Attitudes towards babies.

Social influences and gender differences in the context of baby attitudes.

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Prologue

"Biology is the least of what makes someone a mother." – Oprah Winfrey

Becoming a parent is one of the most vital and profound stages in life. The changes that result are evident in all areas of life, including social relationships, partnerships, and professional and private activities. Some individuals see these changes as positive, whereas for others they are a concern. For many, the decision for a child is associated with a high degree of insecurity (Sévon, 2005). Whether people decide to have children or not, everyone has an explicit idea of what it takes to be a parent and raise a child of his or her own.

People differ regarding how positive they are toward children. However, these attitudes can be more complex than simple positive or negative differences in attitudes (Lichtenstein & Slovic, 2006). There are different ways how these attitudes developed. Some people may adopt the attitudes of their parents (Ohly et al., 2013; Spiel et al., 2016). In addition, attitudes can be influenced by books or websites. An individual's peer group is also conceivably a major influence.

Crucial to all these explanations for why parents have attitudes towards children is that the sum of a person's beliefs is not derived solely from biological sources, but rather is the result of social and cultural imprinting and internal processing. The present investigation has been developed within the scope of this guiding principle.

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Gender research provides a key perspective when studying the social dimension of attitudes and opinions. This relatively young scientific field explores the similarities and differences between men and women and determines causes for them. However, gender research has no generally accepted superordinate theory, but rather a presentation of various perspectives from which individual and fundamental phenomena are considered and explored. Considering that the study of gender (difference) examines a vital category of social distinction, the historical recency of gender research is all the more astounding (Bian, Leslie & Cimpian, 2017; Auspurg, Hinz & Sauer, 2017).

One of the earliest and most crucial works in gender research is *Coming of Age in Samoa* by Mead (1928). This work examined the process by which males and females become the men and women that their cultures prescribe, and stated that gender differences are learned (Mead, 1928). In particular, the questioning of the sexual norms of Western civilization, which were considered as natural, sparked an intense social and scientific debate (Kimmel, 2004).

Social psychologists locate the process of acquiring gender identity in the developmental patterns of individuals in their families and in early childhood interaction (Kimmel, 2004). Freud assumed that gender and sexuality are determined within the family and not by internal biological necessities. In his work *Three Essays on the Theory of Sexuality* (1905), Freud described five distinctive phases. In the first phase (the oral phase), the newborn enjoys the intake of food. In the subsequent second phase (the anal phase), pleasure is provided by returning food in the form of urine and defecation. After the third (the phallic phase) and fourth (the latency phase) phases, the fifth phase (the genital phase) determines sexual development. Here, gender becomes a factor and the task for the young person is to become either masculine or feminine: boys disidentify themselves from the mother and identify with the father, and girls identify

with the mother. Many of Freud's assumptions have since been criticized for methodological and theoretical reasons. Nevertheless, Freud still has "a remarkable impact on contemporary studies on popular assumptions" (Kimmel, 2004, p. 76).

Terman and Miles's research was of paramount importance to gender research, particularly regarding the theory of sex roles (Kimmel, 2004). They developed a psychological inventory that measured the successful acquisition of masculinity and femininity in children and adolescents, albeit first assuming a continuum between masculinity and femininity. Adorno, Frenkel-Brunswik, Levinson and Sanford (1950) built on the work of Terman and Miles and developed an own typology, which also had a lasting impact on gender perspectives. Masculinity and femininity have been described since the time of this publication as internal psychological identification and external behavioral manifestation.

Because births and parenting are a crucial social topic, various models have been developed that reflect different attitudes toward children and reproduction. One of the first approaches came from Malthus (1789), who sought to explain why during some historical epochs of a society many children are born, but in other periods few are. From this sociological perspective came models such as the demographic transition model (Mackenroth, 1951; van de Kaa, 1987). Although these models provide an empirically accurate representation of the increase and decrease of populations using an aggregate data time series, they cannot provide a complete explanation of this process. In addition, they neglect the motives of the people involved.

Another perspective regards the economy. A crucial explanatory approach comes from Becker (1982, 1991). His "new household economy" lists family households as production units in which nonmarketable goods must be produced first. Among these "commodities," Becker counts not only affection and support, but also children. For

example, this model may explain why well-educated women are more likely to choose not to have children than women who are poorly educated. According to Becker's "new household economics," well-educated women have higher opportunity costs for the lost benefit of gainful employment. What remains unclear in this model is why people in developed economies still have children at all, if the costs of having children is greater than the benefit.

A further research direction comes from the perspective of national or cultural comparisons. According to Hoffman and Hoffman (1973), a critical concept in this context is the value of children (VOC), which considers both normative and economic factors and their effects on psychological aspects. The choice of whether and when to have children is the result of a rational weighing of pros and cons. This balance of considerations is particularly relevant in societies where contraceptive use is widespread. According to Hoffman and Hoffman's (1973) approach, the (potential) VOC comprises how children fulfill their parents' needs. These authors were the first to discuss in detail the sense of reward that parenting brings to people (Liefbrour, 2005). The availability of longitudinal studies on younger age groups allows us to examine which perceived cost and benefit considerations are relevant with children in terms of decisions regarding actual behavior (Liefbroer, 2005).

Hoffman and Hoffman (1973) cite nine relevant components for determining the VOC: (1) adult status and social identity; (2) personal survival in children; (3) religious, ethical, and social norms; (4) familial attachment; (5) seeking new experiences; (6) creativity and achievement; (7) power and influence; (8) social comparison and competition; and (9) economic benefits. Parents incur costs directly (financial costs) and indirectly through the renunciation of goods because of the children (opportunity costs). However, benefits arise for the parents: for example, through financial aid such as

children providing support for their parents in their old age, which is common in many societies.

Liefbroer (2005) built on the findings of Hoffman and Hoffman by observing that children meet parents´ needs in three categories: (1) providing economic rewards; (2) meeting emotional or psychological needs (such as self-development); and (3) offering social rewards (such as status gain). In Western societies, emotional and social benefits seem to be the main motives for deciding whether to have children, whereas financial motives tend to reinforce a decision to not have children (Liefbroer, 2005; Matias & Fontaine, 2012; O'Laughlin & Anderson, 2001). These considerations can clarify a range of findings and demonstrate the rational process behind having children, which is often not expressed openly due to political correctness and social conventions. However, an increasing number of studies (Kahneman, 2011) have shown not only that rational considerations guide the actions of humans in the ideal image of *homo economicus* but that we also rely on heuristics. This is because we do not always have all the necessary information and sometimes there is too much information to process.

The concept of the VOC according to Hoffman and Hoffman (1973) is an interesting early approach, which can well relate to the present work. The authors emphasized the VOC for parents, which denotes an individual approach. The present research also addresses this individual approach because it captures the motives of people, while considering that people explicitly do not use such terms as "costs" and "benefits" themselves.

The VOC approach (implicitly) assumes that interviews on the topic of children automatically activate the concept `children`, but without ensuring that it is accurately done. The current work consists of an investigation into the conditions for measuring attitudes towards babies. The present research also develops a multilingual

questionnaire, which is in line with Hoffman and Hoffman's (1973) tradition of comparing cultures. This questionnaire can be used to measure attitudes toward children. In addition, the VOC approach, with its cultural-comparative perspective, emphasizes social diversity and thus the changeability of social roles. The (experimental) studies described in this dissertation fit well with this perspective. Specifically, the present work analyzes whether social gender or biological sex has a greater role in the attribution of social characteristics. If evidence exists for the greater importance of social processes in the assignment social characteristics, then the implicit assumption of cultural causes of individual differences in action can be substantiated.

The three chapters presented here each contain several studies. The three chapters are a heterogeneous collection of studies which may stand alone but can well be applied to the model of Hoffman and Hoffman (1973). The first chapter of this work looks at the implications of adopting baby-related concepts in mate choice as well as partner-related behavior. The second chapter of this work develops a tool to study attitudes toward babies and reproduction. The third chapter examines whether social gender or biological sex has more of an impact on the attribution of character traits.

In the first chapter, against the background of the discussion on the priming effect (Bargh, Chen & Burrows, 1996; Doyen, Klein, Pichon & Cleeremans, 2012; Kahneman, 2012), six studies are presented that examine the basic concept of priming. Priming implies that previous stimuli, or stimuli that are less or more subtle, make knowledge more accessible. The activation and priming methods are systematically varied during experimental manipulation. The concept for priming was ´baby´. The accessibility of baby-related concepts is assessed using word stem completion tasks. The type of manipulation ranges from open, verbal requirements, such as writing an essay on babies (Study 1), to baby-related, coded sentences (Study 2) and nonverbal influences. These

manipulations are conducted with the use of pictures (Study 3) or with the help of objects (Study 4). Finally, in two studies, coactivation is made accessible and captured by activating a distant (albeit not identical) concept. Specifically, it is ascertained whether an experimenter showing images of pregnant women (Study 5) or a pregnant woman (Study 6) made baby-related content more readily available. These investigations are meaningful in relation to the theory of the VOC discussed by Hoffman and Hoffman (1973), because it could be shown that in surveys on the subject of children, parents' schemas and associations are activated.

The second chapter of this work develops a tool to study attitudes toward babies and reproduction: the Procreation Attitude Scales (PrAttS). A German and an English version are described for validation, to allow multilingual investigations in line with the cultural-comparative perspective of Hoffman and Hoffman (1973) and to strengthen the comparability of the results. In addition, this second chapter examines whether the questionnaire also identifies gender differences in attitudes toward children and reproduction.

In the third chapter of this thesis, a pilot study and two main studies are conducted, which can be well related to the assumptions of the VOC theory by Hoffmann and Hoffman (1973). Hoffman and Hoffman (1973) suggested the changeability of social roles but did not explicitly test it. This step is taken in the third chapter. More specifically, this chapter examines whether social gender or biological sex has more of an impact on the attribution of character traits, and thus whether it potentially influences mate choice. First, in the pilot study, idealized images are created of what is meant by stereotypically male and female women or men. For this purpose, the data-based method of reverse correlation image classification (Mangini & Biederman, 2004) is used. This makes it possible to separate the influences of sex and gender. Subsequently,

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the impressions these faces cause are determined. In addition to the pilot study in which the stimuli are developed, two more studies are conducted. The first study focuses on general, cross-gender characteristics, whereas the second focuses specifically on attributes of masculinity and femininity, as proposed by Bem (1974).

Chapter 1: Increased accessibility of semantic concepts after (more or less) subtle activation of related concepts - Support for the basic tenet of priming research.[1]

James Vicary excited the interest of the media about sixty years ago. He had argued that he had projected "Eat Popcorn" and "Drink Coke" prompts for thousands of cinema visitors in a New Jersey cinema for an extremely short time on the screen, without the cinema visitors having noticed after which the sale of popcorn rose by 58% and the sale of Cola by 18%. Even though Vicary later admitted that there was never a study and that the only purpose of the false claim was to create advertising for the cinema (Karremans, Stroebe & Claus, 2006), the idea that more or less subtly presented cues can activate semantic concepts and thereby eventually influence behavior (i.e., priming) continue to fascinate the field of psychology. In the light of a recent debate about priming effects (specifically but not restricted to behavioral priming), we present five studies that support a basic tenet of the priming idea: that more or less subtle cues make consistent knowledge more accessible. Specifically, we show that visual, haptic or social primes of the concept "baby" (Studies 1-4) or "pregnancy" (Studies 5-6) make semantic content related to the concept "baby" more accessible.

Priming has been operationalized as an improvement in performance in a perceptual or cognitive task, relative to an appropriate baseline, produced by context or prior experience (McNamara, 2005). This performance can be closely circumscribed performances like the effect of priming a word on recognizing a highly associated word as a word (a very robust phenomenon; Ramscar, 2016) or more remote performances like the effect of priming an ethnicity on recognizing an object as a weapon (Eberhardt,

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Goff, Purdie & Davies, 2004) or the effect of priming a stereotyped group on stereotype-consistent behavior (Bargh, et al., 1996). In a recent publication, Ferguson and Mann (2014) outline the current impossibility of drawing a clear distinction between these forms of priming, as there are, for example, interdependencies between lexical priming and behavior.

The underlying process of such priming can be explained in terms of spreading activation models (e.g., Anderson, 1983; Collins & Loftus, 1975), often regarded as "the canonical model of semantic priming" (McNamara, 2005, p. 11). According to such models, priming (or retrieving an item from memory) increases the strength of activation of its internal representation which then proceeds from one concept to connected concepts. Remaining accumulated activation facilitates their later retrieval (McNamara, 2005). When, for example, the visual representation of a word such as "Golden Retriever" is presented, it activates its internal representation and spreads to similar concepts, such as "Chihuahua". Spreading activation models have in common that memory is conceptualized as a network of nodes connected to each other by means of links. When a node is activated, this activation spreads to other related nodes. The triggered activation is increasingly weaker the greater the distance to other nodes (Ramscar, 2016).

The very same process can also be described in terms of other models, like distributed network models (e.g., Hebb, 1949; McClelland & Rumelhart, 1981). Although here separate concepts are not thought of as interconnected nodes but as similar patterns of activation, most priming ideas built on spreading activation models also hold in such distributed network models. Initial activation (from external priming or internal retrieval) activates a pattern that thereby – due to its similarity in activation

patterns – automatically co-activates highly related concepts (at least partially) that again facilitates retrieval of this related concept.

There are several potential extensions from the basic principle that an activated concept is also more accessible and over the years some research has moved into more and more subtle alterations – both in terms of how to activate a concept and in terms of the consequences of this activation. In fact, the (fictitious) example of the Vicary study cited above is an excellent example of going to the extremes at both ends: a subliminally presented prime is claimed to activate complex behavior like standing in line, ordering and paying for a soft drink or popcorn.

As incredible as this claim may seem in hindsight, there are indeed a number of non-fictitious studies in support of the notion that activating a semantic concept increases the likelihood of showing behavior consistent with this concept. Priming the concept of professor (vs. soccer hooligan) as a prime of intelligence made participants answer general knowledge questions more succesfully (Dijksterhuis & van Knippenberg, 1998). In another (in)famous example, solving scrambled sentence puzzles that contained words remotely associated with the elderly stereotype (e.g., Florida) decreased participants' walking speed (Bargh, et al., 1996). Such effects have come under increased scrutiny when other researchers failed to replicate the original effects (Doyen, Klein, Pichon & Cleeremans, 2012; Shanks et al., 2013). As a result, many authors now take a skeptical position on whether activating a mental concept will change behavior, also mirrored in Kahneman's (2012) open e-mail in which he refers to questions that have "been raised about the robustness of priming results", calling it a "poster child for doubts about the integrity of psychological research" (p. 1). As a result, he calls for special efforts and methodological rigor for future research to clarify the robustness of priming results in general.

In addition, a recent meta-analysis has assessed the psychological processes associated with presenting words connected to an action or a goal representation. Weingarten et al. (2016) found a small behavioral priming effect. This effect was robust across methodological procedures. However, what was not shown was whether the priming effects remain stable if the same concept is induced but the induction method is varied.

Importantly, the continuously more subtle measures of the consequences of priming are only one aspect and too often the baby "priming" is rhetorically thrown out with the bath water "behavior priming". In the present chapter one step back was taken and attention dedicated to the more or less subtle means of activating a semantic concept. Since there is no clear distinction between different forms of priming (Ferguson & Mann, 2014), a validation of semantic priming can also be understood as the basis for behavioral priming. Although not as much under scrutiny as behavior priming, such effects of greater accessibility of semantically congruent words after subtle and not-so-subtle priming procedures seem worthy of a further investigation.

The present research

For the current study we focused on the concepts of baby for a number of reasons. First, we were interested in the consequences of having baby-related concepts more accessible for mate choice and behavior. All studies but Study 5 also included additional measures to tap into the effect of making baby-related cognition more accessible. As these produced inconsistent results, we focus on the priming effects on semantic accessibility in the current chapter. All materials can be found on the Open Science Framework (OSF). Second, the baby concept seemed like a useful candidate because it allows activation via a closely related construct (i.e., pregnancy) that can rule

out greater accessibility due to verbalization of the actual concept. Concretely, if participants see a picture of a baby, they might covertly articulate the word "baby" and thus have the linguistic concept baby more accessible without actually activating the semantic concept, just by naming what they see. If however, seeing a pregnant woman has the same effect, it has to be mediated via activation of the larger semantic concept, not just by covertly labelling what they see.

Specifically, we report a total of six studies in which we systematically varied the means of activation or priming (the experimental manipulation) and measured the accessibility of semantic concepts with word stem completion tasks. We moved from very overt, verbal manipulations like writing an essay about having a baby (Study 1) or baby-related scrambled sentences (Study 2) to non-verbal manipulations like pictures (Study 3) or objects (Study 4). In the final two studies we activated the focal concept by choosing a remote but not identical concept as the to-be-activated concept to allow for a test of co-activation. Specifically, we tested whether exposure to images of pregnant women (Study 5), respectively a pregnant woman as experimenter (Study 6) will make baby-related content more accessible. On an exploratory note we also examined whether there were gender differences either in the general accessibility of baby-related content or the susceptibility to priming such content. We report all studies conducted to test this idea, all data exclusions, and all manipulations. For each study, all other variables included in the respective studies can be found at https://osf.io/tw3ba/?view_only=5d339c1f072c45ac8ff2bbd2fc17d728

Study 1

The initial study was planned as a test whether a (relatively explicit) activation of the baby concept makes baby-related semantic content more accessible. As a strong and

blatant manipulation of the baby concept we used an essay priming in which participants were asked to write a few sentences about how it would be to have a baby. The dependent variable was the proportion of word stems they completed in consistence with the baby concept (e.g., completing DIA___ to diaper rather than diary).

Method

Participants. In total, 229 persons (53 men, M_{age} = 26.25, SD_{age} = 7.40; 174 women, M_{age} = 21.79, SD_{age} = 3.03) participated in the study. N = 123 participated in the laboratory at the Fresenius University of Applied Science. The participants were undergraduates who earned credit for participating. All subjects were naïve to the purpose of the experiment. A part of the subjects (n = 106) were collected online to increase the sample size.

Procedure and independent variable. At the beginning of the study, the subjects answered a few questions about their age and gender. After that they were asked to write a short essay. Participants in the experimental condition were instructed: "Imagine if you had a baby. Describe thoughts and feelings towards the baby. Write at least 10 sentences." Participants in the control received a similar instruction but had to describe a landscape and their feelings for it. After this, the subjects were given a list of 25 word stems, which they should complete intuitively with the first word that came to their mind. The hypothesis was that priming with babies leads to greater accessibility of baby-related words.

Dependent variable: Word Stem Completion Task. To tap into the extent to which the experimental manipulation increased the accessibility of baby-related concept participants completed the word stem completion task (Roediger, Stadler, Weldon & Riegler, 1992; Graf & Mandler, 1984; Warrington & Weiskrantz, 1970, 1974). In this procedure, participants have to complete a word stem in a way that a whole word

appears. Importantly, these word stems were chosen on the rationale that they can be completed in either a baby-related fashion or in baby-unrelated fashion. With the aid of a dictionary, we pre-selected 25 of such one-syllable-word stems in German which could be completed to form both a baby-related word, and at least one reasonably high frequency alternative word that is not related to babies. For example, the word stem BA__ could be completed as "Baby" (baby-related) or "Bach" (beck). Following Tiggemann, Hargreaves, Polivy and McFarlane (2004), only word stems were selected for the data analysis, if they fulfilled following criteria.

1. At least one baby-related word should be generated. That was the case for every word.

2. No baby-related word should be generated by more than 50% of the participants. This was the case for six words (KI, SPIE, WIP, STRAM, KICH, MÄR), which were therefore not included in the final analysis.

3. No non-baby-related word should be generated by more than 50% of the participants. This was the case for no word.

4. The number of noncompletions of the word stem should not be high. The missing answers varied between 15.7% and 16.2%. A missing-data-analysis was conducted to increase data quality (see below).

5. There should be a complete interrater agreement between two raters whether the generated word was a baby-related word. There were only a few exceptions where the two raters did not agree. These words were counted as non-baby-words.

Finally, 19 word-stems fulfilled these criteria and were included in the final analysis.

Results

A missing-data-analysis was conducted to increase data quality. Wirtz (2004) recommends to use an EM-Algorithm to replace the missing values in a way that the whole information is consistent and maximally plausible if the prerequisites are fulfilled. The prerequisites are that (1) the missing values are missing completely at random, (2) a sample of more than $N = 100$ and (3) a maximum of 30% of missing values per variable. As missing values were completely at random, MCAR-test $\chi^2(6) = 8.013$, p = .237, and in light of our sample size of $N = 240$ and a maximum of missing values of 16.2%, we employed the EM-algorithm to replace the missing values. The final analysis was conducted with this supplemented data set.
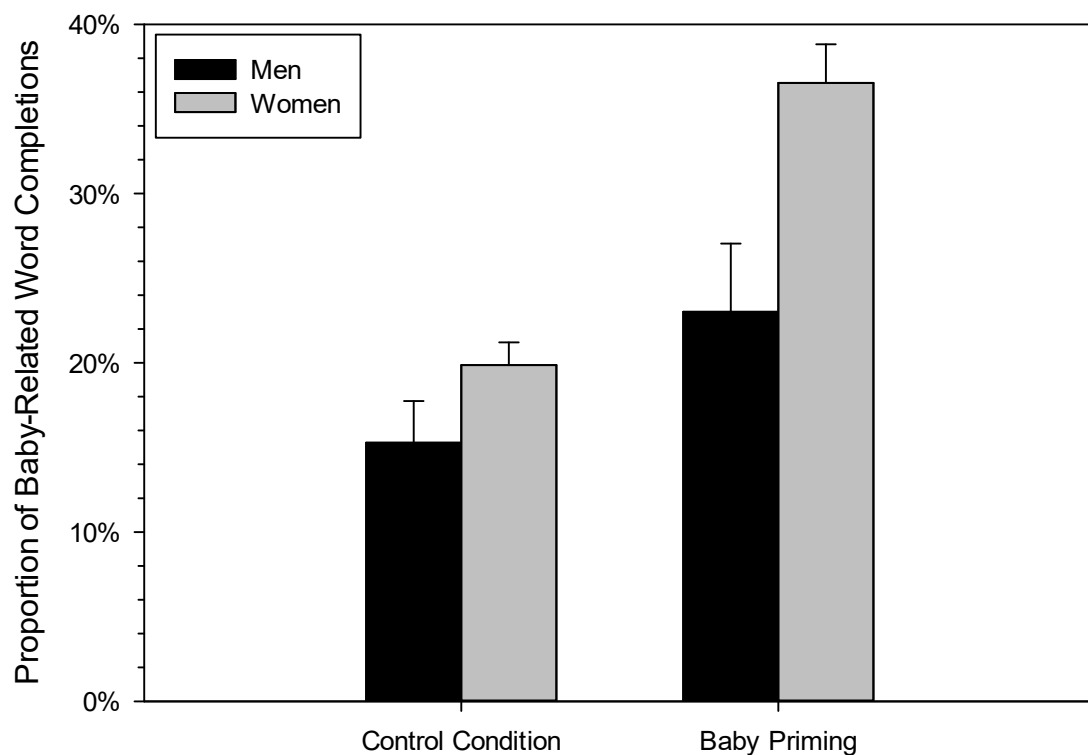
Figure 1. Proportion of baby-related word completion as a function of priming condition and participant gender in Study 1.

A two-way between-groups analysis of variance was conducted to explore the impact of gender and priming with pregnancy on levels of "baby", as measured by the Word Stem Completion Task. As expected, participants provided more baby-related words after writing about having a baby than after writing about a landscape, $F(1, 225)$ = 29.272, $p < .001$, Cohen's $d = 0.79$ (Figure 1). On an exploratory note, women produced significantly more baby-consistent words than men, $F(1, 225) = 24.372$, $p < .001$, but there was no significant effect that the size of this difference was contingent on experimental condition, as indicated by a non-significant interaction, $F(1, 225) =$ 3.394, $p < .067$.

Discussion

Using a relatively explicit manipulation of activating the baby concept had a large effect on the accessibility of baby-related cognitions for men and women. In addition, results suggested that women had an overall greater accessibility of baby-related cognitions. In the remaining studies we sought to move to increasingly more subtle manipulations to test the boundary conditions of this priming effect.

Study 2

To bolster the generalizability of our findings and move towards an arguably more subtle manipulation, Study 2 realized a scrambled sentence task manipulation. Specifically, all participants had to form coherent sentences from a number of presented words. For the experimental group two thirds of these sentences were related to having babies, whereas in the control condition no sentence referred to having babies. Thus, the baby concept was mentioned but – in contrast to Study 1 – not directly task-relevant. The primary task was to form a complete sentence and the baby concept was just more or less incidentally included in these.

Method

Sample. The sample consisted of 67 participants: 60 women (mean age = 21.3 years, *SD* = 1.6) and 7 men (mean age = 22.6 years, *SD* = 1.5). The participants were undergraduates who earned credit for participating. All subjects were naive to the purpose of the experiment.

Procedure and independent variable. The study began with a scrambled sentence task (e.g., Srull & Wyer, 1979) in which participants have to combine a series of loose words into grammatically correct sentences and enter them via the keyboard. Not all words had to be used, so that several possible solutions are possible (e.g., "like to", "cheese", "I", "ice" and "eat" can be solved as "I like to eat ice cream" or "I like to eat cheese"). For each task there were between five and eight loosen words, the mode being seven. The subjects were free to form a sentence from any number of words. A total of 15 such tasks had to be solved. In the control group, none of the words related to the concept baby. In contrast, in the experimental condition, ten out of fifteen sentences included the possibility to form a sentence related to the baby concept. As an illustration, the words "Family", "expected", "Meyer" and "offspring" offered the possibility to form a sentence associated with the baby concept in "Family Meyer expected offspring." As a dependent variable we again used a word stem completion task, this time starting with a new set of word stems.

Word Stem Completion Task. The logic of the dependent variable was identical to Study 1 with the only difference being the exact word stems presented. As we sought increase the generalizability across different samples of word stems, we started from scratch and chose 16 one-syllable-word stems from the dictionary (five of them also included in Study 1, see Table A-2). Applying the same criteria as in Study 1 (Tiggemann et al., 2004), we excluded one word (WEH__) as more than 50% of

participants completed it in a baby-consistent way. The number of non-completion was 22.0 %. A missing-data-analysis was conducted to increase data quality and missing data were again imputed.

Results

A two-way between-groups analysis of variance was conducted to explore the impact of gender and priming on the proportion of baby-related word completions. Participants primed with baby-related scrambled sentences produced more baby-consistent words, $M = 23.64\%$, $SD = 17.33$, than participants in the control group, $M = 16.47\%$, $SD = 9.46$, but this effect was just significant, $F(1, 63) = 4.159$, $p = .046$, Cohen´s $d = 0.51$. There was neither a significant main effect of gender (men: $M = 16.19\%$, $SD = 14.33$, women: $M = 20.44\%$, $SD = 14.31$, $F(1, 63) = .975$, $p = .327$, Cohen´s $d = 0.15$), nor an interaction $F(1, 63) = .857$, $p = .358$.
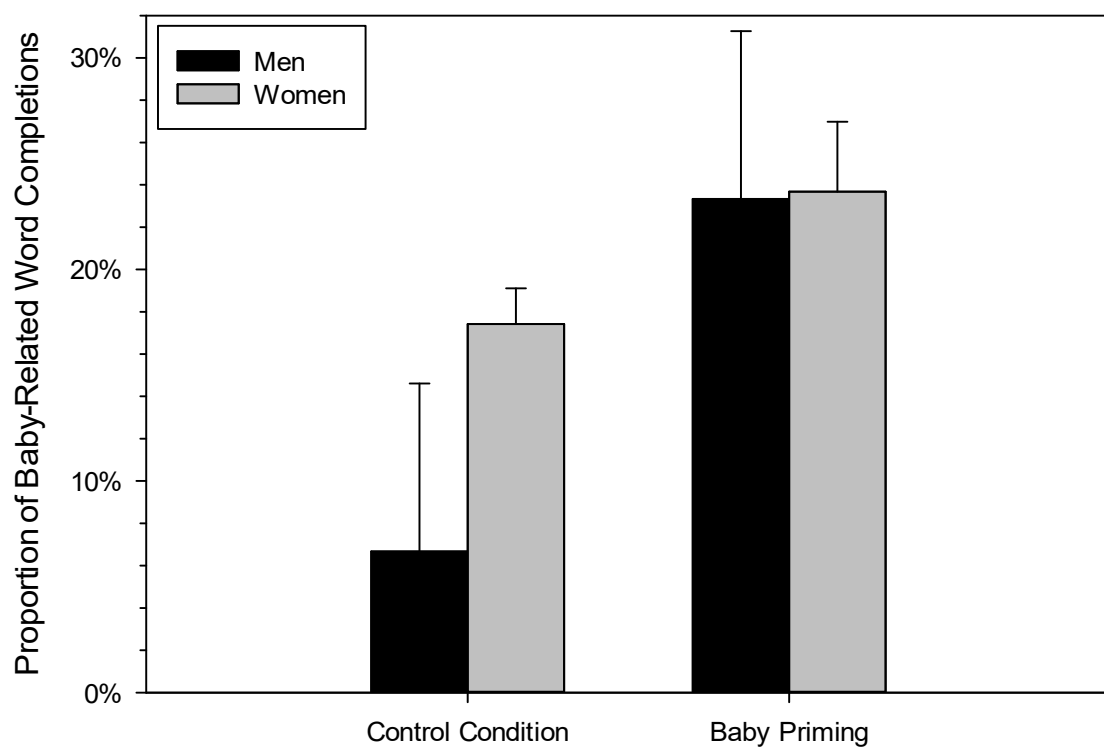
Figure 2. Proportion of baby-related word completion as a function of priming condition and participant gender in Study 2.

Discussion

Study 2 yielded a significant (albeit smaller) effect of a slightly more subtle priming for which the baby concept was not focal to the primary task, but included in a more incidental way. Although this procedure is arguably more subtle than the essay priming in Study 1, it shares one potentially problematic feature: the baby concept was activated via a verbal modality. Such written text (own essays or scrambled sentences) might not only prime the baby concept but actually include words that can later be used as completions for the presented word stems. As an illustration, if participants in Study 1 imagined to have babies wrote "It is difficult to image having offspring for me." and participants in Study 2 unscrambled the presented words to form the sentence "Family Meyer expected offspring", it would be conceivable that they completed a word stem "OFF" to offspring rather than offense not because the semantic concept "baby" was activated but because the very word offspring was temporarily more accessible due to previous exposure. To address this limitation, the following studies activated the baby concept in non-verbal manners.

Study 3

To avoid the restriction to a verbal induction method, Study 3 realized a visual search task manipulation. Specifically, all test persons had to complete a performance test, in which they should find the differences between different images. In the experimental group, babies were also shown on a part of the search pictures. Therefore,

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the concept baby was neither task relevant (as opposed to Study 1) nor verbally presented (as opposed to Studies 1 and 2).

Method

Sample. The sample consisted of 77 participants: 63 women (mean age = 21.2 years, SD = 2.9) and 14 men (mean age = 25.1 years, SD = 4.2). The participants were undergraduates who earned credit for participating. All subjects were naive to the purpose of the experiment.

Procedure and dependent variable. Study 3 was virtually identical to Study 2 (in fact both studies were conducted at the same time and participants were randomly allocated to one of the two) except for the operationalization of the priming procedure. The same 15 words were thus included in the word stem completion task (14.6% non-completion), no word had to be excluded and missing data were again imputed.

Independent variable. Participants were instructed to find a different detail in two simultaneously presented almost identical pictures, allegedly as a measure of visual attention. To indicate their response, participants had to indicate which of four quadrants contained the different detail. All participants completed five such visual search tasks. In the control condition, none of the employed images was related to the concept baby (Figure 3), whereas for the experimental conditions, three out of five images depicted a baby. Correct completion of the task was irrelevant and not recorded, as the only goal was to prime the baby concept via an intensive and motivated examination of the visual material.

	Original image	Search image
Picture pair with the concept "Baby"		
Picture pair without reference to the concept "Baby"		
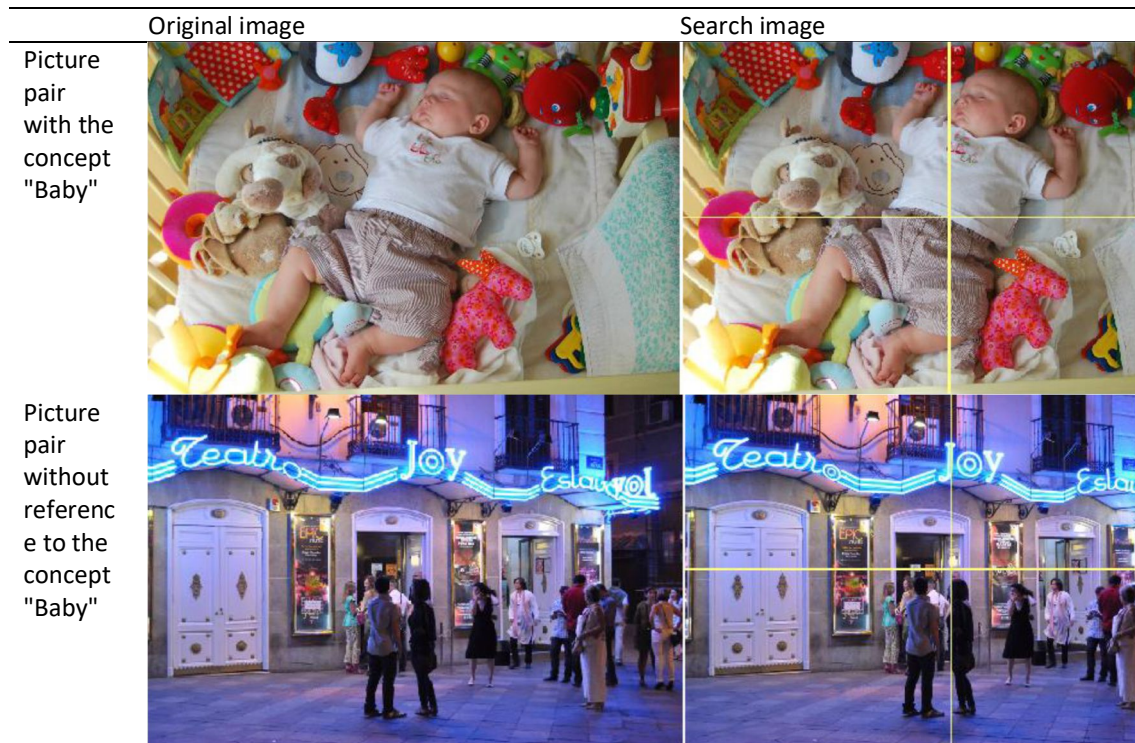
Figure 3. Example for the Visual Search Task in the two conditions of Study 3.

Results

A two-way between-groups analysis of variance was conducted to explore the impact of gender and a priming on proportion of baby-consistent word completions. Participants who had incidentally been exposed to baby pictures provided only descriptively more baby-related words, $M = 20.18\%$, $SD = 16.87$, than participants in the control condition, $M = 17.09\%$, $SD = 9.64$, but this difference was statistically not significant, $F(1, 73) = 0.02$, $p = .964$, Cohen´s $d = 0.22$ (Figure 4). There was also no

significant gender difference $F(1, 73) = 0.86$, $p = .357$, Cohen´s $d = 0.29$ or interaction $F(1, 73) = 0.64$, $p = .428$.
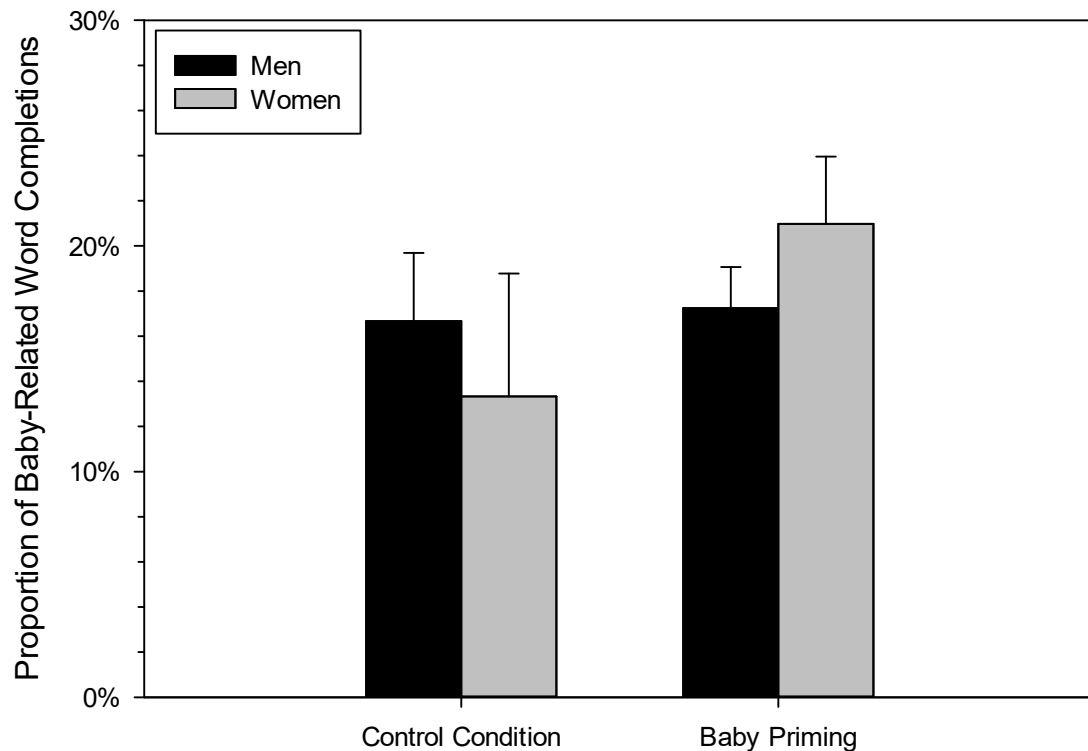
Figure 4. Proportion of baby-related word completion as a function of priming condition and participant gender in Study 3.

Discussion

Study 3 did not yield a significant effect of presenting picture of babies on accessibility of baby-related words. This may indicate that results of the previous studies were indeed critically depending on the verbal presentation of the experimental stimuli, which would introduce an alternative explanation of greater word, rather than concept accessibility (see above). Before rushing to this conclusion, though, we ran another study with again a different, but also non-verbal, modality: haptic touch. As

another alteration we sought to overcome a major drawback of Studies 2 and 3 and increased the sample size.

Study 4

Study 4 aimed at demonstrating that holding a concept-associated object while performing the word stem completion task would be sufficient to make concept-related words more accessible. Haptic information has received prominent attention in writings on *embodiment theory* (e.g., Williams, Huang & Bargh, 2009), allegedly because basic concepts develop from early pre-verbal experiences and are stored in a sensori-motor grounded way. As an example, only holding something with greater weight makes us perceive it as more important because we represent important things as "having more weight" (Jostmann, Lakens, & Schubert, 2009; but see http://www.psychfiledrawer.org/chart.php?target_article=39 for mixed results of replication attempts). For the present study we were not so much interested in sensorimotor representations of semantic concepts but whether merely holding a concept-associated object would be sufficient to make concept-related words more accessible. If successful, this would speak against the notion that priming effect in Studies 1 and 2 were merely due to word (not concept) activation.

Method

Sample. A total of $N = 239$ participants (118 men, $M = 21.39$, $SD = 1.68$; 117 women, $M = 21.22$, $SD = 1.77$) took part in a laboratory study on object evaluation. The participants were undergraduates who earned credit for participating. All subjects were naive to the purpose of the experiment.

Procedure. Participants were led into the lab and instructed to touch the object lying on the table in in front of them. Further, they were asked to keep this object in hand during the remainder of the study. To uphold the cover story a cover story, the

subjects answered a few questions about the object texture before completing the word stem completion task.

Independent variable. The independent variable was realized by manipulating the kind of object subjects were asked to touch. The subjects either touched a soft, baby-related object (a teddy bear), a hard, baby-related object (a rattle), a soft, non-baby-related object (a sock) or a hard, non-baby-related object (a stone).

Dependent variable. We presented ten word stems derived following the same logic as previously explained. We again applied the same exclusion criteria as in the previous studies. Two word stems were excluded and therefore a total of eight word stems were evaluated (see Appendix A). The number of noncompletion was 0.8%. A missing-data-analysis was conducted to increase data quality and missing data were again imputed.

Results

A two-way between-groups analysis of variance was conducted to explore the impact of gender and priming on proportion of baby-related word completions. Participants who touched a teddy bear or a rattle produced more baby-consistent word completions $M = 31.25\%$, $SD = 27.60$, than participants who held a sock or a stone, $M = 20.27\%$, $SD = 20.58$, $F(1, 235) = 11.91$, $p < .001$, Cohen´s $d = 0.45$. There was no significant difference between men, $M = 24.58\%$, $SD = 28.56$, and women, $M = 26.98\%$, $SD = 20.75$. There was, however, a significant interaction effect, $F(1, 235) = 6.922$, $p < .009$, insofar that men in the control group had fewer baby cognitions than women, but this difference disappeared in the priming condition.

A three-way between-groups analysis of variance was conducted to explore the impact of priming with baby and priming with soft or hard objects of baby-related word completions by men and women. Overall, participants who touched a teddy bear or a

rattle produced more baby-consistent word completions $M = 31.25\%$, $SD = 27.60$, than participants who held a sock or a stone, $M = 20.27\%$, $SD = 20.58$, $F(1, 231) = 12.15$, $p < .001$, Cohen's $d = 0.45$, and this effect was moderated by participant gender, $F(1, 231) = 7.39$, $p = .007$, as men showed greater effects than women (Figure 5). Unexpectedly, there was also a significant difference between participants who touched a soft object $M = 29.29\%$, $SD = 26.31$, and participants who touched a hard object, $M = 22.40\%$, $SD = 23.08$, $F(1, 231) = 4.94$, $p = .027$, Cohen's $d = 0.28$. There was, however, no significant interaction effect, or other effects, all Fs < 1.
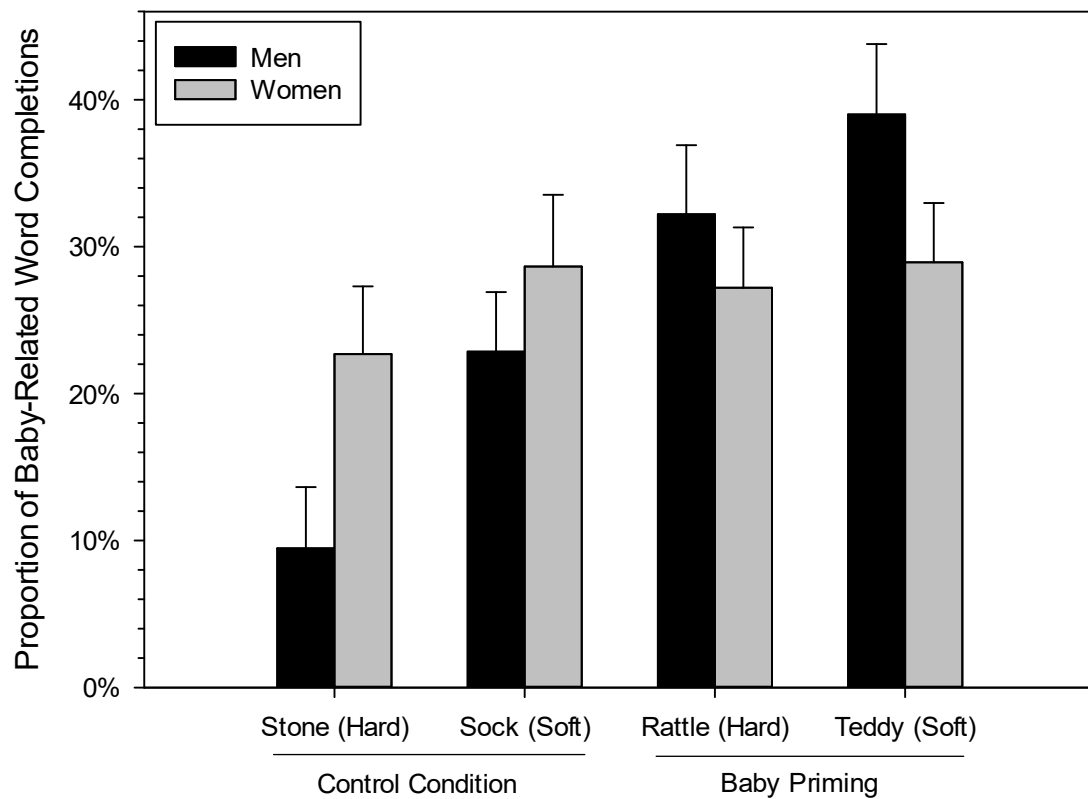
Figure 5. Proportion of baby-related word completion as a function of priming conditions (baby vs. not; soft vs. hard) and participant gender in Study 4.

Discussion

Study 4 provided evidence for the notion that it is not necessary to verbally activate the baby concept in order to make baby-related words more accessible. This is important as it speaks to the fact that the concept (and not just words) became more accessible by merely holding a related object. Having established this, we sought to move one step further in the remaining studies. Specifically we aimed at priming a concept related but not identical to the baby concept: pregnancy.

A possible limitation of the investigation is that in the haptic induction procedure the participants also received visual information of the object, so that a possible influence of the visual information can not be completely excluded.

Study 5

In Study 5 we took a second try to use a visual induction method (after Study 3 failed) with a much larger sample size to be able to detect even subtle differences. Specifically, we displayed full-body images of visible pregnant women (experimental group) or just their cropped faces (control group) to experimentally activate the concept of pregnancy.

Method

Participants and design. 550 students were recruited from a mailing system provided by several German universities and student associations. Participants were randomly assigned to either the experimental (N = 225) or control condition (N = 330). The study took place online. Unexpectedly a large number of participants terminated the experiment without given demographic information, for the remaining $N = 201$, for which we had full demographics information, 136 (68,3%) were women with a mean

age of 25,43 years (*SD* = 4,91) and 63 (31.7%) were men with a mean age of 25.22 (*SD* = 3.83).

Procedures and independent variable. At the beginning of the experiment participants were told that they would be participating in a study about "perception" of other people. Specifically, participants were exposed to twenty full-body pictures of pregnant women (experimental condition) or twenty face portraits cropped from the identical pictures (control group) retained from Wikimedia Commons, an international free collection of pictures, videos and audio files. Criteria for the inclusion of a picture were that there were no letters on the picture (e.g., on a shirt) and there had to be only one person on the picture. There were 20 pictures in total. After every picture, participants were given two or three word stems with a request to complete them with whatever word came to their mind first. At the end of the investigation, a manipulation check was carried out. The test persons were asked about ten different characteristics of the experimental stimulus. One question related to a possible pregnancy. Test persons who did not recognize the pregnant women as pregnant (*n* = 4), and subjects who considered the women pregnant in the control condition (*n* = 22) were excluded from the further analysis.

Dependent variable. For the word stem completion task we aimed for a larger initial pool of word stems: In light of the suboptimal completion frequencies in Study 4 (with many words having more than 50% of only one solution), we aimed for a larger and more diverse sample of word stems in order to increase generalizability. We thus presented 42 one-syllable-word stems in German. Applying the same exclusion criteria as previously 35 word stems fulfilled these and were included in the final analysis (see Appendix A).

Results

We employed the same missing data analysis as in Study 1. Based on a non-significant MCAR-test, χ^2 (2451) = 2425.01, p <.642, a sample size of well over 100, and a maximum of 16.3% missing values, we replaced the missing values with an EM-algorithm. The final analysis was conducted with that supplemented data set.

Due to the unexpectedly high number of participants for which we had no information about their gender (see above), we first computed the simple condition effect without controlling for gender. As expected, having seen (the whole bodies of) pregnant women increased the likelihood of completing the word stems in a baby-related fashion, *M* = 12.25%, *SD* = 8.27, compared to seeing only the (non-revealing) faces of these women, *M* = 6.79%, *SD* = 4.68, *t*(555) = 9.00, p < .001, Cohen's *d* = 0.81.
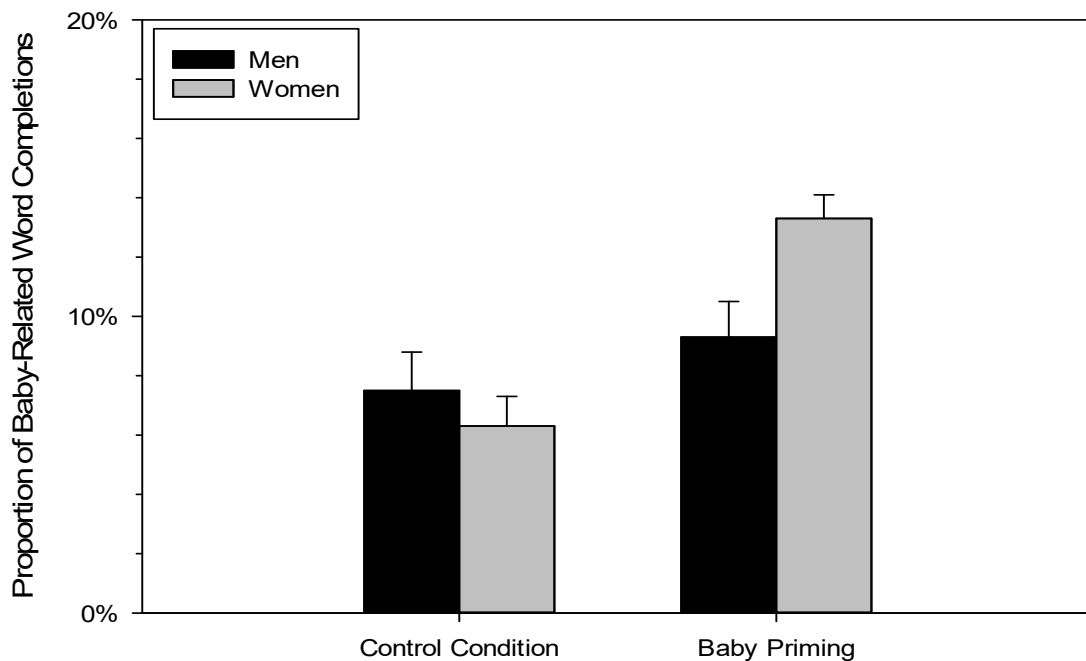
Figure 6. Proportion of baby-related word completion as a function of priming condition and participant gender in Study 5 (for the 201 participants for whom gender information was available).

To address the question of gender main effects and interactions of gender with the experimental manipulation, a two-way between-groups analysis of variance was conducted on the remaining $n = 199$ participants for which we had gender information. There was a statistically significant main effect of priming, $F(1, 197) = 16,352$, $p < .001$, but not for gender $F(1, 195) = 1.576$, $p = .211$. However, the interaction effect, $F(1, 197) = 5.799$, $p < .02$, reached statistical significance. Men and women did not differ in the number of baby-related cognitions after seeing (non-revealing) faces. For participants who had seen images of pregnant women, however, women produced more baby-related words, $t(94.51) = .2.86$, $p = .005$, Cohen's $d = .52$ (Figure 6).

Discussion

Watching images of pregnant women made baby-related cognitions more accessible. This study shows that with a stronger manipulation (repeated exposure in between word completion) and a larger sample, it was indeed possible to provide support for the notion that merely watching an image can increase the accessibility of related verbal content. Furthermore, this study exemplifies that the visual depiction does not need to be the focal concept (baby) but can be a highly related other one (pregnant women). The latter argument may be seen as problematic as we have no evidence whether people indeed interpret the images as depicting pregnancy and then this activated concept co-activated the concept "baby" or whether perceivers interpret the round pregnant belly as merely a container of a baby and thereby directly activate the concept. Without making the point of related concepts too strong thus, we proceeded to our final study with an arguably even more incidental manipulation: the pregnancy status of the experimenter.

Study 6

Study 6 sought to move the approach of Study 5 further into the direction of a naturalistic situation. In laboratory studies at universities, participants are typically recruited by a student assistant who then also briefly explains the study to the participants before leaving them alone to complete the study. In our study, participants were always approached by the same female experimenter, either during her first trimester of pregnancy (control condition) or during her last trimester of pregnancy (experimental condition). Thus, it was possible to combine the advantages of the internal validity of a laboratory testing with the advantages of the external validity of a normal study environment.

Method

Sample. The sample in the laboratory consisted of 118 participants (26 men, 92 women). The test persons were students who received a compensation for expenses in the form of chocolate. All subjects were naïve to the purpose of the experiment.

Procedure and independent variable. Participants were approached on campus by a female experimenter. This was always the same person who was either in the beginning of her pregnancy, invisible to the outside (control condition) or she was visibly in a progressed state of pregnancy (experimental condition). She introduced participants to the procedure and left them to complete the study in a cubicle by themselves. After working on a task unrelated to the current manuscript, participants executed a word stem completion task. At the end of the procedure participants were asked about their demographic background.

Dependent variable. Participants were presented with 40 word stems that could be either used to form a baby-related word or a non-related word. Applying the same exclusion criteria as in previous studies yielded that 30 word stems fulfilled could be

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included in the final analysis. The maximum number of noncompletion was 7.6%. A missing-data-analysis was conducted to increase data quality and missing data were again imputed.

Results

A two-way analysis of variance with priming and gender as between-subjects factors and the proportion of baby-related word completions as dependent variable yielded a significant main effect of priming, $F(1, 114) = 6.994$, $p = .009$, Cohen´s $d = 0.33$. Participants who were recruited and instructed by a visibly pregnant experimenter had more baby content accessible, $M = 14.65\%$, $SD = 8.27$, than participants who seemed to have been recruited by a non-pregnant (in fact early pregnant) experimenter, $M = 11.81\%$, $SD = 6.93$. The main effect of gender did not reach statistical significance, $F(1, 114) = 2.849$, $p = .94$. However, the interaction effect of priming and gender $F(1, 114)=3.60$, $p =.060$, did not reach statistical significance. Men and women did differ in the number of baby-related cognitions when recruited by not visibly pregnant experimenter, $t(57) = 3.10$, $p = .003$, Cohen's $d = 1.01$, but this effect attenuated when recruited by a visibly pregnant experimenter, $t(57) = 0.13$, $p = .900$, Cohen's $d = .11$ (Figure 7).
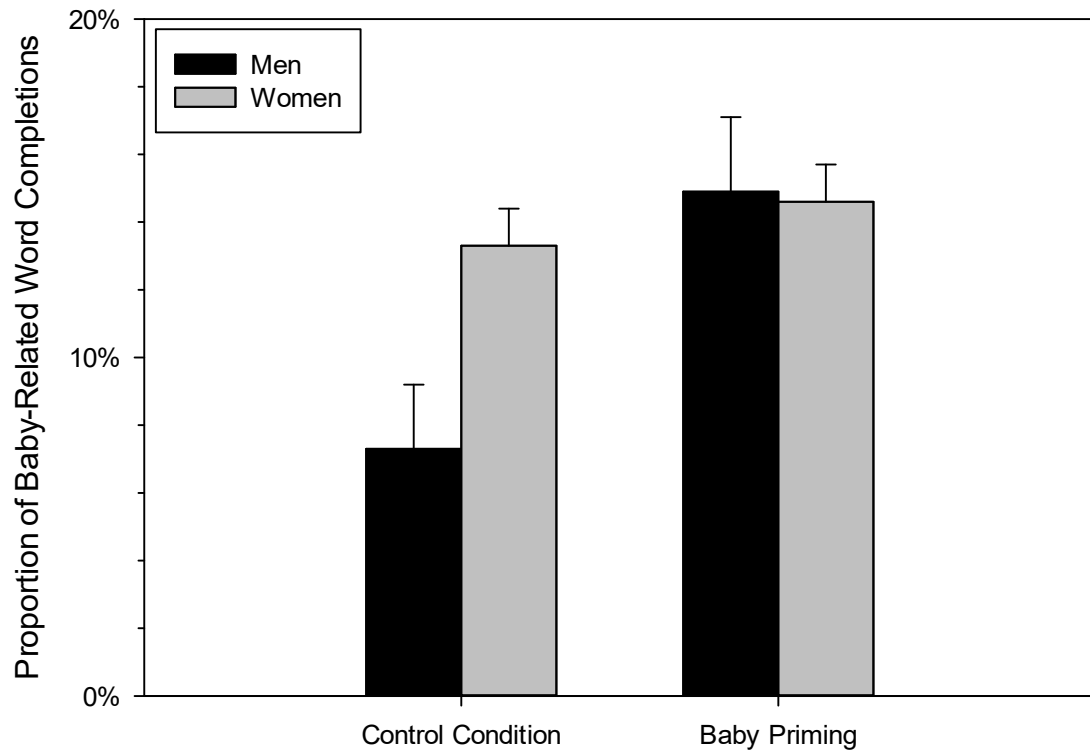
Figure 7. Proportion of baby-related word completion as a function of priming condition and participant gender in Study 6.

Discussion

Using a subtle and elegant manipulation, Study 6 showed that merely being instructed by a pregnant experimenter makes baby-related cognitions more accessible. Although it is not ideal that there was only a quasi-randomization between conditions (one half of participants was recruited in spring, the other half in fall) and that the experimenter is not blind with regard to condition, we cannot conceive of any theoretical alternative explanation to explain our results. Unless one is willing to claim greater accessibility of baby-related word in fall compared to spring, our results can only be attributed to the pregnancy state of the experimenter.

Meta-analytic integration

Across six studies we have obtained evidence for significant priming effect (significant in 5 out of 6 studies) and gender effects (significant in 1 out of 6 studies). To get a better estimate of the average size of this effect, as well as its heterogeneity, we conducted four miniature meta-analyses with the metafor package in R (Viechtbauer, 2010). Specifically, we tested the overall experimental effects collapsed across participant gender, two analyses of experimental effects separately for women and men, and the overall main effect of gender collapsed across experimental conditions. We used Cohen's d as our effect-size estimate in our random-effects model with a random effects maximum likelihood (REML) estimator of heterogeneity.

Results revealed that, not surprisingly, there was robust evidence for an overall priming effect, $d = 0.59$, 95% CI [0.36, 0.81], $p < .0001$, but there was also considerable heterogeneity, $Q(5) = 15.74$, $p = .008$, $I^2 = 67.20\%$ (Figure 8). The separate analysis only for men also indicated a robust priming effect, $d = 0.61$, 95% CI [0.30, 0.91], $p < .0001$, without significant support of hetergeneity, $Q(5) = 8.07$, $p = .1522$, $I^2 = 20.81\%$, suggesting that for men the overall the effect of priming was large and equally strong across experiments (Figure 9). In contrast, the overall effect was somewhat weaker for women, $d = 0.51$, 95% CI [0.17, 0.84], $p = .003$, and heterogeneous across experiments, $Q(5) = 22.44$, $p = .0004$, $I^2 = 75.78\%$ (Figure 10). The potentially surprising fact of a larger priming effect for men has to be qualified, however. As across conditions, women produced meta-analytically significant more baby-related words, $d = 0.26$, 95% CI [0.03, 0.49], $p = .0268$, with no indication of significant heterogeneity of effects, $Q(5) = 9.94$, $p = .077$, $I^2 = 50.41\%$ (Figure 11). It is thus therefore conceivable that the descriptively larger effect for men was due to a ceiling effect: Women had consistently

more baby-related words accessible that there was simply less room for further

activation compared to men.
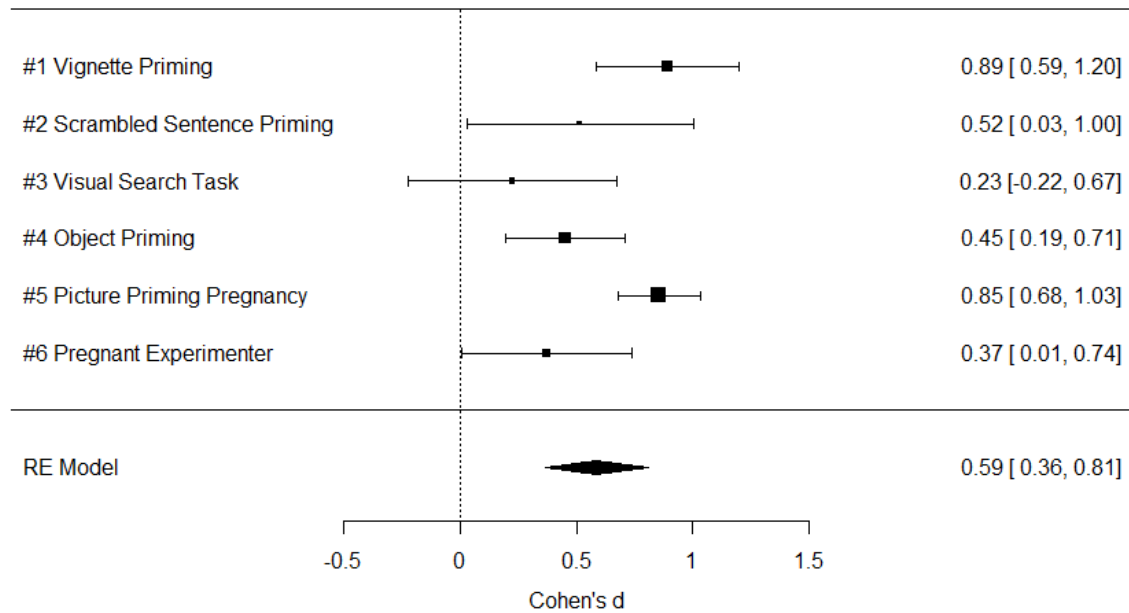
Figure 8. Forest plot of meta-analytic effect of priming on concept accessibility,
collapsed over gender.
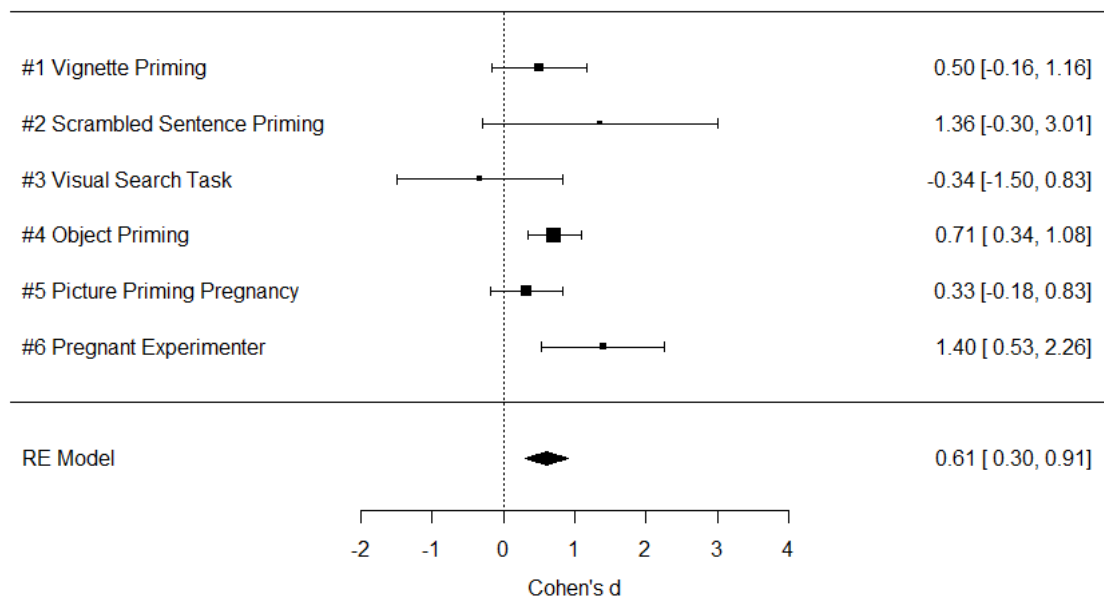
Figure 9. Forest plot of meta-analytic effect of priming on concept accessibility for

men.
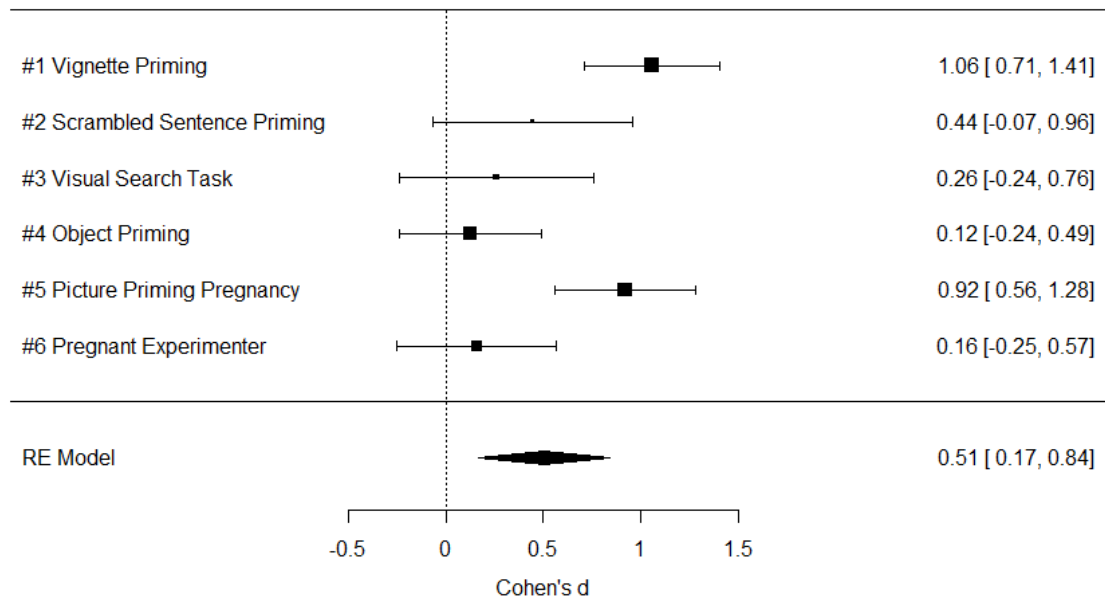
Figure 10. Forest plot of meta-analytic effect of priming on concept accessibility for

women.
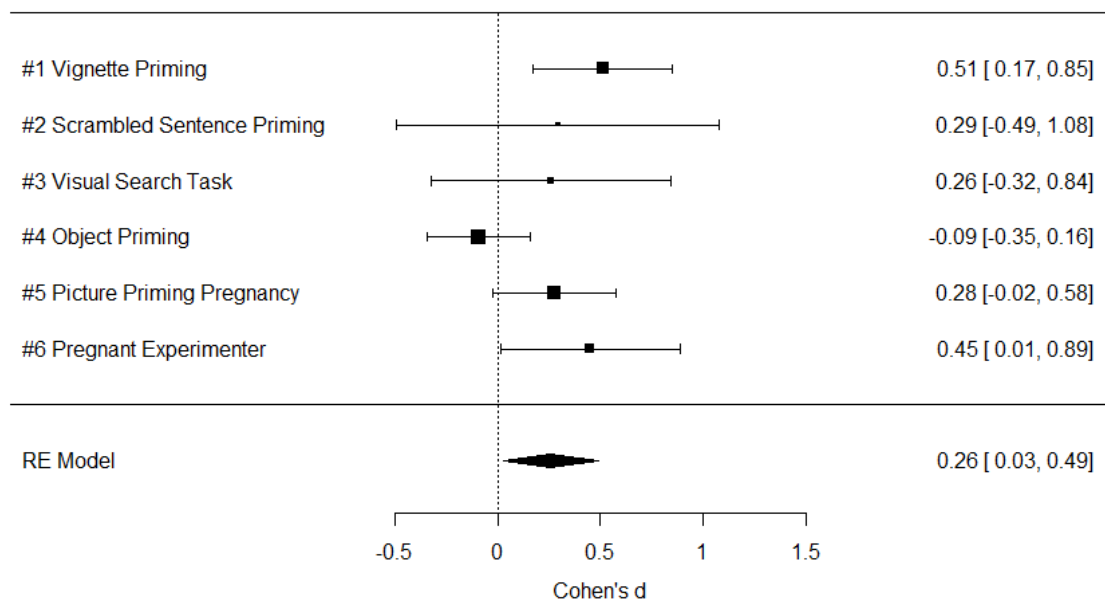
Figure 11. Forest plot of meta-analytic effect of gender on concept accessibility,

collapsed over experimental conditions.

General discussion

In the present study, six studies were performed in which we systematically varied the activation or priming of a concept. Then we measured accessibility for semantic concepts using the word stem completion task. Across six studies, our investigations showed that the activation of semantic concepts is possible through greater accessibility of semantically congruent words (with only one study failing to reach conventional level of significance). The concept baby was activated robustly and the diversity of the methods speaks for the robustness of the effects.

In 5 out of 6 studies, significant priming effects were achieved. There were heterogeneous effects only in female subjects, which can probably be explained by ceiling effects. This means that it does not depend on the induction method if the same semantic concept can be activated. This is in line with a recent meta-analysis that found robust priming effects independent of the methodological procedures (Weingarten et al., 2016).

The effect sizes ranged from small to large but it is difficult to pinpoint the moderating role. Although we initially planned to go from open and blatant (presumably strong) manipulations to continuously more subtle ones, the effect sizes do not reflect such a linear decrease. In fact, even stronger than the blatant vignette priming, the largest effects size was observed for the picture of pregnant women. Arguably, however, this may be due to the exact operationalization of repeated exposure in between completing words. Our variation of priming methods was thus not pure in the strictest sense of changing nothing but the modality of priming.

Although only Study 1 revealed a significant main effect of gender, the meta-analytic integration showed that women reliably had more baby-related words accessible. This may also explain the observed stronger priming effects for men than

women, as women might have been closer to the ceiling than men and had less room to further increase accessibility. Why exactly women had more baby words accessible is at present open to speculation, but it is at least conceivable that social role stereotypes associate women more with the reproductive sphere than men and that women to a certain extent internalize these societal views.

The current studies have some limitations. First, no suspicion check was carried out, so some scholars could argue that awareness of the prime may lead participants either to respond in line with the implications of the prime (i.e., a demand effect) or to attempt to (over-) correct for the prime's bias in line with their naive theories (Wegener & Petty, 1995). Second, through all six studies the operationalization of concept accessibility relied solely on one measure. On the one hand, this increases the comparability of the results of all six investigations, but on the other hand it somewhat reduces the generalizability, which can be compensated to a small extent by the robustness of the word stem task method.

As increasingly remote concepts and behaviors (Dijksterhuis & van Knippenberg, 1998; Bargh, et al., 1996) have been primed, which have come under increasing criticism (Kahneman, 2012), we took a step back and tried to strengthen the roots of priming research. We have been able to replicate a semantic activation several times so that the prerequisite is given for further investigation by behavioral priming. Our findings are consistent with those of Ramscar (2016), who showed that the basal priming mechanisms are robust effects (e.g., priming a word on recognizing a highly associated word as a word). Future research may help further elucidate whether such concept accessibility indeed has the often claimed downstream consequences. Having the baby concept available could for instance influence mate choice and reactions to erotic images (Zilioli et al., 2016) to name just a few.

Chapter 2: Different facets of attitudes towards having children - Introducing the English and German version of the Procreation Attitude Scale (PrAttS).[2]

People differ in how positive they are towards children. However, these attitudes may be more complex than simple positive/negative distinctions (Lichtenstein & Slovic, 2006). According to Liefbroer (2005), children fulfill needs in three categories: (a) economic reward, (b) emotional or psychological needs (such as self-development) and (c) social reward (such as a status gain). In Western societies, emotional and social benefits seem to be the core motives for deciding on children, while financial motives tend to reinforce a decision against having children (Liefbroer, 2005, Matias & Fontaine, 2012, O'Laughlin & Anderson, 2001). Bauer and Kneip (2013) found that attitudes of both partners played an equally important role in decision-making about the first child. Hutteman, Bleidorn, Penke and Denissen (2013) found that personality traits of both partners were directly related to the fertility outcome. In particular, the self-confidence of both partners increased the likelihood of choosing to have a child, while aggressiveness in males reduced the likelihood of conceiving a child. Attitudes towards children also greatly influence how (potential) partners are rated. Fiore and Donath (2005) were able to show that the perceived similarity in a romantic partner with regard to his or her desire to have children greatly influences his or her attractiveness. In the present work, an exploratory attempt was made to develop a scale that tracks different attitudes towards children and allows for a look at potential gender differences.

Parsons, Young, Kumari, Stein and Kringelbach (2011) make one currently influential distinction regarding attitudes towards children. They investigated whether

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[2] This chapter is nearly identical to Marhenke, T., & Imhoff, R. (2018). Different facets of attitudes towards having children - Introducing the English and German version of the Procreation Attitude Scale (PrAttS). Manuscript submitted for publication.

differences between emotional and motivational preference representations could be found using measures of conscious appraisal (`liking`) and behavioral responsivity (`wanting`) towards real-world infant and adult faces. Women gave significantly higher `liking` ratings for infant faces (but not adult faces) than men did, but this difference was not apparent in the `wanting` task, in which men and women could increase or decrease the duration for which they viewed an infant face. The authors suggested that infant faces may have similar motivational salience for men and women, despite gender differences in conscious ratings.

In spite of the innovative potential of these findings, two aspects of this study deserve comment. First, the measures of wanting and liking did not only differ in their presumed motivational vs. emotional quality, but also their measurement modality. Second, the indicators of wanting were based on the interpretation of viewing times. Although a popular tool to assess preferences in many domains (e.g., Rosenzweig, 1942), the specificity of these measures has recently been questioned (Imhoff, et al., 2010; Imhoff, Schmidt, Weiß, Young & Banse, 2012). The present study thus sought to enhance the comparability of the different facets of attitudes towards babies by relying on the same modality (multi-item self-report items) across different sub-facets.

In spite of the measurement issues, a fine-grained method might also help re-assess the existence of gender differences in the different aspect of baby-related attitudes. It has been repeatedly argued that women and men should differ in their attitudes towards babies, as cultural gender stereotypes expect women to be nurturing and affectionate towards babies and children to a greater extent than is the case for men (Katz-Wise, Priess & Hyde, 2010; Kaufman & Uhlenberg, 2000). In other words, people suspect that outward emotional readiness for children, which has been shaped by societal expectations, is reflected in women having a higher emotional `liking` of children

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(Parsons et al., 2011). Nevertheless, gender differences in responding to infants are far from definitive (Berman, 1980). Hildebrandt and Fitzgerald (1978) reported that women are generally more perceptive and responsive to cuteness than men are, but recent findings (Parsons et al., 2011) show that both men and women 'want' to view infants for similar durations, suggesting a more equal interest in infants than previously thought. In line with Parsons et al. (2011), the current study suspects the existence of gender differences in emotional attitudes (`liking`) but not in motivational attitudes (`wanting`).

In the present study, we sought to provide a tool to explore attitudes towards babies and procreation by developing and validating a questionnaire regarding attitudes towards procreation, the PrAttS. Both English and German versions were tested. The aim of this study, however, goes beyond this practical goal. As another goal, we examined whether gender differences in attitudes towards children and reproduction can be found using this measure. All materials can be found on OSF at https://osf.io/tkp7v/?view_only=ff8f7ee0f8ac4fa688f1c6a0d2ce89c6

Study 1

An initial study was conducted to develop a scale tapping into adults' attitudes toward having offspring. A larger number of statements were formulated that expressed a general positive (e.g., I feel happy when I see children playing) or negative (e.g., Children are demanding) emotional value toward having babies. Items soliciting rational attitudes (such as "you should only have children when you have a secure job") reflecting motivational attitudes towards having babies were also formulated.

In an exploratory fashion, the study also assessed participants' orientation to long- and short-term relationships (Schwarz & Hassebrauck, 2007) as well as their sociosexuality (Penke & Asendorpf, 2008). Sociosexuality reflects differences in

seeking sexual contact without a deeper emotional attachment. Extremely large gender effects are often reported with regard to sociosexuality (Schwarz & Hassebrauck, 2007; Penke & Asendorpf, 2008); especially in terms of interest in short-term relationships. For this reason, the present study explores whether these effects can be replicated and whether these can be meaningfully linked to differences in attitude towards babies and reproduction.

Method

Sample. The sample consisted of 157 participants: 57 women (mean age = 35.2 years, *SD* = 12.5) and 93 men (mean age = 32.1 years, *SD* = 9.8); the majority of participants held at least a bachelor's degree (55%).

The Procreation Attitude Scale. Drawing on the conceptual background summarized in the introduction, the authors of the current study obtained input from a native English-speaker and generated a preliminary pool of 36 items that presented attitudes towards children. The complete list of items is presented in Appendix B. In order to ensure applicability to persons with and without children, all items referred to procreation generally; no items referred to respondents' own offspring. Respondents indicated their agreement on a scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Relationship Orientations. The Mateship Orientation questionnaire (Schwarz & Hassebrauck, 2007) is a tool primarily used to assess long- and short-term mate preferences. It consists of two subscales with seven items each: long-term mate preferences (e.g., "Warmth and comfort are necessary parts of a relationship") and short-term mate preferences (e.g., "If I could, I would have sex with as many people as possible"). Participants rated the items on a Likert scale ranging from 1 (I strongly agree) to 7 (I strongly disagree).

Sociosexuality. The revised Sociosexual Orientation Inventory (SOI-R) was included to measure sociosexual orientation, which is defined as inter-individual differences in seeking sexual contact without a deeper emotional attachment (Penke & Asendorpf, 2008). This scale includes three components of sociosexuality: past behavioral experiences, attitudes toward uncommitted sex, and sociosexual desire.

Results

Participants' responses on the PrAttS items were subjected to a preliminary principal components analysis with an oblique rotation. Results revealed ten components with eigenvalues of 1.0 that together accounted for 65.12% of the variance. Three components had eigenvalues greater than 2.0; the pattern matrix and scree plot suggested three interpretable components, each containing multiple items. Items with loadings ≥ .60 and without meaningful cross-loadings on a second factor (≤ .20) were selected. Thirteen items fulfilled these criteria (Table 1) and the emerging factors can be described as *unconditional positivity* (e.g., "I´d be a good father / mother;" 5 items), *anticipated annoyance* (e.g., "Having a baby means less time for myself;" 4 items) and *contingent willingness* (e.g., "You should only have children once you´ve found the perfect partner;" 4 items).

All resulting scales proved sufficiently reliable (Table 2). Unconditional positivity was strongly associated with an orientation toward long-term relationships. Anticipated annoyance was also significantly associated with this orientation. Contingent willingness was negatively related to positive attitudes towards promiscuous behavior and self-reported frequency of such behavior.

There were also a number of gender differences. Unconditional positivity and the long-term mate preferences were significantly more pronounced among women. Men,

on the other hand, reported a greater incidence of short-term mate preferences, more promiscuous attitudes toward uncommitted sex and a stronger sociosexual desire.

Discussion

Study 1 obtained a relatively economical scale to tap into three facets of attitudes toward having children: unconditional positivity, contingent willingness, and anticipated annoyance. Importantly, these attitudes are not only manifestations on one scale ranging from positive to negative but also (relatively) independent facets.

Study 2

Building on Study 1, Study 2 sought to validate a German language version of the same scale as in the previous study. A larger sample was recruited to test whether the lack of gender effects in Study 1 might have been the results of too little statistical power to detect such an effect. A sensitivity analysis revealed that the first study had 95% power to detect the effects of a Cohen's $d = 0.55$ or larger; this number is larger even than estimates of the average effects size in psychology before bias-correction (Bakker, van Dijk & Wicherts, 2012). We thus deemed it advisable to aim for a larger sample in order to have a realistic chance of detecting smaller effects. Finally, the study included different additional variables to gain a better understanding of correlations, as well as potential antecedents and consequences of different attitudinal facets toward having children. In addition to standard measures of personality traits (Big Five), measures of personal upbringing experiences (attachment to mother, educational experiences), current partnerships (attachment to partner), and job and career-related scales were also included.

Method

Sample. A total of 288 participants (151 women, mean age = 24.19, *SD* = 4.95; 85 men, mean age = 25.16 years, *SD* = 6.89) were recruited from different German universities and branches of study through a mailing system. This sample size equipped the study with 95% statistical power to detect also smaller effects of a Cohen's *d* = 0.40 or larger. Participation was voluntary; for the majority of participants (57%), a university-qualifying high-school degree was the highest educational level reached. Another large cohort (42%) had also received university degrees.

Measures

German Version of the PrAttS. A native German speaker and a native English speaker carefully translated all 13 items included in Study 1 into the German language (dual forward translation). When both translations were inconsistent, issues were discussed and resolved by consensus.

Personality Factors. The Big Five personality traits (extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience) were measured on a 5-point scale using the German 50-item Big Five Personality questionnaire (Satow, 2012).

Parenting Style. Schumacher, Stöbel-Richter and Brähler (2002) investigated the connection between the recalled parental parenting behavior and the intensity of the wish to have a child as well as the expression of different fertility motives. It turned out that recalled parental parenting behavior, which was dismissive, over-protective and not very emotionally warm, is especially common among people who do not want to have children themselves. Persons with over-protective parents were more concerned about personal restrictions from their children and lack of support in education. In the present study, the parents' recalled parenting behavior was measured, as associations with contingent willingness (PrAttS) and anticipated annoyance (PrAttS) are assumed.

The Overprotective Education scale (Böhm, 1993) is a 34-item inventory with two subscales for overprotective education by a father or mother. Responses were recorded on a 4-point Likert scale.

Attachment to Mother and Partner. One of the most robust findings of all attachment research is the intergenerational transmission of attachment patterns (Bernier, Matte-Gagné, Bélanger & Whipple, 2014). Van Ijzdenoorn (1995) conducted the first meta-analytic study of the association between maternal and child attachment. The results confirmed the robustness of the association and suggested a large effect size. Verhage et al. (2016) confirmed the association between maternal and child attachment in a recent meta-analysis. Securely bound children also tend to have secure bound children later on, with this secure-autonomous transmission having the greatest effect size.

Verhage et al. (2016) also demonstrated that dismissing caregiver attachment representation leads to avoidant caregiver attachment. It would therefore be conceivable that people with a dismissing caregiver representation have developed more defensive baby cognitions that act as a mediator to future avoidant-child-attachment. The factor Anticipated Annoyance validated in study 1 could reflect this thinking. Therefore, the Specific Attachment Scale for Adults (Asendorpf, Banse, Wilpers & Neyer, 1997) was used to investigate the association between attachment style and procreation attitude. The Specific Attachment Scale for Adults (Asendorpf et al., 1997) taps into respondents' attachment to their partners and mothers on *secure-anxious* and *dependent-independent dimensions*. The tool is composed of 28 items with responses recorded on a 5-point scale.

Career Orientation. The Career Management questionnaire (Gould, 1979) was included in its modified German version (Rowold, 2004) to assess two factors: *career*

plans and *job flexibility*. Job and career-related scales were included because it is possible that people who prioritize career goals or job-related values devalue the idea of raising children.

Results

Factor Structure: Procreation Attitude Scales. The 13 items on the PrAttS were subjected to a confirmatory factor analysis to check whether the structure of the German version of the questionnaire differs from that of the English version. The 13 items were divided between the three latent variables, as in Study 1. Each item belonged only to one subscale. The data converged normally after 35 iterations in the data set, and the prerequisite for a confirmatory factor analysis was achieved. The confirmatory factor analysis for the PrAttS ($\chi2(78) = 975.12$, $p < .001$, Tucker-Lewis Index (TLI) = .87, Comparative Fit Index (CFI) = .90, Root Mean Square Error of Approximation (RMSEA) = .08) yielded an acceptable fit (Moosbrugger & Kelava, 2012). Based on these results, it was assumed that all 13 manifest variables were suitable to map the latent variables and that the structure of the German version of the questionnaire is equivalent to that of the English version.

For reasons of comparability, we also conducted the same preliminary principal components analysis as in Study 1 and obtained similar results. The results revealed three components with eigenvalues greater than 1.0 that together accounted for 56.36% of the variance. Inspection of the pattern matrix and the scree plot indicated three interpretable components each containing multiple items (see Table 1). Consistent with the results obtained using the original English version of the scale, a three-dimensional structure (unconditional positivity, anticipated annoyance, and contingent willingness) was the best solution to explain the data in the sample and demonstrate that the factor

structure of the German version was similar to that of the English version. These results demonstrate the robustness of the questionnaire in assessing these three constructs.

All items for each of the three scales loaded most strongly on their respective scales, with the exception of the item "*Kinder sind anstrengend" (children are demanding)* that loaded most strongly (negatively) on the factor unconditional positivity. Internal consistency was good (Cohen, 1988) for unconditional positivity (Cronbach's α = 0.83) and acceptable for anticipated annoyance (Cronbach's α = 0.69) and contingent willingness (Cronbach's α = 0.72).

As found in Study 1 and as expected, women (M = 3.91, SD = 0.75) demonstrated a higher unconditional positivity than men (M = 3.54, SD = 0.90, $t(249)$=-3.48,, $p < .001$, Cohen's d = 0.45. An opposite effect was found with the items concerning the hesitation to have children. Men (M = 3.81, SD = 0.75) had a higher degree of contingent willingness than women (M = 3.55, SD = 0.71, $t(249)$=-2.74, $p < .007$, Cohen d = 0.36).

Exploratory Interrelations. We explored the relation of the PrAttS with the 50-item Big Five Inventory. There were a number of personality correlates of the PrAtts scales, most notably Unconditional Positivity was related to high levels of extraversion and agreeableness, whereas Anticipated Annoyance corresponded with neuroticism (Table 3).

Potentially even more relevant were the associations between the PrAttS and attachment type. Unconditional positivity was significantly correlated with a secure attachment to mother and father. Dependent attachment to one's mother had a strong positive relationship with unconditional positivity. Interestingly, contingent willingness had a moderate positive relationship with a dependent attachment to both one's mother and father. Anticipated annoyance was moderately correlated with dependent attachment to one's mother.

All career management indices were significantly related with unconditional positivity and contingent willingness. Career plans and job flexibility had moderate positive relationships with unconditional positivity and moderate positive relationships with contingent willingness. Career plans and job flexibility had negative relationships with anticipated annoyance. According to the results, the PrAttS scores were only marginally correlated with the education styles of participants' parents (Table 3).

Discussion

Study 2 confirmed the three-dimensional structure (unconditional positivity, anticipated annoyance and contingent willingness) for the German version of the scale. The internal consistency of the three dimensions was lower in the German than in the English version, but the indices were judged to be satisfactory because both indices were on the high end of the α values (Cohen, 1988) usually deemed acceptable or good (between 0.72 and 0.83).

We explored the relation of the three dimensions of the PrAttS against conceptually related variables. Unconditional positivity had a moderate positive relationship with extraversion and agreeableness as well as a modest relationship with openness. In contrast, a high level of neuroticism had a moderate negative correlation with unconditional positivity, and unconditional positivity was significantly correlated with a secure attachment to one's mother and the father. Career plans and job flexibility had positive relationships with unconditional positivity, indicating that considerable mental flexibility and detailed thoughts about the future can be found in people with welcoming attitudes about babies. It can be concluded that, in general, positive qualities are associated with a positive attitude toward children.

Contingent willingness was positively related to dependent attachment to both one's mother and father. Correspondingly, job flexibility was negatively associated with

contingent willingness, while clear and detailed career plans were positively related to contingent willingness. The data analysis revealed that contingent willingness is independent of education style of participants' parents. It can be concluded that high contingent willingness is reflected in participants' relationships with their parents as well as their job cognitions.

General Discussion

The current chapter presented two studies of the validation of a multilingual (English and German) questionnaire regarding attitudes towards procreation. The studies reported the development and initial validation of a new self-reporting questionnaire (Study 1) as well as the psychometric evaluation and construct validation of the German version of the questionnaire (Study 2). Specifically, the PrAttS consists of 13 items representing three underlying dimensions: (1) unconditional positivity, (2) anticipated annoyance and (3) contingent willingness. The PrAttS provides an explicit method of interest for children, providing an alternative to more recently criticized implicit measures. Some of our exploratory found factors can be classified as part of the wanting-liking paradigm (Dai, Brendl & Ariely 2010).

In line with Parsons et al. (2011), the current chapter showed twice a gender difference in emotional attitudes (`liking`), revealing that women have a stronger emotional interest in procreation and babies. However, the current chapter also showed twice that this gender difference disappears when the motivational attitude to procreation and babies was measured. These results show that attitudes toward babies are multifaceted and that supposedly reliable gender differences (Hildebrandt & Fitzgerald, 1978) are less reliable than commonly thought.

The current studies have some limitations. First, the samples had a limited age range, with few older people included. As a result, generalizability in relation to older

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age groups should be verified. According to Jansen and Liefbroer (2006), understanding the motivations of only one partner is not enough to understand the decision for and against children, so that in future investigations, it would also make sense to survey attitudes towards babies in couples. Additionally, the construct validity data relied solely on self-reported dimensional questionnaires. Other methods such as reports by other informants or observational data of attachment behaviors would be useful in further studies.

The developed instrument provides an economic tool for future research. The scale could be employed both at the level of individual data to seek how mating preferences are associated with attitudes towards procreation and which weight they have. Arguably, even more relevant, future dyadic studies could delineate how similarity of procreation attitudes affects relationship satisfaction. Although the general principle that similarity breeds liking (Byrne, 1971; Sunnafrank, 1983) has received only moderate support in its extension that partner-similarity in personality is associated with relationship success (Lykken & Tellegen, 1993; Robins, Caspi & Moffitt, 2000), having offspring is arguably a relevant common relationship goal for many people. Intra-relational consensus on whether one feels positive, hesitant or negative towards having babies is thus likely to be a determinant not only of relationship satisfaction but also stability, particularly in the biographical phases during which having babies is part of a cultural script.

In conclusion, the PrAttS represents a multidimensional yet concise measure of attitudes toward procreation, with strong internal consistency and some clear interrelations. Because of its length, the PrAttS can be viewed as an economical tool to assess attitudes toward procreation in a wide range of fields such as family counselling or dating services.

Table 1

Items and Corresponding Factor Loadings of the PrAttS in Studies 1 and 2 of Chapter 2

| PrAttS item | Factor loadings | | | | | |
| | Study 1 | | | Study 2 | | |
	1	2	3	1	2	3
Factor A: Unconditional positivity						
I feel I am capable of looking after a child. (Ich fühle mich in der Lage, mich um ein Kind zu kümmern.)	0.86	0.03	-0.03	0.74	-0.17	-0.15
I´d be a good father/mother. (Ich wäre ein guter Vater / Mutter.)	0.83	-0.06	-0.02	0.71	0.30	-0.09
I can see myself having more than one child. (Ich kann mir vorstellen auch mehrere Kinder zu haben.)	0.75	0.01	0.04	0.70	0.35	-0.19
Children require more love than I can give. (Kinder brauchen mehr Liebe als ich geben kann.) (R)	0.74	-0.03	0.13	0.64	0.10	0.31
I feel happy when I see children playing. (Ich fühle mich glücklich, wenn ich spielende Kinder sehe.)	0.73	-0.05	-0.04	0.69	-0.02	-0.16
Factor B: Anticipated annoyance						
You must do without many freedoms when you have a child. (Für ein Kind muss man auf viele Freiheiten verzichten.)	0.03	0.84	0.04	-0.49	0.21	0.48
Bringing up children is difficult. (Es ist schwierig Kinder zu erziehen.)	0.02	0.81	0.05	-0.07	0.08	0.44
Children are demanding. (Kinder sind anstrengend.)	-0.10	0.78	0.20	-0.67	0.05	0.39
Having a baby means less time for myself. (Ein Baby zu haben bedeutet weniger Zeit für mich.)	-0.03	0.75	0.16	-0.39	-0.01	0.44
Factor C: Contingent willingness						
You should only have children once you´ve found the perfect partner. (Nur mit dem perfekten Partner sollte man Kinder bekommen.)	-0.12	0.08	0.77	0.19	0.77	0.03
You sh ould only have children when you have a secure job. (Man sollte erst Kinder kriegen, wenn man einen sicheren Job hat.)	0.08	0.11	0.73	-0.27	0.55	0.14
If you have a child, you need a partner who you can rely on. (Wenn man ein Kind bekommt, muss man sich auf seinen Partner verlassen können.)	-0.04	0.10	0.70	0.10	0.73	0.06
You should only have children with someone who you have known for years. (Kinder sollte man nur mit jemandem bekommen, den man jahrelang kennt.)	0.16	0.10	0.70	-0.31	0.65	0.10
Eigenvalue	3.14	3,03	1,71	4.12	2.33	1.44
% of variance	24.22	23.23	13.15	29.43	16.65	10.27

Note. Extraction method was principal axis factoring with a varimax rotation. Reverse scored items are

denoted with an (R). German versions are in parentheses.

Table 2

Internal consistency, descriptive statistics, and the effect of gender on means of study 1 of Chapter 2

		Women		Men									
	α	M	SD	M	SD	t	r.: 1.	r.: 2.	r.: 3.	r.: 4.	r.: 5.	r.: 6.	r.: 7.
		n		n			n	n	n	n	n	n	n
1. Unconditional positivity	.83	4.16	0.73	3.92	0.81	1.74*							
		52		86									
2. Contingent willingness	.81	3.75	0.89	3.78	0.68	-0.26	-.06						
		55		91			139						
3. Anticipated annoyance	.71	4.28	0.74	4.15	0.61	1.13	.02	.31**					
		54		92			141	148					
4. Long-term mate preference	.85	6.03	0.98	5.47	1.10	3.12**	.74**	.04	.21**.				
		54		88			134	141	141				
5. Short-term mate preference	.90	2.93	2.04	3.53	1.43	-6.60*	.12	.15	-.07**	-,26**			
		56		92			140	148	148	143			
6. Past behavioral experiences	.75	2.85	1.58	2.85	1.81	-0.90	.03	-.18**	-.08	-.04	.41**		
		56		93			141	149	149	144	151		
7. Attitudes towards uncommitted sex	.90	3.93	2.51	5.91	2.35	-4.85**	-.05	-.18**	-.11	-.19**	.78**	.55**	
		55		93			140	148	149	143	150	151	
8. Sociosexual desire	.91	3.01	1.73	5.01	2.18	-5.84**	-.09	.08	-.01	-.21**	.63**	.43**	.61**
		56		92			139	147	147	142	149	150	149

Note. * *p* < .10,   ** *p* < .05.

Table 3

Internal consistency, descriptive statistics, and the effect of gender on means of study 2 of Chapter 2

	α	M	SD	1. n	2. n	3. n	4. n	5. n	6. n	7. n	8. n	9. n	10. n	11. n	12. n	13. n	14. n	15. n
1. Unconditional positivity	.83	3.77	.82														
2. Contingent willingness	.69	3.63	.75	-.10 252													
3. Anticipated annoyance	.72	3.78	.62	-.36** 250	.22** 250												
4. Neuroticism	.85	2.63	.61	-.24** 191	-.03 191	.24** 189											
5. Agreeableness	.83	3.06	.40	.44** 191	-.01 191	.23** 189	-,19** 191										
6. Conscientiousness	.69	2.48	.41	.08 190	.12 190	-.10 188	.08 190	.22** 190									
7. Openness to experience	.66	2.79	.42	.18* 190	-.12 191	-.14 188	-.25** 190	.13 190	-.14 189								
8. Extraversion	.65	2.62	.52	.40** 187	.08 187	-.13 185	-.32** 187	.33** 187	-.23** 186	.31** 186							
9. Overprotective mother	.89	1.97	.50	-.13 205	.08 204	.11 203	.29** 179	-.13 178	-.04 177	.02 177	-.13 174						
10. Overprotective father	.83	1.93	.39	-.06 194	-.13 194	-.01 194	.18* 180	-.14 180	-.09 179	.12 179	.03 176	.55** 185					
11. Secure attachment to mother	.85	4.02	.87	.28** 194	.14 194	-.14 192	-.32** 187	.28** 187	.13 186	.15* 186	.27** 183	-.41** 181	-.18* 183				
12. Dependent attachment to mother	.84	3.66	.39	.67** 249	.29** 248	.23** 249	.00 187	.26** 187	.01 186	.05 186	.36** 183	-.11 202	-.16* 193	.23** 190			
13. Secure attachment to partner	.82	4.10	.71	.19* 156	.15 156	-.09 155	-.26** 154	.15 154	-.15 154	.12 153	.24** 150	-.15 146	-.09 150	.24** 151	.13 154		

	α	M	SD	1. n	2. n	3. n	4. n	5. n	6. n	7. n	8. n	9. n	10. n	11. n	12. n	13. n	14. n	15. n
14. Dependent attachment to partner	.80	2.84	.66	.14 158	.29** 158	.08 157	.21 156	-.05 156	.07 156	-.20* 155	.00 152	.03 148	-.10 152	-.10 153	.28** 156	.32** 157		
15. Career plans	.87	3.26	.84	.15* 241	.17** 241	-.07 239	-.09 187	.07 187	.25** 186	.15* 186	.02 184	.09 200	-.00 190	.09 191	.16 237	.12 152	.06 154	
16. Job flexibility	.56	3.51	.74	.23** 243	-.13* 243	-.09 241	-.32** 190	.27** 190	-.05 189	.47** 189	.25** 186	-.12 203	.09 193	.14 193	.08 239	-.03 156	-.06 158	.10 239

Note. * $p < .10$,   ** $p < .05$

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Chapter 3: Does Bem´s Psychological Androgyny map on gender or sex differences in faces? [3]

Gender is an almost ubiquitous category. On a daily basis, categorizing humans around us in "men" and "women" happens more or less spontaneously (Taylor, Fiske, Etcoff & Ruderman, 1978) from relatively early age onwards (Bennett, Sani, Hopkins, Agostini & Malucchi, 2000; Quinn, Yahr, Kuhn, Slater & Pascalis, 2002). One could say that of the many possibilities to differentiate among humans, gender is one of the most pervasive and frequent: people judge others' intellectual abilities differently based on their presumed gender (Bian, et al., 2017), people use different standards to evaluate performance of men and women (Biernat & Manis, 1994), and are willing to pay one gender less for the same work (Auspurg, et al., 2017). Likewise, people "do" gender on a continuous basis: "Men" wear suits and ties, "women" wear skirts and make-up. People use gendered bathrooms and people often behave in gender consistent ways (masculine for men, feminine for women). In fact, people infer presumed gender-typical facial features from gender-typical behavior: Compared to teachers of maths, teachers of arts are imagined more likely as women than men and more likely as feminine than as masculine women (Degner, Mangels & Zander, 2018). In the present research, we sought explore a similar relation in the opposite direction: Do perceivers infer masculine and feminine behavior traits from masculine and feminine facial features?

It is only a relatively recent insight that there is no deterministic relationship between a person's sex and their gender (Fausto-Sterling, 2000). Most explicitly voiced by post-structural feminists, the notion that gendered attributes and behavior are non-deterministically related to sex already resonated in Bem's (1974) influential work on

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[3] Marhenke, T., & Imhoff, R. (in press). Does Bem´s Psychological Androgyny map on gender or sex differences in faces? Psychology, Society, & Education.

androgyny. In her work, Bem started from the assumption that both men and women have feminine and masculine traits and that integrating both masculine and feminine traits (i.e., being androgynous) may be particularly beneficial. Until Bem´s (1974) groundbreaking work, sex and gender were treated synonymously in the sense that biological men were expected to be masculine and women to be feminine. Accordingly, a person had to be either masculine or feminine, but not both. In societies with a narrow gender self-concept people might inhibit behaviors that are not compatible with the stereotypical sexual self-concept. Therefore, Bem introduced the concept of androgyny, which disconnects sex and gender and includes a continuous representation of gender, which might allow for "an individual to freely engage in both masculine and feminine" behaviors (1974, p. 155). This allows a treatment of the two as independent: men as well as women can differ in their degrees of masculinity and femininity. In the present research we built on this differentiation between sex (men vs. women) and gender (masculine vs. feminine) to test which of the two factors has more weight in impressions.

We focus on faces here because they have tremendous weight in daily interactions. Typically, before we speak with someone we see their face. We even see the faces of people who we never speak to and we still make quick inferential judgments about the person based on their faces: We decode emotions, but also make judgments of presumed trustworthiness within split seconds (Willis & Todorov, 2006). Thus, the face has tremendous weight in daily human interaction, a fact still not fully recognized by social psychological research that too often relies on verbal material – a modality that is much less ubiquitous in everyday interactions.

Nevertheless, there is already some research on gender and faces. Much like the "masculine" and "feminine" traits in Bem's Sex Role Inventory are those traits that are

seen as stereotypically desirable for men and women respectively, many studies have explored what constituted "ideal" (i.e., stereotypically desirable) faces for men and women respectively. Regarding the desirability of men's faces, some authors (DeBruine, Jones, Smith & Little, 2010; Perrett et al., 1998; Rhodes, Hickford & Jeffery, 2000) found that women preferred male subjects with feminine facial features; in other studies a preference for above-average masculine faces was identified (DeBruine et al., 2006; Johnston, Hagel, Franklin, Fink & Grammer, 2001). Some authors (Reed & Blunk, 1990) have found that some women perceived that men's facial hair adds to attractiveness while others (DeBruine et al., 2010; Perrett et al., 1998) feel that it decreases attractiveness. Overall, the findings concerning men's faces seem to be ambiguous. Puts, Jones and DeBruine (2012) suggest that women prefer either masculine faces or slightly feminine male faces on average.

Regarding the desirability of women's faces, a number of studies have found slightly less ambivalent results. Men prefer feminine faces. The femininity and attractiveness of women's faces seems to be important especially when men are seeking long-term partnerships (Confer, Perilloux & Buss, 2010; Rhodes, 2006; Rhodes, et al., 2000). However, when women have been asked to rate the faces of other women, they have judged women with attractive faces as being more attractive to men as well as more promiscuous and flirtatious (Puts et al., 2012; Brewer & Archer, 2007). When women were asked to assess themselves, women with feminine faces had lower values in terms of social dominance and influence (Quist, Watkins, Smith, DeBruine & Jones, 2011).

Another approach to determine masculinity and femininity in the face might be to approach the question not from desirability but from stereo-typicality: what are typical features of men and women? When people see each other for the first time, they

instantly and automatically draw conclusions about others' personalities (Willis & Todorov, 2006) and group memberships (Martin & McRae, 2007). For example, stereotypes about gender roles are seen in the categorization of feminine-looking women as "warm" (Oosterhof & Todorov, 2008), as the classification of a person's sex as female leads to consensual assumptions about gender-specific characteristics. Similarly, masculine-looking people are automatically judged as "colder" and "more competent" (Walker & Wänke, 2017). These automatic conclusions can be viewed as a form of overgeneralization (Zebrowitz, 2010).

In the present research we took an alternative approach. Based on the venture point of the independence of sex (men vs. women) and gender (masculine vs. feminine), we created idealized images of what masculine, respectively feminine men and women were expected to look like (pilot study). To do so, we employed a data-driven Reverse Correlation Image Classification technique (Mangini & Biederman, 2004). These images were then shown to other, hypothesis-blind raters and judged on several rating dimensions (Study 1), among them the Bem Sex Role Inventory items (Study 2). Doing so allowed us to isolate the effects of sex and gender on these impressions.

The present research

Various approaches have been developed in recent years to systematically represent mental concepts in faces (Cheng, O'Toole & Abdi, 2001; Blanz & Vetter, 1999; Mangini & Biederman, 2004). Of these we employed in the current study the reversed correlation task (later cited as RCT) approach in which observers must assess faces that are in high levels of visual noise, a random dot pixel pattern (Mangini & Biederman, 2004). Avoiding presumptions was central to planning the investigation; to achieve this goal, the method is fully data-driven and bottom-up in the sense that no "objective"

reality of femininity and masculinity was presented. Instead, the sum of implicit gender stereotypes was examined.

In the present chapter, we create an ideal prototype of feminine and masculine faces for a male and a female model. We will then see how this maps on impressions these faces evoke. Two studies and a pilot study were conducted; in the pilot study the stimuli were developed. Study 1 focusses on global attributes, whereas study 2 specifically targets attributes of masculinity and femininity as proposed by Bem (1974) and whether the characteristics are associated with the gender or sex of the faces. All materials can be found on OSF at

https://osf.io/6ea3z/?view_only=c9de483bb8994eea80497e359422c328

Pilot study: Stimulus development

The pilot study was a pretest focused on creating the stimuli for the two subsequent studies. Images were created of faces that were intended to represent mental representations of masculinity and femininity; these representations should be tentatively distinguished from each other. The RCT allows an estimate, however subtle, of what is in the subject's (rather than the experimenter's) head (Mangini & Biederman, 2004).

Method

Sample. A group of six undergraduate students at the University of Cologne participated in each of the two tasks in exchange for extra credit in psychology courses. All subjects were unaware of the purpose of the experiment.

Measures

Basic faces. Two basic faces were created. In a first step, sixteen male faces and sixteen female Caucasian faces were selected from the Radboud Face Database

(Langner et al., 2010). In these pictures, all persons had a neutral facial expression, their hair was combed back and they were photographed frontally. Their portraits were then merged gradually using the morphing program Fantamorph (Abrosoft Fantamorph version 5). This process resulted in two faces (Table 4). In the next step, the images were converted into grayscale images and superimposed with a filter that left the faces recognizable but removed the contours to create base face for the Reverse Correlation Image Classification Task (note that the male base face was previously used in Imhoff, Woelki, Hanke & Dotsch, 2013).

Reversed Correlation Image Classification Task (RCT). A RCT is a task in which observers classify faces while experiencing high levels of visual noise (Mangini & Biederman, 2004; for its use in social psychological research see Dotsch, Wigboldus, Langner, & van Knippenberg, 2008; Imhoff, Dotsch, Bianchi, Banse & Wigboldus, 2011; Imhoff & Dotsch, 2013). The visual noise is a random dot pixel pattern, that looks like analog video and television when no transmission signal is obtained by the antenna receiver. The task was used in the current research to assess the implicit concept of a feminine respectively masculine person. In the RCT, subjects saw two faces over which a filter with a black-and-white noise was placed. Subjects had to decide to which of the two faces a certain concept (e.g., masculinity) applied. Participants were unaware that the same face was presented throughout a task and that only the noise rendered the face to fit more in one category or the other. The differences between the average noise patterns for each classification decision provided an estimate of the information mediating these classifications. When the noise was combined with the underlying face, the resultant images were prototypes of their respective classes.

Procedures. Subjects participated in four different discrimination tasks. They are always shown basic faces plus the noise. In the four tasks, they identified a feminine

woman's face (FF), a masculine woman's face (MF), a feminine man's face (FM), and a masculine man´s face (MM). At the beginning of the experiment, the participants were told that they would see 2 pictures each of women (FF, MF) and men (FM, MM). Then they were told to pick the image that they felt was feminine (FF, FM) or masculine (MF, MM). The subjects were then instructed to press the left red button for the left and the right red button for the right image. No feedback was provided, as no responses were correct or incorrect. After participants were given the brief instruction, noisy images were presented two at a time. After the subjects decided on one of the two pictures, the next picture couple was shown directly. After the fourth block of one category, the next category started directly afterwards. There were 4 blocks per category, each with 100 face pairs, i.e., each subject categorized 400 noisy faces for FF, MF, FM and MM. Overall, each subject categorized 1600 faces. The entire experiment lasted approximately 15 minutes and took place in a lab.

Results

Images. The resulting classification images calculated for all six subjects' data are presented in Table 4. Adding or subtracting the classification image to or from the base image resulted in faces that appeared to be effective prototypes of their classes.

The masculine man's face differed from the feminine man's face, and the masculine woman's face differed from the feminine woman's face from a subjective perspective. This discovery illustrated that four very different faces, a feminine man face, a masculine man face, a feminine women face, and a masculine women face, could be formed.

Table 4

Base Images and Classification Image of the RCT

	Gender		
	Base face	Masculine	Feminine
Female			
Sex			
Male			

Study 1

Study 1 focused on three objectives. First, the faces created in the stimulus development phase were tested to determine whether they differed in terms of femininity and masculinity by a larger sample. Secondly, it is determined which other characteristics are associated with prototypically feminine or masculine faces. Thirdly, it tests whether the characteristics are associated with the gender or the sex of the faces.

Method

Sample. A total of 278 participants (186 women, 85 men, mean age = 24.3 years, $SD = 4.5$) were recruited from different German universities and branches of study through a mailing system. Participation was voluntary and took place at home. All but three students had university entrance qualifications or a university degree.

Measures

Masculine-Feminine Faces. The subjects evaluated the four faces formed in the RCT (see Table 4) on the basis of nine categories on a 7-point Likert scale. The questions were how feminine or masculine a person was, how attractive this person was, how good a partner this person would be, how socially dominant this person would be, whether this person would be a good spouse, how much the subject would like to get to know this person, how much the person would help in the household, how fond of children this person was, and how old this person was.

Procedures. At the beginning of the examination, the subjects were told that they were going to see different faces and asked to answer questions about the faces spontaneously and quickly. The pictures were then presented to participants in a randomized order together with one question each.

Results

The significant differences between all four faces in terms of variable `masculinity` confirmed that, as expected, the men's faces were considered to be more masculine than the women's faces; more importantly, the feminized faces were also considered to be more feminine than the masculinized faces. This result was a prerequisite for further analysis. Nine one-way within-subjects analyses of variance were conducted to compare the scores of the four faces. FF was rated most attractive, while (somewhat surprisingly) FF was also perceived most dominant. FM was rated most as fond of children, but MM was rated oldest. Statistical characteristics are presented in Table 5.

Nine two-way within-groups analyses of variance were conducted to explore the impact of sex and gender on the different qualities. Over nine comparisons, the main effects of gender were significant, with only one comparison failing to achieve a conventional level of significance (Table 5). Femininity was associated with higher

attractiveness, younger age, greater desirability as a partner, social dominance, kindness and greater housekeeping qualities.

The main effects of sex were less prevalent (Table 5) and restricted to the fact that women were seen as more attractive, more desirable partners and older. For most of the variables, however, there were significant interactions indicating that the positive aspect of femininity (attractiveness, desirability as partner) were particularly pronounced for women. Only one of the interactions was a clear-cut ordinal interaction whereby masculine men and feminine women were seen as more dominant than feminine men and masculine women, potentially pointing to a stigma of (facial) gender nonconformity.

Table 5

Descriptives and Results of a Two-way within-Subject ANOVA and a one-way within-subjects ANOVA

	Feminine Male (FM)		Masculine Male (MM)		Feminine Female (FF)		Masculine Female (MF)		Main effect Gender		Main effect Sex		Interaction Gender x Sex		Error df
	M	SD	M	SD	M	SD	M	SD	F	P	F	P	F	p	
Masculinity/Femininity	4.05 [c]	1.18	5.95 [a]	1.03	1.95 [d]	1.07	5.37 [b]	1.14	1375.23	< .001	358.91	< .001	170.92	< .001	221
Attractiveness	3.30 [b]	1.22	2.10 [c]	1.06	4.98 [a]	1.12	1.76 [d]	0.86	1265.75	< .001	141.27	< .001	378.23	< .001	252
Being Partnered	3.56 [b]	1.60	2.47 [c]	1.48	4.97 [a]	1.51	2.01 [d]	1.15	447.63	< .001	26.90	< .001	118.65	< .001	203
Dominance	3.14 [b]	1.27	4.85 [a]	1.61	4.81 [a]	1.27	3.30 [b]	1.55	0.63	.430	0.57	.450	320.50	< .001	188
Spouse	4.75 [a]	1.48	2.71 [b]	1.26	4.67 [a]	1.32	3.02 [c]	1.30	309.00	< .001	2.67	.104	4.57	.034	178
To Get to Know Someone	4.25 [b]	1.60	2.31 [d]	1.39	4.75 [a]	1.54	2.09 [c]	1.21	474.32	< .001	2.46	.119	19.67	< .001	174
Housekeeper	4.99 [a]	1.23	2.78 [d]	1.35	4.57 [b]	1.40	3.17 [c]	1.40	241.75	< .001	0.02	.878	21.64	< .001	173
Fond of Children	5.32 [a]	1.35	2.80 [d]	1.35	4.68 [b]	1.37	3.09 [c]	1.34	286.70	< .001	4.66	.032	35.25	< .001	172
Age	23.03 [d]	3.97	29.17 [a]	5.88	26.99 [c]	3.86	27.72 [b]	6.29	98.68	< .001	23.55	< .001	111.27	< .001	171

Note. The letters (A, B, C, D) indicate whether significant mean differences were found between the variables. If the same letters are used for variables then there is no significant difference between the

variables. For better comprehension, the values of masculinity and femininity have been reversed.

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Bonferroni-corrected (p = .00139) control analyses were conducted to check for sex differences in the 36 judgments. Male participants thought that the feminine woman was a better partner (M = 5.55, SD = 1.26) than female participants did (M = 4.66, SD = 1.57, t (205) = 4.03, p < .001). Men also wanted to get to know her (M = 5.35, SD = 1.51) more than women did (M = 4.46, SD = 1.50, t (173) = 3.63, p < .001). All other simple tests failed to reach the adjusted alpha level, and these gender differences were not given further attention.

Discussion

The current study showed that the faces formed in the during stimulus generation differed significantly in their femininity and masculinity. Therefore, it can be assumed that the faces represent mental representations of masculinity and femininity, thus achieving the first goal. The second aim of the study was to determine other characteristics associated with typically feminine or masculine faces: several associations became clear. It has repeatedly been shown that feminized faces by trend are associated with positive characteristics and that this effect cannot be attributed to the sex of the rater. Sex and gender interacted insofar that feminine facial features strengthen the differences in evaluation of sex differences. Third, the comparison between gender and sex of faces clearly showed that gender is more important than sex. The socially constructed idea of masculinity and femininity is clearly associated with several qualities. With the biological sex, however, there were only a few connections. The results indicate that the beliefs of masculinity and femininity are variable and thus culturally shaped.

Study 2

The objective of Study 2 was to test whether the Bem properties (1974) reflect gender differences or sex differences. Additionally, Study 2 sought to check with which properties implicit mental representations of femininity and masculinity are associated.

Method

Sample. A total of 230 participants (152 men, 78 women, mean age = 22.4 years, $SD = 4.5$) were recruited from different German universities and branches of study through a mailing system. Participation was voluntary and took place at respondents' homes.

Measures

Bem Social Role Inventory (BSRI). The Bem Social Role Inventory is a measure of masculinity and femininity as well as gender roles; it assesses how people identify themselves psychologically (Bem, 1974). The tool includes 60 items in three construct categories: masculine items, feminine items, and neutral items (Table 6). The stereotypical properties are all positively connoted. In the present study, 7 items per category were used. The properties of the experimental images were evaluated on a 5-point scale ranging from suitable (1) to unsuitable (5).

Masculine and Feminine Faces. The same four faces were used as in study 1. These faces were created using the RCT, and they represent the mental conceptions of masculinity and femininity (Mangini & Biederman, 2004). For a detailed description of the task and the faces created, see the stimulus development section.

Procedures. At the beginning of the study, subjects were shown four different faces. They were asked to examine the faces closely and evaluate the psychological properties (BSRI) of the faces.

Results

Twenty-four two-way within-groups analyses of variance were conducted to explore the impact of sex and gender on levels of the total values of masculinity, femininity and neutral properties, as well as each of the seven individual properties (Table 6). Gender had an overwhelmingly strong main effect. In each of the 21 individual characteristics, feminized faces differed from masculinized faces. In addition, a major gender effect was found in the overall values of masculinity, femininity, and neutral characteristics. Feminized faces had more "feminine" characteristics than masculinized faces as well as significantly higher levels of "neutral" properties. Feminized faces had also significantly more "masculine" characteristics than masculinized faces. However, this difference was less pronounced. In contrast, only a few properties had a main sex effect. No significant major effect for sex was found on the overall scores for femininity, masculinity, and neutrality.

In masculine and feminine traits, a significant interaction was found between gender and sex. In feminine traits feminization of men's faces leads to a large increase in female characteristics. The increase in female characteristics in women's faces, however, is only moderate. With masculine characteristics you can observe a contrary trend. The feminization of women's faces leads to a strong increase of 'masculine` characteristics, whereas in males' faces feminization leads to a moderate decrease of `masculine` characteristics.

Twenty-four one-way within-subjects analyses of variance were conducted to compare the scores of the four faces. FF were rated most masculine, while (somewhat surprisingly) MF was perceived least masculine. FM was rated most feminine, while (unsurprisingly) MM was rated least feminine

Table 6

Descriptive Statistics of Classified Images Regarding Gender Role Properties and Results of a Two-way within Subject ANOVA and a one-

way within-subjects ANOVA

	Feminine Male (FM)		Masculine Male (MM)		Feminine Female (FF)		Masculine Female (MF)		Main Effect Gender		Main Effect Sex		Interaction Effect		Error df
	M	SD	M	SD	M	SD	M	SD	F	P	F	P	F	P	
Masculinity															
Has Leadership Abilities	2.51 [b]	0.75	2.64 [b]	1.10	3.68 [a]	0.84	1.94 [c]	0.90	104.15	< .001	12.26	.001	211.41	< .001	159
Ambitious	3.14 [b]	0.92	3.31 [b]	0.99	4.09 [a]	0.77	2.47 [c]	0.92	94.57	< .001	0.59	.442	168.37	< .001	159
Factual	3.43 [b]	0.90	2.80 [c]	1.09	3.76 [a]	0.76	2.91 [c]	0.96	79.05	< .001	10.58	.001	2.37	.126	155
Forceful	2.57 [c]	1.01	4.17 [a]	0.81	3.20 [b]	0.92	3.38 [b]	1.08	117.92	< .001	1.36	.245	80.80	< .001	156
Consistent	3.23 [b]	0.78	3.88 [a]	0.97	4.01 [a]	0.75	3.00 [b]	1.00	5.01	.027	0.66	.420	167.31	< .001	155
Analytical	3.08 [b]	0.84	2.98 [b]	1.00	3.69 [a]	0.85	2.40 [c]	0.89	78.42	< .001	0.14	.714	85.30	< .001	159
Willing to Take Risks	2.82 [c]	1.13	4.23 [a]	0.74	3.29 [b]	0.92	2.96 [c]	1.06	49.83	< .001	34.42	< .001	103.85	< .001	158
Masculinity Total	2.98 [c]	0.52	3.41 [b]	0.59	3.67 [a]	0.52	2.73 [d]	0.59	23.01	< .001	0.02	.896	248.04	< .001	152
Femininity															
Dependent	3.08 [a]	0.91	2.56 [b]	1.04	2.46 [b]	0.83	3.32 [a]	0.92	4.65	.033	1.08	.301	93.16	< .001	155
Sensitive	3.49 [a]	1.01	1.66 [d]	0.71	3.16 [b]	0.83	2.06 [c]	0.80	398.13	< .001	0.30	.582	38.44	< .001	159
Affectionate	3.34 [a]	0.96	1.78 [d]	0.76	2.98 [b]	0.89	2.28 [c]	0.91	1.34	< .001	1.34	.250	53.98	< .001	155
Passionate	2.66 [b]	0.88	2.55 [b]	1.08	3.21 [a]	0.84	2.09 [c]	0.85	70.48	< .001	0.46	.496	63.93	< .001	155
Modest	3.59 [a]	0.93	2.31 [d]	0.80	2.58 [c]	0.76	3.10 [b]	0.90	27.11	< .001	3.43	.066	169.58	< .001	152
Sacrifices Oneself	3.10 [a]	0.96	2.42 [c]	0.99	2.67 [b]	0.83	2.73 [b]	1.00	17.25	< .001	0.76	.385	31.03	< .001	157
Yielding	3.37 [a]	0.90	1.82 [d]	0.79	2.43 [c]	0.82	2.79 [b]	0.99	65.56	< .001	0.04	.842	183.39	< .001	158
Femininity Total	3.24 [a]	0.54	2.17 [d]	0.51	2.78 [b]	0.51	2.61 [c]	0.55	158.72	< .001	0.02	.883	138.81	< .001	144

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	Feminine Male (FM)		Masculine Male (MM)		Feminine Female (FF)		Masculine Female (MF)		Main Effect Gender		Main Effect Sex		Interaction Effect		Error df
Neutral															
Trustworthy	3.54 [a]	0.75	1.87 [c]	0.79	3.44 [a]	0.86	2.27 [b]	0.82	390.54	< .001	7.65	.006	19.78	< .001	157
Sociable	3.47 [a]	0.93	2.34 [b]	0.86	3.34 [a]	0.78	2.35 [b]	0.91	240.21	< .001	0.87	.351	0.94	.334	156
Diligent	3.56 [b]	0.81	2.89 [c]	0.91	3.92 [a]	0.75	2.87 [c]	1.00	116.88	< .001	7.82	.006	11.17	.001	155
Conscientious	3.75 [a]	0.81	2.56 [b]	0.88	3.80 [a]	0.68	2.76 [b]	0.88	242.78	< .001	5.23	.024	1.59	.210	154
Reliable	3.67 [a]	0.79	2.81 [b]	0.91	3.73 [a]	0.67	2.90 [b]	0.90	120.43	< .001	2.07	.152	0.09	.765	153
Healthy	3.91 [a]	0.85	3.21 [b]	0.87	3.89 [a]	0.72	2.91 [c]	0.87	184.55	< .001	8.68	.004	7.37	.007	158
Mindful	3.75 [a]	0.79	3.07 [b]	0.79	3.82 [a]	0.63	2.76 [c]	0.85	149.55	< .001	4.53	< .001	10.42	< .001	157
Neutral Total	3.68 [a]	0.46	2.69 [b]	0.53	3.71 [a]	0.43	2.68 [b]	0.57	426.44	< .001	0.19	.661	0.42	.517	146

Note. The letters (A, B, C, D) indicate whether significant mean differences were found between the variables. If the same letters are used for variables then there is no significant difference between the

variables. For better comprehension, the values of masculinity and femininity have been reversed.

Participants completed a total of 21 ratings for each of the four faces adding up to 84 judgments. A properly Bonferroni-adjusted alpha level used to test for gender differences would thus be at $p = .0006$. Adopting even a less conservative p-value of .01 yielded no gender differences on the individual items level or the aggregate level of scales. Based on these results, in the analyses, no further attention was paid to participants' gender.

Discussion

Study 2 again showed consistent effects of target face gender. Feminized faces had a higher expression of masculine, feminine, and neutral characteristics. A reason for this may be that all words of the BSRI reflect positive characteristics. Masculine and feminine properties are formulated in a positive way, and neutral properties have characteristics that characterize them as socially desirable properties. Since we know from study 1 that feminization leads to an increase in attractiveness, and physical attractiveness is associated with other independent properties (Dion, Berscheid & Walster, 1972), it can be assumed that feminization also leads to an increase in other positive properties. In contrast to the strong main gender effect, only marginal differences were found when comparing the characteristics of different sexes. This finding suggests that biological sex has little impact on social judgments. These findings replicate and validate the conclusions made in Study 1.

General Discussion

The present chapter presented two studies that examined whether the continuous properties of masculinity and femininity, as outlined by Bem (1974), are appropriate to differentiate between the visual stereotypes of masculine and feminine men and women. Results from two studies converged in remarkably strong inferences raters seemed to

draw from these faces. Overall, the dimension masculinity–femininity seemed to have more weight in these impressions than whether the base face was composed of male or female faces.

The study of faces in sex-gender differentiation was done in this study because faces are very important in day-to-day interaction. It is all the more surprising that such visual material is relatively seldom used in social psychological research. In the present study, pictures of faces in general and pictures of stereotypical faces in particular have been found to be highly suitable for research on masculinity and femininity. With the Reversed Correlation Task as a relatively simple technique that is intuitively comprehensible for the subjects, it was possible to strongly induce a concept. This induction strength was shown by the fact that the gendered faces differed in all 21 properties according to Bem (1974). Another advantage of the RCT in the present study is that it measures implicit attitudes. Perceptions of "masculinity" and "femininity" are strongly influenced by social desirability and political correctness, so that a direct questioning can only get a glossed image of the convictions of the people. This legitimate and principled objection could be met here elegantly.

As a potential limitation of our current research, all of our studies were conducted in WEIRD (Henrich, Heine & Norenzayan, 2010) countries and our results can thus not be easily generalized to other cultural contexts. Future research might address this limitation in a more inclusive cross-cultural approach to examine to what extent cultural patterns of attribution of properties to the gender can be shown.

Out of the plethora of possibilities to categorize people, gender respectively sex is one of the most used categories and for most people a familiar way of organizing their social environment. Therefore, it is all the more significant that the present study has shown that this trait is probably based on social agreement and that other attributes that

are supposed to be "male" and "female" are the result of a tacit social agreement. The Reversed Correlation Task proved to be an adequate method for determining the implicit attitudes and stereotypes of "masculinity" and "femininity." The development of this new technique allowed biological sex to be separated from the social gender and thus to make unique comparisons.

Epilogue

In the first part of this work six studies were conducted to prove the effects of priming by different types of activation. Here it was demonstrated that semantic concepts were made more accessible through meaningful and related words, but also through images and objects. The effect sizes ranged from small to large, and the meta-analytic integration revealed that women had more baby-related words accessible. One possible interpretation of these findings might be that stereotypical social role models are more likely to link women to reproduction and children and that women have partially internalized these attitudes. Thus, this role model could be brought to life from an early age, and they can automatically grow into it.

In the second chapter of this work, a tool was developed to study attitudes toward babies and reproduction. With the help of the PrAttS, more accurate examinations could now be conducted and more precise comparisons could be made between German and English speaking cultural areas regarding attitudes toward children and the connections among culture and socio-ecological context. This questionnaire fits in well with the culture-comparing tradition of the VOC according to Hoffman and Hoffman (1973).

In the third chapter, two surveys were described that examined whether the continuous properties of masculinity and femininity, as outlined by Bem (1974), are appropriate to differentiate between the visual stereotypes of masculine and feminine

men and women. The results revealed that presumably social gender rather than biological sex had more impact on the attribution of character traits. Overall, the dimension of masculinity–femininity exhibited more weight than the biological sex of faces. For example, male and female models with feminine facial features were more likely to be considered "female." Regarding "feminine" qualities, being warm or caring is still often used as a description in society and associated with good motherhood. The attribution of such features due to the femininity or masculinity of facial features could be crucial in mate choice. The VOC theory by Hoffman and Hoffman (1973) suggested the changeability of social roles. Since the results described in the present work support this assumption, they fit well with the implicit basic assumption by Hoffmann and Hoffman (1973). Their approach to describing psychological perspectives on population development remains a fruitful approach to sociological and sociopsychological issues.

The current work has some limitations. On the one hand, there are possibilities for improvement that concern all three chapters. First, all of our studies were conducted in WEIRD countries (Henrich, et al., 2010). Therefore, the present results cannot be automatically generalized to other cultural contexts. Second, the samples had a limited age range, with only a few older people included. Future research could therefore pursue more inclusive cross-cultural approaches and examine its results on older populations.

On the other hand, there are also possibilities for improvement that concern individual chapters. In Chapter 1, the operationalization of the concept was based on only one measurement, so further operationalization could be used in future investigations to increase generalizability. In Chapter 2, item generation was not based on an (established) theory. Therefore, it would be useful to generate questionnaires on reproduction and attitude to babies based on a theory such as the VOC according to

Hoffman and Hoffman (1973) or Liefbroer (2005). In addition, supplementing the data

of the self-reported dimensional questionnaires with other sources of information would

make sense.

References

Adorno, T. W., Frenkel-Brunswik, E., Levinson, D. J., & Sanford, R. N. (1950). *The Authoritarian Personality*. New York: Harper & Brothers.

Anderson, J. R. (1983). A spreading activation theory of memory. *Journal of Verbal Learning and Verbal Behavior, 22*, 261–295.

Asendorpf, J. B., Banse, R., Wilpers, S., & Neyer, F. J. (1997). Beziehungsspezifische Bindungsskalen für Erwachsene und ihre Validierung durch Netzwerk und Tagebuchverfahren. *Diagnostica, 43*, 289–313.

Auspurg, K., Hinz, T., & Sauer, C. (2017). Why should women get less? Evidence on the gender pay gap from multifactorial survey experiments. *American Sociological Review, 82*, 179–210.

Bakker, M., van Dijk, A., & Wicherts, J. M. (2012). The Rules of the Game Called Psychological Science. *Perspectives on Psychological Science, 7*(6), 543–554.

Bargh, J. A., Chen, M., & Burrows, L. (1996). Automaticity of social behavior: direct effects of trait construct and stereotype-activation on action. *Journal of Personality and Social Psychology, 71*, 230–244.

Bauer, G., & Kneip, T. (2013). Fertility from a couple perspective: A test of competing decision rules on proceptive behaviour. *European Sociological Review, 29*, 535–548.

Becker, G. (1982). Die ökonomische Analyse der Fruchtbarkeit. In Gary S. Becker (Hrsg.) Der ökonomische Ansatz zur Erklärung menschlichen Verhaltens. (pp. 188–214). Tübingen: Mohr.

Becker, G. (1991). A Treatise on the Family (2nd ed.). Cambridge/London: Cambridge University Press.

Bem, S. L. (1974). The measurement of psychological androgyny. *Journal of Consulting and Clinical Psychology, 42*, 155–162.

Bennett, M., Sani, F., Hopkins, N., Agostini, L., & Malucchi, L. (2000). Children's gender categorization: An investigation of automatic processing. *British Journal of Developmental Psychology, 18*, 97–102.

Berman, P. W. (1980). Are women more responsive than men to the young? A Review of developmental and situational variables. *Psychological Bulletin, 88,* 668–695.

Bernier, A., Matte-Gagné, C., Bélanger, M.-E., & Whipple, N. (2014). Taking Stock of Two Decades of Attachment Transmission Gap: Broadening the Assessment of Maternal Behavior. *Child Development, 85*(5), 1852–1865.

Bian, L., Leslie, S. J., & Cimpian, A. (2017). Gender stereotypes about intellectual ability emerge early and influence children's interests. *Science, 355*, 389–391.

Biernat, M., & Manis, M. (1994). Shifting standards and stereotype-based judgments. *Journal of Personality and Social Psychology, 66*, 5–20.

Blanz, V., & Vetter, T. (1999). A morphable model for the synthesis of 3D faces. *Proceedings of the 26th Annual Conference of Computer Graph Interact Techiques*. *19*, 187–194.

Böhm, B. (1993). *Familiäre Ursachen von Bulimie.* Unpublished diploma thesis, Universität Regensburg.

Brewer, G. & Archer, J. (2007). What do people infer from facial attractiveness? *Journal of Evolutionary Psychology*, 1–11.

Byrne, D. (1971). *The attraction paradigm*. New York: Academic Press.

Cheng, Y. D., O'Toole, A. J., & Abdi, H. (2001). Classifying adults' and children's faces by sex: Computational investigations of subcategorical feature encoding. *Cognitive Science. 25*, 819–838.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed*.)*. New

    Jersey: Lawrence Erlbaum.

Collins, A. M., & Loftus, E. F. (1975). A spreading-activation theory of semantic

    processing. *Psychological Review, 82,* 407–428.

Confer, J. C., Perilloux, C., & Buss, D. M. (2010). More than just a pretty face: men's

    priority shifts toward bodily attractiveness in short-term versus long-term mating

    contexts. *Evolution and Human Behavior, 31*, 348–353.

Dai, X., Brendl, C. M., & Ariely, D. (2010). Wanting, liking, and preference

    construction. *Emotion, 10*(3), 324–334.

DeBruine, L. M., Jones, B. C., Little, A. C., Boothroyd, L. G., Perrett, D. I., Penton-

    Voak, I. S., et al. (2006). Correlated preferences for facial masculinity and ideal or

    actual partner's masculinity. *Proceedings of the Royal Society B: Biological*

    Sciences, 273, 1355–1360.

DeBruine, L. M., Jones, B. C., Smith, F. G., & Little, A. C. (2010). Are attractive men's

    faces masculine or feminine? The importance of controlling confounds in face

    stimuli. *Journal of Experimental Psychology: Human Perception and Performance,*

    36, 751–758.

Degner, J., Mangels, J., & Zander, L. (2018). *Think Physics, think Male? Visualizing*

    Gender-stereotypic Representations of Male and Female Teachers. Unpublished

    Manuscript.

Dijksterhuis, A., & van Knippenberg, A. (1998). The relation between perception and

    behavior, or how to win a game of Trivial Pursuit. *Journal of Personality and*

    Social Psychology, 74, 865–877.

Dion, K., Berscheid, E., & Walster, E. (1972). What is beautiful is good. *Journal of*

    Personality and Social Psychology, 24, 285–290.

Dotsch, R., Wigboldus, D. H. J., Langner, O., & van Knippenberg, A. (2008). Ethnic out-group faces are biased in the prejudiced mind. *Psychological Science, 19*(10), 978–980.

Doyen, S., Klein, O., Pichon, C.-L., & Cleeremans, A. (2012). Behavioral Priming: It's All in the Mind, but Whose Mind? *PLoS ONE 7*(1), e29081.

Eberhardt, J. L., Goff, P. A., Purdie, V. J., & Davies, P. G. (2004). Seeing black: race, crime, and visual processing. *Journal of Personality and Social Psychology, 87*, 876–893.

Fausto-Sterling, A. (2000). *Sexing the Body: Gender Politics and the Construction of Sexuality*. New York: Basic Books.

Ferguson, M. J., & Mann, T. C. (2014). Effects of evaluation: an example of robust ''social'' priming. *Social Cognition, 32,* 33–46.

Fiore, A. T., & Donath, J. S. (2005). Homophily in online dating: When do you like someone like yourself? *Computer-Human Interaction,* 1371–1374.

Freud, S. (1905). *Three Essays on the Theory of Sexuality.* Retrieved from: http://icpla.edu/wp-content/uploads/2017/11/Freud-S-Three-Essays-on-the-Theory-of-Sexuality.pdf (2018.10.03).

Gould, S. (1979). Characteristics of career planners in upwardly mobile occupations. *Academy of Management Journal, 22*, 539–550.

Graf, P., & Mandler, G. (1984). Activation makes words more accessible, but not necessarily more retrievable. *Journal of Verbal Learning and Verbal Behavior, 23,* 553–568.

Hebb, D. O. (1949). *The organization of behavior.* New York: Wiley.

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences, 33*, 1–75.

Hildebrandt, K. A., & Fitzgerald, H. E. (1978). Adults' responses to infants varying in
perceived cuteness. *Behavioural Processes, 3*, 159–172.

Hoffman, L. W., & Hoffman, M. L. (1973). The Value of Children to Parents. In J. T.
Fawcett (Ed.), *Psychological Perspectives on Population*. (pp. 19–76). New York:
Basic Books.

Hutteman, R., Bleidorn, W., Penke, L., & Denissen, J. (2013). It takes two: A
longitudinal dyadic study on predictors of fertility outcomes. *Journal of
Personality, 81*, 487–498.

Imhoff, R., & Dotsch, R. (2013). Do we look like me or like us? Visual projection as
self- or ingroup-projection. *Social Cognition, 31*, 806–816.

Imhoff, R., Dotsch, R., Bianchi, M., Banse, R., & Wigboldus, D. H. J. (2011). Facing
Europe: Visualizing spontaneous in-group projection. *Psychological Science, 22*,
1583–1590.

Imhoff, R., Schmidt, A. F., Nordsiek, U., Luzar, C., Young, A. W., & Banse, R. (2010).
Viewing Time revisited: Prolonged response latencies for sexually attractive targets
under restricted conditions. *Archives of Sexual Behavior, 39*, 1275–1288.

Imhoff, R., Schmidt, A. F., Weiß, S., Young, A. W., & Banse, R. (2012). Vicarious
Viewing Time: Prolonged response latencies for sexually attractive targets as a
function of task- or stimulus-specific processing. *Archives of Sexual Behavior, 41*,
1389–1401.

Imhoff, R., Woelki, J., Hanke, S., & Dotsch, R. (2013). Warmth and competence in
your face! Visual encoding of stereotype content. *Frontiers in Psychology, 4,* 386.

Jansen, M., & Liefbroer, A. (2006). Couple's attitudes, childbirth, and the division of
labor. *Journal of Family Issues, 27,* 1487–1511.

Johnston, V. S., Hagel, R., Franklin, M., Fink, B., & Grammer, K. (2001). Male facial attractiveness: Evidence of hormone-mediated adaptive design. *Evolution and Human Behavior, 22*, 251–267.

Jostmann, N. B., Lakens, D., & Schubert, T. W. (2009). Weight as an Embodiment of Importance. *Psychological Science, 20*, 1169–1174.

Kahneman, D. (2011). *Thinking, fast and slow*. New York: Farrar, Straus and Giroux.

Kahneman, D. (2012, September). *A proposal to deal with questions about priming effects.* [Open E-Mail]. Retrieved from https://www.nature.com/polopoly_fs/7.6716.1349271308!/suppinfoFile/Kahneman%20Letter.pdf

Karremans, J. C., Stroebe, W., & Claus, J. (2006). Beyond Vicary's fantasies: The impact of subliminal priming and brand choice. *Journal of Experimental Social Psychology, 42,* 792–798.

Katz-Wise, S., Priess, H., & Hyde, J. (2010). Gender-role attitudes and behaviour across the transition to parenthood. *Developmental Psychology, 46*, 18–28.

Kaufman, G., & Uhlenberg, P. (2000). The influence of parenthood on work effort of married men and women. *Social Forces, 78*, 931–947.

Kimmel, M. S. (2004). *The Gendered Society* (2nd ed.). Oxford: Oxford University Press.

Langner, O., Dotsch, R., Bijlstra, G., Wigboldus, D. H., Hawk, S. T., & Van Knippenberg, A. D. (2010). Presentation and validation of the Radboud Faces Database. *Cognition and Emotion, 24*, 1377–1388.

Lichtenstein, S., & Slovic P. (2006). *The Construction of Preference*. London: Cambridge University Press.

Liefbroer, A. (2005). The impact of perceived costs and rewards of childbearing on entry into parenthood: Evidence from a panel study. *European Journal of Population, 21*, 367–391.

Lykken, D. T., & Tellegen, A. (1993). Is human mating adventitious or the result of lawful choice? A twin study of mate selection. *Journal of Personality and Social Psychology, 65,* 56–68.

Mackenroth, G. (1951). Die generative Struktur von Bevölkerungen und Sozialschichten. *Weltwirtschaftliches Archiv, 66*, 1–55.

Malthus, T. (1789). An Essay on the Principle of Population, as it Affects the Future Improvement of Society with Remarks on the Speculations of Mr. Godwin, M. Condorcet, and Other Writers. Retrieved from http://www.esp.org/books/malthus/population/malthus.pdf

Mangini, M. C., & Biederman, I. (2004). Making the ineffable explicit: estimating the information employed for face classifications. *Cognitive Science, 28*, 209–226.

Martin, D., & McRae, C. N. (2007). A face with a cue: Exploring the inevitability of person categorization. *European Journal of Social Psychology, 37*, 806–816.

Matias, M., & Fontaine, A. M. (2012). Can we have it all? The work and-family coping profiles of dual-earners. *Family Science, 3,* 255–265.

McClelland, J. L., & Rumelhart, D. E. (1981). An interactive activation model of context effects in letter perception: Part 1. An account of basic findings. *Psychological Review, 88,* 375–407.

McNamara, T. P. (2005). *Semantic priming. Perspectives from memory and word recognition*. New York: Psychology Press.

Mead, M. (1928). *Coming of Age in Samoa*. Retrieved from: https://archive.org/details/comingofageinsam00mead/page/n9 (2018.10.03).

Moosbrugger, H., & Kelava, A. (2012). *Testtheorie und Fragebogenkonstruktion* (2nd ed.). Berlin: Springer.

Ohly, H., Pealing, J., Hayter, A. K. M., Pettinger, C., Pikhart, H., Watt, R. G., et al. (2013). Parental food involvement predicts parent and child intakes of fruit and vegetables. *Appetite*, 69, 8–14.

Oosterhof, N. N., Todorov, A. (2008). The functional basis of face evaluation. *Proceedings of the National Academy of Science, 105*, 11087–11092.

O'Laughlin, E., & Anderson, V. (2001). Perceptions of parenthood among young adults: Implications for career and family planning. *The American Journal of Family Therapy, 29*, 95–108.

Parsons, C. E., Young, K. S., Kumari, N., Stein, A., & Kringelbach, M. L. (2011). The Motivational Salience of Infant Faces Is Similar for Men and Women. *Plos One, 6*(5), 1–5.

Penke, L., & Asendorpf, J. B. (2008). Beyond global sociosexual orientations: A more differentiated look at sociosexuality and its effects on courtship and romantic relationships. *Journal of Personality and Social Psychology, 95,* 1113–1135.

Perrett, D. I., Lee, K. J., Penton-Voak, I., Rowland, D., Yoshikawa, S., Burt, D. M., et al. (1998). Effects of sexual dimorphism on facial attractiveness. *Nature, 394*, 884–887.

Puts, D. A., Jones, B. C., & DeBruine, L. M. (2012). Sexual selection on human faces and voices. *Journal of Sex Research, 49*, 227–243.

Quinn, P. C., Yahr, J., Kuhn, A., Slater, A. M., & Pascalis, O. (2002). Representation of the gender of human faces by infants: A preference for female. *Perception, 31*, 1109–1121.

Quist, M. C., Watkins, C. D., Smith, F. G., DeBruine, L. M., & Jones, B. C. (2011). Facial masculinity is a cue to women's dominance. *Personality and Individual Differences, 50,* 1089–1093.

Ramscar, M. (2016). Learning and the replicability of priming effects. *Current Opinion in Psychology, 12*, 80–84.

Reed, J. A., & Blunk, E. M. (1990). The influence of facial hair on impression formation. *Social Behavior and Personality: An International Journal, 18*, 169–175.

Rhodes, G. (2006). The evolutionary psychology of facial beauty. *Annual Review of Psychology, 57,* 199–226.

Rhodes, G., Hickford, C., & Jeffery, L. (2000). Sex-typicality and attractiveness: Are supermale and superfemale faces superattractive? *British Journal of Psychology, 91*, 125–140.

Robins, R. W., Caspi, A., & Moffitt, T. E. (2000). Two personalities, one relationship: Both partners' personality traits shape the quality of their relationship. *Journal of Personality and Social Psychology, 79*, 251–259.

Roediger, H. L., Stadler, M. L., Weldon, M. S., & Riegler, G. L. (1992). Direct comparison of two implicit memory tests: word fragment and word stem completion. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 118*(6), 1251–1269.

Rosenzweig, S. (1942). The photoscope as an objective device for evaluating sexual interest. *Psychosomatic Medicine, 4,* 150–157.

Rowold, J. (2004). *Karriereplanung. Deutsche Übersetzung des Fragebogens zur Karriereplanung von Gould*, 1979. Münster: Westfälische Wilhelms-Universität, Psychologisches Institut II.

Satow, L. (2012). *Big-Five-Persönlichkeitstest (B5T): Test- und Skalendokumentation.* Retrieved from: http://www.drsatow.de (2017.05.27).

Schumacher, J., Stöbel-Richter, Y., & Brähler, E. (2002). Recalled Parental Rearing and the Wish to have a Child - Are there Associations? *Psychotherapie, Psychosomatik & Psychosomatische Medizin, 52*(7), 314–322.

Schwarz, S., & Hassebrauck, M. (2007). Interindividuelle Unterschiede in Beziehungspräferenzen: Das Konstrukt Beziehungsorientierung (BZO) und seine Messung. *Zeitschrift für Sozialpsychologie, 38*, 179–193.

Sévon, E. (2005). Timing motherhood: Experiencing and narrating the choice to become a mother. *Feminism and Psychology, 15*, 461–482.

Shanks, D. R., Newell, B. R., Lee, E. H., Balakrishnan, D., Ekelund, L.,Cenac, Z., et al. (2013). Priming Intelligent Behavior: An Elusive Phenomenon. *PLoS ONE, 8*(4), 1–10.

Spiel, E. C., Rodgers, R. F., Paxton, S. J., Wertheim, E. H., Damiano, S. R., Gregg, K. J., et al. (2016). `He´s got his father´s bias`: Parental influence on weight bias in young children. *British Journal of Developmental Psychology, 34*(2), 198–211.

Srull, T. K., & Wyer, R. S., Jr. (1979). The role of category accessibility in the interpretation of information about persons: Some determinants and implications. *Journal of Personality and Social Psychology, 37*, 1660–1672.

Sunnafrank, M. (1983). Attitude similarity and interpersonal attraction in communication processes: In pursuit of an ephemeral influence. *Communication Monographs, 50*, 273–284.

Taylor, S. E., Fiske, S. T., Etcoff, N. L., & Ruderman, A. J. (1978). Categorical and contextual bases of person memory and stereotyping. *Journal of Personality and Social Psychology, 36*, 778–793.

Tiggemann, M., Hargreaves, D., Polivy, J., & McFarlane, T. (2004). Word-stem completion task to assess implicit processing of appearance-related information. *Journal of Psychosomatic Research*, 57, 73–78.

Van de Kaa, D. J. (1987). Europe´s Second Demographics Transition. *Population Bulletin, 42*, 3–57.

Van Ijzendoorn, M. H. (1995). Adult attachment representations, parental responsiveness, and infant attachment: A meta-analysis on the predictive validity of the Adult Attachment Interview. *Psychological Bulletin, 117,* 387–403.

Verhage, M. L., Schuengel, C., Madigan, S., Fearon, R. M. P., Oosterman, M., Cassibba, R., et al. (2016). Narrowing the transmission gap: A synthesis of three decades of research on intergenerational transmission of attachment. *Psychological Bulletin, 142*(4), 337–366.

Viechtbauer, W. (2010). Conducting Meta-Analyses in R with the metafor Package. *Journal of Statistical Analyses, 36*(3), 1–47.

Walker, M., & Wänke, M. (2017). Caring or daring? Exploring the impact of facial masculinity/feminity and gender category information on first impression. *PLoS ONE, 12*(10), 1–19.

Warrington, E. K., & Weiskrantz, L. (1970). Amnesia: Consolidation or retrieval? *Nature, 228,* 628–630.

Warrington, E. K., & Weiskrantz, L. (1974). The effect of prior learning on subsequent retention in amnesic patients. *Neuropsychologia, 12,* 419–428.

Wegener, D. T., & Petty, R. E. (1995). Flexible correction processes in social judgement: The role of naive theories in correction for perceived bias. *Journal of Personality and Social Psychology, 68*(1), 36–51.

Weingarten, E., Chen, Q., McAdams, M., Yi, J., Hepler, J., & Albarracín, D. (2016). From primed concepts to action: A meta-analysis of the behavioral effects of incidentally presented words. *Psychological Bulletin, 142*(5), 472–497.

Williams, L. E., Huang, J. Y., & Bargh, J. A. (2009). The scaffolded mind: Higher mentalprocesses are grounded in early experience of the physical world. *European Journal of Social Psychology, 39*, 1257–1267.

Willis, J., & Todorov, A. (2006). First impressions: Making up your mind after a 100-ms exposure to a face. *Psychological Science, 17*, 592–598.

Wirtz, M. (2004). Über das Problem fehlender Werte: Wie der Einfluss fehlender Informationen auf Analyseergebnisse entdeckt und reduziert werden kann. *Rehabilitation, 43*(2),109–115.

Zebrowitz L. (2011). Ecological and social approaches to face perception. In A. J. Calder, G. Rhodes, M. H. Johnson, J. V. Haxby (Ed.) *The Oxford Handbook of Face Perception* (pp. 31–50). Oxford: Oxford University Press.

Zilioli, S., Ponzi, D., Henry, A., Kubicki, K., Nickels, N., Wilson, M.C., et al. (2016). Interestin babies negatively predicts testosterone responses to sexual visual stimuli among heterosexual young men. *Psychological Science, 27*(1), 114–118.

Appendices

Appendix A

Word stems used in all studies

Table A-1

All initial word stems, responses and exclusion in Study 1 (in German). In brackets, the total number of responses.

Initial word stem	Responses	Initial word stem	Responses
Ba___	Baby, Barbie, Babbeln (10%)	Speck	Speck (17.9%)
Ras___	Rassel (7.4%)	Sti___	Stillen (21.0%)
Ki___	Kind, Kindergarten, Kinderwunsch, Kinderschokolade, Kita (56.2%)	**Spie___**	Spielen, Spielplatz, Spielzeug (83.3%)
Win___	Winzig, Windel, Winnieh the Pooh, Winzling (24.9%)	Schrei___	Schreien, Schreihals (38.4%)
Geb___	Geburt, Geburtsurkunde, Geboren (22.3%)	Wei___	Weinen, Weich (19.7%)
Pam___	Pampers (26.6%)	Schwan___	Schwanger (26.2%)
Schu___	Schule, Schulkind, Schulsachen (32.8%)	**Wip___**	Wippe (78.3%)
Br___	Brei, Brabbeln (7.4%)	Schau___	Schaukeln, Schaufel, Schaukelpferd (23.6%)
Mi___	Milch (17.0%)	**Stram___**	Strampler, Strampelanzug (60.0%)
Krab___	Krabbeln, Krabbelgruppe (25.8%)	**Kich___**	Kichern (54.5%)
Ma___	Mama (30.1%)	**Mär___**	Märchen (51.9%)
Pa___	Papa, Pampers (27.5%)	Wei___	Weinen (26.6%)
El___	Eltern (28.8%)		

Note. Bold written word stems were excluded according to the criteria of Tiggemann et al. (2004).

Table A-2

All initial word stems, responses and exclusion in Study 2 und Study 3 (in German). In brackets, the total number of responses.

Initial word stem	Responses	Initial word stem	Responses
Ras___	Rassel (5.6%)	Flä___	Fläschen (0.7%)
Ba___	Baby (2.1%)	Schwa___	Schwanger (6.9%)
Mu___	Mutter (39.6%)	Va___	Vater (32.6%)
Ki___	Kind (65.3%)	**Weh___**	Wehen (65.3%)
Tö___	Töchter (15.3%)	Win___	Windel (10.4%)
Schnu___	Schnuller (31.9%)	Sti___	Stillen (11.1%)
Wie___	Wiege (15.3%)	Tau___	Taufe (9.0%)
Säu___	Säugling (41.7%)	Stra___	Strampler (1.4%)

Note. Bold written word stems were excluded according to the criteria of Tiggemann et al. (2004).

Table A-3

All initial word stems, responses and exclusion in Study 4 (in German). In brackets, the

total number of responses.

Initial word stem	Responses	Initial word stem	Responses
Schnu___	Schnuller (31.4%)	Win___	Windel (25.5%)
Mil___	Milch (67.4%)	Stram___	Strampler (44.4%)
Sau___	Saugen (8.4%)	Schw___	Schwanger (7.5%)
Ba___	Baby (27.2%)	Krab___	Krabbeln (30.5%)
Geb___	Geburt (31.4%)	**Kin___**	Kinder (63.6%)

Note. Bold written word stems were excluded according to the criteria of Tiggemann et al. (2004).

Table A-4

All initial word stems, responses and exclusion in Study 5 (in German). In brackets, the

total number of responses.

Initial word stem	Responses	Initial word stem	Responses
Bäue___	Bäuerchen (17,2%)	Bei___	Beissring, beissen, Beinchen (3,5%)
Schlaf___	Schlaflied (3,1%)	Kusch____	Kuscheltier (19,4%)
Wei___	Weinen (12,3%)	Pam___	Pampers (16,3%)
Stra___	Strampler, Strampelanzug (1,8%)	Neug___	Neugeborenes (14,5%)
Töpf___	Töpfchen, Töpflein (15,0%)	Mi___	Milch, Milupa (19,4%)
Fla___	Flasche, Flaeschchen (34,4%)	Pu___	Puder, Puuh (11,5%)
Rass___	Rassel, rasseln (15,9%)	Br___	Brei (5,7%)
Nick___	Nickerchen, Nickelodeon (25,6%)	Kl___	Klein, Kleinkind (19,8%)
Ros___	Rosa, Rosig (51,0%)	Kra___	Krabbeln (1,3%)
Ba___	Baby (6,2%)	Win___	Winzig, Windel (22,9%)
Schr___	Schreien, Schreihals, Schrei (17,2%)	**Mil___**	Milch, Milchpumpe, Milupa (57,1%)
Nu___	Nuckeln, Nuckel (5,3%)	**Sabb___**	Sabber, Sabbern (63,5%)
Hell___	Hellblau (0,9%)	Nacht___	Nachtlicht, Nachttopf (2,6%)
Sti___	Stillen (14,5%)	La___	Latz, Lallen, la-le-lu (1,8%)

Initial word stem	Responses	Initial word stem	Responses
Spie___	Spielen, Spielzeug (66,1%)	**Säug___**	Säugling (82,8%)
Bam___	Bambi, Bambino, bam bam (12,8%)	Häu___	Häufchen, Häuflein (9,7%)
Que___	Quengeln, Quengelnder (8,4%)	Wie___	Wiege (17,2%)
Schn___	Schnuller (0,9%)	Klein___	Kleinkind (23,8%)
Bu___	Buggy, Bub (1,3%)	Wi___	Wiege, Wickeln, Winzig, Windel, Winnie the pooh (28,2%)
Spe___	Speck (17,2%)	Bü___	Bübchen, Büblein, Bürschchen (1,3%)
Hi___	Hipp (0%)	**Pen___**	Penaten-Creme (0%)

Note. Bold written word stems were excluded according to the criteria of Tiggemann et al. (2004).

Table A-5

All initial word stems, responses and exclusion in Study 6 (in German). In brackets, the

total number of responses.

Initial word stem	Responses	Initial word stem	Responses
Bäue___	Bäuerchen (2,5%)	Bei___	Beissring, beissen, Beinchen (2,5%)
Schlaf___	Schlaflied (1,7%)	Kusch____	Kuscheltier (17,8%)
Wei___	Weinen (35,6%)	Pam___	Pampers (15,3%)
Stra___	Strampler, Strampelanzug (0%)	Neug___	Neugeborenes (5,9%)
Töpf___	Töpfchen, Töpflein (9,3%)	Mi___	Milch, Milupa (23,7%)
Fla___	Flasche, Flaeschchen (41,5%)	Pu___	Puder, Puuh (5,1%)
Rass___	Rassel, rasseln (18,6%)	Br___	Brei (4,2%)
Nick___	Nickerchen, Nickelodeon (18,6%)	Kl___	Klein, Kleinkind (15,3%)
Ros___	Rosa, Rosig (32,2%)	**Kra**___	Krabbeln (0%)
Ba___	Baby (2,5%)	Win___	Winzig, Windel (25,4%)
Schr___	Schreien, Schreihals, Schrei (21,2%)	**Mil**___	Milch, Milchpumpe, Milupa (60,8%)
Nu___	Nuckeln, Nuckel (3,4%)	**Sabb**___	Sabber, Sabbern (66,7%)
Hell___	Hellblau (2,5%)	Nacht___	Nachtlicht, Nachttopf (1,7%)
Sti___	Stillen (11,0%)	**La**___	Latz, Lallen, la-le-lu (0%)
Spie___	Spielen, Spielzeug (66,7%)	**Säug**___	Säugling (76,7%)

Initial word stem	Responses	Initial word stem	Responses
Bam___	Bambi, Bambino, bam bam (5,9%)	Häu___	Häufchen, Häuflein (5,9%)
Que___	Quengeln, Quengelnder (2,5%)	Wie___	Wiege (15,3%)
Schn___	Schnuller (0%)	Klein___	Kleinkind (22,0%)
Bu___	Buggy, Bub (0%)	Wi___	Wiege, Wickeln, Winzig, Windel, Winnie the pooh (13,6%)
Spe___	Speck (11,9%)	**Bü**___	Bübchen, Büblein, Bürschchen (0%)

Note. Bold written word stems were excluded according to the criteria of Tiggemann et al. (2004).

Appendix B

Complete list of items

1.	I am afraid of bringing a child into this world.
2.	I feel I am capable of looking after a child.
3.	An unplanned pregnancy is a disaster.
4.	I feel at ease in the presence of children.
5.	Children require more love than I can give.
6.	I feel happy when I see children playing.
7.	Screaming infants make me feel uneasy.
8.	I´d be a good father / mother.
9.	I can see myself having more than one child.
10.	Raising a child on your own is horrible.
11.	To have a disabled child is the worst thing that can happen.
12.	For me, having a child means to be loved.
13.	I´d quickly learn to change nappies.
14.	I feel safe surrounded by my family.
15.	Having children is hardly affordable.
16.	Children are demanding.
17.	Children require a lot of attention.
18.	You must do without many freedoms when you have a child.
19.	Bringing up children is difficult.
20.	Having a baby means less time for myself.
21.	You should only have children when you have a secure job.
22.	You live on through your children.
23.	I am myself responsible for contraception.
24.	Many children have accidents.
25.	If you have a child, you need a partner who you can rely on.
26.	Having children is a way of achieving self-fulfillment.
27.	It´s easy to travel with a baby.
28.	Having children raises self-esteem.
29.	You can´t have a career when you have a child.
30.	You should only have children with someone who you have known for years.
31.	You should only have children once you´ve found the perfect partner.
32.	I would never have unprotected sexual intercourse.
33.	If I / my partner were to become pregnant, I know people who could support us.
34.	I´d work as a babysitter if paid adequately.
35.	Having children is sufficiently supported by the state.
36.	Children often become ill.