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Depression and reliance on ease-of-retrieval experiences

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Abstract

The relationship between level of depressive symptomatology and reliance on the ease-of-retrieval heuristic was investigated. In two studies, differences in ease-of-retrieval were instigated by means of the paradigm introduced by Schwarz and colleagues (1991). Subsequently, participants were screened for depressive symptoms with the ADS (Allgemeine-Depressions-Skala, Experiments 1 and 2) and the BDI (Beck-Depression-Inventory, Experiment 2). In both experiments, participants were randomly selected from a non-clinical population. Results indicate that participants with low levels of depressive symptomatology relied on experienced ease or difficulty, whereas individuals with high levels of depressive symptomatology based their judgment on the accessible content information. Theoretical and practical implications of these findings are discussed.

Word count: 107

Depression and reliance on ease-of-retrieval experiences

Depression is one of the most common and recurrent mental disorders (Kessler et al., 1994). Life-time prevalence has been estimated to range between 10 to 25% for women, and 5 to 12% for men (Saß, 2003), thus affecting a large part of the general population and their social environments. Within research on depression, considerable attention has been paid to the question of how depressed versus non-depressed individuals differ in their judgment and decision making. Research on this topic suggests that social information processing by depressed as compared to non-depressed people is best described as “effortful, vigilant, and complex” (Weary, Marsh, Gleicher, & Edwards, 1993, p. 273). In line with such a generalized propensity for piecemeal processing, it has been reported that depressed individuals use trait attributes in person evaluation, even when non-depressed individuals prefer less effortful category inferences (Edwards & Weary, 1993). Similarly, it has been revealed that depressed as compared to non-depressed individuals are more sensitive to the diagnosticity of information in impression formation tasks (Edwards, Weary, von Hippel, & Jacobson, 2000).

Surprisingly, the available research focused primarily on how depressed people select and process the available *content* information. However, research on judgment and decision making in non-depressed samples has revealed that individuals do not solely rely on available content. Quite often, non-depressed individuals base their judgments on *subjective experiences*, such as affective or cognitive feelings that accompany the elicitation or processing of content information (see contributions in Bless & Forgas, 2000). Cognitive feelings, in particular, refer to the subjective experience of one’s own information processing and include, for example, the feeling of familiarity (Jacoby, Kelley, Brown, & Jasechko, 1989), or the feeling of knowing (Koriat, 1993). As has been repeatedly documented, subjective experiences influence judgments and decisions at least partly independent of the activated content information (for overviews, see Bless & Forgas, 2000; Schwarz & Clore, 1996; Schwarz, 1998). Whereas substantial research has been accumulated in this respect, fairly little is known about whether or not depressed individuals

rely on such feelings. The present research addresses this gap by focusing on one of the most prominent cognitive feelings in judgment and decision making: the experienced ease-of-retrieval (Tversky & Kahneman, 1973). In particular, we propose that depressed individuals are less likely than non-depressed individuals to rely on the experience of ease-of-retrieval. This hypothesis can be derived both from research in the domain of Social Cognition and from research in the domain of Depression, as will be detailed in the following:

In the domain of Social Cognition, various theories converge in suggesting that happy individuals are more likely to rely on heuristic processing, whereas sad individuals are more likely to engage in analytic processing strategies (Mackie & Worth, 1989; Wegener & Petty, 1994; Schwarz, 1990). For instance, it has been reported that sad as compared to happy individuals are less likely to rely on category information in social impression formation (Bless, Schwarz, & Wieland, 1996; Bodenhausen, Kramer, & Süsser, 1994). Presumably, this is because sad individuals tend *not* to rely on heuristics or general knowledge structures when forming judgments of various kinds (see also, Bless, Clore et al., 1996). With respect to the present hypothesis, such a tendency for piecemeal processing is noteworthy, as reliance on ease-of-retrieval experiences has often been conceptualized as a *heuristic strategy* (e.g., Tversky & Kahneman, 1973). Thus, one would expect that sad individuals are unlikely to rely on ease-of-retrieval experiences due to their heuristic nature. Supporting these conjectures, Ruder and Bless (2003) reported that sad moods decreased reliance on ease-of-retrieval experiences. In particular, happy or sad participants were asked to recall either few or many arguments in favor of a particular attitude position. Subsequently, participants indicated their attitude towards this issue. Results support the conclusion that happy participants relied on ease-of-retrieval experiences, whereas sad participants rather judged upon the accessible content information. In extending this result from induced mood to depressed versus non-depressed individuals -- that is, from the state more to the trait level -- one should expect that depressed individuals are less likely than non-depressed individuals to rely on ease-of-retrieval experiences. This hypothesis was investigated in the present research.

Interestingly, the same hypothesis can be derived from research on depression and social information processing. As described above, depressed individuals have been suggested to process social information in a piecemeal fashion. This propensity has been argued to stem from a motivation to form *accurate* judgments, presumably to reestablish a (subjectively felt) loss of control (Edwards & Weary, 1993). Given that heuristics often allow for efficient, but not necessarily error-free judgment making (e.g., Chaiken, Liberman, & Eagly, 1989), depressed individuals should prefer systematic elaboration over heuristic processing. In the present context, this general preference for elaboration should translate into a preference for content information over ease-of-retrieval experiences. Again, this is because ease-of-retrieval experiences are usually thought of as heuristics (Tversky & Kahneman, 1973) or meta-summaries of the currently activated content information (Koriat & Levy-Sadot, 1999). Taken together, the present argument holds that it is the combination of accuracy motivation and the perception of ease-of-retrieval experiences as potentially error-prone that may cause depressed individuals' reluctance to rely on experiential information.

To investigate the outlined hypothesis of differential reliance on ease-of-retrieval experiences of depressed as compared to non-depressed individuals, one needs to separate judgments based on content from those based on ease-of-retrieval experiences (Schwarz et al., 1991). This necessity is already apparent in the seminal work of Tversky and Kahneman (1973), who proposed that individuals base judgments on the experienced ease with which instances come to mind. In one study, participants were presented with a list of female and male names. To manipulate ease-of-retrieval, either the male or the female names were more famous. When later asked to estimate the number of names on the list, participants overestimated the proportion of male (female) names, depending on which category included famous names. This effect may reflect that famous names came to mind more easily, and that this ease-of-retrieval, in turn, served as informational basis for frequency judgments. An alternative explanation, however, holds that participants may have simply based their judgment on the content recalled: Because *more* famous names came to mind, participants may have concluded that there must be more names of the respective category. Note that

this latter explanation is independent of a reliance on ease-of-retrieval. To disentangle this confound, Schwarz and colleagues (1991) introduced the few-versus-many-paradigm which has been established across a wide range of domains (e.g., Wänke, Bohner, & Jurkowitsch, 1997; Rothman & Schwarz, 1998; Haddock, 2002). Within this paradigm, participants are asked to recall either few or many pieces of information from memory, for example, instances of past personal bicycle use (Aarts & Dijksterhuis, 1999). Afterwards, participants are asked for a judgment in the respective domain, for example, a frequency estimate of bicycle use during the last month. Importantly, in forming this judgment, participants may rely on both experiential and content information. If participants rely on *experiential information*, higher frequency estimates are likely after recall of few as compared to many examples, because if it is easy (difficult) to come up with instances, chances are that their frequency is (is not) high. On the other hand, if participants rely on *content information*, higher frequency estimates are likely after recall of many as compared to few examples, because if much (little) information is accessible, chances are that the frequency is (is not) high. Thus, the paradigm yields opposing results, depending on whether the experience- or the content-based judgmental pathway is followed. The present research was built on this methodological paradigm.

Linking our assumptions about the processing of depressed as compared to non-depressed individuals to the described paradigm, participants in Experiment 1 were asked to recall either few or many instances of a particular tool. We expected that non-depressed participants would judge the tool category more positively the easier the recall felt, thus judging the tool category more positively when few rather than many instances had to be recalled. This pattern would reflect a reliance on ease-of-retrieval and replicate prior research. In contrast, this effect should be less pronounced and even reversed for depressed participants due to their hypothesized reliance on the activated content: the tool category should be judged more positively when many rather than few instances had to be recalled.

Experiment 1

Method

Participants. A sample of 66 female students (mean age 21.8 years, $SD = 2.8$) was recruited from the general population of University of Mannheim students; recruitment was limited to female students because the prevalence of depression has been found to be twice as high among women as men (Weissman & Olfson, 1995; see also Oliver & Simmons, 1985).

Design, Procedure, and Materials. The design was quasi-experimental, with level of depressive symptomatology assessed as a continuous score, and participants being randomly assigned to one of two levels of the ease-of-retrieval manipulation (few vs. many instances). Participants first consented to participation in two supposedly unrelated experiments and then received a first questionnaire containing the ease-of-retrieval manipulation. Modeled after the paradigmatic task introduced by Schwarz and colleagues (1991), participants were asked to recall either four or twelve different kitchen tools from memory. As independent pre-testing had shown, recalling four kitchen tools is easy, whereas recalling twelve is difficult.¹ As a manipulation check, participants indicated the difficulty of the recall task (two items, ranging from 1, *very easy*, to 9, *very difficult*). Subsequently, participants made six judgments about kitchen tool importance and usage frequency. Sample items read 'How important are kitchen tools in your everyday life?' (1, *not important*, to 9, *very important*), 'On a daily average, how many times do you use kitchen tools?' (0 to >9). Finally, demographic information was assessed.

Participants were then handed the second, ostensibly unrelated questionnaire containing the Allgemeine-Depressions-Skala (ADS, Hautzinger & Bailer, 1993), a standard German instrument for screening depression in non-clinical populations. The ADS encompasses 20 items addressing specific subjective experiences respondents might have had during the last week (ranging from 1, *applies*, to 9, *does not apply*). A typical item reads 'During the last week ... I had seldom appetite.' The ADS displays convergent validity, for instance, with respect to the Beck-Depression-Inventory (BDI, $r \sim .85$) or the Hamilton-

Depression-Rating-Scale (HAM-D, $r \sim .86$). In addition to the ADS, the second questionnaire contained three cartoons which participants were asked to rate for funniness as a means of mood repair after answering ADS-items. Finally, participants were fully debriefed and, as a precaution, provided with written information about where to seek help if they felt badly. Also, participants were encouraged to take advice (e.g., from university counseling) if they felt that they might need it.

Results

ADS-scores. The 20 items forming the ADS were coded in the same direction and combined to form a single measure (Cronbach's $\alpha = .84$; $M = 6.06$, $SD = 1.22$; $Min = 3.15$; $Max = 8.90$). This measure was z-transformed and compared to the scores within the respective norm table (Hautzinger & Bailer, 1993). As this comparison revealed, 18.2 percent of our sample displayed values of clinical relevance (scores that are one standard deviation below the mean; 24.4 percent in the norm sample).

Despite the fact that the ADS is to assess a trait rather than a state, one could argue that the manipulation of retrieval ease, which was instigated first, influenced the reported ADS-scores, which were assessed second. To address such a potential confound, participants' ADS-scores were subjected to a t-test of independent groups, with number of instances serving as the independent variable. This analysis revealed that ADS-scores were similar regardless of whether participants recalled few versus many instances ($M = 5.99$, $SD = 1.11$ vs. $M = 6.14$, $SD = 1.34$, $|t| < 1$). It thus appears that ADS-scores were unaffected by the ease-of-retrieval manipulation.

Manipulation Check Ease-of-retrieval. The two items assessing ease-of-retrieval were reverse-scaled such that higher values indicate higher experienced ease. As the two items were strongly interrelated ($r = .84$, $p < .01$), they were averaged to form a single measure. This score was entered into a regression analysis with ease-of-retrieval condition as contrast-coded independent variable, the z-transformed ADS-score as a continuous dispositional moderator, and the product interaction term (Aiken & West, 1991). As expected, only a significant main effect for the ease-of-retrieval condition emerged ($\beta = .69$,

$t(62) = 7.50, p < .01$; all other $|t| < 1.3$), with recall of four as compared to twelve kitchen tools being easier ($M = 6.71, SD = 1.34$ vs. $M = 3.76, SD = 1.88$; see Table 1). Thus, the selected manipulation was entirely successful in instigating two different levels of ease-of-retrieval experiences.

Judgments of frequency and importance. The six judgments were z-transformed and averaged (Cronbach's $\alpha = .53$). This measure was entered into a regression analysis with number of instances as contrast-coded independent variable, the z-transformed ADS-score as a continuous moderator, and the product interaction term. As expected, this analysis yielded the predicted significant interaction between number of instances and the ADS-score ($\beta = -.37, t(62) = -3.10, p < .01$; all other $|t| < 1$; see Figure 1). To further investigate this interaction, the impact of the ease-of-retrieval manipulation at one standard deviation above and below the ADS-mean was computed, following the procedures suggested by Aiken and West (1991). Non-depressed participants (one standard deviation *above* the ADS-mean) reported lower ratings after recalling many rather than few tools (negative slope, $\beta = -.37, t(62) = -2.18, p < .02$, one-tailed). In line with prior research (for an overview, Schwarz, 1998), this finding reflects reliance on accessibility experiences. In contrast, depressed participants (one standard deviation *below* the ADS-mean) reported higher ratings after recalling many as compared to few kitchen tools, reflecting influence of the activated content information (positive slope, $\beta = .38, t(62) = 2.27, p < .02$, one-tailed). To further substantiate these conclusions, participants' retrieval experiences were correlated with kitchen tool judgments. If non-depressed participants in fact relied on ease-of-retrieval experiences, retrieval experiences and judgments should be correlated. Conversely, if depressed participants did not rely on ease-of-retrieval experiences, retrieval experiences and judgments should not be correlated. To allow for such an analysis, participants were divided by means of a median-split on ADS-scores ($Md = 6.25$) in those with low as compared to high levels of depressive symptomatology ($M = 7.07, SD = 0.57$ vs. $M = 5.05, SD = 0.78$). For each group the correlation between retrieval experiences and judgments was computed, yielding a significant correlation only for the low-level (non-depressed) group, but not for the

high-level (depressed) group ($r = .46, p < .01$ vs. $r = -.17, p > .33$). Hence, the present evidence allows for the conclusion that non-depressed individuals in fact formed their judgments based on experienced ease or difficulty, while depressed individuals did not rely on this source of information.

Discussion

In line with expectations, Experiment 1 revealed that level of depressive symptomatology moderates reliance on cognitive subjective experiences. In particular, results indicate that participants with low depressive symptomatology were more likely to rely on their experience of ease-of-retrieval when forming judgments, whereas participants with high depressive symptomatology were more likely to rely on the activated content information. Given that previous research investigating information processing of depressed as compared to non-depressed individuals focused on content information only, the present findings are particularly intriguing and of noteworthy importance. At the same time, they raise several questions, which will be addressed in what follows.

Potential limitations and alternative explanations. Experiment 1 departed from prior research endeavors that investigated reliance on ease-of-retrieval experiences by modifying the few-versus-many-paradigm (Schwarz et al., 1991). Instead of asking participants for instances of a *valenced* category (e.g., instances of assertive or unassertive behavior, Schwarz et al., 1991; arguments against the introduction of a highway toll, Ruder & Bless, 2003), participants in the present experiment were asked to recall instances of a *neutral* category (kitchen tools). This set-up was chosen to prevent a critical threat to internal validity. The fundamental logic of the few-versus-many-paradigm can be described as a backward inference from judgmental patterns to underlying processes. If participants judge themselves as more assertive after recalling few as compared to many instances of assertive behavior (judgmental pattern, see Schwarz et al., 1991), it is deduced that they relied on ease-of-retrieval experiences (underlying process). Similarly, if participants judge themselves as less assertive after recalling few as compared to many instances of assertive behavior (reversed judgmental pattern), it is deduced that they relied on content information (opposite underlying

process). Noticeably, such backward inferences are only sound as long as the investigated groups had equal inputs to begin with. If groups differed *ex ante* in ease-of-retrieval experiences, it would be unclear whether differences in the judgmental pattern are due to differences in underlying processes (as hypothesized), or due to the preexisting differences between groups (as equally possible). Hence, to allow for strong conclusions about underlying processes, it is important that experimental groups do not differ to begin with (of notice, if this precondition is ascertained, moderation-designs such as the few-versus-many-paradigm are of the best Social Psychology offers to investigate underlying processes; see Spencer, Zanna, & Fong, 2005). With respect to the present research question, differences between experimental groups were to be expected if participants would have been asked to recall negatively valenced information. This is because depressed versus non-depressed individuals have been shown to differ in the ease with which *negative* information can be retrieved from memory, and that this difference may partly account for the depression-pessimism link (Vaughn & Weary, 2002). Consequently, it appeared prudent not to use a category of negative valence, but rather a neutral one (kitchen tools). Speaking to the success of this strategy, depressed as compared to non-depressed individuals did not differ in the experienced ease-of-retrieval, as evinced by the manipulation check, thus establishing the precondition for strong conclusions about underlying processes. While we believe that this is a strong asset of Experiment 1, it may also be regarded as a limitation, since this set-up reduced the comparability of the present results to prior research endeavors relying on the few-versus-many-paradigm. To address this legitimate objection and to connect to prior research, a positively valenced category (arguments in favor of a social issue) was used in Experiment 2.

Although the few-versus-many-paradigm was first to allow for the differentiation between reliance on ease-of-retrieval experiences versus content information, it has not remained without criticism. Most importantly, it has sometimes been suggested that information retrieved later is of less quality than information retrieved first. As a consequence, one could argue that average information quality is lower in the many as

compared to few condition, and hence that the seeming ease-of-retrieval pattern is a 'disguised' content-effect. To address this concern, various strategies have been employed, including, for instance, the collection of independent quality ratings (e.g., Schwarz et al., 1991, Experiment 2) or the use of yoked-designs (e.g., Wänke, Bless, & Biller, 1996). Another, more direct approach to address this concern is to correlate participants' ease-of-retrieval experiences with judgments. If participants relied on ease-of-retrieval experiences to form judgments, a substantial correlation should emerge; in turn, if participants relied on biased content information, no such correlation should emerge. In the present research, this analysis yielded a substantial correlation for non-depressed participants, suggesting that it was indeed experiential information that non-depressed participants relied upon.

Underlying processes. In the introduction to this article, we substantiated our hypothesis from two perspectives. First, extrapolating social cognitive evidence, we argued that depressed individuals' reluctance to rely on ease-of-retrieval experiences may result from a general reluctance to rely on heuristics or general knowledge structures. As Bless and colleagues (1996) suggested, this reluctance does not necessarily stem from increased motivation to process, but may rather be an adaptive way of information processing. Second, starting from research on depression, we argued that depressed individuals' reluctance to rely on ease-of-retrieval may result from a general tendency for detailed processing. As Weary and colleagues (1993) suggested, such a tendency is motivated by a (subjectively felt) loss of control. Although the two outlined perspectives yield the same hypothesis and predict the same judgmental outcome, the present juxtaposition reveals an important difference in the hypothesized underlying processes. Whereas the first perspective does not imply differences in motivation, the second perspective clearly assumes that depressed versus non-depressed individuals differ in their motivation to process. Put differently, the second perspective assumes that the differential reliance on accessibility experiences as investigated in the present project may be mediated by differences in processing motivation. For example, such differences in motivation could be related to accuracy or control goals (e.g., Weary et al., 1993), or may stem from a tendency of depressed versus non-depressed

individuals to trivialize the respective judgmental domain ('Who cares about kitchen tools anyway?'). To address these alternative mechanisms, we added a series of items in Experiment 2 that targeted participants' motivation and the importance and relevance they attributed to the task.

Experiment 2

Experiment 1 revealed that non-depressed as compared to depressed individuals were less likely to rely on their accessibility experiences. To bolster our confidence in this finding, Experiment 2 was conceptualized as a replication of Experiment 1, however, with four important changes. *First*, for reasons of generalizability, we included the Beck-Depression-Inventory (BDI: Beck, Ward, Mendelson, Mock, & Erbaugh, 1961; for a review, see Beck, Steer, & Garbin, 1988) as an additional measure of individuals' depressive symptomatology. Although the BDI was not constructed to be used as screening instrument for non-clinical populations, it appeared desirable to include a second, more common means of assessment. *Second*, as discussed in Experiment 1, we changed the judgmental domain from tools to attitudes about a social issue. By means of this change, the present project may be connected more easily to prior research relying on the few-versus-many-paradigm. *Third*, we assessed participants' motivation to form accurate judgments and the importance they attributed to the task. *Fourth*, to further understand how the attitudinal judgments are formed based on participants' accessibility experiences, we assessed whether participants' judgments were mediated by inferences of *quantity*. This was motivated by the general conceptualization of ease-of-retrieval judgments as being mediated by higher order metacognitive inferences (e.g., Schwarz et al., 1991). For example, in line with Tversky and Kahneman's (1973) initial theorizing, Schwarz and colleagues (1991) argued that individuals infer *quantity* from experienced ease: 'If it is easy to retrieve instances of assertive behavior, surely there are many. Hence, I'm likely to be assertive.' In contrast: 'If it is difficult to retrieve instances of assertive behavior, most likely there are only few. Hence, I can't be that assertive to begin with.' Despite the popularity of this claim (e.g., Schwarz, 2004), there is no research demonstrating its validity, that is, there is no empirical evidence that demonstrates

the mediating function of inferences of quantity between experienced ease and resulting judgments. The present project is first to fill this gap.

Method

Participants. A sample of 88 female students (mean age 22.1 years, $SD = 3.0$) was recruited from the general population of University of Mannheim students. Participants received for their participation 1 EUR and a chocolate bar (overall value 1.50 EUR, 1.15 USD at that time).

Design, Materials, and Procedure. The basic design of Experiment 1 was replicated. Changes were instigated with respect to the employed materials. For one, the judgmental domain was changed from kitchen appliances to attitudes towards the expansion of the Mannheim regional airport. Participants were informed that this expansion was considered to allow low-fare carriers (e.g., Ryanair) to fly to and from Mannheim, thereby ensuring the region's long-term prosperity. Participants were asked to enumerate either two or six reasons in favor of this proposal. As independent pre-testing at the University of Mannheim has revealed, recalling two reasons is easy, while recalling six reasons is difficult. Similar to Experiment 1, participants then replied to two items serving as a manipulation check. Next, participants evaluated the expansion of the airport by means of two 9-point Likert-scaled items: 'I consider the expansion of the Mannheim regional airport ...' (1, *rather negatively*, to 9, *rather positively*). 'I think that enlarging the Mannheim regional airport is ...' (1, *very bad*, to 9, *very good*). Finally, six 9-point Likert-scaled items were assessed to test various process assumptions. In particular, three items targeted participants' *motivation* with respect to the judgmental task, for instance: 'How motivated were you when replying to the previous judgmental questions?' (1, *not at all*, to 9, *very much*). Two items targeted the *importance* or *relevance* participants attributed to the topic in question, that is, the expansion of the Mannheim regional airport. For instance, one item read: 'How relevant is the topic for you?' (1, *not at all relevant*, to 9, *very relevant*). Finally, one item targeted the *metacognitive inference* that supposedly mediates the impact of accessibility experiences on subsequent judgments. Specifically, after being asked to think again of the aspects they had recalled at

the beginning of the experiment without turning back in the questionnaire, participants answered the following question: 'In sum, do you know rather few or rather many arguments in favour of an expansion of the Mannheim regional airport?' (1, *rather few*, to 9, *rather many*).

As in Experiment 1, participants then continued with self-assessments of depressive symptomatology, working first on the ADS and then on the BDI. The BDI (German version: Hautzinger, Bailer, Worall, & Keller, 1995) contains 21 groups of symptoms and attitudes such as lack of satisfaction or social withdrawal. Usually, each symptom is assessed with four statements, ordered in ascending severity from 0, stating that the symptom is not present, to 3, stating strong clinical relevance. Participants were instructed to tick the statements that best suited their situation during the past week.

Unlike Experiment 1, the cover-story of two independent studies was dropped such that all measures were presented in the same booklet. Like Experiment 1, care was taken that no participant left without being fully debriefed and provided with information about where to seek help when feeling badly.

Results and Discussion

ADS- and BDI-scores. The 20 items forming the ADS were coded in the same direction and combined to form a single measure (Cronbach's $\alpha = .94$, $M = 5.86$, $SD = 1.76$; $Min = 1.50$; $Max = 8.40$). The higher this index, the *lower* participants' depressive symptomatology. Similarly, the 21 items forming the BDI were coded in the same direction and combined to form a single measure (for each group of statements, the highest value was used; Cronbach's $\alpha = .92$, $M = 10.09$, $SD = 9.58$; $Min = 0$; $Max = 40$). The higher this index, the *higher* participants' depressive symptomatology. The ADS- and the BDI-indices were correlated ($r = -.77$, $p < .01$) and individually z-transformed. The measures concur in suggesting that 23.9 percent of participants had scores of clinical relevance (for the respective cut-off criteria, see Hautzinger & Bailer, 1993; Beck & Beamesderfer, 1974),

Although both indices are to measure dispositional depressive symptomatology, one could argue that the manipulation of retrieval ease, which was instigated first, influenced the

reported level of depressive symptomatology, which was assessed second. To address such a potential confound, we calculated two t-tests for independent groups, with number of instances serving as the independent variable, and ADS- or BDI-scores serving as dependent variables. Both analyses revealed that levels of depressive symptomatology did not differ depending on whether few or many arguments had to be recalled (ADS: $M = 5.81$, $SD = 1.78$ vs. $M = 5.96$, $SD = 1.63$, $|t| < 1$; BDI: $M = 10.18$, $SD = 9.24$ vs. $M = 9.89$, $SD = 9.47$, $|t| < 1$). Hence, it appears that level of depressive symptomatology was unaffected by the ease-of-retrieval manipulation.

Manipulation Check Ease-of-retrieval. The two items assessing ease-of-retrieval were scaled such that higher values indicate higher experienced ease. As the two items were strongly interrelated ($r = .77$, $p < .01$), they were averaged to form a single measure. This score was entered into two independent regression analyses, with ease-of-retrieval condition as contrast-coded independent variable, either the z-transformed ADS-score or the z-transformed BDI-score as continuous dispositional moderator, and the respective product interaction term. Both analyses yielded only a significant main effect for the ease-of-retrieval condition (ADS as moderator: $\beta = -.54$, $t(84) = -5.89$, $p < .01$; all other $|t| < 1$; BDI as moderator: $\beta = -.54$, $t(84) = -5.89$, $p < .01$; all other $|t| < 1$;). The selected ease-of-retrieval manipulation was thus highly successful.

Evaluative judgments. The two items assessing participants' attitude toward the airport expansion correlated to a high degree ($r = .95$, $p < .01$) and were thus averaged to form a single measure. This measure was entered into two independent regression analyses with number of instances as contrast-coded independent variable, either the z-transformed ADS-score or the z-transformed BDI-score as continuous dispositional moderator, and the respective product interaction term. As expected, both analyses yielded the predicted significant interaction effect (ADS as moderator: $\beta = -.21$, $t(84) = -2.05$, $p < .05$; all other $|t| < 1.5$; BDI as moderator: $\beta = .20$, $t(84) = 1.86$, $p < .07$; all other $|t| < 1.1$). To further investigate these interaction effects, the impact of the ease-of-retrieval manipulation at one standard deviation above and below the ADS- or BDI-mean was computed, following the

procedures suggested by Aiken and West (1991). Non-depressed participants (one standard deviation *above* the ADS-mean or one standard deviation *below* the BDI-mean) reported more positive attitudes after recalling few rather than many tools (ADS as moderator: $\beta = -.29$, $t(84) = -1.91$, $p < .03$, one-tailed; BDI as moderator: $\beta = -.27$, $t(84) = -1.81$, $p < .04$, one-tailed). In line with prior research (for an overview, Schwarz, 1998), these latter findings reflect reliance on accessibility experiences. In contrast, depressed participants (one standard deviation *below* the ADS-mean or one standard deviation *above* the BDI-mean) reported more positive evaluations after recalling many as compared to few arguments (ADS as moderator: $\beta = .15$, $t(84) = 1.00$, $p > .16$, one-tailed; BDI as moderator: $\beta = .13$, $t < 1$). Presumably, this non-significant tendency reflects influence of the activated content information. To further substantiate these conclusions, we correlated participants' retrieval experiences with evaluative judgments. If non-depressed participants in fact relied on experiences of retrieval ease, retrieval experiences and judgments should be correlated. To allow for such an analysis, participants were divided by means of a median-split in those with low as compared to high levels of depressive symptomatology (ADS: $Md = 6.40$; $M = 7.24$, $SD = 0.52$ vs. $M = 4.52$, $SD = 1.33$; BDI: $Md = 7.00$; $M = 3.33$, $SD = 2.39$ vs. $M = 17.05$, $SD = 8.64$). For both low and high levels of depressive symptomatology, the correlation between retrieval experiences and attitudinal judgments was computed, yielding significant correlations only for the low-level (non-depressed) group, but not for the high-level (depressed) group (ADS: $r = .39$, $p < .01$ vs. $r = .18$, $p > .23$; BDI: $r = .41$, $p < .01$ vs. $r = .13$, $p > .41$). One may thus conclude that non-depressed individuals in fact formed their judgments based on experienced ease or difficulty, while depressed individuals seemed to rely on other sources of information.

In sum, the present results replicate those of Experiment 1. While the hypothesized interaction effect between level of depressive symptomatology and number of instances was significant for the ADS as a moderator, it failed to reach the .05-criterion for the BDI as moderator. Arguably, this was due to the fact that the BDI has been developed for clinical populations, whereas the ADS has been conceptualized as a screening tool for non-clinical

populations, too. Notwithstanding this minor caveat, the replication of the hypothesized pattern of effects across two experiments and with two measures of depressive symptomatology speaks to the general nature of the outlined moderation hypothesis.

Inferences of quantity. In line with prior research (Schwarz et al., 1991), we have interpreted the pattern of results displayed by non-depressed participants as reflecting reliance on accessibility experiences. In both experiments, this conclusion was further supported by significant correlations between experienced ease and resulting judgments. Intriguingly, the present experiment allows to further analyze this link. Early on, Tversky and Kahneman (1973) suggested that the impact of experienced ease on resulting judgments is mediated by an inference of quantity. To tap on such an inference, an additional question was included in the present experiment. Together with experienced ease and resulting judgments, this item was subjected to mediation analysis.² According to Baron and Kenny (1986), four criteria need to be met to establish mediation: First, the predictor variable (experienced ease-of-retrieval) must be related to the criterion variable (evaluative judgment), as reported above. Second, the predictor must be related to the mediator (inference of quantity). In the present experiment, this link was significant ($r = .57, p < .01$). Third, the mediator must be related to the criterion while controlling for the predictor ($\beta = .36, t(44) = 2.20, p < .04$). Finally, in a simultaneous regression of the criterion on the predictor and the mediator, the relationship between the predictor and the criterion ($\beta = .18, t(44) = 1.01, p > .27$) must be substantially reduced (previously: $r = .39$, see above). Given that all four criteria were met in the present experiment, one may conclude that the impact of experienced ease on resulting judgments is indeed mediated by an inference of quantity, as often suggested but previously not empirically substantiated. This conclusion was further confirmed by Sobel's test for determining the existence of a mediational relation ($Z = 1.96, p < .05$).

Motivation and Importance. The three items targeting participants' motivation were strongly interrelated (Cronbach's $\alpha = .74$) and thus averaged to form a single index. To test whether participants differed in their motivation to process as function of the independent

variables, this motivation index was entered into two independent regression analyses with number of instances as contrast-coded independent variable, either the z-transformed ADS-score or the z-transformed BDI-score as continuous dispositional moderator, and the respective product interaction term. Neither of these analyses yielded any effect of significance (all $|t| < 1.1$). Given that the overall mean of the motivation index was slightly higher than the midpoint of the index ($M = 5.81$, $SD = 1.57$), it is unlikely that this lack of effect may be attributed to floor- or ceiling-effects. Rather, it appears that there were no substantial differences between groups.

Similarly, the two items assessing the importance or relevance participants attributed to the airport topic were highly correlated ($r = -.51$, $p < .01$), rescaled such that higher ratings reflect higher importance, and averaged to form a unitary measure. This measure was subjected to the above described regression analyses, yielding no effect of significance (all $|t| < 1.1$). Again, as the overall mean was only slightly different from the midpoint of the scale ($M = 5.99$, $SD = 1.70$), it appears that this lack of effect is not an artifact, but rather reflects that there were no substantial differences between groups.

Participants' motivation and the relevance they attributed to the topic were assessed to allow for further insights about the processes underlying the judgments of depressed versus non-depressed participants. The present results revealed that the experimental groups did not differ in motivation or importance. As such an influence would have been a necessary precondition for a mediation effect, it is unlikely that the moderating impact of level of depressive symptomatology is mediated by differences in either of these constructs. Rather, it appears that level of depressive symptomatology has an independent effect on reliance on accessibility experiences. This conclusion is very much in line with prior research on the processes underlying mood effects (e.g., Bless, Clore et al., 1996; Ruder & Bless, 2003) and will be further discussed in the General Discussion.

General discussion

The present research set out to investigate whether level of depressive symptomatology moderates reliance on accessibility experiences such as experienced ease-of-retrieval. In

line with prior research both in the domain of Depression and Social Cognition, we hypothesized that participants low in depressive symptomatology would rely on experienced ease-of-retrieval to form judgments, whereas participants high in depressive symptomatology would not. The following is to review and discuss the present project's main findings.

In line with the outlined hypothesis, both Experiment 1 and Experiment 2 revealed that level of depressive symptomatology moderates reliance on cognitive subjective experiences. In particular, results indicate that participants with low depressive symptomatology were more likely to rely on their experiences of ease-of-retrieval when forming their judgments, whereas participants with high depressive symptomatology were more likely to rely on the activated content information. This finding is well in accordance with research on mood and processing style, which suggests that happy individuals are more likely to rely on heuristics (e.g., Schwarz, 1990), and consequently accessibility experiences (Ruder & Bless, 2003). At the same time, this finding is equally in line with prior research on the information processing of depressed individuals, which suggests that depressed individuals display a propensity for intensive, piecemeal information processing strategies (Weary et al., 1993; Edwards & Weary, 1993), and consequently not heuristic reliance on experiences of ease-of-retrieval.

Several specifics of the present experiments bolster our confidence in the above conclusions. Most importantly, the pattern of results was replicated across two judgmental domains and with two measures of depressive symptomatology, thus speaking to the general nature of the reported effects. Furthermore, correlational analyses revealed a relationship between experienced ease and resulting judgments only for non-depressed, but not depressed participants.

Going beyond our primary hypothesis, the second goal of Experiment 2 was to shed light on the processes presumably underlying ease-of-retrieval judgments. Most commonly, these processes are assumed to include an inference of quantity, which is then used to construct the resulting judgment. For instance, from the experienced ease of recalling instances of assertive behaviors, participants have been suggested to conclude that there

are many, and hence judge themselves as assertive (Schwarz et al., 1991). Despite the popularity of this claim, we are not aware of any prior empirical substantiation. Hence, the mediation of ease-of-retrieval judgments by an inference of quantity, as observed in Experiment 2, establishes a first empirical pillar to this long-standing theoretical bridge. It comes without saying that further pillars are needed before the processes underlying ease-of-retrieval judgments are fully understood, and that it would be fruitful to find out when inferences of quantity (as addressed here) or other inferences (e.g., quality, see Wänke & Bless, 2000; Tormala, Petty, & Briñol, 2002) are likely to occur.

Caveats and limitations

Two caveats and one limitation of the present findings are worth mentioning. First, although the reported results do connect well to prior theorizing in the domains of both Social Cognition and Depression research, they seem to clash with empirical evidence usually reported in studies using the few-versus-many-paradigm (Schwarz et al., 1991). From a methodological perspective, the present research is a simple few-versus-many-experiment, which is moderated by an individual disposition. Given that ease-of-retrieval effects were present in prior few-versus-many-experiments, they should have occurred in the current experiments, too, regardless of moderation. However, we did not observe any statistically significant main effects. Most likely, this result was due to the fact that we created conditions in which depressive symptomatology was higher than usually expected in a college sample. Indeed, with about a quarter of scores being above critical thresholds, our sample (mostly first years, recruited at the beginning of the semester; females only) was likely to foster reliance on *content* information more than usual convenience samples do. It thus appears that our conditions (fruitful to test the outlined hypotheses) inhibited a priori the emergence of a main effect. In consequence of these post-hoc considerations, one would assume that a) a moderation of reliance on accessibility experiences by depressive symptomatology was always present in prior research, but never detected due to the kind of samples used, and b) that females generally display lower ease-of-retrieval effects than males. We are unaware of any prior study testing for the latter conclusion, but – in light of the present results – would

consider this conclusion likely, because females have been generally suggested to display higher levels of depressive symptomatology than males (e.g., Weissman & Olfson, 1995). It is thus up for future research to test (evidently, with a high N) whether the present results replicate in a normal student population.

A second caveat pertains to issues of generalizability. Specifically, while our sample was tilted towards higher levels of depressive symptomatology, it included only individuals with mild to moderate, yet not severe depressive symptomatology. In line with other research, we therefore emphasize that for severe depressive symptomatology, additional processes might set in (e.g., Marsh & Weary, 1994).

As a conceptual limitation, it appears important to note that the present project addressed *differential reliance* on ease-of-retrieval by depressed and non-depressed individuals. This aspect needs to be separated from the question of whether depressed versus non-depressed individuals *differ in the ease* with which negative information may come to mind. This differential ease may in turn influence judgments, for example, on the likelihood of negative events (MacLeod & Tarbuck, 1994; Vaughn & Weary, 2002).

Theoretical and practical implications

Explaining depressed individuals' reluctance to rely on experiential information. It has been suggested that depressed individuals unrealistically believe to have no or only little control over outcomes (Learned helplessness theory, Abramson, Seligman, & Teasdale, 1978). According to Weary and colleagues (e.g., 1993), believes as these *motivate* depressed individuals to process social information in detailed and piecemeal fashion, seemingly to restore control by accurate understanding. As demonstrations of effortful processing, depressed participants have been shown to rely on individuating trait information rather than category information (Edwards & Weary, 1993), or to be particularly sensitive to the diagnosticity of the available information (Edwards et al., 2000).

The present evidence is partially in line with this theorizing. Indeed, one could argue that depressed individuals consider heuristic reliance on cognitive subjective experiences an error-prone – or at least not sufficiently accurate – strategy. Consequently, they should

refrain from relying on experiences of ease-of-retrieval, and rather form their judgments based on the accessible content information, as depressed participants in the present set of experiments did. Seemingly, such a strategy allows for more accurate judgments – surely, it is more effortful. Implicitly inherent in this explanation is the assumption that depressed participants went for a more effortful processing strategy because they were *motivated* to form accurate judgments. However, given that depressed as compared to non-depressed individuals in Experiment 2 displayed similar levels in accuracy motivation or topic relevance, the present evidence does not fully support such an explanation (noticeably, this is a weak conclusion, as the finding of no difference may imply many different things). Rather than assuming differences in motivation to mediate the link between depressive symptomatology and reliance on processing strategies, we suggest an automatic mechanism similar to the one observed in the mood literature. Bless and colleagues (1996) argued for an adaptive association between mood and reliance on general knowledge structures. According to this account, positive moods signal that it is safe to rely on general knowledge structures, whereas negative moods signal that a situation is problematic and therefore warrants further attention. In extrapolating this account, we propose that depressed as compared to non-depressed individuals perceive more situations as problematic, and hence may resort to effortful processing more often. This account and the above explanation in the terms of Weary and colleagues result in a similar pattern of judgmental results, however, assume different underlying mechanisms. Future research may investigate under which circumstances the one or the other account is more likely.

Interestingly, in research on Depressive Realism, Pacini, Muir, and Epstein (1998) suggested that depressed individuals' reliance on effortful processing may be moderated by the relevance of the situation. In trivial situations, depressed individuals appeared to rely more on effortful processing than non-depressed individuals (as reported in the present set of experiments and most of the prior research), while no such differences were apparent in consequential situations. The authors argued that this is because depressed individuals arrive only in trivial situations to overcompensate for seemingly maladaptive experiential

processing, while they fail to exercise the necessary control in consequential situations. With respect to the present set of experiments, this argument provokes two speculations worth future research. First, to the extent that our participants perceived the judgmental tasks or topics as trivial, it may well be that the reported pattern of results does not hold for more consequential tasks or topics. According to Pacini and colleagues (1998), one would expect that depressed individuals rely on experiential information, too, provided the task or situation are perceived as consequential. Second, whereas the account offered by Pacini and colleagues explicitly holds that depressed individuals overcompensate the experiential influence in their judgments, the explanations offered by Weary and colleagues (1993) and ourselves is less specific. Indeed, no assumptions are made about the fate of the experiential information. However, given that our manipulation checks revealed that depressed individuals experienced differences in ease-of-recall, it appears intriguing to understand whether this information was ignored or corrected when judgments were formed.

Higher effort, but not necessarily greater accuracy. Reliance on heuristics in general, and experiential information in particular, is often portrayed as an error-prone strategy, resulting in speedy but not necessarily accurate decisions. In contrast, content-based judgment is often portrayed as the *via regia* for accurate judgments (particularly in other sciences, e.g., Economics). Despite the popularity of these beliefs, there is good evidence that neither is valid. For instance, content-based processing allows for accurate judgments only to the extent that *all* of the necessary information is *correctly integrated* in a final judgment. Arguably, however, conditions such as these are seldom the case (e.g., Edwards et al., 2000). At the same time, reliance on experiences is not necessarily less (and sometimes even more) valid than relying on content information, as experience- and content-based judgments converge in similar results in many situations (Greifeneder, 2006). Recall, for instance, that both experience- and content-based judgment making led to the erroneous judgment of more male (female) names if the accessibility of male (female) names was increased by adding fame. Reliance on experiential information is thus not necessarily an error-prone strategy, but may result in similarly accurate judgments than reliance on content-

information does. In turn, a tendency for detailed processing of content information does not necessarily lead to higher accuracy in judgments, yet is more laborious and effortful. Given the abundance of judgments to be made every day, and given the abundance of information provided in our world, a tendency to avoid experience-based judgment making may be onerous. One may speculate that such an onerous strategy fosters or even produces some of the symptoms known as depressive symptomatology. From this perspective, it appears that reliance on accessibility experiences is an adaptive strategy that may enhance mental health (for a conceptually related argument, see Taylor & Brown, 1988).

We wish to end these considerations with a final speculation. Based on the work by Weary and colleagues (1993), one of the potential mechanisms we discussed was that depressed individuals are reluctant to rely on accessibility experiences because they perceived these to be error-prone. Intriguingly, this train of thought suggests that depressed individuals' reluctance to rely on accessibility experiences should be reduced when the perception of accessibility experiences is changed from error-prone to valid. Underscoring the general viability of such a mechanism, Unkelbach (2006; forthcoming) demonstrated that judgments based on cognitive experiences may be reversed when underlying beliefs are changed. Henceforth, if one succeeds in changing the (mis-)perception of experiential information from error-prone to generally valid, depressed individuals may rely on this source of information, too. Therapeutic interventions as well as the recent upsurge in public interest and faith in 'intuition' may promote a change in this belief.

Conclusion

The current research provides first evidence that depressed individuals are less likely to rely on the ease-of-retrieval heuristic. We argue that relying on the experienced ease-of-retrieval, and relying on cognitive feelings in general, plays a very important role in human information processing, and we propose that taking this aspect into account may contribute to a better understanding of how depressed and non-depressed individuals differ in their information processing.

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Footnotes

- ¹ German students typically live in apartment-sharing communities, single apartments, or dorms (without catering). Consequently, they usually have at least some experience with kitchen tools.
- ² The group of non-depressed participants varied slightly depending on whether the ADS or the BDI was used to split the sample. Consequently, the respective analyses were conducted twice, once with high-ADS-participants (non-depressed), and once with low-BDI-participants (non-depressed). Given that attained levels of significance were identical in both sets of analyses, only the analyses for high-ADS-participants are reported in the text.

Author's note

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Figure Caption

Figure 1: Kitchen tool evaluation as a function of number of kitchen tools recalled and ADS-score (at three levels, 1 SD below, at, and 1 SD above the sample-mean). Higher scores indicate more positive evaluation.

Figure 1

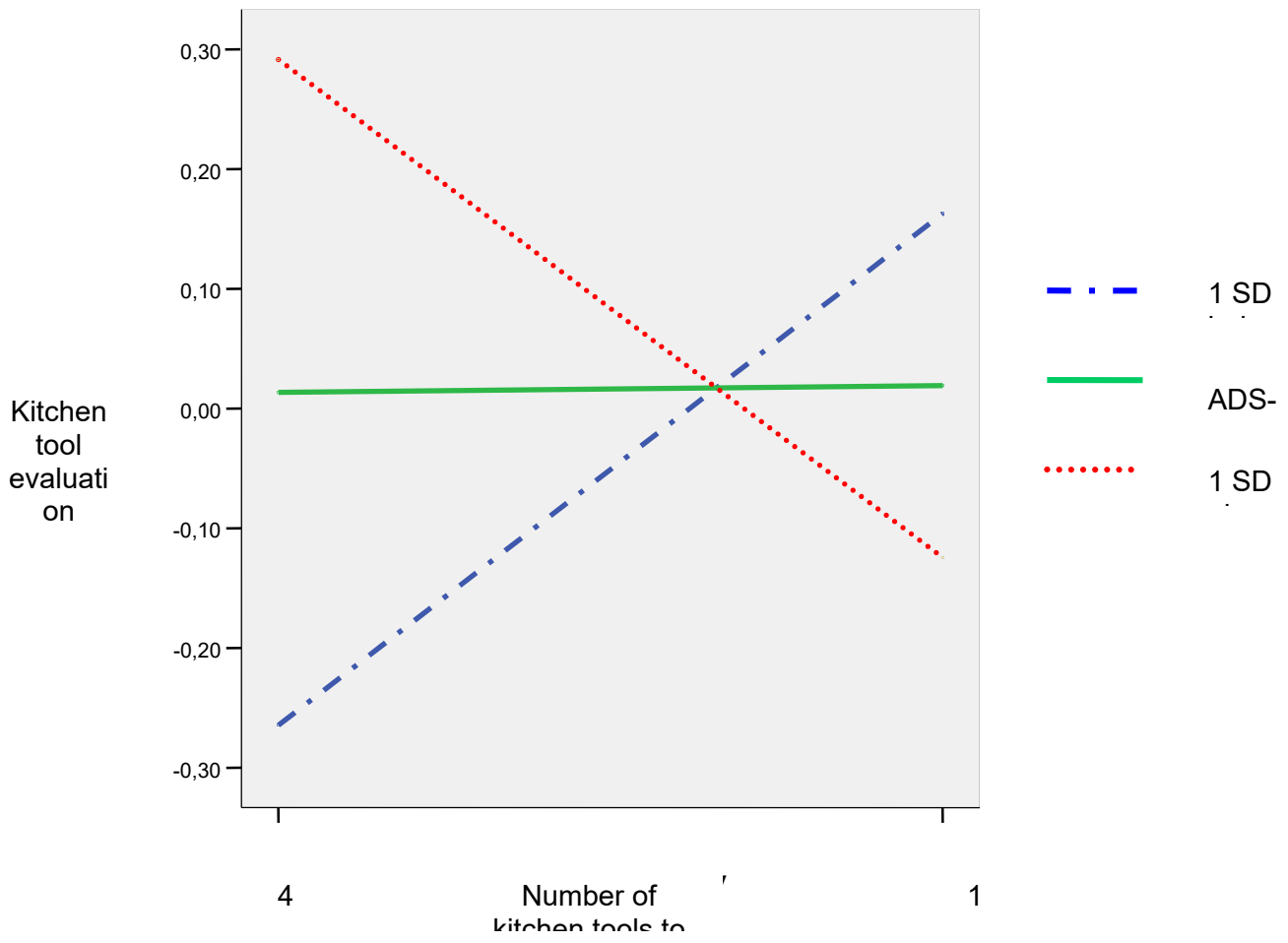


Table 1

Mean Ease-of-retrieval Ratings (and Standard Deviations) as a Function of Number of Instances Recalled and Level of Depressive Symptomatology in Experiment 1.

Number of instances recalled	Level of depressive symptomatology	
	Low	High
Four	6.70 (1.47)	6.72 (1.25)
Twelve	3.92 (1.57)	3.57 (2.24)

Notes. Participants were divided into low versus high levels of depressive symptomatology based on a median-split over ADS-scores ($Md = 6.25$). Ease-of-retrieval ratings were scaled such that higher values indicate higher experienced ease.