Abstract: Research corroborates the notion that fundamental social motives play an important role in biases that favor attractive people. Although an adaptationist framework expects favorable social effects of good looks in most situations and contexts, it simultaneously allows for potential negative social reactions and outcomes that may be elicited by physical attractiveness in other contexts. These effects of attractiveness reflect the reproductive opportunities and threats posed by potential mates and rivals.

Maestripieri et al. provide a valuable conceptual framework for understanding social biases associated with physical attractiveness. Although an adaptationist framework predicts positive social effects of physical attractiveness in some contexts, it also predicts negative social effects of attractiveness in other contexts. Moreover, there are important boundary conditions in how, when, and toward whom those biases are expressed. These patterns reflect the reproductive opportunities and threats posed by potential mates and rivals.

The biasing effects of attractiveness (Talamas et al. 2016) are consistent with humans' natural attention to beauty (Maner et al. 2007b; Mo et al. 2016; Sui & Liu 2009). This preference for good looks is shaped by natural selection and linked to the perception of the target's reproductive value (cf. "good genes theory"; Hamilton & Zuk 1992). People tend to react positively toward attractive members of the opposite sex, reflecting a heightened desire for social interaction (Lemay et al. 2010). In line with evolutionary principles, positive biases toward good-looking persons emerge because attractive people on average have high reproductive value and hence are desired as potential mates.

Consistent with sexual strategies theory (Buss & Schmitt 1993), attractive faces of one's preferred sex are processed with a higher responsiveness in the reward circuitry of people's brains (Kranz & Ishai 2006). Women and men elicit stronger neural responses when viewing faces of desirable mates (Cloutier et al. 2008; Ishai 2007).

Reactions to attractive persons depend on their sex and one's sexual preference (Försterling et al. 2007). Moreover, those reactions are consistent with the fundamental social motives framework, which posits that human motivational systems are functionally shaped to manage the relevant opportunities and threats afforded by social life (Kenrick et al. 2010; Neel et al. 2016). Adaptive mating-related biases (facilitating access to potential mates and avoiding potential rivals) may guide different reactions to attractive other-sex versus same-sex persons.

Indeed, physical attractiveness sometimes leads to negative, rather than positive, interpersonal judgments and outcomes. In the context of social relationships, people often perceive attractive same-sex persons as a threat to their self-esteem (Park & Maner 2009), mate value (Gutierres et al. 1999), and partnership, as well as reproductive success (e.g., Buss et al. 2000). The presence of intrasexual competition is linked to the activation of mate-guarding motives (Maner et al. 2009b; 2012) and even occurs automatically and without awareness (Massar & Buunk 2010). As soon as people reach sexual maturity (Agthe et al. 2013), they tend to derogate (Schmitt & Buss 1996; Vaillancourt 2013) and avoid (e.g., Agthe et al. 2008; 2011; Luxen & van de Vijver 2006) attractive same-sex persons. Accordingly, attractive female adolescents are at greater risk for indirect victimization (Leenaars et al. 2008). Women are often surrounded by friends who are similar in attractiveness, and less attractive friends tend to perceive more mating rivalry (Bleske-Rechek & Lighthall 2010). As women compete more on the dimension of physical attractiveness than men do (Dijkstra & Buunk 2002), women are particularly intolerant of "sexy peers" (Vaillancourt & Sharma 2011).

Negative reactions toward attractive same-sex persons are displayed particularly by people who are likely to fear intrasexual competition: for example, people in their young adulthood (Agthe et al. 2013) who tend to be only moderately attractive themselves (Agthe et al. 2010; Bleske-Rechek & Lighthall 2010), have relatively low self-esteem (Agthe et al. 2011) and high levels of chronic jealousy (Maner et al. 2009b), and tend to

compare downward to avoid social comparison threat (Agthe et al. 2014). Concerns associated with self-esteem and social comparison reflect proximate manifestations of underlying adaptive mating-related motives.

Similarly, boundary conditions for advantageous attractiveness-based biases should be considered. For example, favorable reactions toward attractive opposite-sex targets are less likely when perceivers are involved in dating relationships (Simpson et al. 1990). In a committed partnership, people sometimes ignore (Maner et al. 2008; 2009a) or devalue (Lydon et al. 2003) attractive alternatives. Conversely, attentional attunement to attractive women is pronounced in sexually unrestricted men (Maner et al. 2007a), and nonexclusive daters tend to judge attractive available targets more favorably than unavailable ones (Bazzini & Shaffer 1999). When women are in the fertile phase of their menstrual cycle, they respond more positively toward attractive men (Haselton et al. 2007), while displaying negative and competitive reactions toward attractive women (Fisher 2004). In addition, attractiveness-based biases emerge almost exclusively toward targets of the evaluator's own ethnic background (Agthe et al., 2016). Culture, family expectations, kinship rules, and the extent of individual choice that is allowed in personal relationships may also affect attractiveness-based biases (Anderson et al. 2008; Yu & Shepard 1998).

In sum, prior findings are consistent with the notion that mating-related motives play a role in people's reactions to good-looking persons and point to neural and evolutionary underpinnings of attractiveness-based biases. Physical attractiveness can produce both positive and negative social biases that vary with features of the perceiver (e.g., mood, hormonal influences), the target person (e.g., age, status), and the social context. Such biases reflect fundamental affordances associated with mating and involve motivational systems linked to seeking mates and competing with intrasexual rivals.

Attractiveness biases are the tip of the iceberg in biological markets

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Abstract: Physical attractiveness affects how one gets treated, but it is just a single component of one's overall "market value." One's treatment depends on other markers of market value, including social status, competence, warmth, and any other cues of one's ability or willingness to confer benefits on partners. To completely understand biased treatment, we must also incorporate these other factors.

The target article by Maestripieri et al. is a nice example of how people's market value affects others' willingness to help, hire, or otherwise confer benefits on them. The target article defines "market value" as one's physical attractiveness, but one's overall market value need not to be limited to the mating domain. Because sexual selection is part of social selection more generally (Lyon & Montgomerie 2012; West-Eberhard 1979; 1983), mate choice is also a subset of partner choice more generally, where organisms choose whom to interact with for either sexual or nonsexual relationships. Hence, mates (or potential mates) are just one type of partner that people can choose, albeit a very important type. This commentary generalizes the points in the target article beyond physical attractiveness and mating potential.

Biological markets theory describes how organisms choose partners (Noë & Hammerstein 1994; 1995). It treats social

interactions as occurring within a "market" for commodities, where some individuals are more desirable partners because of their greater ability, willingness, or availability to confer benefits upon partners (Barclay 2013; 2015; 2016). For example, in the mating domain, some partners are healthier, more fertile, more receptive, or better parents, or they carry "good genes" that offspring will inherit. Courting someone with these traits will statistically increase one's fitness, so we evolved to be sexually attracted to cues of these traits. In nonmating domains, some partners provide more effective or more frequent aid, coalitional support, food, knowledge, skills, and so on; these commodities provide statistical fitness benefits, so we evolved to be socially attracted to them. One's overall "market value" in any domain is a composite of one's relative desirability based on the relevant traits, just as one's "mate value" is one's relative desirability based on mating-related traits alone.

Many principles that apply to mating relationships will also apply to nonmating relationships. For example, the target article shows that people are biased toward physically attractive individuals (high mate value) because it is more beneficial to attempt to mate with them. People are also biased toward individuals with other types of market value (i.e., other cues of ability or willingness to confer benefits). For example, high-status people receive preferential treatment in many domains, such as being listened to more often, receiving disproportionate shares of group productivity, and being excused from some social obligations or for bad behavior (reviewed by Henrich & Gil-White 2001; Kafashan et al. 2014). People who appear competent are preferentially chosen as partners for tasks, from job searches to schoolyard team picking; competence-based choice occurs in chimpanzees (Melis et al. 2006) and even in trout (Vail et al. 2014). People who appear wealthy elicit more compliance with their requests (e.g., Nelissen & Meijers 2011). People who appear altruistic or trustworthy are chosen more often as cooperative partners (e.g., Barclay 2004; 2006; Barclay & Willer 2007; Cuesta et al. 2015; Gallo & Yan 2015), selected as leaders (Milinski et al. 2002), and even preferred as romantic partners (e.g., Arnocky et al., in press; Barclay 2010). So although biases toward physically attractive people are important, they are the tip of the iceberg in terms of preferential treatment toward people with high market value. Future research should compare the relative importance of different market-related traits, such as how people trade off the physical attractiveness of (supposedly nonromantic) partners against their competence, status, wealth, cooperativeness, and so on.

Biological markets theory allows us to make further predictions about attractiveness biases, or indeed any biases toward people with high market value. First, the magnitude of bias for a given trait depends on supply and demand. Attractiveness biases should be higher in environments where physical attractiveness is in high demand or low supply, for example, because of high pathogen pressure (Gangestad & Buss 1993) or when other needs like resources are relatively less important (Marlowe 2003). There will be stronger biases toward wealthy people when resources are crucial, toward physically proficient people when physical coalitional conflict is common, and so on.

Second, the magnitude of any bias depends on the variance in that trait. It is pointless to choose partners based on traits with no variance. Choosiness about cooperators diminishes when most people are cooperative (McNamara et al. 2008), so attractiveness should matter less in environments where everyone is attractive, wealth should matter less when everyone is wealthy, and so on.

Third, biases for particular traits depend on people being able to potentially "consume" it. Single men should display larger biases toward attractive women than do married men, especially in strictly monogamous societies with few extra-pair matings (less so under polygyny). Attractiveness should be less important if the target is married, raising children, sexually unreceptive, or chaste. People who do not need a particular trait in a partner should display lower biases toward others who possess it, such

as people who do not need a partner's help being less cooperative (Barclay & Reeve 2012; Kafashan et al. 2014).

Fourth, people who themselves have high market value should be more discriminating (e.g., more influenced by attractiveness) because they are more likely to succeed at attracting the desirable partners than would a low market value person (e.g., Little et al. 2001). For example, attractive men should show stronger biases toward attractive women, good cooperators should show stronger biases toward cooperators, and so on. High market value in one domain can predict preferences in others, such as wealthy individuals showing stronger biases toward attractive partners or vice versa. Extremely unattractive individuals may even be biased against attractive people, whom they have no hope of attracting.

I have highlighted four general types of predictions, derived from biological markets theory, about attractiveness biases. This list is limited by space, not by the utility of the theoretical perspective. Maestripieri et al. have nicely documented biases toward people possessing one highly salient market-related trait (physical attractiveness); we look forward to further work on other market-related traits, how these biases vary with social and ecological circumstances, and the relative weight of each trait across situations.

Attention and memory benefits for physical attractiveness may mediate prosocial biases

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Abstract: Mating motivations can explain attractiveness benefits, but what proximate mechanisms might serve as efficient causes of these biases? There is growing evidence that visual cues of physical attractiveness capture attention and facilitate memory, enhancing salience in ways that could underlie, for example, preferring one job applicant over another. All of these effects beg deeper questions about the meaning of attractiveness.

Empirical evidence for the benefits of being attractive is not easily dismissed, and I agree with the authors that we cannot ignore the explanatory role played by deep-seated mating motivations. However, ancestral mating success is an ultimate cause; one also needs to ask what proximate mechanisms might give rise to these biases and how "attractiveness" is defined in facial signal detection.

The financial/prosocial benefits that the physically attractive enjoy may arise from overt mating strategies that seek to continue interaction with attractive others. However, the salience of one job applicant over another, or the selection of an interaction partner in an economic game, could also arise, at least in part, from cognitive processing biases that can be found in the developmental and evolutionary literatures. Physically attractive women and men have been shown to grab our attention (e.g., Maner et al. 2003), an effect that appears in infancy, replicates across race and age of the faces (Langlois et al. 1991), and cannot simply be reduced to symmetry detection (Samuels et al. 1994). In contrast, memory appears to be sensitive to better recognizing only attractive females, not males (e.g., Becker et al. 2005). These effects follow naturally from the perspective that certain features of attractiveness correspond to signs of genetic health and fertility, and that these have different values for short- and long-term mating goals as a function of observer sex.

Attention to attractiveness may be instrumental to adult mating success, but why should infants prefer attractive faces? From the evolutionary-developmental perspective, mating motivations should promote attentional vigilance to signs of genetic fitness even in children without mature mating motivations, because