

Social Blushing

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This article reviews theory and research regarding the physiology, situational and dispositional antecedents, behavioral concomitants, and interpersonal consequences of social blushing and offers a new theoretical account of blushing. This model posits that people blush when they experience undesired social attention. Puzzling questions involving blushing in solitude, the phenomenology of blushing, types of blushing, and blushing in dark-skinned people are discussed.

Darwin referred to blushing as the "most peculiar and the most human of all expressions" (1872/1955, p. 309). Nearly all people probably have blushed, although people differ in the frequency and intensity with which they blush (e.g., blushing differs across age and culture), as well as in the degree to which the blush can be perceived by others (blushing may be imperceptible in very dark skinned people). Yet, despite its apparent universality, little scientific attention has been devoted to blushing. In this article, we review what is known about social blushing and offer a theory of blushing that integrates existing approaches.

By *blush*, we refer to a spontaneous reddening or darkening of the face, ears, neck, and upper chest that occurs in response to perceived social scrutiny or evaluation. Blushing occurs when the small blood vessels of the so-called "blush region" of the body dilate, increasing the blood volume in this area. Subjectively, blushing is often accompanied by a sensation of warmth in the affected area (Edelmann, 1987; Leary & Meadows, 1991), although people may blush without being aware that they are blushing.

Blushing can be accompanied by a myriad of different, sometimes conflicting emotions, only one of which—a feeling of self-consciousness or conspicuousness—seems to be universal to all episodes of blushing. Some emotional concomitants of blushing are clearly negatively valenced. For example, blushers may feel socially anxious, uneasy, or flustered (as when stared at), embarrassed or silly (after events that threaten their public identities), or ashamed or fearful (if the public infraction involved a moral violation). At other times, blushing occurs in concert with positive feelings such as happiness (as when one is publicly recognized for a personal accomplishment) and grati-

tude (as when one unexpectedly receives a gift or compliment). Because the phenomenology of blushing has not been investigated directly, the relationship between blushing and particular emotions is unclear. Even so, it is obvious that aside from general self-consciousness, blushing is not tied to any specific emotion or set of emotions.

Blushing can be distinguished from other forms of facial flushing that occur for nonsocial reasons. For example, physical exertion and alcohol consumption cause vasodilation in the face, as do carcinoid tumors, some varieties of seizures, sexual arousal, certain drugs, menopausal "hot flashes," and surgical ablation of the trigeminal nerve (Drummond, Gonski, & Lance, 1983). However, data suggest that these sorts of flushes are physiologically distinguishable from emotional blushes of the sort that interest us here (Ginsburg & O'Reilly, 1987; Mellander, Andersson, Afzelius, & Hellstrand, 1982; Wilkin, 1983).

In this article, we review what is known about blushing and offer a new theory that appears to account more parsimoniously for blushing than existing explanations. After examining four basic classes of events that elicit blushing, we describe the behaviors and physiological responses that tend to accompany episodes of blushing. We then review and evaluate three previous conceptual approaches to blushing and describe our approach to blushing. To conclude, we pose four remaining questions about blushing.

Elicitors of Blushing

People blush in a wide variety of situations, but these seem to fall into four categories: threats to public identity, praise and other forms of positive attention, scrutiny, and accusations of blushing.

Threats to Public Identity

People often blush when they are concerned with how they are perceived and evaluated by others (Buss, 1980; Castelfranchi & Poggi, 1990; Darwin, 1872/1955; Edelmann, 1987; Leary

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& Meadows, 1991). Darwin (1872/1955) concluded, for example, that blushing “depends in all cases on . . . a sensitive regard for the opinion, more particularly for the depreciation of others” (p. 335). Darwin (1872/1955) believed that blushing was primarily a response to others’ evaluations of one’s personal appearance, “especially of our faces; and secondarily, through the force of association and habit, in relation to the opinion of others on our conduct” (pp. 335–336). Darwin also noted that “it is not the sense of guilt, but the thought that others think or know us guilty that crimson the face” (p. 337).

The most common incidents that provoke blushing are those that threaten the person’s public identity directly—public violation of norms, incompetence, out-of-role behaviors, and other shameful and embarrassing situations (R. S. Miller, 1986, 1992). In a study of elicitors of blushing, respondents rated “when I’ve been caught doing something improper or shameful” and “when I’ve looked stupid or incompetent in front of others” as two of the most potent (Leary & Meadows, 1991).

Because one subjective experience that accompanies threats to one’s public identity is embarrassment (Goffman, 1959, 1967; Leary, 1983; Schlenker, 1980; see, however, Babcock, 1988), many writers have regarded blushing simply as an expression of embarrassment (Buss, 1980). Although blushing and embarrassment often occur together, blushing is by no means a necessary or automatic response to embarrassing events. Even in the most blush-prone culture surveyed to date, the United Kingdom, only about half the respondents reported blushing during a particular embarrassing incident they recounted (Edelmann et al., 1989). Not only may people feel embarrassed without blushing, but they sometimes blush even though they do not feel embarrassed. Being the center of attention causes many people to blush even when an embarrassing event has not occurred and no embarrassment is felt (Leary & Meadows, 1991). We elaborate on this point below.

Praise and Positive Attention

Although most writers have emphasized the role of socially undesirable, embarrassing, and shameful actions in precipitating blushing, people also blush in response to positive events, such as when they are complimented, praised, or honored (Leary & Meadows, 1991). As Buss (1980) noted, blushing can occur in situations in which people are overpraised, that is, when others’ evaluations are perceived as more positive than is warranted. He reported that women who were excessively praised by a confederate responded by blushing, giggling, and avoiding the other’s gaze.

One explanation for the effects of praise on blushing is that like the threats to identity described above, praise evokes concern about how one is being regarded. Not only may people be concerned with losing poise while at the center of attention but they may also worry that they will be unable to convey adequately their appreciation of others’ recognition without appearing smug or otherwise botching their handling of the event (Buss, 1980; Schlenker & Leary, 1985; Silver, Sabini, & Parrott, 1987). Alternatively, they may fear they will be unable to sustain an equally high performance in the future (Baumeister, Hamilton, & Tice, 1985). These concerns are compounded

when, as in many such instances (e.g., receiving an award), the recipient may be acutely aware of being elevated above the others present. This explanation of praise-induced blushing does not handle all such instances, however, and we suggest a more encompassing explanation below.

Scrutiny

In the instances we have described thus far, blushing is evoked by a specific, interpersonal event, often one that threatens one’s public identity. However, people need not be caught doing something damaging to their public image; people sometimes blush in the absence of any clear evoking stimulus. Some people blush when interacting with authorities, when speaking before audiences, when the center of attention, or even when they are simply stared at by another person (Leary & Meadows, 1991). For example, people often blush when others sing “Happy Birthday” to them (Leary & Meadows, 1991), an event that presumably poses little threat to identity.

Two processes may underlie this effect. Being scrutinized may raise the possibility that one’s appearance or behavior will be found inappropriate or inadequate, thereby threatening one’s public identity. Alternatively, blushing may be a relatively automatic response to staring eyes. Many animals, including humans, appear predisposed to respond to a steady, direct gaze as threatening (Argyle, 1967; Ellsworth, 1975; Ohman, 1986; Tinbergen, 1953; van Hooff, 1972). As we discuss below, we have reasons to believe that some instances of blushing are automatic responses to steady stares.

Templeton and Leary (1991) attempted to distinguish between these two explanations of the link between staring and blushing. Subjects were seated on one side of a covered two-way mirror, and temperature sensors were attached to the cheek and the index finger of the subject’s hand. After baseline data were obtained, the mirror was uncovered to reveal an audience of 6–9 persons seated directly on the other side of the mirror. The audience was instructed to stare into the subjects’ eyes throughout the session.

Two variables were manipulated. First, subjects were told either that the audience could see them quite clearly or that the audience could see only their silhouette. If stare-induced blushing results from increased evaluation apprehension and the potential threat to one’s public image, blushing should be greater when one is observed clearly. Second, in half the conditions, the audience members wore dark glasses, which concealed their eyes, whereas in the other conditions, the audience’s eyes were uncovered.

Facial temperature data showed that blushing was responsive only to whether subjects could see the audience’s eyes: Subjects blushed more when they could see the audience’s stares. Hand temperature, on the other hand, depended only on the degree to which subjects thought they could be seen; hand temperature was lower, indicating increased sympathetic activity, when subjects thought they could be seen clearly. Together, these data suggest that scrutiny-induced blushing may be due to something other than evaluation apprehension, social anxiety, or a potential threat to one’s public identity.

Accusation of Blushing

Blushing can also be reliably induced by telling people they appear to be blushing even when they are not ("Aw, look; she's blushing!").¹ Edelmans (1987, 1990c) regarded this as a special case in which blushing occurred in the absence of an external elicitor. In keeping with the facial feedback hypothesis (Buck, 1980) and self-perception theory (Bem, 1972), he suggested that people use their own expressive behaviors as cues to interpret their internal states. As a result, information that one is blushing may lead people to infer that they are embarrassed, thereby leading them to blush.

Although Edelmans's (1987) interpretation is plausible, other explanations are possible. One is that people blush when accused of blushing because blushing itself can create a threat to one's identity. People realize that blushing signifies to others that they have done or thought something undesirable, or at least that they have lost poise in an otherwise unembarrassing situation. In either case, blushing is damaging to one's image even if one has committed no obvious infraction. Alternatively, people may blush when accused of doing so because they are invariably being scrutinized in such situations; in essence, accusation-induced blushing may be a special case of scrutiny-induced blushing.

Behavioral Concomitants

Blushing tends to be accompanied by a typical pattern of action that includes averted gaze, increased general body motion, speech dysfluencies, and increased smiling (Asendorpf, 1990; Edelmans & Hampson, 1981a, 1981b). In this section, we briefly examine the two behavioral concomitants of blushing that have received the most research attention: averted gaze and smiling. Because little research has examined the link between blushing and these two responses directly, we are forced to extrapolate to some extent from research on behavioral concomitants of embarrassment, recognizing that blushing and embarrassment are distinct phenomena.

Averted Gaze

Not only do people avert their gaze when they blush but they also find it difficult to meet another's gaze when desired. As Darwin (1872/1955) observed, "an ashamed person can hardly endure to meet the gaze of those present so that he almost invariably casts his eyes downwards or looks askant (pp. 320–321)." Modigliani (1971) suggested that decreased eye contact under such conditions did not result from embarrassment *per se* but rather arose from the person's desire to increase the social distance from others who were present (Exline & Winters, 1965). We return to the link between blushing and averted gaze later in the article.

Some degree of gaze aversion during embarrassment seems nearly universal, but its incidence differs across cultures. For example, a much higher proportion of respondents from the United Kingdom (41%) reported averting their eyes when embarrassed than Italian (8%) or Japanese (11%) respondents (Edelmans et al., 1989; Edelmans & Iwawaki, 1987).

Smiling

Blushing is often accompanied by a nervous or "silly" grin. In two cross-cultural studies of embarrassment (Edelmans et al., 1989; Edelmans & Neto, 1989), approximately one third of the respondents indicated that they smiled or grinned when embarrassed. On the surface, such findings are paradoxical, given that the embarrassed person rarely feels like smiling.

Such smiles can be distinguished from genuine smiles of amusement or happiness at a higher-than-chance rate (Asendorpf, 1990). The smile itself is more of a silly or self-conscious grin than a genuine smile, and the eyes tend to appear vacant rather than bemused. In a careful study of smiling and eye contact during embarrassment, Asendorpf found that embarrassed and nonembarrassed smiles differed in their temporal relationship to eye contact. During normal, nonembarrassed smiling, people tend to avert their gaze immediately after the corners of the mouth are maximally upturned (the smile apex). In the case of embarrassed smiling, people tend to avert their gaze a second or two before apex offset. Asendorpf suggested that the temporal positioning of smiling and gaze is partly responsible for the sense of ambivalence about embarrassed smiles: Smiling implies pleasure and social approach, whereas gaze aversion implies discomfort and avoidance, yet during an embarrassed smile, they occur simultaneously. Although this research did not measure blushing, the smiles that accompany blushing appear to be of the same silly or self-conscious variety.

At least three explanations of such smiling have been offered. First, people may purposefully smile to cover or hide their discomfort. Edelmans (1987) reported that 30% of his sample indicated that they smiled to conceal their feelings of social discomfort. Such a strategy is undoubtedly effective; observers often mistakenly identify embarrassment as amusement (Edelmans & Hampson, 1981b). A second explanation is that smiling is used simply to acknowledge that one has behaved in a way that was inappropriate, silly, or otherwise damaging to one's public identity; smiles of acknowledgement are used in a variety of interpersonal contexts (Asendorpf, 1990). Third, the self-conscious smile may be related to the submissive, appeasing grin displayed by other primates in threatening situations (Goodall, 1988; Jolly, 1985; van Hooff, 1972). We return to this possibility later in the article.

Physiological Aspects of Blushing

For a variety of reasons, it is believed that the intensity of redness of human skin during blushing depends on the volume of blood, rather than the rate of blood flow, in the superficial

¹ We conducted pilot research that examined the effectiveness of this tactic to induce subjects to blush in laboratory studies. During an interview regarding social reactions, subjects were asked how often they blush. After recording their answer, the interviewer asked, "Are you blushing now?" Invariably, the subject answered negatively, to which the interviewer prodded "Are you sure? It looks to me like you're starting to blush." Well over half of our subjects showed an immediate increase in facial temperature in response to this prod.

vessels in the skin (Mellander et al., 1982). However, the neural and hormonal mechanisms that control vasodilation in the skin (and, thus, blushing) are poorly understood at present. In this section, we attempt to collate what is known about the physiology of blushing, recognizing that our discussion will raise as many questions as it answers.

The Blush Region

The blush region is localized to the face, ears, neck, and upper chest, suggesting that blushing is not due to generalized vasodilation (Frijda, 1986). The curious localization of the blush area has led to much speculation about and some scientific investigation into the histology and physiology of the blood vessels of these areas. The tautness of the elastic tissue of blood vessels is modulated by essentially constant output from the autonomic nervous system. This intrinsic vasomotor tone is relatively low in the skin of the front of the body, the cheeks, and the breast region (Van der Meer, 1985). Vessels in these regions are thus capable of accommodating a relatively greater blood volume than those in most other parts of the skin, a fact that may partially account for the peculiar localization of blushing.

In addition, both beta-adrenergic receptors (mediating vasodilation) and intrinsic tone are present in the human facial vein, a state of affairs that is unusual for vein tissue in general (Mellander et al., 1982). Consequently, the facial vein may vasodilate in response to factors that do not affect most other veins.

People differ in their relative abundance of innervated alpha and beta-adrenergic receptors in the facial vein, suggesting one reason why individuals differ in their susceptibility to florid blushing (Mellander et al., 1982). Furthermore, the propensity for the blood vessels of the face to dilate is inversely related to age, supporting previous conjecture that functional beta-adrenergic receptors show attrition over time. This finding is consistent with clinical observations that blushing tends to decrease as people age.

In summary, we know that some blood vessels in the face differ structurally from vessels in other parts of the body and that individual differences exist in the responsivity of this area, but little is known beyond that. Most interesting is the question of why the cutaneous vessels of the head and chest region should function differently than those of other parts of the body.

In one of the earliest discussions of the physiology of blushing, Darwin (1872/1955) wrote that attention directed to any part of the body relaxes the small arteries of that part, resulting in vasocongestion. Blushing tends to be localized in the face, he claimed, because we tend to focus on that part of the body when being evaluated. According to Darwin, the face has long been subjected to more attention, both by others and by oneself, than other parts of the body. As a result of this attention to faces across generations, the capillaries in the face have become particularly sensitive to self-attention. Darwin (1872/1955) admitted that this hypothesis was "rash" (p. 337), and he did not explain why episodic self-attention across generations should increase the sensitivity of blood vessels in the blush region. Although Darwin's discussion of blushing seems correct on many counts, his claim that self-attention directly alters vaso-

congestion appears to have little merit (Castelfranchi & Poggi, 1990).

General Physiological Processes

Evidence about the systemic physiological concomitants of blushing is no more concrete than that for the blush region. Given that blushing often occurs with embarrassment and that many writers construe embarrassment as a form of social anxiety (Buss, 1980; Edelman, 1987; Leary, 1983), one would expect the gross physiological changes that accompany blushing to resemble those of an anxiety state, that is, increased activity in the sympathetic nervous system.

Available evidence, however, though sparse and indirect, does not support this contention. First, embarrassment, including that accompanied by blushing, is associated with lower heart rate and blood pressure than is anxiety (Buck & Parke, 1972; Hart, 1987; Leary, Rejeski, & Britt, 1990), the opposite of sympathetic effects. However, these findings are obscured by the fact that most people, though not all, report that their pulse increases when they are embarrassed (Edelman, 1987). Second, blushing appears to be inhibited by activity in the sympathetic nervous system (Berne & Levy, 1988). Indeed, anxiety is typically accompanied by facial blanching, not by blushing; epinephrine, which is released during states of anxiety and fear, causes cutaneous vasoconstriction. Third, one study found no correlation between cheek coloration and skin conductance during a blush-inducing event (Shearn, Bergman, Hill, Abel, & Hinds, 1990).

Fourth, the facial expressions and posture that tend to accompany blushing do not resemble those of fear or anxiety. As MacCurdy (1930) observed, "the unhappy wretch who blushes, averts his eyes, hangs his head, covers his face with his hands, and wishes he might sink through the floor is hardly the picture of fear" (p. 177). Similarly, Sattler (1965) noted that the behaviors that characterize embarrassment are "more characteristic of the inertness of immobility than of the liveliness of flight" (p. 131; see also Schneider, 1977).

The empirical evidence aside, whereas anxiety has been conceptualized as an anticipatory response to threat, blushing and its emotional concomitants appear to be reactive (Harris, 1990). Thus, on both conceptual and empirical grounds, one must question whether the affective state that accompanies blushing can be characterized as anxiety.

As early as 1930, MacCurdy suggested that blushing involved mediation by the parasympathetic nervous system, a speculation consistent with at least some of the available evidence (Buss, 1980; Leary et al., 1990; MacCurdy, 1930). However, parasympathetic vasodilator nerve fibers do not control the blood vessels of the skin directly (Berne & Levy, 1988). Rather than reflecting an influence of the parasympathetic system, blushing may result from inhibition of normal sympathetic tone (Berne & Levy, 1988; Folkow & Neil, 1971). It is evident that knowledge of the physiological basis of blushing is meager and clearly ripe for future research.

Explanations of Blushing

In the next section, we review and critique three existing theoretical analyses of blushing—the psychodynamic, inter-

personal-appraisal, and remedial models—then describe a new theory of social blushing. We have purposefully limited our discussion to conceptualizations of blushing per se and do not address more general explanations of affective states that blushers sometimes experience (such as explanations of embarrassment and shame based on role, self-presentational, self-consciousness, or psychodynamic theories; e.g., Buss, 1980; Goffman, 1959; Lewis, 1987; Silver et al., 1987). As we noted earlier (and will elaborate later in the article), blushing is not tied to any particular emotion (such as embarrassment or shame); thus, explanations of those states do not adequately account for social blushing.

Psychodynamic Explanations

The most prolific writers on the causes and manifestations of blushing are undoubtedly the psychoanalysts. Psychoanalytic interpretations of chronic blushing are diverse (for a review, see Karch, 1971), but there are common threads among the viewpoints. One is that blushing is seen as a conversion symptom, a somatic manifestation of an earlier emotional problem that has been repressed (Benedek, 1925).

Perhaps the most common psychoanalytic explanation is that people blush when they have exhibitionistic wishes that are denied expression (Alexander, 1930). To satisfy the repressed exhibitionistic urge, the tendency is converted into a physiological symptom, namely, vasodilation of the blood vessels in the face. The symbolic nature of this conversion, in which blood is shunted from the genitals to the face, is obvious.

Despite the general psychoanalytic endorsement that blushing results from repressed libidinal or genital excitation (Benedek, 1925; Feldman, 1962; Fenichel, 1945), some have noted that blushing does not always arise from repressed sexual expression. For example, Schenk (1967) emphasized the role of unconscious hostility as an elicitor of blushing, and J. P. Miller (1965) suggested that blushing is a vasomotor end-product of the physiological response to shame.

The considerable effort of psychoanalytic writers toward understanding blushing should be acknowledged, but little research has been conducted that reflects directly on the viability of psychodynamic hypotheses except for a few case studies of atypical cases of chronic blushing. Furthermore, the psychoanalytic emphasis on the sexual origins of blushing seems overstated. People blush in situations that can be construed as reflecting sexual, exhibitionistic, or scopophilic tendencies only with great difficulty (Edelmann, 1987; Karch, 1971). In addition, psychoanalytic explanations have deemphasized situations that cause nearly everyone to blush. (See Edelmann, 1987, for a critique of psychoanalytic approaches to blushing.)

Interpersonal Appraisal

The most common conception of blushing is as a response to concerns with others' evaluations. As noted above, Darwin (1872/1955) viewed blushing as resulting from concerns with others' appraisals: "It is not the simple act of reflecting on our own appearance, but the thinking of what others think of us, which excites a blush" (p. 325). Harris (1990) stated this proposi-

tion more formally, noting that blushing is the hallmark of acute negative public self-attention—a state characterized by a "painful sense of how one appears in the eyes of others" (p. 68) and "accompanied by an awareness of negative discrepancy between presumed or desired self-image and that projected" (p. 68). As we have noted, however, people sometimes blush even though they do not perceive a deficiency in their projected image.

Darwin (1872/1955) assumed that blushing was purely expressive and served no function, noting that "it makes the blusher to suffer and the beholder uncomfortable, without being of the least service to either of them" (p. 336). As we have seen, Darwin viewed blushing as merely a by-product of self-directed attention. (For an excellent analysis of Darwin's view of blushing and its relationship to evolutionary theory, see Browne, 1983).

Communicative and Remedial Approaches

Other writers, however, have suggested that blushing does have a social function. According to Burgess (1839), for example, blushing serves as a sign to others that we recognize that we have "transgressed or violated those rules which should be held sacred" (p. 156). Similarly, MacCurdy (1930) suggested that blushing indicated to a group that particular values were violated and that the violator wanted forgiveness. Karch (1971) considered blushing a mode of communication that occurred when one was concerned that one's appearance in others' eyes had been depreciated. According to his explanation, people blush to deny that they are how they appeared to be.

Castelfranchi and Poggi (1990) have offered the most detailed interpretation of blushing as a mode of communication:

Those who are blushing are somehow saying that they know, care about and fear others' evaluations, and that they share those values deeply; they also communicate their sorrow over any possible faults or inadequacies on their part, thus performing an acknowledgement, a confession, and an apology aimed at inhibiting others' aggression or avoiding social ostracism. (p. 240)

According to Castelfranchi and Poggi, blushing occurs whenever shame before others is felt, whether or not one feels privately ashamed. In fact, they argued that blushing did not occur when only shame before oneself was felt.

Castelfranchi and Poggi (1990) also noted the involuntary nature of blushing when describing its social function. They suggested that most face-saving behaviors that occurred when a person violated social norms could be produced voluntarily (i.e., smiling or apologizing), whereas blushing could not be faked to ingratiate oneself with the group. Blushing, because of its seemingly involuntary nature, clearly indicated to other members of the group that the person was, in fact, ashamed of what he or she did and that he or she wanted to be forgiven.

Research findings and everyday observation attest to the interpersonal nature of blushing and support the notion that whatever else it might do, blushing serves a remedial or face-saving function. Here we mention two points of evidence in support of the remedial nature of blushing:

Others' responses to embarrassment displays. Consistent

with an interpersonal perspective, blushing does possess remedial or face-saving qualities (Castelfranchi & Poggi, 1990; Frijda, 1986; Leary & Meadows, 1991). Blushing and other obvious signs of embarrassment or shame (such as downcast eyes and nervous grinning; Asendorpf, 1990; Edelmann, 1987, Edelmann et al., 1989) mitigate others' negative reactions to behavior that would otherwise result, in minor instances, in loss of public esteem and, in extreme cases, in ostracism. To the extent that blushing occurs amid concerns about being devalued, rejected, or excluded by others, it signifies one's recognition that one has committed a social infraction and sincerely regrets it, indicating the person's endorsement of social norms and serving as a remedial gesture. In brief, blushing serves as a "nonverbal apology" that accepts responsibility for one's undesired behavior, castigates oneself for the offense, and asks others for forgiveness (see Cupach, Metts, & Hazelton, 1986; Schlenker, 1980).

Failing to appear distressed after one's public displays of rule violation, ineptness, immorality, rudeness, or whatever conveys one of two messages to observers: Either such actions are a regular occurrence for the person (and, thus, evoke no more than usual discomfiture) or the person is really indifferent that he or she has transgressed social rules or conveyed a bad impression (and, thus, cares neither for social rules nor for others' evaluations). Appearing distressed, however, conveys that the transgression is unusual, acknowledges support of the social order, and indicates that the person does, in fact, care about how he or she is regarded. In Goffman's (1959) inimitable style, showing one's discomfort "demonstrates that, while he cannot present a sustainable and coherent self on this occasion, he is at least disturbed by the fact and may prove worthy at another time" (p. 111).

An experiment by Semin and Manstead (1982) demonstrated this effect. Subjects watched a videotape of a shopper in a grocery store who inadvertently toppled a tier of toilet paper rolls. The shopper then appeared either obviously embarrassed or unaffected and either stopped to rebuild the display or simply walked away. Subjects rated shoppers who appeared embarrassed more favorably than those who did not appear embarrassed and those who rebuilt the tier more positively than those who walked away. This study did not focus on blushing per se, but it showed clearly that appearing embarrassed does help to repair the person's damaged image. In essence, appearing embarrassed substituted for providing an apology (Leary & Meadows, 1991; Schlenker, 1980; Semin & Manstead, 1982). Unfortunately, this study did not include a control condition in which the embarrassing event did not occur; thus, it is unclear how much embarrassment displays repair the transgressor's damaged image.

Responses to nonobserved blushing. Additional evidence for the remedial function of blushing is provided by a study by Landel and Leary (1992). They reasoned that for blushing to serve as face work for a damaged public image, others must perceive it. If one's blushing is obvious, the predicament is resolved considerably, particularly if the threat to identity is minor. However, a threat to one's public identity might remain unresolved if one's blushing is not seen by others. When others

have not seen a person blush, the person should engage in alternative face-saving strategies to remedy the situation.

To test this notion, Landel and Leary (1992) embarrassed subjects by playing a tape that the subject had recorded privately of himself or herself singing "Feelings," an act that caused most subjects considerable embarrassment. The researcher then either did or did not acknowledge that she saw the subjects blush as the tape was played. Although other interpretations are possible, the findings were consistent with the remedial hypothesis. Subjects who believed the researcher did not see them blush later conveyed a more positive impression of themselves on a questionnaire intended for the researcher. Subjects who thought their blush had been seen made self-presentations that did not differ from a nonembarrassed control group. When blushing could not serve a remedial function, subjects appeared to substitute other means of conveying a positive image to the researcher.

Summary. Although mostly circumstantial, we find the evidence convincing that blushing serves to repair people's public images after a self-presentational predicament. Blushing is likely to occur in situations in which face work is needed, and it appears to placate those who have observed one's undesirable behavior. Furthermore, people who do not think others saw them blush after an embarrassing incident increase their use of alternative face-work strategies.

Although the remedial nature of blushing is well established, we question whether the remedial model can encompass all circumstances in which people blush. Most problematic is the inability of the remedial model to account for blushing that occurs without a clear threat to public identity. As we noted above, praise and other positive attention can cause blushing, as can mere scrutiny and staring, a point that has not been addressed adequately in previous analyses. One might argue that such situations often create concerns about one's public identity that, in turn, trigger remedial blushing, but such an explanation must be stretched in many instances (such as when people blush as their friends sing "Happy Birthday"). Furthermore, people clearly do not blush every time they are worried about what others are thinking of them. Most instances in which people are concerned about how they are perceived and evaluated elicit social anxiety but not blushing (Leary, 1983; Schlenker & Leary, 1982). Thus, existing explanations do not unequivocally identify the necessary and sufficient cause of blushing. In the next section, we present a new perspective on blushing that we believe not only encompasses existing interpersonal and remedial models, but accounts for aspects of blushing that other models cannot.²

Blushing as a Response to Undesired Social Attention *Social and Nonsocial Attention*

People are regularly the focus of others' attention. In most instances, interactants do not consciously contemplate the fact

² A previous article by Leary and Meadows (1991) attempted to account for all instances of blushing within a remedial model. They are now convinced that such models cannot parsimoniously explain all episodes of social blushing.

that others are attending to them or think consciously about what others might be thinking about them, although they undoubtedly monitor others' expressive reactions to them on a nonconscious level (Leary & Kowalski, 1990). Nevertheless, people sometimes become conscious that they are the objects of others' attention. For example, individuals may become aware that people are attending to them when others are visually attentive, offering evaluative feedback, or asking questions about what they are doing.

On some occasions, people sense that the attention they are receiving from others is focused on their socially relevant qualities. Others are attending to them as social beings, drawing inferences about their personal attributes (e.g., personality, motives, thoughts), and considering the interpersonal implications of their behavior. We use the term *social attention* to refer to attention that one believes is directed toward aspects of one's social identity.³

In other instances, people sense that the attention they are receiving is impersonal, as when others view them as utilitarian objects rather than as social interactants. For example, in many highly scripted encounters (such as interactions with a tollbooth operator or check out clerk), interactants often attend to one another for purely utilitarian reasons without attention to one another's social identities. Their exchange may be nearly as nonsocial as that with a vending machine. Similarly, in many physically threatening situations—battles, muggings, riots, and the like—the attention people devote to one another is often nonsocial, much like the attention they would devote to an impersonal threat, such as a coiled snake or an approaching tornado. Norm-bound encounters with people such as physicians, dentists, and hairstylists are also often relatively nonsocial to the extent that the interactants attend in an impersonal manner to limited aspects of one another as opposed to one another's social identities. Of course, regardless of the context, nonsocial attention may suddenly become social when events cue interactants to the fact that others are attending to them as social individuals. For example, a patient may experience largely nonsocial attention from a physician during a physical exam until the physician makes a personal comment that indicates he or she is attending to the patient's social characteristics.

Undesired Social Attention

People often desire social attention and find it rewarding. In other instances, however, social attention is undesired. Social attention may be undesired for at least three reasons. First, people may worry about the impressions others are forming of them. When people think others are attending to aspects of their social identities, self-presentational concerns may arise, often resulting in social anxiety (Leary, 1983; Leary & Kowalski, 1990; Schlenker & Leary, 1982). This is particularly true if individuals become the focus of attention because of obvious ineptitude or because they publicly violate important norms; in such cases, people understandably prefer to be ignored for the present.

Second, social attention often induces people to become self-aware (Buss, 1980). Self-awareness theory posits that when people are made self-aware, they attend to the most salient aspect

of the self, which is then compared with relevant self-standards. In the original presentation of self-awareness theory, Duval and Wicklund (1971) proposed that this comparison typically results in the perception of a negative discrepancy, which is experienced as aversive. Some have questioned whether self-awareness always results in negative affect (e.g., Carver & Scheier, 1981), but self-awareness clearly can be aversive. In fact, people will act to avoid or escape situations that induce self-awareness when an irremediable negative discrepancy exists (Steenbarger & Aderman, 1979).

Third, studies show that intense visual attention, for example, a fixed stare, is often intrinsically aversive. Ellsworth and her colleagues have demonstrated that stares not only induce negative affect in the stared-at individual, but produce lowered evaluations of the starrer and attempts to escape the other's gaze (Ellsworth & Carlsmith, 1968, 1973; Ellsworth, Carlsmith, & Henson, 1972). Of course, in other instances—when social attention is desired, for example—steady gaze can induce pleasant affect (Argyle, 1967).

Depending on the situation, people may respond to undesired social attention in one or more of three ways. In some instances, they respond by challenging the other's attention. This challenge may be verbal ("Hey, what are you lookin' at?") or nonverbal (reciprocal staring, frowning, and other threatening gestures). In each case, the goal is to terminate the undesired social attention.

People may also try to escape the other's attention. Sometimes, they may actually leave situations in which they are receiving undue attention. For example, Ellsworth et al. (1972) showed that subjects who were stared at by a confederate left the situation more quickly than those who were not stared at. When physical escape is not possible, people may withdraw socially while remaining physically present, for example, by avoiding eye contact with those who are overly attentive.

In addition to challenging or escaping the undesired attention, people who feel they are the objects of undesired social attention sometimes blush. In brief, people blush as a result of receiving social attention that is, in one way or another, undesired. Thus, in our view, it is not mere heightened self-awareness or conspicuousness that triggers blushing (Buss, 1980; Darwin, 1872/1955; Kaufman, 1989; Tomkins, 1963), but undesired social attention.

Furthermore, undesired attention from others should induce blushing only when the attention is focused on the person's social or personal qualities. Thus, the man hurrying through dark and deserted streets presumably does not blush when he comes to the attention of a grizzled gang member. In cases such as these, attention may be undesired, yet people do not blush because the attention is largely nonsocial. If, however, attention

³ The experience of being the object of social attention can be distinguished from the state of public self-awareness. When publicly self-aware, people attend to the public aspects of themselves that are visible to others (Buss, 1980). The experience of social attention, in contrast, arises when others appear to direct their attention toward any aspect of one's personal or social identity, whether observable or nonobservable. For example, one would experience social attention if another person were trying to ascertain or imagine one's thoughts or intentions.

should suddenly drawn to the individual's personal or social attributes, the person might blush. For example, should the gang member say, "Don't worry, buddy, I don't even bother with wimps like you," undesired attention would be directed to his social identity, and he might feel a rush of warmth to his face.⁴

Undesired Social Attention and the Elicitors of Blushing

This perspective both explains the four primary elicitors of blushing discussed above more easily than any existing approach and subsumes existing interpersonal approaches to blushing.

First, social attention is least desired in instances in which people have behaved in ways that threaten their public identities. People who have behaved in ways that others may view as incompetent, immoral, or otherwise undesirable understandably find social attention aversive, yet in these kinds of situations, people typically feel that everyone is looking at them (Silver et al., 1987). Thus, the undesired-attention model can explain blushing in "embarrassing" predicaments. In our view, people do not blush in such situations because they are embarrassed or ashamed, as has been widely assumed (e.g., Buss, 1980; Kaufman, 1989), but because they are the objects of undesired social attention.

Second, our explanation more easily explains the effects of praise on blushing than do other models. One need not assume that praise necessarily raises concerns about one's self-presentations (Schlenker & Leary, 1985). Rather, one need only stipulate that the person regards the social attention that accompanies the praise as excessive and undesired. This explains why over-praise more reliably induces blushing than praise that one regards as valid. When one believes the content and manner of praise to be appropriate to the praised event, the accompanying attention is likely to be regarded as appropriate and desired rather than undue, and blushing is unlikely to occur.

Third, this model accounts directly for the effects of scrutiny and staring on blushing. People do not blush when they want to be the focus of others' attention. For example, actors on stage rarely blush even though they are the focus of attention, and lovers stare into one another's eyes for long periods of time without blushing. In both instances, they do not regard the received attention as undesired. Thus, it is neither mere attention nor an implied self-presentational threat per se that causes blushing, but the undesired attention itself. Evaluation apprehension may induce negative affect in such situations, but close scrutiny and staring appear to cause blushing even when one's public identity is not at stake.

Finally, as we noted, accusations of blushing cause people to blush. In our view this is not because people infer they are embarrassed from others' reports they are blushing (Edelmann, 1987), nor because they are worried about the self-presentational implications of the blush (although such worries undoubtedly arise). Rather, being told that one is blushing typically results in the experience of undesired social attention. In our view, any comment that results in undesired social attention, whether about one's appearance ("what happened to your hair?") or behavior ("tell Jack what you did at the bar Saturday night") will potentially cause blushing.

This hypothesis also easily explains the relationship between blushing and the subjective experience of embarrassment or shame. Some writers have assumed that blushing always reflects subjective embarrassment, even in situations in which the blushing person denies being embarrassed. In discussing the apparent paradox of nonembarrassed blushing, Buss (1980) recommended that researchers "assume that blushing means embarrassment even when the person refuses to admit it" (p. 238). According to self-presentational analyses, however, embarrassment should occur only if the person believes that he or she has projected an undesired impression to others (Goffman, 1959; R. S. Miller, 1986; Schlenker & Leary, 1982). However, the experience of undesired social attention in the absence of a self-presentational predicament should result in blushing even though the person is not embarrassed. Indeed, in a factor-analytic study, Leary and Meadows (1991) found that self-reported embarrassment was associated with one variety of blush-inducing situation (that included self-presentational predicaments) but not with situations that did not involve damage to one's public identity.

In a related vein, we noted earlier that Harris (1990) viewed blushing as a consequence of acute negative public self-attention. The critical difference between Harris's explanation and ours is that although both approaches emphasize the role of self-attention in blushing, unlike Harris, we do not assume that blushing results from a discrepancy between the image one wants to convey and the impressions others have formed. As we have shown, people blush even when no such negative discrepancy exists. Rather, mere undesired social attention is sufficient to trigger blushing.

The undesired social attention hypothesis also helps to explain why blushing is usually accompanied by gaze aversion. To the extent that blushing results from undesired attention, one tactic for reducing one's discomfort is to reduce the salience of others' attention by looking downward or away. This may also explain the tendency for blushers to hang their heads and to engage in other acts of "concealment" (see MacCurdy, 1930; Schneider, 1977). In addition, gaze aversion may reflect desires to disaffiliate and serves to increase social distance (Exline & Winters, 1965).

Individual Differences in Blush Proneness

People differ markedly in the frequency with which they blush. In this section, we examine four sets of variables that are related to individual differences in blushing: personality, age, gender, and culture.

Personality variables. The three major perspectives on blushing—the interpersonal appraisal, remedial, and undesired social attention approaches—hypothesize that blushing proneness should be closely linked to people's concerns with

⁴In certain threatening situations, people may not blush even though the necessary conditions are present because sympathetic arousal causes vasoconstriction in the blush region. To use an extreme example, a thief caught in the act or a convict who is about to be executed presumably wouldn't blush even if excessive attention were drawn to their social qualities.

others' impressions of them. People who are particularly concerned about making unflattering impressions should not only be more likely to experience appraisals as threatening and, thus, engage more often in face-saving remediation, but they should be more likely to regard others' attention as undesired. In support of this, scores on the Blushing Propensity Scale correlate positively with fear of negative evaluation, embarrassability, social anxiousness, and physique anxiety (Edelmann, 1990a; Leary & Meadows, 1991). At the extreme, people troubled by chronic blushing obtain scores on measures of social anxiety similar to those of patients who meet *Diagnostic and Statistical Manual of Mental Disorders* criteria for social phobia (Edelmann, 1990a). This correlation of blush proneness with social phobia is not surprising, given that the diagnosis of social phobia is based in part on fear of embarrassment or humiliation.

Furthermore, because those with low self-esteem tend to assume others will draw unfavorable inferences about them, they should find others' attention undesirable, and self-esteem and blushing propensity should correlate negatively, which they do (Leary & Meadows, 1991).

The degree to which people are attuned to the fact that they are the object of others' attention, public self-consciousness, also predicts blushing (Buss, 1980; Edelmann, 1990a). The correlation, however, is small ($r = .29$). This may be because although publicly self-conscious people are more attuned to attention from others, they do not necessarily regard others' attention as undesired or worry more about how they are being regarded.

Age. To the extent that blushing and its behavioral concomitants require self-attention, they should not appear until the emergence of the referential self: the ability to represent oneself in thought, which occurs between 18 and 24 months of age. Lewis, Sullivan, Stanger, and Weiss (1989) showed that the self-conscious behaviors that accompanied blushing in adults (smiling, gaze aversion, and self-touching) increased markedly around age 2 (the study did not examine blushing per se). Lewis et al. interpreted these behaviors as indicating the presence of embarrassment in children of this age, but such a conclusion was not warranted. Not only may we question whether children of this age can experience the threats to public identity that, by definition, elicit embarrassment (Goffman, 1959, 1967; R. S. Miller, 1986; Schlenker, 1980), but some of the manipulations that produced these reactions in this study were not, in fact, embarrassing (e.g., viewing oneself in a mirror). In our view, these data simply show that infants as early as 2 years of age display evidence of self-consciousness in response to self-observation.

In another study, Buss, Iscoe, and Buss (1979) asked parents of 3- to 12-year-olds to specify the earliest age at which their children became embarrassed and blushed. Parents reported that roughly 1 in 4 of the 3-4-year-old children had experienced embarrassment, whereas 3 in 5 of the 5-year-old children had become embarrassed. In addition, among those children for whom parents reported episodes of embarrassment, slightly more than half were reported to blush. These results indicate that embarrassment and blushing may emerge at about the same time as a sense of public self (Buss, 1980), although the retrospective nature of the data make them suspect. Interest-

ingly, retrospections of 100 chronic blushers revealed that they first recalled blushing at an average age of 12.6 (Edelmann, 1990a). If the parental reports in the Buss et al. (1979) study can be believed, people apparently do not remember their earliest episodes of blushing.

Although little is known about the development of blushing, researchers have examined children's concerns about how others evaluate and perceive them. In general, children's concerns about how others evaluate them increase with age (Darby & Schlenker, 1982, 1986; Elkind, 1980). People report that the largest number of embarrassing incidents in school occurred to them between the ages of 11 and 16 (Horowitz, 1962), roughly the ages at which self-consciousness and social anxiety reach their peak (Buss, 1980; Leary, 1983).

The tendency to blush seems to decline with age after adolescence (Shields, Mallory, & Simon, 1990), but the reasons for this are unknown. One possibility discussed earlier involves physiological changes in the blush region (Mellander et al., 1982). Alternatively, people may become less concerned with others' evaluations of them (and, social attention is less commonly experienced as undesired), or people may actually receive less undesired attention from others as they grow older. In addition, as life becomes more routinized and new experiences decline, people are less likely to find themselves behaving inappropriately or at a loss regarding how to act (Shields et al., 1990).

Gender. Although limited, existing empirical evidence does not support the American stereotype that women generally blush more than men. In one experiment that examined sex differences in blushing, Shearn et al. (1990) found no differences between men and women on four physiological measures taken during a blush-inducing procedure (cheek and ear photoplethysmograph, cheek temperature, and skin conductance).

Similarly, men and women do not differ in their total scores on the Blushing Propensity Scale (Leary & Meadows, 1991) nor in self-reported frequency of blushing (Shields et al., 1990). However, a comparison of men's and women's responses to the 14 individual items on the Blushing Propensity Scale found that women indicated that they were more likely than men to blush on three items: talking about a personal topic, being the center of attention, and receiving a compliment. We assume that such differences reflect socialized differences in the situations in which men and women experience undesired social attention.

Cultural differences. In a series of studies, Edelmann and his colleagues asked respondents from a number of countries about their reactions when embarrassed (Edelmann et al., 1989; Edelmann & Iwawaki, 1987; Edelmann & Neto, 1989). Respondents from the United Kingdom reported blushing when embarrassed at the highest rate (55%) of all countries studied. Respondents from most other countries reported blushing when embarrassed somewhat less: West Germany (34%), Japan (30%), Portugal (30%), Italy (29%), Greece (25%), and Spain (21%). Note that these data involve incidence of blushing when embarrassed, not blushing per se.

Reasons for these cultural differences in blushing are unclear. They may involve cultural differences in (a) the degree to which situations that induce embarrassment involve concurrent undesired social attention, (b) the degree to which social attention from others is experienced as undesired, (c) the degree to

which members of the culture give one another social attention, (d) the degree to which blushing is a salient construct in the culture, one likely to be noticed in oneself and others, (e) self-reporting, and (f) modal skin color. Theory-based cross-cultural research has the potential to elucidate the psychological mediators of blushing.

Blushing and Nonhuman Appeasement

One of the more provocative speculations about blushing is that it may be analogous to some appeasement displays observed in other primates (Frijda, 1986; Leary & Meadows, 1991). When facing a physical or social threat, other primates engage in behaviors that diffuse the threat, thereby avoiding aggression and maintaining the animal's position in the group.

Three aspects of these appeasement displays are relevant to our analysis of human blushing. First, when a lower status primate is threatened by a higher status one, the lower status individual will invariably avert his or her eyes, or at least look at the dominant primate obliquely (van Hooff, 1972); gaze aversion is central to primate appeasement (Altmann, 1967). As we saw above, people typically avert their eyes when they blush, a reaction that may similarly function to appease (Hutt & Ounsted, 1966).

Second, under certain circumstances, appeasement and submission in other primates include a vacant, mirthless, silly grin. This grin, which has been called the full closed grin (Goodall, 1988) or the silent horizontal bared-teeth display (van Hooff, 1972), is easily distinguished both from affiliative smiles and threatening teeth baring. As we discussed, a morphologically similar nervous grin also often accompanies blushing.

Third, blushing and nonhuman appeasement share a common elicitor: staring. In fact, a steady gaze is a primary elicitor of appeasement in nonhuman primates (Bolwig, 1978; Chevalier-Skolnikoff, 1973; R. E. Miller, 1975), as it is of human blushing.

In our view, these similarities between nonhuman appeasement and human blushing are not coincidental. All three coincide with our explanation of blushing as a response to undesired social attention. Traditionally, ethologists have viewed nonhuman appeasement in terms of its function in averting or counteracting aggression among conspecifics (Bolwig, 1978; Manning, 1972; Walters & Seyfarth, 1987), and we have no quarrel with the findings that displays of appeasement and submission do, in fact, deter physical aggression among nonhumans (Caryl, 1979; Hinde, 1985; van Hooff, 1972).

However, if one closely examines the threat-and-appeasement sequence of behavior as it occurs among most nonhuman primates, it seems clear that the most immediate effect of appeasement is often that the threatening animal loses interest in its target. Whereas moments before, the threatening animal was focused exclusively and intensely on its target, once the target appeases, the higher status animal usually breaks its gaze, often looking around disinterestedly and wandering away (Bolwig, 1978). For example, van Hooff (1972) found that the most common reactions to the silent, bared-teeth display involved "nonsocial" responses, such as "leaving the displaying animal alone" (p. 224).

Most species have facial displays that deter potential interaction (Fridlund, 1991a), and our analysis suggests that blushing may act similarly by reducing undesired social attention among humans, either by attenuating or shortening it or by eliminating it entirely. Blushing, then, may be a social attention diversion or distraction mechanism comparable with nonhuman appeasement displays. Besides their shared functions of remediation or appeasement, both are elicited by undesired attention from conspecifics and typically deflect it.

Despite these parallels between blushing and nonhuman appeasement, we see at least four potential weaknesses to these speculations regarding blushing's function and its possible relationship to the appeasement behaviors of nonhuman primates. The first is that blushing initially increases rather than decreases the blusher's conspicuousness (Bergler, 1944; Buss, 1980). However, notwithstanding the fact the blushing may draw brief attention to the blusher, in fact people tend not to focus their attention on those who blush or show other signs of social discomfort. To affect others' responses to the individual, any nonverbal cue must be obvious.

Second, although blushing tends to deter undesired attention, it does not always do so. Under some circumstances, others may tease the abashed individual about blushing and may draw others' attention to the blush. Although people sometimes pay inordinate attention to blushers (and may even taunt them), we believe that this response to blushing is not only relatively unusual, but counternormative. Except when one interactant is motivated to upstage or humiliate another, people typically try to help others maintain face, first by engaging in civil inattention when others lose poise and secondarily by trying to smooth over the disrupted encounter (Goffman, 1959, 1967). Thus, the fact that blushing sometimes results in increased undesired social attention does not negate the fact that under most circumstances (and in polite company), it deters it.

A third objection is that, to our knowledge, no other primate displays upper-torso blushes as part of appeasement or submission, even in the presence of gaze aversion and grinning (and the face may flush for other reasons). This does not necessarily invalidate the notion that blushing serves to deter undesired attention (humans are, after all, the only primate whose lack of hair permits blushes to be easily seen), but our conjecture would be strengthened by the finding that some other animal blushes when confronted with undesired social attention from a conspecific.

A fourth question, not only for our model, but for any explanation that posits an interpersonal function of blushing, is why dark-skinned persons blush even though their blush is typically not visible to others. We return to a detailed discussion of this question below.

In summary, it is an intriguing possibility that blushing may be not only a response to undesired attention, but a mechanism for deterring such attention when it occurs. Direct evidence for this conjecture is admittedly weak, but the possibilities for future research are inviting.

Coping With Blushing

Most people have great difficulty controlling the extent to which they blush. In a study of self-identified chronic blushers,

presumably those with experience dealing with blushing, Edelmann (1990b) found that 62% reported that they had no strategy for coping with blushing. Furthermore, many reported using strategies that may not be optimal; for example, 17% opted to leave blush-inducing situations or to avoid them entirely. Roughly 20% of respondents reported using strategies such as distraction or relaxation.

Although evidence is sparse, blushing appears to be largely beyond voluntary control (Castelfranchi & Poggi, 1990). It is simply not possible to will oneself to stop blushing; indeed, trying not to blush may only increase blushing (Timms, 1980). Biofeedback, which has been used to control other cardiovascular processes, is unsuccessful in helping chronic blushers to constrict the blood flow in their cheeks (Rein, Giltvedt, & Gøtestam, 1988).

One might be able to inhibit blushing by disregarding others' attention. One way of doing this might be by eliminating the stigma associated with blushing so that one is no longer concerned when one starts to blush. Indeed, paradoxical intention, in which clients are encouraged to try to blush when they feel themselves blushing, has decreased blushing in case studies of chronic blushers (Boeringa, 1983; Frankl, 1975; Lamontagne, 1978; Timms, 1980).

An interesting question is why people should want not to blush. If, as either the remedial or undesired-attention approaches suggest, blushing diffuses interpersonal threats, people should not mind blushing. Although data on this point do not exist, we suspect that people usually do not mind blushing when blushing seems to be socially appropriate. Blushing after appearing silly, when being overpraised, or when singled out for attention, for example, is not only appropriate, but expected, and people are often not particularly concerned about it. However, people may believe that blushing in the absence of clear precipitating events implies either that a hidden infraction has occurred (as when people blush when teased about something ostensibly done in private) or that the person has lost poise in an otherwise unthreatening situation (conveying an impression of being shy, socially unskilled, or otherwise *déclassé*). In addition, frequent blushers may worry about the cumulative effects of being perceived as such (e.g., that they will be seen as neurotic).

Directions for Future Research

Data regarding blushing are sparse except for the recent work by Edelmann, Asendorpf, and their colleagues (see Asendorpf, 1990; Edelmann, 1987, 1990c). Our review of the literature suggested many questions about blushing, but four were particularly interesting.

Do People Blush in Private?

One recurring question involves whether people blush when they are alone. With the exception of some psychodynamic approaches, all explanations of blushing (including ours) assume that blushing arises from social evaluation or attention. Furthermore, both the remedial and undesired-attention mod-

els suggest that to the extent that blushing serves an interpersonal function, it must be seen by other people to be effective. Taken together, these models would predict that people should rarely blush in solitude. In support of this, data show that blushing is primarily a social phenomenon; people report that they rarely blush when they are alone no matter how silly, incompetent, or shameful their behavior. They may feel incompetent, silly, or ashamed when performing certain actions in private or when thinking in private about public transgressions, but they rarely blush. In fact, 95% of the respondents in one study indicated that they rarely, if ever, blushed when they were alone (Leary & Meadows, 1991).

However, some people do report, both in research settings and anecdotally, that they have blushed when they were alone (Leary & Meadows, 1991). Do they? To the extent that an experimental test of this question requires subjects to firmly believe that they are completely alone (and unobserved even by physiological measuring devices), researchers may have difficulty answering this question directly.

In the absence of direct evidence, we must rely on self-reports of unknown validity. In informal interviews with people who claim to have blushed when alone, we have found that many assume they have blushed in private because they felt silly, incompetent, embarrassed, or ashamed. When pressed, however, many admitted that they couldn't be sure they blushed, that is, they didn't actually see themselves blush and couldn't recall that their faces actually felt hot.

Even so, some people insist they have blushed in private. In many instances, the situations in which they report blushing are, although solitary, nonetheless interpersonal. For example, people report blushing during telephone conversations (or, as in a few cases reported to us, on receiving an obscene phone call). Although people in such situations are alone (thereby eliminating the possibility that blushing will serve a remedial or attention-diverting function in that particular setting), they are clearly interpersonal. Furthermore, such situations typically involve undesired social attention, the obscene phone call being a good example.

Even in situations in which people are completely alone, they often respond as if others were present. As Fridlund (1991a) observed, "we often imagine that others are present when they are not. . . . We imagine talking to them, arguing with them, making love with them, and throughout these acts, we deploy facial displays" (pp. 45-46; see also Fridlund, 1991b; Fridlund et al., 1990). In addition, as Cooley (1902), Mead (1934), and other symbolic interactionists proposed, people perceive and evaluate themselves from the standpoint of society at large. Thus, we would expect to find that people occasionally blush in private when they imagine being the focus of others' undesired attention. For example, a solitary person recalling a public embarrassment might, in fact, blush.

We conclude, then, that although blushing typically occurs in face-to-face contacts, it is occasionally triggered in solitary, yet interpersonal, settings in which the essential element of real or imagined undesired social attention is present. We think it important to study more carefully instances in which people report blushing in private.

Do People Know When They Blush?

The question of whether people typically know they are blushing bears on the reliability and validity of self-reported blushing (and, thus, on questions such as whether people blush in private). Not only may we question whether people know when they blush (in one study, over half of the respondents reported being told they were blushing without feeling the blush; Shields et al., 1990), but a question may be raised about the degree to which people can remember past episodes of blushing (try to recall the last time you are certain you blushed).

Although data relevant to this point do not exist, we suspect that people feel only their strongest blushes. If so, weak blushes go largely undetected, and people whose blushes are typically low in intensity (as opposed to intensely florid blushers) may underreport their blushing. Indeed, we've encountered people who claim they never blush, in whom we have subsequently induced blushing quite easily. Furthermore, some of these individuals maintained that they could not feel themselves blushing even though observers could see that their face was red.

The solution, of course, is to measure blushing directly, using either a photoplethysmograph to measure skin coloration or a thermistor to measure skin temperature. Each of these techniques has its advantages and disadvantages. The photoplethysmograph more directly measures blood volume, but it is of limited use on people with very tanned or dark skin. Temperature probes are not affected by the subject's skin tone, but provide a less direct index of blood volume. Both techniques have been used successfully in studies of blushing (Leary et al., 1990; Rein et al., 1988; Shearn et al., 1990; Templeton & Leary, 1991), but research is needed to explore the reliability and validity of these measures, to examine their convergence (see, for example, Shearn et al., 1990), and to study the relationships among self-reports, physiological indexes, and visually observed blushing.

Are There Two Forms of Social Blushing?

All discussions we have seen of blushing deal with the spontaneous blush that appears rapidly on the face, neck, and ears. Yet, we have witnessed in others a second variety of "creeping" blush. Unlike the classic blush, the creeping blush occurs slowly, appearing at first as small splotches or streaks that look much like a rash on the upper chest or neck. Over a period of several minutes, the rash spreads upward to the upper neck, jaw, and cheeks. In some cases, the creeping blush does not reach its peak for several minutes after onset, whereas the classic blush typically reaches its peak within seconds. Furthermore, even at its peak, the creeping blush typically appears splotchy rather than uniform.

This sort of blush is commonly observed in speakers who are giving prepared presentations to an audience.⁵ It seems to result from simply being before the audience and is not related to an identifiable precipitating event. Like the embarrassed blush, the creeping blush appears to result from undesired social attention, but we have no explanation regarding why its onset and appearance differ from the embarrassed blush. Research on the creeping blush and its relationship to the classic blush is needed.

Why Do Dark-Skinned People "Blush"?

During the 19th century, the question of whether non-Whites blushed was of considerable interest to scientists, philosophers, and theologians alike because of its implications for the moral and social status of Blacks and Native Americans (see Burgess, 1839; Darwin, 1872/1955; Ricks, 1974; Schneider, 1977). Ricks noted that this was not only an abstract philosophical or theological issue but also a political one. In early 19th-century thought, blushing signified moral sensitivity. Theologians maintained that the fact that only humans blushed indicated that they were uniquely moral and fundamentally different from other animals (Browne, 1983). The same argument was used in discussions of the moral superiority of Whites over other races. If non-Whites did not blush and, thus, were not fully human, Europeans could feel less loath to enslave such groups and colonize their lands.

As Darwin (1872/1955) correctly observed, Blacks and other dark-skinned people do, in fact, experience increased blood volume in the face in the kinds of social situations that induce observable blushing in Whites. Unlike lighter skinned people, in which the blush is red or pink, blushes in dark-skinned people appear either as a further darkening of the skin or are not observable by others at all. (Given that so-called blushing in dark-skinned people does not involve a blush at all suggests that we need a more general term for the phenomenon, perhaps *social facial vasodilation*.)

The fact that facial vasodilation is not easily observed in much of the world's population raises questions for any explanation of blushing that invokes an interpersonal function of the perceived blush. How can blushing serve as a remedial gesture or as an attention-diverting mechanism if it can't be seen? This question becomes even more problematic if one assumes, as most evidence suggests, that all races evolved from dark-skinned peoples of the African savanna (Johanson & White, 1979).

We have no entirely satisfactory resolution to this question but will suggest three highly speculative directions for future investigation. One possibility is that the skin tone of early hominids, although dark, was light enough to permit blushes to be seen. Alternatively, the blush reaction may have emerged for reasons unrelated to social communication and only later came to serve an interpersonal function among light-skinned peoples. A third possibility is that the behavior that occurs amid undesired social attention—for example, blushing, downcast eyes, and nervous smiling—evolved, for reasons unknown, as associated traits. For dark-skinned and light-skinned people alike, the observable components of the syndrome served the same social function: Light-skinned people simply were able to use all three aspects of the syndrome, whereas darker people could rely on only two.

⁵ In a pilot study, Mark R. Leary and another researcher observed 20 students who were presenting 15-min talks to a group of faculty and students. The two observers reliably detected this creeping blush in over 50% of the students.

Conclusions

Although it occurs relatively infrequently, blushing exerts a strong and important effect on others' responses. In addition, some people worry about blushing to the extent that they try to avoid situations in which they may blush, take steps to hide their blushes (cosmetically, for example), and seek professional help for chronic blushing. Thus, far from being a minor annoyance, blushing can have notable interpersonal consequences, and additional research on blushing will increase the understanding of human social behavior appreciably. Understanding blushing will require the efforts of researchers spanning several scientific fields, including social, personality, developmental, psychophysiological, clinical, and cross-cultural psychology, as well as those from anthropology, primatology, and the neurosciences.

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