Westermarck, Freud, and the Incest Taboo: Does Familial Resemblance Activate Sexual Attraction?

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Pers Soc Psychol Bull 2010 36: 1202 originally published online 20 July 2010
DOI: 10.1177/0146167210377180

Personality and Social
Psychology Bulletin
36(9) 1202–1212

DOI: 10.1177/0146167210377180
http://pspb.sagepub.com

Westermarck, Freud, and the Incest Taboo: Does Familial Resemblance Activate Sexual Attraction?

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Abstract

Evolutionary psychological theories assume that sexual aversions toward kin are triggered by a nonconscious mechanism that estimates the genetic relatedness between self and other. This article presents an alternative perspective that assumes that incest avoidance arises from consciously acknowledged taboos and that when awareness of the relationship between self and other is bypassed, people find individuals who resemble their kin more sexually appealing. Three experiments demonstrate that people find others more sexually attractive if they have just been subliminally exposed to an image of their opposite-sex parent (Experiment 1) or if the face being rated is a composite image based on the self (Experiment 2). This finding is reversed when people are aware of the implied genetic relationship (Experiment 3). These findings have implications for a century-old debate between E. Westermarck and S. Freud, as well as contemporary research on evolution, mate choice, and sexual imprinting.

Keywords

attraction, evolution, incest avoidance, mere exposure, Freud, sexual imprinting

Received November 6, 2009; revision accepted March 23, 2010

In 1891, Edward Westermarck, a Finnish sociologist and anthropologist, published *The History of Human Marriage*, a 1,544-page thesis on the nature of intimate relationships (Westermarck, 1891/1921). One of Westermarck's goals was to explain why virtually every human society has social prohibitions against sexual relations among kin. According to Westermarck, incest taboos exist because the offspring of incestual relations have a greater chance of mortality. As such, natural selection may have crafted psychological mechanisms that lead people to feel sexual aversions for others to whom they are genetically related. Because people tend to be genetically related to others with whom they are reared, Westermarck hypothesized that growing up together was a critical proximate factor governing incest avoidance.

From the standpoint of contemporary evolutionary psychology, Westermarck's hypothesis seems not only reasonable but rather sophisticated given that few scholars had applied Darwinian ideas to the study of human behavior in the late 1800s. Thus, it may come as a surprise that Westermarck's thesis had virtually no impact on psychological scholarship for the better part of the 20th century. One reason for the lack of influence was the ascension of Freudian psychoanalysis. Freud (1913/1953) took issue with Westermarck's hypothesis, claiming that people tend to avoid incest not because evolved psychological mechanisms exist that prevent it but because human societies have created prohibitions against mating with kin to circumvent the biological and social consequences of incestuous behavior. More provocatively, Freud argued that there would be no need for taboos against incest unless there were incestuous urges to be repressed (see also Frazer, 1910).

In the years since the debate between Westermarck and Freud, Freud's impact on scientific psychology has waned. Moreover, the last 30 years have witnessed a resurgence of interest in Westermarck's ideas, largely due to the rising prominence of evolutionary anthropology and psychology. It is now widely accepted that there are social-cognitive adaptations that evolved specifically to prevent incest. Indeed, incest avoidance is considered to be a quintessential psychological adaptation (Schmitt & Pilcher, 2004). This position is based on a variety of data, including research on incest

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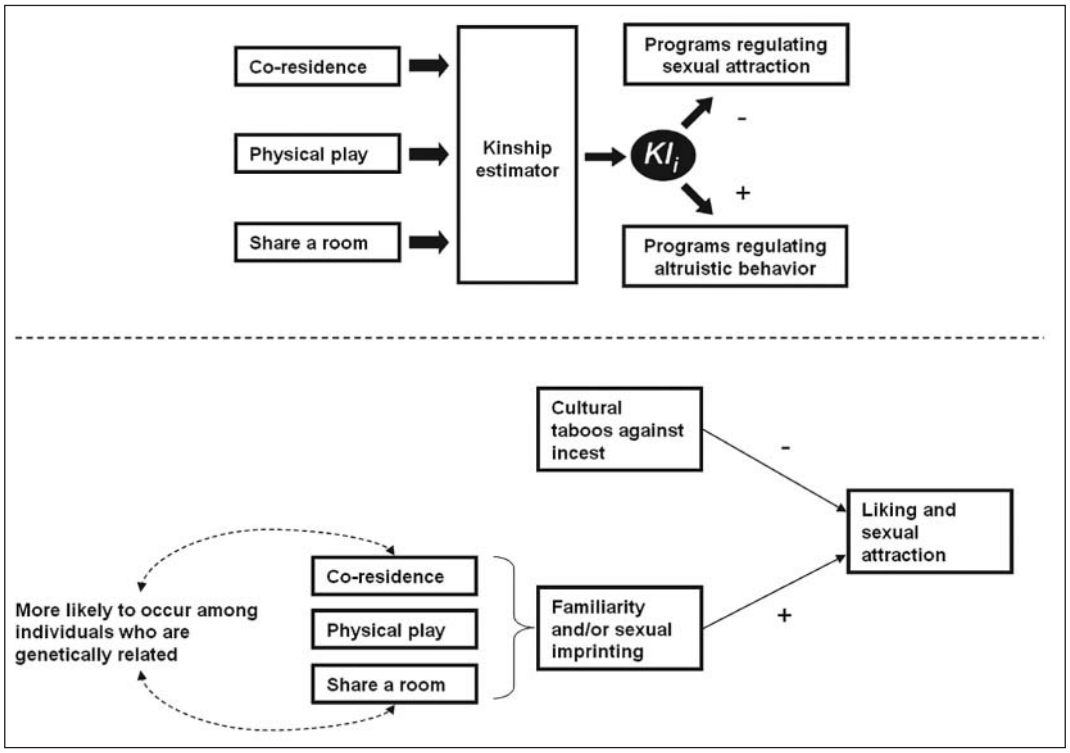

Figure 1. Models of incest avoidance
The upper panel illustrates the key processes involved in neo-Westermarckian models, adapted from Lieberman, D., Tooby, J., & Cosmides, L. (2007), by permission from Macmillan Publishers Ltd: Nature, 445, 727-731, copyright © 2007. The lower panel illustrates the key processes involved in the evolutionary psychodynamic model of incest avoidance.

avoidance in nonhuman animals, the cross-cultural prevalence of incest avoidance, and the finding that children who are reared together are less likely to marry one another—regardless of whether they are biologically related (e.g., Shepher, 1971, 1983; Wolf, 1995). These observations have led contemporary scholars to conclude not only that Westermarck was right but that Freud was wrong (e.g., Lieberman & Symons, 1998; Wolf, 2004).

In this article we argue that the intellectual debate between Freud and Westermarck may have been settled prematurely. Specifically, we present data that suggest that the nonconscious activation of mental representations of kin leads to increases in sexual desire for others (Experiment 1) and that people find facial images more sexually appealing when their own genes have been subtlety infused into those images without their awareness (Experiment 2). However, when people are aware of the potential genetic relatedness between themselves and the faces they are evaluating (i.e., when incest taboos are activated), they find the faces less attractive (Experiment 3). These data suggest that there may be some legitimacy to Freud's controversial claim that the incest taboo exists because there is a nonconscious propensity for people to find people who resemble kin attractive. Before reporting these studies in more depth, we first review contemporary Westermarckian perspectives on incest avoidance. We also summarize some of the data that these perspectives do not easily explain and discuss an integrated evolutionary-psychodynamic framework that may be capable of accounting for those findings.

Contemporary Evolutionary Models of Incest Avoidance

One of the most prominent neo-Westermarckian models of incest avoidance was put forward by Lieberman, Tooby, and Cosmides (2003). According to these scholars, cognitive mechanisms governing incest avoidance operate by computing an estimate of the genetic relatedness between self and other, and if that estimate is sufficiently high in magnitude, feelings of sexual aversion toward the other are triggered. Lieberman et al. referred to this computational mechanism as a nonconscious "genetic kinship estimator" (p. 821) and argued that the estimates it produces are influenced by a variety of social and developmental factors, such as whether people have shared a room, played together, and spent a considerable amount of time together. A visual illustration of the neo-Westermarckian model is shown in the upper panel of Figure 1. One of the advantages of this model is that it provides a clear explanation for why people are less likely to mate with a person with whom they were reared. According to the model, the experience of growing up with someone should increase a person's estimate of the genetic relationship

between the self and the other, which in turn should inhibit sexual desire toward him or her.

Although the neo-Westermarckian model offers a credible explanation for many empirical findings, there are some observations that it cannot explain as easily. For example, it has been widely documented that people tend to marry individuals who are similar to themselves with respect to a variety of physical attributes (e.g., Bereczkei, Gyuris, Koves, & Bernath, 2002; Zajonc, Adelmann, Murphy, & Niedenthal, 1987)—a phenomenon referred to as *homogamy*. The phenotypic similarities between spouses have led some writers to speculate that a *sexual imprinting* process takes place in humans, one in which early caregiving experiences help organize the kinds of expectations (or "search images") that people develop concerning desirable mates (e.g., Bateson, 2004; Bereczkei, Gyuris, & Weisfeld, 2004; Bowlby, 1969; Diamond, 1992). The phenomenon of sexual imprinting was originally described by early ethologists who noted that upon reaching puberty, geese who were reared by humans often directed their mating behavior toward humans. Sexual imprinting has been well established in several nonhuman species (Immelmann, 1972), but until recently, few researchers had attempted to study sexual imprinting in humans. In one of the first rigorous investigations into this issue, Bereczkei et al. (2004) obtained photographs of 26 Caucasian women's spouses and their adoptive fathers. A sample of more than 200 undergraduate judges then attempted to match each woman's adoptive father with her spouse in a multiple-choice test in which one photo was the true spouse and the other three were foils. The data indicated that judges were able to match women's adoptive fathers with their spouses much better than would be expected by chance. This and other studies (e.g., Bereczkei et al., 2002) are significant because they suggest that early rearing experiences might be partly responsible for shaping mate preferences in adulthood.

It is also noteworthy that research on the social psychology of attraction has documented that some of the most important predictors of attraction are the kinds of factors that neo-Westermarckian perspectives hypothesize to inhibit sexual desire, such as familiarity, proximity, and a history of shared experiences (e.g., Aron, Norman, Aron, McKenna, & Heyman, 2000). One of the classic findings in social psychology is that proximity is the single best predictor of liking and attraction (e.g., Berscheid & Walster, 1974). Moreover, research on the *mere exposure effect* has demonstrated that people tend to like objects more if they are familiar—even if that familiarity arises from nonconscious exposure (Kunst-Williams & Zajonc, 1980). Importantly, the mere exposure effect has been documented in the domain of interpersonal attraction. Moreland and Beach (1992), for example, found that students were more likely to be attracted to a confederate who had attended their classes 15 as opposed to 5 times over the course of a semester (see also Saegert, Swap, & Zajonc, 1973). This finding raises the possibility that people may be inclined to find kin, who are highly familiar, more attractive than nonkin.

An Evolutionary Psychodynamic Perspective on Incest Avoidance

To review, existing data suggest that certain factors, such as growing up with someone, can lead to both sexual aversion *and* attraction. These findings pose challenges for neo-Westermarckian perspectives on attraction. We believe it may be possible to reconcile these disparate observations by integrating some of Freud's insights with those from social psychology and the evolutionary literature on sexual imprinting. Specifically, like Freud, we hypothesize that there are nonconscious mechanisms that lead people to feel sexually attracted to kin (see the lower portion of Figure 1). There may be a number of mechanisms that give rise to this effect, such as sexual imprinting, preferences for the familiar, or some combination of these and other processes. Regardless of the precise mechanisms, we posit that they have the net effect of predisposing people to find genetically similar others (i.e., individuals who, more often than not, are familiar and part of the early rearing environment) to be more sexually attractive than others would find them.

It is important to note that this hypothesis, while having a Freudian flavor, is not a psychoanalytic one per se. A core theme of this framework is that the kinds of phenomena that captured the attention of Freud and other psychoanalysts may be the product of relatively naive psychological mechanisms (see also Brumbaugh & Fraley, 2006; Greenwald, 1992). For example, if people are attracted to familiar stimuli, a logical consequence is that people will be attracted to individuals who were a part of their early caregiving environments (i.e., highly familiar others). This effect, coupled with the social prohibitions against inbreeding (see the following), may be sufficient to produce a variety of interesting complexes, conflicts, and compromises that are psychodynamic in their effects, if not in their origins.

Assuming that a predisposition exists for people to be drawn toward people who resemble them, it is necessary to explain why inbreeding is not more prevalent than it is. We hypothesize, as did Freud, that proximate inhibitions against inbreeding are largely due to social norms rather than a nonconscious incest-avoidance adaptation per se. Social norms against inbreeding are not only pervasive but emotionally powerful. Many people are repulsed by the thought of romantic relations between kin (e.g., Haidt, Koller, & Dias, 1993). Indeed, marriage among first cousins is illegal in 22 American states (Bittles, 2004), and social sanctions against mother–son relations have inspired one of the most frequently used derogatory terms in Western languages (Arango, 1989). Even in nonhuman primate societies, the social penalties for inbreeding are far from subtle. For example, Pusey (2004) observed that although young gorillas are

allowed to mount their parents freely, this behavior is reprimanded as the children mature.

It is possible, of course, to argue that these social inhibitions are the emergent result of evolved psychological mechanisms for incest avoidance. We return to this issue in the General Discussion, but for now, we emphasize that this evolutionary psychodynamic perspective makes some predictions that are not anticipated easily by neo-Westermarckian perspectives. Specifically, this framework implies that if cultural norms and taboos are bypassed, people will find others who are genetically similar to themselves more sexually attractive. However, when those taboos are activated, people should find others who they believe to be related to the self less sexually attractive.

Experiment 1

The present studies were designed to evaluate neo-Westermarckian and evolutionary psychodynamic models in experimental situations in which they lead to different predictions. If there is an implicit tendency for people to be attracted to kin—a tendency that is not acknowledged consciously—it should reveal itself when participants are unaware of their relatedness to the targets being evaluated. In Experiment 1 we asked people to rate the sexual attractiveness of images of strangers. Before each image appeared on the computer display, we subliminally exposed people to one of two images. Participants in the experimental condition were exposed subliminally to an image of their opposite-sex parent. Participants in the yoked control condition were exposed subliminally to the same image, but for these participants, the image did not portray *their* parent. This procedure allowed us to determine whether activating representations of kin without the participant's awareness would facilitate or inhibit sexual attraction toward novel individuals. According to neo-Westermarckian perspectives, activating parental representations should lead the genetic kinship estimator to overestimate the relatedness between self and other, thus producing lower ratings of sexual attraction relative to the control condition. According to the evolutionary psychodynamic model, activating parental representations without awareness should make the stranger seem more familiar, thus leading to heightened sexual attraction relative to the control condition.

Method

Seventy-four undergraduates (36 men and 38 women) participated in the study to fulfill a requirement for an introductory psychology class. The mean age of participants was 19 years ($SD = 2.52$). Participants visited our laboratory for two ostensibly unrelated studies, one on personality and family photographs and another on physical attraction. Participants were instructed to bring a family photograph with them to the research session. When participants arrived, we explained that we were conducting research on the association between personality and the characteristics of people's family photos. Specifically, we explained that people's family photographs tend to vary with respect to how closely positioned family members are, whether family members appear happy, and so on. We stated that the goal of our research was to determine how personality is related to these qualities. As participants filled out the questionnaires, the research team scanned the family photo and created a digital image of the opposite-sex parent for use in the second research session. All photos depicted biological family members.

In the second, purportedly unrelated study participants were asked to rate the sexual attractiveness of 100 faces. Participants were told that they would be viewing computerized images of people taken from a college yearbook. They were instructed to rate the sexual attractiveness of each face on a 1 (*not at all attractive*) to 7 (*extremely attractive*) scale. We emphasized *sexual* attractiveness to ensure that the ratings would not merely reflect general positive regard. The faces were drawn from a Canadian college yearbook to help ensure that they would be unfamiliar to our participants. For each trial, a fixation cross appeared for 1,000 ms, followed by a 17-ms presentation of a prime image, followed immediately by a 17-ms mask. The image to be rated then appeared and remained on the screen until the participant pressed a number key to indicate how sexually attractive he or she thought the face was. Each prime and target image was presented at 300 × 360 pixels with a CRT monitor set to 75 hz refresh. Participants were seated approximately 24 in. from the monitor.

Participants were tested in same-sex pairs. One member of the pair was randomly assigned to be the experimental participant; the other served as a yoked control. For the participant in the experimental condition, the prime image was an image of that person's opposite-sex parent. For the control participant, the same image was used. For that participant, however, the image did not depict a personal family member. This procedure ensured that the primes used in the experimental condition were not objectively more attractive on average than those used in the control condition.

When the session was complete, participants were queried to determine whether they were aware of anything unusual. No participants reported seeing anything out of the ordinary. Moreover, none of the participants suspected that the two studies were related or reported anything that suggested that they were aware of the nature of the priming. Participants were then debriefed and dismissed.

Results and Discussion

There was a statistically significant effect of condition on ratings of attraction, $t(72) = 2.08$, $p < .05$, $d = .49$. On average, participants who had been primed with an image of their own parent found the faces more sexually attractive ($M = 3.82$,

SD = .51) than did participants who had been primed with another participant's parent (*M* = 3.56, *SD* = .56). The finding that people found others more sexually attractive after being primed with their opposite-sex parent is more consistent with the evolutionary psychodynamic model of incest avoidance than with the neo-Westermarckian model.

Experiment 2

In Experiment 2 we again asked people to view a variety of faces and rate their sexual attractiveness. The faces were *morphed* images—images that had been digitally manipulated to be composites of two distinct faces (see Penton-Voak, Perrett, & Peirce, 1999). In the experimental condition we morphed the participant's own face into the faces of opposite-sex strangers to various degrees, ranging from 0% to 45%. Participants were not told that their own faces were being used. In the yoked control condition, people rated the same faces, but in this case, the morphed image was not based on the self but on another subject.

We used the participant's face instead of a biological relative's face for morphing purposes because self is a prototype for someone who shares 100% of the participant's genetic variance. As such, by manipulating the extent to which the stimuli contain elements of the participant's face, we could indirectly vary the manifest genetic relatedness between the stimulus and the participant in a relatively straightforward manner. Although it would also be of interest to use the faces of genetic relatives, one limitation of doing so is that genetic relatedness is difficult to assess in a precise manner. For example, nontwin siblings share 50% of their genetic variance *on average*, but for some people that number is higher and for others it is lower. Using the participant's own image allowed us to maintain a greater degree of control over the gradient we wished to vary.

From a neo-Westermarckian perspective we might expect participants to find the composite faces less sexually attractive if those composites contain images of the self (i.e., someone to whom one is genetically related) rather than images of another subject. Specifically, the similarity should lead the genetic kinship estimator to produce a high estimate of relatedness, which in turn should weaken sexual desire. According to an evolutionary psychodynamic perspective, we might expect participants to find the composite faces more sexually attractive if those composites contain the self rather than images of another subject.

Method

Forty undergraduates (18 men and 22 women) participated in the study to fulfill a requirement for an introductory psychology course. The mean age of participants was 18.75 years (*SD* = .90). Participants visited our laboratory for two ostensibly unrelated studies, one on personality and facial structure and another on physical attraction. When participants arrived for the first session, we explained that we were conducting research on the association between personality traits and the characteristics of people's faces. We took a head-on digital photograph of each participant and then asked him or her to complete some questionnaires.

Between the two research sessions, we created composites of each participant's face and faces of 10 strangers using digital morphing software (Abrosoft, 2004). The participant's face was morphed to five different degrees (0%, 22%, 32%, 39%, and 45%) into each of 10 faces, thus creating a total of 50 faces to be rated. These specific levels were chosen to approximate those produced by a logarithmic function in anticipation that most of the differences would fall near the lower-middle range of the morphing spectrum. We did not morph beyond 45% because pilot testing indicated that some people could "see" themselves in the images once the 50% threshold had been crossed. Moreover, once the 50% threshold had been crossed, people began raising questions about the gender of the person in the image. One to two weeks after Session 1, participants returned to the lab to participate in an ostensibly unrelated study. They were told that they were participating in a study on facial attractiveness and that they would be rating how sexually attractive they found each of 50 faces. Participants were tested in same-sex pairs. One person in the pair was randomly assigned to be the experimental participant; the other was designated as the yoked control. The experimental participant rated the 50 faces that had been constructed by morphing his or her own face into that of opposite-sex strangers. The control participant rated the same faces, but the faces were not personally relevant to him or her. Faces were presented in a random order for each participant. Because the faces were morphs, there was a high degree of similarity between certain images. Thus, we told participants that some of the images might look identical but that they were different in subtle ways that might not be apparent unless they were viewed side by side. When the session was complete, participants were queried to determine whether they were aware of anything unusual about the images they had seen. No participants reported anything out of the ordinary. Moreover, none of the participants suspected that the two studies were related. Participants were then debriefed and dismissed.

Results and Discussion

We analyzed the ratings of sexual attraction in a mixed ANOVA, treating morph level as a repeated measures factor and condition (i.e., self-morph or not self-morph) as the between-subjects factor. The results are illustrated in Figure 2. The main effect of condition was statistically significant, $F(1, 38) = 5.84$, $p < .05$, $\eta^2 = .13$). Participants who saw morphed images containing elements of themselves found the faces more sexually appealing than control participants

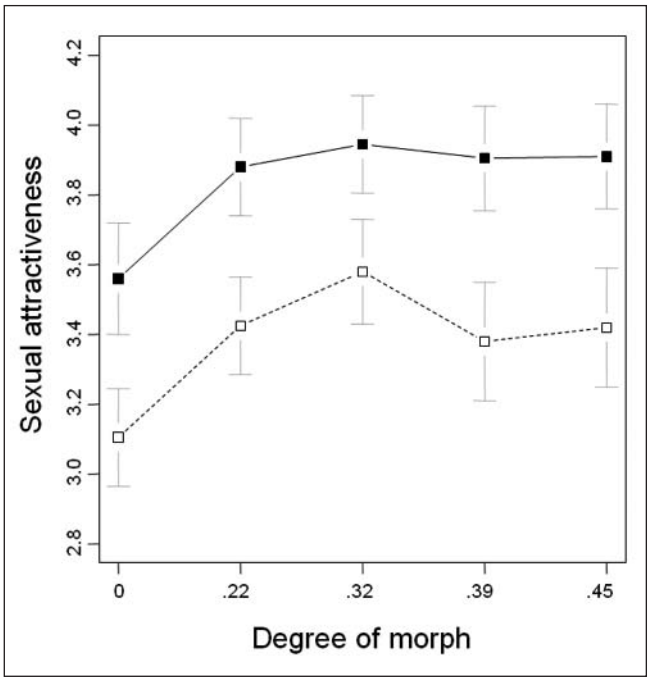

Figure 2. Ratings of sexual attractiveness as a function of condition and degree of morphing
The solid curve represents average ratings for participants who were rating composite images based on the self. The hashed curve represents the average ratings for participants in the control condition. Error bars represent standard errors.

who saw the same morphed images. There was also a main effect of morphing level, $F(1, 38) = 7.30$, $p < .05$, $\eta^2 = .16$). Participants found the faces more attractive as the degree of morphing increased, but this effect was largely due to the difference between the 0% morphs and the others. This finding provides a conceptual replication of previous work by Langlois and Roggman (1990) on the attractiveness of composites.

It should be noted that the experimental participants found the faces more attractive even when those faces contained 0% of themselves. Because the order in which the faces were presented was randomized for each participant, it is probably the case that the perceived attractiveness of the 0% faces was contaminated by the perceived attractiveness of those same faces when they were morphed with the self. Indeed, when we analyzed ratings for only the 0% faces that were presented in the first 10 trials, there was no significant difference between the experimental and control conditions, $t(37) = .58$, *ns*. In summary, people found faces more sexually appealing if those faces were composites. Importantly, however, the faces were rated as being more attractive if they were composites containing the self.

Experiment 3

Thus far, our results suggest that people are more likely to find others attractive when (a) they have been subliminally primed with an image of their kin (i.e., a parent) and (b) when those others contain elements of the self (i.e., someone who is perfectly genetically related to the self). These experiments capitalize on the assumption that when the conscious mind is unaware of the incestuous implications of being attracted to the target, people will find the targets more sexually attractive. In Experiment 3 we held constant the family resemblance of the faces to be rated and varied instead people's conscious awareness of the meaning of the task. As before, we asked people to view a variety of composite faces and rate the sexual attractiveness of those faces. In the experimental condition, we falsely told participants that we had morphed, to varying degrees, their own face into the faces they were rating. In the control condition, people rated the same faces but were not told that we had morphed the self into those faces. This procedure allowed us to vary the activation of the cultural taboos that may regulate sexual desire while ensuring that the images did not actually resemble the faces of participants in the experimental condition more than those in the control condition (and vice versa).

According to a Westermarckian perspective, people in both conditions of this design should provide equivalent ratings of attraction. Because the stimuli do not vary in their genetic relatedness to the self or in their familiarity, there is no reason the genetic kinship estimator should produce higher estimates of relatedness in one condition as opposed to the other. Moreover, because the dynamics of incest avoidance are assumed to be nonconscious in neo-Westermarckian models (see Lieberman et al., 2003, p. 825), this model implies that there will be no effect of the activation of cultural taboos on ratings of attraction. According to an evolutionary psychodynamic perspective, however, the conscious knowledge that the faces being rated might be genetically related to the self should trigger sexual aversion—even when there is no objective similarity between those faces and the self.

Method

Thirty-nine undergraduates (23 men and 16 women) participated in the study to fulfill a requirement for an introductory psychology course. The mean age of participants was 19.35 years ($SD = 1.18$). Participants visited our laboratory for a study on facial attractiveness. When participants initially arrived we explained that we were conducting research on factors that make some faces more attractive than others. We took a head-on digital photograph of each participant and then asked him or her to complete some questionnaires. Once the questionnaires were complete, participants were told that in the next task, they would be rating the sexual attractiveness of 50 opposite-sex faces presented on a computer monitor. Participants in the experimental condition were told that the 50 faces had been constructed by morphing their own face into those of strangers as a way of simulating the appearance of kin. Specifically, participants were told, "We are interested in studying incest. We want to know

how attractive people find faces that are designed to resemble genetic relatives such as parents, brothers, and sisters." Control participants were not given this information. The same faces were rated by participants in both conditions and were presented in a random order for each participant. All participants were told that some of the faces would seem familiar but that each face was in fact unique and should be rated on its own merit. We were careful to eliminate any potential demand characteristics and did not convey any information that might lead participants to judge the faces in a manner that was inconsistent with whatever social norms they would use outside of the experimental context.

Results and Discussion

We analyzed the ratings of sexual attraction in a mixed ANOVA, treating morph level as a repeated measures factor and condition as the between-subjects factor. The results are illustrated in Figure 3. The main effect of condition was statistically significant, $F(1, 37) = 5.34$, $p < .05$, $\eta^2 = .13$. Participants who rated morphed images that they thought contained elements of themselves found the faces less sexually appealing than control participants who were rating the same morphed images. There was also a main effect of morphing level, $F(1, 37) = 7.98$, $p < .05$, $\eta^2 = .17$. Participants found the faces more attractive as the degree of morphing increased, again replicating the finding that composite faces are considered more attractive than the components themselves. Taken together, these results demonstrate that conscious awareness of the purported genetic relatedness between self and other leads to diminished feelings of desire, even when the actual degree of resemblance is zero.

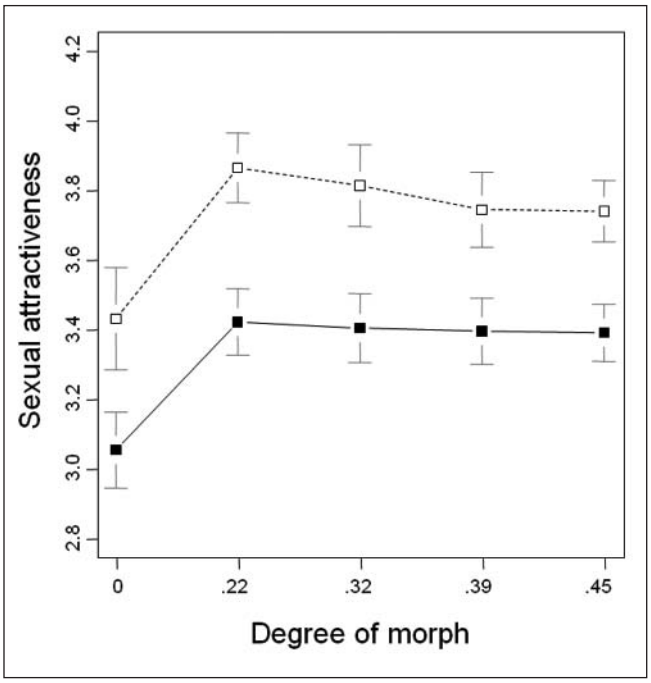

Figure 3. Ratings of sexual attractiveness as a function of condition and degree of morphing
The solid curve represents average ratings for participants who *thought* they were rating composite images based on the self. The dashed curve represents the average ratings for participants in the control condition. Error bars represent standard errors.

General Discussion

Neo-Westermarckian models of incest avoidance posit that a variety of factors, such as proximity, familiarity, and a history of shared experiences, lead the mind to estimate a high degree of genetic similarity to another person, a process that triggers sexual aversion toward that individual. Research on sexual imprinting and the social psychology of attraction, however, suggests that these factors play a role in facilitating attraction. Thus, there is a curious, but unacknowledged, puzzle in the literature: How can the same factors have different consequences for human mating preferences? One of the goals of this article is to highlight and reconcile this paradox by bringing together ideas from evolutionary, social, and psychodynamic psychology. We proposed that experiences with kin can lead to increases in sexual attraction when people are unaware of the incestuous implications of their desire for others. People's awareness of these implications, however, can inhibit that desire.

Our studies demonstrated that when representations of kin were primed via subliminal exposure to images of the opposite-sex parent or when participants evaluated others that, unbeknownst to them, had been morphed with their own image, participants found others more sexually attractive. These findings only emerged when participants were unaware of the link between themselves and the others being evaluated. When participants were told in Experiment 3 that the faces were designed to resemble genetic relatives, they found the faces less appealing. Taken together, these findings have important implications for the Westermarck–Freud debate, as well as contemporary theories of attraction and mate choice. We discuss these implications in more depth next.

Was Freud Right?

One of Freud's controversial arguments was that there are nonconscious processes that lead people to be sexually attracted to family members. Without the existence of such processes, Freud argued, there would be no need for such powerful taboos concerning incest. Our data suggest that there may be some truth in Freud's claim. According to the research presented here, the nonconscious activation of representations of kin increased people's ratings of the sexual attractiveness of strangers. Moreover, when we created images of artificial genetic relatives, people found those images more attractive. These data are compatible with the notion that, all other things being equal, there may be a predisposition for people to find others more attractive when they resemble kin.

Although parts of Freud's argument may have been correct, we doubt that his broader psychoanalytic framework is necessary to explain these findings. According to an evolutionary psychodynamic framework, attraction for kin arises not because people harbor natural incestuous urges (Freud, 1913/1953) but because the mechanisms that promote familiarity, bonding, and attraction are most likely to operate on inputs experienced in the early family environment. For example, if sexual imprinting really takes place in humans, then one's early interactions with primary attachment figures can play an influential role in shaping the "ideal" for what kinds of people one will find attractive (Bowlby, 1969). Specifically, one will be drawn toward others who resemble one's family members. Importantly, when those processes operate in conjunction with the cultural taboos that repress incestuous behavior, the outcome may be a tendency for people to find others attractive who are similar, but not too similar, to the self and kin—an outcome that would lead to a compromise between the costs entailed by excessive inbreeding and outbreeding (Bateson, 2004). Indeed, if the combination of these two processes draws people toward similar others, it may help explain why homogamy exists (i.e., the tendency for people to marry others who are physically similar to themselves and their kin) and why inbreeding is such a rare phenomenon.

Although we believe our studies document an intriguing phenomenon, they do not help explain exactly how the mind produces it. An important direction for future research is to determine whether the findings reported here are best explained through a sexual imprinting-like mechanism or whether they are best explained through a more general and benign process, such as perceptual fluency—a process that has been proposed to explain the mere exposure effect and aesthetic judgments (Bornstein, 1989; Reber, Schwarz, & Winkielman, 2004). According to the perceptual fluency hypothesis, some stimuli are easier to process than others based on previous exposure. As such, the ease with which the stimulus is processed is misattributed as a preference for that stimulus. Perhaps some physical features are simply easier to process than others because of previous exposure and, as a consequence, people are drawn to others who have familiar features (i.e., features that are common to themselves and their family members). In other words, it is possible that *exposure frequency* is the key mechanism underlying these effects, as expected from a perceptual fluency hypothesis, rather than *time frame of exposure* (i.e., when the exposure took place), as implied by the sexual imprinting hypothesis. One way to separate these effects would be to have people rate the attractiveness of faces that are based on others who vary in familiarity (i.e., how long they have been known) and the point in the life course at which they became known (i.e., early childhood, young adulthood). If the sexual imprinting hypothesis is correct, the developmental period should have effects above and beyond what should be expected on the basis of exposure duration alone.

Implications for Westermarckian Perspectives

Our findings are difficult to explain within the neo-Westermarck framework that has been endorsed by many scholars in recent years (e.g., Wolf & Durham, 2004). According to this perspective, one reason kin and other familiar others are not typically targeted as potential mates is that shared experiences with those individuals lead the genetic kinship estimator, an evolved psychological mechanism, to estimate high degrees of relatedness toward those others, estimates that, in turn, inhibit sexual desire. If this model is correct, we might expect that subliminally activating representations of kin, as was done in Experiment 1, would mislead the genetic kinship estimator into overestimating the biological relatedness of certain targets, thereby leading to lower ratings of attraction. The activation of these representations, however, led to increases, not decreases, in desire relative to control conditions. On the basis of neo-Westermarckian models, we might also expect people to find faces that contain elements of themselves less sexually attractive because the presence of the self should trigger greater estimates of genetic relatedness (DeBruine, 2002), which should, in turn, inhibit sexual desire. The data from Experiment 2, however, suggest that self-similarity enhanced sexual desire relative to control conditions. Moreover, some neo-Westermarckian perspectives prioritize psychological explanations for the incest taboo over cultural explanations, holding that specialized cognitive adaptations are responsible for incest avoidance rather than a person's acquisition of cultural norms. Experiment 3 suggests that merely activating these cultural norms, however, was sufficient to produce sexual aversions, even when the stimuli were no more kin-like than those viewed in the control condition.

We do not believe that it is possible to reconcile easily our findings within a Westermarckian framework. At the heart of the Westermarckian perspective is the assumption that there are specialized, nonconscious mechanisms that lead people to feel sexual aversions toward familiar others. Our data suggest, however, that familiar others can enhance sexual desire toward novel targets. Moreover, our data suggest that the activation of cultural knowledge can play a potent—and sufficient—role in inhibiting sexual attraction.

Reconsidering the Westermarck Effect

One of the advantages of neo-Westermarckian models is that they easily explain the phenomenon of *negative imprinting* (also called the *Westermarck effect*). Negative imprinting refers to the observation that people who are raised together rarely marry—a finding that is often hailed as a crucial piece

of evidence for Westermarck's hypothesis. One of the more well-known reports of negative imprinting was reported by Shepher (1971). Shepher observed that children who were raised together in Israeli kibbutzim were unlikely to marry one another, suggesting that the process of growing up with someone may lead to diminished sexual desire for that person (see Wolf, 1995, for a similar demonstration from arranged marriages in Taiwan).[1]

Is it possible to explain the Westermarck effect without assuming there is a specialized mechanism that leads people to feel sexual aversion toward kin and people with whom they were reared? We believe that one way to explain the Westermarck effect is via the process of habituation. Research indicates that sexual passions often wane as people become increasingly habituated to one another (Call, Sprecher, & Schwartz, 1995; James, 1981). As such, when people grow up, they may come to find that their playmates, siblings, and friends are less sexually appealing than they are relative to other people.

At first glance, it may seem that this proposal is inconsistent with our previous argument that familiarity plays a role in facilitating sexual desire. There is an important distinction to be made, however, between familiarity that arises from conscious and unconscious sources. A potential mate can be novel yet be especially intriguing because there is something about him or her that *seems* familiar but is difficult to identify or articulate. Indeed, mere exposure effects are most pronounced when participants are unaware of previous exposure to the experimental materials (Bornstein, 1989a, 1989b). When participants are aware of the repeated exposure, their preference for those stimuli is weakened. Thus, it seems likely that familiarity enhances sexual desire when its origins are unknown. When the source of familiarity is obvious, however, as it is with siblings and playmates, familiarity will not necessarily have the same effects.

Bateson's (1983) model of optimal outbreeding combines these distinct ideas in an elegant manner. Specifically, he proposes that there are two key factors underlying mate preferences. According to Bateson, sexual imprinting leads animals to find individuals with whom they were raised (typically kin) sexually attractive. A second process, habituation, eventually weakens that desire. The consequence is that there is a nonmonotonic relationship between familiarity and sexual desire. If a target is too familiar, habituation dominates and the stimulus will not elicit sexual desire. If a target is too novel, however, it may not resemble closely enough the "search image" of what is desirable in a mate. The optimal state, therefore, falls between the extremes. Empirical research on animal behavior supports this position. Bateson (1982), for example, found that Japanese quail are most sexually responsive to quail who are first or second cousins rather than siblings or nonrelatives, suggesting that the most desirable mate is one who is moderately related to the self.

Bateson's (1983, 2004) ideas can be integrated with the present framework to provide an alternative explanation for the Westermarck effect. Specifically, as people spend an increasing amount of time together (as is the case with children who are raised together), their sexual interest in one another will wane. Their experiences with that person, however, will provide the foundation for a set of preferences that, if embodied by a novel individual, have the potential to enhance that individual's sexual appeal. In this way, early rearing experiences can play a profound role in shaping mate preferences, but in a way that is unlikely to be noticed by the individual.

In summary, we propose that the so-called Westermarck effect is not a result of innate mechanisms that inhibit desire for individuals with whom one was raised but is instead a result of simple habituation.[2] We argue, however, that, beneath the surface, those early experiences are setting the stage for a set of preferences that essentially co-opt early attachment and caregiving experiences in the service of sexuality, leading people to find attractive in others features that are shared by their family members.

Limitations and Caveats

It is our hope that these studies will not only help bring new life to the century-old debate between Freud and Westermarck but also advance discussions on the role of early caregiving and attachment experiences in the development of mate preferences. We should highlight, however, some caveats and limitations of the present research. First, we should make clear that we are not proposing that the mind functions in a way that leads people to harbor unconscious desires for their family members. As illustrated in the lower portion of Figure 1, we are arguing that people are inclined to find highly familiar features attractive, either for reasons involving mere exposure, sexual imprinting, or both. It just so happens that kin are more likely than not to be both highly familiar and primary attachment figures. As such, there should be a tendency for people to be attracted to kin and people who resemble their kin, but one that is opposed by the internalization of cultural norms and weakened by simple habituation.

Second, we would like to note that although we believe these data pose challenges for Westermarckian perspectives, they are not incompatible with a broader evolutionary framework. The Westermarckian perspective is based on the assumption that cultural taboos are caused by nonconscious psychological mechanisms that lead people to feel sexual aversions toward kin or people with whom they have been reared. At the heart of this explanation is the assumption that there is a correspondence between cultural products and the psychological adaptations that give rise to them. According to this line of thought, if there are taboos against incest, there must be specialized cognitive modules that (a) cause people

to avoid inbreeding and (b) cause cultures to discourage it. We would like to suggest an alternative but related view (see also Boyd & Richerson, 1985). Namely, it is possible for the norms, conventions, and taboos of a society to serve biological functions (e.g., discouraging individuals from engaging in incestual relations) without being organized by specialized psychological adaptations. Under these conditions, the proximate mechanisms governing adaptive behavior may not be localized within the mind of an individual (e.g., a specialized psychological mechanism or module) but rather may be in the interaction between the individual and the culture in which he or she is situated (Richardson & Boyd, 2005). Our data do not speak to this issue per se, but we think it is an important one for future scholars to debate.

We should also point out some limitations of this research. Although the use of morphed images based on the self (Experiment 2) provides a means for simulating the genetic relatedness between the self and the targets being evaluated, people's attraction to those faces could be more of a reflection of self-love than sexual imprinting processes. We suspect that either scenario would appeal to psychodynamically oriented psychologists, and teasing apart the true source of the effects would be an important direction for future research. We note, however, that a self-love perspective would not be particularly useful for explaining the data from Experiment 3.

In closing, these data suggest that cultural taboos against incest may exist because, in their absence, people experience greater sexual attraction for people to whom they are related. Although these data are difficult to explain from the perspective of neo-Westermarckian models, we have argued that they can be understood within the context of a broader evolutionary psychodynamic model, one that assumes two basic processes: a nonconscious one that facilitates attraction to familiar others, such as family members and those who resemble them, and a conscious one that censors those urges. From this point of view, one reason Oedipus longed for (and eventually married) his mother in the myth of *Oedipus Rex* is because she was related to him. His desire was possible, however, only because he was unaware of his true relationship to her.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

Notes

1. An alternative explanation for this finding comes from attachment theory. In short, children who are separated from their primary caregivers at an early age are more at risk for developing insecurity, which in turn can interfere with the development of close, harmonious relationships with others.
2. We do not think habituation offers a full explanation for incest taboos because, conceptually, habituation should lead to sexual indifference, not sexual aversion. The thought of incest, however, often elicits feelings of disgust or moral outrage (e.g., Haidt et al., 1993; Lieberman, Tooby, & Cosmides, 2003). We think that the strong affective component of this reaction is probably best explained as an exaggerated response to actual or imagined violations of cultural taboos.

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