M. (1998). The visual process method: A new method to study physical attractiveness. *Evolution and Human Behavior, 19,* 111–123.

Haven, S., & ten Berge, J. F. M. (1977). *Tucke's coefficient of congruence as a measure of factorial invariance: An empirical study*. Unpublished manuscript, University of Groningen, Netherlands.

Hazan, C., & Diamond, L. M. (2000). The place of attachment in human mating. *Review of General Psychology, 4,* 186–204.

Harris, C. R. (2000). Psychophysiological responses to imagined infidelity: The specific innate

modular view of jealousy reconsidered. *Journal of Personality & Social Psychology, 78,* 1082-1091.

Harris, C. (2002). Sexual and romantic jealousy in heterosexual and homosexual adults. *Psychological Science, 13,* 7-12.

Harris, C. R., & Christenfeld, N. (1996a). Jealousy and rational responses to infidelity across gender and culture. *Psychological Science, 7,* 378-379.

Harris, C. R., & Christenfeld, N. (1996b). Gender, jealousy, and reason. *Psychological Science, 7,* 364-366.

Harvey, P. H., & Clutton-Brock, T. H. (1985). Life history variation in primates. *Evolution, 39,* 559-581.

Haslam, N. & Bornstein, B. H. (1996). Envy and jealousy as discrete emotions: A taxometric analysis. *Motivation and Emotion, 20,* 255-272.

Hatfield, E., & Rapson, R.L. (1996). *Love and sex: Cross-Cultural perspectives.* Boston: Allyn & Bacon.

Hazan, C., & Shaver,P.R. (1987). Romantic love conceptualized as an attachment process. *Journal of Personality and Social Psychology, 52,* 511-524.

Hazan, C., & Zeifman, D. (1999). Poor bonds as attachments: Evaluating the evidence. In J. Cassidy & P.R. Shaver (Eds.), *Handbook of attachment* (pp. 336-354.) New York: Guilford.

Heaven, P. C. L., Connors, J., & Stones, C. R. (1994). Three or five personality dimensions? An analysis of natural language terms in two cultures. *Personality and Individual Differences, 17,* 181-189.

Heine, S. J., Lehman, D. R., Peng, K., & Greenholtz, J. (2002). What's wrong with cross-

cultural comparisons of subjective Likert scales? The reference-group effect. *Journal of Personality and Social Psychol- ogy, 82,* 903–918.

Heinz, A., Deserno, L., & Reininghaus, U. (2013). Urbanicity, social adversity and psychosis. *World Psychiatry, 12*(3), 187-197. doi:10.1002/wps.20056

Heller, D., Perunovic, W. Q. E., Reichman, D. (2009). The future of person-situation integration in the interface between traits and goals: A bottom-up framework. *Journal of Research in Personality, 43,* 171–178.

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences, 33*(2-3), 61-83. doi:10.1017/S0140525X0999152X

Heuchert, J. W. P., Parker, W. D., Stumpf, H., & Myburgh, C. P. H. (2000). The five-factor model in South African college students. *American Behavioral Scientist, 44,* 112-125.

Hinde, R. A. (1984). Why do the sexes behave differently in close relationships? *Journal of Social and Personal Relationships, 1,* 471–501.

Hofstede, G. (1998). *Masculinity and femininity: The taboo dimension of national cultures.* Thousand Oaks, CA: Sage.

Hofstede, G. (2001). *Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations (2nd. ed.).* Thousand Oaks, CA: Sage.

Hofstee, W. K. B., de Raad, B., & Goldberg, L. R. (1992). Integration of the Big-Five and circumplex approaches to trait structure. *Journal of Personality and Social Psychology, 63*, 146-163.

Hofstede, G., & McCrae, R. R. (2004). Personality and culture revisited: Linking traits and dimensions of culture. *Cross-Cultural Research, 38*, 52-88.

Hogan, R. & Hogan, J. (1992). *Hogan Personality Inventory Manual (2nd ed.)*. Tulsa, OK:

Hogan Assessment Systems.

Hogan, J., & Ones, D. S. (1997). Conscientiousness and integrity at work. In R. Hogan, J. Johnson, & S. Briggs (Eds.), *Handbook of personality psychology* (pp. 849-870). San Diego, CA: Academic Press.

Hogan, J., & Ones, D. S. (1997). Conscientiousness and integrity at work. In R. Hogan, J. Johnson, & S. Briggs (Eds.), *Handbook of personality psychology* (pp. 849 – 870). San Diego, CA: Academic Press.

Holdsworth, R. (2015, November 23). Trap Streets Are Real, And Here Are Some Of London's. Retrieved February 03, 2018, from https://londonist.com/2015/11/london-trap-streets

Hoyle, R. H., Fejfar, M. C., & Miller, J. D. (2000). Personality and sexual risk taking: A quantitative review. *Journal of Personality, 68,* 1203– 1231.

Hrdy, S. B. (1981). *The woman that never evolved.* Cambridge, MA: Harvard University Press.

Huang, Y., Guo, D., Kasakoff, A., & Grieve, J. (2016). Understanding U.S. regional linguistic variation with twitter data analysis. *Computers, Environment and Urban Systems, 59*, 244-255. 10.1016/j.compenvurbsys.2015.12.003

Hupka, R. B. (1991). The motive for the arousal of romantic jealousy: Its cultural origin. In P. Salovey (Ed.), *The psychology of jealousy and envy* (pp. 252-270). New York: Guilford Press.

Hupka, R. B., & Bank, A. L. (1996). Sex differences in jealousy: Evolution or social construction? *Cross-Cultural Research, 30,* 24-59.

Hyde, J. S. (1986). Gender differences in aggression. In J. S. Hyde & M. C. Linn (Eds.), *The psychology of gender: Advances through meta-analysis* (pp. 51– 66). Baltimore: Johns Hopkins University Press.

Inglehart, R. (1990). *Culture shift in advanced industrial society.* Princeton, NJ: Princeton University Press. Inglehart, R., & Baker, W. E. (2000). Modernization, cultural change, and the persistence of traditional values. *American Sociological Review, 65*, 19-51.

Inglehart, R. (1997). *Modernization and post modernization: Cultural, economic and political change in 43 societies.* Princeton, NJ: Princeton University Press.

Jackson, D. N., Paunonen, S. V., & Tremblay, P. F. (2000). *Six Factor Personality Questionnaire: Technical Manual*. Port Huron, MI: Sigma Assessment Systems.

Jantz, M. (2017, January-February). GIS: Layers of data. *Mt. Lebanon Magazine,* pp. 36-39.

John, O. P. (1990). The "Big Five" factor taxonomy: Dimensions of personality in the natural language and in questionnaires. In L. A. Pervin (Ed.), *Handbook of personality: Theory and research* (pp. 66-100). New York: Guilford.

John, O. P., Donahue, E. M., & Kentle, R. L. (1991). *The Big Five Inventory--Versions 4a and 54.* Berkeley, CA: University of California, Berkeley, Institute of Personality and Social Research.

John, O. P., & Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspective. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (2nd ed., pp. 102-138). New York: Guilford.

Johnson J. A. (2014). Measuring thirty facets of the Five Factor Model with a 120-item public domain inventory: Development of the IPIP-NEO-120. *Journal of Research in Personality*, *51,* 78-89.

Johnson, S. (2006). *The ghost map: The story of London's most terrifying epidemic--and how it changed science, cities, and the modern world*. New York: Riverhead Books.

Johnson, T., Kulesa, P., & Cho, Y. I. (2005). The relation between culture and response styles:

Evidence from 19 countries. *Journal of Cross-Cultural Psychology, 36*, 264-277.

Jokela, M. (2009). Personality predicts migration within and between U.S. states. *Journal of Research in Personality, 43*(1), 79-83. 10.1016/j.jrp.2008.09.005

Jokela, M. (2014). Personality and the realization of migration desires. In P. J. Rentfrow (Ed.), *Geographical psychology: Exploring the interaction of environment and behavior* (pp. 71-87). Washington, D.C: American Psychological Association.

Jokela, M., Bleidorn, W., Lamb, M. E., Gosling, S. D., & Rentfrow, P. J. (2015). Geographically varying associations between personality and life satisfaction in the london metropolitan area. *Proceedings of the National Academy of Sciences of the United States of America, 112*(3), 723.

Jost, J. T., Glaser, J., Kruglanski, A. W., & Sulloway, F. J. (2003). Political conservatism as motivated social cognition. *Psychological Bulletin, 129*(3), 339-375.

Kaplan, R. M., & Saccuzzo, D.P. (1993). *Psychological testing: Principals, applications, and issues* (3rd ed.). PacificvGrove, CA: Brooks/Cole.

Kaplan, S. (1992). Environmental preference in a knowledge-seeking, knowledge-using organism. In J. H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture*. New York: University Press.

Kaplan, S. & Kaplan, R. (1982). *Cognition and environment: Functioning in an uncertain world*. New York: Praeger.

Karrow, R. W., Ortelius, A., & Bagrow, L. (1993). *Mapmakers of the sixteenth century and their maps: Bio-bibliographies of the cartographers of abraham ortelius, 1570 : Based on leo bagrow's A. ortelii catalogus cartographorum*. Chicago: Published for The Newberry Library by Speculum Orbis Press.

Kasser, T., & Sharma, Y. S. (1999). Reproductive freedom, educational equality, and females' preference for resource-acquisition characteristics in mates. *Psychological Science, 10,* 374-377.

Katigbak, M. S., Church, A. T., Guanzon-Lapeña, M. A., Carlota, A. J., & del Pilar, G. H. (2002). Are indigenous personality dimensions culture specific? Philippine inventories and the five-factor model. *Journal of Personality and Social Psychology, 82,* 89-101.

Keller, H. (1990). Evolutionary approaches. In J. W. Berry, Y. H. Poortinga, & J. Pandey (Eds.), *Handbook of cross-cultural psychology,* 2nd ed.

Kellert, S. R., Heerwagen, J., & Mador, M. (2008). *Biophilic design: The theory, science, and practice of bringing buildings to life*. Hoboken, N.J: Wiley.

Kelly, R. L. (1995). *The foraging spectrum: Diversity in hunter–gatherer lifeways.* Washington, DC: Smithsonian Institution Press.

Kenrick, D.T. & Funder, D.C. (1988). Profiting from Controversy: Lessons from the Person-Situation Debate. *American Psychologist, 43* (1), 23–34.

Kenrick, D. T., Neuberg, S. L., Zierk, K. L., & Krones, J. M. (1994). Evolution and social cognition: Contrast effects as a function of sex, dominance, and physical attractiveness. *Personality and Social Psychology Bulletin, 20,* 210–217.

Kenrick, D. T., Sadalla, E. K., Groth, G., & Trost, M. R. (1990). Evolution, traits, and the stages of human courtship: Qualifying the parental investment model. Special issue: Biological foundations of personality: evolution, behavioral genetics, and psychophysiology. *Journal of Personality, 58,* 97-116.

Kenrick, D., Sadalla, E., & Keefe, R. (1998). Evolutionary cognitive psychology: The missing

heart of modern cognitive science. In C. Crawford & D. Krebs (Eds.), *Handbook of evolutionary psychology* (pp. 485–514). Mahwah, NJ: Erlbaum.

Kirk, R. E. (1999). *Statistics: An introduction.* Fort Worth, TX: Harcourt Brace.

Kirkpatrick, L. A. (1998). Evolution, pair-bonding, and reproductive strategies: A reconceptualization of adult attachment. In J. A. Simpson & W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp353-393). New York: Guilford.

Kirkpatrick, L. A. (1999). Attachment and religious representations and behavior. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment* (pp. 803-822). New York: Guilford.

Kirkpatrick, L. A., & Davis, K. E. (1994). Attachment style, gender, and relationship stability: A longitudinal analysis. *Journal of Personality and Social Psychology, 66,* 502-512.

Kirkpatrick, L. A., & Hazan, C. (1994). Attachment styles and close relationships: A four year prospective study. *Personal Relationships, 1,* 123-142.

Kitayama, S., Markus, H.R., Matsumoto, H., & Norasakkunkit, V. (1997). Individual and collective processes in the construction of the self: Self-enhancement in the United States and self criticism in Japan. *Journal of Personality and Social Psychology, 72,* 1245-1267.

Klohnen, E. C., & John, O. P. (1998). Working models of attachment: A theory-based prototype approach. In J. A. Simpson &W. S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 115-140). New York: Guilford.

Klusmann, D. (2002). Sexual motivation and the duration of partnership. *Archives of Sexual Behavior, 31,* 275–287.

Knodel, J., Low, B., Saengtienchai, C., & Lucas, R. (1997). An evolution- ary perspective on Thai sexual attitudes and behavior. *Journal of Sex Research, 34,* 292–303.

Komiya, A., Oishi, S., & Lee, M. (2016). The rural–urban difference in interpersonal regret.

Personality and Social Psychology Bulletin, 42(4), 513-525. doi:http://dx.doi.org.ezaccess.libraries.psu.edu/10.1177/0146167216636623

Krug, S. E., & Kulhavy, R. W. (1973). Personality differences across regions of the United States. *Journal of Social Psychology, 91*(1), 73.

Krupić, D., & Corr, P. J. (2014). Individual differences in emotion elicitation in university examinations: A quasi-experimental study. *Personality and Individual Differences, 71*, 176. doi:10.1016/j.paid.2014.08.001

Kucsera, J. V., Siegel-Hawley, G., & Orfield, G. (2015). Are we segregated and satisfied? segregation and inequality in southern California schools. *Urban Education, 50*(5), 535-571. 10.1177/0042085914522499

Lancaster, J. B. (1989). Evolutionary and cross-cultural perspectives on single-parenthood. In R. W. Bell & N. J. Bell (Eds.), *Interfaces in psychology* (pp. 63-72). Lubbock: Texas Tech University Press.

Landis, B., & Gladstone, J. J. (2017). Personality, income, and compensatory consumption: Low-income extraverts spend more on status. *Psychological Science, 28*(10), 1518-1520. doi:10.1177/0956797617714811

Landolt, M. A., Lalumiere, M. L., & Quinsey, V. L. (1995). Sex differences in intra-sex variations in human mating tactics: An evolutionary approach. *Ethology and Sociobiology, 16,* 3–23.

Laumann, E.O., Gagnon, J.H., Michael, R.T., & Michaels, S. (1994). *The social organization of sexuality*. Chicago: University of Chicago Press.

Lawless, N. M., & Lucas, R. E. (2011). Predictors of regional well-being: A county level analysis. *Social Indicators Research, 101*, 341-357. doi:10.1007/s11205-010-9667-7

Leak, G. K., Gardner, L. E., Parsons, C. J. (1998). Jealousy and romantic attachment: A replication and extension. *Representative Research in Social Psychology, 22*, 21-27.

Leak, G. K., & Parsons, C. J. (2001). The susceptibility of three attachment style measures to socially desirable responding. *Social Behavior and Personality, 29,* 21-30.

Le Boeuf, B. J. (1974). Male–male competition and reproductive success in elephant seals. *American Zoologist, 14,* 163–176.

Lee, K., & Ashton, M. C. (2004). Psychometric properties of the HEXACO Personality Inventory. *Multivariate Behavioral Research, 39,* 329-358.

Leitenberg, H., & Henning, K. (1995). Sexual fantasy. *Psychological Bulletin, 117,* 469 – 496.

Levine, R. A. (2001). Culture and personality studies, 1918-1960: Myth and history. *Journal of Personality, 69*, 803-818.

Linklater, A. (2003). *Measuring America: How the United States was shaped by the greatest land sale in history*. New York: Plume.

Lipari, R. N., Van Horn, S. L., Hughes, A., & Williams, M. (2017, July 20). State and substate estimates of any mental illness from the 2012–2014 national surveys on drug use and health. Retrieved March 10, 2018, from https://www.samhsa.gov/data/sites/default/files/report_3189/ShortReport-3189.html

Little, B. R. (2014). *Me, myself, and us: The science of personality and the art of well-being*. New York: PublicAffairs.

Little, T. D. (2000). On the comparability of constructs in cross-cultural research: A critique of Cheung and Rensvold. *Journal of Cross-Cultural Psychology, 31*, 213-219.

Lonner, W. J. (1979). Issues in cross-cultural psychology. In A. J. Marsella, R. Tharp, & T. Cibarowski (Eds.), *Perspectives in cross-cultural psychology* (pp. 17-45). New York:

Academic Press.

Longer, W.J. (1980). The search for psychological universals. In H.C. Triandis & W.W. Lambert (Eds.), *Handbook of cross-cultural psychology* (Vol. 1, pp. 143-204). Boston: Allyn and Bacon.

Lonner, W. J. (1980). The search for psychological universals. In H. C. Triandis & W. W. Lambert (Eds.), *Handbook of cross-cultural psychology* (Vol. 1, pp. 143-204). Boston: Allyn & Bacon.

Lord, R., & Smydo, J. (2016, January 3). No Safe Harbor: McKees Rocks, Homestead left with clusters of mentally ill residents. Retrieved March 10, 2018, from http://www.post-gazette.com/news/health/2016/01/03/No-Safe-Harbor-McKees-Rocks-Homestead-left-with-clusters-of-mentally-ill-residents/stories/201601030021

Lovejoy, O. (1981). The origin of Man. *Science, 211,* 341–350.

Low, B. S. (1989). Cross-cultural patterns in the training of children: An evolutionary perspective. *Journal of Comparative Psychology, 103,* 311–319.

Low, B. S. (1989). Cross-cultural patterns in the training of children: An evolutionary perspective. *Journal of Comparative Psychology, 103,* 311-319.

Low, B. S. (1990). Marriage systems and pathogen stress in human societies. *American Zoologist, 30,* 325-339.

Low, B. S. (2000). *Why sex matters.* Princeton, NJ: Princeton University Press.

Lucas, R. E. (2014). Life satisfaction of U.S. counties predicts population growth. *Social Psychological and Personality Science, 5*(4), 383-388. doi:10.1177/1948550613494227

Lucas, R.E., Cheung, F., Lawless, N.M. (2014). Investigating the subjective well-being of United

States Regions. In P. J. Rentfrow (Ed.), *Geographical psychology: Exploring the interaction of environment and behavior* (pp. 161-177). Washington, D.C: American Psychological Association.

Lucas, R. E., Diener, E., Grob, A., Suh, E. M., & Shao, L. (2000). Cross-cultural evidence for the fundamental features of extraversion. *Journal of Personality and Social Psychology, 79*, 452-468.

Lynn, R., & Martin, T. (1995). National differences for thirty-seven nations in extraversion, neuroticism, psychoticism and economic, demographic and other correlates. *Personality and Individual Differences, 19*, 403-406.

Maccoby, E. E. (1998). *The two sexes.* Cambridge, MA: Harvard University Press.

MacDonald, K. B. (1998). Evolution, culture, and the Five-Factor Model. *Journal of Cross-Cultural Psychology, 29,* 119–149.

Macintyre, S., & Sooman, A. (1991). Non-paternity and prenatal genetic testing. *Lancet, 338,* 869–871.

Main, M. (1990). Cross-cultural strategies of attachment and attachment organization: Recent studies, changing methodologies, and the concept of conditional strategies. *Human Development, 33,* 48-61.

Malamuth, N. M. (1996). Sexually explicit media, gender differences, and evolutionary theory. *Journal of Communication, 46,* 8–31.

Maples, J. L., Guan, L., Carter, N. T., & Miller, J. D. (2014). A test of the International Personality Item Pool representation of the revised NEO Personality Inventory and development of a 120-item IPIP-based measure of the Five-Factor Model. *Psychological Assessment*, *26*, 1070-1084.

Markey, P. M., & Markey, C. N. (2009). A brief assessment of the Interpersonal Circumplex: The IPIP-IPC. *Assessment, 16,* 352-361.

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review, 98,* 224-253.

Marvin, R.A., & Britner, P.A. (1999). *Cultural anthropology* (6th ed.). Belmont, CA: Wadsworth.

Maynard Smith, J. (1977). Parental investment: A prospective analysis. *Animal Behavior, 25,* 1–9.

McCann, S. J. H. (2011). Conservatism, openness, and creativity: Patents granted to residents of American states. *Creativity Research Journal, 23,* 339-345. doi:10.1080/10400419.2011.621831

McCann, S. J. H. (2017). Higher USA state resident neuroticism is associated with lower state volunteering rates. *Personality and Social Psychology Bulletin, 43*(12), 1659-1674. 10.1177/0146167217724802

McCoy, K. (2017, July 18). Pizza Hut plans to hire roughly 14,000 new drivers this year. Retrieved March 04, 2018, from https://www.usatoday.com/story/money/2017/07/18/pizza-hut-plans-hire-roughly-14-000-new-drivers-year/488352001/

McCrae, R. R. (2000). Trait psychology and the revival of personality and culture studies. *American Behavioral Scientist, 44,* 10-31.

McCrae, R. R. (2001). Trait psychology and culture: Exploring intercultural comparisons. *Journal of Personality, 69,* 819-846.

McCrae, R. R. (2002). NEO-PI-R data from 36 cultures: Further intercultural comparisons. In

R. R. McCrae & J. Allik (Eds.), *The five-factor model of personality across cultures* (pp. 105-126). New York: Kluwer Academic/Plenum.

McCrae, R. R., & Costa, P. T., Jr. (1990). *Personality in adulthood*. New York: Guilford.

McCrae, R. R., & Costa, P. T., Jr. (1997). Conceptions and correlates of openness to experience. In R. Hogan, J. Johnson, & S. Briggs (Eds.), *Handbook of personality psychology* (pp. 825-847). San Diego, CA: Academic Press.

McCrae, R. R., & Costa, P. T., Jr. (1999). A Five-Factor theory of personality. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (2nd ed., pp. 139-153). New York: Guilford.

McCrae, R. R., Zonderman, A. B., Costa, P. T., Jr., Bond, M. H., & Paunonen, S. V. (1996). Evaluating replicability of factors in the Revised NEO Personality Inventory: Confirmatory factor analysis versus Procrustes rotation. *Journal of Personality and Social Psychology*, *70*, 552-566.

Mead, M. (1935). *Sex and temperament in three primitive societies.* New York: Morrow.

Mealey, L. (2000). *Sex differences: Developmental and evolutionary strategies.* San Diego, CA: Academic Press.

Messick, S. (1995). Validity of psychological assessment: Validation of inferences from persons' responses and performances as scientific inquiry into score meaning. *American Psychologist, 50*, 741-749.

Miller, L. C., & Fishkin, S. A. (1997). On the dynamics of human bonding and reproductive success: Seeking windows on the adapted-for human- environment interface. In J. A. Simpson & D. T. Kenrick (Eds.), *Evolutionary social psychology* (pp. 197–235). Mahwah, NJ: Erlbaum.

Miller, L. C., Putcha-Bhagavatula, A., & Pedersen, W. C. (2002). Men's and women's mating preferences: Distinct evolutionary mechanisms? *Current Directions in Psychological Science, 11,* 88–93.

Mills, S., Saidel, T., Bennett, A., Rehle, T., Hogle, J., Brown, T., & Magnani, R. (1998). HIV risk behavioral surveillance: A methodology for monitoring behavioral trends. *AIDS, 12,* S37–S46.

Minkov, M., & Hofstede, G. (2014). Clustering of 316 European regions on measures of values: Do Europe's countries have national cultures? *Cross-Cultural Research: The Journal of Comparative Social Science, 48*(2), 144-176.

Misra, G. (1994). Psychology of control: Cross-cultural issues. *Journal of Indian Psychology, 12*, 8-48.

Mize, S. J. S., Robinson, B. E., Bockting, W. O., & Scheltema, K. E. (2002). Meta-analysis of the effectiveness of HIV prevention interventions for women. *AIDS CARE, 14,* 163–180.

Mokdad, A. H., Dwyer-Lindgren, L., Fitzmaurice, C., Stubbs, R. W., Bertozzi-Villa, A., Morozoff, C., . . . Murray, C. J. L. (2017). Trends and patterns of disparities in cancer mortality among US counties, 1980-2014. *Jama, 317*(4), 388-406. 10.1001/jama.2016.20324

Montello, D. R. (2013). *Behavioral geography* Oxford University Press. doi:10.1093/obo/9780199874002-0069

Moore, M. M. (1995). Courtship signaling and adolescents: "Girls just wanna have fun"? *Journal of Sex Research, 32,* 319–328.

Moran, P. (1999). The epidemiology of antisocial personality disorder. *Social Psychiatry and Psychiatric Epidemiology, 34*(5), 231-242. doi:10.1007/s001270050138

Moray, N. (2008). The good, the bad, and the future: On the archaeology of ergonomics. *Human Factors: The Journal of the Human Factors and Ergonomics Society, 50*(3), 411-417. 10.1518/001872008X288439

Mundigl , R. (2009, August 18). Choropleth Map Template USA by Counties. Retrieved February 04, 2018, from http://www.clearlyandsimply.com/clearly_and_simply/2009/08/choropleth-map-template-usa-by-counties.html

Munroe, R. L., & Munroe, R. H. (1997). A comparative anthropological perspective. In J. W. Berry, Y. H. Poortinga, & J. Pandey (Eds.), *Handbook of cross-cultural psychology,* (2nd ed., Vol. 1, pp. 171-213). Boston: Allyn and Bacon.

Murray, D. R., & Shaller, M. (2010). Historical prevalence of disease within 230 geopolitical regions: A tool for investigating origins of culture. *Journal of Cross-Cultural Psychology, 41*, 99-109. doi:10.1177/0022022109349510

Murray, D. R., & Shaller, M. (2014). Pathogen prevalence and geographical variation in traits and behaviors. In P. J. Rentfrow (Ed.), *Geographical psychology: Exploring the interaction of environment and behavior* (pp. 51-70). Washington, D.C: American Psychological Association.

National Committee for Mental Hygiene. (1918). Statistical manual for the use of institutions for the insane. New York, NY: Author.

National Research Council (U.S.). Committee on Support for Thinking Spatially: The Incorporation of Geographic Information Science across the K-12 Curriculum. (2006). *Learning to think spatially*. Washington, D.C: National Academies Press.

Neel, J. V., & Weiss, K. M. (1975). The genetic structure of a tribal population, the

Yanomama Indians: XIII. Biodemographic studies. *American Journal of Physical Anthropology, 42,* 25–51.

Nesse, R. M. (1990). Evolutionary explanations of emotions. *Human Nature, 1,* 261-289.

Nettle, D., & Penke, L. (2010). Personality: bridging the literatures from human psychology and behavioural ecology. *Philosophical Transactions of the Royal Society B: Biological Sciences, 365*(1560), 4043–4050. http://doi.org/10.1098/rstb.2010.0061

New Mexico Department of Health (2017, January). Retrieved from www.nmhealth.org

Nichols, D. S., Padilla, J., & Gomez-Maqueo, E. L. (2000). Issues in the cross-cultural adaptation and use of the MMPI-2. In J. H. Dana (Ed.), *Handbook of cross-cultural and multicultural assessment* (pp. 247-266). Mahwah, NJ: Lawrence Erlbaum.

Norman, W. T. (1963). Toward an adequate taxonomy of personality attributes: Replicated factor structure in peer nomination personality ratings. *The Journal of Abnormal and Social Psychology, 66*(6), 574-583. doi:http://dx.doi.org.ezaccess.libraries.psu.edu/10.1037/h0040291

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York: McGraw-Hill.

Obschonka, M., Schmitt-Rodermund, E., Silbereisen, R. K., Gosling, S. D., & Potter, J. (2013). The regional distribution and correlates of an entrepreneurship-prone personality profile in the United States, Germany, and the United Kingdom: A socioecological perspective. *Journal of Personality and Social Psychology, 105*(1), 104-122. doi:http://dx.doi.org.ezaccess.libraries.psu.edu/10.1037/a0032275

Obschonka, M., Stuetzer, M., Rentfrow, P. J., Potter, J., & Gosling, S. D. (2017). Did strategic bombing in the second world war lead to ‘German angst’? A Large-scale

empirical test across 89 German cities. *European Journal of Personality, 31*(3), 234-257. doi:10.1002/per.2104

Oishi, S., & Diener, E. (2001). Goals, culture, and subjective well-being. *Personality and Social Psychology Bulletin, 27,* 1674-1682.

Oishi, S., & Graham, J. (2010). Social ecology: Lost and found in psychological science. *Perspectives on Psychological Science, 5*(4), 356-377. 10.1177/1745691610374588

Oishi, S., & Hoffman, K. M. (2014). Current and future directions of socio-ecological psychology. *Psychologia: An International Journal of Psychological Sciences, 57*(2), 59-64. doi:http://dx.doi.org.ezaccess.libraries.psu.edu/10.2117/psysoc.2014.59

Oishi, S., Talhelm, T., & Lee, M. (2015). Personality and geography: Introverts prefer mountains. *Journal of Research in Personality, 58,* 55-68. doi:http://dx.doi.org.ezaccess.libraries.psu.edu/10.1016/j.jrp.2015.07.001

Oliver, M. B., & Hyde, J. S. (1993). Gender differences in sexuality: A meta-analysis. *Psychological Bulletin, 114,* 29–51.

Olmstead Alan L, Rhode Paul W. (2000). The transformation of northern agriculture. In: S.L. Engerman & R.E. Gallman (Eds.), *The Cambridge economic history of the United States. vol. 3.* (pp.693-742). Cambridge: Cambridge University Press.

Orians, G. (1980). Habitat selection: General theory and applications to human behavior. In J. S. Lockard (Ed.), *The evolution of human social behavior* (pp. 49-66). Chicago: Elsevier.

Orians, G. & Heerwagen, J. H. (1992). Evolved responses to landscapes. In J. H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture*. New York: University Press.

Paul, L., Foss, M. A., & Baenninger, M. A. (1996). Double standards for sexual jealousy:

Manipulative morality or a reflection of evolved sex differences? *Human Nature, 7:3,* 291-324.

Park, J., Cho, Y.-S., Yi, K.-H., Rhee, K.-Y., Kim, Y., & Moon, Y.-H. (1999). Unexpected natural death among Korean workers. *Journal of Occupational Health, 41,* 238-243.

Park, N., & Peterson, C. (2010). Does it matter where we live? The urban psychology of character strengths. *American Psychologist, 65,* 535-547. doi:10.1037/a0019621

Pasternak, B., Ember, C., & Ember, M. (1997). *Sex, gender, and kinship: A cross-cultural perspective.* Upper Saddle River, NJ: Prentice Hall.

Peabody, D. (1985). *National characteristics*. New York: Cambridge University Press.

Peabody, D., & De Raad, B. (2002). The substantive nature of psycholexical personality factors: A comparison across languages. *Journal of Personality and Social Psychology, 83,* 983-997.

Pedersen, F.A. (1991). Secular trends in human sex ratios: Their influence on individual and family behavior. *Human Nature, 2,* 271-291.

Pedersen, W. C., Miller, L. C., Putcha-Bhagavatula, A. D., & Yang, Y. (2002). Evolved sex differences in the number of partners desired? The long and the short of it. *Psychological Science, 13,* 157–161.

Peen, J., Schoevers, R. A., Beekman, A. T., & Dekker, J. (2010). The current status of urban-rural differences in psychiatric disorders. *Acta Psychiatrica Scandinavica*, *121*(2), 84-93. doi:10.1111/j.1600-0447.2009.01438.x

Peretti, P. O., & Pudowski, B. C. (1997). Influence of jealousy on male and female college daters. *Social Behavior and Personality, 25:2,* 155-160.

Pescor, M. (1934). The Woodworth Personal Data Sheet as Applied to Delinquents. *Public*

Health Reports (1896-1970), 49(38), 1111-1115. doi:10.2307/4581311

Petrie, M., & Kempenaers. (1998). Extra-pair paternity in birds: Explaining variation between species and populations. *Trends in Evolutionary Ecology*, 52-58.

Philipp, E. E. (1973). Discussion: Moral, social, and ethical issues. In G. E. W. Wolstenholme & D. W. Fitzsimons (Eds.), *Law and ethics of A. I. D. and embryo transfer: Ciba Foundation Symposium 17* (pp. 663–666). London: Associate Scientific.

Piedmont, R. L., Bain, E., McCrae, R. R., & Costa, P. T., Jr. (2002). The applicability of the five-factor model in a sub-Saharan culture: The NEO-PI-R in Shona. In R. R. McCrae & J. Allik (Eds.), *The five-factor model of personality across cultures* (pp. 155-173). New York: Kluwer Academic/Plenum.

Pietromonaco, P.R., & Barrett, L.F. (1997). Working models of attachment and daily social interactions. *Journal of Personality and Social Psychology, 73*, 1409-1423.

Pietrzak, R. H., Laird, J. D., Stevens, D. A., & Thompson, N. S. (2002). Sex differences in human jealousy: A coordinated study of forced-choice, continuous rating-scale, and physiological responses on the same subjects. *Evolution and Human Behavior, 23*, 83-94.

Pinker, S. (1997). *How the mind works*. New York: Norton.

Plaut, V. C., Markus, H. R., & Lachman, M. E. (2002). Place matters: Consensual features and regional variation in American well-being and self. *Journal of Personality and Social Psychology, 83*(1), 160-184. doi:10.1037//0022-3514.83.1.160

Poortinga, Y. H., Van de Vijver, F., & Van Hemert, D. A. (2002). Cross-cultural equivalence of the Big Five: A tentative interpretation of the evidence. In R. R. McCrae & J. Allik

(Eds.), *The five-factor model across cultures* (pp. 273-294). New York: Kluwer Academic/Plenum.

Poortinga, Y. H., & van Hemert, D. A. (2001). Personality and culture: Demarcating between the common and the unique. *Journal of Personality, 69,* 1033-1060.

Pullman, H., & Alik, J. (2000). The Rosenburg Self-Esteem Scale: Its dimensionality, stability and personality correlates in Estonian. *Personality and Individual Differences, 28,* 701-715.

Punch (1849). The water that John Drinks. (not sure how to cite this)

Quinn, N. (1977). Anthropological studies on women's status. *Annual Review of Anthropology, 6,* 181-225.

Raaflaub, K. A., & Talbert, R. J. A. (2009). *Geography and ethnography: Perceptions of the world in pre-modern societies* (1st ed.). Chichester, U.K;Malden, MA;: Wiley-Blackwell.

Ramirez-Esparza, N., Gosling, S. D., Benet-Martinez, V., Potter, J. P., & Pennebaker, J. W. (2006). Do bilinguals have two personalities? A special case of frame switching. *Journal of Research in Personality, 40,* 99-120.

Raskin, R. N., & Hall, C. S. (1979). A narcissistic personality inventory. *Psychological Reports, 45*(2), 1-590.

Raskin, R., & Terry, H. (1988). A principal-components analysis of the narcissistic personality inventory and further evidence of its construct validity. *Journal of Personality and Social Psychology: Personality Processes and Individual Differences, 54*(5), 890-902.

Regan, P. C. (1998a). Minimum mate selection standards as a function of perceived mate value, relationship context, and gender. *Journal of Psychology and Human Sexuality, 10,* 53–73.

Regan, P. C. (1998b). What if you can't get what you want? Willingness to compromise ideal mate selection standards as a function of sex, mate value, and relationship context. *Personality and Social Psychology Bulletin, 24,* 1294–1303.

Regan, P. C., & Berscheid, E. (1997). Gender differences in characteristics desired in a potential sexual and marriage partner. *Journal of Psychology and Human Sexuality, 9,* 25–37.

Rentfrow, P. J. (2010). Statewide differences in personality: Toward a psychological geography of the united states. *American Psychologist, 65*(6), 548-558. doi:10.1037/a0018194

Rentfrow, P. J. (2014). *Geographical psychology: Exploring the interaction of environment and behavior.* Washington, DC: American Psychological Association.

Rentfrow, P. J., Gosling, S. D., Jokela, M., Stillwell, D. J., Kosinski, M., & Potter, J. (2013). Divided we stand: Three psychological regions of the United States and their political, economic, social, and health correlates. *Journal of Personality and Social Psychology, 105*(6), 996-1012. doi:http://dx.doi.org.ezaccess.libraries.psu.edu/10.1037/a0034434

Rentfrow, P. J., Gosling, S. D., & Potter, J. (2008). A theory of the emergence, persistence, and expression of geographic variation in psychological characteristics. *Perspectives on Psychological Science, 3*(5), 339-369. doi:http://dx.doi.org.ezaccess.libraries.psu.edu/10.1111/j.1745-6924.2008.00084.x

Rentfrow, P. J., Jost, J. T., Gosling, S. D., & Potter, J. (2009). Statewide differences in personality predict voting patterns in 1996-2004 U.S. presidential elections. *Social and psychological bases of ideology and system justification.* (pp. 314-347) Oxford University Press, New York, NY. doi:10.1093/acprof:oso/9780195320916.003.013

Reynolds, J. D. (1987). Mating system and nesting biology of the red- necked phalarope *Phalaropus lobatus*: What constrains polyandry? *Isis, 129,* 225–242.

Rholes, W. S., Simpson, J. A., & Blakely, B. S. (1995). Adult attachment styles and mothers' relationships with their young children. *Personal Relationships, 2,* 35-54.

Rholes, W.S., Simpson, J.A., & Stevens,J.G. (1998). Attachment orientations, social support, and conflict resolution in close relationships. In J.A. Simpson &W.S. Rholes (Eds.), *Attachment theory and close relationships.* (pp. 166-188). New York: Guilford.

Roberts,N., & Noller,P. (1998). The associations between adult attachment and couple violence: The role of communication patterns and relationship satisfaction. In J.A. Simpson & W.S. Rholes (Eds.), *Attachment theory and close relationships* (pp. 317-350). New York: Guilford.

Robinson, J. P., Shaver, P.R., & Wrighrsman, L.S. (1991). Criteria for scale selection and evaluation. In J. P. Robinson, P. R. Shaver, & L.S. Wrightsman (Eds.), *Measures of personality and social psychological attitudes* (pp. 1-16). San Deigo, CA: Academic Press.

Rohner, R. P., & Brittner, P.A. (2002). Worldwide mental health correlates of parental acceptance-rejection: Review of cross-cultural and intercultural evidence. *Cross-Cultural Research, 36,* 16-47.

Rosenberg, M. (1965). *Society and adolescent self-image.* Princeton, NJ: Princeton University Press.

Rothbaum, F., Weisz., J., Prott, M., Miyake, K., &Morelli, G. (2000). Attachment and culture: Security in the United States and Japan. *American Psychologist, 55,* 1093-1104.

Rowe, D. C. (2002). On genetic variation in menarche and age at first sexual intercourse: A critique of the Belsky–Draper hypothesis. *Evolution and Human Behavior, 23,* 365–372.

Rusbult, C. E. (1980). Commitment and satisfaction in romantic associations: A test of the investment model. *Journal of Experimental Social Psychology, 16,* 172-186.

Salmon, C., & Symons, D. (2001). *Warrior lovers: Erotic fiction, evolution, and female sexuality.* London: Weidenfeld & Nicolson

Salovey, P., & Rodin, J. (1988). Coping with envy and jealousy. *Journal of Social and Clinical Psychology, 7,* 15-33.

Sarkar, S. (2017, February 27). Pokémon Go hits 650 million downloads. Retrieved March 04, 2018, from https://www.polygon.com/2017/2/27/14753570/pokemon-go-downloads-650-million

Sasse, G., Mu ̈ller, H., Chakraborty, R., & Ott, J. (1994). Estimating the frequency of nonpaternity in Switzerland. *Human Heredity, 44,* 337– 343.

Saucier, G. (1997). Effects of variable selection on the factor structure of person descriptors. *Journal of Personality and Social Psychology, 73,* 1296-1312.

Saucier, G., & Goldberg, L. R. (2001). Lexical studies of indigenous personality factors: Premises, products, prospects. *Journal of Personality, 69,* 847-879.

Scharfe, E., & Bartholomew, K. (1994). Reliability and stability of adult attachment patterns. *Personal Relationships, 1,* 23-43.

Scheib, J. E. (1997, June). *Context-specific mate choice criteria: Women's trade-offs in the contexts of long-term and extra-pair mateships.* Paper presented at the Annual Meeting of the Human Behavior and Evolution Society, University of Arizona, Tucson, AZ.

Schmitt, D. P. (2002). A meta-analysis of sex differences in romantic attraction: Do rating contexts affect tactic effectiveness judgments? *British Journal of Social Psychology, 41,* 387– 402.

Schmitt, D. P. (2002). Are sexual promiscuity and relationship infidelity linked to different personality traits across cultures? Findings from the International Sexuality Description Project. In W. Lonner, D. L. Dinnel, S. A. Hayes, & D. N. Sattler (Eds.), *Online readings in psychology and culture.* Western Washington University, Department of Psychology, Center for Cross-Cultural Research Website: http://www.wwu.edu/~culture.

Schmitt, D. P. (2002). Personality, attachment, and sexuality related to dating relationship outcomes: Contrasting three perspective on personal attribute interaction. *British Journal of Social Psychology, 41,* 589-610.

Schmitt, D. P. (2003). *Is short-term mating the result of insecure attachment? A test of competing evolutionary perspectives.* Manuscript submitted for publication.

Schmitt, D. P. (2003). *Short-term mating desires are related to finger length ratios, waist-to-hip ratios, and body symmetry in college-aged men and women.* Manuscript submitted for publication.

Schmitt, D. P. (2003). *Sociosexuality from Argentina to Zimbabwe, a 48-nation study: Evolutionary and social role perspectives on sex, culture, and strategies of human mating.* Manuscript submitted for publication.

Schmitt, D. P. (2003). *Short-term mating and romantic attachment across 52 nations: Where are the connections?* Manuscript submitted for publication.

Schmitt, D.P. et al. (2017). Narcissism and the strategic pursuit of short-term mating: Universal links across 11 world regions of the International Sexuality Description Project-2. *Psychological Topics, 26,* 89-137.

Schmitt, D. P., Alcalay, L., Allensworth, M., Allik, J., Ault, L., Austers, I., Bennett, K. L., et al. (2003). Are men universally more dismissing than women? Gender differences in

romantic attachment across 62 cultural regions. *Personal Relationships, 10,* 309-333.

Schmitt, D. P., Alcalay, L., Allensworth, M., Allik, J., Ault, L., Austers, I., Bennett, K. L., et al. (2004). Patterns and universals of adult romantic attachment across 62 cultural regions: Are models of self and other pancultural constructs? *Journal of Cross-Cultural Psychology, 35,* 367-402.

Schmitt, D. P., Alcalay, L, M., Allik, J., Ault, L., Austers, I., Bennett, K. L., et al. (2003). Universal sex differences in the desire for sexual variety: Tests from 52 nations, 6 continents, and 13 islands. *Journal of Personality and Social Psychology, 85,* 85-104.

Schmitt, D. P., Alcalay, L.M., Allik, J., Angleitner, A., Ault, L., Austers, I., Bennett, K. L., et al. (2004). Patterns and universals of mate poaching across 53 nations: The effects of sex, culture, and personality on romantically attracting another person's partner. *Journal of Personality and Social Psychology, 86,* 560-584.

Schmitt, D. P., Allik, J., McCrae, R. R., Benet-Martinez, V., Alcalay, L., Ault, L., Austers, I., Bennett, K. L., et al.* (2007). The geographic distribution of big five personality traits: Patterns and profiles of human self-description across 56 nations. *Journal of Cross Cultural Psychology, 38,* 173-212.

Schmitt, D. P., & Buss, D. M. (2000). Sexual dimensions of person description: Beyond or subsumed by the Big Five? *Journal of Research in Personality, 34,* 141-177.

Schmitt, D. P., & Buss D. M. (2001). Human mate poaching: Tactics and temptations for infiltrating existing mateships. *Journal of Personality and Social Psychology, 80,* 894-917.

Schmitt, D. P., & Buss, D. M. (1996). Strategic self-promotion and competitor derogation: Sex

and context effects on the perceived effective- ness of mate attraction tactics. *Journal of Personality and Social Psychology, 70,* 1185–1204.

Schmitt, D. P., Couden, A., & Baker, M. (2001). The effects of sex and temporal context on feelings of romantic desire: An experimental evaluation of Sexual Strategies Theory. *Personality and Social Psychology Bulletin, 27,* 833– 847.

Schmitt, D. P., & Shackelford, T. K. (2003). Nifty ways to leave your lover: The tactics people use to entice and disguise the process of human mate poaching. *Personality and Social Psychology Bulletin, 29,* 1018-1035.

Schmitt, D. P., Shackelford, T. K., & Buss, D. M. (2001). Are men really more "oriented" toward short-term mating than women? A critical review of research and theory. *Psychology, Evolution and Gender, 3,* 211–239.

Schmitt, D. P., Shackelford, T., Duntley, J., Tooke, W., & Buss, D. M. (2001). The desire for sexual variety as a tool for understanding basic human mating strategies. *Personal Relationships, 8,* 425-455.

Schmitt, D. P., Shackelford, T. K., Duntley, J., Tooke, W., Buss, D. M., Fisher, M. L., et al. (2002). Is there an early 30s peak in female sexual desire: Cross-sectional evidence from the United States and Canada. *The Canadian Journal of Human Sexuality, 11,* 1–18.

Schwarz, N. (1999). Self-reports: How the questions shape the answers. *American Psychologist, 54*, 903-105.

Scoble, R. & Israel, S. (2017). *The fourth transformation: How augmented reality and artificial intelligence change everything*. Patrick Brewster Press.

Self, W. & Steadman, R. (2007). *Psychogeography: Disentangling the modern conundrum of psyche and place*. Publishers Weekly.

Shaban, H. (2017, July 25). As your Roomba cleans your floors, it's gathering maps of your house. Retrieved March 05, 2018, from http://www.latimes.com/business/technology/la-fi-tn-roomba-map-20170725-story.html

Shackelford, T. K. (1997). Perceptions of betrayal and the design of the mind. In J. A. Simpson & D. T. Kenrick (Eds.), *Evolutionary social psychology* (pp. 73–108). Hillsdale, NJ: Erlbaum.

Shackelford, T. K. (2001). Self-esteem in marriage. *Personality & Individual Differences, 30,* 371-390.

Shackelford, T. K., & Buss, D. M. (1996). Betrayal in mateships, friendships and coalitions. *Personality and Social Psychology Bulletin, 22*, 1151-1164.

Shackelford, T. K., & Buss, D. M. (1997). Marital satisfaction in evolutionary psychology perspective. In R. J. Sternberg & M. Hojjat (Eds.), *Satisfaction in close relationships* (pp. 7–25). New York: Guilford Press.

Shackelford, T. K., Buss, D. M., & Bennett, K. L. (2002). Forgiveness or breakup: Sex differences in responses to a partner's infidelity. *Cognition & Emotion, 16*, 299-307.

Shackelford, T. K., & LeBlanc, G. J. (2001). Sperm competition in insects, birds, and humans: Insights from a comparative evolutionary perspective. *Evolution and Cognition, 7*, 194-202.

Shackelford, T. K., LeBlanc, G. J., & Drass, E. (2000). Emotional reactions to infidelity. *Cognition and Emotion, 14*, 643-659.

Shackelford, T. K., LeBlanc, G. J., Weekes-Shackelford, V. A., Bleske-Rechek, A. L., Euler, H. A., & Hoier, S. (2002). Psychological adaptation to human sperm competition. *Evolution and Human Behavior, 23,* 123–138.

Sharpsteen, D. J. (1993). Romantic jealousy as an emotion concept: A prototype analysis. *Journal of Social and Personal Relationships, 10*, 69-82.

Sharpsteen, D. J., & Kirkpatrick, L. A. (1997). Romantic jealousy and adult romantic attachment. *Journal of Personality and Social Psychology, 72*, 627-640.

Sheehan, M. J., & Watson, M. W. (2008). Reciprocal influences between maternal discipline techniques and aggression in children and adolescents. *Aggressive Behavior, 34*(3), 245-255. 10.1002/ab.20241

Shellman-Reeve, J. S., & Reeve, H. K. (2000). Extra-pair paternity as the result of reproductive transactions between paired mates. *Proc. R. Soc. Lond. B., 267*, 2543-2546.

Shweder, R. A. (1990). *Thinking through cultures*. Cambridge, MA: Harvard University Press.

Simpson, J. A. (1990). Influences of attachment styles on romantic relationships. *Journal of Personality and Social Psychology, 59*, 971-980.

Simpson, J. A. (1999a). Attachment theory in modern evolutionary perspective. In J. Cassidy & P. R. Shaver (Eds.), *Handbook of attachment* (pp. 115-140). New York: Guilford.

Simpson, J.A. (1999b). Attachment theory and research: Implications for the theory and practice of individual psychotherapy with adults. In J. Cassidy & P.R. Shaver (Eds.), *Handbook of attachment* (pp. 575-594). New York: Guilford.

Simpson, J. A., & Gangestad, S. W. (1991). Individual differences in sociosexuality: Evidence for convergent and discriminant validity. *Journal of Personality and Social Psychology, 60*, 870-883.

Simpson, J. A., & Gangestad, S. W. (1992). Sociosexuality and romantic partner choice. *Journal of Personality, 60,* 31–51.

Simpson, J. A., Gangestad, S. W., Christensen, P. N., & Leck, K. (1999). Fluctuating asymmetry,

sociosexuality, and intrasexual competitive tactics. *Journal of Personality and Social Psychology, 76,* 159–172.

Simpson, J. A., & Rholes, W. S. (Eds.). (1998). *Attachment theory and close relationships.* New York: Guilford.

Smith, P. B. (2004). Acquiescent response bias as an aspect of cultural communication style. *Journal of Cross- Cultural Psychology, 35,* 50-61.

Smith, R. L. (1984). Human sperm competition. In R. L. Smith (Ed.), *Sperm competition and the evolution of animal mating systems* (pp. 601–659). New York: Academic Press.

Smuts, B. B. (1985). *Sex and friendship in baboons.* New York: Guilford.

Snyder, M., Simpson, J. A., & Gangestad, S. (1986). Personality and sexual relations. *Journal of Personality and Social Psychology, 51,* 181-190.

Sonnad, N. (2014, December 23). The dude map: How Americans refer to their bros. Retrieved February 04, 2018, from https://qz.com/316906/the-dude-map-how-american-men-refer-to-their-bros/

Spector, P. E. (1992). *Summated rating scale construction.* Newbury Park, CA: Sage.

Speed, A., & Gangestad, S. W. (1997). Romantic popularity and mate preferences: A peer-nomination study. *Personality and Social Psychology Bulletin, 23,* 928–935.

Sprecher, S., Sullivan, Q., & Hatfield, E. (1994). Mate selection prefer- ences: Gender differences examined in a national sample. *Journal of Personality and Social Psychology, 66,* 1074–1080.

Soon, H., & Malley-Morrison, K. (2000). Young adult attachment styles and intimate relationships with close friends: A cross-cultural study of Koreans and Caucasian Americans. *Journal of Cross-Cultural Psychology,31,* 528-534.

Spence, J. T., & Helmreich, R. L. (1978). *Masculinity and femininity: Their psychological dimensions, correlates, and antecedents.* Austin: University of Texas Press.

Sprecher,S., Aron,A., Hatfield, E., Cortese, A., Potapova, E., & Levitskay,A. (1994). Love: American style, Russian style, and Japanese style. *Personal Relationships, 1,* 349-369.

Sroufe, L. A. (1983). Infant-caregiver attachment and patterns of adaption in preschool: The roots of maladaptation and competence. In M. Perimutter (Ed.), *The Minnesota Symposia on Child Psychology: Vol. 16. Development and policy concerning children with special needs* (pp. 41-83). Hillsdale, NJ: Erlbaum.

Steel, P., & Ones, D. S. (2002). Personality and happiness: A national-level analysis. *Journal of Personality and Social Psychology, 83,* 767-781.

Stephan, C. W., Bechman, G. F. (1999). What's sex got to do with it? Attachment, love schemas, and sexuality. *Personal Relationships, 6,* 111-123.

Stephens-Davidowitz, S. (2017). *Everybody lies: Big data, new data, and what the internet can tell us about who we really are* (First ed.). New York, N.Y.: Dey St., an imprint of William Morrow.

Stewart, D. K., & Love, W. A. (1968). A general canonical correlation index. *Psychological Bulletin, 70,* 160-163.

Stewart, R. A., & Beatty, M. J. (1985). Jealousy and self-esteem. *Perceptual and Motor Skills, 60,* 153-154.

Stoeber, J., & Corr, P. J. (2015). Perfectionism, personality, and affective experiences: New insights from revised reinforcement sensitivity theory. *Personality and Individual Differences, 86,* 354-359. doi:10.1016/j.paid.2015.06.045

Stumer, N., & Gungor, D. (1999). Psychometric evaluation of adult attachment measures in

Turkish samples and a cross-cultural comparison. *Turkish Journal of Psychology, 14,* 71-109.

Suomo, S.J. (1995). Influence of Bowlby's attachment theory on research on nonhuman primate biobehavioral development. In S. Goldberg, R. Muir, & J. Kerr (Eds.), *Attachment theory: Social, development, and clinical perspectives* (pp. 185-201). Hillsdale, NJ: Analytic Press.

Swami, V., Weis, L., Lay, A., Barron, D., & Furnham, A. (2016). Associations between belief in conspiracy theories and the maladaptive personality traits of the personality inventory for DSM-5. *Psychiatry Research, 236,* 86-90.

Symons, D. (1979). *The evolution of human sexuality.* New York: Oxford University Press.

Tamres, L. K., Janicki, D., & Helgeson, V. S. (2002). Sex differences in coping behavior: A meta-analytic review and an examination of relative coping. *Personality and Social Psychology Review, 6,* 2-30.

Taylor, S. E., Klein, L. C., Lewis, B. P., Gruenewald, T. L., Gurung, R. A. R., & Updegraff, J. A. (2000). Biobehavioral responses to stress in females: Tend-to-befriend, not fight-or-flight. *Psychological Review, 107,* 411-429.

Teismann, M. W., & Mosher, D. L. (1978). Jealous conflict in dating couples. *Psychological Reports, 42,* 1211-1216.

Terracciano, A., Abdel-Khalek, A. M., Adam, N., Adamovova, L., Ahn, C. K., et al. (2005). National character does not reflect mean personality trait levels in 49 cultures. *Science, 310,* 96-100.

Thiessen, D. (1994). Environmental tracking by females: Sexual lability. *Human Nature, 5,* 167–202.

Thompson, A. P. (1983). Extramarital sex: A review of the research literature. *Journal of Sex Research, 19,* 1–22.

Tooby, J., & Cosmides, L. (1990). The past explains the present: Emotional adaptions and the structure of ancestral environments. *Ethology and Sociobiology, 11,* 375-424.

Tooby, J., & Cosmides, L. (1992). The psychological foundations of culture. In J. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind* (pp. 19-136). New York: Oxford University Press.

Tooke, W., & Camire, L. (1991). Patterns of deception in intersexual and intrasexual mating strategies. *Ethology and Sociobiology, 12,* 345–364.

Townsend, J. M. (1995). Sex Without emotional involvement: An evolutionary interpretation of sex differences. *Archives of Sexual Behavior, 24,* 173-206.

Triandis, H. C. (1994). *Culture and social behavior*. New York: McGraw-Hill.

Triandis, H. C., (1995). *Individualism and collectivism.* Boulder, CO: Westview Press.

Triandis, H. C. (1997). Cross-cultural perspectives on personality. In R. Hogan, J. Johnson, & S. Briggs (Eds.), *Handbook of personality psychology* (pp. 439-464). San Diego, CA: Academic Press.

Trivers, R. (1972). Parental investment and sexual selection. In B. Campbell (Ed.), *Sexual selection and the descent of man, 1871-1971* (pp. 136-179). Chicago: Aldine.

Trivers, R. (1985). *Social evolution.* Menlo Park, CA: Benjamin Cummings.

Tsai, J. L., Knutson, B., & Fung, H. H. (2006). Cultural variation in affect valuation. *Journal of Personality and Social Psychology, 90,* 288-307.

Tupes, E. C., & Christal, R. C. (1958). *Stability of personality trait rating factors obtained under*

diverse conditions. Wright Air Development Center Wright-Patterson AFB, OH, No. 58-61.

Tupes, E. C., & Christal, R. E. (1961). *Recurrent personality factors based on trait ratings.* Personnel Research Lab Lackland AFB, TX. No. 61-97.

Ulrich, R.S. (1983). Aesthetic and affective response to natural environment. In I. Altman & J. Wohlwill (Eds.), *Human behavior and environment, Vo1.6: Behavior and natural environment.* New York: Plenum, 85-1 25.

Ulrich, R. S. (1984). View through a window may influence recovery from surgery. *Science, 224*(4647), 420-421. doi:10.1126/science.6143402

Ulrich, R. S. (1986). Human responses to vegetation and landscapes. *Landscape and Urban Planning, 13*, 29-44. doi:10.1016/0169-2046(86)90005-8

United States Department of Education (2017, January 04). Rethinking Discipline. Retrieved February 04, 2018, from https://www2.ed.gov/policy/gen/guid/school-discipline/index.html

United Nations Development Programme (2001). *Human development report 2001.* New York: Oxford University Press.

United Nations Statistics Division (2001). *World population prospects: The 2000 revision, Volume 1: Comprehensive tables* (United Nations publication, Sales No. E.01.XIII.8).

United States Census Bureau International Database (2017, January). Retrieved from http://www.census.gov/geo/maps-data/maps/thematic.html

United States Environmental Protection Agency (1989). Report to Congress on indoor air quality: Volume 2. EPA/400/1-89/001C. Washington, DC.

USDA United States Department of Agriculture Economic Research Service (2018). Retrieved

from https://www.ers.usda.gov

van de Vijver, F. J. R. (2000). The nature of bias. In R. H. Dana (Ed.). *Handbook of cross-cultural and multicultural personality assessment* (pp. 87-106). Mahwah, NJ: Lawrence Erlbaum.

van de Vijver, F. J. R., & Leung, K. (2000). Methodological issues in psychological research on culture. *Journal of Cross-Cultural Psychology, 31,* 33-55.

van de Vijver, F. J. R., & Leung, K. (2001). Personality in cultural context: Methodological issues. *Journal of Personality, 69,* 1007-1031.

van de Vijver, F. J. R.., & Leung, K. (1997). Methods and data analysis of comparative research. In J. W. Berry, Y.H. Poortinga, & J. Pandey (Eds.) *Handbook of cross-cultural psychology* (2nd ed., pp. 257-300). Boston: Allyn &Bacon.

Van de Vliert, E., Schwartz, S. H., Huismans, S.E., Hofstede, G., & Daan, S. (1999). Temperature, cultural masculinty, and domestic political violence: A cross-national study. *Journal of Cross-Cultural Psychology,30,* 291-314.

Van de Vliert, E., Yang, H. (2014). Where on Earth do collectivists live? Climato-economic impacts on ingroup love and outgroup hate. In P. J. Rentfrow (Ed.), *Geographical psychology: Exploring the interaction of environment and behavior* (pp. 15-30). Washington, D.C: American Psychological Association.

van Hemert, D. A., van de Vijver, F. J. R., Poortinga, Y. H., & Georgas, J. (2002). Structural and functional equivalence of the Eysenck Personality Questionnaire within and between countries. *Personality and Individual Differences, 33,* 1229-1249.

van Herk, H., Poortinga, Y. H., & Verhallen, T. M. M. (2004). Response styles in rating scales: Evidence of method bias in data from six EU countries. *Journal of Cross-*

Cultural Psychology, 35, 346-360.

van IJzendoorn, M.H., & Sagi, A. (1999). Cross-cultural patterns of attachment: Universal and contextual dimensions. In J. Cassidy & P.R. Shaver (Eds.), *Handbook of attachment* (pp. 713-734). New York: Guilford.

van Oers, K., de Jong, G., van Noordwijk, A. J., Kempenaers, B., & Drent, P. J. (2005). Contribution of genetics to the study of animal personalities: A review of case studies. *Behaviour, 142*(9-10), 1185-1206. 10.1163/156853905774539364

Vassos, E., Pedersen, C. B., Murray, R. M., Collier, D. A., & Lewis, C. M. (2012). Meta-analysis of the association of urbanicity with schizophrenia. *Schizophrenia Bulletin, 38*(6), 1118-1123. doi:10.1093/schbul/sbs096

Vedel, A. (2016). Big five personality group differences across academic majors: A systematic review. *Personality and Individual Differences, 92*, 1-10.

Voracek, M. (2001). Marital status as a candidate moderator variable of male-female differences in sexual jealousy: The need for representative population samples. *Psychological Reports, 88,* 553-566.

Voracek, M., Stieger, S., & Gindl, A. (2001). Online replication of evolutionary psychological evidence: Sex differences in sexual jealousy in imagined scenarios of mate's sexual versus emotional infidelity. In U. Deitrich Reips and M. Bosnjak (Eds.), *Dimensions of Internet Science* (pp. 91-112). Lengerich, Germany: Pabst Science Publishers.

Walker, Kyle E. (2016). Locating neighbourhood diversity in the American metropolis. *Urban Studies.* Published online May 2016.

Walsh, M. (2012). Hantaviruses. Retrieved from www.infectionlandscapes.org

Walter, A. (1997). The evolutionary psychology of mate selection in Morocco: A multivariate

analysis. *Human Nature, 8,* 113–137.

Walters, S., & Crawford, C. B. (1994). The importance of mate attraction for intrasexual competition in men and women. *Ethology and Sociobiology, 15,* 5–30.

Waters, E., Merrick, S., Treboux, D., Crowell, J., & Alberstein, L. (2000). Attachment security in infancy and early adulthood: A twenty-year longitudinal study. *Child Development, 71,* 684-689.

Watson, D. P., & Burlingame, A. W. (1960). *Therapy through horticulture*. New York: Macmillan.

Watson, D., & Clark, L. A. (1997). Extraversion and its positive emotional core. In R. Hogan, J. Johnson, & S. Briggs (Eds.), *Handbook of personality psychology* (pp. 767–793). San Diego, CA: Academic Press.

WebMD (2016, December). Cold and flu symptoms across the U.S. Retrieved from www.webmd.com

Weinhardt, L. S., Carey, M. P., Johnson, B. T., & Bickham, N. L. (1999). Effects of HIV counseling and testing on sexual risk behavior: A meta-analytic review of published research, 1985–1997. *American Journal of Public Health, 89,* 1397–1405.

White, G. L. (1981). Some correlates of romantic jealousy. *Journal of Personality, 49: 2,* 129-147.

White, G. L., & Mullen, P. E. (1989). *Jealousy*. New York: Guilford.

Whitley, B. E. (1996). *Principles of research in behavioral science.* Mountain view, CA: Mayfield.

Wiederman, M. W. (1997). Extramarital sex: Prevalence and correlates in a national survey. *The Journal of Sex Research, 34,* 167–174.

Wiederman, M. W., & Allgeier, E. R. (1993). Gender differences in sexual jealousy:

Adaptationist or social learning explanation? *Ethoglogy and Sociobiology, 14,* 115-140.

Wiederman, M. W., Allgeier, E. R. (1995). Empirical investigation of the use of the term "jealousy" in survey research. *Representative Research in Social Psychology, 20,* 15-29.

Wiederman, M. W., & Dubois, S. L. (1998). Evolution and sex differences in preferences for short-term mates: Results from a policy capturing study. *Evolution and Human Behavior, 19,* 153–170.

Wiederman, M. W., & Hurd, C. (1999). Extradyadic involvement during dating. *Journal of Social and Personal Relationships, 16,* 265–274.

Wiederman, M. W., & Kendall, E. (1999). Evolution and sex differences in sexual jealousy: Investigation with a sample from Sweden. *Evolution and Human Behavior, 20,* 121-128.

Wiggins, J. S., & Trapnell, P. D. (1997). Personality structure: The return of the Big Five. In R. Hogan, J. Johnson, & S. Briggs (Eds.), *Handbook of personality psychology* (pp. 737-765). San Diego, CA: Academic Press.

Wilcox, R. R. (1987). *New statistical procedures for the social sciences.* Hillsdale, NJ: Erlbaum.

Wilcox, R. R. (1996). *Statistics for the social sciences.* San Diego, CA: Academic Press.

Wilson, A. B., Vincent, A., Ahnesjö, I., & Meyer, A. (2001). Male pregnancy in seahorses and pipefishes (family syngnathidae): Rapid diversification of paternal brood pouch morphology inferred from a molecular phylogeny. *The Journal of Heredity, 92*(2), 159.

Wilson, G. D. (1987). Male–female differences in sexual activity, enjoyment, and fantasies. *Personality and Individual Differences, 8,* 125–127.

Williams, G. C. (1966). *Adaptation and natural selection.* Princeton, NJ: Princeton University Press.

Williams, J. E., & Best, D. L. (1990). *Measuring sex stereotypes: A multination study* (revised ed.). Newbury Park, CA: Sage.

Wood, W., Christensen, P. N., Hebl, M. R., & Rothberger, H. (1997). Conformity to sex-typed norms, affect, and self-concept. *Journal of Personality and Social Psychology, 73,* 523-535.

Wood, W., & Eagly, A. H. (2002). A cross-cultural analysis of the behavior of men and women: Implications for the origins of sex differences. *Psychological Bulletin, 128,* 699-727.

Wright, T. M., & Reise, S. P. (1997). Personality and unrestricted sexual behavior: Correlations of sociosexuality in Caucasian and Asian college students. *Journal of Research in Personality, 31,* 166–192.

Xu, W., Lyn, S., Akella, M., & Hopkins, D. (2017). A Million Walks in the Park - CARTO. Retrieved March 06, 2018, from https://carto.com/a-million-walks-in-the-park/

Yan, L., Fang, L., Huang, H., Zhang, L., Feng, D., Zhao, W., . . . Cao, W. (2007). Landscape elements and hantaan virus-related hemorrhagic fever with renal syndrome, people's republic of china. *Emerging Infectious Diseases, 13*(9), 1301.

Zammuner, V. L. (1995). Naïve theories of emotional experience: Jealousy. In J. L. Russell, J. Fernandez-Dols, A. S. R. Manstead, & J. C. Wellencamp (Eds.), *Everyday conceptions of emotion* (pp. 434-455). Dordrecht, Netherlands: Kluwer Academic Publishers.

Zammuner, V. L., & Fischer, A. H. (1995). The social regulation of emotions in jealousy situations: A comparison between Italy and the Netherlands. *Journal of Cross Cultural Psychology, 26: 2*, 189-208.

Zammuner, V. L., & Frijda, N. H. (1994). Felt and communicated emotions: sadness and jealousy. *Cognition and Emotion, 8,* 37-53.

Zeifman, D., & Hazan, C. (1997). Attachment: The bond in pair-bonds. In J. Simpson & D. T. Kenrick (Eds.), *Evolutionary social psychology* (pp. 237–263). Hillsdale, NJ: Erlbaum.

Zuckerman, M. (1994). *Psychobiology of personality.* New York: Cambridge University Press.

CITY UNIVERSITY
LONDON

STATEMENT OF CO-AUTHORS of JOINT PUBLICATIONS

TO WHOM IT MAY CONCERN

Title of publication:

[redacted]

Name of candidate: Kevin Bennett

Title of research thesis: *Geographical Distributions of Psychological Traits Across Diverse Social and Physical Environments*

Name of first supervisor: [redacted]

We, the undersigned, co-authors of the above publication, confirm that the above publication has not been submitted as evidence for which a degree or other qualification has already been awarded.

We, the undersigned, further indicate the candidate's contribution to the publication in our joint statement below.

Signature: [redacted]

Name:

Date:

Statement indicating the candidate's contribution to the publication
(Statement in support of candidate's contribution to the publication)

I confirm that Kevin Bennett contributed the following to the publication listed on this document:

Kevin supervised data collection at his site for the International Sexuality Description Project, helped in data entry, data interpretation, and manuscript evaluation. Kevin served as co-collaborator and site coordinator for New Mexico on this large cross-cultural data set involving over 50 nations and 6 continents.

CITY UNIVERSITY
LONDON

STATEMENT OF CO-AUTHORS of JOINT PUBLICATIONS

TO WHOM IT MAY CONCERN

Title of publication:

[redacted]

Name of candidate: Kevin Bennett

Title of research thesis: *Geographical Distributions of Psychological Traits Across Diverse Social and Physical Environments*

Name of first supervisor: [redacted]

We, the undersigned, co-authors of the above publication, confirm that the above publication has not been submitted as evidence for which a degree or other qualification has already been awarded.

We, the undersigned, further indicate the candidate's contribution to the publication in our joint statement below.

Signature: [redacted]

Name:

Date:

Statement indicating the candidate's contribution to the publication
(Statement in support of candidate's contribution to the publication)

I confirm that Kevin Bennett contributed the following to the publication listed on this document:

Kevin supervised data collection at his site for the International Sexuality Description Project, helped in data entry, data interpretation, and manuscript evaluation. Kevin served as co-collaborator and site coordinator for New Mexico on this large cross-cultural data set involving over 50 nations and 6 continents.

CITY UNIVERSITY
LONDON

STATEMENT OF CO-AUTHORS of JOINT PUBLICATIONS

TO WHOM IT MAY CONCERN

Title of publication:

[redacted]

Name of candidate: Kevin Bennett

Title of research thesis: *Geographical Distributions of Psychological Traits Across Diverse Social and Physical Environments*

Name of first supervisor: [redacted]

We, the undersigned, co-authors of the above publication, confirm that the above publication has not been submitted as evidence for which a degree or other qualification has already been awarded.

We, the undersigned, further indicate the candidate's contribution to the publication in our joint statement below.

Signatu[redacted]

Name:

Date:

Statement indicating the candidate's contribution to the publication
(Statement in support of candidate's contribution to the publication)

I confirm that Kevin Bennett contributed the following to the publication listed on this document:

Kevin supervised data collection at his site for the International Sexuality Description Project, helped in data entry, data interpretation, and manuscript evaluation. Kevin served as co-collaborator and site coordinator for New Mexico on this large cross-cultural data set involving over 50 nations and 6 continents.

CITY UNIVERSITY
LONDON

STATEMENT OF CO-AUTHORS of JOINT PUBLICATIONS

TO WHOM IT MAY CONCERN

[redacted]

Name of candidate: Kevin Bennett

Title of research thesis: *Geographical Distributions of Psychological Traits Across Diverse Social and Physical Environments*

Name of first supervisor: [redacted]

We, the undersigned, co-authors of the above publication, confirm that the above publication has not been submitted as evidence for which a degree or other qualification has already been awarded.

We, the undersigned, further indicate the candidate's contribution to the publication in our joint statement below.

[redacted]

Statement indicating the candidate's contribution to the publication
(Statement in support of candidate's contribution to the publication)

I confirm that Kevin Bennett contributed the following to the publication listed on this document:

Kevin assisted in the development of testing materials and ideas. He collected and entered data into SPSS, helped with data analysis and interpretation, and he played valuable role in the process of editing and evaluating the manuscript for publication.

CITY UNIVERSITY
LONDON

STATEMENT OF CO-AUTHORS of JOINT PUBLICATIONS

TO WHOM IT MAY CONCERN

Title of publication: [redacted]

Name of candidate: Kevin Bennett

Title of research thesis: *Geographical Distributions of Psychological Traits Across Diverse Social and Physical Environments*

Name of first supervisor: [redacted]

We, the undersigned, co-authors of the above publication, confirm that the above publication has not been submitted as evidence for which a degree or other qualification has already been awarded.

We, the undersigned, further indicate the candidate's contribution to the publication in our joint statement below.

Signature: [redacted]

Name:

Date:

Statement indicating the candidate's contribution to the publication
(Statement in support of candidate's contribution to the publication)

I confirm that Kevin Bennett contributed the following to the publication listed on this document:

Kevin supervised data collection at his site for the International Sexuality Description Project, helped in data entry, data interpretation, and manuscript evaluation. Kevin served as co-collaborator and site coordinator for New Mexico on this large cross-cultural data set involving over 50 nations and 6 continents.

CITY UNIVERSITY
LONDON

STATEMENT OF CO-AUTHORS of JOINT PUBLICATIONS

TO WHOM IT MAY CONCERN

Title of publication:

[redacted]

Name of candidate: Kevin Bennett

Title of research thesis: *Geographical Distributions of Psychological Traits Across Diverse Social and Physical Environments*

Name of first supervisor: [redacted]

We, the undersigned, co-au[redacted]lication, confirm that the above publication has not been submitted as evidence for which a degree or other qualification has already been awarded.

We, the undersigned, further indicate the candidate's contribution to the publication in our joint statement below.

Signature [redacted]

Name:

Date:

Statement indicating the candidate's contribution to the publication
(Statement in support of candidate's contribution to the publication)

I confirm that Kevin Bennett contributed the following to the publication listed on this document:

Kevin supervised data collection at his site for the International Sexuality Description Project, helped in data entry, data interpretation and manuscript evaluation. Kevin served as co-collaborator and site coordinator for New Mexico on this large cross-cultural data set involving over 50 nations and 6 continents.