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Effects of exemplars and base-rate information on online physician rating sites

Der Einfluss von Fallbeispielen und summarischen Realitätsbeschreibungen auf Online-Arztbewertungsportalen

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Abstract: In recent years, the number of users on online physician rating sites has increased continuously. According to exemplification theory, user comments have a strong influence on individual judgments. Visualized base-rate information can constrain these effects. This study examines the impact of exemplars and base-rate information regarding physician rating sites on the perception and evaluation of doctors, as well as participants' behavioral intentions. To address this question, we conducted a 2 x 2 x 2 online experiment (N = 216). We developed eight alternative versions of a physician rating site, varying the valence of the exemplars (factor 1: positive/negative) and base-rate information (factor 2: positive/negative) and the type of presentation of the base-rate information (factor 3: bar graph/average grade). Our results show that the valence of both significantly influenced participants' recall, evaluation and behavioral intentions. Furthermore, the negative bar graph led to a more accurate evaluation than the negative average grade. The strong impact of base-rate information limits the scope of exemplification effects in the context of physician online rating sites.

Keywords: Physician rating site, exemplification theory, experiment

Zusammenfassung: In den vergangenen Jahren ist die Nutzerzahl von Arztbewertungsportalen im Internet stark angestiegen. Den Befunden zu Fallbeispieleffekten entsprechend beeinflussen insbesondere Nutzerkommentare die individuelle Urteilsbildung. Durch grafische Aufbereitung der summarischen Realitätsbeschreibung kann diese Wirkung eingeschränkt werden. Daher stellt sich die Frage, welchen Effekt Fallbeispiele und summarische Realitätsbeschreibungen auf Arztbewertungsportalen auf Nutzer haben. Untersucht wurde dies in einem 2 x 2 x 2-Onlineexperiment (N = 216). Als Stimulusmaterial dienten Bildausschnitte einer Arztbewertungsseite. Diese unterschieden sich hinsichtlich der Valenz der Fallbeispiele (Faktor 1: positiv/negativ) und summarischen Realitätsbeschreibungen (Faktor 2: positiv/negativ). Bei Letzteren wurde zudem die Art der Darstellung (Faktor 3: Balkendiagramm/Durchschnittsnote) variiert. Die Ergebnisse zeigen, dass sowohl Fallbeispiele als auch summarische Realitätsbeschreibungen die Erinnerung, Bewertung und Verhaltensintention signifikant beeinflussen. In Bezug auf die Darstellung ergab sich, dass ein negatives Balkendiagramm zu einer akkurateren Bewertung führte als eine negative Durchschnittsnote. Der starke Einfluss der summarischen Realitätsbeschreibung schränkt die Tragweite des Fallbeispieleffekts im Kontext von Online-Arztbewertungsportalen ein.

Schlagwörter: Arztbewertungsportale, Fallbeispielforschung, Experiment

1. Introduction

Over the years, the Internet has become increasingly important for health communication. The number of persons who use it for seeking health-related information has risen continuously. According to a representative survey (MSLGroup, Germany, 2012) the majority of the German population (75%) used the Internet for health-related information regularly or occasionally. At the same time, the number of health-related websites has also increased (Eysenbach, 2003), especially the so-called Web 2.0 applications (e.g., social media) are becoming increasingly popular (Betsch, et al., 2012). Users of such sites can create new content, share it with other users or comment on already-existing content (Betsch & Sachse, 2012).

One genre of social media applications in the health context are online physician rating sites. They can be defined as "internet-based social networking platforms that allow patients to discuss peer-to-peer information and to give evaluations based on personal experiences" (Fischer & Emmert, 2015, p. 281). In Germany, most online physician rating sites, such as 'Jameda,' 'DocInsider' or 'Topmedic,' are commercially oriented. Nevertheless, surveys confirm the increasing relevance of these sites as a source of health information. A cross-sectional study by Emmert, Meier, Pisch, and Sander (2013) showed that 25 percent of the (German) respondents trust online physician rating sites when searching for health information. Moreover, every third user has already previously judged a physician online. Further studies have supported these results and showed that more than half of the onliners know physician online rating sites (ForwardAdGroup, 2015).

Like other rating websites (e.g., for hotels or restaurants), users can rate physicians based on different evaluation criteria (e.g., waiting time, kindliness, treatment). In addition to this statistical data, users have the opportunity to report their experiences in the form of user comments. This raises the question which type of information – user comments or statistics – has a stronger influence on people's perception and judgments of the physician.

To answer this question, we refer to exemplification theory, which deals with the influence of exemplars (e.g., user comments) and base-rate information (e.g., statistics). Exemplification research suggests that single comments can influence people's perception and judgment more strongly than statistical information (Zillmann & Brosius, 2000). This effect has been supported in many studies in various fields and for various media channels (e.g., Bosch, 2014; Daschmann, 2001; Tran, 2012; and for an overview see Zillmann & Brosius, 2000). Also, a study in the context of online rating sites verified the strong impact of user comments on the perception of a university professor (Scherr, Müller, & Fast, 2013b). In addition, exemplification effects were confirmed in various studies in the health domain (e.g., Betsch, Renkewitz & Haase, 2013; Rossmann & Pfister, 2008; Ziegler, Pfister & Rossmann, 2013; for an overview see Zillmann, 2006).

Nevertheless, exemplification research in the context of social media in general, and physician online rating sites in particular, is still scarce. Our study deals with this new area of application and investigates the impact of user comments and statistics on users' perception and evaluation of a physician, as well as on their behavioral intention to consult a doctor. In contrast to many previous exemplifi-

cation studies, we varied both the exemplars (user comments) and the base-rate information (valence, presentation). Thus, with this study we contribute to the existing body of exemplification and health communication research, not only by examining an increasingly relevant social media channel (physician online rating sites), but also by examining exemplification in the context of various types of base-rate information.

2. Exemplification theory and health communication

Physician online rating sites provide the opportunity to obtain statistical data and read about other patients' experiences with a doctor. Exemplification theory deals with the influence of such single-case information (so-called *exemplars*) on forming a judgment. It assumes that people tend to form their opinion about social issues based on exemplars rather than statistical information (so-called *base-rate information*) (Zillmann & Brosius, 2000). The idea is that exemplars, due to their authenticity and liveliness, can be processed more easily than statistical information (Peter, 2017). Therefore, exemplars have a stronger influence on judgment, risk perception, attitude and behavioral intention in comparison to the more valid base-rate information (Brosius, 1996; Peter, 2017; Rossmann & Pfister, 2008; Scherr et al., 2013b; Ziegler et al., 2013).

Zillmann, Perkins, and Sundar (1992) investigated the influence of exemplars in the media environment for the first time. Participants were given a newspaper article about a diet program in which the statistical value of success for each version was kept constant (*base-rate information*), whereby the valence of the exemplars varied. The authors could verify that the participants were predominantly influenced by exemplars. Participants of the experimental group with unilateral negative exemplars overestimated the probability of an increase in weight after a diet although the base-rate information was the same for all groups.

This effect was supported in other experimental studies in health communication (for an overview see Peter, 2017; Zillmann, 2006). For instance, studies replicated the stronger impact of exemplars in the context of HIV/AIDS (Boyson, Zimmerman, & Shoemaker, 2015), preventive medical examinations (Cox & Cox, 2001), mental illness literacy (Chang, 2008) or hepatitis B virus (De Wit, 2008). However, other studies did not find an exemplification effect at all (Rossmann & Pfister, 2008) or a partially stronger effect of base-rate information on the attitude towards tanning bed use (Greene & Brinn, 2003). Only a few researchers varied both exemplars and base-rate information in the context of health information and found that the combination of both had a stronger impact on the credibility of the message and individuals' attitude (Allen et al., 2000) or on risk perception (Betsch et al., 2013; Nan, Dahlstrom, Richards, & Rangarajan, 2015) than just one type of information had.

3. Exemplification theory and social media

The Internet offers users the opportunity to publish their personal experiences, thoughts, and feelings without great effort or barriers, for example in user comments. At this point, the question arises as to whether user comments can be defined as exemplars.

Daschmann (2001) differentiates exemplars from single cases, because exemplars are used to make a statement about a real situation that goes beyond a single case. In a journalistic article, this generalization is normally provided by base-rate information (Daschmann & Brosius, 1999). Whereas in classical news reports there is an explicit mention about the relationship between base-rate information and exemplars, this is not the case in user comments. However, Zillmann, and Brosius (2000, p. 11) define exemplars by focusing on the perception of the recipients: "Recipients, as a rule, do nonconsciously infer that the properties observed in a few instances apply to the aggregate of like instances. It is this deep-rooted inclination to generalize observed phenomena that gives individual events the status of exemplars." That means, recipients subconsciously generalize those exemplars and assume them as examples for a real situation (Zillmann & Brosius, 2000). Online rating sites normally include base-rate information that describes the average opinion of the user. Due to the deep-rooted inclination to generalize information, user comments on rating sites can be perceived as exemplars for this base-rate information.

Lee and Jang (2010) were the first to investigate the exemplification theory in the context of readers' reactions to news on Internet portal sites. In their experimental design, participants read an online article with reactions of other users as either aggregate approval ratings or individual comments. The authors could demonstrate that user comments especially influenced the perception of public opinion and personal opinions.

Recent studies show that positive information leads to a more positive perception and attitude, whereas negative information has the opposite effect (e.g., Arpan, 2009; Peter, Rossmann, & Keyling, 2014; Winter, Brückner, & Krämer, 2015). Scherr, Müller, and Fast (2013a) examined exemplification effects in the context of an online rating site for university professors. They found that positive exemplars lead to a more positive perceived climate of opinion, personal opinion, and stronger intended actions than negative exemplars. The same was shown for positive and negative base-rate information. Another study in this area presented user comments on Facebook dealing with the effectiveness of flu vaccination (Peter et al., 2014), which were varied according to their valence (positive vs. negative), the number of comment likes, and post likes. The results showed a weak impact of user comments on intention to be vaccinated, which was not reinforced by the number of likes the comment had.

In summary, studies on exemplification theory have shown that the valence of exemplars and base-rate information can change the perception of health-related content, attitudes and behavioral intentions in different media channels (Zillmann & Brosius, 2000; Peter, Rossmann, & Keyling, 2014). Accordingly, we formulated the following hypothesis:

H1: Predominantly positive exemplars will lead to a more favorable perception and evaluation of a doctor, and to a stronger behavioral intention to consult the doctor than will predominantly negative exemplars.

H2: Predominantly positive base-rate information will lead to a more favorable perception and evaluation of a doctor, and to a stronger behavioral intention to consult the doctor than will predominantly negative base-rate information.

Many exemplification studies indicate that "exemplars are more effective in influencing individuals' risk perception or behavioral intentions than other types of information" (Peter et al., 2014, p. 20; e.g., Daschmann, 2001; Green, 2006; Kim, Bigman, Leader, Lerman, & Capella, 2012; overview: Zillmann, 2006). To explain these exemplification effects, studies often refer to the base-rate fallacy (e.g., Zillmann, 2006). It assumes that people tend to estimate probabilities more on the basis of single cases than on the basis of the actual distribution of characteristics (Bar-Hillel, 1980; Tversky & Kahneman, 1973). A reason for this can be found in the limited human processing capacity. The heuristic-systematic model (Chaiken, Liberman, & Eagly, 1989) differentiates between two processing modes: a systematic and a heuristic route. When people are motivated, concentrating, and have enough free cognitive capacity, they process information systematically and the estimation bias is lower. When people do not have these free capacities or are distracted, they process information on the heuristic route and are more affected by external cues (e.g., attractiveness, vividness, pure number of arguments) (Brosius, 1995; Krämer, 2015; Zillmann, 2006; Zillmann & Brosius, 2000). Heuristics in form of simple "shortcuts" (Pfister, 2012, p. 58) increase the efficiency of human thinking (e.g., Brosius, 1995; Pfister, 2012; Zillmann & Brosius, 2000).

In the context of exemplification theory, two variants of heuristics are relevant: representativeness and availability heuristic. Following the representativeness heuristic, people classify things by their similarity to a prototype (Aronson et al., 2004). At least it is an estimate, to what extent an object, person or event belongs to a specific category of objects, persons or events (Zillmann & Brosius, 2000). As a result, the true sample size is ignored and people estimate probabilities more by single cases than by base-rates.

Furthermore, the availability of information plays a role (availability heuristic). Information that can be easily accessed influences the judgment. Based on research findings (e.g., Tversky & Kahneman, 1973), exemplars can be easily remembered because of their distinctive characteristics, clarity and vividness. This can lead to an availability bias and to an overestimation of probabilities (e.g., of incidence rates) (Daschmann, 2001; Zillmann & Brosius, 2000).

Additionally, exemplars appear to be more trustworthy and authentic (Brosius, 1995; Betsch et al., 2012; Brosius & Peter, 2017). Brosius (2003) explained the exemplification effect even from an anthropological view: Therefore, people always trusted in other's statements in order to survive, whereas statistics have only found their way into the human environment in the modern era.

Recent studies in the context of online health information verified the strong impact of exemplars as compared to the effect of base-rates. In their study, Betsch,

Ulshöfer, Renkewitz, and Betsch (2011) examined the effects of base-rate information and narratives that addressed vaccination for children in the form of user comments on an online bulletin board.[1] The results showed that user comments had a stronger impact on risk perception of vaccination and participants' intention to get their children vaccinated than did statistical data. These findings were stronger when the user comments had a higher degree of emotionality. Scherr et al. (2013b) examined the exemplification effect in the context of the online rating site *RateMyProfessor.com*. They found that the rating of a fictional professor was mainly influenced by a few user comments, whereas the simultaneously presented and statistically more valid average rating was just secondary. Even if some individual studies (e.g., Hoeken & Hustinx, 2009; Peter & Brosius, 2010) found a stronger impact for base-rate information, most other studies found evidence for a stronger effect of exemplars as compared to base-rate information (e.g., Müller, Scherr, & Fast, 2013; Peter, 2013). It is likely that, in a similar way, user comments on an online physician rating site have a stronger impact on perception, evaluation, and intentions than base-rate information:

H3: Exemplars will have a stronger impact on perception and evaluation of a doctor, and on the behavioral intention to consult the doctor than will base-rate information.

On a typical online physician rating site, users do not receive either exemplars or base-rate information. Rather, they receive both sets of information at the same time. Recent studies found that the combination of exemplars and base-rate information with the same valence has the strongest impact on credibility of the message and individuals' attitude (Allen et al., 2000) or on risk perception (Betsch, Renkewitz, & Haase, 2013; Nan et al., 2015). One explanation for the strong impact of the combination of exemplars and base-rate information of the same valence is that especially cumulative and consonant media contents support the perception of a climate of opinion (Schenk, 2007). For this reason, we formulated the following hypothesis:

H4: The combination of exemplars and base-rate information of the same valence will have a stronger impact on perception, evaluation, and behavioral intention than will the combination of exemplars and base-rate information of different valence.

There are many ways to present base-rate information. Online physician rating sites like 'Jameda' combine different presentation types: (1) aggregate approval ratings, indicating the users' opinion in the form of average grades (numbers), (2) visualized statistical data like rating distributions (e.g., bar graphs). Studies have shown that visualized statistical data can reduce the stronger effect of exemplars in offline environments (Peter & Brosius, 2010; Ubel, Jepson, & Baron, 2001). Peter and Brosius (2010) examined the impact of visualized base-rate information

1 In research, narratives are often used interchangeably with exemplars, because the mechanisms are similar (Peter, 2017). Studies in the context of online user comments use the term 'exemplars' (Peter et al., 2014) as well as 'narratives' (Betsch et al., 2011).

in their study on politicians and found that visualized base-rate information in the form of an infographic had a stronger impact than exemplars. However, a follow-up study could not clearly replicate this finding (Peter, 2013). Other studies found an effect of graphically presented statistical information on individual's decision making on the one hand (Ubel et al., 2001; Winterbottom, Bekker, Conner, & Mooney, 2008; Mazur & Merz, 1993) and on recall on the other hand (Griffin & Stevenson, 1996). This effect can be explained by the fact, that graphically presented statistical information increases people's understanding of statistics and subsequently influence the process of decision making (Feldman-Stewart, Kocovski, McConnell, Brundage, & Mackillop, 2000; Fagerlin, Wang, & Ubel, 2005). Furthermore, they are more eye-catching and vivid, which can support heuristic information processing (Chaiken et al., 1989). For this reason, we formulated the following hypothesis:

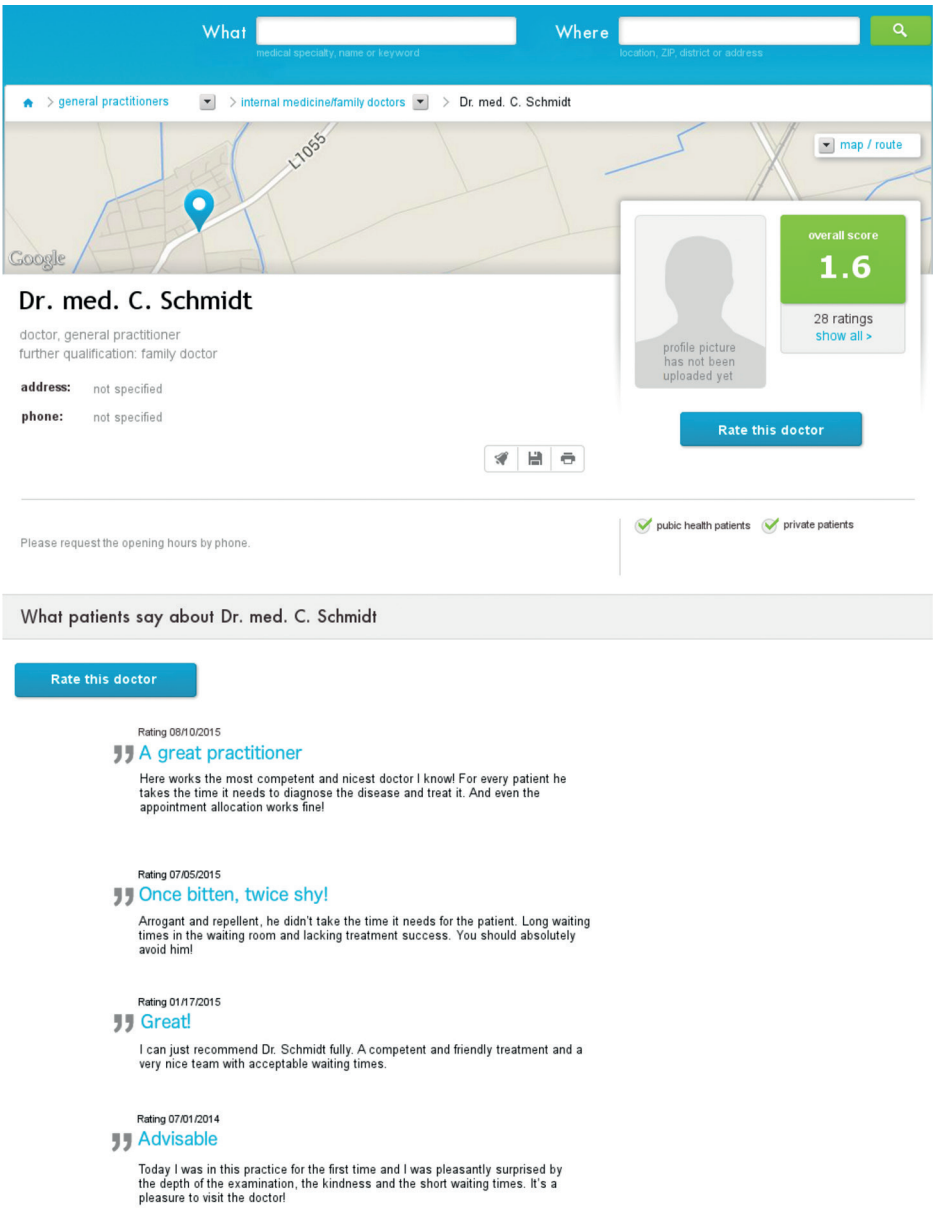
H5: The presentation of base-rate information in form of a bar graph will have a stronger impact on perception, evaluation, and behavioral intention than will the presentation of base-rate information in form of an average grade.

4. Method

4.1 Experimental Design

To test our assumptions, we conducted an online experiment with a 2 x 2 x 2 design. We showed our participants a fictitious online rating site of the general practitioner 'Dr. Schmidt,' which was very similar to a Jameda page (see Figure 1). The stimuli varied in the valence of the exemplars (*factor 1, positive vs. negative*), the valence of the base-rate information (*factor 2, positive vs. negative*) and their presentation (*factor 3, bar graph vs. average grade*).

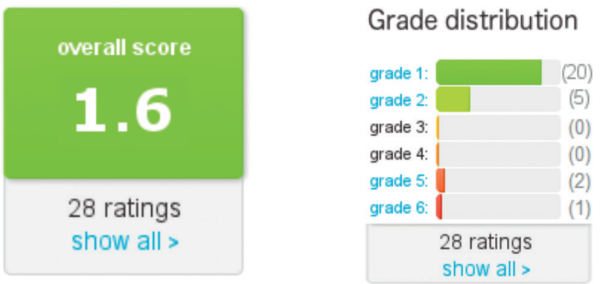
Figure 1. Stimulus example (version: positive base-rate information, positive exemplars, average grade)



Specifically, each stimulus version depicted the base-rate information beneath the name and contact data of the doctor, which resulted from 28 user ratings ranging from 1 = *very good* to 6 = *very bad* (German school grades). The base-rate was

either 1.6 (positive valence) or 5.3 (negative valence). It was either presented as a simple average grade or in the form of a bar graph (see Figure 2). The average grade was visualized with a green (positive base-rate information) or a red background (negative base-rate information). For the bar graph versions, a color gradient from green to red (positive base-rate information) respectively from red to green (negative base-rate information) was used. That factor was held constant in all conditions.

Figure 2. Presentation of the (positive) base-rate information (left: average grade, right: bar graph)



As exemplar information, each page showed four user comments evaluating the perceived competence of the doctor, his kindness, and waiting times in his practice (see Table 1). Three exemplars had the same valence (positive vs. negative), whereas the second comment in line had the opposite point of view. This resulted in a total of eight stimulus versions, to one of which participants were randomly assigned.

The online questionnaire started with several questions on third variables before the participants were shown the fictitious online rating site. They were told to have an attentive look at the page and to take as much time as they needed. Afterwards, an evaluation of the page followed, and the dependent measures were assessed. The questionnaire ended with questions on sociodemographic variables and a debriefing.

Table 1. Different versions of the exemplars

Version 1: Mostly positive exemplars	Version 2: Mostly negative exemplars
A great practitioner Here works the most competent and nicest doctor I know! For every patient he takes the time it needs to diagnose the disease and treat it. And even the appointment allocation works fine!	**Once bitten, twice shy!** Arrogant and repellent, he didn't take the time it needs for the patient. Long waiting times in the waiting room and lacking treatment success. You should absolutely avoid him!
Once bitten, twice shy! Arrogant and repellent, he didn't take the time it needs for the patient. Long waiting times in the waiting room and lacking treatment success. You should absolutely avoid him!	**A great practitioner** Here works the most competent and nicest doctor I know! For every patient he takes the time it needs to diagnose the disease and treat it. And even the appointment allocation works fine!
Great! I can just recommend Dr. Schmidt fully. A competent and friendly treatment and a very nice team with acceptable waiting times.	**Incompetent** Today I was in this practice for the first and last time! After three hours of waiting I underwent an unfriendly treatment and a bored mass processing. I definitely experienced this better before!
Advisable Today I was in this practice for the first time and I was pleasantly surprised by the examination, the kindness and the short waiting times. It's a pleasure to visit the doctor!	**Unacceptable** Despite acute pain I sat in the waiting room for four hours, to be treated then within five minutes by an unfriendly and incompetent doctor. NEVER AGAIN!

4.2 Measurement

4.2.1 Dependent variables

Perceived average grade. Traditionally, exemplification research examines the perceived public opinion to figure out how exemplars influence the way people think. Similarly, we assessed participants' perception of the doctor's average grade. The question read, "When you think back to the rating site: What do you think, how is Dr. Schmidt rated on average by the users?" Participants indicated their answers in an open text field on a school grade scale (1 = *very good* to 6 = *very bad*). Decimal places were possible (M = 3.25; SD = 1.45).

Evaluation. The evaluation of 'Dr. Schmidt' was assessed on a 6-point scale (1 = *very good* to 6 = *very bad*) with one question: "Even though you do not know Dr. Schmidt personally: Which school grade would you give him as a doctor?" (M = 3.39; SD = 1.14).

Behavioral intention. Participants were asked to imagine that they have to see a general practitioner due to illness. On a 5-point scale, they had to estimate if they would consult 'Dr. Schmidt' in this case (1 = *not at all*, 5 = *definitely*; M = 3.18; SD = 1.05).

4.2.2 Control variables

Personal attitude toward doctors. Participants' attitude toward general practitioners was measured on a 5-point scale (1 = *do not agree at all*, 5 = *definitely agree*) with six items, featuring the dimensions of 'trust,' 'support,' and 'information uncertainty,' two items each (Pfaff & Freise, 2003). These items formed the personal attitude toward doctors index (M = 3.68, SD = 0.70, α = 0.85).

Personal attitude toward online physician rating sites. With this variable, we assessed participants' attitudes toward physician rating sites in general. Again, they could provide their answers on a 5-point scale (1 = *do not agree at all*, 5 = *definitely agree*). The two items ("For their choice of doctor people should check online physician rating sites", "Online physician rating sites fulfill their purposes and are very useful for individuals' choice of doctor") formed the attitude toward physician rating sites index (M = 3.01, SD = 0.95, α = 0.77).

Activity on physician online rating sites: In line with the current state of research, we divided activity into two dimensions: Activity related to the total number of searches for a doctor (M = 2.50; SD = 1.49) and activity related to the total number of evaluations of a doctor on an online rating site (M = 1.19; SD = 0.53), one item each. It was assessed on a 5-point scale (1 = *never* to 5 = *more than ten times*).

Evaluation of the stimulus material. To exclude confounding effects caused by different evaluations of stimulus versions, the participants were asked to rate the online rating site on a 5-point semantic differential with six items: "factual – emotional," "comprehensible – incomprehensible," "informative – not informative," "trustworthy – untrustworthy," "credible – not credible," "interesting – not interesting." On basis of these items an evaluation index was created (M = 2.99, SD = 0.75, α = 0.81).

4.3 Participants

The study was implemented via the online tool 'Unipark.' The questionnaire was mainly distributed by the authors and the official Jameda page via Facebook. Furthermore, healthcare institutions (e.g., health insurance funds, Federal Ministry of Health) were contacted to share the online link for the questionnaire in internal newsletters. This distribution resulted in a sample of 216 participants[2] (52.8% female). Moreover, the participants were rather young (M = 29.65, SD = 9.33) and highly educated (88% high school diploma or higher). About one fifth of the participants indicated that they work in the medical sector. The participants were randomly assigned to one of the eight experimental groups. The groups differ in their sample sizes (group 1: n = 20, group 2: n = 25, group 3: n = 32, group 4: n = 20, group 5: n = 31, group 6: n = 34, group 7: n = 29, group 8: n = 25) resulting from the fact that only fully completed questionnaires were included into the analysis. However, comparing the groups by sociodemographic and other control variables

2 A power analysis (via *G*Power*) stated a total sample size of n = 2192 to identify even small effects (f = 0.10). With a sample size of n = 216 only effects up to f = 0.32 can be shown.

showed no significant differences (age: $F(7, 208) = 0.320$, $p = 0.944$; gender: $\chi 2 = 5.789$, $p = 0.565$, education: $\chi 2 = 26.038$, $p = 0.205$, experience in a medical profession: $\chi 2 = 5.147$, $p = 0.642$, attitude toward physician online rating sites: $F(7, 208) = 0.567$, $p = 0.782$, attitude toward doctors: $F(7, 208) = 1.121$, $p = 0.351$, frequency of searching for a doctor on a rating site: $F(7, 208) = 1.516$, $p = 0.163$, frequency of evaluating a doctor on a rating site: $F(7, 208) = 1.223$, $p = 0.292$).

5. Results

5.1 Confound check

First, we conducted a confound check to test whether the experimental manipulation resulted in different evaluations of the stimulus material. For that purpose, we carried out a univariate analysis of variance (ANOVA) with the evaluation of the stimulus as the dependent variable and the distribution of valence of the exemplars, valence of the base-rate information and presentation of the base-rate information as factors. Results showed no difference for valence (positive: $M = 2.98$; $SD = 0.75$; negative: $M = 3.00$; $SD = 0.75$) and presentation of the base-rate information (bar graph: $M = 2.94$; $SD = 0.79$; average grade: $M = 3.04$; $SD = 0.70$). However, there was a significant difference between the exemplar versions, in that participants rated the page with predominantly positive exemplars (comments pro 'Dr. Schmidt') significantly better ($M = 2.83$; $SD = 0.73$) than the pages with exemplars predominantly contra 'Dr. Schmidt' ($M = 3.19$; $SD = 0.73$), $F(1, 215) = 13.264$, $p < 0.001$, partial $\eta^2 = 0.060$.[3] Therefore, the evaluation of the stimulus served as covariate in the following analysis.

5.2 Main effects of exemplars and base-rate information

To test our hypotheses, we conducted a multivariate analysis of covariance (MANCOVA). The dependent variables were the perceived average grade and evaluation of the doctor, as well as behavioral intention[4]; factors were the valence of exemplars and base-rate information and presentation. Covariates included the evaluation of the stimulus, gender, experience in a medical profession, activity on physician online rating sites, and the personal attitude toward doctors as well as toward physician online rating sites (see Table 2).[5]

3 A detailed analysis of the single evaluation items showed that predominantly negative exemplars lead to an evaluation of the exemplars as more emotional ($M = 4.03$; $SD = 0.95$; $F(1, 20) = 20.719$; $p < 0.001$), not informative ($M = 3.12$; $SD = 1.09$; $F(1, 5) = 4.92$; $p < 0.05$), not credible ($M = 3.37$; $SD = 0.94$; $F(1, 6) = 6.523$; $p < 0.05$), and untrustworthy ($M = 3.08$; $SD = 0.96$; $F(1, 6) = 6.997$; $p < 0.01$).

4 The dependent variables were previously tested for absence of multiple co-linearity. To run a MANCOVA, Tabachnick & Fidell (2012) suggest that no correlation should be above $r = 0.90$. The results showed, that a negative remembered average grade ($r = -0.50$; $p < 0.001$) and a negative evaluation ($r = -0.71$; $p < 0.001$) led to a smaller behavioral intention. Nevertheless, the correlation coefficient is under $r = 0.90$.

5 All other assumptions to run a MANCOVA were met: independence, random sampling, multivariate normality, homogeneity of covariance matrices (Field, 2009).

As a first step, we examined the main effect of exemplars on people's perception and evaluation of a doctor, as well as on their behavioral intention. We assumed that predominantly positive comments will lead to a more favorable perception and evaluation, and to a stronger behavioral intention than will predominantly negative comments (H1). The results showed a principal effect for all dependent variables in the expected direction (perceived average grade: $F(1, 215) = 30.588$, $p < 0.001$, partial $\eta^2 = 0.132$; evaluation: $F(1, 215) = 32.273$, $p < 0.001$, partial $\eta^2 = 0.138$; behavioral intention: $F(1, 215) = 24.242$, $p < 0.001$, partial $\eta^2 = 0.108$). Precisely, participants who read predominantly positive exemplars perceived the average grade to be better ($M = 2.92$, $SD = 1.39$) than those with negative exemplars ($M = 3.66$, $SD = 1.44$). In addition, they evaluated the doctor more positively (positive: $M = 3.02$, $SD = 1.01$, negative: $M = 3.85$, $SD = 1.14$) and had a stronger behavioral intention to consult this doctor (positive: $M = 3.46$, $SD = 0.98$, negative: $M = 2.82$, $SD = 1.02$).

To test hypothesis 2, we examined the main effects of base-rate information on the dependent variables. In detail, we assumed that predominantly positive base-rate information will lead to a more favorable perception and evaluation of a doctor and a stronger behavioral intention than predominantly negative base-rate information. The result showed a principal effect for the valence of the base-rate information for all three dependent variables: Participants with positive base-rate information perceived the average rate to be better ($M = 2.32$, $SD = 1.00$) than those with negative base-rate information ($M = 4.14$, $SD = 1.26$), $F(1, 215) = 160.47$, $p < 0.001$, partial $\eta^2 = 0.444$. They evaluated the doctor more positively (positive: $M = 2.99$, $SD = 1.02$, negative: $M = 3.77$, $SD = 1.13$), $F(1, 215) = 38.469$, $p < 0.001$, partial $\eta^2 = 0.161$ and had a stronger behavioral intention (positive: $M = 3.51$, $SD = 0.94$, negative: $M = 2.85$, $SD = 1.05$), $F(1, 215) = 25.864$, $p < 0.001$, partial $\eta^2 = 0.123$, than those with negative base-rate information. With this, H2 could be confirmed.

With regards to hypotheses 3, the results show that both the valence of exemplars and base-rate information had an effect on perceived average grade, evaluation of the doctor, and behavioral intention (see Table 2). However, for all dependent variables the impact of the base-rate information was stronger than of the exemplars. Hence, H3 was not supported.

With our fourth hypothesis, we predicted an interaction effect between exemplars and base-rate information with positive or negative valences on the dependent variables. Our results showed no interaction effect for the perceived average grade ($F < 1$, *ns*), evaluation of the doctor ($F(1,215) = 1.736$, *ns*), and behavioral intention ($F < 1$, *ns*). With this, hypothesis 4 was not supported.

5.3 Indirect effects of presentation

Our fifth hypothesis stated that base-rate information in the form of a bar graph has a stronger impact on perception, evaluation, and behavioral intention than an average grade. Firstly, we looked for a 2-way interaction between presentation and the valence of base-rate information (Table 2). We found an interaction between the valence of the base-rate and the presentation type for evaluation, in

that subjects who saw the base-rate information with negative valences as a bar graph rated the doctors even more negatively (M = 4.10, SD = 1.05) than subjects who saw the negative base-rate as an average number (M = 3.61, SD = 0.86). However, no difference was found between the two presentation types for positive base-rate information (average grade: M = 2.99, SD = 0.96; bar graph: M = 3.01, SD = 0.96). Also, for the perceived average grade and behavioral intention, no interaction effect occurred. Hence, hypothesis 4 was supported for evaluation but not for perceived average grade and behavioral intention.

Secondly, we examined a possible 3-way interaction between all factors. The results showed no interaction effect on the dependent variables (perceived average grade, evaluation, behavioral intention: $F < 1$, *ns*). With this, H5 was not supported.

Table 2. Main and indirect effects of valence and presentation on perceived average grade, evaluation and behavioral intention (MANCOVA)

	perceived average grade		evaluation		behavioral intention	
	F	part. η2	*F*	part. η2	*F*	part. η2
valence EX	30.588***	0.132	32.273***	0.138	24.242***	0.108
valence BRI	160.471***	0.444	38.469***	0.161	25.864***	0.114
valence EX x valence BRI	0.121	0.001	1.736	0.009	0.102	0.001
PRE x valence BRI	1.313	0.006	4.193*	0.020	2.226	0.011
PRE x valence BRI x valence EX	0.932	0.005	0.180	0.001	0.013	0.000

Note. n = 215, EX: exemplars, BRI: base-rate information, PRE: presentation, *$p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

6. Discussion

Our study investigated the impact of user comments and statistics on online physician rating sites on users' perceptions, attitudes and behavioral intentions to consult a doctor. Additionally, we wanted to examine the effect of two different ways to present the base-rate information.

For both exemplars and base-rate information, we found principal effects of the valence on all dependent variables: both positive comments and positive base-rate information led to a more favorable perceived average grade and evaluation of the doctor, as well as a stronger behavioral intention to consult the physician. As the Eta values show (see Table 2), the influence of exemplars and base-rate information on evaluation and behavioral intention is nearly equally strong. Regarding the perceived average grade, however, base-rate information had a much stronger effect than exemplars, contradicting our hypothesis. Maybe the direct

request to recap the observed base-rate information boosts their effect. This result is similar to some studies in the context of exemplification theory, which have shown a stronger impact of base-rate information in an offline environment (e.g., Hoeken & Hustinx, 2009; Peter & Brosius, 2010). At least we can claim that the subjects formed their judgments not only based on the exemplars, but also based on base-rate information. Therefore, our findings limit the scope of exemplification effects in the context of online rating sites.

The strong effect of the base-rate information becomes especially relevant in the context of a typical usage situation of online physician rating sites. Usually, people first search for a doctor, then receive a list of matching physicians provided with base-rate information and only after that do they select a specific page that delivers the base-rate information combined with exemplars for a specific physician. Hence, it seems likely that a hierarchy of effects specifically applies to rating sites for physicians. We assume that, in the majority of cases, the pages of physicians with a bad average grade but good user comments will not be consulted by the users. In this case, the valence of the base-rate information gains importance. Future studies should take these different selection steps into account, for example with a selective exposure setting instead of a forced exposure setting.

Moreover, we could not find an interaction effect for valence of exemplars and base-rate information on perceived average grade, evaluation, and behavioral intention. These results differ from recent studies that found this interaction effect (Allen et al., 2000; Betsch et al., 2013). One explanation is that the main effects of user comments and statistics were so strong, that the interaction of both could not add to more explained variance. Furthermore, previous studies in the context of exemplification theory usually tested if either exemplars or base-rate information or a combination of both affected judgments and attitudes most strongly (Allen et al., 2000; Betsch et al., 2013; Nan et al., 2015). In contrast, all participants in the present study received a combination of exemplars and base-rate information. An advantage of the chosen procedure is the high external validity, because exemplars and base-rate information are combined on one page on nearly all online rating sites. Practically, the results indicate, that the bigger impact still results from these single factors and not from their combination. Nevertheless, future research should investigate the isolated effects of base-rate information and exemplars on a physician online rating site.

Furthermore, we examined the effects of presentation of the base-rate information. We found an interaction effect with the valence of the base-rate information only for the evaluation of the doctor: participants evaluated the physician in a more accurate way regarding the given base-rate (school grade: 5.3) when they saw the negative bar graph as compared to participants who saw the negative average grade. This finding supports the assumption that graphically presented statistical information increases people's understanding of statistics (e.g., because of their vividness). Subsequently, this leads to a lower estimation bias than a simple average grade.

It is interesting that the influence of the presentation was only found in conditions with negative base-rates. An explanation could be the negativity bias. Thus, after reception stimuli are automatically identified as predominantly positive,

neutral or negative. Based on research findings, negative traits have a greater effect on judgments than positive traits (e.g., Birnbaum, 1972; Fiske, 1980). These results can also be found in risk-taking research, where a stronger influence of losses in contrast to gains is widely verified (Ito, Larsen, Smith & Cacioppo, 1998). In the context of exemplification theory, a negativity bias was mostly examined for exemplars, not for base-rate information (Winter et al., 2015). Our findings indicate that, especially on physician online rating sites, the valence of the base-rate information has a strong influence. Maybe this negativity bias was supported by the different colors of the base-rate information. Even if the factor was held constant in all conditions, different colors can cause different effects. Visual advertising research suggests that the color green is seen as center between the turning points red and blue. Whereas green is more neutral and has a soothing effect, red elements are more conspicuous and aggressive (Heller, 1997; Hortен, 1994). Regarding the availability heuristic, maybe the red-covered base-rate information can be more easily assessed because of its distinctive and conspicuous characteristics. This result could indicate that visually distinctive base-rate information outshines exemplification effects; specifically, a strong visual anchor like a red background in combination with base-rate information might minimize exemplification effects. Further studies should investigate the influence of different colors in the context of exemplification theory.

In the end, we found no interaction effect between all three factors (valence of exemplars and base-rate information, presentation). In relation to the presentation, we can finally say that, for our study, there are interaction effects with the valence of the base-rate information, but not with both exemplars and base-rate information with different valences. This means that the exemplification effect cannot be decreased by presentation type of the base-rate information for online physician rating sites. However, the presentation can boost the single effects of the base-rate information and make it more available.

There are several limitations to be mentioned. First, we had a relatively small sample, which is why no representative statements can be made. Although the rather young sample is characteristic for an average user of social media applications/rating sites (MSLGroup Germany, 2012), it would be interesting to look at the effects for different age groups.

Secondly, the evaluation was assessed by single item measures, even though the constructs include the components competence, kindness, and waiting times of the practitioner. Single item measures are more vulnerable to random measurement errors and unknown biases in meaning and interpretation, which can be cancelled out with mutliple-item scales (Hoeppner, Kelly, Urbanoski, & Slaymaker, 2012).

Additionally, we only assessed the evaluation for a general practitioner, not for medical specialists. It would be interesting to investigate whether similar effects can be found for other physicians, because other characteristics such as different methods of treatment or specific specializations may play a bigger role than kindness or waiting times.

Furthermore, concerning the external validity, we had to impose restrictions regarding the user comments. They varied only in relation to the content-related elements of friendliness, waiting times and competence. User comments on online

rating sites can contain less, more or other contents, which can have an impact concerning the perception and evaluation of physicians. Previous studies showed for example that the emotionality of a comment can influence the process of forming a judgment (Zillmann, 2006). In our study, participants perceived negative comments as less credible and objective than positive comments. These differences in perception led to different evaluations of the physician (see Section 5.1). Therefore, we included the evaluation index as a covariate, but even then, the effects of user comments and statistics were stable (see Table 2). Further studies should verify the emotionality and evaluation of the user comments initially to ensure comparability of the experimental groups. Additionally, previous studies found that ratings on physician online rating sites are usually rather positive (Emmert, Sander, & Pisch, 2013). Consequently, the negative treatment in the present study only partially reflects the social reality.

In summary, our study could help to understand the influence of user comments and statistics in health communication, especially on online physician rating sites. We found that both exemplars and base-rate information had an impact on users' perception, evaluation, and behavioral intention. In the context of exemplification theory, we found no 'traditional' exemplification effect, because even when the exemplars had a strong impact on the dependent variables, the effect of the base-rate information was stronger. Regarding exemplification theory, our findings indicate that an exemplification effect could be minimized by strong visual anchors and a presentation as an average grade. One assumption is that these factors lead – even in regard to a heuristic information processing – to a better availability of the base-rate information. Therefore, our findings help to understand the effects of exemplars and base-rate information on online physician rating sites.

But even for practice our results are very important. On the one hand, web designers could use our findings for the layout of future physician online rating sites and pay more attention to visual anchors to reduce the strong effect of user comments (especially regarding the typical usage setting of online physician rating sites). On the other hand, this study helps physicians to understand the perception and decision making of their patients. Physicians' profiles are mostly created automatically without their consent, so that users can criticize them unnoticed. So even when very positive base-rate information directs a user to the profile of a specific physician, a few negative comments can have an influence on his or her judgment. On many online physician rating sites, the doctors have the opportunity to react to user comments via a response function. Future studies should investigate the impact of such direct reactions on users' perception and judgment. Moreover, it would be interesting to examine whether user comments have an impact on the doctor-patient relationship. One assumption is that negative comments can lead to a loss of trust in the physician's competence. At least it must be suggested that, because of the increasing number of users and the strong impact of health-related information (user comments, statistics) on online physician rating sites, doctors should pay more attention to their own profiles on such Internet pages.

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