

## Other Papers

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### Nature vs. nurture and the flexibility of gender stereotypes: Counterstereotypical information can both diminish and enhance ingroup stereotyping

**Abstract:** *The present studies explore how activating concepts pertaining to the origins of interindividual differences affect the processing of stereotypical and counterstereotypical information. The concepts, i.e., nature and nurture, are both assumed to evoke similar stereotypical expectations although nurture implies greater flexibility. The studies show that stereotypical information enhances whereas counterstereotypical information diminishes stereotyping when nurture is activated. In contrast, counterstereotypical evidence challenges what activated nature would suggest and perceivers primed with nature evince stronger stereotyping when they encounter counterstereotypical information. The results also show that priming nature leads perceivers to attribute stereotype conformity to internal causes whereas nurture accredits conformity to situational constraints. Stereotype flexibility is associated with the subjective ease with which perceivers can both imagine counterstereotypical and mentally undo stereotypical evidence.*

**Keywords:** *Stereotypes, Essentialism, Social Attribution, Gender Differences*

The present research examines how activation of either the nature (biology) or the nurture (socialization) concepts could affect one's gender ingroup stereotyping. Nature and nurture can both be conceived as alternative interpretation frames while stereotype conformity or disconformity is being observed. An individual perceiver can endorse or repudiate either explanation and the explanations can both be temporarily activated in order to interpret stereotypical or counterstereotypical empirical evidence. As nature seems to imply that psychological characteristics are stable and also meaningful in some respect, stereotypical expectations triggered by nature might be more rigid and less probabilistic than those triggered by nurture. Nurture implies less rigid expectations because social conventions and reinforcements regarding gender role conformity are culturally relative, largely arbitrary, and theoretically reversible (cf. Braun & Davidson, 2017; Hoffman & Hurst, 1990; Hornsey, Wellauer, McIntyre, & Barlow, 2015; Taylor, 1996). However, nurture could actually lead to construing even more stereotypical representations of social categories whenever stereotype conformity is observed, because the conformity verifies that exogenous

factors cause stereotypical gender differences and because socialization may have eliminated differences between the sexes or even induced the reverse ones (cf. Endendijk, Groeneveld, van der Pol, van Berkel, Hallers-Haalboom, Bakermans-Kranenburg, & Mesman, 2017; Keener & Strough, 2017; Lytton & Romney, 1991). Briefly stated, activating nurture should thereby result in "discounting" (cf. Kelley, 1973) deeper inherent features (e.g., hormones) as causal explanations. The rationale behind this *mutability-hypothesis* is that stereotypical expectations evoked by nurture are more flexible and that empirical differences are regarded as ontologically less meaningful. Since nurture does not necessarily imply that empirical differences echo deeper, stable and inherent characteristics, counterstereotypical evidence simply signifies that not every boy or girl has fallen victim to gender typed socialization. At surface, the notion that category differences are perceived as less stable and meaningful would imply that focusing on nurture diminish stereotyping. However, if exogenous forces can produce multiple and theoretically reversible outcomes, stereotypical information confirms that socialization may in fact produce gender-typical differences.

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As for nature, research on subjective essentialism suggests that adopting a biological interpretation frame should promote stereotyping (e.g., Bastian & Haslam, 2006; Brewer & Harasty, 1996; Crawford, Sherman, & Hamilton, 2002; Haslam, Bastian, & Bissett, 2004; Haslam, Rothschild, & Ernst, 2000; Hilton & von Hippel, 1990; McGarty, Haslam, Hutchinson, & Grace, 1995; Nuernberger, Nerb, Schmitz, Keller, & Suetterlin, 2016; Yzerbyt, Corneille, & Estrada, 2001; Yzerbyt & Rocher, 2002; Yzerbyt, Rocher, & Schadron, 1997). However, because this research has focused almost exclusively on stereotypical perceptions of outgroup members (cf. Hebl, Williams, Sundermann, Kell, & Davies, 2012; Yzerbyt et al., 2001), this conclusion might be premature. When one perceives outgroup members, one focuses largely on similarities among them and attends mainly to stereotype consistent information (e.g., Bastian & Haslam, 2007; de Dreu, Yzerbyt, & Leyens, 1995; Fiske & Taylor, 1991; Kahn & Davies, 2011; Oakes, Haslam, & Turner, 1991; Park & Rothbart, 1982; Stangor & Lange, 1994; Weeks, Weeks, & Long, 2017). Outgroup perception evokes prototype-based expectations and outgroup members are likely to be judged in terms of the social category involved (e.g., Ackerman, Shapiro, Neuberg, Kenrick, Becker, Griskevicius, Maner, & Schaller, 2006; Brewer, Weber, & Carini, 1995; Kahn & Davies, 2011; Koomen & Dijker, 1997; Linville, Fischer, & Salovey, 1989; Maass, Montalcini, & Bibiotti, 1998; Yzerbyt, Rogier, & Fiske, 1998).

Ingroup representations are typically less schematic and involve a number of weakly associated characteristics. Information about ingroup members is thus less likely to be processed on the category basis (e.g., Alexandre, Waldzus, & Wenzel, 2016; Fiske & Taylor, 1991; Linville et al., 1989; van Veelen, Otten, Cadinu, & Hansen, 2016). Stereotype inconsistent information is usually attended to more thoroughly than stereotype consistent information when one processes information about ingroup members because ingroup prototypes are more differentiated and less salient (Koomen & Dijker, 1997). Perceivers focus more on differences among than on similarities between ingroup members since sustaining ingroup stereotypes is not as functional as the perpetuation of outgroup stereotypes. However, as ingroup members are often concerned about how they are perceived by outgroups, ingroup stereotypes are highly relevant (e.g., Turner, Oakes, Haslam, & McGarthy, 1994; Yzerbyt, Cambon, 2017).

How a biological interpretation frame affects the processing of counterstereotypical information has received very little attention. We suggest that activating nature should lead an observer to respond differently to ingroup members who match or mismatch the ingroup's prototype. Counterstereotypical information should challenge what activated nature would suggest if the biological interpretation frame really implies that empirical differences between groups reflect deeper, stable, and meaningful characteristics. Our *rebound-hypothesis* states that counterstereotypical evidence enforces stereotypical perceptions more than stereotypical information does if

nature is activated as a causal explanation of phenotypic variance. This hypothesis does not imply, however, that activating nature biases the encoding of stereotypical information. We do not expect that nature and nurture affect differentially the perceived typicality of a particular target (e.g., trait ascriptions) but that they determine which inferences are drawn from the perceived evidence. We argue that nature, activated as a causal explanation, renders it subjectively difficult to imagine counterstereotypical behaviours and characteristics, basically because essentialist interpretations involve the idea of real, deep, and meaningful gender group differences.

Why should the activation of nurture make it easier to imagine counterstereotypical evidence? To the extent that social influences are believed to be effective, perceivers should attribute supportive evidence to situational constraints. Thus, if stereotype conformity in fact affirms what the interpretation frame (i.e. nurture) would suggest, characteristics of stereotype conforming targets should be attributed to contextual factors. An *observer* can thus more easily undo the empirical evidence if he or she locates the cause within the social system (e.g., role modelling, reinforcements) rather than within the nature of an individual (e.g., heritable dispositions). As situational constraints are typically more controllable than dispositions, perceivers should find it easier to mentally undo or mutate stereotypical evidence that is caused by the situation (Kray, George, Liljenquist, Galinsky, Telock, & Roese, 2010; Levy, Stroessner, & Dweck, 1998; N'gbala & Branscombe, 1995; N'gbala & Branscombe, 2003; Roese, 1997; Roese, Morrison, 2009).

To sum up, we hypothesize that stereotype conformity should be attributed differently, depending on which causal explanation is activated. Perceivers primed with nature should attribute stereotypical evidence to internal causes, whereas perceivers primed with nurture should attribute stereotypical evidence to external causes. The reverse should hold true for counterstereotypical evidence. According to our 'rebound-hypothesis' (see: above), when nature is primed, counterstereotypical evidence should lead to reinforcing the stereotype, because counterstereotypical evidence challenges nature as the possible causal explanation. According to our 'mutability-hypothesis' (see: above), however, when nurture is primed, counterstereotypical evidence should undermine perceived stereotypicality. We further suggest that social attribution should go hand in hand with the subjective ease of mental simulations.

## Study 1

A popular gender stereotype that directly acts on the genesis of sex differences centres on girls' and boys' differential playing preferences (e.g., rugged vs. gentle). Developmental research shows that parents often reinforce "gender-appropriate" play themes in girls and boys (e.g., Jacklin, DiPietro, & Maccoby, 1984). Moreover, adults tend to recall their former playing preferences consistent with their gendered self-conceptions and sexual orientation as adults (e.g., Bem, 1996). Depending upon which causal

explanation (nature vs. nurture) is temporarily accessible, individuals should process information that is consistent or inconsistent with this gender stereotype differently. Either interpretation frame may give rise to the conjecture that men and women preferred different play themes during childhood. However, as gender differences that are attributed to nurture appear more arbitrary, individuals primed with nurture should stereotype their ingroup less when confronted with stereotype inconsistent information than with stereotype consistent information. Conversely, individuals primed with nature should stereotype their ingroup more strongly when they encounter stereotype inconsistent information, because stereotype inconsistent information violates what nature, as a causal explanation, would imply.

### Participants and design

Forty-eight university students (25 women, 23 men,  $M$  age = 20.4 years) were randomly assigned to one of the conditions of the 2 (ingroup's play themes: stereotype consistent vs. stereotype inconsistent) by 2 (priming: nature, nurture) with approximately equal proportions of men and women across conditions.

### Procedure and measures

Participants individually completed a questionnaire on "self and identity". On the first page, participants read that the experimenters were interested in the development of identity and that children's playing preferences might indicate the importance of gender group membership to self-definition. All participants were told that a previous inquiry conducted by the Department of Psychology showed that adults largely agree that most play themes can be identified unambiguously as gender-typed and classified as either characteristic of boys or of girls. Hence, for all participants, gender-based expectations regarding different playing preferences of boys and girls were made salient. They were then given examples of gender-typed playing. Male participants were first provided with male-typed examples (climbing, shooting bows and arrows, playing ball, diving, and model constructing) and then with female-typed examples (hopscotch, doll's pram, skipping, playing the flute, playing store). This order was reversed for female participants.

Participants were then asked to complete a "language and social perception" test, i.e. to identify semantic clusters (two or more nouns that shared some underlying meaning) among distracting words in a "word-tree". The test had first been successfully pre-tested in a pilot study, ( $N = 40$ ), conducted to examine whether priming particular semantic terms that were associated with nurture or nature influenced the salience of those two concepts as potential explanations for phenotypic differences. In the present study, half the participants were primed with nature and the other half with nurture as a causal explanation of phenotypic variance. Following this, participants were informed about the alleged results of the inquiry. Participants in the stereotype *consistent* condition learned that the faked inquiry had revealed that about 80 percent of the interviewed students

of their university reported that they had frequently played the respective gender-typed games. In the stereotype *inconsistent* condition, they learned that only about 40 percent had engaged in gender-typical playing. Note that participants were merely given gender typical or atypical information concerning ingroup members to avoid a strong activation of gender stereotypes (i.e. to avoid a situation in which participants would have thought of the opposite sex representatives' preferences instead of the distribution of preferences within their own gender category). Providing information about the opposite gender may not only activate an 'oppositeness' heuristic (i.e. that ingroup members infer the opposite about another group, Cadinu & Rothbart, 1996) but may also confound typicality with the distribution of preferences across groups.

Next, participants were asked to estimate the percentage of same-gender others who favoured gender typical play themes in infancy and also the percentage of same-gender others who favoured atypical play themes. Other research has documented that percentage estimates with respect to a target group's attributes are predictive of stereotypes about the group (e.g., McCauley & Stitt, 1978). To obtain a composite score of ingroup stereotyping, the percentage of atypical play themes was subtracted from the number of typical ones. This difference was then divided by the sum of the two percentages. Higher scores thus indicate a strong polarization of estimates, which also implies that the sum tends towards 100. Note that about 40 percent of the participants gave estimates that exceeded 100, showing that typical vs. atypical play themes are not necessarily perceived as mutually exclusive.

Participants were then asked to think about how they would personally explain empirical differences in playing preferences of boys and girls. Specifically, they responded (1, *do not agree at all*; 7, *agree completely*) to two statements referring to potential explanations of gender differences with respect to play themes: "Assuming that boys and girls differ in their play themes, I think that these differences are caused by socialization", and "Assuming that boys and girls differ in their play themes, I think that these differences are caused by biology". The answers to these two attribution items were not significantly correlated with each other,  $r = .03$ , showing that nature and nurture are seen as two independent explanations of gender differences in children's play themes.

### Results

Percentage estimates were subjected to a 2 (priming) by 2 (information) by 2 (participants' gender) analysis of variance. This ANOVA showed a main effect for participants' gender. Male participants gave much more polarized (i.e. stereotyped) estimates than female participants,  $M = 0.64$  vs.  $M = 0.38$ ,  $F(1, 40) = 13.80$ ,  $p < .01$ . More importantly, the analysis revealed a significant interaction between priming and stereotypical information,  $F(1, 40) = 5.25$ ,  $p < .03$  ( $d = .43$ ), which was not further qualified by participants' gender. As Table 1 shows, participants primed with nurture evinced stronger ingroup stereotyping in the stereotype consistent than in the stereotype inconsistent condition.

Conversely, participants primed with nature evinced stronger ingroup stereotyping in the stereotype inconsistent than in the stereotype consistent condition. Simple contrasts, however, failed to reach conventional levels of significance (two-tailed).

**Table 1. Percentage estimates of sex-typical playing**

	Sample Information			
	stereotypical		counterstereotypical	
Priming	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Nature	0.41	(0.21)	0.62	(0.21)
Nurture	0.56	(0.31)	0.44	(0.31)

*Notes.* The numbers refer to the difference between typical and atypical play themes, divided by their sum; means with different subscripts differ at  $p < .05$ ;  $N = 48$ .

With respect to the attributions of gender differences in play themes, a multivariate analysis revealed no significant effects, except that male participants attributed gender differences more to nature than female participants,  $M = 5.38$  vs.  $M = 4.55$ ,  $F(1, 40) = 4.80$ ,  $p < .04$ . The two attribution items were thus unaffected by the experimental manipulations. Nevertheless, they were differentially related to participants' percentage estimates regarding playing preferences. A regression analysis with the two attributions and their interaction (i.e. the product of centered scores) showed a positive relation between attributions to nature and ingroup stereotyping,  $\beta = .45$ ,  $p < .01$ , but no significant relationship between ingroup stereotyping and attributions to nurture,  $\beta = -.19$ , *ns*. The interaction term was also significant,  $\beta = -.40$ ,  $p < .01$ , showing that the positive relationship between stereotyping and attribution to nature was attenuated to the extent that nurture is seen as a plausible alternative explanation.

## Discussion

The results of this study support the hypothesis that stereotype inconsistent information imposes a challenge on nature as a causal explanation of gender differences. Activating nature does not necessarily lead to stereotyping the ingroup more strongly when confirming evidence is observed. However, as our study illustrates, when the evidence challenges what nature implies suggesting that the ingroup cannot unambiguously be distinguished from a relevant outgroup, people may tend to affirm the difference between the in- and outgroup. Although the outgroup was not explicitly mentioned in the information about ingroup members' preferences, stereotype inconsistent information may nevertheless suggest that the ingroup is less distinct from the outgroup than expected. Recall that all participants were informed about the results of an inquiry that seemingly revealed strong gender differences with respect to playing preferences. Individuals who were primed with nurture showed stronger ingroup stereotyping when facing stereotypical rather than counterstereotypical

evidence. This finding suggests that stereotypical information may bolster stereotypes about the ingroup even if stereotypical expectations are anything but rigid or strict. Thus, it would be premature to attest individuals favouring nurture over nature a less biased social perception. On the contrary, the extent to which one would agree with what the power of nurture is to create gender differences should mediate stereotypical perceptions in contexts where observable evidence confirms existing social stereotypes.

A limitation of this study is that participants were given information about the prevalence of play themes and were then asked to estimate the relevant preferences of their fellow ingroup members. Thus, depending on the stereotypicality of the statistical information, participants may have imagined or retrieved different exemplars of their gender category, which then caused or biased the estimated preferences. Therefore, the aim of Study 2 was to replicate the obtained interaction between stereotypicality and interpretation frames by using a different measure of ingroup stereotyping. Furthermore, as both nature and nurture are assumed to activate stereotypical expectations, participants also indicated whether they were surprised by the statistical information. If it is true that nature and nurture activate similar expectations about the magnitude and direction of gender differences, they should not interact with the statistical information on surprise.

## Study 2

### Participants and design

Fifty-two university students (26 women, 26 men,  $M$  age = 22.0 years) were randomly assigned to one of the conditions of the 2 (ingroup's play themes: stereotype consistent vs. stereotype inconsistent) by 2 (priming: nature, nurture) with equal proportions of men and women across conditions.

### Procedure and measures

The procedure was largely identical to the one adopted in the previous study, with one exception. After the priming procedure, participants were again informed of the alleged results of an inquiry among fellow students. This time, however, they were given stereotype consistent and stereotype inconsistent statistics. Assuming that the activation of the oppositeness heuristic can hardly be avoided in the context of play themes, participants in the stereotype *consistent* condition learned that 76% of their same-sex fellow students recalled having frequently engaged in gender typical playing, whereas 43% ostensibly recalled having frequently engaged in gender atypical playing. Following a procedure used by Hegarty and Pratto (2001), these percentages were reversed in the stereotype *inconsistent* condition. Note that the sum of these two percentages adds up to 119, suggesting that typical and atypical play themes seem to be distinct but not necessarily mutually exclusive. Although Study 1 clearly revealed a more balanced estimate of female participants compared to their male counterparts, we decided to provide male and female participants with identical statistics. With

respect to the distribution of playing preferences, this manipulation keeps the variability of preferences within groups constant by varying their typicality. Participants then completed a measure of ingroup stereotypicality that was similar to the one used by Maurer, Park, and Rothbart (1995) who asked participants to judge the percentage of group members who would endorse certain attitude statements. This measure of stereotypicality is based on the prevalences of stereotypical and counterstereotypical attributes that are ascribed to group members (Park & Rothbart, 1982; Park, Ryan, & Judd, 1992). Instead of making percentage estimates, however, participants in the present study were asked to indicate (1, *do not agree at all*; 7, *agree completely*) whether "... most women/men of their age would hold a positive attitude towards ...", followed by six statements that were either stereotype consistent or stereotype inconsistent. Participants were asked to base their perceptions on same-sex others of their age. Three of these attitude statements were stereotypical of women (taking delight in shopping, reading romantic novels, being concerned about gifts), and three were stereotypical of men (making contact with someone of the opposite sex, going wild every now and then, showing others how sportive or cool one is). A multivariate analysis of variance with participants' gender as a between factor showed that male and female participants expected their fellow group members to hold stereotypical attitudes ( $p < .01$ ). As stereotypicality reflects the difference between stereotype consistent and stereotype inconsistent attitudes, counterstereotypical attitudes were reverse scored. This six-item measure of stereotypicality was sufficiently reliable (women: Cronbach's alpha = .66; men: Cronbach's alpha = .78). Finally, participants indicated whether they were personally surprised by the (fictitious) percentages presented to them (1, *not at all surprised*; 7, *very much surprised indeed*).

## Results

A 2 (priming) by 2 (information) by 2 (participants' gender) ANOVA on the surprise item only showed a main effect for the stereotypicality of the information. Participants exposed to the inconsistent information were more surprised than participants exposed to the stereotype consistent information,  $M = 3.58$  vs.  $M = 2.57$ ,  $F(1, 44) = 6.22$ ,  $p < .04$ . Counterstereotypical information was thus somewhat more surprising than stereotype consistent information, but surprise was not affected by the priming. A 2 x 2 x 2 ANOVA on the measure of ingroup stereotyping revealed a main effect for participants' gender. Male participants perceived their own gender category more stereotypically than female participants,  $M = 5.10$  vs.  $M = 4.35$ ,  $F(1, 44) = 9.29$ ,  $p < .01$ . More importantly, a significant interaction between priming and stereotypicality was obtained,  $F(1, 44) = 7.83$ ,  $p < .01$  ( $d = .49$ ), which was not further qualified by participants' gender. The means are shown in Table 2. A simple contrast analysis showed that stereotype inconsistent information led to stronger stereotyping than stereotype consistent information for those participants who were

primed with nature. Furthermore, individuals in the stereotype inconsistent condition perceived their ingroup more stereotypically when they were primed with nature than with nurture. Thus, overall, this interaction supports the notion that activating nurture involves more flexible stereotyping. Stereotype consistent information increased and stereotype inconsistent information reduced stereotypicality. On the other hand, nature as an interpretation frame seems to be less compatible with stereotype inconsistent information. Stereotype inconsistent information increased the perceived stereotypicality of the ingroup, compared to a condition where the empirical evidence was compatible with the social stereotype and thus did not challenge what could be suggested by nature as a causal explanation.

**Table 2. Ingroup stereotyping (endorsement of attitudes)**

	Sample Information			
	stereotypical		counterstereotypical	
Priming	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Nature	4.48 <sub>a</sub>	(0.78)	5.12 <sub>b</sub>	(0.91)
Nurture	5.02 <sub>a</sub>	(0.83)	4.28 <sub>a,c</sub>	(1.02)

Notes. Scores could range from 1 to 7; means with different subscripts differ at  $p < .05$ ;  $N = 52$ .

## Discussion

The results further support the notion that the two different interpretation frames moderate the influence of (counter-)stereotypical information on ingroup stereotyping. Similar to the previous study, activating nurture led participants to adjust their representation of the ingroup to the empirical evidence. That is, participants primed with nurture showed stronger stereotyping when they encountered stereotypical evidence. Conversely, participants who were primed with nature showed stronger ingroup stereotyping when they were exposed to counterstereotypical evidence. The latter finding is only partially consistent with other research showing that perceivers who believe that group differences are real and meaningful tend to overstate intracategory similarity and stereotypicality (e.g., Yzerbyt et al., 2001). It also seems to be inconsistent with the notion that evidence confirming stereotypes leads to an accentuation of intercategory differences (Krueger, Rothbart, & Sriram, 1989). Krueger and colleagues, however, also suggest that people who strongly endorse stereotypes might tolerate atypical information as long as category distinctions are not fundamentally challenged. Furthermore, the proposition that beliefs in an underlying essence of social categories foster stereotyping does not exclude the possibility that strong stereotyping is particularly likely when the underlying essence is challenged. It seems important to repeat that the priming procedure in the present research should not activate beliefs about intercategory differences, but merely the possible causal explanation of the origin of

interindividual differences. Hence, the similarities between the present and other research findings should loom larger than the disparities. The aim of the next study was to address the possibility that the interpretation frames may differ in the likelihood with which they prompt categorial thinking or attribution, respectively, depending on whether the encountered evidence is consistent or inconsistent with a given ingroup stereotype.

### Study 3

When a target's category membership is salient, perceivers use observable evidence to make inferences about the social category and stereotype conformity of a target may be sufficient to align social categories with empirical evidence. Perceiving a target that either matches or mismatches a social stereotype should activate either category-based knowledge or stereotypical expectations, respectively. Hence, stereotype (dis-)conformity of a target should affect inductive reasoning. In attributional terms, this would mean that gender category membership of the target is informative and meaningful with respect to the social category. We expect that the two interpretation frames (i.e. nature and nurture) will alter attributional inferences, so that a target's category membership is perceived as more informative or diagnostic of the category if perceivers primed with nurture encounter stereotypical information and also if perceivers primed with nature encounter counterstereotypical information. Thus, attributional inferences should parallel stereotyping. If this prediction is confirmed, it will lend further credence to the notion that the two causal explanations affect the processing of (counter-)stereotypical evidence.

#### Participants and design

Forty-eight university students (24 women, 24 men,  $M$  age = 22.2 years) were randomly allocated to one of the conditions of the 2 (ingroup target: stereotype consistent vs. stereotype inconsistent) by 2 (priming: nature, nurture) with approximately equal proportions of men and women across conditions.

#### Procedure and measures

Participants completed a questionnaire on impression formation. They were told that the experimenters were interested in whether other ingroup members are perceived as similar or dissimilar to the self. They then completed either the *nature* or the *nurture* priming task ("language and social perception" test, see: above). Participants were then informed about a recent inquiry among their fellow students and that the aim of this alleged inquiry was to gather idiosyncratic information about men and women of their age. The instruction went on to say that they would be given an excerpt from a narrative self-description of a same-sex other. The self-description of this (fictitious) fellow student was either consistent or inconsistent with the ingroup stereotype (i.e. that women are typically more concerned about social relations, whereas men are typically more independent). Following some trivial information

(e.g., that the fellow student lived in an apartment-sharing community), participants were given the self-descriptions. The target's profile in the stereotype consistent and stereotype inconsistent conditions did *not* vary with respect to his or her social orientation displayed as an adult but with respect to playing preferences during childhood. Target descriptions presented to participants mentioned that the target person either enjoyed gentle or rugged playing, and that he (she) frequently played either with the mother or the father. Thus, in the stereotype *consistent* condition, female (male) participants learned that the target preferred gentle (rugged) playing and frequently played with her mother (father), and vice versa in the stereotype *inconsistent* condition.

Participants then indicated (1, *do not agree at all*; 7, *agree completely*) on two items ( $r = .63$ ,  $p < .01$ ) whether they thought that the target person had been a typical child ("I think that his/her play themes were similar to those of other boys/girls at that age", "I think that s/he had much in common with other boys/girls"). This measure served to check the manipulation of stereotypicality. Next, participants completed a 3-item measure (1, *do not agree at all*; 7, *agree completely*) of category-based inferences regarding "I think that biological sex is sufficient to explain playing preferences", "I think that a person's sex is important to make predictions about his or her individual development", and "Every person has some features that can be expected from his/her biological sex". The answers to these items ( $\alpha = .70$ ) were averaged. High scores indicate that social category membership is perceived as diagnostic of group differences (i.e. the extent to which a certain phenotype can be predicted from category membership).

#### Results

A 2 (priming) x 2 (target information) by 2 (participants' gender) ANOVA on ratings of stereotypicality showed that the conforming target was perceived as more typical of his/her gender category (boys/girls) than the disconforming target,  $M = 4.80$  vs.  $M = 2.85$ ,  $F(1, 40) = 17.14$ ,  $p < .001$ . With respect to social attribution, a 2 x 2 x 2 ANOVA revealed a significant 2-way interaction between priming and stereotypicality,  $F(1, 40) = 9.35$ ,  $p < .01$  ( $d = .54$ ), which was not further qualified by participants' gender. The means are shown in Table 3. As within-cell variability of these ratings was rather strong, simple contrasts failed to reach conventional level of statistical significance (two-tailed). Nevertheless, the pattern of means is consistent with the hypothesis that activating nature (or nurture) as an interpretation frame may moderate the influence of stereotype consistent and inconsistent information on individuals' social attribution. When nurture was primed, participants exposed to stereotypical information evinced a stronger category-based perception than participants exposed to counterstereotypical information. However, activating nature as a causal explanation led participants to endorse category-based perceptions (or attributions) more strongly when they encountered counterstereotypical information.

We also examined the relationship between target typicality and social attribution. In support of the hypothesis, this relationship was positive in the nurture priming condition ( $r = .52, p < .05$ ), but negative in the nature priming condition ( $r = -.32, ns$ ). Thus, when nurture is primed, typical targets may give rise to stronger stereotyping, whereas atypical targets may do the same when nature is activated as a causal explanation.

**Table 3. Attributions to sex-category membership**

	Target Information			
	stereotypical		counterstereotypical	
Priming	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Nature	2.61	(1.40)	3.91	(1.84)
Nurture	3.89	(1.37)	2.42	(1.36)

Notes. Scores could range from 1 to 7;  $N = 48$ .

### Discussion

The results support the notion that different interpretation frames can evoke different social attributions of empirical evidence that is consistent or inconsistent with an ingroup stereotype. Participants were exposed to the description of a single group member who either matched or mismatched stereotypical expectations. Although nature and nurture should evoke similar stereotypical expectations, information that confirmed or disconfirmed the stereotype was processed differently, depending on which of the two causal explanations was accessible during the judgments. The results again support the hypothesis that individuals primed with nature tend to affirm their expectations if empirical evidence challenges what nature, as an interpretation frame, suggests. The results also support the notion that nurture may lead to more flexible judgements. The fact that perceived typicality of the target was related differently to attributions to gender category further suggests that activating nature may render a subtyping process more likely, whereas activating nurture may lead to including a counterstereotypical exemplar into one's group representation. Note, however, that the priming procedure did not affect perceived typicality of the target. Thus, the two interpretation frames again seem to evoke similar expectations, although perceivers draw different inferences from observable evidence regarding ingroup stereotypes. Participants in this study were given abstract and vague information about the target's playing preferences during childhood. Therefore, we cannot ignore the possibility that participants retrieved or imagined different exemplars of their gender category in the two target conditions, depending on what (i.e. nature or nurture) was accessible during the judgements. Thus, if the activated interpretation frames in fact determined which exemplar of a social category was retrieved or imagined, they should also have affected perceptions of the target. This was not the case, however, and so we tentatively conclude that information about the targets was processed differently, depending

on which causal explanation was accessible during perception.

### Study 4

The aim of study 4 was twofold. First, we have argued that the two causal explanations of gender differences should involve different attributions of locality. If nurture does in fact involve exogenous influences that are to some extent arbitrary and thus theoretically reversible, it should turn perceivers' attributions of observable evidence more to situational constraints than to actors' internal dispositions. More precisely, we argue that stereotype consistent observations are particularly likely to be attributed to characteristics of the situation, whereas counterstereotypical evidence should more likely be attributed to the characteristics of the target (something that has to do with his or her unique personality). The rationale behind this presumption is that exogenous factors should unfold in particular behavioural contexts that appeal to the goals and attitudes of people who aim to guide or govern the target of socialization. This is not to say that educators tend to overlook a target's dispositions, but simply that stereotypical expectations can reflect either naïve beliefs about the target's dispositions and temperament (which are assumed to provoke "gender appropriate" role modelling etc.) or ideological set points, or both. On the other hand, activating nature as an interpretation frame should lead to attributing stereotype-confirming evidence to inherent individual factors but disconfirming evidence more to situational constraints. This differential attribution might then sustain the belief that stereotypes mirror meaningful and deeper differences between group members. Ironically, when nurture is activated, stereotypical evidence could affirm the possibility that empirical differences in traits or behaviours are caused by exogenous (arbitrary) factors. And disconfirming evidence may undermine stereotypical conceptions precisely because situational constraints seem to be too weak to evoke stereotypical behaviours. Such an inference is quite compatible with the surmise that exogenous factors create uniformity among members of a group.

The second aim of this study was to demonstrate that perceivers primed with nature should find it more difficult to imagine counterstereotypical events than those primed with nurture. Given that both causal explanations evoke similar stereotypical expectations, both nature and nurture should make it difficult for a perceiver to mentally undo or mutate stereotypical evidence. However, if activating nurture does in fact involve more flexible constructions of social categories, mental simulations of counterstereotypical occurrences should be relatively easy. And if it is true that counterstereotypical evidence challenges nature as an interpretation frame, perceivers primed with nature should find it difficult (or may refuse) to imagine counterstereotypical behaviours. To test this assumption, participants were either exposed to stereotype-confirming or disconfirming target information. The information concerned the target's social orientation.

A popular gender stereotype states that men and women differ in their social orientation: women are relation oriented, i.e., they tend to trust in others, whereas men are independence oriented, i.e., they tend to count on themselves (cf. Cross, Bacon, & Morris, 2000). Having been exposed to the target information, the participants were asked how easily they could imagine that the target would evince the “opposite” orientation. Furthermore, they were asked to indicate how likely they thought it was that the target would engage in certain behaviours that were either compatible or incompatible with the stereotype. If counterfactual simulations in fact undermine the inductive potential of stereotypes, perceivers’ subjective ease of counterfactual simulations should mediate the influence of the activated interpretation frames on stereotyping.

### Participants and design

Forty-eight university students (24 women, 24 men,  $M$  age = 21.8 years) were randomly assigned to one of the conditions of the 2 (priming: nature, nurture) by 2 (ingroup member: stereotypical, counterstereotypical) between-subjects design with equal proportions of males and females across conditions.

### Procedure and measures

The cover story informed participants that the experimenters were interested in naïve theories of personality and wanted to check whether intuitive conceptions of personality are affected by habitual language use. To prime either nature or nurture as a causal explanation, participants then completed the “language and social perception” test (see: above). They were then exposed to individual target information that was either consistent or inconsistent with the gender stereotype about men’s and women’s social orientation (see: above). Female participants read a short description of a relation oriented woman in the stereotype *consistent* and a short description of an independence oriented woman in the stereotype *inconsistent* condition. This assignment was reversed for male participants. Thereafter, in accordance with the cover story, participants were informed that naïve theories of personality imply that perceivers use available information about another person (e.g., gestures) to make generalized predictions about his or her behaviour. Furthermore, such predictions could mirror the subjective ease with which perceivers may imagine that the target might behave quite differently. To assess counterfactual ease, female participants were asked to indicate (1, *does not apply at all*; 7, *applies completely*) whether “I can easily imagine that someone who is relation oriented could also behave in an independent way in other situations” and whether “I can easily imagine that someone who is independence oriented could also behave in a relation oriented way in other situations”. These two statements referred to the target that was portrayed before. The first item assessed the subjective ease with which the perceiver can imagine that individuals’ social orientation could shift from stereotypical to counterstereotypical (i.e. that typical group members could also behave atypically and thus “violate” the ingroup

stereotype), and the second one assessed the subjective ease with which the perceiver can imagine that social orientation could shift from counterstereotypical to stereotypical. The latter item was reverse coded and the answers were averaged ( $r = .52, p < .01$ ). For male participants ( $r = .49, p < .01$ ), the terms “in a relation oriented way” and “in an independent way” were interchanged. Higher scores indicate subjective ease of counterstereotypical simulation.

Six different behaviours were then described and participants were each time asked to indicate whether they could imagine that the target person would behave in the way presented in the description (1, *very unlikely*; 7, *very likely*). Stereotypical and counterstereotypical behaviours were presented in an alternating order. The behaviours related to the relation orientation were: Spending money for a present for someone who isn’t that close to one’s heart, conceding a point in an important joint decision, and taking a risk and helping someone who is in danger. The behaviours relating to the independence orientation were: Breaking up a close relationship instead of trying to solve the problems, taking one’s mind off things when being worried instead of talking to others, working alone instead of working in a team of fellow students. A factor analysis resulted in a one-factor solution (Eigenvalue: 3.76) that explained about 63 percent of the variance. Factor loadings ranged from  $-.61$  to  $.79$ . This factor reflects a bipolar structure and the six rated behaviours were thus compiled into a composite measure of stereotyping. For female participants, “independent” behaviours were reverse coded, whereas the “relation” behaviours were reverse coded for male participants (women:  $\alpha = .87$ ; men:  $\alpha = .89$ ). High scores thus indicate that the target is expected to behave in accordance with the ingroup stereotype.

### Results

A 2 (priming) by 2 (target information) by 2 (sex of participant) ANOVA on the subjective ease of counterstereotypical simulation revealed a marginal interaction between prime and target stereotypicality,  $F(1, 40) = 3.84, p < .06$ . Although this interaction was only marginally significant, the pattern of means nevertheless supports the hypothesis: In the stereotype consistent condition, ease of counterstereotypical simulation was hardly affected by the priming manipulation (nature,  $M = 4.01$ ; nurture,  $M = 3.54$ ). However, counterstereotypical simulation was significantly affected by the priming manipulation in the stereotype inconsistent condition (nature,  $M = 3.06$ ; nurture,  $M = 4.47, t = 2.34, p < .05$ ). Counterstereotypical simulation was thus subjectively easier when nurture rather than nature was rendered accessible.

With respect to stereotypic generalizations (the degree to which single observations evoke generalized expectations), a 2 x 2 x 2 ANOVA showed a main effect for target stereotypicality. Participants had more generalized expectations about the target in the stereotype consistent than in the stereotype inconsistent condition,  $M = 3.65$  vs.  $M = 2.22, F(1, 40) = 25.42, p < .001$ . More importantly, this main effect was qualified by the priming manipulation,  $F(1, 40) = 8.67, p < .01 (d = .53)$ . The means are shown in

Table 4. Simple contrast analyses showed that participants primed with nurture revealed more generalized expectations in the stereotype consistent than in the stereotype inconsistent condition. Thus, overall, the pattern of means clearly supports the notion that stereotyping is more flexible in relation to nurture than in relation to nature as a causal explanation.

**Table 4. Stereotypic generalizations**

	Target Information			
	stereotypical		counterstereotypical	
Priming	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Nature	3.23 <sub>a,c</sub>	(1.65)	2.69 <sub>b,c</sub>	(1.51)
Nurture	4.01 <sub>a</sub>	(1.36)	1.74 <sub>b</sub>	(1.29)

Notes. Scores could range from 1 to 7; means with different subscripts differ at  $p < .05$ ;  $N = 48$ .

To test whether stereotyping is mediated by the subjective ease of counterstereotypical simulation, stereotyping was regressed simultaneously on condition (nurture: 1; nature: -1) and on subjective ease of simulation. However, because the stereotype consistent condition was largely unaffected by the priming manipulation, this regression analysis was confined to the stereotype inconsistent condition. Priming then predicted stereotyping (.34) and subjective ease (.44,  $p < .05$ ). Furthermore, subjective ease predicted stereotyping (.47,  $p < .05$ ). In the simultaneous regression, the effect of subjective ease remained significant (.42,  $p < .05$ ), whereas the priming effect was markedly reduced (.06,  $Z = 1.51$ , *ns*). Thus, although the statistical power is less than optimal for this analysis, the mediation analysis supports the notion that stereotyping depends on the subjective ease with which counterstereotypical simulations can be executed.

## Discussion

This study aimed to show that perceivers tend to form generalized expectations and that these expectations are influenced by mental simulations of the available evidence. When the target was consistent with the social stereotype, imagining the opposite behaviour or trait was comparably difficult. However, considering the opposite (i.e. counterstereotypical behaviours or traits) was subjectively easier for individuals who were primed with nurture than for those primed with nature. As a consequence, participants primed with nurture revealed less generalized expectations when being exposed to counterstereotypical target information, but more generalized expectations when being exposed to stereotype consistent information. Both these findings support the notion that nurture, as an interpretation frame, leads to more flexible or mutable construals than nature, and that it is the subjective ease of counterstereotypical simulation that undermines stereotyping. In other words, perceivers who focus on exogenous factors are more able or willing to imagine that the very same target could

behave differently in other situations, whereas perceivers focusing on nature have more difficulty (or show more resistance) imagining counterstereotypical behaviours or characteristics. Such differences in the mental construal of alternatives to (the observed) reality may be one important factor that explains why the interpretation frames moderate the processing of counterstereotypical evidence. Although speculative, differences in the ease of mental simulations should be systematically related to social attributions, so that perceivers who attribute more to the situation than to internal factors (of the actor) should be more able or willing to imagine the opposite because situational constraints are believed to be more mutable and controllable than internal causes.

## General discussion

The present research provides a starting point for exploring the role of two causal explanations for gender differences in the processing of stereotypical and counterstereotypical evidence. Gender stereotypes suggest differences between the sexes and the differences can evoke two alternative explanatory concepts: nature, implying that occurrences are primarily caused by endogenous factors (e.g. “Basic things like a person’s temperament are determined largely by one’s genes”), and nurture, implying that phenotypic variance is primarily caused by exogenous factors (e.g. “How a person matures depends primarily on the type of social environment in which he or she grows up”). If we assume that both explanatory concepts can evoke similar stereotypical expectations, the relative weight given to either of them paves the way for different inferences and attributions. To the extent that one suspects or knows that men and women differ in biological or neurophysiological parameters and that boys and girls are exposed to different reinforcement schedules and social conventions, one should interpret information that is consistent or inconsistent with a stereotype differently, mainly because stereotypical expectations triggered by nurture are more flexible or pliable.

The present research focused on ingroup stereotypes and showed that the two interpretation frames (i.e. nature and nurture) did not affect perceived stereotypicality of a target (e.g., which kind of social orientation the target represents, i.e. whether he or she is relation or independence oriented), but did affect social inferences and the mental representation of social categories. Such construals were more flexible when nurture was rendered accessible and perceivers adjusted their perceptions of the ingroup to the available evidence. On the other hand, when it was nature that was rendered accessible, counterstereotypical evidence led perceivers to endorse ingroup stereotypes more strongly. This differential processing of stereotypical and counterstereotypical information seems to be (partially) driven by attributions of locality and the subjective ease of counterstereotypical simulation. Individuals focusing on nurture tend to attribute stereotype-confirming evidence to situational constraints, whereas those focusing on nature tend to attribute disconfirming evidence to the situation.

Furthermore, when nature is activated, individuals seem to find it more difficult to imagine that a target who matches stereotypical expectations could or would perform or display counterstereotypical behaviours or characteristics. These differences, if further substantiated, will have important implications for social perception and social judgment because the very perception or interpretation of a psychological characteristic is likely to depend on the interpretation frame which is used. Research on outgroup perception has shown that, when perceivers focus on a target's social category membership, they need less evidence to confirm and more disconfirming evidence to discard stereotypical traits (e.g., Biernat & Ma, 2005). These differences may become more extreme when perceivers employ nature as an interpretation frame.

The present findings support the notion of greater stereotype flexibility in regard to exogenous factors. Specifically, nurture as an interpretation frame seems to invite perceivers to include atypical group members into the social category. Presumably because nurture implies that group differences are ontologically less meaningful – as socialization is somewhat arbitrary by nature – counterstereotypical exemplars are less likely to be contrasted away from the prototype but more likely to increase the perceived variability within social categories. Reduced stereotyping faced with counterstereotypical evidence thus seems to imply a greater 'tolerance of atypicality'. It remains to be tested whether this tolerance also holds for outgroup perception. Please recall that ingroups are typically perceived as more differentiated than outgroups. Paradoxically, however, activating nurture as an interpretation frame can also provoke stronger stereotyping and categorial thinking when perceivers encounter stereotypical information. Perceivers tend to generalize from exemplars to the group and to overstate stereotype conformity of the target when the empirical evidence seems to verify the effectiveness of exogenous influences. Greater stereotype flexibility is thus a two edged sword because it also implies the possibility that confirming evidence consolidates a fragile stereotype.

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