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**This is your brain on bias... or, the neuroscience of bias
(For people wanting to reduce their biases)**

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Faculty Lecture Series - Clark College May 3, 2011

Revised July 1, 2011

This article is a revision of a lecture which was first presented at Clark College, Vancouver, WA as part of the Clark Faculty Lecture Series.

Introduction

The title of this lecture is the *neuroscience of bias*, which is not a topic that you run across very often! The route I took to this topic followed the convergence of two relatively long-term interests of mine: social justice and neuroscience. Social justice has been a driving force in both my personal and professional life throughout my adulthood- essentially for the last 45 years. As a developmental psychologist, my obsession with neuroscience and its implications for early education and parenting began in the 1980s with the publication of a couple of seminal studies about how experience shapes the architecture of the brain. From the point of view of the whole field, social science research into bias has "exploded" so to speak with the advent of multiple technologies (like the functional MRI) and the parallel, rapid expansion of our understanding of the brain. This research is bringing us much closer to finding practical and effective solutions for the persistent, harmful, and unequal treatment of our fellow human beings, based

solely on some characteristic they possess or their apparent membership in or identification with a particular group. In other words, bias.

Once scientists could, through technology, view the living brain in action, research could begin on how the various parts of the brain interact, how they function, and ultimately how they create behavior. My focus is on a narrow range of human behaviors, specifically, conscious and unconscious bias, stereotypes, and discriminatory behavior. In this presentation, we are going to look to neuroscience and psychology to help explain where bias comes from, what "forms" it comes in, how we acquire the specific biases we have, and finally, what we can do to reduce our biases.

To be able to discuss the topic of bias from the perspective of neuroscience, we need to all have in common some basic information about the brain and how it works. So, after defining a few terms from the bias literature, I'll do a short presentation about the neuron and the structural basis of memory. Following that, I'll present the material on bias, interweaving additional information about the brain. At the end, there will be time for questions and comments. For your interest, I've provided a bibliography of the articles and books that I used in my research on this topic.

To begin - terminology:

I want to clarify some terminology used in the literature on bias. The first term is ethnicity, which refers to the ancestry and the culture(s) of the people who bore us and the people who raised us. It includes our family lines and the ethnic cultures from which they came. Ethnicity does not refer to color so much as it

refers to culture. We are all socialized into the cultural ways of our ethnic heritage, whether we know it or not - we learn the language, values, beliefs, assumptions, and micropractices of our family. We also learn who is "one-of-us" and who is not. For the young baby starting out, this is what they have to learn.

The term race is frequently used as being synonymous with ethnicity as well as being represented by particular physical variations in facial characteristics, hair color and texture, and skin tone. Race also is associated with some behavioral characteristics, such as style of dress, language, or accent. Since race is not a viable, biological concept, but is a socially constructed concept, I will use the term "ethnicity" unless I am quoting an author who uses the term "race" or divides subjects into categories such as Black and White.

One of the reasons for looking at bias on a biological or more precisely on a neurological level is to try to clarify the "literal" meaning of knowledge "construction." In the current literature, race is described as a constructed concept, meaning that humans made these racial categories as part of a cultural adaptation (the process of which is too complex to go into in this discussion). But, in short, we made up categories of races to solve some perceived social problem(s); and we attached certain physical characteristics and other "essential" characteristics to each of these racial categories. Through our experiences in the world, especially as children, we also have attached feelings and assumptions to each of these racial categories as well as to the key physical and behavioral characteristics associated with them. When we look at some concepts about the brain, we will see how all learning, how all memory -and thus all bias- is constructed in the brain, literally, on a physical level.

In the literature on bias, you will also see frequent use of the terms: in-group and out-group. On a personal level, in-groups are people with whom you share one or more traits - i.e., people who are like you. Out-groups are those who are different from you. A person's in-group could be people in their extended family, people of the same ethnic/linguistic background; people who share the same interests and passions, even people who look alike. Out-groups differ from the individual along similar lines.

From a larger society perspective, in-groups refer to members of the dominant culture (those with social and institutional power), where as out-groups refer to members of non-dominant or minority cultures. Out-group members are also referred to as targets. One individual person can be a "member" of both in-groups and out-groups simultaneously. If I describe someone as African-American, female, and Christian, from this description, she has membership in two out-groups and one in-group. If I describe a man who is German-American, gay, and 85 years of age, he is in two in-groups and two out-groups.

In addition, researchers in this field focus their studies on various concepts including: bias, prejudice, stereotypes, and attitudes. Let me clarify these terms briefly.

Bias is a broad term that refers to an "assortment of stereotypical beliefs and attitudes about social groups". (Carpenter, 2008, 33) There are multiple types of bias.

"**Prejudice** refers to negative affective [or emotional] responses toward outgroup members." (Amodio & Devine 2006, 652) The authors, Frith &

Frith, define prejudice as a "fundamental process by which the brain enables us to decide what to do on the basis of inadequate evidence." (2008, 508)

"**Stereotypes** refer to cognitive representations of culturally held beliefs about outgroup members." (Amodio & Devine 2006, 652) More specifically, "a social stereotype is a mental association between a social group or category [of people] and a trait." (Greenwald and Krieger 2006, 949-50)

An **attitude** is made up of an evaluation of that trait, group, or person. (Greenwald and Krieger 2006, 949-50)

The focus of a stereotype is on the trait itself. In an attitude, the focus is on the evaluation of that trait or person or group. So, with this terminology taken care of, I want to turn to biology and share some basic information about the brain, because bias is learned (or constructed), and what is learned changes both the number and strength of connections between the cells of the brain. The brain is enormously plastic and its very structure changes with every experience we have - in the outer world and inner world as well.

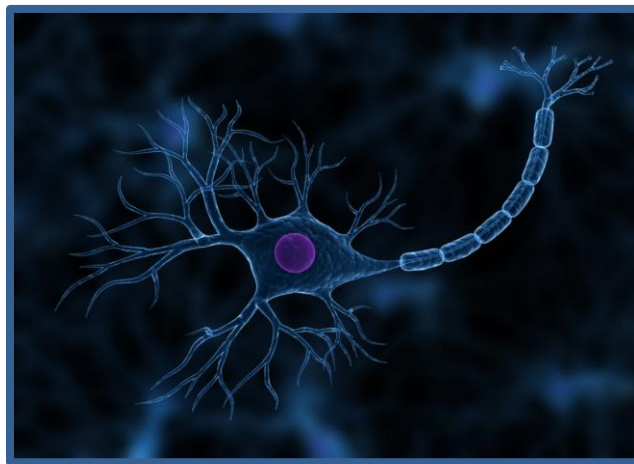
What I want to show you is what happens, at a cellular level when we learn to classify people into racial categories, and further, what happens in the brain when we learn stereotypes, attitudes, prejudice, and bias. To do this, we have to look at memory - for without memory, there is no learning; without learning, there is no memory.

There are hundreds of thousands of cells in the brain intricately interconnected into vast networks. There are two major cell types in the brain that are involved in learning, memory and behavior - they are called neurons and glial cells. As the

research on neurons is more extensive, I will focus my remarks on the neuron and its role in memory, learning and empathy.

The Neuron and Memory

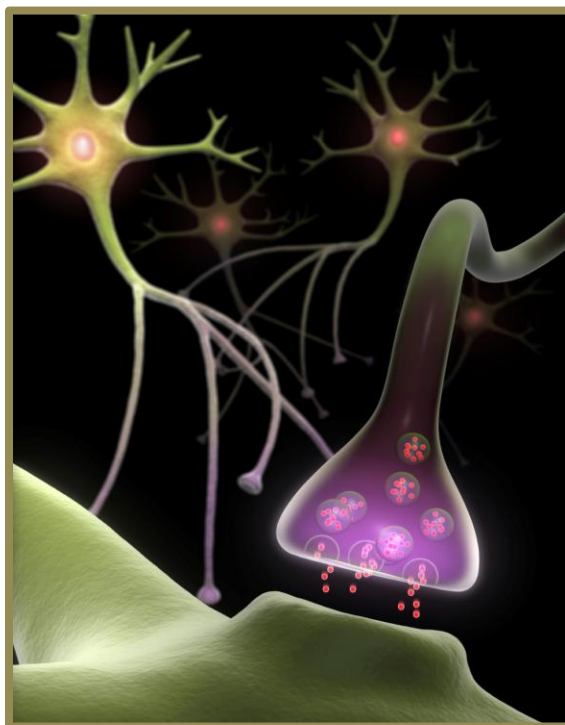
Let's look at the parts of the neuron and see how memory (or learning) works. This image below is a computer illustration of one particular type of neuron. Neurons are communication cells in the brain and they come in different shapes and sizes. Each neuron has a cell body, called the soma, and a nucleus in the center which contains both DNA and the machinery to make RNA, which are needed to run the cell and create connections to other neurons.



The projections (on the left) that come out of the cell body, and look like tree branches, are called dendrites. Dendrites are the structures that receive information from other neurons. Another projection (or process as they are called) is the axon, seen on the right. It is the part of the neuron that sends signals to other neurons. The axon (like the dendrites) also has branches, called terminal branches, which have a sort of bulb at the end of each branch. This bulb is called a synaptic terminal. Let's take an even closer look.

The Synapse - where cells connect

The place where the terminal branches of one neuron come very close to the dendrites of other neurons is a microscopic space called the synapse. This is "where the action is".



Inside the synaptic terminal are little packets of molecules called neurotransmitters. When the neuron gets activated by other neurons, it releases the neurotransmitters into the tiny space, called the synaptic cleft. They float over to the dendrite of the receiving neuron and stimulate it at receptor sites, activating this neuron.

So how does memory or learning work? Very recent research is giving us some answers. Memory is in networks of neurons in the brain, and learning strengthens the connections between the neurons in these networks. Connections between neurons become strengthened in two ways. A connection that is not used very

much is weak and may have "empty" synaptic terminals - with no neurotransmitter. Once the connection starts getting used, and we start to learn something, there is an increase in the amount of neurotransmitter released, and empty terminals get filled. We call this working memory. When we really learn something and don't forget it (meaning long-term memory) the neuron actually makes more terminal branches to be able to make even more connections. The very architecture of the brain has been changed! When you hear or read that experiences strengthen connections and make more connections, this is what is being described. And, the experiences that get "wired" into networks of neurons in the brain as memories include emotional and evaluative associations that we make with various characteristics of people - in both our in-groups and out-groups.

The organization of memory systems - implicit and explicit memory

These networks of neurons are functionally organized into memory systems. We can depict these memory systems in the form of an organizational "tree". Sensory memory holds information for a fraction of a second. Short-term memory can hold unrehearsed information for about 20 seconds. Working memory is the ability to hold a larger amount of more complex information through use and repetition (like knowing procedures related to your work). Long term memory is an unlimited capacity store that can hold information over long periods of time, essentially for the "life of the brain."

Within long term memory, we have declarative memory, which handles factual information in language and symbols (called semantic memory), as well as memory for time-based events. Non-declarative, or implicit, memory holds actions, motor skills, conditioned reflexes, and emotional memories.

Principles of Bias, Brain Function, and Learning

As more specific types of implicit and explicit memory, we have implicit and explicit forms of bias. Much work has been done studying explicit, or conscious, bias, especially the most violent forms, as expressed by groups such as the Ku Klux Klan and the many "white power"/neo-Nazi organizations with which we are familiar in the United States. Implicit, or unconscious, bias has been difficult to study until fairly recently, precisely because it is unconscious! Thanks to the development of the various imaging machines as well as the personal computer, researchers now have the technological support that they need to peer inside the parts of the mind and brain that have been so elusive.

Bias

As research has progressed, types and definitions of bias have been identified, operationalized, and clarified. Also, a particular technique was developed, called the IAT or Implicit Association Test, which has been found to reliably measure implicit or unconscious attitudes, including implicit bias. The web address for the test is on the last page of the bibliography I prepared for you.

Explicit Bias is a type of bias that is processed at a conscious level with awareness and intent. It is processed as semantic memory, in words. Explicit bias is frequently expressed in overt behavior, through passive means such as exclusion, as well as acts of deliberate violence, such as physical and verbal harassment.

Implicit Bias is processed at an unconscious level without the person's awareness that the bias even exists, let alone influences his or her behavior. Implicit bias is

activated automatically and it includes emotions or feelings about the target. The implicit stereotypes that people have "are category associations that become activated" without the person's intention or awareness when he or she interacts with a person who is a member of the category. An example of this could be, an employer who, having several equally qualified job applicants, chooses the one who is a member of his/her in-group citing that the applicant would "fit in" better with co-workers. "Substantial evidence has accumulated for the influence of implicit stereotypes on [people's] judgment and behavior." (Blair, Ma, & Lenton 2001, 828) Let me give you one example that has national significance.

In a study done in the United States in 2010, the investigators found that people who were high in implicit prejudice were "significantly less likely to vote for Obama [in the 2008 election] than those low in prejudice." (Knowles, Lowery, and Schaumberg, 423) In fact, implicit bias subsequently predicted opposition to President Obama's health care reform agenda. In this study,

"When a description of health care reform was attributed to Bill Clinton, implicit prejudice was unrelated to support for the policy. Yet when the same description was associated with President Obama, the negative relationship between prejudice and policy support again emerged."

This study combined with many others "suggests that implicit prejudices are real, can be measured, and influence consequential, real-world attitudes and behavior." (Knowles, Lowery, and Schaumberg, 423)

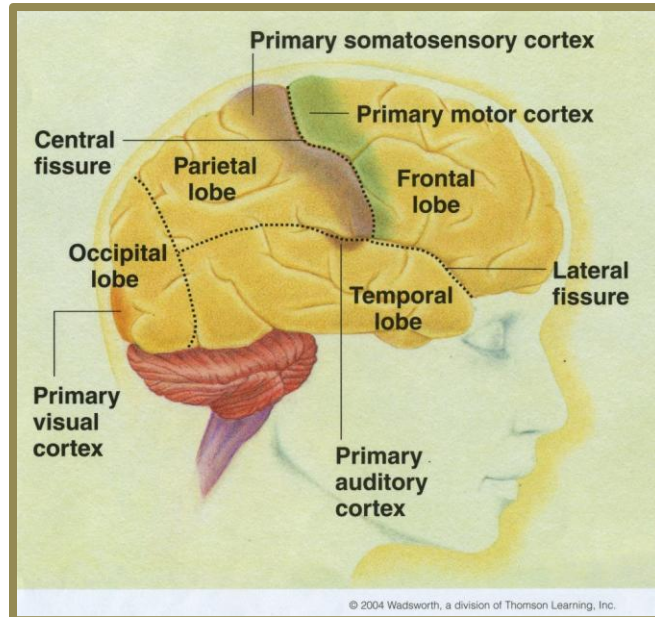
Aversive Bias/Racism:

To make matters worse, researchers Dovidio and Gaertner have uncovered another form in which implicit bias occurs. They call it **aversive racism**. "Aversive racism is the inherent contradiction that exists when the denial of personal prejudice [or explicit bias] co-exists with underlying unconscious negative feelings and beliefs [or implicit bias]." "The negative feelings that aversive racists experience are typically more diffuse, such as feelings of anxiety and uneasiness." (Dovidio and Gaertner 2005, 42) "Dissociations [between implicit and explicit attitudes] are commonly observed in attitudes toward stigmatized groups, including groups defined by race, age, ethnicity, disability, and sexual orientation." (Greenwald & Krieger 2006, 949)

This form of implicit bias is particularly maddening for members of non-dominant, target groups. The folks who display aversive racism, on the outside, are avowed anti-racists. Yet, in their interpersonal relations with members of target groups, their implicit bias is expressed in affect, body language, and differential treatment. People in the target groups distinctly feel the bias directed at them, but cannot find overt signs to point to - that would confirm what they were experiencing. This can lead to serious communication problems and can destroy interpersonal trust. Aversive bias has negative consequences for work environments and can get in the way of successful efforts to increase diversity in organizations. To better understand implicit or unconscious bias, we need to look at parts of the brain.

Parts of the Brain

The cells of the brain are organized into functional areas with each area specializing in what it does. The cortex, which is the outer part that we typically see when we look at a picture of a brain, is divided up into 4 functional lobes in each of the two hemispheres of the brain. They are the occipital lobes for vision, temporal lobes for hearing, speech, and language, parietal lobes for sensory information from the body, and the frontal lobes for motor control and higher order thought.



The frontal lobes contain the prefrontal cortex which processes conscious thought and the so-called "executive functions" - like, planning, goal setting, morality, and cognitive control. Long projection axons connect the prefrontal cortex with all other areas of the brain, and it is the prefrontal cortex that pulls all the input together into a coherent whole. On the underside of the prefrontal cortex is the orbitofrontal cortex, which is the seat of all forms of self-regulation - cognitive,

physical, social, and emotional. We work on developing this part of our brain into our early twenties.

In the mid-1990s, neuroscientists in Parma, Italy discovered particular groups of neurons that they dubbed "mirror" neuron systems. Mirror neurons are networks of neurons that are part of a "basic functional mechanism, [called] embodied simulation, which gives us an experiential insight of other minds." (Gallese n.d.) The idea that there is a mirror system in the brain arises from the observation that the same brain areas are activated when we observe another person doing something as when we do the same action ourselves. This applies to emotions too - we really CAN feel another's pain!

Mirror neurons also allow us to infer or predict others' intentions through activation of "logically related" mirror neurons that are most likely to follow the observed behavior. "To ascribe an intention is to infer a forthcoming new goal, and this is an operation that the mirror system does automatically." (Iacoboni, et. al. 2005, 5) When a person teases us, it is our mirror neurons that allow us to know if the teasing is friendly or not!

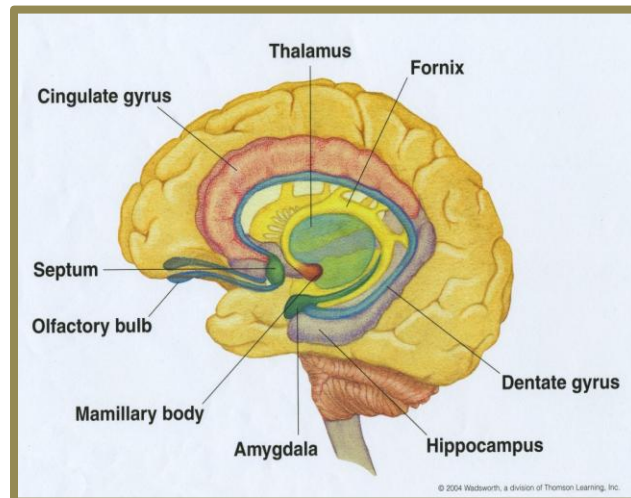
[Interestingly,] the brain's mirror system is not tied to any particular brain region. The location of the activation will depend upon what is being observed." (Frith 2007, 673) If you watch a major league baseball pitcher, your mirror neurons in your vision and motor areas will be activated - and you'll feel yourself throwing that ball. In terms of empathy, or the mirroring of emotions, the activation happens in the emotional centers of the brain. Mirror neurons are not, however, little "on/off" switches. Researches have discovered that the amount of empathy we

show another person is modifiable by our social relationship with that person, thus our mirror systems do not respond to all people equally.

Implicit or unconscious stereotyping is based in biased forms of cognitive processing through biased associations which can influence if and how strongly our mirror neurons respond to other people. Implicit stereotypes can impact forming judgments and goals, for example, not "seeing" ethnic or gender stereotypes and as a result supporting policies that disadvantage others based on these stereotypes. (Amodio & Devine 2006, 653-659)

Sub-cortical structures:

In addition to the cortex, the brain has numerous sub-cortical structures that provide various survival and memory functions.



The amygdala is a part of the limbic system which some call the "emotional brain". The amygdala is involved in the learning and expression of emotion, and particularly in processing fear. It is said that the amygdala is "quick to learn and slow to forget".

Implicit evaluative bias is supported by structures such as the amygdala, which also regulates our approach/withdrawal tendencies and our emotional or affective processes that we use for evaluation. Implicit evaluative bias is typically expressed in nonverbal behaviors and affective responses, such as having more uncomfortable interactions, less eye contact, and more blinking. (Amodio & Devine 2006, 653-659) Mirror neuron networks in the target person can "read" these nonverbal behaviors and "know" that the other person is expressing bias.

"Reports of affectively [or emotionally] laden childhood experiences have been shown to correlate with adult implicit attitudes." Thus, experiences we have had as a child that are somehow associated with members of an out-group, and that caused us to have very strong emotional reactions, especially fear, correlate with our unconscious thoughts and feelings about all members of that out-group. "At the neural level the magnitude of implicit [preferences *for* your in-group and *against* out-groups] correlates strongly with activation in the amygdala." (Dunham, Baron, & Banaji 2008, 252) To transition into looking at how we acquire biases, I want to share an example of an "emotionally laden childhood experience" that very likely increased this child's implicit biases. I observed this incident many years ago while travelling to visit relatives in the mid-west.

I had to change planes in Chicago, and once off the plane I headed for the women's restroom, which in O'Hare airport was very large! There were over a dozen stalls and there was a long line of women waiting for their turn, and some of the women had children with them. A European-American woman with a preschool aged girl was next up. The little girl's behavior was clearly indicating the urgency of her need to use the toilet! A stall door opened, and a woman who was African-

American came out. The little girl began to bolt toward the now vacant stall, whereupon her mother grabbed her by the arm and said, "We'll wait for the next one." With nothing else said about "why" they should wait, I witnessed the planting of an implicit bias into the mind and brain of a young girl, through associational learning. This preschooler was left to figure out for herself what was wrong with that stall. It looked like all the others, so it must have something to do with who just used it. Her discomfort, confusion, and ultimately fear (possibly of wetting herself) got "attached" to a person who only differed from her by the color of her skin. When the next stall was vacated by a "white" woman, they went in.

How do we acquire biases?

Infancy and early childhood are the periods in development during which implicit biases and stereotypical associations are put into place. The elements that make up these associations are both innate (meaning there is a genetic predisposition) as well as learned (meaning it is constructed by the child from their experiences). According to Rudman, "much of what is learned early in life is preverbal and taught indirectly. These lessons form the foundation on which later learning is built and may also serve as a nonconscious source for related evaluations and actions," such as what I witnessed in O'Hare Airport. (2004, 79)

Newborns prefer facelike configurations to other patterns that are equally complex, but not facelike. This, in combination with the discovery of a "face recognition area" in the brain, in the fusiform gyrus, suggests that this preference for faces is innate. "However, infants also prefer to look at the face of and hear the voice of their primary caregiver, prefer the sound of their native language, prefer women's faces and prefer faces of racial ingroup members" say authors

Dunham, Baron and Banaji. "This latter set of preferences is clearly learned; [because] infants whose primary caregivers are male or who are frequently exposed to racial outgroups do not show these normative patterns of preference. Overall, these results indicate the role of both innate proclivities and early experience in shaping preferences." (Dunham, Baron, & Banaji 2008, 248) In addition, the data presented in the article by Dunham, et. al., suggest that "implicit intergroup preferences follow a decidedly different pattern [than explicit preferences]... [The implicit preferences are] characterized by early emergence of ingroup preference followed by developmental stability." (Dunham, Baron, & Banaji 2008, 249)

From an evolutionary perspective, we can ask, what would be the advantage of having this implicit in-group preference and having it emerge early? To start with, "humans are among the most social of all primates and success in social interactions is one of the major forces driving our evolution." (Frith & Frith 2008, 503) In the paper by Dunham, Baron, and Banaji, the authors state that "the implicit [or unconscious] system forms and maintains adultlike intergroup evaluations from early in development." This ability to quickly evaluate other groups along a good-bad continuum and "to use those evaluations as guides to action is fundamental to an organism's survival and plausibly forms part of an evolved mechanism to track and monitor social coalitions." "The early presence of group-based evaluations probably implicates a general system for rapid preference formation, grounded in the evaluative or attitudinal system", which is processed as implicit memory. (Dunham, Baron, & Banaji 2008, 252)

"Children [who are] from racial/ethnic groups that are socially advantaged (and, hence, dominant) show robust preferences for their ingroup." In one study, White 6-year-olds in the U.S. showed the same levels of manifested ingroup preference as White adults in the U.S. (Dunham, Baron, & Banaji 2008, 249) In this study, White "children as young as three who could successfully categorize by race showed a tendency to be influenced by facial expression such that angry faces were overcategorized as Black, demonstrating a negative association with that group." (Dunham, Baron, & Banaji 2008, 250)

"On average, adult members of non-dominant groups show weak or no implicit preference [for their in-group]." (Dunham, Baron, & Banaji 2008, 250) In one study, this was found for the elderly, who showed a preference for younger people, for Black Americans, who showed no racial in-group preference, and for lesbians and gay men, who showed only a weak in-group preference. "Thus, ingroup preference clearly interacts with social learning about the relative status of one's own group." (Dunham, Baron, & Banaji 2008, 250)

In another study with a similar finding, Hispanic children as young as age five, and who grew up in a predominantly Hispanic neighborhood, "showed no preference for their ingroup when compared with the White majority.... Interestingly, these same Hispanic children ... did show ingroup preference when comparing their group to Black Americans. This result is noteworthy because it demonstrates that children's implicit attitudes are sensitive to which of two outgroups (White and Black) is socioculturally advantaged." (Dunham, Baron, & Banaji 2008, 251) Here we see an example of the co-construction of race and class.

Classical Conditioning - Associative learning

Brain Principle: Cells that fire together, wire together.

Classical conditioning is a type of learning where a stimulus acquires the ability to evoke a response that was originally evoked by another stimulus.¹ An example from the animal world would be a dog learning to associate the sound of a certain cupboard (where the dog food is stored) being opened with getting fed. The dog will wake up from a sound sleep at the sound of that cupboard being opened!

"A long history of attitude research has implicated classical conditioning as a mechanism by which attitudes can be acquired and maintained." More recent research has confirmed "that conditioning processes are closely tied to the genesis of racial attitudes." (Livingston and Drwecki 2007, 817) We also know that fear is easily conditioned. If you have a frightening car accident at a particular corner, you may have a fear response every time you come to that corner, even though nothing dangerous or fear inducing is currently happening. That corner has come to be associated with both the memory of the accident and the fear you felt at the time. Since implicit bias and fear learning are both at least partly a product of conditioning, are fear and bias somehow related?

Fear Conditioning and Implicit Bias

A number of previous authors have "observed that race bias and fear learning rely on overlapping neural systems suggesting a shared mechanical link between the two." (Navarrete, et. al., 2009, 155) Could it be that implicit bias is a type of fear response? In the field of psychology, we use the word "potentiate" in reference to

¹ Weiten, W. (2010). *Psychology: Themes and Variations*. 8th Ed. Belmont, CA: Wadsworth, 232.

increasing something or making it happen more quickly or powerfully. So, fear-potential is referring to increasing a fear response.

In studying adults, researchers have found that having implicit in-group preferences can predict having fear-potential responses to members of social out-groups. These responses are similar to things that we call "prepared fear stimuli". Prepared or fear-relevant stimuli are things that "humans associate more readily with aversive [or negative] stimuli", and, as such, extinction of these associations is more difficult and less complete. (Maroney 2009, 84) Prepared fear stimuli include specifically spiders and snakes. (Dunham, Baron, & Banaji 2008, 252) Interestingly, these prepared or fear-relevant stimuli do not include other dangerous things, such as broken electrical cords or firearms. Thus, these prepared or fear-relevant stimuli are not just learned. These tendencies are assumed to be evolutionary adaptations for survival.

According to Maroney from a 2009 study, "a subject will learn to fear both a butterfly and a snake if both images are paired with electric shock, but the aversive association with the snake will kick in more strongly and die more slowly - and incompletely." In this study, using African-American (or Black) subjects and European-American (or White) subjects, the subjects were conditioned to fear pictures of both Black and White faces, by pairing them with a mild electric shock. Then, the shocks stopped and the pictures of Black and White faces continued to be presented. This was the extinction phase. The researchers measured the physical indicators of anticipatory fear reactions in both the conditioned phase and the extinction phase. The question they asked was: When trained in this way to

"fear faces, would subjects treat the faces of out-group others more as they would butterflies or as they would snakes?" (Maroney 2009, 85)

It was snakes. Both Black and White subjects "acquired a stronger anticipatory fear response to out-group than to in-group faces, and both showed resistance to fear extinction only for out-group faces. Thus, the 'persistence of fear' learning during extinctions for out-group members mirrors the pattern observed for snakes and spiders,' demonstrating that 'unfamiliar members of a racial out-group can serve as prepared stimuli in a fear-learning situation'." (Maroney 2009, 85) It's like an evolutionary set-up.

According to Maroney, "out group preparedness" has been found to "lead to more negative evaluations of the out group and thus contributes "to the genesis and maintenance of racial prejudice, especially implicit or less conscious forms of it'." (2009, 85)

Gender and implicit bias

In another 2009 study of fear conditioning in which a fear response was conditioned in subjects toward female and male faces of Black and White Americans, the authors found that "social out-group targets served as prepared stimuli" but only when the example was male. (Prior studies had tended to use face stimuli that were only males.) "This finding suggests that the resistance to extinction of conditioned fear toward an out-group target... is not likely to be caused by a psychological system that operates merely on in-group and out-group categorical distinctions, but one that uses gender categories as well." (Navarrete, et. al. 2009, 158) Here we see evidence of the co-construction of race and gender.

Perception and bias:

Implicit bias is made up of both social and perceptual components. Let's take a look at some studies on bias and perception. Let's look at visual perception and the other-race-effect (or "they all look alike"): Evidence suggests that people see the faces of members of a racial out-group as looking more similar, making it harder to distinguish one person from another. In comparison, they see the faces of people who are members of their racial in-group, as being not similar, and thus, easier to differentiate.

In fact, "throughout one's lifespan, greater experience with faces of a particular race leads to greater expertise in individuating faces of that race. This explanation is bolstered by several recent studies that indicate that exposure to a specific race face morphology early in life equips people to better individuate faces of that race later in life, regardless of the learners' own-race." (Lebrecht, et. al., 2009, 1)

What this means, essentially, is that perceptual "lumping together" can lead to social "lumping together". "Once stereotypes, positive or negative, are associated with some members of a social group" not being able to tell individuals apart "makes it more likely that these biases will be extended to all of its members." (Lebrecht, et. al., 2009, 3)

Neuroimaging studies have revealed that within the fusiform area, which is associated with face processing, when European-American subjects looked at the face of another European-American, there was a larger neural response than when

they looked at African-American faces. (Lebrecht, et. al., 2009, 3) These findings support the existence of the other-race-effect in perception.

Now let's look at **Auditory Perception**:

In a 2010 study of the influence of a person's accent on their credibility, Lev-Ari and Keysar found that "when people listen to accented speech, the difficulty they encounter reduces 'processing fluency.' But instead of perceiving the statements as more difficult to understand, they perceived them as less truthful," even when the speaker was simply delivering a message. When people tried to work on this to reduce it, they were successful when the speakers' accents were mild. When the accents were heavy, the listeners were unable to undo the impact of the difficulty. (1095)

Emotions, empathy, and bias

Emotions accompany all perceptions, thoughts, and behaviors. They are as much a part of everything we do as is cognition. In fact, emotions solidify memory and learning. Emotions are also critical to social interaction. According to Rudman, in a 2004 article, evidence exists that "indicates that early and affective [or, emotional] experiences may influence automatic evaluations more than explicit attitudes. In addition, there is growing evidence that systemic, culturally held appraisals [of groups] can bias people's automatic evaluations" regardless of their expressed personal opinion. (2004, 81) Implicit bias is insidious.

In a 2010 article by Gutsell and Inslight, entitled, "Empathy Constrained", the authors studied "perception-action-coupling" [which] is a process whereby a person experiences the vicarious activation of their own neural system for action during

the perception of action by someone else. It is very important for social relationships and "is essential for a number of forms of interpersonal sensitivity, including emotional contagion, empathy, theory of mind," and the understanding of action and intention. (841-2)

The authors found perception-action-coupling "to be subject to social factors. For example, when observing others in pain, people show activity in brain areas associated with the experience of pain", but, according to these authors' findings, this neural activity is shown only for people who they like; not for those who they dislike. "Similarly, participants show diminished neural activation of pain circuits when observing ethnic outgroup members in pain relative to [ethnic] ingroup members." (Gutsell and Inzlicht 2010, 842)

According to Gutsell and Inzlicht, their findings suggest that "people do not mentally simulate the actions of [members of] outgroups." Their mirror-neuron-systems "are less responsive to outgroup members than to ingroup members." (Gutsell and Inzlicht 2010, 844) In fact, they found that the more the participants were prejudiced against a particular outgroup, the less their motor cortex fired when watching the actions of a member of that outgroup. These authors studied European Canadians and found that they showed the greatest reduction in activation of the motor cortex with South-Asian Canadians, who were disliked the most, then Black- (or African-) Canadians, followed by East-Asian Canadians.

Gutsell and Inzlicht go on to state that their research suggests that:

"selective attention and motivation seems to favor ingroup members such that ingroups are processed in greater depth than outgroup members, with evidence indicating greater activity in the amygdala, fusiform gyri, and orbitofrontal cortex. Similarly, selective attention and motivation might filter for the actions of ingroup members."

Against the backdrop of all this information on bias, what happens when we add power into the equation?

Power and implicit bias

The amount of power that a person has will impact how much implicit bias they carry. According to a 2010 study about power and implicit bias, it appears that "the power of the perceiver increases implicit prejudice towards low status racial groups." Explicit bias, however, is not impacted by power. "Having power increases automatic negative evaluations of stigmatized groups, and increases the experience of negative affect [or emotions] when encountering stigmatized group members. Furthermore, these detrimental effects of power were found across target groups [in this study, namely Blacks and Arabs] and across different countries (Italy and Spain), contributing to the generalizability of the findings." (Guinote, Willis, & Marellotta 2010, 305)

The authors of this study hypothesize that if powerful people came to know a person who is a member of a target group more as an individual, "the selective focus [noted in] powerful individuals would turn away from... [stereotypes and] towards individuating information of the targets." They might not show implicit bias. (Guinote, Willis, & Marellotta 2010, 305) In contrast, powerless people "tend

to respond to multiple cues in any situation" and thus should have less varied responses across situations. (Guinote, Willis, & Marelotta 2010, 306) Therefore, it appears that peoples' relative situational power affects how they view and evaluate others on an implicit, or unconscious, level.

All of these studies can help us understand why and how we acquire implicit biases and how these unconscious attitudes can influence our behavior. Lest we throw up our arms in despair at what seems to be an insurmountable problem, I am happy to report that there are current studies that give us some ways to begin to counteract biases, especially implicit or unconscious bias.

What does research tell us about "un-learning" bias?

Under stress and pressure, we tend to default to implicit associations. This may be partly due to the fact that cross-cultural interactions use more energy. When we are stressed, we have less energy available. Implicit prejudice and stereotypes are most likely to be expressed under these circumstances.

Let me digress here with a short example of my personal experience with the impact of stress on the expression of implicit bias. My husband, Silas, had to have his "other" hip replaced recently, and unfortunately, after recovering for three weeks, he accidentally dislocated the new hip which was an even bigger deal than the initial surgery and it required me to take off a week of work (and I teach college), take care of him at all times, put a week's lectures online, and do all the other stuff of life and caregiving for someone who was essentially immobilized. I was REALLY stressed out. Four days after the dislocation, I was thinking about how stressed I was, and it occurred to me to take an Implicit Bias test! I took three,

and my bias was off the charts, especially about Asian-Americans. My test said I did not see them as citizens. I puzzled on this one for awhile and then it occurred to me where I got that stereotype. I was born in May of 1945, the day after Victory in Europe and three months prior to the dropping of the atomic bombs on Japan. My family got one of the first televisions and I grew up watching a lot of "old" cartoons, many of which were from WWII. I was exposed, from birth to many images, associations, fears, and assumptions about Japanese people, which I obviously generalized to all people who appeared Asian to me. Here I am at this age, still holding a stereotype from when I was very young and unaware of all that was going on.

Social context (environments that highlight or focus on admired and disliked members of various groups) can impact implicit bias. (Dasgupta & Greenwald 2001, 807) Thus, the over-representation, especially in the media, of European-American people in positions of power or honor, and the over-representation of, for example, African-American people (especially men) as criminals, aggressors, or side-kicks, helps to maintain negative stereotypes and evaluations of Blacks and positive evaluations of Whites. This influence of the social context applies to other categories as well, such as sexual orientation, gender, age, ability, etc.

Unlearning bias - finding strategies

Now, automatic and implicit attitudes used to be seen as being resistant to change. However, there is "new evidence suggesting that automatic preference and prejudice may indeed be malleable." (Dasgupta & Greenwald 2001, 806)

There are various methods that people have tried for unlearning or reducing bias. Some have been found to work and some have not, and, some work for one type of bias and not the other.

Ones that don't work:

Let's start with what doesn't work and get these out of the way.

Some people think that you can get rid of any biases you might have concerning out-groups by sheer will power and thought suppression. However, research has found that trying to directly suppress awareness of differences and the stereotypes attached to those differences can sometimes have the unintended consequences of actually reinforcing them. This can happen by giving the stereotypes so much attention. (Blair, Ma, & Lenton 2001, 838) Repetition of associations has the effect of strengthening them. This is a basic principle of brain science as well as learning theory.

Another method used to reduce bias in people is by exposing them to information that contradicts the stereotypes they hold about out-groups. This may not always work though, as "explicitly held stereotypes [about members of an out-group] can remain unchanged in the face of contradictory evidence (for example, information about new members [of the out-group]), provided that perceivers construe those new individuals as atypical. In such a situation, new cognitive categories (subtypes) are created to accommodate counterstereotypic individuals without changing the original stereotype." (Dasgupta & Greenwald 2001, 808) Another way to put this is, "you're not like the others, you're different".

Ones that do work:

Now, let's take a look at what research has found to be strategies that do work to reduce bias. Much research suggests that "both implicit and explicit stereotypes are responsive to current inputs, including the perceiver's thoughts and social context." The findings of a study by Blair, Ma, and Lenton suggest "that people may be able to achieve the ... goal [of suppressing stereotypes] through the activation and strengthening of counterstereotype associations" through the use of mental imagery, which I'll discuss in more detail shortly. (Blair, Ma, & Lenton 2001, 838)

"Thus, a more positive and proactive approach to changing stereotypes would be to encourage people to consider the diversity within social groups and especially the many examples of group members who disconfirm the stereotype." (Blair, Ma, & Lenton 2001, 838) If done repeatedly, "implicit evaluations of historically stigmatized groups such as African Americans and older people may be modified, at least temporarily. (Dasgupta and Greenwald 2001, 806)

Implementation Intentions

Stewart and Payne, in a 2008 study on bringing automatic stereotyping under control, discuss a method called "implementation intentions". This is a "special type of conscious control strategy" that uses if-then or when this-then that action plans. These "help people enact their goals more efficiently than general intentions." (1332-4) For example, consider the two following statements in terms of how effective they would be in changing our behavior:

"When I leave work, I will exercise at the gym."

vs.

"I will exercise more."

The first statement is an implementation intention strategy that is being used to exercise more. The "if-then" nature of the first thought is more precise and has a specific outcome! The second one is more general.

In their three experiments, Stewart and Payne used the commonly held stereotype about African-American people, especially men, that they are more likely to be violent and commit crimes than European-Americans. They found that "automatic stereotyping was reduced when participants made an intention to think specific counterstereotypical thoughts whenever they encountered a Black individual." The participants were each instructed to say or think the word "safe" at each encounter, creating a new automatic association. Stewart and Payne point out that the changes seen, the reduction in stereotyping was "driven by a change in automatic stereotyping and not controlled thinking. [They were learning a new stereotype, if you will.] This benefit was acquired with little practice and it generalized to novel faces. Thus, implementation intentions may be an effective means for controlling automatic aspects of thought." (1332)

For another example of an implementation intention, think about the stereotypes people have about anyone with a mobility problem or speech problem. People with characteristics such as these are often assumed to not be very smart. For this situation, the counterstereotype could be the word, "intelligent". For Mexican-Americans, try "hard working". For gays, lesbians, bisexual, and transgendered people, try "moral" or "devoted parent".

This particular strategy can be used by everyone, all the time, and in a private way. The authors of the study claim that just making the intention starts to change

implicit associations and stereotypes. Implementation intentions appear to function in two ways. First, they increase the strength of the association between the environmental cue (seeing a Black individual) and the goal directed intention (the word "safe")- think synapses, think neurotransmitters. The second way implementation intentions work is that they make both the cue from the environment (seeing a Black individual) and the goal directed intention increase in accessibility - it becomes easier. "Once a person has made the initial if-then intentions, these intentions require little motivation and effort to employ" say Stewart and Payne. (2008, 1334) "General intentions may not produce the intended response efficiently." It needs to be specific, so for best results, you need to figure out what your specific implicit biases are and then come up with a counterstereotype to use.

Counterstereotypical implementation intentions operate at an automatic level. They serve to decrease "the influence of stereotypic associations on responses." (Stewart and Payne 2008, 1342-3) So, this technique can change behavior. This, to me, is very big.

In addition to employing implementation intention strategies, Stewart and Payne suggest that people work to change their social contexts. We should try to increase our intergroup contact - spend time with people who are not members of our in-group. This means that in institutional settings, such as schools and workplaces, we should increasingly and proactively diversify the work force. This must be a conscious effort. We must put procedures in place that prevent those in positions of power and authority, those who do the hiring, from defaulting to stereotypes in their judgments and going with in-group preferences.

In a place like a community college, if we purposefully work to achieve a highly diversified workforce, we increase the likelihood of people having significant, daily interactions with folks from out-groups. This increase in contact can lead to the formation of cross-group friendships.

Stewart and Payne suggest that we should try to create and maintain authentic friendships with people from out-groups. They also suggest we need to work on improving our familiarity with members of out-groups with the goal of increasing our ability to see each person in a more individual manner. In other words, try to overcome seeing members of an out-group as all "looking alike"! Changing the social context in an institution by working to diversify the workforce creates a social context in which this is much more likely to happen! Research on "friendships" lists "apparent availability" as one of the factors involved in the formation of friendships, thus many friendships are made in the workplace and in schools, where many of us spend a significant amount of time.

All of these strategies work to replace automatic stereotypes with attitudes that individuate. We are adding an association and strengthening it, so it can grab more cortical real estate. A conscious effort to individuate (to easily "tell apart" members of an out-group) can remove a default setting to stereotype and can remove the fear or withdrawal response in the amygdala. (Wheeler and Fiske 2005, 61)

What else can we do?

A 2001 article by Rudman, Ashmore, and Gary points out that voluntary participation in some type of diversity training which stresses "appreciation, rather

than elimination, of group differences" has been found to be successful in reducing both explicit and implicit bias. (Rudman, et. al. 2001, 857) The reductions in explicit bias are, according to the authors, likely due to the content of the class. The reductions in implicit bias, however, appear to "represent an incidental learning process, one that is indirectly gained by participating in the course." (Rudman, et. al. 2001, 866) Many authors have argued that automatic biases are learned indirectly.

"If people unintentionally acquire implicitly prejudicial attitudes and beliefs, why would it be necessary for them to deliberately unlearn them? Indeed, [in their study, Rudman, et. al. found that] people motivated to 'try hard' not to be prejudiced were unable to change their IAT [Implicit Association Test] scores. By contrast, people briefly exposed to positive Black exemplars [such as Martin Luther King, Jr.] or primed with counterstereotypic mental imagery did show reduced implicit biases through processes that seem to be relatively indirect." (Rudman, et. al. 2001, 866)

This study by Rudman, Ashmore, and Gary was looking at students who were enrolled in a college seminar about prejudice and conflict. The authors found that those students "who evaluated the African-American professor and the course positively, who made friends with out-group members, and who reported feeling less threatened by out-group members also showed decreased implicit prejudice and [decreased] anti-Black stereotypes." (2001, 866)

Understanding how bias works can loosen its grip on us.

"Prejudice appears to be the unfortunate consequence of lower-level affective processes that are not easily altered by higher-order reasoning." It is possible

that people "could achieve non-bias through practice, selective attention, or interpersonal experiences that gradually recondition attitudes." (Livingston and Drwecki 2007, 822)

In terms of bias and fear-conditioning, (back to spiders and snakes) researchers have found only one clear connection, and that is that "higher levels of interracial dating correlated with lower levels of fear-conditioning bias." (Maroney 2009, 85; Navarrete, et. al. 2009, 155) Humans seemed to have evolved a predisposition to fear "dissimilar others" yet the "precise content of the 'dissimilar other' judgment is likely filled by social and cultural learning. But, what is learned can sometimes be unlearned. The interracial dating correlation is given additional grounding by robust data in support of the "contact hypothesis", and this "suggests that the sociocultural learning aspect of this evolutionary grounded mechanism might be malleable." (Maroney 2009, 87) "By knowing one another well, we may eventually turn down the volume on internal alarms that keep ringing long after the danger has passed." (Maroney 2009, 88)

One last brain science principle: Use it or lose it. Frequency counts!

Repetition strengthens connections and lack of use weakens connections in the brain. For people who are highly motivated to reduce their implicit biases and who adopt one or more of the strategies described, repetition of the strategy will strengthen those neural networks and, in turn, may weaken the stereotypical one. Every time we employ one of these strategies, we make an investment for an unbiased future.

Conclusion

We cannot wait for institutional change to remove all forms of bias. We must each take responsibility for the biases we carry, and work actively to re-learn new associations. But, while we do this, we must not neglect the necessary institutional change that is required to alter the social contexts - where we live, where we learn, where we work, and where we play - so that they no longer perpetuate and maintain institutional bias, which by its very nature benefits members of the dominant culture at the cost of everyone else.

I want to end with a short re-cap of what to remember and what we can do.

First, accept the fact that each of us learned biased beliefs, assumptions, and stereotypes about people who are members of "out-groups". We can challenge these by focusing our attention on members of that out-group who do not fit these conceptions. Purposefully look for counterstereotype examples. Do this a lot.

Second, when encountering a person who is different from you, check how you are feeling and try to get a hint of what you might be thinking about this person and how it makes you feel. This awareness will help you find out what specific stereotypes you hold.

Third, remember that we all have unconscious, implicit biases about others. Find a word or phrase that counters the stereotype you have and say this word to yourself whenever you encounter a member of that group.

Fourth, remember also that we are born with a neural bias for in-group members. Factor this in when making decisions, such as in hiring or evaluating people who are members of an out-group.

Fifth, know that experiences impact both our conscious and unconscious thoughts and what we remember. Intentionally get to know people who are not like you. Get to know them well.

Sixth, mirror neurons allow us to feel how others feel. When interacting with people who are different than you, practice increasing your understanding of them and your empathy for them.

Seventh, purposefully work to reflect on and transform your behavior toward out-group members in such a way that you reduce the impact of your stereotypes and biases on your actions and interactions.

I invite you, I urge you to take these steps to “teach” your brain new associations and then keep reinforcing them. I ask this of each of you and of my own self so we can all contribute toward achieving the goal of reducing and hopefully preventing the deep and widespread personal and social damage that occurs as a result of the impact of bias on our behavior.

Bibliography

- Amodio, D.M., & Devine, P.G. (2006). Stereotyping and evaluation in implicit race bias: Evidence for independent constructs and unique effects on behavior. *Journal of Personality and Social Psychology*, *91*, 652-661. doi:10.1037/0022-3514.91.4.652
- Blair, I.V., Ma, J.E., & Lenton, A.P. (2001). Imagining stereotypes away: The moderation of implicit stereotypes through mental imagery. *Journal of Personality and Social Psychology*, *81*, 828-841.
- Carpenter, S. (2008). Buried prejudice. *Scientific American Mind*, *19*, 33-39.
- Cozolino, L. (2006). *The Neuroscience of Human Relationships and the Developing Brain*. New York: W.W. Norton & Company.
- Cristol, D. & Gimbert, B. (2008). Racial perceptions of young children: A review of literature post-1999. *Early Childhood Education Journal*. *36*, 201-207. doi: 1007/s10643-008-0241-6
- Dasgupta, N. & Greenwald, A.G. (2001). On the malleability of automatic attitudes: Combating automatic prejudice with images of admired and disliked individuals. *Journal of Personality and Social Psychology*. *81*, 800-814.
- Dovidio, J.F., & Gaertner, S.L. (2005). Color blind or just plain blind? The pernicious nature of contemporary racism. *The Nonprofit Quarterly*, *12*, 40-46.
- Dunham, Y., Baron, A.S., & Banaji, M.R. (2008). The development of implicit intergroup cognition. *Trends in Cognitive Sciences*, *12*, 248-253. doi:10.1016/j.tics.2008.04.006
- Frith, C.D. (2007). The social brain? *Philosophical Transactions: Biological Sciences*. *362*, 671-678.
- Frith, C.D. & Frith, U. (2008). Implicit and explicit processes in social cognition. *Neuron*, *60*, 503-510. doi: 10.1016/j.neuron.2008.10.032
- Galinsky, A.D. & Mosdowitz, G. B. (2000) Perspective-taking: Decreasing stereotype expression, stereotype accessibility, and in-group favoritism. *Journal of Personality and Social Psychology*. *78*, 708-724.
- Gallese, V. Intentional attunement. The mirror neuron system and its role in interpersonal relations. *Interdisciplines*. Retrieved 1-11-2006. <http://www.interdisciplines.org/mirror/papers/1/>
- Gallese, V., Migone, P., & Eagle, M. (submitted to JAPA). Intentional attunement: Mirror neurons and the neural underpinnings of interpersonal relations. Retrieved 1-1-2011: <http://www.mimetictheory.org/bios/gallese.html>

- Greenwald, A.G. & Krieger, L.H. (2006). Implicit bias: Scientific foundations. *California Law Review*, *94*, 945-967.
- Guinote, A., Willis, G.B., & Martellotta, C. (2010). Social power increases implicit prejudice. *Journal of Experimental Social Psychology*, *46*, 299-307. doi: 10.1016/j.jesp.2009.11.012
- Gutsell, J.N. & Inzlicht, M. (2010). Empathy constrained: Prejudice predicts reduced mental simulation of actions during observation of outgroups. *Journal of Experimental Social Psychology*, *46*, 841-845. doi:10.1016/j.jesp.2010.03.011
- Heyes, C. (2010). Where do mirror neurons come from? *Neuroscience and Biobehavioral Reviews*, *34*, 575-583. doi: 10.1016/j.neubiorev.2009.11.007
- Iacoboni, M., Molnar-Szakacs, I., Gallese, V., Buccino, G., Mazziotta, J.C., & Rizzolatti, G. (2005). Grasping the intentions of others with one's own mirror neuron system. *PLoS Biology*, *3*, (3): e79.
- Knowles, E.D., Lowery, B.S., & Shauberg, R.L. (2010). Racial prejudice predicts opposition to Obama and his health care reform plan. *Journal of Experimental Social Psychology*, *46*, 420-423. doi: 10.1016/j.jesp.2009.10.011
- Leander, N.P., Chartrand, T.L., & Wood, W. (2011). Mind your mannerisms: Behavioral mimicry elicits stereotype conformity. *Journal of Experimental Social Psychology*, *47*, 195-201. doi: 10.1016/j.jesp.2010.09.002
- Lebrecht, S., Pierce, L.J., Tarr, M.J., & Tanaka, J.W. (2009). Perceptual other-race training reduces implicit racial bias. *PLoS ONE*, *4*, 1-7.
- Lev-Ari, S. & Keysar, B. (2010). Why don't we believe non-native speakers? The influence of accent on credibility. *Journal of Experimental Social Psychology*, *46*, 1093-1096. doi:10.1016/j.jesp.2010.05.025
- Livingston, R.W., & Drwecki, B.B. (2007). Why are some individuals not racially biased? Susceptibility to affective conditioning predicts non prejudice toward blacks. *Psychological Science*, *18*, 816-823.
- Maroney, T.A. (2009). Unlearning fear of out-group others. *Law and Contemporary Problems*, *72*, 83-88.
- McGillicuddy-De Lisi, A.V., Daly, M., Neal, A. (2006). Children's distributive justice judgments: Aversive racism in Euro-American children. *Child Development*, *77*, 1063-1080.
- Meltzoff, A.N. (1995). Understanding the intentions of others: Re-enactment of intended acts by 18-month-old children. *Developmental Psychology*, *34*, 838-850.

- Meltzoff, A.N. (2007). 'Like me': A foundation for social cognition. *Developmental Science*, 10, 126-134. doi: 10.1111/j.1467-7687,2007.00574.x
- Meltzoff, A.N. & Decety, J. (2003). What imitation tells us about social cognition: A rapprochement between developmental psychology and cognitive neuroscience. *Philosophical Transactions of the Royal Society B: Biological Sciences*. 358, 491-500.
- Meltzoff, A.N. & Moore, M.K. (1977). Imitation of facial and manual gestures by human neonates. *Science*. 198, 75-78.
- Méndez Barletta, L. (2008). Teachers' differential treatment of culturally and linguistically diverse students during sharing time. *Colorado Research in Linguistics*. 21, 1-21.
- Molnar-Szakacs, I., Wu, A.D., Robles, F.J., Iacoboni, M. (2007). Do you see what I mean? Corticospinal excitability during observation of culture-specific gestures. *PLoS ONE*. 2 (7): e626. doi: 10.1371/journal.pone.0000626. Retrieved 12-17-2010. <http://www.plosone.org/article/info>
- Morrison, K.R. & Chung, A.H. (2011). "White" or "European American"? Self-identifying labels influence majority group members' interethnic attitudes. *Journal of Experimental Social Psychology*. 47, 165-170. doi: 10.1016/j.jesp.2010.07.019
- Navarrete, C.D., Olsson, A., Ho, A.K., Mendes, W.B., Thomsen, L., & Sidanius, J. (2009). Fear extinction to an out-group face: The role of target gender. *Psychological Science*. 20, 155-158.
- Öhman, A. (2005). Conditioned fear of a face: A prelude to ethnic enmity? *Science*. 309, 711-713. doi:10.1126/science.1116710
- Olson, M.A. & Fazio, R.H. (2001). Implicit attitude formation through classical conditioning. *Psychological Science*. 12, 413-417.
- Olson, M.A., & Fazio, R.H. (2006). Reducing automatically activated racial prejudice through implicit evaluative conditioning. *Personality and Social Psychology Bulletin*, 32, 421-433. doi:10.1177/0146167205284004
- Olsson, A., Ebert, J.P., Banaji, M.R., & Phelps, E.A. (2005). The role of social groups in the persistence of learned fear. *Science*. 309, 785-787. doi:10.1126/science.1113551
- Olsson, A. & Phelps, E.A. (2004). Learned fear of "unseen" faces after Pavlovian, observational, and instructed fear. *Psychological Science*. 15, 822-828.
- Pearson, A.R., Dovidio, J.F., & Gaertner, S.L. (2009). The nature of contemporary prejudice: Insights from aversive racism. *Social and Personality Psychology Compass*, 3, 1-25. doi:10.1111/j.1751-9004.2009.00183x

Phelps, E.A. (2006). Emotion, learning, and the brain: From classical conditioning to cultural bias. In P.B. Baltes, P.A. Reuter-Lorenz, & F. Rösler, (Eds.), *Lifespan development and the brain: The perspective of biocultural co-constructivism* (pp.200-216). New York: Cambridge University Press.

Phelps, E.A., O'Connor, K.J., Cunningham, W.A., Funayama, E.S., Gatenby, J.C., Gore, J.C., & Banaji, M.R. (2000). Performance on indirect measures of race evaluation predicts amygdala activation. *Journal of Cognitive Neuroscience*. 12, 729-738. doi:10.1162/089892900562552

Phelps, E.A. & Thomas, L.A. (2003). Race, behavior, and the brain: The role of neuroimaging in understanding complex social behaviors. *Political Psychology*. 24, 747-758.

Rudman, L.A. (2004). Sources of implicit attitudes. *Current Directions in Psychological Science*. 13, 79-82.

Rudman, L.A., Ashmore, R.D., & Gary, M.L. (2001). "Unlearning" automatic biases: The malleability of implicit prejudice and stereotypes. *Journal of Personality and Social Psychology*. 81, 856-868.

Rudman, L.A., Greenwald, A.G., & McGhee, D.E. (2001). Implicit self-concept and evaluative implicit gender stereotypes: Self and ingroup share desirable traits. *Personality and Social Psychology Bulletin*. 27, 1164-1178. Doi:10.1177/0146167201279009

Sinclair, S., Dunn, E., & Lowery, B.S. (2004). The relationship between parental racial attitudes and children's implicit prejudice. *Journal of Experimental Social Psychology*. 41, 283-289. doi:10.1016/j.jesp.2004.06.003

Squire, L.R., & Kandel, E.R. (2009). *Memory: From Mind to Molecules*. Greenwood Village, CO: Roberts & Company.

Stewart, B.D. & Payne, B.K. (2008). Bringing automatic stereotyping under control: Implementation intentions as efficient means of thought control. *Personality and Social Psychology Bulletin*. 34, 1332-1345.

Wheeler, M.E. & Fiske, S.T. (2005). Controlling racial prejudice: Social-cognitive goals affect amygdala and stereotype activation. *Psychological Science*. 16, 56-63.

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