Research Article

Bald and Bad?

Experimental Evidence for a Dual-Process Account of Baldness Stereotyping

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Abstract: According to (a) the beauty ideal of a full head of hair and (b) the physical attractiveness stereotype (PAS; "what is beautiful is good"), bald men should appear less attractive than nonbald men, not only physically but also socially. To explain inconsistent results on this prediction in previous research, we suggest two antagonistic processes: the automatic activation of the PAS at the implicit level and its suppression at the explicit level, the latter process selectively triggered by individuating information about the target person. In line with this account, we only found negative social attractiveness ratings for bald men by same-aged women when individuating target information was lacking (Experiment 1). In contrast, irrespective of whether individuating information was available or not, we reliably found evidence for the PAS in different implicit paradigms (the implicit association test in Experiment 2 and a source monitoring task in Experiment 3). We conclude that individuating information about bald men suppresses PAS application, but not PAS activation.

Keywords: male hair loss, social perception, physical attractiveness stereotype, individuating information, implicit measures

OPEN DATA

A full head of hair is part of the general body image ideal (Cash, 2001; Synnott, 1987). Therefore, not surprisingly, many men with hair loss (*male pattern balding*, MPB), especially those at young age, are uncomfortable with their condition. Hair loss distress includes the feeling of looking old and unattractive and the fear of social rejection, for example, when searching for a partner or a job (Cartwright, Endean, & Porter, 2009; Williamson, Gonzalez, & Finlay, 2001). MPB is not a medical problem in the proper sense; it has no impact on the individual's state of physical health. MPB has a genetic basis and is induced by systemic androgens (testosterone and its metabolite dihydrotestosterone) leading to the miniaturization of hair follicles. It occurs in a characteristic pattern, beginning with recession of the frontal hairline and proceeding with thinning and loss of the hair on the crown and the temples (Olsen et al., 2005; Trüeb & Lee, 2014). MPB does not emerge until after puberty, when androgen levels have reached their maximum. Prevalence rates increase remarkably between the age of 30 and 40 years (Budd, Himmelberger, Rhodes, Cash, & Girman, 2000; Rhodes et al., 1998). Nevertheless, about one fifth of males in their twenties show at least some degree of hair loss, and some even show complete baldness (see Price, 2003).

With regard to the impact of MPB on interpersonal impression formation, one might ask whether balding men are not only perceived as less good-looking but also as less warm and friendly. This is exactly what the *physical attractiveness stereotype* (PAS; Dion, Berscheid, & Walster, 1972) predicts (for meta-analyses, see Feingold, 1992; Langlois et al., 2000). Accordingly, people generally assume that persons who are physically attractive are also socially attractive, that is, have socially desirable traits such as gregariousness and cheerfulness ("what is beautiful is good and what is ugly is bad"). Despite a wealth of empirical support for the PAS (see, e.g., Olson & Marshuetz, 2005; Swami et al., 2008, for PAS effects of facial and figure attractiveness, respectively), experimental evidence is quite mixed for the domain of MPB. Although most relevant studies agree that bald or balding men are perceived as less physically attractive (Cash, 1990; Hellström & Telke, 1994; Mannes, 2013; Moerman, 1988; Muscarella & Cunningham, 1996; Roll & Verinis, 1971; but see also Butler, Pryor, & Grieder, 1998; Sigelman, Dawson, Nitz, & Whicker, 1990; Wogalter & Hosie, 1991), only some show analogous effects on the evaluation of social attractiveness (Cash, 1990; Moerman, 1988), while others show no such effects (Hellström & Telke, 1994; Mannes, 2013; Muscarella & Cunningham, 1996; Roll & Verinis, 1971). Noteworthy, all these studies vary considerably in their experimental design and the samples, materials, and measures used, so that comparisons across studies are difficult (for a review, see Henss, 2001).

Does this inconsistent pattern of results question the validity of the PAS in the domain of MPB? Based on the fundamental distinction between *stereotype activation* and *stereotype application*, we argue that the activation of the PAS does not necessarily imply its application at the behavioral level. Stereotype activation depends on the momentary cognitive accessibility of a specific stereotype, whereas stereotype application implies its factual impact on person judgment and social behavior (Kunda & Spencer, 2003; Macrae & Bodenhausen, 2000). Although there might be a general spontaneous preference for physically attractive people, a good-looking person (such as a man with a full head of hair) is not always judged as more socially attractive than a less good-looking person (a bald man). As research on gender, age, and ethnic stereotypes has shown (e.g., Casper, Rothermund, & Wentura, 2011; Crawford, Jussim, Madon, Cain, & Stevens, 2011; Krueger & Rothbart, 1988), personal and contextual details known about a target person play a key role in stereotype suppression, resulting in non-application of an activated stereotype. The more such *individuating information* (as opposed to *categorical information*, e.g., on gender, age, or ethnic background) is available, the less people rely on stereotypes (Brewer, 1988; Fiske & Neuberg, 1990). Often only a small amount of information about an individual's specific character or situation is sufficient to override stereotype application (Jussim, 2012; Kunda & Thagard, 1996; with regard to the impact of individuating information on the PAS, see Eagly, Ashmore, Makhijani, & Longo, 1991).

To disentangle stereotype activation and stereotype application in the domain of MPB, the present research addressed the perception of bald versus nonbald men in two ways: First, in addition to experimentally manipulating target hair condition, we varied individuating target information within and across experiments. Second, we used implicit measures of target attractiveness in addition to explicit measures. In three studies, we examined whether bald men were rated not only as less physically attractive but also as less socially attractive than nonbald men. As outlined, we were skeptical about a robust PAS effect at the explicit level. We rather suggested a hidden conflict between PAS application and suppression, resulting in an outcome that largely depends on the availability of individuating information. Experiment 1 investigated the interaction between target hair condition and individuating information on explicit evaluations of physical and social attractiveness. We expected that bald target persons would be rated as both physically and socially less attractive than nonbald targets when no individuating information is provided about targets. In contrast, when individuating information is available, bald targets should still be rated as physically less attractive, but this should not generalize to social attractiveness ratings. Put differently, individuating target information was predicted to suppress the application of the MPB-related PAS at the *explicit* level. Irrespective of whether or not individuating target information is available, PAS activation should be reliably detectable at the *implicit* level at which cognitive processes are supposed to operate without conscious control (Devine, 1989; Moors & De Houwer, 2006). We aimed to demonstrate the automatic activation of the PAS by using two well-established measures of implicit information processing: the implicit association test in Experiment 2 and a source monitoring task in Experiment 3.

All experiments were conducted with young female participants (evaluating same-aged men) because the impact of MPB on person evaluations might be of particular relevance in (heterosexual) mixed-sex settings. Physical appearance is an essential factor in sexual and romantic attraction. It is typically the first information we have about a person and thus sets a threshold for making contact and establishing a relationship, mediated by the processing of further information about nonphysical characteristics (Lemay, Clark, & Greenberg, 2010). One might think, for example, about the booming Internet dating market. As recent research has shown in accordance with the PAS, dating sites of physically attractive young men are more successful in terms of females' impression formation (indexed by their response activity) than dating sites of less attractive men (Brand, Bonatsos, D'Orazio, & DeShong, 2012; McGloin & Denes, 2018; for disadvantages of bald men on the dating market, see Franzoi, Anderson, & Frommelt, 1990; Muscarella & Cunningham, 1996).

Experiment 1

The purpose of the first experiment was to investigate the impact of MPB on the explicit evaluation of physical and social attractiveness. Irrespective of whether or not individuating information was provided, bald target males should generally be rated as physically less attractive than nonbald target males. In contrast, the application of the PAS at the explicit level should depend on the (non-)availability of individuating information. Only in the condition lacking individuating information, bald men should also be rated as less socially attractive than nonbald men. However, this effect should not occur in the individuating information condition.

Method

Sample

Participants of this online experiment were 106 females with a mean age of 21 years. Participants were recruited at the University of Trier via social network websites using a snowball sampling strategy. Almost 2/3 of the participants were students (63%; various fields of study), 11% were training for a job, and 22% were employed. Most participants reported to speak German at a native-speaker level (93%); others reported to speak German very well. German language proficiency was required because this and the following experiments were conducted in German. Psychology students could receive course credit for participation.

Design

Experiment 1 used a 2 × 2 mixed-factorial design. Target hair condition (nonbald vs. bald) was varied within participants and individuating target information (no vs. yes) between participants.

Materials

We applied and further adapted black-and-white portrait pictures that had been created by Neave and Shields (2008) with a facial composite software. In particular, the original 10 nonbald targets (Caucasian men in their twenties with full short hair of different color and texture) were additionally morphed into complete bald targets. The two hair conditions corresponded to the extreme types I and VII of the Hamilton-Norwood Scale of MPB (Hamilton, 1951; Norwood, 1975). Put differently, each of the 10 prototypes existed in 2 versions, a nonbald and a bald one, giving a set of 20 targets. Sample pictures are depicted in Figure 1; all pictures used in the experiment can be found in the online materials supplied at https://doi.org/10.23668/psycharchives.2364 (see Figure S1).

With regard to the individuating target information, we took 20 attributes (10 negative and 10 positive attributes) from Wehr and Buchwald's (2007) evaluation study of German trait words. Specifically, we selected attributes that are highly diagnostic for low versus high social attractiveness. Sample attributes are *open-minded*, *sociable*, *funny* (positive social attractiveness) and *grim*, *superficial*, *intolerant* (negative social attractiveness).[1] Based on these 20 attributes, we created two 60-word vignettes, each containing five positive and five negative social attributes. The order of positive and negative attributes was matched between vignettes. The two vignettes are provided in the online material (https://doi.org/10.23668/psycharchives.2364, see Table S1).

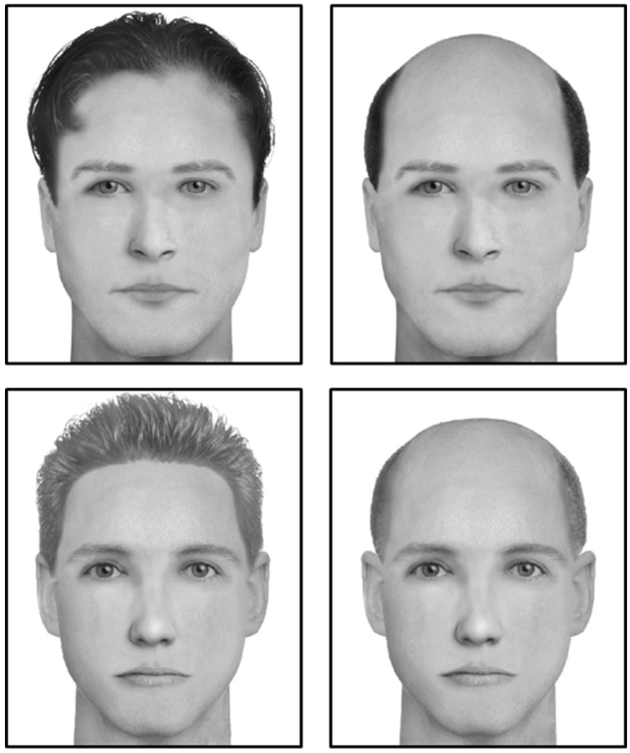

Figure 1. Two sample target prototypes used in the present research.

Procedure

After providing informed consent, participants were presented with two face portraits: one of a nonbald male target and one of a bald male target. The two targets were randomly chosen from the described target set, with the restriction that they had to stem from different prototypes. In the individuating information condition, participants additionally received the short vignettes with ambivalent character descriptions. In the no individuating information condition, no such vignettes were provided. The presentation order of the two targets was random, as was, in the individuating information condition, the assignment of vignettes to targets.

Participants were asked to acquaint themselves with the targets, followed by ratings of physical and social attractiveness, each ranging from 1 (= *not at all*) to 5 (= *very much*). The item wordings were "Wie attraktiv finden Sie diese Person?" and "Wie sympathisch finden Sie diese Person?", respectively. Note that in German the person characteristic "attraktiv" refers to physical attributes only (thus to be

[1] Wehr and Buchwald (2007, Study 2) asked their participants (N = 119 students) to rate the social desirability of 218 personality attributes on a 9-point scale ranging from 1 (= *not desirable at all*) to 9 (= *absolutely desirable*). The 20 negative attributes chosen for the present research (Studies 1–3) ranged from M = 1.42, SD = 0.93 ("bitter"), to M = 2.51, SD = 1.40 ("introverted"); the 20 positive items ranged from M = 6.85, SD = 1.85 ("popular"), to M = 8.32, SD = 0.95 ("satisfied"). Both, the means of the least negative and least positive items ("introverted" and "popular", respectively) were, with opposite signs, significantly different from 5 (i.e., the scale midpoint indicating neutral social desirability), $t(118) = 19.40$, $p < .001$, $d_z = 1.78$, and $t(118) = 10.91$, $p < .001$, $d_z = 1.00$, respectively.

translated as "good-looking" or "handsome"), whereas "sympathisch" refers to social attributes (to be translated as "friendly" or "likeable").[2] For each target, the face portrait, character description (in the individuating information condition only), and attractiveness ratings were displayed on the same computer screen. Target presentations were as long as participants required for the evaluation task.

Results

Means and standard errors of the two attractiveness ratings for the different experimental conditions are illustrated in Figure 2. Separate 2 (hair condition: nonbald vs. bald) × 2 (individuating information: no vs. yes) mixed analysis of variances (ANOVAs) were conducted for physical and social attractiveness. With a total sample size of N = 106, the statistical power of all F tests for main effects, simple main effects, and interactions exceeded $1 - \beta = .84$, given our significance level $\alpha = .05$, a correlation of r = .50 between-repeated measurements, and to-be-detected effects of medium size (population $f = .25$ or $\eta_p^2 = .06$, Cohen, 1988). All power analyses were conducted with G*Power 3.1.9.3 (Faul, Erdfelder, Buchner, & Lang, 2009).

With regard to physical attractiveness, only the main effect of hair condition was significant, $F(1, 104) = 57.58$, $p < .001$, $\eta_p^2 = .36$. Bald targets were generally rated as less physically attractive than nonbald targets. To corroborate the physical attractiveness advantage for bald targets across both individuating information conditions, we additionally analyzed simple main effects. As expected, simple main effects of hair condition were significant in the no individuating information condition, $F(1, 104) = 36.19$, $p < .001$, $\eta_p^2 = .26$, as well as the individuating information condition, $F(1, 104) = 21.92$, $p < .001$, $\eta_p^2 = .17$.

With respect to social attractiveness, there was a significant interaction between hair condition and individuating information, $F(1, 104) = 14.27$, $p < .001$, $\eta_p^2 = .12$. Bald targets were rated as less socially attractive in the no individuating information condition, $F(1, 104) = 9.19$, $p < .01$, $\eta_p^2 = .08$, for the simple main effect. In contrast, they were rated as more socially attractive in the individuating information condition, $F(1, 104) = 5.25$, $p = .02$, $\eta_p^2 = .05$, for the corresponding simple main effect.[3]

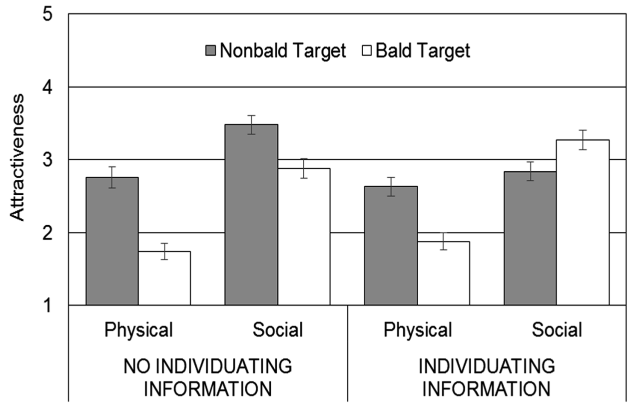

Figure 2. Means and standard errors of physical and social attractiveness ratings of Experiment 1.

Discussion

As predicted, the application of the PAS depended on the availability of individuating target information. When target presentations included pictures only, nonbald targets were rated as both physically and socially more attractive than bald targets, which corresponded to the PAS. However, when target presentations additionally included character descriptions, nonbald targets were only rated as physically more attractive than bald targets. With regard to social attractiveness, the effect was even reversed. In the individuating information condition, bald targets were rated as more socially attractive than nonbald targets, which was in stark contrast to the PAS.

Our subsequent Experiments 2 and 3 aimed to demonstrate the robustness of PAS activation at the implicit level, irrespective of whether individuating target information was unavailable (Experiment 2) or available (Experiment 3). Moreover, to conceptually replicate Experiment 1 (with slight variations in the target presentation), we additionally investigated explicit person evaluations, with Experiment 2 replicating the no individuating information condition and Experiment 3 replicating the individuating information condition of Experiment 1. The reason for splitting up the

[2] Across the three studies, bivariate correlations between the physical and social attractiveness ratings were consistently positive, $.33 \leq rs \leq .40$, $ps < .001$; the overall mean correlation was $r = .36$, $p < .001$ (r-z-r transformation procedure). Correlation coefficients neither differed between the two target hair conditions (nonbald vs. bald), $z = 0.12$, $p = .45$, nor between the two individuating information conditions (individuating information vs. no individuating information), $z = 0.56$, $p = .23$.

[3] We additionally checked for demand effects. Due to the presentation of both bald and nonbald targets, participants could have discerned the experiment's purpose – which, in turn, might have changed their evaluation behavior. That is why we additionally examined only the first target presented. Comparisons between the results reported in this paper and the results obtained from the first target analyses were very similar across all three studies. Due to the lower power of the latter analyses, not all effects could be replicated in terms of statistical significance (but most of them remained marginally significant; see Table S4 provided at http://doi.org/10.23668/psycharchives.2364).

individuating information factor is a technical one. As we will see in detail later, the implicit measure used in Experiment 2 precluded individuating target information (i.e., the target presentation was restricted to categorical information), whereas the implicit measure used in Experiment 3 required individuating target information in addition to categorical information.

Experiment 2

Our second study investigated the impact of MPB on both explicit and implicit evaluations of physical and social attractiveness. As said, target presentations in Experiment 2 consisted of picture information only (i.e., there was no individuating information available). In line with the no individuating information condition of Experiment 1, bald men should be rated as both physically and socially less attractive than nonbald men. In addition, we expected to find strong evidence for PAS activation at the implicit level, as reflected in the implicit association test (IAT; Greenwald, McGhee, & Schwartz, 1998). The IAT is a response time measure designed to assess associations between targets (in the present experiment, men with vs. without hair) and attributes (indicating low vs. high social attractiveness). It reveals stereotype activation to the extent that participants find it easier (i.e., need less time) to make stereotype-congruent categorizations (Banaji & Greenwald, 1994). Specifically, participants should respond faster to PAS-congruent (nonbald-positive and bald-negative) IAT categorizations compared with PAS-incongruent categorizations (opposite target-attribute assignment).

Method

Sample

Participants were 50 female students from the University of Mannheim (various fields of study) with a mean age of 22 years. Most participants were native German speakers (84%); others reported to speak German very well (14%) or well (2%). Participants received course credit or monetary compensation for participation.

Design

Experiment 2 consisted of two parts. In the first part (explicit evaluation task), participants were presented with a series of nonbald versus bald target males. That is, a single factor (hair condition: nonbald vs. bald) within-subject design was used. Note that target presentations consisted of pictures only and thus corresponded to the no individuation information condition of Experiment 1.

In the second part (implicit evaluation task), participants completed an IAT. The IAT included two binary categorization instructions, the order of which was counterbalanced across participants. One instruction required PAS-congruent categorizations, whereas the other required PAS-incongruent categorizations.

Materials

The 20 target pictures (10 nonbald and 10 bald men) and the 20 attributes (10 positive and 10 negative trait words) were identical to those used in Experiment 1 (see Figure S1 and Table S2 in the online materials).

Procedure

Participants provided informed consent and were seated in front of computer screens. They were presented with a sequence of 20 target males. The corresponding pictures resulted from 10 prototypes, combined with either a full head of hair or a bald head (see Experiment 1). The order of target presentations was random. After each target presentation, participants were asked to provide ratings of physical and social attractiveness (same items used in Experiment 1). The physical and social attractiveness ratings were averaged per participant separately for nonbald versus bald targets.

IAT instructions informed participants that response times would be measured when they were to categorize faces and trait words. Correct responses were to be given as quickly but also as reliably as possible by pressing one of two response keys ("D" and "K"). A red "X" on the screen would indicate any incorrect reaction, and the next stimuli would only appear after a correct reaction. The response-stimulus interval was 500 ms. As depicted in Table 1 and following the standard procedure (Greenwald, Nosek, & Banaji, 2003), the IAT consisted of seven blocks, five of which were practice blocks and two of which were test blocks.

The crucial IAT measure was based on the response times in the four double-discrimination blocks (3, 4, 6, and 7). In one instructional condition, the two PAS-congruent (nonbald-positive and bald-negative) categorizations each shared a response key, whereas in the other instructional condition, the response key assignment referred to the two PAS-incongruent (nonbald-negative and bald-positive) categorizations. Sample screens of the double-discrimination tasks are shown in Figure 3.

Results

We conducted matched-pair *t*-tests to test our hypotheses. With a total sample size of N = 50, the statistical power of these tests amounts to $1 - \beta = .93$, given our significance level α = .05 and to-be-detected effects of medium size (population d_z = 0.50; Cohen, 1988).

Table 1. Block sequence in the Implicit Association Test of Experiment 2

Block	No. of trials	Function	Items assigned to left-key response ("D")	Items assigned to right-key response ("K")
1	20	Practice	Nonbald targets	Bald targets
2	20	Practice	Positive social attributes	Negative social attributes
3	20	Practice	Nonbald targets + positive social attributes	Bald targets + negative social attributes
4	40	Test	Nonbald targets + positive social attributes	Bald targets + negative social attributes
5	20	Practice	Bald targets	Nonbald targets
6	20	Practice	Bald targets + positive social attributes	Nonbald targets + negative social attributes
7	40	Test	Bald targets + positive social attributes	Nonbald targets + negative social attributes

Notes. The assignment of response keys to positive and negative social attributes and to nonbald and bald targets were counterbalanced between participants as was the order of PAS-congruent and PAS-incongruent double-discrimination blocks (blocks 3 and 4 vs. blocks 6 and 7). The order of trials was randomized within each block.

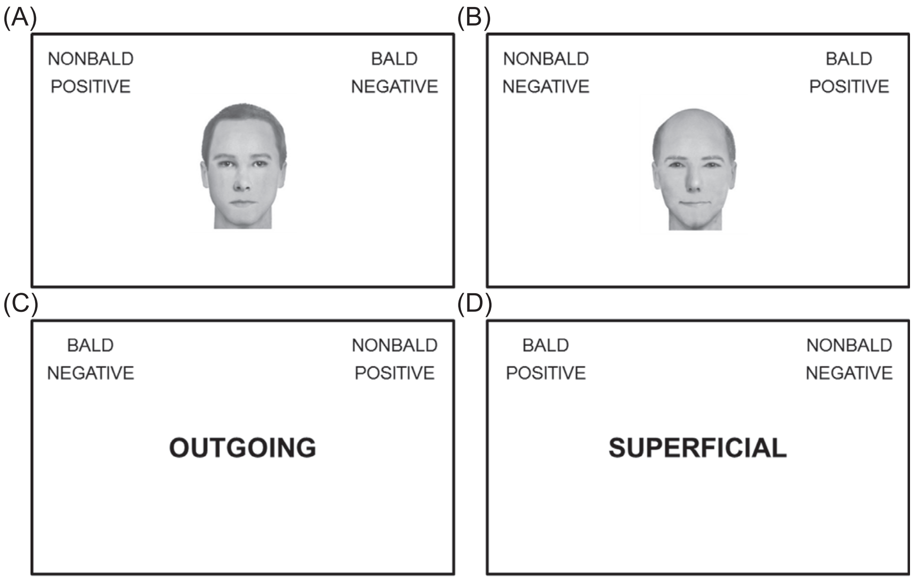

Figure 3. Four sample screens of the implicit association test (IAT) used in Experiment 2. All screens stem from a double-discrimination block (3, 4, 6, or 7; see Table 1). (A) and (B) require target group categorizations; (C) and (D) attribute valence categorizations. (A) and (C) require IAT responses that are congruent with the physical attractiveness stereotype (PAS; nonbald-positive and bald-negative, respectively, are linked to the same response key); (B) and (D) require IAT responses that are incongruent with the PAS (nonbald-negative and bald-positive, respectively, are linked to the same response key). The correct response for the sample screen (A) is given by the left response key ("D"); correct responses for the other sample screens (B) to (D) are given by the right response key ("K").

Explicit Evaluation

Means and standard errors of the averaged attractiveness ratings for the two hair conditions are illustrated in Figure 4. The paired *t*-tests (hair condition: nonbald vs. bald) were conducted separately for physical and social attractiveness. Hair condition effects were significant in both analyses. Nonbald targets were rated as more physically attractive, $t(49) = 12.27$, $p < .001$, $d_z = 1.74$, as well as more socially attractive than bald targets, $t(49) = 6.10$, $p < .001$, $d_z = 0.86$.

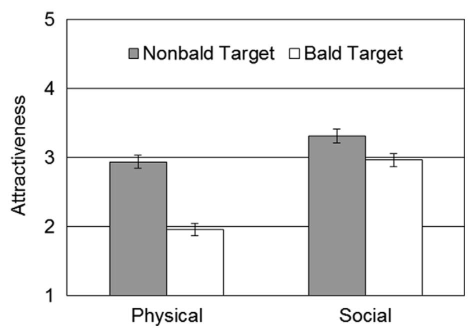

Figure 4. Means and standard errors of physical and social attractiveness ratings of Experiment 2.

Implicit Evaluation

For each participant, an IAT measure in the form of the *D* score, a variant of Cohen's *d* (Greenwald et al., 2003), was computed by calculating the standardized difference between the mean response times for the PAS-congruent and the PAS-incongruent double-discrimination blocks (blocks 3 and 4 vs. blocks 6 and 7; for details, see Lane, Banaji, Nosek, & Greenwald, 2007). A positive *D* score indicates faster responses in the PAS-congruent blocks (paired associations of nonbald targets and positive social attributes and bald targets and negative social attributes) compared to the PAS-incongruent blocks (opposite assignment of targets and attributes). As hypothesized, the paired *t*-test revealed that *D*s were significantly positive

(*M* = 0.41), $t(49) = 9.58$, $p < .001$, $d = 1.36$, indicating that it was easier for the participants to make PAS-congruent categorizations overall. A positive *D* score was observed among 46 of the 50 participants. Moreover, participants were not only faster in the PAS-congruent blocks (*M* = 747 ms) compared with the PAS-incongruent blocks (*M* = 907 ms), but also more accurate. The proportion of correct responses was higher in the PAS-congruent blocks (*M* = 0.96) compared with the PAS-incongruent blocks (*M* = 0.94), $t(49) = 2.23$, $p = .03$, $d_z = 0.32$.

Discussion

Target presentations of Experiment 2 included pictures of nonbald versus bald males only and thus corresponded to the no individuation information condition in Experiment 1. Results for explicit target evaluation were consistent in both studies. Corresponding to the PAS and replicating Experiment 1 for the no individuation information condition, nonbald targets were rated as both physically and socially more attractive than bald targets.

In the same vein, the IAT provided evidence for PAS activation at the implicit level. It revealed significantly faster response times (and also more correct responses) when nonbald targets were associated with positive social attributes and bald targets with negative social attributes compared with opposite target-attribute combinations. In sum, PAS-consistent evidence was found at both the explicit and the implicit level when pictures of the target persons were presented in isolation. This is in line with our predictions for the no individuating information condition.

Despite these clear-cut results, two open questions remain. Is PAS activation reliably elicited at the implicit level, even when assessed with implicit measures other than the IAT? Moreover, is PAS activation at the implicit level robust against presenting bald and nonbald target persons along with individuating information, as predicted by our theoretical framework? These questions were addressed in Experiment 3.

Experiment 3

The third study reinvestigated the impact of MPB on both the explicit and implicit perception of physical and social attractiveness. In contrast to Experiment 2, however, targets were presented with both portrait pictures and character descriptions. As outlined, such individuating information should selectively suppress PAS application at the explicit level. Therefore, in line with the results for the individuation information condition in Experiment 1, bald targets in Experiment 3 should be rated as only physically but not socially less attractive than nonbald targets. In contrast to the hypothesized PAS suppression at the explicit level, we predicted PAS activation at the implicit level, this time assessed by using a source monitoring task (SMT). The SMT is a recognition memory measure that refers to the discrimination of the origin of information (Mitchell & Johnson, 2000). According to the attention-elaboration hypothesis (Bobrow & Norman, 1975) stereotype-incongruent information attracts more attention and thus is elaborated more deeply than stereotype-congruent information. Consequently, source memory for stereotype-incongruent information should exceed source memory for stereotype-congruent information, a prediction that has been well-supported empirically (Erdfelder & Bredenkamp, 1998, see also Bell, Mieth, & Buchner, 2015; Kroneisen & Bell, 2013).[4]

Method

Sample

Participants of this online experiment were 116 females with a mean age of 22 years. Participants were recruited at the University of Trier via social network websites using a snowball sampling strategy. Most of the participants were students (72%; various fields of study). All participants reported to speak German on a native-speaker level. Psychology students could receive course credit for participation.

Design

Experiment 3 consisted of two experimental parts and a filler task in between. In the first part (explicit evaluation task), participants were presented with two target males, a nonbald and a bald man. That is, a one-factor (hair condition: nonbald vs. bald) within-subject design was used. Note that target presentations consisted of both portrait pictures and character descriptions, and thus corresponded to the individuation information condition of Experiment 1.

In the second part (implicit evaluation task), participants worked on a SMT in which they were to recognize the positive versus negative attributes of the nonbald versus bald

[4] We do not want to conceal that some studies report an effect opposite to the attention-elaboration hypothesis, that is, better memory for schema-congruent information. Following two meta-analyses (Rojahn & Pettigrew, 1992; Stangor & McMillan, 1992), these contradictory findings can be explained by the memory measure used (cf. Erdfelder & Bredenkamp, 1998): Studies using measures that correct for guessing biases (such as the present experiment) revealed a memory advantage for schema-incongruent information and typically a guessing advantage for schema-congruent information. In contrast, studies using uncorrected memory measures such as simple recognition hit rates or raw recall rates rather tend to find evidence for a congruency advantage. Because uncorrected memory measures are sensitive to schema-correlated guessing, memory for schema-congruent information is most likely overestimated by these measures.

targets previously presented and assign them to the correct source. The SMT in the present study was based on a one-factor within-subject design resulting from the comparison between PAS-congruent (nonbald-positive and bald-negative) and PAS-incongruent (nonbald-negative and bald-positive) source memory performance.

Materials

To match the number of target pictures and character descriptions, we used two targets only. We thus made some effort in pretesting the materials. New black-and-white portrait pictures were generated with a facial composite software. In a pilot study, 6 prototypes (faces without hair segments) had been shown to 16 female students from the University of Trier, who provided ratings of target physical attractiveness. For the present experiment, those two prototypes were chosen that were rated as medium and about equally attractive. Full hair and complete bald segments were then added to the two prototypes to get the four portrait pictures required. Picture materials can be found in the online materials (https://doi.org/10.23668/psycharchives.2364, see Figure S2).

The 20 attributes required for the two character descriptions (10 negative and 10 positive ones) were identical to those used in the previous studies. The 20 new attributes additionally required for the SMT (10 positive and 10 negative ones) were drawn from the same item pool as the old attributes. Attribute selection followed the same criteria (high diagnosticity for social attractiveness, strong affective valence), so that old and new attributes did not differ in this regard. Complete attribute lists can be found in the online materials (https://doi.org/10.23668/psycharchives.2364, see Table S3).

Procedure

Participants provided informed consent and were presented with two face portraits: one of a nonbald male target and one of a bald male target. In addition to the face portraits provided, target presentations included brief ambivalent character descriptions, each with five positive attributes and five negative attributes (same vignettes used in Experiment 1). The order of hair condition was random, as was the assignment of vignettes to targets. Subjects were asked to acquaint themselves with the two targets and to provide ratings of physical and social attractiveness (same measures used in Experiments 1 and 2). For each target, the face portrait, the character description, and the attractiveness ratings were displayed on the same computer screen. Target presentations were as long as participants required for the person evaluation task.

After providing attractiveness ratings for the two targets, participants performed an unrelated filler task (solving a set of anagrams) for about 8 min. Then, they were to respond to an unexpected SMT. This task included the 20 attributes that had previously been associated with either of the two targets, randomly intermixed with 10 positive and 10 negative new attributes, that is, 40 attributes in total. Participants were asked whether each trait had belonged to one or the other target person, or to neither of them.

To disentangle memory and guessing processes involved in source monitoring appropriately, source monitoring data are often analyzed by means of multinomial processing tree (MPT) models (for reviews, see Batchelder & Riefer, 1999; Erdfelder et al., 2009). MPT models of source monitoring provide two different memory measures – item discrimination (i.e., discrimination between old and new attributes) and source identification (i.e., target identification in the case of old attributes) while also taking possible guessing influences into account (Batchelder & Riefer, 1990; Bayen, Murnane, & Erdfelder, 1996). The crucial SMT test refers to the comparison between PAS-congruent and PAS-incongruent source identification performances. PAS-incongruent information should receive more attention and elaboration during encoding and thus result in better source identification than PAS-congruent information.

Results

Explicit Evaluation

As in Experiment 2, we conducted matched-pairs *t*-tests to test our hypotheses on explicit evaluations. With a total sample size of $N = 116$, the statistical power of these tests exceeds $1 - \beta = .99$, given our significance level $\alpha = .05$ and to-be-detected effects of medium size (population $d_z = 0.50$, Cohen, 1988). Means and standard errors of the two attractiveness ratings for the two hair conditions are illustrated in Figure 5. The paired *t*-tests (hair condition: nonbald vs. bald) were conducted separately for physical and social attractiveness. Hair condition effects were significant in both analyses. Nonbald targets were rated as more physically attractive, $t(115) = 4.97$, $p < .001$, $d_z = 0.46$, but less socially attractive than bald targets, $t(115) = 2.15$,

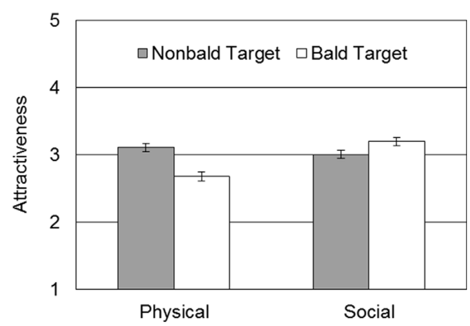

Figure 5. Means and standard errors of physical and social attractiveness ratings of Experiment 3.

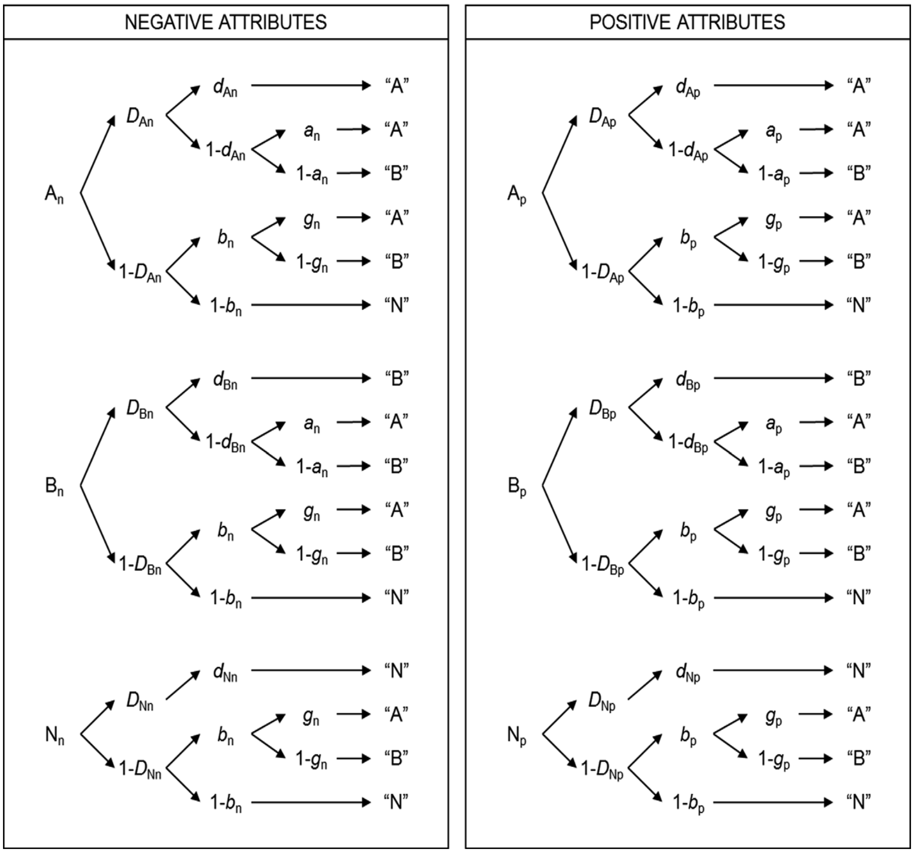

Figure 6. The version of the two-high threshold multinomial model of source monitoring (Bayen et al., 1996) used in Experiment 3. A and B denote target attributes of the nonbald and the bald target, respectively; N denotes new attributes not processed before. "A", "B", and "N" are the corresponding responses of the participants. The italicized parameters in-between denote probabilities of cognitive processes (see text) that mediate between encoding of test attributes and the response in the source monitoring task; indices "n" and "p" denote negative and positive attributes, respectively.

p = .03, d_z = 0.20. That is, the effects of hair condition on physical and social attractiveness were in opposite directions.

Implicit Evaluation

First, we computed conventional hit and false alarm rates for old and new attributes, HR = .76 and FAR = .39, respectively, as well as the average conditional source identification measure, ACSIM = .62, representing the average proportion of recognized items (i.e., attributes) assigned to the correct source (i.e., target; Murnane & Bayen, 1996). Obviously, both item recognition and source monitoring performance were better than random, but far from perfect.

Recognition asymmetries in source monitoring were analyzed by using the two-high threshold source monitoring (2HTSM) model proposed by Bayen et al. (1996). This model decomposes observable memory performance in process-pure measures of item memory, source memory, and guessing. The 2HTSM model posits that two discrete memory states, item discrimination and source identification, are attained with certain probabilities that can be estimated from response frequencies. Specifically, as depicted in Figure 6, participants are assumed to detect an old item – whether a negative or positive attribute (left or right side of the figure) – with probability D. They then either correctly identify the source of the item with probability d or fail to remember the source ($1 - d$). In the latter case, they need to guess the source (probability a for source A and $1 - a$ for source B). However, if an old item is not initially detected as old ($1 - D$), then, with probability b, participants guess the item is an old one. Subsequently, they guess the item is from source A or B with probabilities g and $1 - g$, respectively. Alternatively, they guess the item is new with probability $1 - b$. With regard to new items, distractor identification either succeeds (D) or fails ($1 - D$). In the latter case, participants either guess the item is old with probability b (and then guess the source with probability g for A and $1 - g$ for B) or they guess it is new with probability $1 - b$. In a model validation study comparing different multinomial models of source monitoring, this 2HTSM model proved to be most adequate for measuring item and source memory in source monitoring paradigms (Bayen et al., 1996).

Applying the 2HTSM model to Experiment 3 requires two sets of model trees and corresponding parameters, one set for negative attributes (indexed n; left side of Figure 6) and one for positive attributes (indexed p; right side of Figure 6). Each set includes three trees, one for attributes of the nonbald target (Source A), another for attributes of the bald target (Source B), and a third for new attributes (N). However, the full model depicted in Figure 6 is not (yet) identifiable. It includes 16 model parameters, but there are only 12 degrees of freedom in the data. Following Bayen et al. (1996), identifiable submodels of the full model were obtained by imposing equality constraints on parameters.

Using a special purpose software program for the analysis of multinomial models (*multiTree*; Moshagen, 2010), we fitted a first submodel – the Base Model (Model 1) – with the following two assumptions: First, the probability of item discrimination does not differ between items of both sources and new items; $D_{An} = D_{Bn} = D_{Nn}$ and $D_{Ap} = D_{Bp} = D_{Np}$. Second, the probability of guessing for one or the other source does not differ between detected and undetected items; $a_n = g_n$ and $a_p = g_p$.[5] These assumptions are in line with the 4-parameter 2HTSM that performed best in the comparative model validation study of Bayen et al. (1996). Since the source identification parameters d are free to vary, this model is neutral to our hypothesis on a memory advantage of stereotype-incongruent information. As the G^2 goodness-of-fit test shows, the Base Model fitted the data very well, $G^2(2) = 1.04$, $p = .59$.

We next tested whether source memory for stereotype-congruent information was homogeneous, that is, whether the positive attributes of nonbald men were recollected as well as the negative attributes of bald men. Correspondingly, we imposed the restriction $d_{Ap} = d_{Bn}$ on the Base Model parameters, resulting in what we call the Congruency Invariance Model (i.e., Model 2). This model fitted the data not significantly worse than the Base Model, $\Delta G^2(1) = 1.27$, $p = .26$. That is, source memory for stereotype-congruent information did not depend on target hair condition. Analogously, the restriction $d_{An} = d_{Bp}$ was imposed to test whether source memory for stereotype-incongruent information was homogeneous, that is, whether negative attributes of nonbald men were recollected as well as positive attributes of bald men (Incongruency Invariance Model; i.e., Model 3). Again, this model did not fit significantly worse than the Base Model, $\Delta G^2(1) = 1.91$, $p = .17$. Hence, source memory for stereotype-incongruent information was independent of target hair condition, too.

Subsequently, we considered both previous restrictions in combination: $d_{Ap} = d_{Bn}$ and $d_{An} = d_{Bp}$ (Double Invariance Model; i.e., Model 4). As expected, this did not result in a significant model fit decrease compared to the Base Model, $\Delta G^2(2) = 2.40$, $p = .30$. Importantly, based on this model, the estimate of the source identification parameter for stereotype-incongruent information (.64) was considerably larger than the corresponding estimate for stereotype-congruent information (.34). That is, positive attributes of bald men and negative attributes of nonbald men were much better remembered than negative attributes of bald men and positive attributes of nonbald men. Finally, this difference was tested for significance. The Double Invariance Model 4 served as a new model against which we tested a model with equal source monitoring parameters, $d_{Ap} = d_{Bn} = d_{An} = d_{Bp}$. This time the model fit was significantly worse, $\Delta G^2(1) = 4.52$, $p = .03$, indicating that source memory for stereotype-incongruent information indeed exceeded source memory for stereotype-congruent information significantly.

Maximum likelihood parameter estimates and standard errors for the four submodels of the 2HTSM are listed in Table 2. The most parsimonious Double Invariance Model 4 was the most revealing. It showed a clear memory advantage for stereotype-incongruent information. Note that the source guessing parameters did not differ significantly from the base rate .50, neither for positive attributes, $\Delta G^2(1) = 0.74$, $p = .39$, nor for negative attributes, $\Delta G^2(1) = 0.02$, $p = .88$. That is, the experimental manipulation of hair condition only affected source memory but not source guessing in case of source memory failure; put differently, source guessing was essentially unbiased.

Discussion

Target presentations of Experiment 3 included both portrait pictures and character descriptions and thus corresponded to the Experiment 1 individuation information condition. Results for explicit target evaluation were consistent. Deviating from the PAS and replicating the Experiment 1 results for the individuation information condition, bald target males were rated as only physically but not as socially less attractive than nonbald targets. Quite the reverse, bald targets even had a slight advantage in social attractiveness evaluations, which exactly replicates Experiment 1.

However, the SMT again provided clear evidence for PAS activation at the implicit level. It revealed significantly better source memory for target-attribute associations that were incongruent with the PAS (negative social attributes of nonbald targets and positive social attributes of bald targets) compared with opposite, PAS-congruent associations. This pattern is consistent with the attention-elaboration hypothesis, according to which stereotype-incongruent information attracts more attention and thus is elaborated

[5] The assumption that the source guessing probabilities a and g do not differ between recognized and unrecognized items proved to be successful in almost all applications of the two-high threshold source monitoring model so far (see, e.g., Küppers & Bayen, 2014). Systematic differences between a and g have been found only when item recognition versus recognition failure entails information about the likely source of an item (Batchelder & Batchelder, 2008; Meiser, Sattler, & von Hecker, 2007). Such effects cannot be expected for the present research.

Table 2. Parameter estimates (standard errors) for four submodels of the two-high threshold multinomial model of source monitoring that fit the data of Experiment 3

Model	Parameters			
	D	*d*	*a*, *g*	*b*
1: Base Model	$D_{An} = D_{Bn} = D_{Nn}$: .39 (.02)	d_{An}: .53 (.11)	$a_n = g_n$: .52 (.02)	b_n: .55 (.02)
	$D_{Ap} = D_{Bp} = D_{Np}$: .35 (.02)	d_{Ap}: .21 (.15)	$a_p = g_p$: .53 (.02)	b_p: .68 (.01)
		d_{Bn}: .42 (.11)		
		d_{Bp}: .76 (.12)		
2: Congruency Invariance Model	$D_{An} = D_{Bn} = D_{Nn}$: .40 (.02)	$d_{Ap} = d_{Bn}$: .34 (.09)	$a_n = g_n$: .52 (.02)	b_n: .55 (.02)
	$D_{Ap} = D_{Bp} = D_{Np}$: .35 (.02)	d_{An}: .56 (.11)	$a_p = g_p$: .53 (.02)	b_p: .68 (.01)
		d_{Bp}: .73 (.12)		
3: Incongruency Invariance Model	$D_{An} = D_{Bn} = D_{Nn}$: .39 (.02)	$d_{An} = d_{Bp}$: .63 (.13)	$a_n = g_n$: .50 (.02)	b_n: .55 (.02)
	$D_{Ap} = D_{Bp} = D_{Np}$: .35 (.02)	d_{Ap}: .27 (.11)	$a_p = g_p$: .52 (.02)	b_p: .68 (.01)
		d_{Bn}: .39 (.11)		
4: Double Invariance Model	$D_{An} = D_{Bn} = D_{Nn}$: .39 (.02)	$d_{Ap} = d_{Bn}$: .34 (.09)	$a_n = g_n$: .50 (.02)	b_n: .55 (.02)
	$D_{Ap} = D_{Bp} = D_{Np}$: .36 (.02)	$d_{An} = d_{Bp}$: .64 (.08)	$a_p = g_p$: .52 (.02)	b_p: .68 (.01)

Notes. *D* = probability of correctly detecting old and new attributes, respectively (item discrimination parameter); *d* = probability of correctly identifying the source of an attribute (source identification parameter); *a* and *g* = probability of guessing an attribute, whether detected or undetected, is from Source A; *b* = probability of guessing an attribute is old; A and B = Sources A and B (nonbald and bald target), respectively; N = new attributes; n and p = negative and positive attributes, respectively.

more deeply than stereotype-congruent information (Erdfelder & Bredenkamp, 1998).

General Discussion

A review of experimental research on the social perception of MPB (Henss, 2001) showed that male hair loss, by and large, has a negative impact on the perception of physical attractiveness ("handsome appearance") but an ambiguous effect on the perception of social attractiveness ("likeable impression"). This conflicts with the PAS prediction of a consistently negative impact on both attractiveness dimensions (Dion et al., 1972). Importantly, however, all studies reviewed by Henss (2001) used explicit ratings of target attractiveness and none of them systematically examined effects of presenting individuating target information, a variable known to have a gatekeeper function in stereotype application (Kunda & Thagard, 1996). The present research addressed this twofold desideratum – systematical variation of individuating information on bald versus nonbald target males and measurement of both explicit and implicit evaluations.

Summary of Main Findings

Based on cognitive models of stereotyping (see Evans & Stanovich, 2013, for a critical review), we separated two distinct processes: the *activation* of the PAS at the *implicit* level and its *application* at the *explicit* level. The latter should be fostered by categorical salience (i.e., physical attractiveness cues, such as a full head of hair or a bald head) and suppressed by individuating information (i.e., information about personal characteristics beyond categorical information). This is exactly what we found at the explicit level. Young women rated same-aged bald men as both less physically and less socially attractive than nonbald men when target presentations consisted of face portraits only (Experiment 1: no individuating information condition; Experiment 2). However, when target presentations combined portrait pictures with character descriptions (Experiment 1: individuating information condition; Experiment 3), bald targets were still rated as less physically attractive but no longer as less socially attractive; in contrast, this time bald targets were rated as even more socially attractive than nonbald targets. In other words, there was a general physical attractiveness disadvantage but no general social attractiveness disadvantage for bald men. Importantly, the power of all three studies conducted was substantially higher than typically recommended (e.g., .80 by Cohen, 1988). That is, the chance of finding an effect, if it existed, was very high.

As predicted, the results observed for implicit measures of person evaluation, namely the IAT (Experiment 2) and the SMT (Experiment 3), diverged from those obtained with explicit measures. At the implicit level, we reliably found evidence consistent with the PAS, irrespective of whether target presentations consisted of picture information only or included both picture and character information. In the IAT, participants were faster to respond to PAS-congruent (nonbald-positive and bald-negative) categorizations compared with PAS-incongruent (nonbald-negative and bald-positive) categorizations. Similarly, in the SMT, participants were better in remembering PAS-incongruent compared with PAS-congruent categorizations, corresponding to the predictions of the attention-elaboration hypothesis. This result supports the idea that PAS activation occurs automatically and can thus be reliably and robustly detected by implicit measures.

Implications for the Physical Attractiveness Stereotype

The present research has some important implications for stereotype research in general and the PAS in particular. It highlights the importance of distinguishing between stereotype activation and stereotype application in the domain of physical appearance. Automatic PAS activation due to high or low levels of target physical attractiveness, as detected by implicit measures, does not inevitably lead to analogous explicit ratings of target social attractiveness. Our findings confirm an inhibitory effect of individuating target information on the application of the PAS at the explicit level. Apparently, under some conditions, such as the availability of individuating information, people use an "inner check" when it comes to inferring inner from outer qualities (cf. Crandall & Eshleman, 2003).

From a social and moral cognition perspective, such caution in stereotyping makes sense intuitively. Although stereotypes simplify processing of social information, they always bear the risk of oversimplification (Allport, 1954; Macrae, Milne, & Bodenhausen, 1994). Therefore, our social cognitive system has to keep a lid on them. The interaction between stereotype activation by categorical information on the one hand and stereotype suppression due to individuating information on the other hand contributes to balancing efficiency and accuracy of information processing (Jussim, McCauley, & Lee, 1995; Monteith, Sherman, & Devine, 1998). This benefit of processing individuating information may outweigh its possible detrimental effects, mainly the ignorance of base rates (Kahneman & Tversky, 1973; Nisbett & Ross, 1980). Clearly, assuming "what is beautiful is good" might often be unjustified, and drawing the complementary conclusion "what is ugly is bad" might even be unfair. This dark side of the PAS closely relates to discrimination and stigmatization, as has most impressively been shown for people with overweight (Puhl & Brownell, 2001). Therefore, children are taught to reflect before categorizing others based on their physical appearance ("beauty is but skin deep"). Gathering individuating information plays a key role in such reflection.

The finding that, in the individuating information condition, bald men were consistently rated as more socially attractive than nonbald men deserves special attention. We originally predicted the MPB-related PAS would be suppressed when individuating information is available, possibly resulting in a null effect of baldness on social attractiveness ratings. However, there was even a social attractiveness advantage for individuated bald targets. Similar effects in other domains have been described as *compensatory stereotyping* (e.g., "poor but honest", "small but sexy"; Kay & Jost, 2003; Stone, Perry, & Darley, 1997). This phenomenon is predicted, among others, by the *system justification theory* (Jost & Banaji, 1994; Jost, Banaji, & Nosek, 2004) which proposes a general motivation to view the social system to which one belongs as fair and good. Balancing negative aspects of a prejudiced group with positive attributes contributes to mentally restoring or defending equity and justice of one's own system. In a similar vein, the *impression management theory* (Leary & Kowalski, 1990) explains compensatory stereotyping as a consequence of benevolence. People are not only motivated to create a favorable self-presentation but also to demonstrate positive attitudes toward and relations with other people and groups (which, in turn, places them in a positive light). Thus, they try to find counter-stereotypical evidence that allows them to compensate for negative stereotyping (Bergsieker, Leslie, Constantine, & Fiske, 2012; Czopp, Kay, & Cheryan, 2015).

As our IAT (Experiment 2) and SMT measures (Experiment 3) clearly showed, the PAS is reliable and robust at the implicit level, irrespective of whether individuating information is available or not. At the implicit level, the PAS thus seems to be resistant against individuating information. This interpretation coincides with the assumption that implicit processes are slow to build and slow to change (e.g., Rydell & McConnell, 2006; Wilson, Lindsey, & Schooler, 2000), whereas, at first glance, it seems to conflict with recent research emphasizing the malleability of implicit processes (Smith & De Houwer, 2015; for an overview, see Gawronski & Sritharan, 2010). Importantly, however, evaluation change at the implicit level requires strong counter-stereotypical information processing (e.g., by using learning paradigms aiming to recategorize stereotyped groups; Ito, Chiao, Devine, Lorig, & Cacioppo, 2006; Olson & Fazio, 2006) which was not the case in our experiments. The individuating information we used included PAS-congruent as well as PAS-incongruent attributes across both hair conditions. Apparently, ambivalent individuating information per se (without any advantage or disadvantage for any target group) is sufficient to suppress stereotyping – at the explicit but not the implicit level.

Conclusion

Taken together, our research provides a mixed message for young men suffering from hair loss and worrying about social withdrawal, especially by women of their age. As the PAS suggests, MPB might not only be perceived as a disadvantage in terms of physical attractiveness but also in terms of social attractiveness. This double burden was detected at the implicit level of person judgment – and at the explicit level as long as target presentations consisted of picture information only. However, adding individuating target information changed the result pattern at the explicit level. This manipulation increased the social attractiveness perception of bald target males and even produced a slight advantage compared with nonbald targets. Note that individuating information not only referred to "bright side" features; the character descriptions we used included both positive and negative aspects and were counterbalanced across hair conditions. Apparently, learning more about the diverse personality aspects of a bald man remarkably increases his social attractiveness. This "bald but nice" finding might encourage balding men to accept their condition rather than to struggle against it (see Kranz, 2011).

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