



## Flash Report

The role of social meaning in inattention blindness: When the gorillas in our midst do *not* go unseen

Aneeta Rattan\*, Jennifer L. Eberhardt\*

Stanford University

## ARTICLE INFO

## Article history:

Received 10 April 2010

Revised 23 June 2010

Available online 8 July 2010

## Keywords:

Inattention blindness

Dehumanization

## ABSTRACT

Without visual attention, even the obvious—like a gorilla walking through a scene of people—goes undetected (Mack & Rock, 1998; Simons & Chabris, 1999). This “inattention blindness” is a persistent, well-documented limitation of the human visual system. The current research examines whether *social meaning* reduces this visual bias by imbuing unexpected objects with signal value, thus increasing their relevance and facilitating perception. Using one of the most established illustrations of inattention blindness, we show for the first time that activating a social association, even an erroneous one (i.e., the African American–ape association), drastically attenuates inattention blindness. This is not accounted for by visual feature matching. Rather, these results suggest that social meaning, even when flawed, may direct our visual system towards associated visual information that would otherwise be overlooked. As such, these results provide a powerful replication of the African American–ape association and illustrate that this broadly held association has the power to spontaneously change the content of one’s visual world.

© 2010 Elsevier Inc. All rights reserved.

People give great authority to what they see with their eyes. In fact, we are shocked when faced with the limits of our visual system, such as when veering out of the way of a previously unseen child crossing the road or when a bicyclist suddenly appears “out of nowhere” before our car. What accounts for these moments in which sight fails us? Research in cognitive psychology provides an unequivocal answer – without attention, even visual information of great consequence may not reach conscious perception (Chabris & Simons, 2010; Mack & Rock, 1998; Neisser, 1979; Simons & Chabris, 1999). This phenomenon, inattention blindness, is especially robust and forces us to recognize that the content of the perceived visual world is significantly limited.

One stunning illustration (Simons & Chabris, 1999; based on Neisser, 1979) of the primary role of attention in perception involves showing people a video of 2 teams with 3 players each, passing balls to one another. Participants are instructed to count the number of passes made among the players in white shirts. In the middle of the video, someone wearing a gorilla costume enters the scene from the right, pauses and beats her chest, and then exits (see Fig. 1). This “gorilla” is on the screen for approximately 9 s of the 30-s video and passes directly through the participant’s visual field, plainly visible to anyone not counting the passes. However, only 42% of participants detected the “gorilla” (Simons & Chabris, 1999); with their attention allocated

to counting the ball passes, these participants were blind to the “gorilla,” even though, physically, it passed right before their eyes (see <http://viscog.beckman.illinois.edu/flashmovie/15.php> to view the video clip).

This demonstration has been used thousands of times in psychology classes, presentations, and workshops throughout the world, both because the result is powerful and because it rarely fails to emerge. Indeed, few factors have been identified that reduce inattention blindness. One such factor involves color similarity. For example, when the color of the unexpected object matches the color of the attended object, participants are more likely to consciously detect the unexpected object—they exhibit less inattention blindness (Mack & Rock, 1998; Mack, Pappas, Silverman, & Gay, 2002). Certain stimuli that have been considered intrinsically meaningful (i.e., carry inherent signal value), such as happy faces or one’s own name, also reduce inattention blindness (Mack & Rock, 1998; Mack et al., 2002). More recently, research shows that the observer’s conscious goals, such as explicitly attending to objects from a specific conceptual category (e.g., furniture) may buffer against inattention blindness if the unexpected object is goal-relevant (e.g., a different object from the same attended category; Koivisto & Revonsuo, 2007; also see Most, Scholl, Clifford, & Simons, 2005). Although these factors present important moderators, there may be few opportunities for them to relieve our “blindness” in real world, complex scenes. In other words, unexpected objects entering our visual field may only rarely be color or goal matched to what we are already attending, and almost never graphics of smiling faces or our names. In fact, inattention blindness is seen as so impervious to outside influence that cognitive

\* Corresponding authors. Department of Psychology, 450 Serra Mall Bldg 420, Stanford, CA 94305-2130, USA.

E-mail addresses: [arattan@stanford.edu](mailto:arattan@stanford.edu) (A. Rattan), [jleberhardt@stanford.edu](mailto:jleberhardt@stanford.edu) (J.L. Eberhardt).



Fig. 1. Reprinted (Simons & Chabris, 1999; Figure 3). Used with permission.

psychologists have characterized it as a “fundamental fact of cognitive functioning” (Chabris & Simons, 2010). Our minds are simply not built to attend to every object that appears before us at any given moment—no matter how distinctive that object may be. Can anything, then, insulate us against blindness in everyday life?

Even in the absence of specific goals, we propose that socially derived meaning has the capacity to direct attention and thus reduce blindness to important visual information. In the words of William James, “Attention *creates* no idea, an idea must already be there before we can attend to it. Attention only fixes and retains what the ordinary laws of association bring ‘before the footlights’ of consciousness” (James, 1890/1950). In fact, a well-established body of research illustrates that socially derived associations can influence visual processing (Bruner, 1957; von Hippel, Sekaquaptewa, & Vargas, 1995). One classic example (Bruner & Goodman, 1947) revealed that poor children, for whom money is especially imbued with value, greatly overestimate the size of coins even when the coins are in plain view. This research illustrates that an object’s social associations can magnify its perceptual features. Yet, after decades of study, the authors are aware of no published research that examines whether social associations can alleviate inattention blindness. Is it possible that social associations imbue certain objects with meaning—objects that would otherwise lack signal value—thus bringing these objects into the “footlights” of attention?

Here, we examine whether social associations can have previously unexamined visual benefits. Of course, we acknowledge that many social associations are neither valid nor positive and can lead to significant societal costs (Donders, Correll, & Wittenbrink, 2008; Eberhardt, Goff, Purdie, & Davies, 2004; Trawalter, Todd, Baird, & Richeson, 2008). For example, research shows a prevalent association in the U.S. between African Americans and apes (Goff, Eberhardt, Williams, & Jackson, 2008). This association is dehumanizing, leads people to condone violence against African Americans, and is related to a higher likelihood of death sentences for African American than European American defendants in capital cases (Goff et al., 2008). More relevant to our focus here, this bi-directional association has also been shown to facilitate visual processing: priming the concept of African Americans facilitates the identification of degraded ape images, and priming the concept of apes leads people to spend more time visually attending to African American faces (Goff et al., 2008). In short, the social association between African Americans and apes prevalent in the U.S. offers clear visual tuning benefits, despite its profound societal costs.

In the current study, we focus on one potential visual benefit that, thus far, has gone unexamined: the capacity of the African American–

ape association to reduce inattention blindness. Whereas previous research on this association has focused on how people viewing a degraded object interpret it, here we examine whether they consciously register an unexpected, but association-relevant, object at all. Additionally, while a primary metric of previous research has been how long people spend visually attending to an object, here we focus on whether people are aware that they have attended to the object at all. That is, might the association between African Americans and apes be so powerful that it can begin to undo inattention blindness—commonly thought to be a fundamental (and virtually unavoidable) aspect of human cognition? If so, such a finding may have important implications: not only would it illustrate the power of the African American–ape association, but it would also highlight the potential role social associations may play in mitigating the negative impacts of our visual limitations more broadly.

We examined the extent to which the African American–ape association could reduce inattention blindness, capitalizing on the fact that its most well-known demonstration involves a person in a gorilla costume as the unexpected object that typically goes unseen (Simons & Chabris, 1999). If, as we hypothesize, social meaning can drive attention, fewer participants should exhibit inattention blindness after being prompted to think of African Americans (as opposed to European Americans) because in this context ape-related objects have increased signal value.

## Method

### Participants

Sixty-one European American students (26 females, 25 males, and 10 unreported) participated for course credit or pay.

### Procedure

We used a slightly modified version of the well-known inattention blindness demonstration described above (Simons & Chabris, 1999). Participants entered a lecture room in groups of 3–25. First, to prime race and thus make salient the African American–ape association, participants rated the popularity of a list of names, presented alphabetically. We randomly assigned participants to sort either a list of 8 stereotypically African American (Jamel, Malik, Rashaun, Tyrone, Ebony, Lashandra, Nichelle, and Shaniqua) or European American (Adam, Brad, Frank, Harry, Betsy, Heather, Katie, and Megan) names (Greenwald, McGhee, & Schwartz, 1998), with each list also containing 4 race-neutral names (Johnathan, Michael, Danielle, and Nicole). Next, the experimenter instructed participants to, “watch the team of players who are wearing light colored shirts and count the number of passes the members of this team make to one another.” After the video<sup>1</sup> ended, participants completed a survey, estimating the number of passes and responding to four questions that increasingly probed whether or not they saw the person in the gorilla suit (e.g., “Did you notice anything other than the six players on the video,” Simons & Chabris, 1999).

## Results and discussion

Participants’ responses were consistent across these questions, so we coded their first response for spontaneous admissions of seeing the “gorilla.” We found, as expected, that participants were significantly more likely to notice the “gorilla” in the African American prime condition,  $\chi^2(1, 61) = 3.85, p < .05$ , exhibiting almost 25% less

<sup>1</sup> All video rights obtained from Viscog Productions, Inc. Surprising studies of visual awareness, volume 1 (DVD). (Champaign, IL: Viscog Productions, 2003). <http://www.viscog.com>.

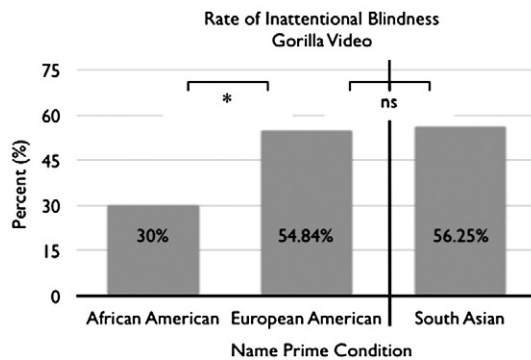


Fig. 2. The stereotypical African American name prime produced less inattentional blindness than the stereotypical European American and South Asian name prime conditions.

inattentional blindness than in the European American prime condition (see Fig. 2).

It is possible that these differences could represent distraction, in which case those in the African American prime condition might have been more likely to see the “gorilla,” but less able to complete their primary task of counting the passes. However, priming condition did not predict differences in the reported number of passes ( $p > .7$ ) and still significantly predicted detection of the gorilla controlling for the reported number of passes, with those primed with African American names 1.7 times more likely to see the “gorilla,” ( $B = .54$ ,  $SE = .27$ ,  $p < .05$ , *odds ratio* = 1.71). These results support our hypothesis that socially derived meaning affects inattentional blindness and provide an additional illustration of the African American–ape association.

Alternative explanations are still possible. First, previous research finds that detection increases if the colors of the unexpected object and the object of focus match (Mack & Rock, 1998). Perhaps thinking of African Americans immediately before the video brings the color “black” to mind, therefore increasing participants’ likelihood of noticing the black gorilla. According to this strict color-matching hypothesis, the visual match between the color black and the color of the gorilla could account for these results rather than the social association we propose. Selecting names as the race prime, rather than faces, allowed us to avoid introducing color as an obvious confound (Goff et al., 2008). However, it could still be argued that a name prime might conjure a color that approximates the color of apes. To examine this possibility more directly, we asked 17 European American undergraduates (6 females) to indicate (yes or no) whether a black square measuring approximately 1-in.  $\times$  1-in. on a white sheet of paper (which, unbeknownst to participants, was actually a swatch of the gorilla costume) was (a) “the same color as the skin of African Americans” and (b) “the color you picture when you picture African Americans.” 100% of participants answered “no” to both questions, indicating that, in terms of the strict color-matching hypothesis, shared basic visual properties (between gorillas and African Americans) are not driving these results.

Another version of the color-matching hypothesis states that the color of African Americans’ skin is dark and, in particular, darker than the skin of European Americans. According to this less strict color-matching hypothesis, thinking of African Americans may not lead one to think of the color “black,” but may bring to mind a color that more closely approximates the shade of the gorilla costume. Alternatively, perhaps the results are due to the dehumanization of outgroups in general (Leyens et al., 2000)—the propensity to see outgroups as less human than one’s ingroup—rather than the specific African Americans–ape association.

To investigate these possibilities, we ran an additional condition in which we primed 16 European American participants (9 females)

with South Asian names (e.g., Ajay, Anjali, Deepak)<sup>2</sup> and then showed the inattentional blindness video. The rate of detection was no different from the European American name prime condition as described above ( $p > .9$ ; see Fig. 2), indicating both that the association with apes is not general to all outgroups and that color-matching, even in its less strict formulation, does not account for the results.

## General discussion

Socially derived associations, even those that have profoundly negative consequences, can drive visual attention. In this study, the gorilla was given added signal value when African Americans were primed and was thus brought to the “footlights” of attention. Because no social association exists between European Americans and apes nor between South Asians and apes, the gorilla remained in the shadows, largely undetected.

Past research has shown that when people hold the conscious goal of attending to a specific category of objects (e.g., are instructed to attend to four identical African American faces on a screen), they are less “blind” to the unexpected appearance of another object from that category (e.g., an additional, identical African American face; Most et al., 2005). Our results illustrate that social meaning can have the same effect, but without goal activation and for objects that should otherwise be deemed entirely unrelated (e.g., African Americans and apes). In other words, by virtue of a social association linking African Americans and apes, the unexpected ape image led to the same outcome (enhanced detection) that an African American face might be expected to produce.

Demonstrations of inattentional blindness illustrate the profound limitations of visual processing. However, we have shown, for the first time, that social associations can substantially reduce inattentional blindness. This raises the possibility for future investigation that, insofar as the visual stimuli we encounter in everyday life are socially meaningful, we may be somewhat protected from pervasive “blindness.”

Inattentional blindness is commonly accepted as an inherent by-product of our visual system: attending to one object may mean sacrificing seeing another at all. The results reported here, however, raise the possibility that the inherent zero-sum nature of visual attention may not be fixed. In the current study, detecting the gorilla did not come at the expense of accurately counting the ball passes. It is as though the African American–ape association provided the study participants with a type of visual fluency, increasing their capacity to extract more from the visual world.

Nevertheless, despite the advantages that social associations can offer for visual processing, there may be significant costs here too. Social associations may restore our sight, yet these associations may only allow us to see more of a world that is compatible to them. For example, social associations may leave us blind to important information that falls outside of our pre-existing associations (e.g., counter-stereotypical information). Rather than working to challenge associations that are faulty or negative, such as the African American–ape association, the visual information we receive from the world may further support them. Future research should examine whether social meaning might work to simultaneously increase what we perceive, but constrain the span of objects deemed worthy of attention, “fix[ing] and retain[ing] what the ordinary laws of association bring ‘before the footlights’ of consciousness” (James, 1890/1950).

## Acknowledgments

Special thanks to RaceLab, Taylor Phillips, and Krishna Savani. This research was supported by a Stanford University Deans Award

<sup>2</sup> A pilot sample of 12 undergraduates correctly identified the outgroup associated with the names and listed “brown” as this group’s skin color.

awarded to Jennifer L. Eberhardt. Aneeta Rattan was supported by a National Science Foundation Graduate Research Fellowship.

## References

- Bruner, J. S. (1957). On perceptual readiness. *Psychological Review*, 64, 123–152.
- Bruner, J. S., & Goodman, C. C. (1947). Value and need as organizing factors in perception. *Journal of Abnormal Social Psychology*, 42, 33–44.
- Chabris, C., & Simons, D. (2010). *The invisible gorilla: And other ways our intuitions deceive us*. New York, NY: Crown.
- Donders, N. C., Correll, J., & Wittenbrink, B. (2008). Danger stereotypes predict racially biased attentional allocation. *Journal of Experimental Social Psychology*, 44, 1328–1333.
- Eberhardt, J. L., Goff, P. A., Purdie, V. J., & Davies, P. G. (2004). Seeing black: race, crime, and visual processing. *Journal of Personality and Social Psychology*, 87, 876–893.
- Goff, P. A., Eberhardt, J. L., Williams, M. J., & Jackson, M. C. (2008). Not yet human: implicit knowledge, historical discrimination, and contemporary consequences. *Journal of Personality and Social Psychology*, 94, 292–306.
- Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. K. (1998). Measuring individual differences in implicit cognition: the implicit association test. *Journal of Personality and Social Psychology*, 74, 1464–1480.
- James, W. (1890/1950). *The principles of psychology*. New York: Dover.
- Leyens, J. P., Paladino, P. M., Rodriguez-Torres, R., Vaes, J., Demoulin, S., Rodriguez-Perez, A., & Gaunt, R. (2000). The emotional side of prejudice: the attribution of secondary emotions to ingroups and outgroups. *Personality and Social Psychology Review*, 4, 186–197.
- Koivisto, M., & Revonsuo, A. (2007). How meaning shapes seeing. *Psychological Science*, 18, 845–849.
- Mack, A., Pappas, Z., Silverman, M., & Gay, R. (2002). What we see: inattention and the capture of attention by meaning. *Consciousness and Cognition*, 11, 488–506.
- Mack, A., & Rock, I. (1998). *Inattention blindness*. Cambridge: MIT Press.
- Most, S. B., Scholl, B. J., Clifford, E. R., & Simons, D. J. (2005). What you see is what you set: sustained inattention blindness and the capture of awareness. *Psychological Review*, 112, 217–242.
- Neisser, U. (1979). The control of information pickup in selective looking. In A. D. Pick (Ed.), *Perception and its Development: A Tribute to Eleanor J Gibson* (pp. 201–219). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Simons, D. J., & Chabris, C. F. (1999). Gorillas in our midst: sustained inattention blindness for dynamic events. *Perception*, 28, 1059–1074.
- Trawalter, S., Todd, A. R., Baird, A. A., & Richeson, J. A. (2008). Attending to threat: race-based patterns of selective attention. *Journal of Experimental Social Psychology*, 44, 1322–1327.
- von Hippel, W., Sekaquaptewa, D., & Vargas, P. (1995). On the role of encoding processes in stereotype maintenance. *Advances in Experimental Social Psychology*, 27, 177–254.