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by

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ABSTRACT

Spontaneous trait inferences have been the focus of impression formation research for nearly a century. Spontaneous trait inferences impact the judgments and decisions we make about these objects and people particularly when the group membership of that object or person is meaningful to us, such as their race/ethnicity. Research on extralist cues has suggested the spontaneous trait interferences act via the encoding specificity principle: only items stored can be retrieved, and the effectiveness of retrieval depends on the contextual information that is stored with the word in episode memory. Other research suggests that stereotypes may disrupt the spontaneous inferences process. However, no research has been conducted to investigate the degree to which racial stereotypes may impact the spontaneous trait-inferencing process based on face-type. This present research presented participants with a variety of behavioral sentences paired with photographs of people. Participants then saw a trait probe word that was related to the behavior sentence. The behavior sentences varied in the degree to which they may be considered stereotypical of African American individuals. The faces presented also varied in the degree to which they will be considered prototypical of an African American face. I expected that the degree to which a face is considered to be prototypical of race would influence the stereotypical associations that were activated. I expected that the activation of stereotypical knowledge would impact the speed at which people responded to the trait probe word. However, the results suggest that all African American faces, regardless of face-type, were categorized similarly and elicited similar inferencing responses. Implications from this present research could suggest that no matter how representative a face may be of a racial category, if that face is categorized within a particular race, there may similar consequences in the initial impression formation stages for all faces. Implications from the research will aid in the development of bias prevention by illustrating the ways in which people encode information about others and their behaviors.

INDEX WORDS: Inferencing, Face-type, Stereotypes

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DEDICATION

This dissertation is dedicated to my mother and my grandmother – the two women who have supported me through my highest of highs and my lowest of lows. This milestone would not have been possible without them.

In Loving Memory of

Lillian Elaine Bond

November 12, 1931 – June 24, 2022

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1 THEORETICAL FRAMEWORK

People often spontaneously form impressions of others without necessarily having any particular goal or an intention to do so (Todorov & Uleman, 2002). Impressions may be influenced by a variety of characteristics and features in the social environment. Salient features about a person—such as gender, age, and race—can automatically activate associated stereotypes and influence spontaneous inferences that impact impression formation (Wigboldus, Dijksterhuis, & van Knippenberg, 2003; Wigboldus, Sherman, Franzese, & van Knippenberg, 2004; Yan, Wang, & Zhang, 2012). Activated stereotypes can simplify information processing by serving as efficiency devices and cognitive shortcuts (Macrae, Milne, & Bodenhausen, 1994). Although stereotypes allow individuals to handle issues more effortlessly and efficiently, they also may cause inaccurate perceptions of others (Bargh, 1999; Fiske, 1998). Otherwise typically occurring spontaneous trait inferences may be less likely when an activated stereotype is inconsistent with the behavior. This can cause people to inhibit positive inferred traits that they may otherwise have been extended to someone had there not been a competing negative activated stereotype associated with the person (or vice versa). Understanding the cognitive mechanisms that underlie spontaneous trait inferencing—including the impact of stereotypes—may aid in the development of preventions and training geared towards decreasing negatively biased judgment and decision-making about others.

Cognitive and social psychologists have studied spontaneous trait inferences for over 70 years. With origins in research related to person perception and impression formation (Asch, 1946; Tagiuri & Petrullo, 1958), spontaneous trait inferences are thought to be the process of inferring personality traits about an actor’s behavior (that may be diagnostic of future behaviors), generally without any awareness or intention (Orghian, Ramos, Garcia-Marques, & Uleman, 2019; Winter & Uleman, 1984). Aside from the spontaneous trait inferences that people make from observed behavior, people also make overgeneralized stereotypical inferences based on group membership, particularly related to salient group memberships.

One research question that has not been explored is the degree to which racially stereotypical knowledge impacts the spontaneous trait inferencing process via a recognition probe paradigm. There is an abundance of literature to suggest that racial stereotypes regarding African Americans are most often negative. For example, one prevailing and ubiquitous stereotype is the association of Black males with assumed criminality and violent behavior (Correll, Park, Judd, & Wittenbrink, 2002; Devine & Elliot, 1995; Dovidio, Evans, & Tyler, 1986; Niemann, Jennings, Rozelle, Baxter, & Sullivan, 1994). Historically, Black Americans have been subject to racism at all levels of society. The association has been cyclical, with negative stereotypes contributing to racism and racism contributing to negative stereotypes. (Kleider-Offutt, Bond, & Hegerty, 2017).

Science has not been immune to the dark past: dating back to the 19th century, researchers investigating the physical differences in facial structure between Black and White individuals was amongst many forms of scientific racism (see Guthrie, 2004 for review). According to Gould (1996), Samuel Morton (Morton, 1849) is most prominently known for his research on skull-size differences between Black and White individuals. Morton concluded that the skulls of Black people were significantly smaller than that of White people, implying differences in brain size. Those findings seemed to support the stereotype that Black individuals were inferior to White individuals in terms of intellectual/cognitive ability and essentially justifying stark disparities in legal, economic, and social status. other researchers of the time seemed to replicate these results Other researchers of the time seemed to replicate these results (Gould & Gold, 1996; Nott & Gliddon, 1854) and thus provided more evidence to the assumed inferior and dehumanized status of Black individuals. This research has since been widely discredited and is now understood to be one of many forms of scientific racism (Menand, 2001).

Present-day media portrayals further perpetuate these associations (Travis Lash Dixon & Maddox, 2005) through misrepresentation of Black Americans as the perpetrators of crime (see also Dixon & Linz, 2000a, 2000b). Rothbart, Fulero, Jensen, Howard, and Birrell (1978) drew implications from their research to suggest—because much of the information we learn about groups (particularly minority groups) is through news media, and because news media tends to present the most extreme offenses—that we tend to overrepresent the extreme behavior towards these depicted groups. Although the effects of news media are still prevalent to date (Dixon, 2008; Dixon, 2017; Dixon and Williams, 2014; Hurley, Jenson, Weaver, & Dixon, 2015) other mainstream media depictions (e.g., non-news TV, movies, social media) of African Americans also play a similar role (Abraham, 2003; Adams-Bass, Stevenson, & Kotzin, 2014).

It is possible that the pervasive and ubiquitous negative stereotype of Black Americans—being associated with assumed criminality and violence and also in addition to the more positive stereotypes (i.e., athletic, rhythmic)—may affect (whether in an inhibiting or a facilitating role) the spontaneous trait inferencing process. If racially stereotypical knowledge impacts the spontaneous trait inferencing process, in a way similar to stereotypes associated with occupational category labels (Wigboldus, Dijksterhuis, & van Knippenberg, 2003), then there should be similar differences in the way people respond to relevant traits when viewing faces that are highly representative (prototypical) of a race compared to less representative of a race (not prototypical) paired with behaviors.

There are two related questions that seem to drive knowledge and understanding regarding spontaneous trait inferences (Uleman, Newman, & Winter, 1992). First, what are the minimal conditions needed to go beyond simply perceiving and categorizing objects to more complex cognition operations like drawing inferential knowledge (e.g., personality traits) about those objects? Second, do such inferences require volition (or intentions, incentives, or motivations) or conscious awareness to occur? To answer these questions, there has been a great deal of research to explore how cognitive mechanisms may facilitate spontaneous trait inferencing and impact their outcomes. One understanding gained from this research is that inferences occur in a multi-stage process (Bassili, 1989a, 1989b; Gilbert, Krull, & Pelham, 1988; Kintsch, 1988; Whitney, Waring, & Zingmark, 1992). This literature suggests (a) information is attended to based on relevant knowledge and the associated category is activated as the result of stimulus processing; (b) relevant information stored in long-term memory may be connected later (categorized) to the stimulus representation; and (c) additional information from the social environment and long-term memory may result in revision of the constructed representation. Each substage of the trait inferencing process, as well as their outcomes (e.g., the judgments and decisions we may make based on the information we encode), will be explored further. Specifically, I investigated how judgments, impacted by stereotypes, interfere with the spontaneous trait inferencing process and the subsequent decisions people make based on the information encoded.

1.1 Attention

1.1.1 Spontaneous Trait Inferences

For people to manage large amounts of complex social information, they must selectively attend to certain features of a stimulus field before further processing the information (e.g., assigning stimuli to categories). thus, reducing the amount of information being processed when make a judgment or decision (Bargh & Pietromonaco, 1982). A related research question is: to what degree must people attend to behavioral information to facilitate spontaneous trait inferences? Uleman, Moskowitz, Roman, and Rhee (1993) investigated this while manipulating the amount of attention participants could give to behavioral sentences at encoding. Their results across two studies suggested that people recall sentences better when they have trait-implying cues available than when recalling the sentences with no cue, even under incidental conditions.

Another heavily debated area of investigation regarding spontaneous trait inferences is whether they are automatic or controlled processes. Posner and Snyder (1975), Shiffrin and Schneider (1977; 1977), and Logan (1984) were a few of the frontrunners to propose models of automatic versus conscious (controlled) processing. Posner and Snyder (1975) proposed three criteria for considering a cognitive process to be automatic: (a) it occurs without intention, (b) it occurs outside of conscious awareness and (c) it occurs without interfering with other mental activity. Conscious (controlled) processing requires attention, awareness and does interfere with other mental activity. Logan's model was similar to the Posner-Snyder's model and further suggested that automatic processes were either relatively permanent, or rehearsed to such a degree that they are not easily malleable. Shiffrin and Schneider's general theory of information processing was also similar to the Posner-Snyder model further emphasizing that automatic processes were well-learned and generally independent of on the amount of cognitive resources available. Conscious, controlled processes, on the other hand, were considered more demanding of processing capacity. Taken together, these models suggest that automaticity requires less effort than controlled processes and they are largely determined by intention, awareness and the degree to which cognitive processes are dependent on the cognitive resources available.

People make trait inferences without any intentions to do so and with little to no awareness of having made them (Uleman, 1987; Winter & Uleman, 1984; Winter, Uleman, & Cunniff, 1985). At best, people may have a weak and fleeting awareness of making trait inferences at encoding, but there is no evidence to suggest people have any awareness of these inferences immediately after recall. Automatic processes are unaffected by limitations in cognitive capacity; even when people are cognitively taxed, automatic processes should persist with minimal or no disruption (McLeod, 1977; Stager & Zufelt, 1972; Uleman et al., 1992). Broadbent (1958) considered cognitive resources to be a single yet flexible facility of limited capacity (Engle, Kane, & Tuholski, 1999; Just & Carpenter, 1992). A person's performance will deteriorate as processing demand begins to exceed the limited capacity system. This suggests that dual-task performance would be unimpaired as long as the amount of resources needed to conduct the two concurrent tasks does not exceed the total resources available. Although it is now known processing capacity overload for dual tasks is more likely to be domain-specific, rather than a single capacity system, cognitive scientists generally agree that dual-tasks are more likely to be successfully completed when both tasks are automatic compared to controlled (Mcleod, 1977). Conversely, detriments in performance on dual-tasks success would suggest that at least one of the tasks is more controlled compared to automatic. This is no different from other perceptual process that seem to fall on the automatic to controlled spectrum. For example, even a perceptual process such as attentional capture to threatening stimuli are considered to not be a completely bottom-up, automatic process (Fabio & Caprì, 2019).

Although there is evidence to suggest that spontaneous trait inferences occur with little or no awareness and without intention, there is also evidence to indicate that when instructed to do so, people have the ability to attend to their inferences (initiate), not attend to them (inhibit) and even stop attending after initiation (Uleman, 1987). Because of this, spontaneous trait inferences are thought to reside somewhere between being an automatic and controlled process. Heider (1982) suggested that spontaneous trait inferences may occur on a continuum ranging from being completely unaware of the factors influencing social judgments to being fully cognizant of the cues shaping these judgments. Where spontaneous trait inferences fall on the automatic to controlled spectrum is thus likely to be dependent on the instructions, context, and additional information available at the time of encoding. For this reason, Uleman et al. (1992) argued that spontaneous trait inferences are not automatic based on capacity or inhibition criterion; rather they are best characterized as "spontaneous" because although they may occur without intentions or awareness, they do still require some amount of cognitive capacity and can be inhibited and terminated. Evidence suggests a distinction between the automaticity of spontaneous trait inferencing and trait activation automatically leading to categorization. If trait activation occurs, it seems automatically to lead to the categorization of behavior. This may or may not also result in automatic spontaneous trait inferencing. Once a trait is activated and used to identify a behavior, its readily accessible nature seems to increase the likelihood that it will facilitate subsequent information processing which may be used to make judgments and decisions about people (Bassili, 1989b; Newman, 1993). Simply state, spontaneous trait inferences can be augmented, controlled, or inhibited under the right conditions.

When participants were shown behavioral sentences and were instructed to form impressions about the actors performing the behaviors, trait cue effectiveness significantly improved sentence recall at test compared to participants who are not given the same impression formation instructions (Bassili & Smith, 1986). Further, spontaneous trait inferences may not only occur when information is present and attended to (Uleman, 1987; Uleman, Newman, &

Winter, 1987). When participants read behavioral sentences and then received instructions unrelated to the traits implied by these sentences (e.g., write down a word that rhymes with a word in the sentence), there was a significant reduction in cued recall. However, when the instructions required meaning extraction, spontaneous trait inferencing did occur with trait cued recall being the most effective compared to semantic or non-cued recall. This suggests that processing goals may inhibit the social inferences people would otherwise make.

1.1.2 Race and Stereotypes

Stereotypes are positive or negative beliefs held about a particular groups' behavior and attributes (see review in Fiske, 1998). Many stereotypes are learned early in life and are considered to be such well-established associations (Allport, Clark, & Pettigrew, 1954; Devine, 1989), that they are automatically activated in the presence of a stimulus from the stereotyped group. This activation occurs despite efforts to control the process (E. Smith & Branscombe, 1984), regardless of prejudice level (Devine, 1989, 2001). There is a large body of research to suggest that stereotypes directly impact what people pay attention to and subsequently the degree to which they remember those objects at a later time (see also Memory section, below). For example, threatening stimuli (such as snakes) in particular seem to bias or capture visual attention (Öhman & Mineka, 2001). More recently, Koster, Crombez, Verschuere, and De Houwer (2004) used an attentional dot-probe task to show certain stimuli that may have fear-based associations capture attention faster and hold attention longer than neutral stimuli. In addition, faces seem to capture attention preferentially in a way that other objects do not (Ro, Russell, & Lavie, 2001). In a study using a change blindness paradigm, Ro et al. (2001) all found that changes in faces were detected more quickly and accurately compared to changes in other objects. Similar to findings by Koster et al. (2004), this detection of faces seems to be particularly strong when researchers manipulated the emotions displayed by the face, such that faces judged to be angry or threatening garnered a stronger attentional response compared to neutral and happy faces. This suggests that certain faces, particularly those interpreted to be threatening, are more likely to garner attention compared to other faces. Neurological evidence (Lieberman, Hariri, Jarcho, Eisenberger, & Bookheimer, 2005) seems to suggest that people display selective attention to Black faces compared to White. This could be related perceived threat Black faces evoke likely related to the stereotypes people hold (Lieberman, Hariri, Jarcho, Eisenberger, & Bookheimer, 2005).

1.2 Knowledge and Categorization

Rogers and Cox (2015) defined conceptual knowledge as knowledge that enables people to recognize and make inferences about objects and their respective properties or features. Although concepts have been defined and discussed in many ways, they are considered to be the "mental representation of a particular class or individual" (Smith, 1989, p. 502). Concepts provide us with the meaning of objects and the rules for sorting these objects into categories (Kiefer & Pulvermüller, 2012). Similarly, information about our social world is organized by concepts. Social concepts embody our knowledge about a social category and its members (Kunda, 1999). Like categorizing objects, grouping people together is not necessarily determined by objective knowledge; it reflects people's understanding of the groupings that are most likely to be meaningful. For example, it could technically be just as likely for people to be grouped by shoe size as by skin color, but personal experience may determine skin color to be more meaningful, and thus people may be more likely to group people by skin tone over shoe size (Kunda, 1999). When conceptualizing "meaningful", it is best to consider multiple definitions of the word (Dictionary, 1989): "meaningful" as something that may (a) be important, serious, significant and (b) have a recognizable function in a language system. The former encompasses the amount of relevant information that is tied to an object. Having more relevant information associated with the object increases the amount of meaning that object has to us. The latter encompasses the degree to which that object is useful and aids in navigating our environment or the degree to which the object aids in making judgments and decisions

1.2.1 Spontaneous Trait Inferences

Traits are included in the concepts, and subsequent rules for categorization, that people use to represent other people (Peabody, 1967; Uleman et al., 1993; Zanna & Hamilton, 1972). The concepts (and their respective categories) that are activated when navigating our social world play a major role in how we interpret and understand the events and people we encounter (e.g., the impression we form; Kunda, 1999). Social and cognitive psychologists have taken great interest in understanding the determining factors that lead to the activation of a concept. Concepts, and their respective category members, may be activated in a few different ways including salience, chronic category accessibility, and priming (Kunda, 1999)—all of which impact the use of spontaneous trait inferencing.

Category accessibility (or salience) is crucial in perception due to the ambiguity of social information (Bruner, 1957). When a relevant category is readily accessible, it may serve as the best fit for making sense of particularly ambiguous information (Bargh & Pietromonaco, 1982; Bruner, 1957). The degree to which a category may be chronically accessible is related to the frequency of use: the more a category is used, the more accessible it is (Hayes-Roth, 1977; Higgins et al., 1982; Srull & Wyer, 1979, 1980). Higgins and colleagues (1982) showed participants trait words that were either positive or negative. Participants were asked to memorize these words then were shown ambiguous behavioral sentences. As expected, participants were more likely to evaluate the target actor in congruence with the trait (either positive or negative) that they saw earlier. This early activated trait category was more accessible due to its recent use and due to being used to process subsequent trait-relevant information.

Priming occurs when the presentation of one stimulus alters the way we respond to another stimulus due to the ease of accessibility of relevant information facilitated by the first stimulus (Hillenger, 1980). Newman and Uleman (1990) investigated assimilation and contrast effects using a priming paradigm to test how the effectiveness of traits for cueing recall of behaviors reflects how trait inferences are encoded. If priming only leads to assimilation effects, then when a concept is activated (e.g., positive trait), it will lead to subsequent evaluations and perceptions of relevant information that are congruent with the prime (e.g., evaluating subsequent relevant stimuli positively; Higgins, Rholes, & Jones, 1997). Both assimilation and contrast (i.e., incongruent evaluation) effects can occur due to priming. When participants are unaware of a prime, they are more likely to interpret ambiguous behavioral information in a congruent (i.e., assimilative) manner (Lombardi, Higgins, & Bargh, 1987). Conversely, those who were aware of the prime were more likely to categorize actions in a way that was incongruent with the trait prime (i.e., contrast effects). Higgins (1989) suggested that these findings may have occurred because, when people are aware of the prime, the prime may act as a sort of standard against which the other stimuli are judged. It may be less likely for the test stimuli to meet this standard leading to contrasting effects.

1.2.2 Race and Stereotypes

During social categorization, social stimuli (i.e., people) are grouped together, as are the attributes and characteristics (e.g., behaviors) associated with these social categories. Social categories elicit category information, or stereotypes, that facilitate impression formation (Allport et al., 1954; Bargh, 1999; Devine, 1989; Dovidio et al., 1986; Fazio & Dunton, 1997; Freeman, Penner, Saperstein, Scheutz, & Ambady, 2011; Gilbert & Hixon, 1991; Ramasubramanian, 2011; Sinclair & Kunda, 1999). How people think about stimuli, whether as social entities or as objects, impacts the type of category (and relevant stereotype) activation that occurs (Hugenberg, Sacco, & Compass, 2008). Activating and applying social category information seemingly aids in navigating a socially-complex world by allowing people to satisfice (Simon, 1945) using just enough category information to meet our goals rather than considering all information, including that which may be potentially irrelevant. Many theorists agree that social categorization and the subsequent activation of stereotypes are unconditional phenomena, occurring even with the mere presentation of a social target (see Bargh, 1999 for a review). Further, it is held that social categorization, and subsequent stereotype activation, tends to occur most powerfully in situations where the goals of the task require perceivers to think about others as social beings (Hugenberg et al., 2008).

Alternatively, prototypes are considered to be the best-fit, or most central members, of a category (Rosch, 1973; J. D. Smith, 2014). Consistent with research on representative heuristics (Braga, Ferreira, & Sherman, 2015; Kahneman, 2011; Tversky & Kahneman, 1974; Wells, 1985), judgments and decisions made about potential members of a category are determined based on how closely the members resemble or represent the central or idealized member of the category (Rosch, 1975). Similar to stereotypes, there is a significant amount of literature suggesting that certain facial features may be perceived as more prototypical of a particular racial category than other facial features. To be clear, this is not to say that any feature or set of features are inherent to any race. But rather, certain faces may be *perceived* to be more prototypical of race than others and therefore may be most associated with the stereotypes linked to that racial category compared to others. Blair (2002) suggests that African American faces perceived to be more prototypical (or stereotypical) of race are categorized more quickly as being African American compared to faces with less-prototypical faces.

1.3 Judgment, Decision-Making

1.3.1 Spontaneous Trait Inferences

Social categories provide cognitive structures for organizing information. (Otten & Moskowitz, 2000; Tajfel, Turner, Austin, & Worchel, 1979). Social categorization can facilitate the automatic activation of the concepts associated with those categories. Although this process leads to a variety of judgments and decisions (that go beyond the scope of this document), one outcome is the positive or negative evaluations and expectations we have towards other groups, which may bias subsequent information processing about those groups (Maass & Schaller, 1991; Otten & Moskowitz, 2000). For example, Otten and Moskowitz (2000) investigated how a minimal-groups paradigm would influence the types of spontaneous trait inferences participants would make about their in-group vs. out-group. A minimal-groups paradigm organizes participants into groups based on arbitrary criteria created by the experimenters (Tajfel, Billig, Bundy, & Flament, 1971). Previous research suggests that this sort of paradigm activates in-group favoritism that impacts subsequent judgment and decision-making (Brewer & Brown, 1998). Positive affect associated with an in-group, even if arbitrarily assigned, activates and impacts subsequent implicit inferences and explicit behavior. This study illustrates how bias and subsequent biased inferences can occur with a random, meaningless group assignment; however, we find similar patterns when the groups do have prior meaning and are not so random (Allport et al., 1954; Devine, 1989; Devine & Elliot, 1995; Dovidio et al., 1986).

1.3.2 Stereotypes and Heuristics

People reply on heuristics to make quick (and yet efficient) decisions that maximize optimal outcomes, particularly about uncertain events (Gigerenzer & Gaissmaier, 2011; Kahneman & Frederick, 2005). Classic research conducted by Tversky and Kahneman (1974) showed that the use of heuristics, or mental shortcuts, helps people quickly arrive at conclusions by reducing the amount of cognitive processes that may otherwise be necessary to make decisions and solve problems. Availability heuristics are based on the cognitive availability of verifying information (Braga et al., 2015; Tversky & Kahneman, 1974). People make decisions via availability heuristics based on how readily available the information comes to mind. Rothbart et al. (1978) suggested that stereotypes act via availability heuristic formation; the ease with which people retrieve information (e.g., behaviors about social groups) influences how prevalent they perceive the event, object or behaviors occur in the environment. The utilization of stereotypes are often thought to be not only conscious, but also unconscious or automatic processes (Fiske, 1993) and, thus, may influence both implicit and explicit judgments. These processes aid individuals by filtering out and filling in information associated with the stereotype to make decision-making more efficient, particularly in uncertain situations.

1.3.3 Stereotypes and Spontaneous Trait Inferences

From a cognitive perspective, stereotypes act as efficient cognitive tools that simplify the social perception process (Bodenhausen & Wyer, 1985; Macrae et al., 1994). Instead of spending time and energy attending to the specific and individual characteristics of people’s social environment, people use stereotypes to form quick impressions and make judgments about others (Brewer & Feinstein, 1999; Fiske & Neuberg, 1990). Stereotypes may be efficient inferential tools that aid in forming impressions about the others in people’s social environments, without necessarily needing specific and individuating information beyond their social group membership (Ramos, Garcia-Marques, Hamilton, Ferreira, & Van Acker, 2012).

Both stereotypes and spontaneous trait inferences aid in the coherence and comprehension of information (Ramos et al., 2012). Drawing on the principle of coherence, comprehension is the "construction of coherent representation" (p. 1248) of the information that is provided in the environment. During the process of comprehension, people make inferences that extend beyond the information that is explicitly given to create a coherent representation (Ramos et al., 2012). Ramos and colleagues (2012) that inferences are more likely to occur when they aid in the "coherent integration" (p. 1254) of previously learned stereotypical knowledge and new behavioral information This integration process occurs due to the encoding process outlined earlier (Wigboldus, Sherman, Franzese, and van Knippenberg (2004). To test this integration process, Wigboldus and colleagues (2004) proposed that activating a particular stereotype prior to encoding of behavioral information potentially makes stereotype-consistent information more readily accessible and stereotype-inconsistent information less accessible. It stands to reason that if the information is stereotype-consistent, this consistency should not interfere with the spontaneous trait inferencing process because the implied trait just becomes more easily accessed. Stereotype-inconsistent information should interfere with the spontaneous inferencing process, however, because the mind is receiving and attempting to process two competing pieces of information: a) the information that is received prior to encoding and b) the inconsistent information at encoding. When this occurs, the activated stereotype is competing with the trait that would have otherwise been implied from the behavioral information. This process makes it is easier to reject a probe that is stereotype-inconsistent because that information is not readily available. It is harder to reject stereotype-consistent probes because that information is readily available, and it is harder to determine whether that readily available information is in fact present or not.

1.3.4 Race and Stereotypes

As mentioned, stereotypes are positive or negative beliefs held about a particular groups' behavior and attributes (see review in Fiske, 1998). They can also be thought of as mental representations for members of (typically social) groups (e.g., gender, race). Stereotypes are often thought to be not only conscious, but also unconscious or automatic processes (Fiske, 1993). Although these processes aid individuals by filtering out and filling in information associated with the stereotype to make decision-making as effortless as possible, these processes do not, at times, come without (sometimes extreme) consequences. Racial stereotypes consistently affect African Americans across many actions and behaviors, and generally in negative ways. Participants report higher hosptily and violence for African American men compared to White men (Duncan, 1976). They are also more likely to consider these hostile behaviors to be attributed to dispositional character traits when the target person is an African American male compared to a White male. Other less negative stereotypes (but not necessarily less problematic, like the "athletic" stereotype) also seem to affect evaluative judgment and decision-making. Stone, Perry, and Darley (1997) found that when participants listened to a recording of a college basketball game, they rated players depicted as Black to have more athletic ability compared to when players were depicted as White.

1.4 Memory

Tulving and Thompson (1973, p. 352) stated that "remembering is regarded as a joint product of information stored in the past and information present in the immediate cognitive environment of the rememberer." Although experimenters have long known that memory includes some combination of 'acquisition, retention, transfer and inference of associations between stimuli and responses' Tulving and Thompson (1973, p. 352) the intertwined and seemingly co-dependent nature of these subsystems made them difficult to investigate prior to the late 40s and early 50s (Tulving & Thomson, 1973; Endel Tulving & Osler, 1968). However, a new way to investigate retrieval as a separate process emerged using what was called the "extralist cueing effect." The extralist cueing effect is the recall of a list item by a retrieval cue that was not explicitly a part of the initial input list. The extralist cueing effect is a robust empirical phenomenon (Bilodeau, 1967; Bilodeau & Blick, 1965; Fox, Blick, & Bilodeau, 1964; McLeod, Williams, & Broadbent, 1971; Postman, Adams, & Phillips, 1955). For example, McLeod, Williams and Broadbent (1971) showed participants a list of words followed by a mental arithmetic task. Participants were then asked to recall the words that had been presented earlier. After a brief two-minute delay, participants were then shown cues not previously presented but related to the original list of words (extralist cue words). For example, if participants saw the list *bed, pillow and blanket,* they may receive a nonpresented but related cue word like *sleep*. They then received the same instructions, to recall as many words as possible from the originally presented list. For words still not recalled from the original list, participants received a second cue word. Similar to previous findings (Endel Tulving & Osler, 1968), the results suggested that one cue assisted in stimulus word recall and the second cue produced even further recall.

Tulving and Thomson (1973) concluded that the effectiveness of extralist cues can best be explained by what is now known as the encoding specificity principle (Tulving & Thomson, 1973). Broadly, this principle states that the effectiveness of retrieval largely depends on the contextual information that is stored with the word in episodic memory; the more the external contextual information at retrieval matches the external contextual information at encoding, the more effective retrieval is generally indexed by accuracy and level of detail recalled. For example, the word VIOLET may typically be encoded and stored as a color name and would not be retrieved well if cued with an instance of the category of flower or girls' names. According to the encoding specificity principle (Tulving & Thomson, 1973), effective retrieval of the word in response to such cues would be likely to occur only if the contextual information at encoding also suggested the word VIOLET to be a girl's name or a flower (see below section for further information on categorical knowledge).

1.4.1 Spontaneous Trait Inferences

It is debated to this day whether, or the degree to which, encoding versus retrieval plays a role in the inferencing process at test. A retrieval explanation would suggest that there is a preexisting association in semantic memory between the cue and the to-be-remembered material. When the cue is presented, the to-be-remembered information is brought to the forefront of the mind (Uleman, 1987). An encoding explanation would suggest that an association is established in episodic memory between the cue and the to-be-remembered material. In this instance, the cue does not need to be present at encoding, but simply inferred. When the inferred cue is presented explicitly for the first time at test, the newly established association between the cue and the to-be-remembered material in episodic memory leads to recall.

Is spontaneous trait inferencing better explained from an encoding or from a retrieval perspective? That is, is the trait spontaneously generated when information is encoded for subsequent memory, or does retrieval of information result in spontaneous trait inferences? Uleman et al. (1992) probed this question by manipulating the amount of cognitive resources available to people (i.e., cognitive load). Participants saw a number series varying in difficulty (i.e., all the same numbers in a digit string versus different numbers in a digit string), one number at a time. Participants then saw a distractor sentence followed by a black slide where they were to recall the digit sequence they saw earlier. Simultaneously, participants monitored a signal light and were asked to press a response key when it lit up (further taxing resources available). The main results showed that disposition (trait) cues under low cognitive load (i.e., simple digit string) were more effective for recalling sentences compared to no cues. There was no significant difference under high load (i.e., the multiple-digit condition). Taken together, these results suggest that the effectiveness of cued recall is moderated by the level of available cognitive resources. These results (a) further support the argument against considering spontaneous trait inferencing an automatic process and (b) support the encoding explanation of spontaneous trait inferencing. Decreasing the amount of cognitive resources available directly interferes with making and encoding trait inferences. If disposition (trait) cued recall depends primarily on retrieval processes, there would be no difference between digit conditions, because the retrieval conditions and materials were the same for all participants in the study. Participants unloaded any material they were asked to remember before the test. Only the encoding conditions were manipulated; therefore, they are the main process involved in trait inferencing.

1.4.2 Race and Stereotypes

Schemas can generally be defined as categories people have theories about based on previous knowledge or experience that function as a framework of knowledge to help people better understand their environment (D. J. Schneider, 2005; Tse et al., 2007). Schemas aid in the encoding into and retrieval from memory. People tend to remember and understand information better when a relevant schema is salient. Because stereotypes act as a type of schema, people seem to show differences in the information that is remembered based on the stereotype that has been made salient. Pittinsky, Shih, and Ambady (2000) found that when perceivers are primed to think of an Asian woman as a “female” (often stereotyped as having a deficit in mathematical ability), they remember lower SAT scores than when they are primed to think of her as “Asian” (often stereotyped as having exceptional mathematical ability). Although schemas (and stereotypes) seem to facilitate remembering for accurate information, they also seem to facilitate memory for inaccurate information. People tend falsely to remember schema-relevant information being presented that was actually never presented (Lenton, Blair, & Hastie, 2001; Sherman & Bessenoff, 1999). For example, people with strong gender stereotypes seem to remember gender-consistent information being presented (Stangor, 1988) and sometimes misremember the gender of the target presented in a scene when the scene involves gender-incongruent activities (Signorella & Liben, 1984). Stereotypes also seem to act as a type of source-monitoring cue for memory (Sherman & Bessenoff, 1999). Source-monitoring processes are particularly needed when it is difficult to make sense of the information provided (Jacoby, Woloshyn, & Kelley, 1989). Because stereotypes seem also to be evoked when cognitive resources are particularly low, they may be more likely to be attributed to the target individual, event, or object resulting in either an accurate or inaccurate remembering of the source of the memory.

Police line-ups and eyewitness testimony research illustrate some of the gravest implications of cognitive processing and memory encoding errors from stereotypical expectations. The Innocence Project (2013) indicated that Black men accounted for more than 60% of overturned convictions due to advancements in DNA identification. Memory is dependent on a witness’s ability accurately to associate a behavior with a source target and thus, to correctly attribute criminal behavior to the criminal (Sherman & Bessenoff, 1999). These types of critical source-monitoring tasks can be complicated by the stereotypical expectations that may bias the perceiver (see Hamilton & Sherman, 1994, for a review). Race, sex, age, or dress are all cues with associated stereotypes that may lead perceivers to be more or less likely to identify the source target of the criminal behavior accurately. Eyewitness identification error is the leading cause of wrongful convictions (The Innocence Project, 2013). Previous literature has found that Black men are falsely identified in simultaneous line ups more so than White men (Vitriol, Appleby, & Borgida, 2019). Further, Knuycky, Kleider, and Cavrak (2014a) found that Black men with stereotypical features were more likely falsely identified compared to Black men with nonstereotypical features. Taken together, these findings suggest that the degree to which a target is associated with a negative stereotype impacts the degree to which that stereotype may act as a source-monitoring cue for later retrieval.

1.5 Individual Differences in Spontaneous Trait Inferencing

Studies have shown that differences in power (e.g., societal status) impact the way people make inferences (Goodwin, Gubin, Fiske, & Yzerbyt, 2000; Wang & Yang, 2017). Although these studies did not directly investigate race/ethnicity or gender, it is possible that certain groups that are historically associated with relatively high systemic and societal power may elicit different trait inferences compared to those that are not. Other research has suggested that personality traits like idocentrism versus allocentrism impact the type of inferences that people make. Like power, certain race/ethnic groups may be perceived to be more idiocentric compared to allocentric and this perception may influence the type of spontaneous inferences that people make about those groups.

1.5.1 Powers

Power is defined as the degree to which one can alter another person's state by providing or withholding resources and eliciting consequences/punishments (Emerson, 1962; Keltner, Gruenfeld, & Anderson, 2003; Wang & Yang, 2017). Power influences the degree to which people rely on stereotypes when forming social perceptions (Fiske, 1993; Fiske & Dépret, 1996; Goodwin et al., 2000; Keltner et al., 2003; Willis & Guinote, 2011). High-power people tend to live in environments with an abundance of resources, and they therefore may process social events quickly because they are less likely to be motivated to care about the consequences of faulty perceptions (Wang & Yang, 2017). Further, because high-power people have an abundance of resources, they may be more selective in the way they allocate their cognitive resources. Low-powered people have less available resources and are subject to more threats and punishment from the social environment compared to high-powered people (Domhoff, 1998; French & Raven, 1959; Weber, 1947, as cited by Wang & Yang, 2017). Keltner and colleagues (2003) suggest that low-power people may be more effortful and deliberate when interpreting social behaviors in an attempt to increase the odds of positive outcomes.

The power and cognition literature proposes that power may impact the degree to which people make judgments and decisions that are consistent with a stereotype when stereotypical information is readily available (and applicable to the situation; Wang & Yang, 2017; Willis & Ginote, 2011). Powerful individuals attend more to stereotype-consistent information compared to stereotype-inconsistent information (Goodwin et al., 2000); they tend to view people that perform stereotype-consistent roles as more suitable for jobs than people that perform stereotype-inconsistent roles (Guinote & Phillips, 2010); and they respond faster to stereotype-consistent than stereotype-inconsistent words after viewing photographs of Black and White individuals

(Guinote, 2010). Low-power people do not show those differences which suggests that power may influence the degree to which people display stereotypical biases (Wang & Yang, 2017). For example, participants in a study by Wang and Yang (2017) were shown either a high-power word prime (e.g., control, dominant) or low-power primes (e.g., submit, comply). Participants were then shown elderly stereotype-consistent and stereotype-inconsistent sentences followed by a corresponding trait probe. Consistent with previous research, participants took more time correctly to reject probes following elderly stereotype-consistent sentences than following control sentences. However, this effect only occurred for the high-powered individuals. There was no difference in response time for low-powered individuals suggesting that high-powered individuals were more susceptible to making spontaneous trait inferences from elderly-consistent sentences but not stereotype-inconsistent sentences.

1.5.2 Idiocentricism vs Allocentrism

Cross-cultural research suggests certain global regions tend operate as more individualist cultures, where people’s behaviors are generally guided by personal goals. Other regions are more strongly defined by collectivistic cultures, where people’s behaviors are guided by group or communal goals (Triandis, 1990). Miller and colleagues suggest that individualist culture are more likely to describe others in terms of their perceived personality trait terms compared with collectivistic culture (Miller, 1984, 1987). Additionally, people within individualistic cultures are more likely to view individuals as autonomous entities whose behaviors are a consequence of internal characteristics, attributes, and traits (Markus & Kitayama, 1991). During the categorization process, people in individualistic cultures may be more likely to make dispositional trait inferences and less likely to adjust these inferences even with additional situational context to contrary. People from collectivistic cultures, however, may be less likely to focus on dispositional interpretations and thus, more likely to consider situational information when interpreting the behavior of others (Nisbett, 2004).

Newman (1993) investigated how idiocentrism and allocentrism impacted trait inferencing. Similar to certain cultures being more individualistic compared to collectivistic, individual personalities differ in idiocentrism compared to allocentrism (Triandis, Leung, Villareal, & Clack, 1985). People from individualist cultures are more likely to be more idiocentric, focusing on things like personal achievement. In contrast, people from collectivistic cultures are more likely to be more allocentric, focusing on things like family and social groups (Triandis, 1990). Newman (1993) proposed that people high in idiocentrism would are more likely to interpret behaviors in dispositional, trait terms, whereas those low in idiocentrism would be more likely to consider situational information. Newman measured a group of men's idiocentrism and then showed them behavioral sentences. After a delay, the men were asked to recall sentences following a personality trait cue. Newman found that the men who were high in idiocentrism were more likely spontaneously to interpret behavior in trait terms compared with the men who were low in idiocentrism.

In sum, when reviewing some of the literature surrounding attention, knowledge/categorization, memory and judgment and decision-making relevant to spontaneous trait inferences to this point, a few key points seem to emerge. Spontaneous trait inferences seem to fall on an automatic to controlled spectrum where people tend to be unaware of making these inferences, but they can control them under certain conditions (e.g., when instructed or motivated to do so). Previous knowledge, particularly knowledge that has been primed impacts spontaneous trait inferences. Further, the way information is encoded impacts the types of retrieval cues that are most effective in retrieval stored information. When stereotypical information is encoded with behavioral information, these stereotypes may act as a retrieval cue, even if specific stereotypical information is not explicitly presented. Finally, individuals and groups demonstrate more spontaneous trait inferencing than other based on individual differences. In Chapter 2, the literature on spontaneous trait inferences by White adult populations will be discussed.

2 SPONTANEOUS TRAIT INFERENCES: Race, Face-type, and Stereotypes

What is one of the main concerns most people have when interviewing for a new job or meeting a partner's family for the first time? Odds are that they are most preoccupied with making a good first impression. Impression formation research (Gilbert, 1998) involves the investigation of ways in which people form quick evaluations about others and their behaviors. One way quick evaluations are made is via the trait inferences that are drawn from these behaviors (Uleman, Newman, & Moskowitz, 1996). Research on spontaneous trait inferences has largely focused on the specific behaviors and the nondescript actors performing those behaviors, However, in everyday life, there is much more available and observable information—like gender, age, and skin tone–all of which are salient features people use to categorize others quickly and efficiently (Fiske, 1998). Once people are categorized, automatic attributes and characteristics (e.g., stereotypes) associated with the category may be applied to that specific actor or group member. The purpose of this present research is to investigate the combined effects of stereotypical knowledge associated with group membership (i.e., race) and the inferences people make when this knowledge potentially competes with presented behavioral information.

2.1 Spontaneous Trait Inferences: What are they and how do they occur?

As was detailed in Chapter 1, spontaneous trait inferences occur when an inference is drawn from another person's behavior, typically without any intention of forming some sort of impression about that person (Uleman, Adil Saribay, & Gonzalez, 2008). Spontaneous trait inferences are considered to be "spontaneous" because they occur quickly (Todd, Molden, Ham, & Vonk, 2011), generally without intention or awareness (Orghian, Ramos, Garcia-Marques, &

Uleman, 2019; Winter & Uleman, 1984), and are highly efficient but not uncontrollable (Crawford, Skowronski, Stiff, & Scherer, 2007).

The most compelling evidence for spontaneous trait inferences is supported by a cued-recall procedure that is based on Tulving and Thomson's (1973) principle of encoding specificity. This principle states that "specific encoding operations performed on what is perceived determine what is stored, and what is stored determines what retrieval cues are effective in providing access to what is stored" (Tulving & Thomson, 1973, p. 369). More recent studies have utilized using an "online" recognition probe paradigm (McKoon & Ratcliff, 1986; Uleman, Hon, Roman, & Moskowitz, 1996) wherein participants are shown trait-implying sentences along with control or filler sentences followed by a probe word. Participants are asked to indicate as quickly and accurately as possible whether the probe word was presented in the previous sentence. For experimental trials, the probe word is a trait word that is implied in the previously presented sentence (e.g., the girl hit the teacher, followed by the word *aggressive*"). These trait probe words, however, may serve multiple roles: to imply certain behaviors, and to imply characteristics about one's group membership (i.e., stereotypes).

Spontaneous trait inferences can occur with little to no awareness or conscious attention. In one study, participants were shown sentences and then distracted before being asked to recall the sentences they had seen previously (Winter & Uleman, 1984). Some participants saw relevant trait cues that were implied from the previously shown sentences whereas other participants saw irrelevant cues. Participants who received relevant trait cues recalled sentences better at test than those who did not receive trait cues. This occurred even when participants received no instruction to infer traits or form impressions about the targets in the sentences. In the same study, participants were asked open-ended questions to participants regarding the strategies they may have used to remember sentences presented to them. Any mention of traits, impression formation, or personality was treated as awareness of using some sort of trait inferencing strategy. The experimenters also asked participants whether they used any visual strategies or word associations; participants had no conscious awareness of using any memory strategies during encoding or retrieval of the presented sentences. Winter et al. (1985) conducted a similar procedure but presented sentences to participants *as* the distractor task. Again, trait cues resulted in significantly better recall of these sentences compared to no cues and other types of cues (e.g., gist cues, semantic cues). Winter et al. (1985) also tested the possibility that, in previous studies, participants may have had a fleeting awareness of having made some sort of inference that was quickly lost by the time awareness was assessed. That is, assuming that an inference was made, did participants have awareness of that inference at any point in time even if they did not have awareness of them at test? Participants were asked similar strategy-use questions, but this time, immediately after being asked to repeat the sentence aloud.

However, spontaneous trait inferences also seem to fall on a spectrum of automaticity such that although they do show characteristics of automatic processes, there also seem to be controlled characteristics. Uleman and colleagues (1992) showed participants a number series (varying in difficulty) one digit at a time. Participants then saw a distractor sentence (the trait inferring behavioral sentence) and then were asked to recall the digit series they saw earlier. The results suggested that trait cues were less effective for sentence recall in participants who memorized the more difficult digit series (high load) compared to participants who memorized simple digit series (low load). These findings suggest that a concurrent cognitive load task interfered with making trait inferences, thus, undermining the assumption that trait inferences are automatic.

Priming also impacts the way spontaneous trait inferences occur both in an assimilative and a contrasting manner. Newman and Uleman (1990) primed participants with trait concepts followed by ambiguous behavioral sentences. If the behavior is spontaneously interpreted and encoded in congruence with the activated category (assimilation effect), then it should also follow that a trait retrieval cue congruent with the primed concept would be a better recall cue than a trait concept that is incongruent with the primed concept. Conversely, the experimenters also hypothesized that if the results are in line with alternate literature showing assimilation and contrast effects, together, then the above hypothesis should only hold when people are not consciously aware of the prime. Similar to previous studies, participants were shown a prime that was presented either above or below the threshold of what is considered to be conscious awareness. Participants were then shown ambiguous sentences followed by a trait cue (that was either congruent or incongruent with a later presented cue). When participants could not remember the prime they were shown, they generally demonstrated better sentence recall for congruent prime and cue meaning pairs (assimilation effects). Incongruent pairs elicited better recall when participants could remember the prime. This suggests that whether or not a trait concept has been recently activated via priming and how aware subjects are of the activation may be critical factors in predicting the likelihood of the trait being spontaneously inferred. Further, the type of priming (i.e., race versus gender prime) and the way in which a category is made accessible impacts the types of traits we infer and potentially the sort judgments we make.

Spontaneous trait inferences are also impacted by the depth of encoding processes. Uleman et al. (1993) illustrated the involvement of encoding versus retrieval by manipulating the depth of encoding processing. Levels of processing theory (Craik & Lockhart, 1972) suggests that the degree to which a stimulus is processed depends on attention, meaning, and connections to other information that stimulus may have. Shallow processing may result in poor memory for the stimulus, whereas deep processing generally results in better memory for the stimulus (Craik & Lockhart, 1972). By using various photographic primes (see categorical knowledge section for priming review) accompanied with behavioral sentences, Uleman and colleagues (1993) sought to manipulate the elaboration and depth of processing. The experimenters showed participants behavioral sentences paired with a photograph of the actor (i.e., face), a setting (i.e., landscape), or something abstract (i.e., a pattern). After a brief distraction, half of the participants were shown the initial photograph again, whereas the other participants were not and were asked to recall as much of the initial sentence as possible. They found that actor photographs at encoding did facilitate better recall of behaviors compared to settings and patterns. This suggests two things. First, inferences may refer to the actor in a behavioral sentence possibly more than the behavior itself. Second, because faces likely convey more meaning and establish more connections compared to landscapes and patterns, the face-behavioral sentence pairs likely resulted in more elaborative encoding than setting and abstract pairs. This provides further evidence for an encoding explanation compared to a retrieval explanation of spontaneous trait inferencing. This is not to completely diminish the role retrieval plays in spontaneous trait inferencing process. When behavioral sentences are recalled, they are retrieved from memory in some manner; taken together, these findings suggest that the inference occurs at encoding and later aids in retrieval. Retrieval is efficient to the degree that the initial encoding was efficient.

2.2 Race, Face-type, and Stereotypes

During categorization, prototypes are the idealized, best-fit, or most central members of a concept (Rosch, 1973). From this perspective, judgments and decisions made about potential members of a category are determined based on how closely they resemble or represent the prototype (Rosch, 1975; J. D. Smith & Minda, 2001). This would be true for social categorization as well. Certain faces may be perceived to be more prototypical of their racial group than other faces within that same racial group, and certainly more so than faces outside of that racial group. For example, Black men may be categorized on the basis of the degree to which they possess stereotypically Black facial features, such as some combination of darker skin, broad nose, and full lips, wide-set eyes (Blair, Judd, & Chapleau, 2004; Blair, Judd, Sadler, & Jenkins, 2002; Blair, Judd, & Fallman, 2004; Bond, 2016; Eberhardt, Goff, Purdie, & Davies, 2004; Knuycky, Kleider, Cavrak, 2014). It follows that prototypical faces within race may be considered most representative of that race, therefore more likely to be subjected to judgment and categorization via the stereotypes typically associated with that social racial category. Again, this is not to say that any specific feature or set of features are inherent to any particular race but rather, because of historical context, certain facial features or combinations of features may be associated with certain racial categories more so than others.

For example, Kleider and colleagues (2012) found the encoding process of prototypical faces may lead to a face-source memory error. Because these faces are the most representative of a category, and the category's respective stereotypes, it may be more difficult to remember the contextual information with which the face was originally encoded, especially when the original context was incongruent with the stereotype of the category. Kleider and colleagues (2012) showed participants panels of faces paired with a role label that was either positive (e.g., artist) or negative (e.g., drug dealer). After completing a distractor task for twenty minutes, participants were shown the previously viewed faces individually and were asked to categorize the faces into their original roles. Stereotypical faces were more likely to be accurately categorized into negative roles compared to positive roles. Further, when participants did miscategorize faces, they were more likely to miscategorize stereotypical faces into negative roles compared to positive roles. Extending these findings, Bond, Washburn, and Kleider-Offutt (2021) found that when using a similar paradigm with Black children's faces, similar results would found. Children with stereotypical faces were more likely to be miscategorized into negative roles compared to positive roles. Further, people were more like to increase the level of discipline for schoolhouse infractions when the child had a stereotypical face rather than a nonstereotypical face. These findings further support the idea that faces most representative of a category are most likely to be associated with the stereotypes linked to the category, and the faces least representative of a category are least likely to be associated with these stereotypes.

Neurological evidence converges well with behavioral evidence suggesting that people pay selective attention to Black faces compared to White faces. When shown pictures of African Americans and White individuals, fMRI research shows that multiple areas of the brain (i.e., amygdala, midbrain, hippocampus) were all more active for African American faces than for White faces (Lieberman et al., 2005). Examining event-related potential responses, Ito and Urland (2005) found that when participants were shown pictures of Black and White males and making race-irrelevant decisions, Black male targets elicited a larger positive-going P200 signal, which has also been found to respond differentially to threatening images (e.g., fierce dogs). In a follow-up study using a dot-probe detection paradigm, Trawalter, Todd, Baird, and Richeson (2008) found that when Black faces were presented briefly (30-ms), they captured attention differentially (indexed by shorter reaction time latencies) compared to White faces.

2.3 Stereotypes and Spontaneous Trait Inferences

Stereotypes may interfere with the spontaneous inferencing process. Although limited, research in this area has provided some answers on the role that spontaneous trait inferences play in how stereotypes impact the initial stages of information processing, during the encoding of social behavior, and in a social context. Wigboldus et al. (2003) suggested stereotypical trait inhibition or facilitation may either hinder or foster the spontaneous trait inferencing process. The experimenters proposed that activating a particular stereotype, prior to encoding behavioral information, makes stereotype-consistent information more readily accessible and stereotype-inconsistent information less accessible. If the information is stereotype-consistent, this should not interfere with the spontaneous trait inferencing process because the implied trait just becomes more easily accessed. However, stereotype-inconsistent information should interfere with the spontaneous inferencing process because essentially the mind is receiving two different messages: (1) information prior to encoding, and (2) inconsistent information at encoding. In this case, the activated stereotype is competing with the trait that would have otherwise been implied from the behavioral information.

In two studies, participants read behavioral sentences or phrases accompanied with a label that was either stereotype-consistent or stereotype-inconsistent with the behavioral sentence (Ramos et al., 2012). For example, the behavioral sentence “asked where the stars came from” would be shown. This sentence implies the trait *curious*. This behavioral sentence was accompanied with a category label that was either stereotypically consistent (e.g., the best student), or inconsistent (e.g., the most popular student) with the behavioral sentence. To understand the degree to which people make spontaneous trait inference and spontaneous situational inferences, the researchers also added additional situational sentences (e.g., “this being one of the homework questions”), which implied situational inference (e.g., *duty*). After viewing the sentence, participants then saw a relevant probe word (e.g., curious, duty) and were asked to indicate as quickly and accurately as possible whether the probe word was mentioned in the previous sentence. Participants made more errors for trait probes in the stereotype inconsistent condition compared to the stereotype consistent condition. This supports the hypothesis that spontaneous trait inferences are less likely to occur when the stereotype is consistent with the behavior compared to inconsistent. Participants were more likely correctly to indicate that an implied trait was presented in the prior behavioral sentence when the behavior was performed by a member of a group wherein the behavior is stereotypically inconsistent than when the behavior was performed a stereotype-consistent group member.

Wigboldus and colleagues (2003) found similar results as Ramos and colleagues (2012) when they investigated how stereotypical information, presented both with conscious awareness and below the threshold of conscious awareness, influenced spontaneous trait inferencing. Wigboldus et al. (2003) presented an actor along with a behavioral sentence that illustrated either stereotype-consistent or stereotype-inconsistent behavioral pairs. When the behaviors were stereotype-inconsistent, participants took less time to make accurate responses indicating inhibition of stereotype trait inferencing. They found similar results even when stereotype labels were presented briefly and considered to be below the threshold of conscious awareness. Because stereotype-inconsistent information leads to weak spontaneous trait inferences, it is much easier for participants to indicate that the probe word was not in the prior sentence. These results suggest that stereotypes interfere with the stereotype inferencing process when the information is stereotype-inconsistent. Further, Wigboldus, Sherman, Franzese, and van Knippenberg (2004) found that under high cognitive load conditions, spontaneous trait inferences were less likely for stereotype–inconsistent than stereotype–consistent behaviors. However, there were no differences under low load suggesting that stereotypes are especially likely to affect spontaneous trait inferencing when cognitive resources are at a deficit.

Similar to Wigboldus et al. (2003), Stewart, Weeks, and Lupfer (2003) also investigated the degree to which stereotypes may impact spontaneous trait inferences but specifically focused on positive and negative racial stereotypes. Stewart et al. (2003) showed participants pictures of either Black or White individuals paired with a behavioral sentence. Participants saw sentences that were indicative of both positive and negative traits that had be pre-rated as being stereotypic of African American men: athletic, funny, musical, lazy, promiscuous, unintelligent, and criminal (Stewart et al., 1998). Participants also completed a survey as an index for individual differences in prejudice level. High-prejudice participants compared to low-prejudice participants were expected to make spontaneous trait inferences about African American stereotypic behaviors and therefore would be more likely inaccurately to indicate that they had seen a African American stereotypic trait implying word when the behavior sentence was paired with Black male target compared to a White male target. However, the results indicated that people made these expected spontaneous trait inferences regardless of prejudice level. Regardless of prejudice level, participants were more likely inaccurately to indicate that they had seen a African American stereotypic trait implying word when the behavior sentence was paired with Black male target compared to a White male target. Taken together, Wigboldus et al. (2003) investigated how category labels and their associated stereotypes may impact spontaneous trait inferences whereas Stewart et al. (2003) investigated more specifically how racial stereotypes may impact spontaneous trait inference and subsequent memory for implied words. However, no previous study has investigated how stereotypes may be associated with certain faces within race compared to others and how this distinction may also impact memory for trait-implying words.

3 METHODOLOGY

3.1 General Method and Hypotheses

Using a recognition probe paradigm (McKoon & Ratcliff, 1986), the present research is intended to extend the research conducted by Wigboldus et al. (2003) by investigating (1) how racial stereotypes may impact the spontaneous trait inferences process, and (2) the degree to which how a person represents a racial stereotype may impact spontaneous trait inferencing. If a face only moderately represents a particular racial category, will there be weaker spontaneous trait inferences compared to when faces that are perceived to be highly representative of a particular racial category? In this study, participants read sentences, paired with a face that was either prototypical or nonprototypical, and that was followed by probe words. Participants were asked to indicate as quickly and accurately as possible whether these probe words were a part of the preceding sentence.

I hypothesized stronger spontaneous trait inferences and, thus, slower and less accurate responses to relevant trait probes when the behavior in the preceding sentence was stereotype consistent with the face-type presented, compared to when this behavior was stereotype inconsistent. I hypothesized that for stereotype-congruent behavioral information, people would make spontaneous trait inferences that made it harder to indicate quickly whether the trait probes were actually present or not in the preceding sentence. Increased ease of access of stereotype consistent information should elicit the inference of stereotypical information that was never presented, which would interfere with the ability accurately to recognize a subsequent trait probe (whether it was presented or not). However, when the behavior is inconsistent with the activated stereotype, the increased accessibility of behavior-inconsistent traits and decreased accessibility of behavior-consistent traits are likely to interfere with the spontaneous trait inferencing process, making it easier to recognize whether or not a subsequent trait probe had been presented.

An alternative explanation for these potential findings is that the difference in RTs between stereotype-congruent and stereotype incongruent sentences may be due solely to stereotype activation and not to the biased spontaneous trait encoding process outlined above. The presentation of the face may automatically activate a relevant trait (e.g., Devine, 1989; Dijksterhuis & van Knippenberg, 1996), potentially making it harder for participants subsequently to indicate that the trait probe was not in the sentence. In other words, would participants spontaneously infer the trait “smart” on the basis of the sentence “The professor wins the science quiz,” or would the activation of the stereotype of “professors” lead to the automatic activation of this trait? For this reason, I also included trials with neutral behavioral sentences to address the issue of trait inference merely due to stereotype activation explicitly. To check for stereotype activation effects, participants responded to stereotype-neutral sentences that were followed by trait probes that might be activated based on the face-type presented with these sentences (e.g., athletic [fun]). Stereotype-neutral sentences should still lead to trait activation and the effects should still be just as strong as the stereotype-congruent sentences. However, I expected that stereotypical trait activation based on face-type alone would not lead to the same probe-response interference process as for the spontaneous trait inferences based on stereotype-congruent behavior.

Although a face-type may activate stereotype-congruent traits, such traits may be less likely to be associated with the content of the neutral behavior because the stereotypical traits that are activated play little role in the interpretation of the behavior. Because of this, the confusion of whether the trait was in the sentence or not is less likely to occur. Therefore, I predicted that participants would respond more slowly to relevant trait probes when the behavior in the preceding sentence was stereotype congruent with the face-type presented than when the behavior is stereotype neutral with respect to the face-type presented. I also expected that participants would respond more slowly to relevant trait probes when the behavior in the preceding sentence is stereotype congruent with the face-type presented than when the behavior is stereotype-incongruent. If however, trait activation by face-type alone is playing a larger role, I expected the latencies to probes following stereotype-congruent and stereotype-neutral sentences to be similar. NOTE: I had no priori expectation about probe word/face-type congruency, only congruency between face-type and behavior sentences. That is not to say that this is not a valuable research question but rather that such exploratory analyses extend beyond the scope of this present research. In summary, I expected participants to take longer to indicate whether a trait probe was part of the previous sentence when the sentence is stereotype congruent compared to incongruent/neutral with the face (Experiment 1) when the photo prime is presented before the behavioral sentence and not after (Experiment 2 and 3).

3.2 Recruitment

Due to restrictions necessary to comply with COVID-related procedures, all experiments were performed on Qualtrics and all participants were recruited via Amazon Mechanical Turk. Participants were compensated $2.00 for approximately 1 hour of participation. All participants were required to be above the age of 18, fluent in the English language and residing in the United States to participate. In this study, all participants read sentences, paired with a face that was either prototypical or nonprototypical, and that was followed by probe words. Participants were asked to indicate as quickly and accurately as possible whether these probe words were a part of the preceding sentence. All participants also answered demographic questions related to age, race, gender, ethnicity, political affiliation, political attitudes, mathematical ability, household income, location and education level (the latter seven variables not analyzed for this dissertation).

3.3 Experiment 1

3.3.1 Participants

The sample included 33 White participants and 13 non-White participants (14 female, 32 male). The majority of participants (n = 29) were 25-35 years of age (6 = 18-25 years of age; 10 = 35-65; 1 = did not report).

3.3.2 Materials

Face Stimuli. Twelve photos, pre-rated (Ma, Correll, & Wittenbrink, 2015) as African American, were selected for the following experiments (stereotypical, M = 4.41; nonstereotypical, M = 2.08; on a 5-point Likert scale).

Sentence and Probe Stimuli. Six pre-rated sentence and probe stimuli (Stewart et al., 2003) were selected for the following experiments. Each sentence was considered to be significantly stereotypical of African Americans. Six pre-rated neutral sentences and probe stimuli were also selected for the following experiments (Wigboldus et al., 2003). NOTE: Therefore, it follows that stereotypical faces would be considered consistent when paired with stereotypical sentences and nonstereotypical faces would be considered inconsistent when paired with stereotypical sentences. See the Appendices for the sentence stimuli that were used.

3.3.3 Procedures

3.3.3.1 Experimental Trials

Six trait-implying sentences along with six neutral sentences were used. Each sentence was paired with one face-type (stereotypical or nonstereotypical). Stereotype consistency was manipulated by varying the face-type (stereotypical or nonstereotypical) resulting in 24 sentence-face pairs. To manipulate the probe type (and eliminate each response from being “no”), each sentence was randomly be followed by a trait-implying probe or a literal repetition of the verb in the behavioral sentence resulting in 48 experimental sentence-face pairs. Participants saw each of these combinations twice resulting in 96 experimental trials total per participant. Note, however, that trait probes following stereotype-neutral sentences consisted of the same traits as would be used for the stereotype-consistent sentences for each target. Thus, the neutral behavioral sentence “The man [nonstereotypical face] walks through town” may have been followed by the trait probe *fun*, whereas the neutral behavioral sentence “The man [stereotypical face] walks through town” may have been followed by the trait probe *athletic*. This was to test the extent to which face-type may elicit stereotype congruent trait activation despite the use of neutral behaviors.

3.3.3.2 Filler Trials

Finally, 120 filler sentences that were not followed by a probe word were added, and randomly interspersed with the 96 probe-word trials. This was done to prevent participants from predicting when a probe word would appear (see, for a similar procedure, McKoon & Ratcliff, 1986; Uleman, Hon, et al., 1996). Filler sentences described the same kind of behaviors and actors as the experimental sentences, to prevent participants from learning to discriminate between sentences that were followed by a probe and sentences that are not. Thus, each participant completed a total of 216 trials in Experiment 1.

3.3.4 Procedures

The study was conducted on participants' personal computing devices. To ensure participants attended to the face presented, they were told to remember the actor that performed the behavioral sentence. After participants consenting to the experiment via button click, they were provided a brief explanation of the task. They were shown an example of a face, behavioral sentence and probe word. They were instructed to press "A" on the keyboard if the probe word was shown in the behavioral sentence just presented and to press "L" on the keyboard if it was not. Before the actual experiment, participants had two practice blocks of trials. For the first practice, participants read short sentences that appeared in the center of the screen, each for 2,000 ms. After a blank screen for 500 ms, a probe word appeared in the center of the screen. The participants' task was to indicate, as quickly and accurately as possible, whether the probe word was present in the preceding sentence. Participants then saw a blank screen for 1,000 ms before proceeding to the next sentence. The first practice round consisted of 10 trials. For the second practice round, participants were asked to perform the same task; however, in this round the sentences also were accompanied by photos of faces. After the two practice rounds, participants completed the experimental trials.

Participants were presented with sentences randomly paired with a face (prototypical or non-prototypical). Both the face and the behavioral sentence appeared on the screen simultaneously for 2,000 ms. Next, participants saw a probe word. They were asked to indicate as quickly and accurately as possible whether each probe word was a part of the preceding sentence. Similar to the procedures conducted by Wigboldus et al. (2003), participants completed 96 experimental trials with a probe word interspersed randomly with 120 filler trials. On these filler trials participants saw the same experimental and neutral sentences but without probe words. No action was required of participants for filler trials.

Trials were administered in six blocks, each block consisting of 16 probe-word trials and 20 trials without a probe word, in random order. Participants completed one block, took a 15s break, and then proceed to the next block until all six blocks (216 total trials) were completed. Block order was counterbalanced and randomized across participants.

3.4 Experiment 2

In Study 2, I presented participants with behavioral sentences in which the actor was described with the letter X (e.g., "X wins the science quiz"). However, unlike Experiment 1, in which participants saw face/behavior-sentence pairs simultaneously, in Experiment 2 the faces and sentences were presented sequentially and in different orders. On some trials, participants saw a prime picture of a face presented prior to the presentation of the sentence. As in Experiment 1, that face could either be stereotype congruent, stereotype incongruent, or stereotype neutral with respect to the behavior presented in the sentence. On other trials, the behavioral sentences were followed by a photo that was stereotype congruent, stereotype incongruent, or stereotype neutral with the behavior in the sentences. These primes, however, still preceded the presentation of the trait-probe words to which participants were required to respond by indicating whether or not the word had been in the sentence. Finally, some sentences were presented without a preceding or subsequent photo at all. These sentences serve as a baseline condition. I hypothesized stronger spontaneous trait inferences and, thus, slower and less accurate responses to relevant trait probes when the behavior in the preceding sentence was stereotype consistent with the face-type presented, compared to when this behavior was stereotype inconsistent. I expect these pattern of results only when the photo prime is presented before the behavioral sentence and not after.

3.4.1 Participants

The sample consisted of 37 White participants and 13 non-White participants (8 female, 41 male, 1 nonbinary). The majority of participants (n = 29) were 25-35 years of age (9 = 18-25 years of age; 9 = 35-65 years of age; 3 = did not report).

3.4.2 Procedure

Like Experiment 1, the study was conducted on participants' personal computing devices. To ensure participants attended to the face presented, they were instructed to remember the actor that performed the behavioral sentence. After participants consenting to the experiment via button click, they were provided a brief explanation of the task. They were shown an example of a face, behavioral sentence, and probe word. They were instructed to press "A" on the keyboard if the probe word was shown in the behavioral sentence just presented and to press "L" on the keyboard if it was not. Before the experiment began, participants completed a practice round of trials consisting of 15 sentences and probes paired with photos. Participants were instructed that these pictures referred to the actor in each sentence. Participants completed 102 trials, which were presented in random order, with a 15s pause when participants were halfway through the test to minimize errors due to fatigue. Each sentence described the behavior of an unknown actor who was indicated with an X (e.g., "X hits the saleswoman"). The six trait-implying behavioral sentences were presented five times resulting in 30 experimental trials: (a) once with a stereotypically-congruent and (b) once with a stereotypically-incongruent face-type photo that was presented for 2,000 ms before the stimulus sentence presentation; (c) once with a stereotypically-congruent and (d) once with a stereotypically-incongruent face-type photo that was presented after the probe presentation for 2,000 ms and thus after the stimulus sentence; and (e) once with no photo presented at all. In addition, 24 trait versions of the sentences paired with photos (half shown with the photo shown before the sentence and half shown after the sentence) were added to make sure each type of probe could elicit a “yes” answer or a “no” response (12 stereotype -consistent and 12 stereotype-inconsistent) and 12 trials with no probe at all. In total, these 36 filler trials were presented two times, for the total of 102 trials per participant. At the end of the experiment, participants answered demographic questions.

3.5 Experiment 3

Study 3 was identical to Study 2; however, faces were presented for 300 ms before or after the behavioral sentences. I expected the same pattern of results as predicted for Study 2.

3.5.1 Participants

The sample for Experiment 3 included 39 White participants and 13 non-White participants (9 female, 42 male, 1 nonbinary). The majority of participants (n = 31) were 25-35 years of age (8 = 18-25 years of age; 11 = 35-65 years of age; 2 = did not report).

3.5.2 Procedures

The experiment was presented as described in Experiment 2, with the two exceptions being that (a) faces were presented briefly immediately before the sentences or the probes for 300 ms (vs 2,000 ms in Experiment 2), and (b) participants were *not* explicitly told prior to the study that the face presented on the screen right before or after each sentence indicated something about the actor (the X) in the sentence as they were in Experiment 2.

4 RESULTS

4.1 Experiment 1

4.1.1 Reaction Time

RTs faster than 200 ms and slower than 2,000 ms were regarded as invalid and thus disregarded. This results in the exclusion of 1,635 (42%) trials[1]. The remaining RTs for accurate trials were analyzed in a 2 (face-type: stereotypical vs nonstereotypical) X 2 (sentence type: stereotypical vs neutral) X 2 (probe: literal vs implied) repeated-measures analysis of variance (ANOVA). There was no significant difference in mean latency times when responding to trait probes that followed stereotypical faces (*M* = 1,301 ms, *SE* = 56.61) compared to nonstereotypical faces (*M* = 1,310 ms, *SE* = 56.31), $F(1, 41) = 0.206$, $p = .652$, $\eta_p^2 = .005$. As expected, there was a significant difference in response times when participants responded to trait probes that followed stereotypical sentences (M = 1,327 ms, SE = 53.83, SE = 59.23) compared to neutral sentences (M = 1,283 ms, SE = 59.23), $F(1, 41) = 4.287$, $p = .045$, $\eta_p^2 = .095$. However, there was no interaction between face-type and sentence type, $F(1, 41) = .076$, $p = .784$, $\eta_p^2 = .002$ (see Table 1).

It is worth noting that although I did not have any priori expectations regarding group membership differences, there was also no difference between White (M = 1,347 ms, SE = 64.21) and non-White participants (M = 1,185 ms, SE = 107.79), $F(1, 40) = 1.671$, $p = .204$

[1] Analyses were also completed with a 3,000 ms cutoff for invalid trials, which resulting in only 13% excluded trials; however, this did not change the pattern of results, aside from there no longer being a main effect of sentence type. For consistency with the proposal, the analyses with the 2,000 ms cutoff will be reported.

Table 1: Means, Standard Deviations, and Analysis of Variance of Face-type and Sentence-Type Reaction Times (in ms)

Measure	Stereotypical Face		Nonstereotypical Face	
	M	SE	M	SE
Stereotypical Sentence	1,325	55.59	1,329	54.79
Neutral Sentence	1,277	60.36	1,290	60.91

4.1.1 Error Rates

A 2 (face-type: stereotypical vs nonstereotypical) X 2 (sentence type: stereotypical vs neutral) repeated-measures ANOVA was conducted to examine variations in response accuracy on trials in which the probe word was implied (i.e., excluding literal probe word trials). There was no difference in error rates for face-type, $F(1, 41) = 2.575$, $p = .116$, $\eta_p^2 = .055$ (stereotypical, M = .181, SE = .01; nonstereotypical, M = .170, SE = .01); however, there was a main effect for sentence type, $F(1, 41) = 4.305$, $p = .044$, $\eta_p^2 = .098$. Participants had higher error rates for stereotypical sentences (M = .187, SE = .01) compared to neutral sentences (M = .164, SE = .01). There was no interaction for face-type and sentence-type, $F(1, 41) = 0.823$, $p = .369$, $\eta_p^2 = .018$.

4.2 Experiment 2

4.2.1 Reaction Time

RTs faster than 200 ms and slower than 2,000 ms were regarded as invalid and thus disregarded (43% of trials)[2]. The remaining RTs for accurate trials were analyzed using a 2 (face-type: stereotypical vs nonstereotypical) X 2 (sentence type: stereotypical vs neutral) X 2 (prime condition: prime before vs prime after) repeated-measures ANOVA. There was no main

[2] Analyses were also completed with a 3,000 ms cutoff for invalid trials, which resulting in only 25% excluded trials; however, this did not change the pattern of results. For consistency with the proposal, the analyses with the 2,000 ms cutoff will be reported.

effect of face-type, $F(1, 42) = 3.975$, $p = .053$, $\eta_p^2 = .088$, sentence type, $F(1, 42) = 1.449$, $p = .236$, $\eta_p^2 = .034$, or presentation of prime condition, $F(1, 42) = .001$, $p = .972$, $\eta_p^2 = .000$. There was no interaction between face-type and sentence type, $F(1, 42) = .001$, $p = .863$, $\eta_p^2 = .001$. There was no interaction between face-type and prime presentation, $F(1, 42) = .073$, $p = .789$, $\eta_p^2 = .002$, nor between sentence type and prime presentation, $F(1, 42) = 2.520$, $p = .120$, $\eta_p^2 = .058$. Neither was there an interaction between these three variables, $F(1, 42) = 1.463$, $p = .233$, $\eta_p^2 = .034$ (see Table 2 and 3 for descriptive statistics).

Table 2: Face-type and Sentence-Type Reaction Times (in ms) when photo prime was presented before behavioral sentence

Measure	Stereotypical Face		Nonstereotypical Face	
	M	SE	M	SE
Stereotypical Sentence	1,299	87	1,313	85
Neutral Sentence	1,228	77	1,279	81

Table 3: Face-type and Sentence-Type Reaction Times (in ms) when photo prime was presented after behavioral sentence

Measure	Stereotypical Face		Nonstereotypical Face	
	M	SE	M	SE
Stereotypical Sentence	1,246	79	1,314	87
Neutral Sentence	1,279	79	1,296	79

However, when looking only at baseline trials (when no photo prime was present), there was a main effect of sentence type, $F(1, 42) = 11.191$, $p = .003$, $\eta_p^2 = .348$, such that people responded faster to neutral sentences (M = 1332 ms, SE = 75.04) than to stereotypical sentences (M = 1419 ms, SE = 69.89).

4.2.2 Error Rates

A 2 (face-type: stereotypical vs nonstereotypical) X 2 (sentence type: stereotypical vs neutral) repeated-measures ANOVA was conducted to examine variations in response error rates. There was no difference in accuracy rates for face-type, $F(1, 42) = .09$, $p = .780$, $\eta_p^2 = .002$ (stereotypical, M = .19, SE = .009; nonstereotypical, M = .19, SE = .008) however, there was a main effect for sentence type, $F(1, 42) = 9.249$, $p = .004$, $\eta_p^2 = .159$. Participants had higher error rates for stereotypical sentences (M = .201, SE = .008) compared to neutral sentences (M = .172, SE = .008). There no interaction for face-type and sentence-type, $F(1, 42) = 3.652$, $p = .062$, $\eta_p^2 = .069$.

4.3 Experiment 3

4.3.1 Reaction Time

RTs faster than 200 ms and slower than 2,000 ms were regarded as outliers and thus disregarded (39% of trials)[3]. The remaining RTs for accurate trials were analyzed in a 2 (face-type: stereotypical vs nonstereotypical) X 2 (sentence type: stereotypical vs neutral) X 2 (prime condition: prime before vs prime after) repeated-measures ANOVA. The results of these analyses were similar to those from Experiment 2. There was no main effect of face-type, $F(1, 44) = 3.975$, $p = .054$ $\eta_p^2 = .088$, sentence type, $F(1, 44) = 1.532$, $p = .333$, $\eta_p^2 = .034$, or presentation of prime, $F(1, 44) = .045$, $p = .845$, $\eta_p^2 = .001$. There was no interaction between face-type and sentence type, $F(1, 41) = .001$, $p = .863$, $\eta_p^2 = .001$. There was no interaction between face-type and prime presentation, $F(1, 44) = .030$, $p = .864$, $\eta_p^2 = .001$, nor between

[3] Analyses were also completed with a 3,000 ms cutoff for invalid trials, which resulting in only 19% excluded trials; however, this did not change the pattern of results. For consistency with the proposal, the analyses with the 2,000 ms cutoff will be reported.

sentence type and prime presentation, $F(1, 44) = .038$, $p = .847$, $\eta_p^2 = .001$. Neither was there an interaction between these three variables, $F(1, 44) = 1.598$, $p = .452$, $\eta_p^2 = .033$.

Table 4:Face-type and Sentence-Type Reaction Times (in ms) when photo prime was presented before behavioral sentence

Measure	Stereotypical Face		Nonstereotypical Face	
	M	SE	M	SE
Stereotypical Sentence	1,339	81	1,327	84
Neutral Sentence	1,298	79	1,301	81

Table 5: Face-type and Sentence-Type Reaction Times (in ms) when photo prime was presented after behavioral sentence

Measure	Stereotypical Face		Nonstereotypical Face	
	M	SE	M	SE
Stereotypical Sentence	1,281	85	1,326	87
Neutral Sentence	1,252	79	1,309	79

4.3.2 Error Rates

A 2 (face-type: stereotypical vs nonstereotypical) X 2 (sentence type: stereotypical vs neutral) repeated-measures ANOVA was conducted to examine variations in response error rates. There was no difference in accuracy rates for face-type, $F(1, 44) = .802$, $p = .375$, $\eta_p^2 = .018$ (stereotypical, M = .199, SE = .009; nonstereotypical, M = .183, SE = .008) however, there was a main effect for sentence type, $F(1, 44) = 7.528$, $p = .023$, $\eta_p^2 = .159$. Participants had higher error rates for stereotypical sentences (M = .195, SE = .011) compared to neutral sentences (M = .170, SE = .007). There no interaction for face-type and sentence-type, $F(1, 44) = 1.366$, $p = .249$ $\eta_p^2 = .030$.

5 DISCUSSION

Impression formation is an important aspect of interpersonal relations, particularly initial or first impressions. People often spontaneously form impressions of others without necessarily having any particular goal or an intention to do so (Todorov & Uleman, 2002). Impressions may be influenced by a variety of characteristics and features in the social environment. As mentioned, salient features about a person—such as gender, age, and race—can automatically activate associated stereotypes and influence spontaneous inferences that impact impression formation (Wigboldus, Dijksterhuis, & van Knippenberg, 2003; Wigboldus, Sherman, Franzese, & van Knippenberg, 2004; Yan, Wang, & Zhang, 2012). Activated stereotypes can simplify information processing by serving as efficiency devices and cognitive shortcuts (Macrae et al., 1994). Although stereotypes allow individuals to handle issues more effortlessly and efficiently, they also may cause inaccurate perceptions of others (Bargh, 1999; Fiske, 1998). Otherwise typically occurring spontaneous trait inferences may be less likely when an activated stereotype is inconsistent with a behavior. When considering the cognitive mechanisms that underpin this phenomenon, the literature suggests spontaneous trait inferencing is the byproduct of the objects/people we pay attention to, how we categorize those objects and the recall of previously stored associations. Spontaneous trait inferences impact the judgments and decisions we make about these objects and people particularly when the group membership of that object or person is meaningful to us such as race/ethnicity.

Research suggests that stereotypes may impact the spontaneous inferences process (Wigboldus et al., 2003) such that stereotype-consistent information results in more recall errors compared to stereotype-inconsistent information. However, no research has been conducted to investigate the degree to which racial stereotypes may impact the spontaneous trait inferencing process within a racial group; these studies have only focused on spontaneous trait inferencing across racial groups. The purpose of this present research was to investigate how differences in face-types (more or less representative of African Americans) would impact the spontaneous trait inferencing process and subsequent memory for implied stereotypical traits. In three experiments, participants were shown a variety of behavioral sentences paired with photographs of people. Participants then saw a trait-probe word that was related to the behavior sentence. The behavioral sentences stereotypical of African American individuals or neutral. The faces presented also varied in the degree to which they were considered prototypical of a typical African American face. I expected that the prototypicality of race would influence the stereotypical associations that were activated. That is, I expected that the activation of stereotypical knowledge would impact the speed at which people respond to the trait probe word.

In Experiment 1, I expected that, for stereotype-congruent face-type–behavior combinations, the increased ease of access of stereotype congruent information should elicit the inference of stereotypical information that was never presented, which would interfere with the ability accurately to recognize a subsequent trait probe (whether it was presented or not). However, when the behavior was incongruent with the activated stereotype, the increased accessibility of behavior-incongruent traits and decreased accessibility of behavior-congruent traits would be more likely to interfere with the spontaneous trait inferencing process (and thus, easier to recognize whether a subsequent trait probe was present or not) evoked by the behavior. Based on this reasoning, I hypothesized stronger spontaneous trait inferencing and, thus, slower and less accurate responses to relevant trait probes when the behavior in the preceding sentence was stereotype congruent with the face-type presented than when this behavior was stereotype incongruent. These primary hypotheses were not supported in the present experiment although participants did generally respond quicker neutral sentences compared to stereotypical sentences.

I anticipated that the results of this study would further suggest that the differences in reaction time for stereotype-congruent vs stereotype-incongruent sentences are not solely due to stereotype activation. This would be evidenced by differences in stereotype-congruent vs stereotype-neutral sentences. Alternatively, it may have been possible that the responses to congruent and neutral face type-behavior combinations would be relatively slow not because of a spontaneously inferred trait while reading the sentence but rather because of the relationship between the trait and the sentence that becomes apparent only once the trait probe is presented. Presenting photographs of faces after the behavior would help to confirm whether the results occur due to initial encoding or a backwards integration mechanism. Study 2 (photo presentation above the threshold of conscious awareness) and 3 (photo presentation below the threshold of conscious awareness) were designed to address this issue by presenting photos both before and after behavioral sentences.

In Experiment 2 and 3, I expected that participants would make greater spontaneous trait inferences when the face-type and behavior are stereotype-congruent compared to incongruent. The findings from these studies would further delineate whether this effect occurs due to the increased accessibility of stereotype-congruent information or alternatively, the decrease of stereotype incongruent information. Participants were expected to make quicker responses to trait probes for stereotype incongruent face-type–behavior combinations than for stereotype-congruent combinations and the no-category baseline when the category prime preceded the behavior presentation. This would suggest that when the behavior is incongruent with the activated stereotype, the increased accessibility of stereotype-incongruent information and the decreased accessibility of stereotype-congruent information is likely to interfere with the spontaneous trait inference process (weaker spontaneous trait inferences). Further, if this is the case, stereotype-incongruent information presented *after* the behavioral information should not interfere with the spontaneous trait inference process. That is, the relevant trait inference should have already occurred once the incongruent face-type has been presented. These hypotheses, however, also were not supported in the present experiments. However, baseline trails where no photo prime was displayed also showed a main effect of sentence time suggesting that the results from Experiment 1 have less to do with face-type interference and more to do with the sentences themselves.

5.1 Theoretical Interpretations

Overall, none of the proposed hypotheses were supported in these experiments. One theoretical perspective that should be considered is the degree to which schema-consistent and scheme-inconsistent information aid in memory. Research comparing schema-consistent and scheme-inconsistent information on memory seems to suggest that scheme-consistent information should be most preferred in memory. However, classic research conducted by Hastie and Kumar (1979) found that scheme-relevant information (whether consistent or inconsistent) best determines the type of information that is best remembered. In those experiments, it was proposed that when a photo stimulus is consistent with the behavioral sentence, this would cause interference such that it would be harder to recall whether a later relevant probe was present or not. However, research on scheme-inconsistent information seems to suggest that incongruent information may actually lead to more associative links compared to incongruent links. Hastie (1980) and Srull (1981) suggest that, from an associative network theory perspective, incongruent information may get additional processing for people to make sense of the information being presented. For example, highly prejudiced individuals thoroughly process stereotype-inconsistent information and are threatened by it (Sherman, Stroessner, Conrey, & Azam, 2005). Incongruent information may be linked with additional items/nodes to aid in retrieval compared to congruent information which is quickly processed with fewer associative links needed to aid in retrieval. If this is the case, it is possible that incongruent pairs also were linked to relevant probe words during the encoding process, which would have aided in retrieval at test. However, it is also worth noting that memory for incongruent items depends somewhat on additional time for processing and the proposed experiments did not allow much time for additional processing so it would follow that this preference for incongruent information should have been reduced (Dijksterhuis & Van Knippenberg, 1995; Garcia-Marques, Hamilton, & Maddox, 2002; Macrae, Hewstone, & Griffiths, 1993) but it is unclear what that threshold of “additional processing” is.

Another possible explanation is that although photos of stereotypical and nonstereotypical faces were found to be significantly different from each other, perhaps during the experimental phase this distinction was not different enough to garner the expected differences in encoding and subsequent response time. Essentially, it is possible that no matter what the stereotypicality of the face, if an African American/Black face is categorized as such, then similar encoding processes related to stereotypes and implied traits will occur across all faces within this category leading to no real differences across faces. This is consistent with other category-label effects, such as the other-race (or cross-race) effect which suggests that people are better at recognizing faces within their own race compared to outside of their race (Anzures et al., 2013; Meissner, Brigham, & Butz, 2005). It is possible that the expected differences in response may only occur when faces are categorized into separate racial categories as illustrated in the studies conducted by Stewart et al. (2003).

Further, although stereotypical faces were considered to be more consistent with certain stereotypical behaviors and traits than others, this difference may not have been distinct enough to illicit the interference proposed for subsequent studies, particularly when indexing latency reaction times. Although efforts were taken to make sure the extremes of nonstereotypical and stereotypical faces were used, when making quick judgments people may consider all faces to be part of the same group and thus associated with certain stereotypical behaviors equally. If so, the implications from these results may suggest that for certain decisions if a face is categorized as African American, the proposed interference may occur regardless of face-type. This is supported by the fact that participants did respond quicker to neutral sentences compared to stereotypical sentences suggesting that sort of interference did occur for stereotypical behavioral sentences when paired with any face. Previous research has shown that there are face-type differences within racial group that do elicit differential responses in judgment and decision-making (Kleider-Offutt et al., 2017; Knuycky et al., 2014a; Knuycky, Kleider, & Cavrak, 2014b). However, these differences are not always shown in all paradigms. For example, although Bond et al. (2021) found differential responses for faces based on face-type for miscategorizations, we did not find the same when people made accurate categorizations of faces. Results from this present research suggest that face-type does not garner differential responses for spontaneous trait inferencing interference. Further research is needed to further distinguish when we see these face-type differences.

Alternatively, these present studies differed from Wigboldus et al. (2003) in a potentially important way. Wigboldus et al. (2003) used occupation labels (e.g., skinhead, professor) as their "category label." They theorized that each of these category labels were associated with certain stereotypes that would lead to the proposed encoding processes and subsequent errors. The studies in this present research have two created categories, however, these categories are not necessarily both associated with a particular set of stereotypes. What I designed in the present study is one category (stereotypical faces) that has a high degree of features and traits representative of African Americans. The second category (nonstereotypical faces) is a category that lacks (some of) these features and traits and therefore may be less representative of African Americans. That is, it is possible that nonstereotypical faces are not strongly associated with any set of stereotypes (whether Black, White or any stereotypes relevant to the behavioral sentences used in this study). If so, this would lead to no major differences in the encoding process and subsequent response time. That is to say, in previous literature the categories used (either race or occupation) may have been highly associated with certain stereotypes, whereas in this present study one category (stereotypical faces) is associated with categorical stereotypes whereas the other category (nonstereotypical faces) is simply less strongly associated with those same stereotypes. This may have led to both groups still being encoded similarly when paired with stereotypical behavioral sentences.

5.2 Limitations

Due to restrictions and limitations accompanying data collection in a pandemic, it was necessary to transition many experiments to an online platform. Although this transition has had many benefits, it has also come with its challenges and limitation. This transitioned to online platforms has come with many benefits but have also come challenges (Aguinis, Villamor, & Ramani, 2021; Kan & Drummey, 2018). Although multiple attention checks were used throughout the study to ensure engagement (e.g., asking participants what are the colors fo the

US flag), perhaps some users are so accustomed to navigating these checks that they did not serve the purpose as intended. Hauser and Schwarz (2016) report that MTurk users perform better on attention checks than do subject pool participants. They suggest that this means participants a generally more attentive to instructions compared to subject pool participants. Although this could be true, this also could mean that MTurk participants are regularly exposed to similar attention checks and therefore know to expect them but may still disengage from the actual experiment.

Related to the use of using an online platform, there are also many technical limitations and challenges that should be noted that may have impacted the results found in these experiments. First, was the general issue of participants potentially seeing confusing images. Multiple participants reported in the comments section that they seemed to see flashes of programming language/figures in between slides that were distracting from the overall experiment. This may have been particularly a problem for the experiments that were intentionally investigating how images displayed below the threshold of conscious awareness may impact latency responses. Upon my review of the experiments on different browsers, approximately one out of ten times, there were brief flashes of images/language that were not intended for the participants to see. Another concern that may review articles on online studies point out (Barnhoorn, Haasnoot, Bocanegra, & van Steenbergen, 2015), are the differences in personal computers and hardware. These differences lead to limitations in controlling for buffering time, presentation lags, image displays, etc. Even within individual response time, there were still many instances where the latency response time for one trial was drastically different from the response time to a different trial such that uses the individual average response time as a means of correction in cleaning data did not seem to be very useful. Finally, generally speaking, the Qualtrics platform is well known for its use in collecting survey-related data. Using this platform for reaction time experimental data seemed to be a bit challenging for the platform particularly related to getting accurate timing (as nuanced as milliseconds). The best this platform could accommodate was a timestamp for the moment a page was submitted. Although advancement/submission of a page was programming to be linked to the actual participant key response, it remains unclear whether the key response was the actual time recorded or moments later when a page was recorded to have been submitted (potentially after some lag or buffering). If the reaction time recorded was actually linked to some later time after a potential lag and buffering and not the actual key response, then many responses were not actually true to the participants' judgments.

Based on some feedback from participants, it is possible that there is an expectation of the amount of time spent or the type of studies that are conducted on the web-based data collection platform, MTurk. Although participants were compensated the average MTurk compensation of $2.00, it is possible that the compensation was not comparable to the amount of time and effort required of participants. If participants had an expectation of completing a survey in 30 minutes, they may be more likely to disengage at around 30 minutes rather than completing the full experiment with equivalent engagement throughout. Aguinis et al. (2021) summarize ten challenges of working specifically with MTurk samples. One primary challenge to consider is inattention. MTurk users often complete experiments in a distracting environment and do so as quickly as possible to maximize their monetary gains. MTurk users are also less likely to pay attention to study instructions or manipulations but rather to immediately advance through these parts of the presentation (Aguinis et al., 2021). Last, compared with student in-person samples, online participants are significantly more likely to be distracted due to cell phone use (MTurker

= 21% vs. student = 9%), internet surfing (MTurker = 11% vs. student = 1%), or conversing with another person (MTurker = 21% vs. student = 2%; (Aguinis et al., 2021). These challenges could have been particularly detrimental to obtaining optimal data related to reaction time where timing is being investigated down to milliseconds.

There are a few additional concerns that Aguinis et al. (2021) summarized that should be noted. First, there seems to be a moderate percentage of MTurk workers who may misrepresent their self-reported demographic information including but not limited to their income, education, age, and gender in order to meet the criteria of the study. This could be anywhere from 10% to 13%, to 24% to 83% (Aguinis et al., 2021). Kan and Drummey (2018) found that in the presence of explicit eligibility requirements, 21.8% (Study 2) to 55.8% (Study 1) of participants misrepresented themselves in order to qualify for the studies (55.8% in Study 1 and 21.8% in Study 2). In some cases, people may alter their IP address information to so that it appears as a US location. Although the stereotypes proposed in these studies have consistently been shown to be ubiquitous in the literature, it is possible, particularly in cases where someone is not actually from the US, that these stereotypes do not apply in the same way for the people that may misrepresent their identities.

5.3 Future Directions

Future investigations of this research question will analyze these data for evidence of change across trials (e.g., did participants learn to distinguish between stereotypical and nonstereotypical faces) and to examine effects of or correlations with the other variables in the present dataset (e.g., education, geography, income, political affiliation). Future direction will also aim to replicate previous findings between Black and White individuals using this paradigm. Given the technical and theoretical limitations of this present study, in the future I will attempt to mitigate some of the technical concerns by running these same experiments in a traditional laboratory setting. The participants will be taken to a physical laboratory where they will complete the above studies on a laboratory computer monitored by the research team. This method would serve as a replication of the above findings, address the current potential limitations, and support that overall findings that all African America faces, regardless of face-type, were judged similarly. Investigating these differences will help to further determine the degree to which the distinction between nonstereotypical and stereotypical faces impacted results. If my research team finds the expected results for Black and White faces, but still does not find the expected results with stereotypical and nonstereotypical Black faces, then this would further suggest that the distinction between stereotypical and nonstereotypical Black faces is not enough to garner differential results. But rather that, no matter how representative a face is of a race, as long as that face is categorized as being Black/African American, the face may automatically be associated with certain stereotypes which impact spontaneous trait inferencing in similar ways.

Future research should also investigate other potential moderating variables that have impacted these types of studies in the past such as the level of prejudice and motivation to control prejudice (Olson & Fazio, 2004) as well as other cognitive abilities that have shown to individual differences in decision-making such as working memory and cognitive load (Kleider-Offutt, Clevinger, & Bond, 2016; Kleider, Parrott, & King, 2010). Previous research has found that individual differences in working memory accompanied with cognitive load have impacted the degree to which individuals potentially use stereotypical information as a means for decision-making. It is possible that certain people in this present research may be more likely to elicit the expected reactions (e.g., high working memory vs low working memory; high prejudice vs low prejudice) but these groups were not captured in the present research. Other research investigating levels of prejudice and motivation to control prejudice has found that certain individuals may be more likely to “bend over backward” to appear unbiased or in some cases, to not appear to lenient towards stereotyped groups. Because demand characters may have been a concern in this present research, this may be a moderating variable worth considering in future lines of this research. Because spontaneous trait inferencing seems to fall on the automatic to controlled spectrum therefore may be truly automatic (Heider, 1982), it is possible that demand characteristics still impacted responses.

Although most of my presented hypotheses were not supported in this present line of research, these data have (as research goes) elicited more questions to be explored in the future. Currently, implications from this present research could suggest that no matter how representative a face may be of a racial category, if that face is categorized within a particular race, there may similar consequences in the initial impression formation stages for all faces. However, future research must be conducted related to these questions. That is to say, this is only the beginning!

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APPENDICES

Appendix A

Appendix A.1: Stereotypical Sentence and Probe Stimuli (Stewart et al., 2008)

Dated several women at the same time	promiscuous
Failed an introductory course twice	unintelligent
Impressed his friends with his a cappella vocal performance	musical
Made three touchdowns in one game	athletic
Was caught shoplifting at a department store	criminal
Was the center of attention at parties because of his jokes	funny

Appendix A.2: Neutral Sentence Stimuli (Wigboldus et al., 2003)

Buys a new coat
Collects his groceries
Cycles through the street
Eats a sandwich
Orders a cup of coffee
Walks through town