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ORIGINAL ARTICLE

Gender Categorization of Perfumes: The Difference between Odour Perception and Commercial Classification

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ABSTRACT *The odour perception of perfumes is claimed to be associated with gender. Although a gender-sensitive research approach is desirable when the gender variable is in focus, a deeper analysis of this association is uncommon. In this study, 18 participants (aged 20–30 years) gender categorized 12 perfumes. A gender-sensitive approach was applied to the analysis of the gender associations when sniffing perfumes, in order to examine how the participants' gender categorizations correspond to the commercial classifications of the 12 perfumes. The results demonstrate that the participants' gender associations of the perfumes constitute a scale reflecting the perfumes' odour qualities, where only the perfumes perceived as extremely feminine or masculine were categorized in the same way as the commercial classifications. It is therefore argued that the gender dichotomy of femininity and masculinity does not correspond to the perceived gender associations of perfumes in the present study.*

Introduction

Gender is claimed to be one of the categories the individual uses when classifying perfumes (cf. Zarzo 2008; Zarzo & Stanton 2009). When sniffing a perfume, it is suggested that the masculinity or femininity of the scent comes to mind (Zellner et al. 2008). In this study, the gender association when sniffing perfumes is the primary focus. It has been argued that the notion of the variable “gender” needs to be not only further discussed, but also further questioned (Francis 2002). Feminist science needs to be broadened to include also experimental psychology, while experimental methods need to be much more “gender-sensitive”. This paper is an attempt to combine these two research fields.

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By researching the gender associations of 12 different perfumes, it is possible to reach a deeper knowledge of whether and how the commercial gender categorizations of perfumes correspond to what human beings actually perceive. Is it possible to discriminate “feminine” perfumes from “masculine” perfumes? In this study I will deconstruct the femininity and masculinity associations of perfumes by analysing the odour perception of these fragrances, when their commercial gender categorization is unknown.

Odours and human mating

Perfumes are described as an important factor in the social communication between human beings, where it is claimed that women and men want to increase their gender-specific associations (see e.g. Milinski & Wedekind 2001; Herz & Inzlicht 2002; Sergeant et al. 2005). The use of perfumes has earlier been described as a feminine manifestation (cf. Twenge 1999), but today both women and men are perfumed. As a consequence, perfumes have been described as agents of social communication between women and men (Bigelow 1993). The focus has primarily been on heterosexuality and (implicitly or explicitly) on mating/reproductivity.

Even though some perfume advertisements use the dual marketing approach where, for example, both heterosexual and homosexual men are addressed by the same ads (as described by e.g. Rohlinger 2002), very many perfume ads still wrongly assume a heterosexual market (as pointed out by Tuna & Freitas 2012). It is within this understanding of the perfumery market that this paper is written.

It has been suggested that heterosexual women and men have different odour preferences in a partner (cf. Bigelow 1993; Milinski & Wedekind 2001; Lübke et al. 2012) and also that heterosexuals and homosexuals have different odour preferences in a partner (Martins et al. 2005; Lübke et al. 2012).

Differences in olfaction between women and men are sometimes seen as related to sexual behaviour (see e.g. Garcia-Falgueras et al. 2006), and imaging studies have demonstrated that brain activations were differentiated with respect to the sex and sexual orientation of the smeller (Savic et al. 2001). However, it has also been suggested that odour preferences are influenced by socio-cultural norms and hence differ between cultures (see e.g. Classen 1992; Ayabe-Kanamura et al. 1998), indicating that they might be socially constructed.

There are many different kinds of explanation for the suggestion that odours play an important role in human mating. For example, odours are sometimes described as a fundamental part of coupling among other species (see e.g. Scordato & Drea 2007), and it is proposed that human mating may be similar to the mating behaviour of other animals (Buss 1989) among whom odour is important (Thornhill & Gangestad 1999; Singh & Bronstad 2001). The arguments here often refer to pheromones and their impact on the human being.

The term “pheromones” refers to a broad group of signal smells in, for example, mammals (including the human being), signalling the individual’s specific genotype set, often described as a major histocompatibility complex (MHC). Pheromones have been suggested to influence human mating (Cutler 1999; McCoy & Pitino 2002). For example, researchers have demonstrated that female participants expressed a

preference for the odour of men with an MHC differing from their own (Wedekind et al. 1995), although single women seemed to prefer odours of MHC-similar men (Roberts et al. 2008). It has also been demonstrated that romantic couples in some—but not all—populations are significantly more MHC-dissimilar than random pairs (Chaix et al. 2008). Following this, the MHC locus of immunity genes, according to some studies, may influence mate choice in humans (Wedekind et al. 1995; Jacob et al. 2002; Garver-Apgar et al. 2006).

However, other researchers claim that no strong evidence for the importance of this factor has been reported (for an overview, see Hays 2003): Derti et al. (2010) argued that results concerning the MHC locus are not sufficiently robust to draw these conclusions concerning the influence of MHC on human mating, whereas Jacob and McClintock (2000) argued that results from insects may not generalize to humans. McCoy and Pitino (2002) suggested that pheromones from young, fertile, sexually active women had powerful effects on the behaviour of the other gender, but Winman (2004) claimed that McCoy and Pitino had no support in their data for the drawing of such a conclusion. Because of these contradictory results, there is not enough evidence to draw conclusions concerning human mating based on odours.

Other theorists have pointed out that the human being is first and foremost a social being, and that human mating is mediated by other factors, such as a differentiation based on power in social hierarchies (for an overview, see e.g. Paulsen 2010). However, a lot of advertisements for perfumes often refer to the notion of *odours* as being important in human (heterosexual) mating. The perfumery market may be well aware of the problematic assumptions behind its advertising when framing perfumes as either enhancing the feminine aspects of women or the masculine aspects of men.

Gender associations of perfumes

Another possible explanation as to why perfumes might be interpreted as important agents in social communication among humans is found in social constructivism, or in social-role theory, where the notion of gender is argued to be socially constructed rather than biologically determined (as described in e.g. Bussey & Bandura 1999; Francis 2002; Johannesen-Schmidt & Eagly 2002; Riley 2003; Nieuwenhoven & Klinge 2010). The gender associations of perfumes, where “masculinity” and “femininity” serve as two opposites in the same odour dimension (as shown in Jellink 1993; Zarzo 2008; Zarzo & Stanton 2009; Lindqvist 2012a), correspond well to the notion of heterosexuality according to a social-role approach, where the human being is seen as being socialized into thinking of gender as a binary polarization of heterosexual women and men (Bussey & Bandura 1999; Riley 2003). This suggests a gender dichotomy where the notion of “gender” constitutes the social behaviours related to biological sex (as described in e.g. Francis 2002; Nieuwenhoven & Klinge 2010).

As early as the 1980s, Baron (1983; 1986) demonstrated that women wearing a perfume associated with the feminine gender were interpreted as less confident than non-perfumed women, while men wearing a perfume associated with the masculine gender were interpreted as more confident than non-perfumed men. Moreover, Fiore (1992) demonstrated that individuals wearing a perfume associated with the feminine

gender were described as having fewer typically masculine traits than someone not wearing such perfume, implying that the gender associations triggered by sniffing a perfume on someone also activates stereotypes (i.e. feminine/masculine traits) when interpreting that individual's personality. This was confirmed by Sczesny and Stahlberg (2002), who demonstrated that individuals wearing a perfume associated with the masculine gender were interpreted as more competent than individuals wearing a typically feminine perfume.

In previous research on the associations triggered by perfumes and how different scents can affect individuals in social situations, one important notion has been that gender is a factor clearly expressed in the fragrances. Gender *stereotypes* have often been the focus when studying perfumes, and the perfumes chosen as stimuli often consist of *typically* feminine and masculine odours, although the gender associations constitute some kind of gender continuum rather than two clearly separated groups of "feminine odours" and "masculine odours". Whether a fragrance is interpreted as feminine or masculine is probably related to stereotypical associations with the feminine gender (represented as e.g. "flowery, fruity, sweet") and to the masculine gender (represented as e.g. "smoky, leather"). Sometimes, the perceived femininity and masculinity of the perfumes have been measured (cf. Graham et al. 2000; Sczesny & Stahlberg 2002; Zellner et al. 2008), but this measurement has not been the primary focus and is therefore not further analysed. Often the commercial gender categorizations of the perfumes, as given by the manufacturers, are not discussed at all.

A gender-sensitive approach

In this study, a *gender-sensitive* approach is applied. This approach has its origins in social-role theory, and emphasizes that "gender" is not a solid variable in itself, but rather a description of other variables comprised into the variable known as "gender" (Moerman & van Mens-Verhulst 2004), i.e. the social and cultural influences that engender (expected) differences between women and men (cf. Francis 2002; Nieuwenhoven & Klinge 2010). A gender-sensitive approach invites us to reflect on what the gender categories in different studies actually represent.

A lot of researchers fail to take the gender variable into consideration when analysing data (for examples, see Marrocco & Stewart 2001; Ramasubbu et al. 2001). The dichotomous variable "gender" (with the possible answers "female" or "male") has historically not been seen as a socio-demographic variable (cf. Klinge & Bosch 2001). The first step towards solving this has been to apply a "gender perspective" to the research. In the social sciences (experimental psychology included) this "gender perspective" often consists of dividing the results into two groups—women and men—and comparing the (potential) differences between these groups.

Grant (2002) argues that it is problematic, and even simplistic, to treat the biological variable "sex" as if it could capture the full array of social structures that influence "gender". One aim of this study is therefore to make a scientific contribution to the criticism of the on-going division of humanity and its surroundings into "feminine" and "masculine".

According to a gender-sensitive approach (cf. Moerman & van Mens-Verhulst 2004; Lindqvist 2013), researchers need to define what is meant by “gender”: what gender is, and what it is not. Thereafter they (we) need to include this knowledge in the research.

Aim and research questions

By researching the gender associations of 12 different perfumes, it is possible to reach a deeper knowledge of whether and how the commercial gender categorizations of perfumes correspond to what human beings actually perceive. Is it possible to discriminate “feminine” perfumes from “masculine” perfumes?

In this study I will deconstruct the feminine and masculine associations of perfumes by trying to answer the following questions: 1) How well do the participants’ gender categorizations of the perfumes correspond to the commercial categorizations? 2) Is it possible to divide the perfumes into two distinct groups (one feminine and one masculine) according to the participants’ gender associations? 3) What is the relation between the participants’ gender categorizations and the odour characteristics of the perfumes?

Method

Participants

Eighteen undergraduate students aged 20–30 years (nine women and nine men) from Stockholm University completed the experiment. Most people in the Western world are so-called cissexuals, meaning that they are individuals whose sex and gender correspond. In this study, all participants were cissexuals. Because of this, when I use the term “gender” to refer to the participants in my study, I mean both how they define themselves (their gender) and also what biological sex they have, since this happened to be the same thing.

The participants were recruited through advertising in the campus area and received monetary compensation for their participation. All participants were asked to fill out a questionnaire with some background information. Since it is suggested that sexuality may influence odour preference and the gender-related associations of odours (Martins et al. 2005; Lübke et al. 2012), the participants were asked about their sexuality in the questionnaire, and all 18 were heterosexual.

Stimuli

Perfumes are commercially categorized as either “feminine”, “masculine”, or “unisex”, with those categorized as “unisex” constituting a minority (Sczesny & Stahlberg 2002). Twelve different perfumes were selected as stimuli. Six of the 12 perfumes were commercially categorized as “feminine”, five as “masculine”, and one as “unisex”.

The fragrance industry differentiates the odour qualities of perfumes into seven groups (Fiore 1992). The perfumes selected as stimuli in this experiment had different

Table 1. The ID no., commercial gender categorization, and basic odour characteristics of each perfume.

Perfume no.	Gender category	Odour characteristics
1	F	clementine, citrus, orchid, floral
2	F	chocolate, orchid, honeysuckle
3	F	fruity, strawberry, sweet
4	F	jasmine, iris, musk, vanilla, blackcurrant
5	F	vanilla, bergamot, jasmine
6	M	lemon, rosemary, basil
7	M	citrus, basil, rosemary, pear
8	M	iris, cardamom, lavender, smoky
9	M	hawthorn, honeysuckle, sandalwood
10	M	cardamom, mandarin, bergamot, orchid
11	U	citrus, musk, vanilla
12	F	citrus, musk, vanilla, floral

kinds of documented odours, to cover a broad range of scents from spicy to sandalwood to floral. Table 1 describes the documented odours of each perfume. Perfumes categorized as “feminine” are often described as “flowery” or “fruity”, while perfumes categorized as “masculine” are described as “spicy” or “tangy” (see e.g. Sczesny & Stahlberg 2002; Zarzo 2008).

The perfumes were added to 500 mL glass bottles to an amount of 1 mL. The glass bottles were then covered with aluminium foil; one single perfume was added to each bottle. Each perfume was added to four different bottles, one for each of the four tasks; hence, the experiment made use of 48 glass bottles.

Measuring the gender associations of perfumes

The gender associations of perfumes can primarily be measured in two ways: The first is to sniff the perfume and assess the femininity and masculinity after the very same sniff, or to assess the gender association on a binary scale from masculinity to femininity. However, according to a social-role approach to “gender” and its relation to “sex”, where gender is explained as a binary polarization of female and male (Bussey & Bandura 1999; Riley 2003), it is implied that if something is associated with femininity it is also associated with an absence of masculinity. Therefore, using a binary gender scale would actually assume this division into femininity or masculinity, rather than analysing it. Therefore, such a procedure calls for differences in the gender scaling: If a participant rates a perfume as very feminine, the participant is automatically socialized to think of that specific perfume as not masculine. The procedure where participants scale the femininity and masculinity at the same time, after the same sniff, might therefore prime them to scale femininity and masculinity differently.

The second way of assessing the femininity and masculinity of perfumes is to separate the two scaling procedures, and ask the participants to rate femininity separately from masculinity. With this procedure, they are not primed to think of the scents as *either* feminine *or* masculine. Such a scaling procedure enables a

deconstruction of the gender associations of perfumes. That is, these associations are often treated as opposites. A more unprejudiced and gender-sensitive design makes it possible actually to research the gender associations of perfumes as such.

The experiment

Participants arrived at the laboratory individually and were shown to a desk with four lines of glass bottles, 12 bottles in each line (i.e. every perfume was represented once in each line). The order of the bottles was randomized, with different orders for each of the four lines and with new randomizations for each participant. One common assumption is that perfumes smell different depending upon how their scent is mixed with the odour of the human wearing the perfume (Lenochová et al. 2012). However, earlier research has indicated that, although there is a different odour perception when a perfume is applied to human skin, this perception might be related to the gender of the human wearing it (Lindqvist 2012b).

The participants were informed that the purpose of the study was to investigate the perception of different perfumes, and that the experiment consisted of the following four tasks:

Task 1: Gender categorization—where the participants were asked to categorize the perfumes as feminine, masculine, or unisex. The task was *not* to guess how the perfumes were commercially categorized, but to decide for themselves.

Task 2: Femininity—where the task was to judge the femininity of each perfume, on a fixed scale from 0 to 10, where 0 meant “not feminine at all”, and 10 meant “totally feminine”.

Task 3: Masculinity—where the task was to judge the masculinity of each perfume, on a fixed scale from 0 to 10, where 0 meant “not masculine at all”, and 10 meant “totally masculine”.

Task 4: Intensity—where the task was to judge the intensity of each perfume, using free magnitude estimation (cf. Stevens 1975) in which participants build their own individual scales during the experiment. Each individual intensity scale was multiplied by the specific constant that made the highest intensity value 100, and the average value was calculated for each perfume.

Small bowls of coffee-beans were put next to each line of bottles. The participants were asked to take a sniff of these bowls between sniffing the perfumes, in order to neutralize the odour perception of the perfumes. Also, the participants took breaks of 2 minutes every fifth perfume to reduce the risk of olfactory fatigue.

Results and discussion

Basic characteristics of the gender associations

The gender scalings of female and male participants were highly correlated using Spearman’s rho rank correlation coefficient, both concerning femininity scaling

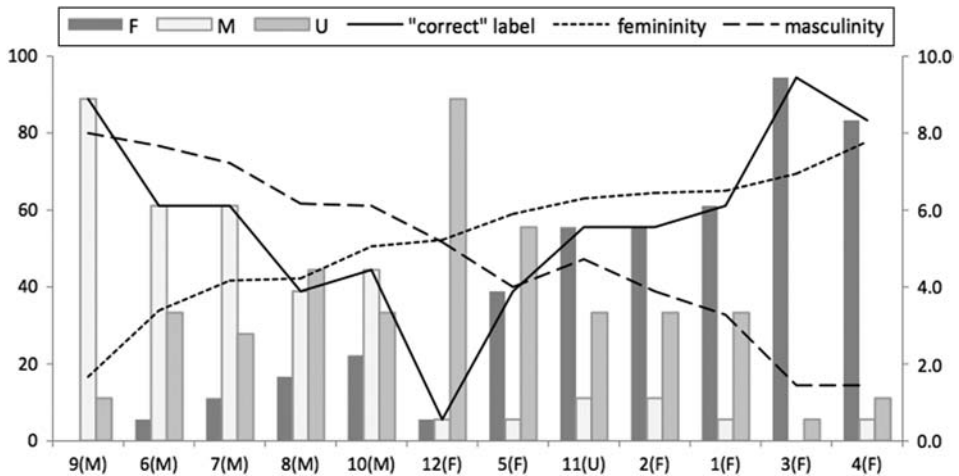


Figure 1. Primary scale: The proportion of participants (in %) who wanted to classify the perfumes as either masculine (M), feminine (F), or unisex (U); The proportion of participants (in %) who categorized respective perfumes “correctly”, that is, in the same way as the commercial gender categorization (solid line). Secondary scale: The gender scales (femininity and masculinity). Commercial gender categorization marked on x-axis for every perfume (F, U, M), together with their specific ID number.

($r_s = 0.83$, $P = 0.001$) and masculinity scaling ($r_s = 0.69$, $P = 0.014$), corresponding to the results of Zellner et al. (2008). These results indicate that there was no difference between the female and male participants in gender associations of the perfumes. Therefore, all the following data were collapsed across gender.

There was no significant correlation between intensity and femininity ($r = -0.037$, $P = 0.908$) or intensity and masculinity ($r = -0.026$, $P = 0.937$), indicating that the gender associations were not influenced by differences in odour intensity. This correlation is important, since odour perception might be influenced by intensity (cf. Rouby & Bensafi 2002; Rouby et al. 2009).

The average group mean value on the femininity scale for the perfumes commercially categorized as feminine was 5.3 (on a scale of 0 to 10), which cannot be seen as particularly high, indicating that the perfumes categorized as feminine in general were not perceived as exceptionally feminine. The average group mean value on the masculinity scale for perfumes commercially categorized as masculine was 4.9 (on a scale of 0 to 10), which is even lower than the average value of perfumes categorized as feminine, indicating that the perfumes categorized as masculine were in general not perceived as exceptionally masculine.

The relation between femininity and masculinity

There was a highly significant negative correlation between femininity and masculinity scaling ($r = -0.93$, $P < 0.01$), indicating that a high value on the femininity scale for a specific perfume implies a low value on the masculinity scale for the same specific perfume. This result indicates that the femininity and masculinity

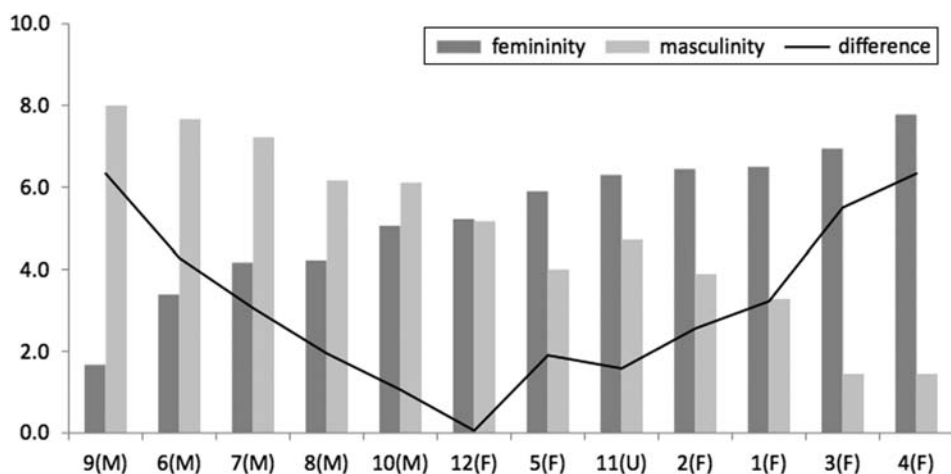


Figure 2. The gender scales (femininity and masculinity), presented with the difference between the femininity value and the masculinity value for each perfume. Commercial gender categorization marked on x-axis for every perfume (M, F, U), together with their specific ID number.

scales actually do constitute two opposites of one binary scale since the two scales were so highly negatively correlated, where a higher value on the femininity scale implies a lower value on the masculinity scale, and vice versa. However, as illustrated in Figure 1, the femininity and masculinity scales do *not* represent two distinctly separated groups of perfumes, where “feminine” and “masculine” perfumes are found in two different groups. This was also indicated by the average mean values of the femininity and masculinity scales, being around the value of 5.

Only three of the 12 perfumes (nos. 3, 4, 9) scored particularly high values (> 7.5 out of 10) on the masculinity scale *or* on the femininity scale. These perfumes match the typical description of female (“floral”, no. 4) and masculine (“spicy”, nos. 6 and 9) fragrances quite well (as described by e.g. Sczesny & Stahlberg 2002; Zarzo 2008). That “floral” odours are associated with femininity, and “spicy” ones with masculinity, is probably a very old cultural tradition that the Western human has learned.

These results demonstrate that the perfumes constitute a gender spectrum instead of two separated groups (masculine/feminine), confirming earlier findings (cf. Zarzo 2008; Zellner et al. 2008; Zarzo & Stanton 2009), and actually validating the assumption that the gender associations of perfumes *could* be seen as a binary scale. *But*, the results also demonstrate that the perceived gender of perfumes is more of a floating continuum and that most perfumes are located in the middle of this continuum. Moreover, this binary scale seems to reflect the odour qualities of the perfumes, where the most “gendered” odour characteristics are found at the extremes of the scale. Concerning these perfumes, “gender” could be seen as strongly declared in the fragrances. Concerning the rest of the perfumes, this assumption is not that certain, at least if “gender” is defined as “feminine” or “masculine” (that is, if we accept the common notion of gender as being dichotomous).

Gender categorization

There was a highly significant correlation between the difference between femininity and masculinity (illustrated in Figure 2), and the total number of participants wanting to categorize the perfumes in the same way as the commercial gender categorization (illustrated in Figure 1; $r_s = 0.92$, $P < 0.001$), indicating that the more “gendered” the odour, the easier it is to categorize that specific odour “correctly”.

Since the gender categorization task had three possible options (feminine, masculine, unisex), the result expected by chance would be 33%. The total number of participants who gender-categorized the perfumes in the same way as the commercial categorization was only exceptionally high (>83%) for three perfumes (nos. 3, 4, 9; Figure 1). These three perfumes are the same ones already discussed, since they have quite “gendered” odour characteristics.

On average, the participants wanted to categorize 3.8 perfumes (32%) as unisex, compared to the 1 perfume (8%) that was actually being commercially categorized as unisex.

Concerning the perfume commercially categorized as unisex (no. 11), 33% of the participants wanted to categorize it as unisex. Perfume no. 12, commercially categorized as feminine, has the same value on the femininity scale as on the masculinity scale. This perfume also has the largest number of participants (89%) who wanted to categorize it as “unisex”.

The difference between the participants and the perfumery market concerning how to gender categorize perfumes implies that gender associations are procedures in which the assumption concerning the duality of female and male is not sufficient: Since gender is considered to be strongly reflected in perfumes, and since the gender of the scent is claimed to be one of the main associations when sniffing a perfume (as described in Zarzo 2008; Zellner et al. 2008), this is noteworthy. Instead, these results again indicate that the commercial gender categorizations do not correspond well to the perceived gender associations of the fragrances.

Conclusions

The main finding in this experiment is that the participants did not perform well in gender categorizing the 12 perfumes used as stimuli in the same way as they are commercially categorized, indicating that the commercial gender categorization might not be self-evident. Even though the gender associations of the perfumes resulted in two opposites where femininity and masculinity were negatively correlated, the perfumes could not be separated into one feminine and one masculine group.

Since it is suggested that individuals learn to categorize others according to the gender dichotomy (Francis 2002), even though many behaviours and traits are common among both women and men (MacInnes 1988), the socially learned understanding of the world involves the belief that these two gender categories or groups are separate. However, the results of this study indicate that traditional commercial gender categorizations might be too narrow, since the commercial

classifications do not seem to correspond well to how the participants in this study actually wanted to categorize the odours themselves.

The results suggest that gender seemed to be perceived as being strongly reflected in the perfumes used as stimuli in this study *only* in the case of the very few perfumes found at the extremes of the gender scale. These perfumes seemed to have odour characteristics that in earlier research have been defined as typically feminine or typically masculine (cf. Zarzo 2008).

Some attempts to develop the commercial gender categorization of perfumes have been made, and introducing unisex perfumes can be seen as one of those. However, the perfumery market still categorizes most perfumes as either feminine or masculine. This is probably due to the market's wish to sell an "identity" rather than a specific odour quality, where this "identity" itself is categorized as "feminine" or "masculine". Therefore, the perfumery market may very well be aware of the problematic assumptions behind its advertising, and the market is probably framing perfumes as either feminine or masculine since that corresponds well to heteronormativity theory. Also, research on pheromones and the MHC explicitly links perfumes to human mating (see Wedekind et al. 1995), stating that since perfumes have been used for more than 5000 years, individual preferences for perfume ingredients (scents) might have a biological significance in that they correlate with, for example, mate choice. This exemplifies the way in which the connection between perfumes and human mating is a widespread assumption.

Since only 18 relatively young persons (aged 20–30 years) participated in this study, it is hard to generalize the results to a larger population; for example, since the perception of odours changes during the process of ageing (see e.g. Konstantinidis et al. 2006; Rouby et al. 2009). However, this study has described some tendencies that could be further analysed in the future, and is therefore of interest for gender research since it demonstrates how classical assumptions concerning gender can be empirically tested. This paper is a *very small* contribution to gender-sensitive research, but the results emphasize the phenomenon that our preconceptions about the research variables will influence the results. That is, if one does not take into account the division of humanity and human attributes into "masculine" and "feminine", one might not find anything more than gender differences. But, when one tries to analyse these differences a bit, one will usually gain a deeper understanding of the results.

In the present study, it was demonstrated that the commercial gender classifications of the perfumes used as stimuli did not correspond well to how the perfumes were actually perceived: The participants tended to categorize a large proportion of the perfumes as "unisex", although most perfumes in this study were commercially categorized as either "feminine" or "masculine". Therefore, the results of this study can be interpreted as a scientific contribution to the criticism of the ongoing division of humanity into two separated groups of "females" and "males". At least, this division could be further analysed before such assumptions concerning humanity and its surrounding world influence the conclusions.

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