

ones in their inner virtual world before taking the risk of applying them in the harsh external environment. Compared with the “Skinnerian creature,” which can learn only by testing actions in the external environment, such that successful actions are reinforced and therefore tend to be repeated, the Popperian creature is more sophisticated and efficient (Dennett 1995). This ability to simulate the external world in an inner model may be one reason why the human species has evolved such a large and complex brain despite its significant costs (Aiello & Wheeler 1995). Excessive simulation, however, may occasionally lead to delusion. One such example is religion. Humans exhibit cognitive characteristics such as those described by theory of mind (Premack & Woodruff 1978) and pattermicity (Shermer 2011), which have allowed us to adapt to various ecological and social environments throughout human evolutionary history. These traits lead us to imagine entities that do not really exist and to attribute agency to them (Bering 2010). Such a simulation underlies the belief in a god or multiple gods. In some cases, religions require their followers to pay extreme costs, ranging from donations to suicide bombing. Religion does, however, serve the function of strengthening the cohesiveness of a group and facilitating the process of group selection, which may explain the existence of religion despite its unscientific nature and irrationality. Delusion has positive as well as negative consequences.

The ability to create a mental world that simulates actions in the external environment has an impact on many social and cultural phenomena. For example, altruism toward non-kin from whom they do not expect future help is an important behavior that is characteristic of human beings; such altruism is based on indirect reciprocity (Nowak & Sigmund 1998). Altruistic behavior toward strangers can then be interpreted as a kind of investment because a reward for the behavior is not guaranteed. Our societies, however, are sustained by this highly developed indirect reciprocity. Optimistic misinterpretations and imagination regarding the behavior of other people are needed to make such investments possible (e.g., Oda et al. 2011). The target article should, therefore, address future challenges and shed light on human behavior by appealing to the power of imagination.

The biasing effects of appearances go beyond physical attractiveness and mating motives

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Abstract: The influence of appearances goes well beyond physical attractiveness and includes the surprisingly powerful impact of “face-ism” – the tendency to stereotype individuals based on their facial features. A growing body of research has revealed that these face-based social attributions bias the outcomes of labor markets and experimental economic games in ways that are hard to explain via evolutionary mating motives.

In their review of the literature, and the arguments that follow, Maestripieri et al. largely overlook the fact that the biasing effects of appearances go well beyond physical attractiveness and include the surprisingly powerful impact of face-based social attributions (e.g., the extent to which a person has a competent-looking or trustworthy-looking face). Missing from their article is a discussion of the role of “face-ism” – the tendency to stereotype individuals based on their facial appearances. A growing body of research has revealed that people spontaneously

form social attributions from facial cues (Todorov et al. 2015); that these face-based attributions can bias a variety of important decisions (Olivola et al. 2014b), including those made in labor market contexts and experimental economic games; and that they do so above and beyond physical attractiveness. Many of these face-ism biases are hard to reconcile with evolutionary theories and harder still to explain in terms of mating goals.

1. Face-based social attributions predict labor market outcome. There is copious evidence that individuals seem to benefit from having faces that we stereotypically associate with desirable traits (Olivola et al. 2014b; Todorov et al. 2015). Military cadets who have more dominant-looking faces achieve higher ranks (Mueller & Mazur 1996), which may help explain why military leaders have distinctively dominant (or “cold”-looking) faces relative to other types of leaders (Olivola et al. 2014a). CEOs who have more competent-looking faces receive higher compensation, despite not performing any better (Graham et al., in press); in fact, their facial competence predicts their compensation better than their facial attractiveness (Graham et al., in press). Political candidates who have more competent-looking faces receive larger vote shares during elections, after controlling for their facial attractiveness (Olivola & Todorov 2010); here too, facial competence is a better predictor of success than facial attractiveness (Olivola & Todorov 2010). Political candidates who have more conservative-looking faces are also more popular with conservative voters, despite these political facial stereotypes being unrelated to physical attractiveness (Olivola et al. 2012). People are more likely to lend or donate money to individuals who (visually) look trustworthy, after controlling for their physical attractiveness and a host of financial and demographic variables (Duarte et al. 2012; Jenq et al. 2015). Recent studies have also shown that facial trustworthiness predicts corporate status (Linke et al. 2016), and even academic research productivity (Dilger et al. 2015), to a greater extent than facial attractiveness.

2. Face-based social attributions bias decisions in experimental economic games. Research has also shown that face-ism biases choices in experimental economic games. For example, a number of studies have demonstrated that senders in the trust game invest significantly more in receivers who have trustworthy-looking faces than in those with untrustworthy-looking faces (Bailey et al. 2016; Chang et al. 2010; Ewing et al. 2015a; 2015b; Rezlescu et al. 2012; Tingley 2014; van’t Wout & Sanfey 2008). In another type of experiment, involving a “debt game” in which players had to guess whether potential lenders were going to charge them no-, moderate-, or high-interest rates on their debt, participants were more willing to borrow from lenders with trustworthy-looking faces than from those with untrustworthy-looking faces, even though these facial cues were uncorrelated with the lenders’ actual decisions (Suzuki & Suga 2010). The biasing influence of facial trustworthiness in experimental economic games is a robust phenomenon: It has been demonstrated across age groups, including young children (Ewing et al. 2015a; 2015b), young adults (Bailey et al. 2016; Chang et al. 2010; Suzuki & Suga 2010; Tingley 2014; van’t Wout & Sanfey 2008), and older adults (Bailey et al. 2016), and also across countries, including the United States (Chang et al. 2010; Tingley 2014; van’t Wout & Sanfey 2008), the United Kingdom (Rezlescu et al. 2012), Australia (Bailey et al. 2016; Ewing et al. 2015a; 2015b), and Japan (Suzuki & Suga 2010). Only children with autism spectrum disorder were shown to be immune to this bias (Ewing et al. 2015a). Moreover, this bias persists (albeit to a smaller degree) in the face of contradictory reputational information concerning the receiver’s trustworthiness (Rezlescu et al. 2012). Importantly, facial trustworthiness influences investments in the trust game even when facial attractiveness fails to do so (van’t Wout & Sanfey 2008), or when the facial stimuli have been designed to vary primarily in terms of their perceived trustworthiness (Bailey et al. 2016; Rezlescu et al. 2012; Tingley 2014).

3. The biasing effects of face-based social attributions are difficult to explain in terms of evolutionary mating motives. Although the biasing effects of physical attractiveness may be well explained in

terms of evolutionary mating motives, the same is not true of face-based trait inferences. Consider labor market outcomes: Evolutionary mating motives cannot explain why, even after controlling for physical attractiveness, face-based social attributions predict income (Graham et al., in press), professional status (Linke et al. 2016; Mueller & Mazur 1996), political success (Olivola & Todorov 2010; Olivola et al. 2012), and the ability to attract loans (Duarte et al. 2012) or donations (Jenq et al. 2015). Nor can they explain why political facial stereotypes (how conservative a political candidate's face makes him or her look) predict the voting preferences of Republicans but not Democrats (Olivola et al. 2012), despite both groups having (presumably similar) mating motives. Or consider results from the trust game: Evolutionary mating motives fail to explain why 5-year-olds and 10-year-olds (who presumably lack sexual interest) are more willing to invest in individuals who have trustworthy-looking faces (Ewing et al. 2015a; 2015b), or why adult players are more willing to invest in individuals represented by trustworthy-looking computerized faces (Bailey et al. 2016; Rezlescu et al. 2012; Tingley 2014), despite the (very) limited sexual appeal of these avatar-like face stimuli. In fact, face-based social attributions have been shown to predict mating preferences, *above and beyond* physical attractiveness (Olivola et al. 2016). In sum, researchers need to recognize that the biasing effects of appearances go well beyond physical attractiveness and mating motives.

An assessment of the mating motive explanation of the beauty premium in market-based settings

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Abstract: Labor market and real-life studies were not designed to discriminate between evolutionary and taste-based and stereotype explanations for the beauty premium, have too many confounding effects, and lack crucial information. Smaller-stake and experimental studies provide more compelling evidence in favor of mating motives and suggest the direction of future research for the economists' field studies.

Maestriepieri et al. provide an excellent compendium and careful interpretation of the various explanations proposed by economists, social psychologists, and evolutionary psychologists for the beauty premium we observe in many aspects of everyday life. In particular, the authors illustrate the advantages of the evolutionary psychology theory that attractive individuals are favored for mating reasons in explaining the evidence from labor markets to loans, political elections, and economic games in the lab.

Economists, and possibly other scholars, have so far mostly ignored such an explanation and have not directly tested it in the field. The authors have the merit, among others, of stressing the importance of such an explanation, creating an opportunity for dialogue across disciplines, and spearheading more work in markets and other high-stake settings to disentangle the evolutionary explanation from the other two being proposed.

The task that Maestriepieri et al. have embarked on is a difficult one. Despite growing evidence from field studies that attractive people get better treatment (Hamermesh 2011), are more likely to find jobs and be promoted (Hamermesh and Biddle 1994), and get better terms on loans (Ravina, under review), most of the market-based studies are designed to disentangle the taste-based discrimination explanation from the statistical discrimination/social

psychology explanation that good looks are markers of productivity and good character. As such, these studies do not usually contain sufficient analyses to directly test the evolutionary explanation. For example, findings that attractiveness matters more for women than men in employment audit studies (Busetta et al. 2013) can in principle be reconciled with the statistical discrimination explanations of higher productivity if the jobs for which this is true are more likely to be filled by women and also happen to be jobs that require a lot of interaction with the public. Although in theory the study could have been designed to estimate the importance of mating motives in employers' decisions, not enough information was collected for this purpose. For example, the study does not provide enough information to assess the actual performance of employees with those characteristics that interacted with the employers in the past. The study also does not contain information on the sex of the employers who are more biased toward attractive candidates. Finally, getting a callback is not equivalent to landing the job, and although some employers might be motivated by mating motives when deciding whom to call back, they might act differently when making job offers having more long-lasting economic consequences for their firm.

This opens the question of the strength of the mating motive as the stakes increase. The evidence in favor of the evolutionary explanation is stronger in studies where smaller amounts of money are at stake, like for charity donations, restaurant tips, mock jury trials, and essay evaluations. In such cases, it is easier to disentangle the different explanations because more information is provided about the gender of the decision maker and the attractiveness and gender of the person being evaluated, and in many cases, the individual's actual ability is accurately measured or randomly assigned (Benson et al. 1976). However, such studies involve very low stakes and artificial settings, which might abstract from factors that in real life routinely interact with the feature being studied and change its effects.

Does the mating motive survive in settings with higher stakes, different contexts, and a more heterogeneous population? From the evidence available so far, we do not have enough information to tell. In addition, several economic studies indicate that the higher the experience and expertise of the decision maker, the less influenced he or she is by appearance (see Ravina, under review, for an example). Whether the behavior toward attractive people is conscious or unconscious, when the stakes become bigger, the decision makers might pay more attention to other dimensions of the problem, focus more, and think their decisions over more carefully.

Finally, another important avenue of research that few studies touch upon is whether other factors and personal characteristics interact with gender to affect mating motivations. The findings in Jensen (2013) that dominant males are less affected by attractiveness than weak ones constitute an example in this direction. Such analysis is important because it contributes to shedding light on the magnitude of the beauty premium in different contexts and different subjects and could possibly help distinguish among the explanations put forward in the different disciplines.

Understanding the mechanism behind the beauty premium has important implications. Depending on the causes of the positive bias toward attractive people, and the relationship between attractiveness and productivity, prosocial behaviors, and personality traits, we should either ignore the bias or make sure that our employees/decision makers are made aware or protected from it and from the "mistakes" to which it leads. Understanding the mechanism will also help us identify the people more prone to the bias, the contexts in which it is stronger, and possibly the best devices to protect the decision makers from it when the stakes are high, if they do not do so already by themselves. Finally, we might want to identify the cases in which we should encourage the bias as it leads to prosocial behaviors, higher productivity, or more happiness.

To conclude, the questions of whether the results found in lab experiments and smaller-stake settings "scale up" to real-life