universal scaling theories. Thus, the theory needs to be further developed—for example, to consider not only interactions between pairs of particles, but also the simultaneous interaction of the three of them. There is also the need for new and better experiments that can probe more properties of these systems.

Even after a century of research, there remains excitement in understanding the few-body binding laws. Besides the interest in identifying simple universal relations, there is another important motivation for those working with ultracold atomic gases: One goal is to be able to engineer the interaction between atoms to achieve a quantum system in which multiple-body interactions dominate the physical behavior (*11*). Because the dominant contribution has so far come from two-body interactions, this would lead to a revolution possibly opening new avenues for fundamental research—for example, in the study of exotic quantum phases (*12*).

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PSYCHOLOGY

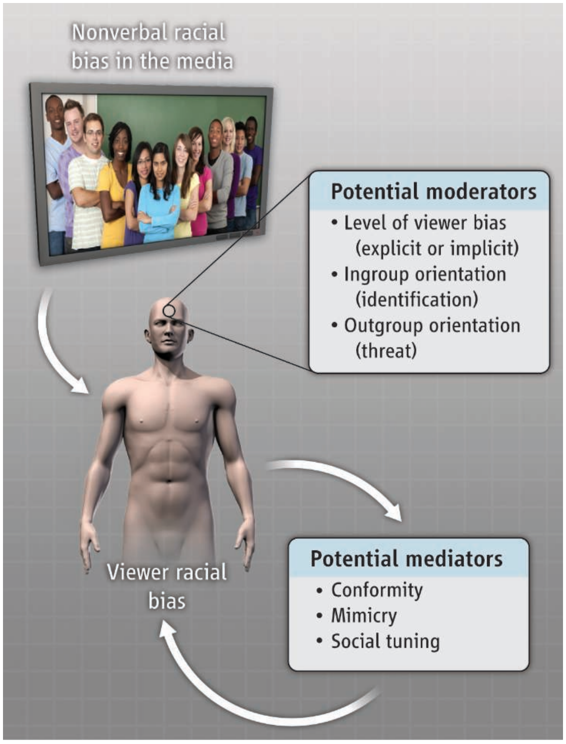
Racial Bias, Unspoken But Heard

Exposure to nonverbal behaviors can transmit race bias to observers.

John F. Dovidio

Nonverbal behavior is a powerful form of social influence. People can abstract accurate meaning from even very brief exposures to nonverbal behavior—a facial expression or subtle body language, for example (*1*). Across cultures, the ability to understand nonverbal messages occurs quickly; even infants and toddlers demonstrate this capacity. Moreover, nonverbal signals can be especially effective in transmitting social attitudes because they can be spontaneously understood with minimal effort and are perceived as a source of valid information. On page 1711 of this issue, Weisbuch *et al*. (*2*) examine how racial prejudice can be covertly spread and reinforced, and propose that in American society, negative nonverbal behavior modeled by white individuals in popular media critically shapes white viewers' orientations toward black individuals [see (*3*) for how race was determined in the study].

Norms of egalitarianism in the United States have grown steadily stronger, while expressed racial prejudice among white Americans has declined dramatically (*4*). Yet, there is ample evidence that whites continue to exhibit bias against blacks (as well as toward other traditionally disadvantaged groups), not only with respect to the extremist behaviors of an unrepresentative few but also in terms of subtle discrimination by a substantial portion of mainstream white American society (*5*). The dynamics of subtle bias have received substantial empirical attention and are generally well understood. For example, whites who appear nonprejudiced on self-report measures tend to display negative nonverbal behaviors as a function of unconscious, automatically activated racial bias (*6*). Less clear, however, is how this prejudice, which is largely unspoken, can be transmitted culturally. The findings of Weisbuch *et al*. are particularly provocative because they uncover racial bias in actors' nonverbal displays despite the highly scripted nature of prime-time television shows, which generally minimizes expressions of racial bias (*7*). In addition, they obtain their findings with samples of white college undergraduates, who are more favorable toward outgroups (individuals whom the white students consider outside their group) and more inclined to conceal negative responses toward outgroups than the "average" white American (*8*). Thus, nonverbal messages influence relatively sophisticated participants who are especially motivated to appear unbiased.



Covert transmission. An individual's implicit prejudice, ingroup racial identity, and current state of intergroup relations can increase his/her sensitivity to nonverbal cues of bias, such as those displayed on television. These cues, in turn can shape viewers' perceptions of social norms or induce mimicry or social tuning to elicit personal racial bias.

Although Weisbuch *et al*. demonstrate the potent impact of viewing nonverbal expressions of racial bias in the media, they do not directly illuminate the processes that account for this influence. It is possible, for example, that despite their conscious motivation to appear unbiased, participants actually harbored prejudice toward blacks. Thus, they may be particularly attuned to nonverbal expressions of racial bias, which could disinhibit their latent (implicit) prejudice. Indeed, participants in the Weisbuch *et al*. studies showed an overall prowhite bias on an implicit association test, which is hypothesized to measure the strength of automatic mental associations between objects and/or concepts. In addition, exposure to the racially biased nonverbal behavior on television influenced

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their spontaneous emotional responses to blacks but not to Asians. This explanation suggests that the impact of viewing nonverbal bias against blacks on television would be more pronounced among whites who have stronger implicit antiblack dispositions.

The findings of Weisbuch *et al*. also implicate the more general process of social tuning (*9*). As social animals, humans strive to establish a sense of shared reality with others; consensual understanding has the psychological benefit of reducing uncertainty and social anxiety, as well as the practical consequence of enhancing coordination. Because of the primacy, efficiency, and immediacy of nonverbal communication, nonverbal signals can elicit similar responses. People spontaneously mimic the nonverbal behaviors of others (*10*). From the social tuning perspective, the impact is deeper than behavioral mirroring: People also adopt the views that the other person is perceived to hold, particularly when there is an affiliative bond with the other person.

Group identities can also influence the ways people attend and respond to nonverbal expressions of others in systematic ways. People automatically evaluate other members of their group (ingroup members) more positively, are more trusting of them, and process information about them in a deeper and more detailed way. Members of other groups are viewed with suspicion and competitively (*11*). As a consequence, people may be especially sensitive to nonverbal cues from a member of their own racial group, particularly when it signals something negative about a member of another group. Shared group membership further provides the affiliative connection that motivates social tuning, which occurs without full awareness or control. In the United States, people automatically activate mental representations of racial group memberships when they see a person of another race. They become spontaneously aware of the person's racial group membership, which makes them also think more about their own group membership. However, because Weisbuch *et al*. used only white participants, it is unclear whether their participants' behaviors are rooted specifically in whites' prejudice toward blacks or represent a more general intergroup phenomenon. In the latter case, the effects of witnessing an ingroup member display negative nonverbal bias would occur both for blacks and whites and be stronger when participants have stronger group identities or feel more threatened by the outgroup.

Thus, the nonverbal displays of white characters toward blacks on television have deep influence on the whites' attitudes toward, and associations with, blacks. Beyond its practical implications, including illuminating how unspoken racial bias can be transmitted to millions of white Americans, the research of Weisbuch *et al*. suggests that nonverbal signals of ingroup members toward outgroup members can have a profound impact on white Americans' biased behavior—one that occurs largely without awareness. The influence of nonverbal racial bias on television evades the normal strategies for inhibiting overt manifestations of bias and can be communicated widely in unspoken ways to have broad impact on intergroup relations.

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ENGINEERING

Enabling New Missions for Robotic Aircraft

Improved sensing and planning for enhanced flight duration allow unpiloted small aircraft to fly autonomously in cluttered environments over long distances.

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Can we engineer an artificial "homing pigeon"—that is, create a small aircraft that can perform a task for us, pilot itself, and travel for a long time over great distances? Uninhabited aerial vehicles (UAVs), which have been developed mainly for military applications, are still remotely controlled, and some tasks, such as flying in crowded environments, are too difficult, dangerous, or expensive to be performed by even the smallest of these aircraft (*1*). These problems have spurred the development of smaller robotic air vehicles. Specifically, micro air vehicles (MAVs) are inexpensive, fly autonomously, and are small and lightweight (with wingspans of 15 cm or total mass of 0.5 kg) (*2*). We focus on the two technical challenges that must be met by MAVs if they are to fly as well as birds, namely perception—sensing and responding to their environment—and persistence—staying airborne.

MAVs possess special features that allow them to perform missions that cannot be completed by larger aircraft. For example, MAVs can fly in close proximity (0 to 50 m) to terrain where collision risks are high, and can collect data in urban or dense forest environments. For atmospheric studies, conventional aircraft create more disturbances on airflow and need long sensor booms or towed arrays. An MAV has little effect on airflows, and sensors can reside on the aircraft. Additionally, MAVs can operate stealthily, allowing both covert military surveillance missions and surveillance of natural animal behavior in places where larger UAVs cannot operate.

Perception is essential for MAVs operating in new flight domains, not only to execute their mission but also for basic guidance and control. The main issue is that capabilities are dictated by the payload capacity of the craft, and the ability to lift payload is limited by small wings. The navigation systems for larger UAVs are designed under the assumption that position and velocity are known at all times. They rely on both a global posi-

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