AN ATTEMPT TO EXPERIMENTALLY DEMONSTRATE THE ATTRACTIVENESS BIAS

CHRISSY D. VINCENT

An Attempt to Experimentally Demonstrate the Attractiveness Bias

by

Chrissy D. Vincent

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Department of Psychology

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Abstract

There exists a large body of psychological research suggesting that attractive people tend to be judged and treated more favorably than unattractive people in a wide variety of social settings. Much of the research on this attractiveness bias, however, has simply relied upon natural variation to separate target individuals into groups of differing attractiveness levels. The current study sought to employ the mere exposure effect to achieve an experimental manipulation of attractiveness, thereby separating attractiveness from any covariates that may have potentially confounded it in these prior studies. Participants were exposed to pictures of target individuals while engaged in a distracting task, and later rated those same targets on attractiveness, sociability, relationship happiness, and career success. The purpose of the experiment was to investigate whether exposure frequency influenced the latter three judgments, and whether that influence was mediated by perceived attractiveness. Unfortunately, mere exposure failed to affect attractiveness ratings, so the intended analysis could not be performed. Explanations for the lack of exposure effects based on both cognitive load and classical conditioning theories are discussed.

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Human social judgments are complex, and are influenced by countless factors. One factor in particular that has been given much attention in the psychological literature is physical attractiveness. Many research studies conducted over the past several decades have shown that an individual's physical attractiveness can have a profound impact on a wide variety of judgments that others make about that individual. The present study will focus on this attractiveness bias, and explore the possibility of demonstrating it by using a purely experimental manipulation of attractiveness.

The Attractiveness Bias

A classic study investigating the effect of physical attractiveness on social judgment was conducted by Dion, Berscheid, and Walster (1972). Participants rated photos of attractive, average, and unattractive people on a number of evaluative dimensions. Attractive targets received significantly more positive ratings than average or unattractive targets. The attractive targets were assumed to possess more socially desirable personality traits, and were expected to secure more prestigious jobs, experience happier marriages, and lead generally better lives than were less attractive targets. This research finding was groundbreaking at the time of this particular study, and was termed the "what is beautiful is good" phenomenon (Dion, Berscheid, & Walster, 1972; Gillen, 1981).

Since the publication of Dion, Bersheid, and Walster's classic study, the tendency for attractive individuals to be judged as having more socially desirable personalities and

better life outcomes than unattractive individuals has been replicated many times, and has become well established in the psychological literature (Eagly et al., 1991). The inclination to judge attractive people more positively than their unattractive peers even extends to those who know those people well (Langlois et al., 2000), despite the fact that the actual qualities of attractive people are not much different from those of less attractive people (Feingold, 1992). Furthermore, those individuals who are particularly below average in attractiveness seem to be at a marked disadvantage in social judgment. Griffen and Langlois (2006) recently demonstrated that both adults and children rate unattractive targets as less sociable, less altruistic, and less intelligent than either average or attractive targets. It appears that the attractiveness stereotype is not unipolar, but simultaneously encompasses the complementary concepts of "beauty is good" and "ugliness is bad" (Griffen & Langlois, 2006). The pervasiveness of this bipolar stereotype in Western society can easily be confirmed by an exploration of popular media, which often portray physically attractive characters as "good" and unattractive characters as "bad". Indeed, an analysis of top-grossing U.S. films found that attractive characters were portrayed much more favourably than unattractive characters on numerous dimensions, and that this relationship was stable across time periods, characters' sex, and characters' centrality to the plot (Smith, McIntosh, & Bazzini, 1999).

Studies have shown that the attractiveness stereotype is not only reliable, but strong enough to operate on an implicit level, in situations where attention is not at all directed toward a person's physical appearance. Participants engaged in a modified Stroop task are quicker to recognize words with positive affective valence when they are

superimposed on an image of an attractive face rather than an unattractive one (Leeuwen & Macrae, 2004). This may not be surprising, given that the perception of differential attractiveness has been shown to occur automatically with the initial encoding of sensory data (Locher et al., 1993). However, even when participants are led to discount the relevance of attractiveness by being told that it is a mere subjective preference, they continue to make personality inferences consistent with the attractiveness stereotype (Ellis, Olson & Zanna, 1983). In addition to being activated automatically, then, this stereotype seems to be resistant to explicit correction.

Along with being pervasive and automatic, the attractiveness stereotype has also proven to be widely applicable. It has been demonstrated with middle-aged targets (Adams & Huston, 1975) and elderly targets (Perlini, Bertolissi, & Lind, 1999) as much as with younger ones, and even judgments of infants are affected. Across three different ethnic groups, adults were found to rate attractive babies as smarter, more likable, more generally good, and less likely to cause problems for parents than less attractive babies (Stephan & Langlois, 1984). Attractiveness can clearly affect judgment across a wide range of target categories.

Attractiveness stereotyping may often lead to physically attractive individuals receiving preferential treatment in real-world social situations. Not surprisingly, physical attractiveness has proven to be a strong determinant of how individuals are treated in peer contexts, especially in the realm of dating and relationships. In a classic field study by Walster, Aronson, Abrahams, and Rottmann (1966), male and female students were randomly paired with one another for a date at a dance. During the evening's

intermission, partners were separated and asked to evaluate one another on several dimensions. The results indicated that by far the largest determinant of how much a given partner was liked, was desired for a second date, and was likely to be actually asked for a second date was simply that partner's level of physical attractiveness. Physically attractive partners were consistently evaluated and treated much more favourably than unattractive ones. In contrast, the effects of personality and intellectual measures on compatibility were negligible (Walster et al., 1966).

More recently, Peretti and Abplanalp (2004) noted the apparent importance of "chemistry" in college-level dating, and attempted to delineate the core variables of this concept for college students. They used an open-ended questionnaire that allowed respondents to list any words or concepts concerning their ideas, attitudes, opinions, or values regarding chemistry in dating relationships. For both male and female students, the most frequently stated variable was physical attractiveness. Participants deemed attractiveness to be of primary importance in determining whether they took action to make contact with the other person (Peretti & Abplanalp, 2004). Evidently, the impact of physical attractiveness on dating behaviour has not changed much—it has merely become couched in more neutral terms, such as "chemistry".

Furthermore, physical attractiveness may continue to exert an influence on judgment and behaviour once relationships progress to a more intimate level. Self-disclosure is an integral part of intimate relationships, and one investigation has found evidence that highly attractive self-disclosers attain a greater level of acceptance than those who are less attractive (Kleinke & Kahn, 1980). This effect was demonstrated for

disclosures about parental suicide, sexual attitudes, and aggressive feelings of competitiveness.

Notably, it is not only adults who show preferential treatment to peers who are more attractive. On the contrary, this tendency can be detected as early as preschool. Sociometric data reveal that the more attractive a child is, the more the child's preschool classmates wish to associate with him or her, regardless of the child's actual social competence (Vaughn & Langlois, 1983). This early childhood attractiveness bias may be attributable to socialization through parental expectations and verbal behaviours. Children whose parents expect them to engage in attractiveness stereotyping and differential treatment do so more than children whose parents do not hold such expectations, and mothers have been found to convey various types of communications to their children that are consistent with a physical attractiveness stereotype (Adams, Hicken, & Salehi, 1988).

Preferential treatment based on attractiveness occurs not only in peer contexts, but in parenting contexts as well. A study of maternal behaviour has shown that mothers of attractive infants are very affectionate and playful with them. In contrast, mothers of less attractive infants are more likely to be attentive to people other than their infants, and engage in routine care-giving rather than affectionate behaviour (Langlois, Ritter, Casey & Sawin, 1995). Research also shows that adults display differential treatment toward attractive and unattractive children in circumstances in which the childrens' behaviour is identical. Adults are more forgiving of an attractive child who has behaved violently toward another child or an animal than they are of an unattractive child who is guilty of

the exact same transgression. They are also less likely to attribute an attractive child's transgression to an enduring antisocial disposition (Dion, 1972). Moreover, such differential treatment does not apply only to misbehaving children. When children are well-behaved, adults often provide more help and social rewards, such as smiles, to physically attractive children than they do to physically unattractive children (Matter & Matter, 1989). Although society dictates that all children are supposed to seem beautiful to their parents (Langlois et al., 1995), it is clear that the attractiveness bias can colour even this most basic and intimate human relationship.

If people do not treat their peers or even their own children in a manner that is free of attractiveness biases, then such impartial treatment certainly cannot be expected from more detached evaluators. Indeed, such evaluators show a practically universal tendency to ascribe greater talent and competence to attractive than to unattractive individuals. For example, male college students have been found to evaluate the quality of an essay and the ability of its writer much more positively when they believe it to be written by an attractive rather than an unattractive female, especially when the objective quality of the essay is relatively poor (Landy & Sigall, 1974). This same pattern of evaluation has emerged when females are used as essay raters (Cash & Trimer, 1984), and it has been found to be independent of the race of the essay writer (Maruyama & Miller, 1980). Attractive musicians also tend to be strongly favoured in their area of expertise, where their performances are judged as better than those of unattractive musicians when performing voice solos (Wapnick, Darrow, Kovacs, & Dalrymple, 1997) and violin solos (Wapnick, Kovacs-Mazza, & Darrow, 1998). Similar results have been

obtained for piano solos, but only among female performers (Ryan & Costa-Giomi, 2004). This differential evaluation standard can have important real-world consequences, since the greater talent and competence ascribed to attractive individuals in evaluation situations may operate to afford them more (or better) opportunities in life.

One social sphere in particular where evaluations may have a significant impact on an individual's opportunities and outcomes is academics. Indeed, the attractiveness bias has been revealed to be as prevalent in educational settings as it is elsewhere. A meta-analytic review of research on attractiveness effects in the classroom (Ritts, Patterson, & Tubbs, 1992) indicated that physically attractive students of all ages are usually judged by their teachers as being more intelligent and possessing more academic potential than their less attractive classmates, and tend to receive significantly higher grades and achievement scores. They are also considered to be more friendly, attentive, popular, and outgoing (Ritts, Patterson, & Tubbs, 1992). This is significant, because teacher and professor evaluations are often required for and play a crucial role in determining college entry and job hiring decisions.

However, attractiveness effects in educational settings are not all one-sided. Students have been shown to demonstrate equally biased tendencies in their evaluations of their instructors. Riniolo, Johnson, Sherman, & Misso (2006) recently conducted an analysis of naturally occurring data obtained from a widely popular website dedicated to evaluations of college professors. Across four separate universities, professors perceived as attractive received higher student evaluations than did non-attractive controls who were matched for both department and gender. Furthermore, the effect size of this

difference was quite large—an interesting finding when one considers that institutionally sponsored student evaluations can exert a heavy influence on such important decisions for professors as promotion, tenure, and salary increases (Riniolo, Johnson, Sherman, & Misso, 2006).

Teachers and professors are not the only individuals who may be subject to attractiveness biases in the work environment. On the contrary, these prejudices may be more prevalent on the job than in any other social milieu. In work-related settings, attractive people are found to be favoured over equally qualified unattractive people in hiring decisions (Dipboye, Arvey, & Terpstra, 1977; Dipboye, Fromkin, & Wiback, 1975; Raza & Carpenter, 1987), in recommendations regarding salary raise and promotion (Frieze et al., 1991; Jackson, 1983; Ross & Ferris, 1981), and in evaluations of career potential (Cash, Gillen, & Burns, 1977). Attractive applicants and employees are favoured in both managerial and non-managerial positions, and in both simulated and real-world contexts. The extent of this favoritism is smaller when decisions are made by more experienced managers, but it is nevertheless still present (Marlowe, Schneider, & Nelson, 1996). One naturalistic study led to the conclusion that a one-unit difference in judged attractiveness may actually translate into an annual salary discrepancy in the order of thousands of dollars (Frieze et al., 1991). Given that this particular study was conducted over a decade ago, the possibility exists of an even larger discrepancy today. The available evidence certainly indicates that the attractiveness biases operating in professional environments are far from subtle, and may result in gross injustices.

Although attractiveness biases in the workplace are quite consequential, there are venues in which they may have an even greater impact. For example, research indicates that they may operate in clinical settings. In one study, naïve judges were shown to be more likely to attribute psychological disturbance to unattractive than to attractive target persons, an effect that failed to be attenuated by a warning that attractiveness was irrelevant and should be disregarded (Jones, Hansson, & Phillips, 1978). Another study uncovered further evidence that it is not only naïve judges who are susceptible to such biases. When exposed to videotaped interviews with clinical patients, graduate students in clinical psychology rated attractive males and females as having healthier self-concepts than their unattractive counterparts (Hobfoll & Penner, 1978). If the judgment of advanced clinical psychology students can be so easily swayed by attractiveness, it seems likely that this variable may inadvertently affect practicing clinicians as well. Such a bias could potentially lead to inappropriate or inadequate diagnosis and care of mental health patients.

By far the most unanticipated finding pertaining to the attractiveness bias, though, is the discovery that it can affect criminal trials. The judicial process in our society has been carefully designed to foster impartiality, but it is still not immune to attractiveness effects. A meta-analysis of experimental research on mock juror judgments (Mazzella & Feingold, 1994) revealed that it is generally advantageous for criminal defendants to be physically attractive. Mock jurors were less likely to find physically attractive defendants guilty than physically unattractive defendants, and they also recommended less punishment for the attractive defendants. There is some suggestion, however, that

the bias may not be quite so simple. Attractiveness effects may operate differently for different types of crime. Sigall and Ostrove (1975) found attractiveness to be an advantage to defendants for crimes unrelated to physical attractiveness, such as burglary, but a detriment for attractiveness-related crimes, such as swindle. Either way, the legal system dictates that juridical judgments should be based only on the available evidence, and remain unaffected by extraneous factors such as physical appearance. Defendants of all attractiveness levels have the right to a fair trial and should be equal in the eyes of the law. Research suggests that this is not the case.

It is clear that preferential treatment of attractive individuals is a very real and pervasive phenomenon. Studies investigating this attractiveness bias, however, all suffer a common methodological pitfall. At present, researchers have yet to develop a successful way to experimentally manipulate attractiveness. Attractiveness is a characteristic that is subject to natural variation among individuals, and most studies investigating its effects have merely relied on this natural variation to separate target individuals into groups of differing attractiveness levels. This is not a true experimental manipulation—and true manipulation is needed in order to separate attractiveness from all those variables with which it naturally covaries, such as the shape and size of different facial features and aspects of personal grooming.

This is not to say that no experimenter has ever tried to manipulate attractiveness—occasional attempts have been made. For example, Sigall and Aronson (1969) were able to make a female experimenter appear either attractive or unattractive by using make-up and wigs. They subsequently showed that male participants liked her

more and expressed more willingness to work with her in the future when she looked attractive. Unfortunately, this form of manipulation is still problematic because it does not unconfound attractiveness from variables such as hairstyle, hair colour, and make-up style. Almost all of the effects that, up to now, have been attributed to variations in target attractiveness could be due not to attractiveness itself, but to some as yet undetected correlate. What is needed is a way of manipulating the attractiveness of a given target without changing any of his or her other characteristics. Studies of the effects of repeated exposure suggest one such method.

The Mere Exposure Effect

Fortuitously, there exists a broad psychological literature indicating that prior exposure can operate to produce increased liking or attraction for a re-exposed target. In his seminal monograph, Zajonc (1968) discussed compelling evidence of a correlation between the affective connotation of words and word frequency. Specifically, he asserted that frequently used and encountered English words tend to have a more positive affective valence than less frequent words. He speculated that this positive affect arises from the greater familiarity surrounding these words. He then lent experimental support to this conjecture by demonstrating that participants who were repeatedly exposed to nonsense words and symbols later judged those targets more positively than did unexposed participants (Zajonc, 1968). Years later, a classic study by Kunst-Wilson and Zajonc (1980) corroborated and extended these findings, showing that people tend to prefer objects that they have seen previously over ones that they have not, even when they are completely unaware of such prior exposure. In a task involving forced choice

between pairs of irregular octagons, participants exhibited a marked preference for octagons they had seen before over ones they had not. This tendency emerged despite the fact that their exposure to the preferred octagons was so brief that they were unable to accurately identify which of the octagons they had been shown (Kunst-Wilson & Zajonc, 1980).

A meta-analysis of over 200 experiments addressing this "mere exposure" phenomenon in the 20 years following Zajonc's groundbreaking paper established that the effect is very real, reliable, and robust (Bornstein, 1989). Although the classic exposure-affect studies mainly used nonsense words, symbols, and polygon shapes as stimuli, the relationship proved to be easily demonstrable with a wide variety of stimulus types, including simple and complex line drawings (Stang & O'Connell, 1974; Berryman, 1984), paintings (Berlyne, 1970; Zajonc et al., 1972; Oskamp & Scalpone, 1975), musical excerpts (Brentar, Neuendorf, & Armstrong, 1994; Szpunar, Schellenberg, & Pliner, 2004), and unfamiliar gustatory stimuli (Pliner, 1982; Crandall, 1984). Many of these stimuli are of more real-world consequence than the abstruse stimuli of the classic studies. Also of considerable practical importance is a recent finding that the effect can be obtained for products presented in advertising campaigns (Baker, 1999). Although exposure effects cannot bestow a new product with any marketing advantages against known, well-established competitors, they can confer an edge against other unknown competitors as long as those competitors do not have any obviously superior performance characteristics. Moreover, even if these competitors do have some superior qualities, the

exposed product may still enjoy greater success if the consumer's motivation to deliberate at the time of brand choice is low (Baker, 1999).

More pertinent to the present research considerations, though, are the studies that have employed actual human faces as exposure stimuli. Bornstein, Leone, and Galley (1987) demonstrated that exposure effects obtained using simple polygon stimuli could be just as easily obtained using photographs of human targets. Exposure to photographs of actual people later caused participants to prefer those photos over new, previously unseen photos. Furthermore, prior exposure to a person's photograph was found to change participants' attitudes and behaviour toward that target person when he or she was encountered in a later phase of the experiment. Participants who had been exposed to a particular research confederate's face in an earlier phase of this experiment were significantly more likely to later agree with that confederate's opinion during a group decision-making task than were participants who had not seen the face. The latter participants were found to exhibit only chance levels of agreement with the confederate (Bornstein, Leone, & Galley, 1987). This is a noteworthy finding, since it clearly indicates that exposure phenomena can impact people's perceptions and treatment of others in real social situations.

In a further investigation of this possibility (Moreland & Beach, 1992), four female research confederates posed as regular students in a personality psychology course being held in a large lecture hall. Each confederate attended a different number of class sessions. One confederate attended no class sessions at all, one confederate attended five class sessions, one confederate attended ten class sessions, and the final

confederate attended fifteen class sessions. Aside from the attendance difference, the four confederates behaved identically. They simply entered the lecture hall and sat in clear view, quietly listening and taking notes for the duration of the class time. To create conditions of mere exposure, they did not interact with any students or otherwise draw any explicit attention to themselves. They were merely present in the classroom. During the last week of classes, students were shown slides of the confederates and asked to rate them on measures of familiarity, interpersonal attraction, and similarity. Although none of the confederates was consciously recognized by the students, confederates who had attended more class sessions received significantly higher ratings on interpersonal attraction, and also, interestingly, on similarity to the students (Moreland & Beach, 1992). Although the confounding of exposure frequency with individual confederates could be problematic, this study is remarkable in its demonstration of exposure effects in a realistic field setting. Future replications using different confederates may prove to be valuable.

Moreland and Beach's study, while illustrating the exposure phenomenon in a naturalistic social context, also raises the question of whether the effect of exposure on interpersonal attraction, or liking, is direct or indirect. Because exposure was also found to increase ratings of similarity, and similarity is known to be positively related to liking (Byrne, 1971), it seems possible that prior exposure exerts only an indirect effect on interpersonal attraction via perceived similarity. Mediation analyses, however, have provided sound evidence that this is not the case. In fact, the opposite is true—interpersonal attraction mediates the relationship between exposure and perceived

similarity (Moreland & Zajonc, 1982). Moreover, research involving the active manipulation of perceived similarity has shown that regardless of whether perceived similarity is high or low, frequently seen others are rated more positively than less frequently seen others on a variety of dependent measures (Brockner & Swap, 1976). The relationship between exposure and interpersonal attraction appears to be both robust and direct.

Interpersonal attraction and perceived physical attractiveness, however, are two distinctly different concepts. Liking a person does not necessarily guarantee that one will find him or her physically attractive. Therefore, the question of whether exposure can act to heighten a target's perceived physical attractiveness requires some attention. Peskin and Newell (2004) exposed participants to female faces at varying frequencies, and found that increasing exposure to the faces served to increase their physical attractiveness ratings. They also found that there was no differential effect of exposure on typical and distinctive faces. Rather, exposure increased attractiveness ratings to the same degree for both average-looking and unusual-looking targets (Peskin & Newell, 2004). The results of this investigation indicate that for any given target individual, perceived physical attractiveness can be effectively changed by changing prior exposure frequency. It appears that this may constitute a promising method of manipulating physical attractiveness while holding constant all other target characteristics.

Although the mere exposure effect appears to be a robust one, there are many conditions that affect its strength. One factor that has proven to have a major impact is exposure duration. Meta-analyses have revealed that exposure effects tend to be stronger

in studies using shorter exposure durations, and are especially strong when stimuli are presented below the threshold of recognition (Bornstein, 1989). This finding has since been tested directly in the laboratory (Bornstein & D'Agostino, 1992), with results indicating that 5-ms, unrecognized stimuli produce significantly larger mere exposure effects than do stimuli presented for longer durations. These results were obtained for polygon, Welsh figure, and photograph stimuli. Indeed, exposure effects may deteriorate when exposure durations are too long, resulting in an inverted-U relationship between exposure duration and liking ratings of merely-exposed stimuli (Hamid, 1973). Clearly, if one wishes to employ exposure to manipulate physical attractiveness ratings, one must be very careful in selecting a maximally effective exposure duration. Using a duration that is not sufficiently brief may cause stimuli to become too recognizable and undermine the effectiveness of the manipulation. Even though there is some evidence that it is greater total exposure time, rather than greater exposure frequency, that acts to elicit more positive affective responses (Marcus & Hakmiller, 1975), it is undoubtedly advantageous to keep exposure durations short and instead manipulate exposure frequency, in order to prevent stimuli from becoming too consciously recognizable and potentially weakening the exposure effects.

It should be noted that there are some circumstances under which it is impractical to present stimuli below the threshold of conscious perception. This is usually the case in research using auditory rather than visual stimuli. Under such conditions, it is common to employ the use of a distracter task to direct explicit attention away from the stimuli, thereby rendering them more subliminal. In the classic shadowing experiment conducted

by Cherry (1953), for example, participants wearing headphones were simultaneously presented with two spoken messages—one in the right ear, and one in the left ear. They were asked to "shadow", or repeat, the message playing in one ear while ignoring the message playing in the other ear. Cherry found that changes in the unattended message from English to a different language or to reverse speech went largely unnoticed (Cherry, 1953). In a similar experiment, Moray (1959) found that even a word presented 35 times in the unattended message was never explicitly recalled by subjects. However, it has been found that these unattended messages can still have an impact on later task performance (Banks, Roberts, & Ciranni, 1995).

Remarkably, though, some research suggests that when exposed stimuli are recognizable, exposure effects may be stronger when those stimuli are specifically "remembered" rather than being merely "known". A study exploring the relationship between liking ratings and recognition performance for obscure classical and Russian music melodies found that people rated a melody more positively when they concretely remembered hearing it earlier in the study than when they simply knew the melody but could not remember the specific instance in which they heard it (Wang & Chang, 2004). However, these results should probably be applied to the current considerations with caution, as auditory and visual stimuli are different from one another and may interact with exposure to produce unique and divergent patterns of results.

Another factor that may affect exposure effects is the pleasantness of the experimental context. Burgess and Sales (1971) reported two experiments that showed that positive contexts facilitated the exposure phenomenon and negative contexts

inhibited it. In the first study, correlational evidence showed the relationship between exposure and liking to be stronger for participants who found experimental participation to be relatively enjoyable than for participants who found it to be less enjoyable. In the second study, intentionally created positive contexts were found to provide positive relationships between exposure and affect, while intentionally created negative contexts were shown to provide negative relationships between those same variables. Based on these findings, the researchers put forth an explanation for exposure effects based on classical conditioning. They posited that the contexts in which mere exposure studies take place are affectively positive for most participants. Stimuli that are more frequently presented become more strongly associated with this positive context than do less frequently presented stimuli, and therefore become more capable of eliciting the corresponding positive affect. In other words, the positive affect which characterizes the exposure context is increasingly transferred to the exposed stimulus as the number of trials increases (Burgess & Sales, 1971).

Although this theory appears to be a plausible one, there has also been some evidence to the contrary. Saegert, Swap, & Zajonc (1973) performed an investigation to determine the effects of mere exposure and positive and negative contexts on interpersonal attraction among female research participants. In this research, exposure was manipulated by varying the number of times participants encountered one another, and context was manipulated by having subjects taste different solutions during the encounters. Three flavours of Kool-Aid were used to foster a pleasant, positive context, and weak solutions of vinegar, quinine, and citric acid—all of which are quite noxious—

were used to create a negative context. This pleasant/noxious solution manipulation, however, proved to exert no influence on interpersonal attraction ratings. Attraction between participants was found to vary as a direct function of number of encounters, in negative as well as in positive contexts (Saegert, Swap, & Zajonc, 1973). It appears that the relationship between exposure and interpersonal attraction may not be a simple function of classical conditioning, and context may not always be as crucial as was once thought. Nevertheless, it might be prudent in this line of research to ensure that exposure contexts are pleasant for participants, or at the very least, that they are not too objectionable.

When using human faces as exposure stimuli, the race of the target persons may influence the exposure effect. It may not be surprising that choosing the race of such stimulus faces is an issue of some concern for most researchers. Although some studies have shown this variable to be of little consequence (Hamm, Baum, & Nikels, 1975), other studies have suggested that this characteristic may be of critical importance for the success of the exposure manipulation. For example, Perlman & Oskamp (1971) presented white participants with black and white individuals in positive, neutral, and negative contexts. Overall, they found that exposure in positive behaviour contexts improved attitudes and exposure in negative contexts was a detriment to attitudes. However, it was also found that the positive exposure effect was weaker for black target individuals than for white ones, while the negative exposure effect was stronger for black target individuals than for white ones. In a more recent study (Bruce et al., 1997), black and white female Americans were exposed at varying frequencies to photographs of

black and white female targets. They were then asked to rate the physical attractiveness of those targets. Bruce et al. (1997) found that among both black and white participants, there was a reliable exposure effect only for white targets. The researchers surmised that this pattern of results might be due to the fact that in American culture, fewer black faces than white faces are generally encountered, and therefore American viewers require a higher level of exposure to these faces in order to produce a comparable effect. Whatever their cause, these findings imply that at least in a society comprised of a white majority, restricting target faces to those of white individuals may be beneficial for the strength of exposure effects.

Finally, the probability of achieving reliable exposure effects in the laboratory may depend on the presence or absence of alternative targets for misattribution at the time of re-exposure. Misattribution models of prior exposure effects (Bornstein & D'Agostino, 1994; Jacoby, Kelley, & Dwyan, 1989; Klinger & Greenwald, 1994) suggest that re-exposure triggers an initial positive reaction that is ambiguous, and can therefore be attributed to many salient or feasible causes. If this is the case, higher attractiveness or liking ratings are likely to be obtained only when the re-exposed target itself is the focus of attention, and thus appears to be the best explanation for the positive response. If other probable causes for the response can be identified at the time of re-exposure, the positive affect may instead be attributed to them, resulting in a lack of increased liking or attraction for the re-exposed target. Repeated exposure has indeed been found to affect evaluations of a variety of properties, including the famousness of names (Jacoby et al., 1989), the brightness of stimuli (Mandler, Nakamura, & Van Zandt, 1987) and the

duration of stimuli (Witherspoon & Allan, 1985). It has also been shown that such evaluations can be unaccompanied by any global liking or preference for the re-exposed stimulus itself. In one study, for example, participants were exposed to a target sentence through headphones. They then heard either the same sentence or a different one accompanied by annoying noise. The annoying noise was rated as less loud by participants hearing the re-exposed target sentence than by participants hearing a novel sentence, but these sentences were not differentially liked or preferred (Jacoby et al., 1988).

In another more recent study, participants read a persuasive essay advocating an increase in taxes to help repair public freeways. This essay was accompanied by a photograph of the author, to which the participants either had or had not been previously subliminally exposed. Participants who had seen the author agreed with the essay's message to a significantly greater degree than did participants who had not seen the author. However, there were no differences in these participants' ratings of the author's attractiveness (Weisbuch, Mackie, & Garcia-Marques, 2003). The presence of a probable alternative target for misattribution, it seems, may nullify the tendency for a previously exposed target to be perceived as more likeable or attractive.

It would appear that the manipulation of exposure frequency may be an effective way to alter the perceived attractiveness of stimulus faces. Accordingly, exposure may potentially be used to achieve a purely experimental demonstration of the attractiveness bias. In the present experiment, photographs of white target individuals were presented at very brief exposure durations, within an experimental context that was free from any

alternative targets for misattribution. The purpose of the experiment was to investigate whether exposure frequency influenced social judgments, and whether that influence was mediated by perceived attractiveness. It was hypothesized that exposure frequency would show either a positive linear or a positive quadratic relationship with ratings of target attractiveness, target sociability, target career success, and target relationship happiness. Straight-line and inverted –U relationships have been the types most commonly found in previous mere exposure research (Bornstein, 1989). Furthermore, the operation of an attractiveness bias in addition to a basic mere exposure effect would suggest that the latter three ratings should be strongly dependent on attractiveness ratings. It was therefore also hypothesized that the relationships between each of these three ratings and exposure frequency would be mediated by attractiveness ratings. That is to say, it was predicted that the significance of these relationships would be reduced if the variability due to attractiveness were removed. Attractiveness could then be considered at least partially responsible for the relationships. Such a pattern of results would represent one of the few truly successful experimental demonstrations of the attractiveness bias.

It should be noted that there is already some correlational evidence that lends support to the notion of an exposure-induced attractiveness bias. There exists a strong, positive correlation between the average number of news conferences given by an American president each month and his subsequent ranking in the Murray-Blessing Poll (Young & French, 1996). Correlational evidence, however, can hardly be taken as definitive proof of causality. The present experimental research has tried to eliminate the

confounding variables that are so problematic in such correlational work, making it possible to draw more definite conclusions about the effects of exposure-induced attractiveness on social judgments.

Method

Participants

Participants for the study were 100 students from Memorial University of Newfoundland. Some of these participants were recruited from undergraduate psychology classes and further contacted by e-mail, while others were recruited through their e-mail response to posters placed on bulletin boards around campus. Half of the participants were male, and half were female. Participants ranged in age from 18 to 50 years old (*M = 23.98, Mode = 19*), and were predominantly Caucasian undergraduates. However, neither ethnicity nor educational level was recorded for each individual participant. Participants were paid $4.00 for approximately a half an hour of participation.

Materials

Stimuli for the study were digitized pictures of adult males and females originating from a variety of sources (such as internet, television, magazines, and family pictures contributed by others). All pictures showed the head and shoulders of individuals, and were digitally cropped to a width of 172 pixels and a height of 203 pixels, measuring approximately 4.7 cm in width and 5.4 cm in height on the participant's computer screen.

Pictures were chosen from a larger pool of 588 such stimuli, all of which had been previously rated for target attractiveness on a scale from 1 to 10 (*M = 4.44, Median = 4.23, SD = 1.24, Min = 1.50, Max = 8.42*). These attractiveness ratings were obtained in several earlier studies (Grant et al., 2000), in which each picture was judged by at least 10 male and 10 female student raters. Only pictures of Caucasian targets who received an average attractiveness rating between 4.00 and 5.00 were selected for use in this study (*N = 101, M = 4.48, Median = 4.46, SD = 0.31*). This was done to ensure that the exposure effect had maximum room to manifest itself in both directions along the rating scale.

Procedure

Participants were tested individually, in a private cubicle equipped with a personal computer running a *Visual Basic* program. All instructions and experimental materials for the first and third phases of the study were presented by the computer, and participants responded by pointing and clicking with the mouse or by entering numbers with the keypad. The second phase of the study was completed with a pencil and paper.

Phase 1

In the first phase of the study, participants were told that they were about to see a series of images, each of them presented very briefly on the screen and directly followed by a letter of the alphabet. They were advised to pay close attention, as it was very important that they did not miss seeing anything. They were instructed that it was their task to correctly categorize the letters they saw as vowels or consonants—when they saw a vowel, they should press the 1 key on the keypad, and when they saw a consonant, they should press the 3 key. They were asked to respond as quickly and as accurately as they

possibly could. This categorization task was intended to draw the participants' explicit focus away from the stimulus faces, resulting in a presentation that was somewhat more subliminal. As previously mentioned, such distracter tasks have sometimes been used in auditory research to successfully accomplish the goal of subliminal exposure (Cherry, 1953; Moray, 1959; Banks, Roberts, & Ciranni; 1995). The presence of distracter tasks in these studies permitted messages to be presented to participants outside of their conscious awareness. Since the computers used in the present study could not support extremely short exposure durations, the vowel-consonant categorization task was designed to be sufficiently distracting to render the picture presentations more subliminal.

The computer randomly selected 50 (25 male and 25 female) of the 101 stimulus pictures for presentation to each participant, and then randomly assigned 10 (5 male and 5 female) of these selected pictures to each of the following five exposure frequencies—0 exposures, 1 exposure, 2 exposures, 5 exposures, and 10 exposures. The computer subsequently proceeded to flash each stimulus picture on the screen the predetermined number of times. Exposures occurred in random order, and were 25 ms in duration. Each exposure was immediately followed by a masking image comprising a letter of the alphabet. All letters except Y were used as masks. Masking letters were assigned to images at random, and remained on the screen until categorized. Participants had as much time as needed to categorize each letter by pressing either a 1 or a 3. The computer then presented the next image-mask combination. When all exposures were complete, participants moved on to the second phase of the study.

Phase 2

In the second phase of the study participants worked at a filler task intended to distract their attention from the pictures that they had seen, and decrease explicit memory for those pictures. The filler task was a simple anagram task. Participants were given a sheet of paper with thirty scrambled words, and were instructed that they had five minutes to unscramble them. They were told that it was okay if they could not finish the task in the allotted time, but that they should try as hard as they could. When the five minutes were up, participants moved on to the third phase of the study.

Phase 3

In the third and final phase of the study, participants were told that they would see a series of pictures of people, and would be asked to make a number of social judgments about each individual depicted. They were told that they should be completely honest in making all judgments.

The computer then presented the 50 selected test pictures one at a time in random order, and each picture was accompanied by four judgment questions:

"How attractive is this person?"

"How sociable is this person?"

"Does/Will this person have a successful career?" and

"Does/Will this person have a happy romantic relationship?"

Question order was randomized for each picture, and participants were given as much time as needed to indicate their answers to each question on a 9-point scale, ranging from (1) not at all to (9) extremely. All data gathered from the participants were then recorded and stored in an anonymous data file for statistical analysis.

Results

Mean ratings of attractiveness, sociability, relationship happiness, and career success obtained for targets at each of the five exposure frequencies are shown in Table 1. These mean ratings are also depicted graphically in Figure 1.

The first step in the analysis of these data was to assess, for each participant, the relationship between exposure frequency and attractiveness ratings while controlling for the age, gender, and pre-rated attractiveness of targets. Mere exposure effects often manifest themselves as a linear trend, but are also sometimes known to show an inverted-U quadratic trend (Bornstein, 1989). For this reason, an assessment of the exposure-attractiveness relationship had to allow for both of these possibilities.

A new variable was first created by squaring each exposure frequency. A hierarchical regression analysis was then performed on each participant's data, with attractiveness ratings as the dependent variable. In this analysis, target age, target gender, and pre-rated attractiveness were entered first, followed by exposure frequency, and finally by squared exposure frequency. From these regressions, a *t*-value was obtained for each of the regression coefficients and these *t*-values became the dependent variables in subsequent analyses. These *t*-values were descriptive statistics with an expected value of zero. In order to determine if the mean of each group of *t*-values differed significantly from zero, a series of one-sample *t*-tests was performed.

Surprisingly, a one-sample *t*-test conducted on the *t*-values for target age (M = .30, SD = 1.55) revealed that the mean of these *t*-values did not differ significantly from zero, $t(99) = 1.94$, $p = .06$. A one-sample *t*-test conducted on the *t*-values for target

gender (M = -.53, SD = 2.16), however, showed a significant departure from zero, $t(99)$ = -2.45, p = .02, as did a similar one-sample t-test conducted on the t-values for pre-rated target attractiveness (M = 1.99, SD = 1.19), $t(99)$ = 16.74, p = .00. These results indicate that male targets were rated as significantly more attractive than female targets, and that targets with high pre-rated attractiveness scores were rated as significantly more attractive than targets with low ones. Such significant results, of course, were anticipated. These variables were included in the regression analysis in order to remove a substantial portion of the variance from the obtained attractiveness ratings, thereby allowing for a more sensitive test of exposure frequency effects.

A one-sample t-test conducted on the frequency t-values (M = -.08, SD = 1.03) showed that the mean of these t-values did not differ significantly from zero, $t(99)$ = -.75, p = .46. Similarly, a one-sample t-test conducted on the squared frequency t-values (M = -.05, SD = 1.03) showed that the mean of these t-values also did not differ significantly from zero, $t(99)$ = -.52, p = .60. This lack of either a linear or a quadratic relationship between exposure frequency and attractiveness ratings indicates that there is no mere exposure effect on attractiveness in these data.

With no effect of exposure frequency on attractiveness ratings, it was impossible to conduct the intended mediation analysis. However, it still seemed possible that exposure frequency may have affected the other ratings made by participants, even if it did not affect attractiveness ratings. Since ratings of attractiveness, sociability, relationship happiness, and career success were positively inter-correlated for almost all participants, they were added together to create an overall index of positivity. As a more

powerful test for mere exposure effects, the previous regression analysis was then repeated for each participant, using the new positivity index as the dependent variable rather than attractiveness ratings. Again, *t*-values were obtained and recorded for each participant's regression co-efficients.

A one-sample *t*-test conducted on the new *t*-values for target age (M = 1.64, SD = 1.24) revealed that the mean of these *t*-values now differed significantly from zero, $t(99) = 13.15$, $p = .00$. Older targets received significantly higher positivity scores than did younger ones. A one-sample *t*-test conducted on the new *t*-values for target gender (M = -.34, SD = 1.49) also maintained a significant departure from zero, $t(99) = -2.26$, $p = .03$, as did a similar one-sample *t*-test conducted on the new *t*-values for pre-rated target attractiveness (M = 1.42, SD = 1.03), $t(99) = 13.73$, $p = .00$. Using this new positivity index, then, males still received significantly higher ratings than did females, and targets with high pre-rated attractiveness scores still received significantly higher ratings than did targets with low ones. Again, such significant results were not suprising given that these variables were entered into the analysis for the purpose of statistical control.

A one-sample *t*-test conducted on the new frequency *t*-values (M = -.01, SD = 1.11) showed that the mean of these *t*-values still did not differ significantly from zero, $t(99) = -.07$, $p = .95$. Similarly, a one-sample *t*-test conducted on the new squared frequency *t*-values (M = -.12, SD = 1.09) also remained non-significant, $t(99) = -1.12$, $p = .27$. Even with this more powerful test for mere exposure effects, there seem to be none in this particular study.

Discussion

Although the attractiveness bias is clearly pervasive and consequential, a purely experimental demonstration of this bias has yet to be documented. Such a demonstration could potentially be achieved by finding some way to systematically vary the perceived attractiveness of a given set of targets, thereby removing all of the undetected correlates that confound attractiveness when it is measured rather than manipulated. To this end, the present study attempted to employ exposure frequency as a means of systematically manipulating attractiveness. The intention was to then explore whether these experimentally-induced perceptions of attractiveness had a direct impact on other types of social judgments. Unfortunately, however, this study failed to reveal any effect of exposure frequency on attractiveness. Any further exploration of the attractiveness bias was therefore impossible.

The absence of a mere exposure effect in these data is puzzling in view of the steps taken to facilitate the phenomenon. A powerful within-subjects experimental design was used, and the data were subjected to a very sensitive analysis method that was able to control for extraneous variables. Attractiveness was measured using a nine-point Likert scale, which should have been capable of detecting small differences in attractiveness ratings among target pictures. Additionally, although the computers used in the experimental procedure were unable to support extremely short exposure durations, a distracter task was added to the exposure phase to in order keep picture exposures more subliminal. All things considered, one would certainly expect mere exposure effects to be demonstrated in these data. There are, however, at least two possible explanations for

why the expected effects were not manifested. Both explanations concern the nature of the distracter task.

The distracter task employed during the exposure phase of this experiment was a very simple vowel-consonant categorization task, but participants were instructed to perform this task with as much speed and accuracy as they possibly could. As such, the task demanded a lot of cognitive attention, and participants could quite plausibly be considered to be under a high cognitive load. Indeed, such reaction-time tasks are usually considered to be high in cognitive load. Greenwald, McGhee, and Schwartz (1998), for example, argue that the reaction-time component of the implicit association test (IAT) places participants under such high cognitive load that they are completely incapable of consciously controlling their attitudes. Hence, the IAT is touted as being an excellent measure of implicit, rather than explicit, attitudes (Greenwald, McGhee, & Schwartz, 1998). The similarity of this study's distracter task to the IAT suggests that these participants were, in all probability, also experiencing high cognitive load. In most published mere exposure studies, on the other hand, exposure durations have been short enough to eliminate any need for a distracter task (Kunst-Wilson & Zajonc, 1980; Bornstein, Leone, & Galley, 1987; Bornstein, 1989; Bornstein & D'Agostino, 1992). Bornstein, Leone, & Galley (1987), for example, used a tachistoscope to achieve exposure durations as short as 4 ms. Accordingly, participants in that study were under absolutely no cognitive load at the time of exposure. They simply watched a screen as the stimuli were subliminally presented. Some studies with very short exposure durations have employed simple tasks to ensure that attention is properly focused on the

experimental stimuli, such as requiring participants to acknowledge each stimulus flash with a verbal response (Kunst-Wilson & Zajonc, 1980) or a key press (Bargh & Pietromonaco, 1982). However, such tasks differ from the distracter task used in the current study in that they do not focus attention away from the exposed stimuli, and they do not place participants under cognitive load. The fact that participants in this study were experiencing high cognitive load sets this procedure apart from those used in previous mere exposure studies.

High cognitive load has been found to hinder many types of social cognition processes. For instance, it reduces the likelihood of making complex attributions for others' behaviour (Gilbert et al., 1988), and it seriously hampers efforts at thought suppression and other forms of mental control (Wegner, 1994). In fact, cognitive load is likely to impair any social cognition process that is relatively conscious and controlled (Kunda, 1999). However, it is also the case that cognitive load may sometimes have an impact on processes that are more unconscious and automatic. Stereotype activation often occurs without awareness or intention, yet high cognitive load has been found to disrupt the spontaneous activation of racial stereotypes (Gilbert & Hixon, 1991; Spencer et al., 1998). Presumably, a process is capable of being negatively affected by high cognitive load if it requires a certain amount of mental capacity in order to be executed. Although mere exposure phenomena are generally considered to be automatic due to the fact that they often occur outside of awareness (Kunst-Wilson & Zajonc, 1980; Bornstein & D'Agostino, 1992), it is true that they do require some degree of mental effort. Clearly, exposed images must be processed enough to be stored in memory, even if that

memory is implicit rather than explicit. Accordingly, mere exposure effects can only occur if participants have sufficient mental resources with which to attend, process, and store exposed stimuli. Under extremely high cognitive load, this criterion may not be met. It is certainly possible that the distracter task employed during the exposure phase of this study was simply too demanding. If it commanded too many cognitive resources, there may not have been enough left over to allow for a mere exposure effect.

This explanation for the lack of exposure effects found in the current study could be put to the test in future research. It would be interesting to replicate the experiment using a distracter task where the cognitive load is varied systematically. If mere exposure effects are found when participants perform less demanding versions of the task but not when they perform more demanding ones, the cognitive load explanation for the lack of effects would be supported. Task conditions could also be compared to a control condition in which participants perform no distracter task. It may be the case that even a small amount of cognitive load is enough to undermine mere exposure effects.

A second possible explanation for the lack of exposure effects is indirectly related to the cognitive load of the distracter task. Due to the demanding nature of the task, a substantial number of participants expressed intense feelings of stress, frustration, and failure at the conclusion of the exposure phase. There is a potential mechanism by which such feelings may have been detrimental to the manifestation of mere exposure effects. As was previously mentioned, the classical conditioning theory of mere exposure suggests that exposure effects can occur only when exposed stimuli become associated with a positive context or emotion. Should these stimuli instead become associated with

a negative context or emotion, an inverse exposure effect will likely be the result. Upon re-exposure, the stimuli will evoke negative rather than positive affect, and will consequently receive worse ratings than previously unexposed stimuli (Burgess & Sales, 1971). If this kind of classical conditioning process was in fact at work in the current study, it may have led to a negative relationship between exposure and attractiveness ratings for those participants who found the distracter task stressful or frustrating, and a positive relationship between exposure and attractiveness ratings for those participants who did not. An examination of the *t*-value associated with the frequency term for each participant provides some degree of support for this speculation—very few of these *t*-values hover near zero. Instead, there are approximately equal numbers of positive and negative *t*-values, which appear to be canceling one another with the net result that the mean *t*-value is very close to zero. It is certainly possible that these unexpected negative *t*-values could have occurred because these particular participants were experiencing negative emotion at the time of exposure. These could have been the very participants who later reported feeling stress and frustration.

It would be easy to directly test this conjecture in future replications of the current study by devising some method of measuring participant stress during the exposure phase. It may be possible to quantify stress indirectly by using a simple count of the errors made during the distracter task. In all probability, more errors would be indicative of higher stress levels and more negative emotion among participants. However, the relationship between performance and stress may not be perfect, since other factors such as personal investment in task performance may also play a substantial role in

determining stress levels. Therefore, it may be more appropriate to ask participants to rate their own stress level during the exposure phase on an approximately labeled Likert scale. Alternatively, a personality inventory could be administered in order to assess whether the type of relationship evidenced between exposure and attractiveness ratings is related to personality factors such as neuroticism. There are many possibilities for future research on this front.

No matter what the specific reason for the lack of mere exposure effects found in these data, it would be extremely valuable to replicate this study. With no mere exposure effect on attractiveness ratings, it was impossible to test the main hypothesis of the current experiment. That is, it is still unclear whether the attractiveness bias can be obtained using a true experimental manipulation. Until such a demonstration can be made, the attractiveness bias will continue to be confounded by uncontrolled and undetected correlates—and we may never be sure whether it should even be called an "attractiveness" bias at all. A successful replication of the present study would finally be capable of addressing this important issue.

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Table 1

Mean attractiveness, sociability, relationship happiness, and career success ratings for targets at each exposure frequency

	Exposure Frequency				
	0	1	2	5	10
Attractiveness					
Mean	4.59	4.54	4.59	4.57	4.51
SD	1.22	1.15	1.07	1.15	1.18
Sociability					
Mean	5.77	5.72	5.79	5.83	5.76
SD	.785	.862	.867	.925	.841
Relationship Happiness					
Mean	5.76	5.76	5.76	5.75	5.79
SD	.832	.929	.806	.963	.864
Career Success					
Mean	6.15	6.18	6.20	6.28	6.20
SD	.855	.878	.832	.868	.809

Note: All means are based on an n of 10.

Figure 1

Mean attractiveness, sociability, relationship happiness, and career success ratings for targets at each exposure frequency