Automatic affective associations and psychopathology

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SUMMARY AND CONCLUSIONS

The aim of this thesis was to examine the theoretical and clinical relevance of distinguishing between (dysfunctional) automatic and more deliberated affective associations. This interest was sired by the development of so called 'implicit measures', better referred to as indirect measures of relatively automatic associations (De Houwer, in press). The major appeal of these measures is that they require neither verbalization nor introspection. For this reason they seem relatively robust against self-presentational concerns and experimental demand, and promised to be able to tap pertinent associations that a respondent may dismiss as irrelevant, or that may be inaccessible for conscious introspection. As such, indirect measures of automatic associations provided an attractive additional tool next to self-reports for investigating dysfunctional beliefs. In very broad terms these measures seemed important in two types of disorders. The first are disorders in which individuals' initial negative evaluations of stimuli are assumed to be very important, while these initial associations are not necessarily in conflict with more deliberated associations (e.g., anxiety disorders). The second are disorders in which initial positive associations may promote approach behaviors towards stimuli of which an individual knows they are not good for him or her, and which they sometimes even explicitly report not to like (e.g., addictive behaviors). The studies presented in this thesis focused on automatic associations in the context of spider phobia and smoking as prototypical exemplars of these types of disorders.

To investigate the relevance of distinguishing between (dysfunctional) automatic and more deliberated associations in these disorders, the present research project focused on the following four questions: 1) are individuals with certain psychopathological complaints characterized by specific dysfunctional automatic affective associations? 2) do automatic and deliberated affective associations predict different types of disorder related behavior? 3) are changes in dysfunctional affective automatic associations related to changes in disorder related symptoms? and 4) can specific automatic (e.g., harm or contamination-related) affective associations be assessed beyond more global affective associations?

In this final chapter I will provide a summary of the studies presented in this thesis and will shortly recapitulate these findings in terms of the four research questions mentioned above. Following this, the present findings will be critically discussed and related to other (recent) research on automatic associations in the context of psychopathology. Finally, I will provide overall conclusions and discuss directions for future research.

Summary of the studies

As a first step, the studies described in Chapter 2 focused on the question whether specific automatic associations differentiate between known groups in the context of smoking. Given the stigmatized nature of smoking we expected not only that automatic affective associations would successfully differentiate between groups, but also that direct and indirect measures would be dissociated. That is, smokers were expected to display neutral to negative attitudes toward smoking on the self-report measures, but positive attitudes on the indirect measures. However, although smokers' attitudes were found to be less negative than those of non-smokers, also smokers displayed negative associations with smoking on the self-report measures as well as on the Implicit Association Test (IAT: Greenwald, McGhee, & Schwarz, 1998), that was included as an indirect measure of participants' attitudes toward smoking. However, indirect

measures have been found to be susceptible to subtle contextual factors (e.g., Blair, 2002), and the IAT-results do not necessarily reflect the associations of interest (e.g., De Houwer, 2002). Therefore, in a subsequent experiment, it was tested whether these findings might have been an artifact of measurement setting and/or the indirect measure that was used. Following this, attitudes were assessed in two different contexts, a smoking and a non-smoking setting, using the Affective Simon Task (AST: De Houwer & Eelen, 1998) as an alternative indirect measure next to the IAT. However, again no evidence emerged to indicate that positive associations are involved in smoking. In concert with previous findings (e.g., Swanson, Rudman, & Greenwald, 2001) these results add to the idea that global (automatic) affective associations are not a driving factor in smoking behavior. Instead, global affective associations may function as a more or less strongly inhibiting factor. Alternatively, the results could indicate that global affective associations play no role in the continuation of smoking behavior at all.

Meanwhile, Sherman and colleagues found preliminary evidence that positive associations may exist with more specific aspects of smoking (e.g., Sherman, Presson, Chassin, Rose, & Koch, 2003). Therefore, in a second study, it was tested whether pictorial stimuli that focus on the sensory aspects of smoking would elicit positive automatic affective associations in smokers and negative automatic associations in non-smokers. To circumvent some of the interpretational problems associated with the IAT we used an alternative measure, the single target IAT (stIAT: Wigboldus, Holland, & van Knippenberg, 2005). In line with the idea that indeed positive automatic associations may exist with specific aspects of smoking, we found smokers to display a positive attitude toward smoking-relevant pictures. Self-reported attitudes toward these stimuli appeared to be overall neutral. However, exploring the items of the self-report measure separately suggested that the overall neutral score may be better interpreted as an ambivalent explicit attitude. As expected, non-smokers displayed negative associations with smoking on the stIAT and the self-report measure. Following this, it may be that not so much global affective associations but associations with specific aspects of smoking are involved in the maintenance of smoking behavior in the face of the obvious health risks. Interestingly, the stIAT but not the self-report measure was significantly correlated with self-reported craving. Possibly measures of automatic associations are a better predictor of subsequent smoking than self-report measures. All in all, these studies seem to indicate that smokers and non-smokers are indeed characterized by specific automatic associations. Although we found no convincing evidence for the expected dissociation between deliberated and automatically activated attitudes in habitual smokers, the results do suggest that indirect measures may yield complementary information next to self-reports.

The next main goal, addressed in Chapter 3, was to investigate whether disorder-specific automatic associations have specific predictive validity for disorder-related behaviors. We therefore examined the predictive power of automatically activated spider-related affective associations for automatic and controllable fear responses. Several recent information-processing models (Beck & Clark, 1997; Fazio & Towles-Schwen, 1999; Strack & Deutsch, 2004) predict that relatively spontaneous responses are primarily related to initial, automatic associations, whereas reflective responses are more strongly related to deliberated associative processes. Therefore, we expected that the presently used indirect measure of automatic associations, the Extrinsic Affective Simon Task (EAST: De Houwer, 2003) would best predict responses on a physiological index of individuals' disposition to avoid spider-related stimuli. Individuals' self-report-

ed fear of spiders, on the other hand, was expected to be the best predictor of overt avoidance behavior in the presence of a spider. From the data, indeed, the expected pattern of results emerged. This corroborates the idea that indirect measures of automatic associations have specific predictive power for automatic fear responses, and underlines the value of including both self-reports and indirect measures of automatic associations when assessing evaluative antecedents of behavior.

An important challenge throughout this thesis was to find an adequate indirect measure of automatic affective associations. Although we started to use the IAT initially for pragmatic reasons (i.e., the task seemed more flexible than for instance priming procedures, and was found to provide stronger effect sizes and more reliable results (e.g., Bosson, Swann, & Pennebaker, 2000)), the straightforward interpretation of IAT results as reflecting automatic target-attribute associations has since been challenged. It has been argued that the particular set-up of the IAT causes interpretative problems when assessing concepts that have no natural opposite (e.g., De Houwer, 2002). In addition, it has been shown that under certain circumstances IAT effects reflect conscious response strategies (e.g., Mierke & Klauer, 2001), and may sometimes even reflect no target-attribute associations at all (e.g., Rothermund & Wentura, 2001; 2004). Therefore, the studies described in Chapter 4 explored the merits of the EAST (De Houwer, 2003). This task appears a promising alternative to the IAT for the following reasons. First, the task requires no contrast target category relative to which the results should be interpreted. In other words, associations with a single target can be assessed. Second, and more importantly, because each stimulus functions as its own control within a single task, the EAST is much more robust against non-associative response strategies than the IAT. For these reasons, the EAST seemed very promising for application in the field of psychopathology research. The main focus of our studies was the question whether the EAST would also work with pictorial stimuli instead of words, which were successfully used in the original task (De Houwer, 2003). The advantage of being able to use a fully pictorial task is that pictorial stimuli may be more ecologically valid and can be used for concepts that cannot be captured in a single word. In addition, a pictorial EAST would require no reading skills, making the task available for individuals who cannot (yet) read, or don't speak the language. In a first experiment, the pictorial EAST was found to be sensitive to normatively valenced stimuli, tended to differentiate between high and low fearful individuals with respect to spider pictures, and showed independent predictive validity for overt avoidance behavior. As such, these findings seemed to confirm the EASTs' usefulness in psychopathology research. However, as the EAST is a relatively complex task it was important to ascertain that it could also be successfully employed in community samples. This was tested in a second experiment. The results of this experiment showed that the EAST effects were independent of age and educational level. This suggests that the EAST may also be successfully used in older individuals and/or individuals with relatively low levels of education. Meanwhile, it may still be that the size of the EAST effects are moderated by other cognitive factors that are related to the ability to switch between sorting target and attribute stimuli during the EAST. This may potentially limit the sensitivity of the task.

The next step was to use this tool in a clinical context, to test whether changes in automatic associations as indexed by the EAST are related to changes in symptoms. If automatic affective associations are important in the maintenance of a specific disorder one would expect that a change in symptoms, for instance following a successful treatment, would be related to a change in automatic associations. Importantly, there

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is considerable evidence that affective associations are relatively resistant to extinction (see De Houwer, Thomas, & Baeyens, 2001 for an overview). As such, residual negative associations might be an important factor in the reinstatement of fear responses. Indeed, laboratory studies provided support for the idea that negative affective associations are involved in return of fear (Hermans, Dirikx, Vansteenwegen, Baeyens, Van den Berg, & Eelen, 2005; Dirikx, Hermans, Vansteenwegen, Baeyens, & Eelen, 2005). The study described in Chapter 5 aimed to investigate this issue in a clinical context. First, we tested whether automatic affective associations are malleable by regular treatment procedures. Second, we explored whether residual affective associations are related to symptom return. To this purpose self-reported and automatic affective associations (indexed with the pictorial EAST described in Chapter 4) were assessed in spider phobic individuals before and after a single-session exposure in vivo treatment, and at a 2-month follow-up. The results showed that automatic and self-reported associations changed favorably following treatment over and above test-retest effects. These findings provide support for the malleability of automatic affective associations and are consistent with the presumption that automatic affective associations may be involved in the maintenance of complaints. Meanwhile, the prognostic data provided no support for the alleged causal role of (residual) negative automatic affective associations in the return of complaints. Results indicated that relatively negative self-reported associations immediately after treatment were associated with less pronounced overt approach behavior at follow-up, whereas such a relationship was absent for the automatic affective associations.

Although there seems little doubt that global affective associations (i.e., with pleasant and unpleasant or positive and negative) are involved in many forms of psychopathology, cognitive models assume that highly specific dysfunctional beliefs maintain disorders. Assessing specific associations is therefore crucially important for examining the validity of such models. In addition, knowledge of what specific associations are (not) involved in a disorder may influence the treatment of choice. That is, pertinent harm-related associations may require a somewhat different interventions than pertinent contamination-related associations. The studies described in Chapter 6 were designed to investigate whether more specific automatic affective associations can be assessed beyond more global affective associations. As a first step, the IAT was used to assess associations with concepts that were expected to share a similar global valence but to differ with respect to their associations with disgust and threat. The results indicated that the IAT can be used to assess specific threat and disgust-related associations. Following this, the next study employed this IAT to explore the role of harm and contamination-related associations in spider phobia. Treatment seeking and non-phobic individuals completed a harm and a contamination related IAT. Phobic individuals were assessed before and after a one-session of 2.5 hours in vivo exposure. Results show that both self-reported measures of harm and contamination associations as well as the harm and contamination IATs distinguished between phobic and non-phobic participants. Meanwhile, only self-reported harm associations incrementally predicted participants' overt avoidance behavior next to self-reported global affective associations. In addition, only self-reported associations were specifically reduced following treatment. Finally, although there was an overall reduction in threat and disgust IAT effects from the first to the second assessment, these changes were similarly strong in the treatment and the no-treatment control group. This suggests that the IAT was rather sensitive to test-retest effects and may thus not be a suitable measure in the

context of repeated assessments. Thus, although the data show that specific automatic affective associations can be assessed beyond more global affect, they do not allow for inferences to be made concerning the role of automatic harm or contamination-related associations in the maintenance of spider fear.

Recapitulation

In the introduction of this thesis the goals of the present studies were outlined focusing on four research questions. In the following I will shortly recapitulate the main empirical findings along the lines of these questions to evaluate what answers were generated by the studies presented in this thesis.

Are individuals with certain psychopathological complaints characterized by specific dysfunctional automatic affective associations?

Both the studies on smoking in Chapter 2 and the studies focusing on spider fear in Chapter 4 and 5 showed that our indirect measures differentiated between known groups. Bearing in mind that the findings using the IAT and the stIAT do not necessarily reflect automatic affective associations, these findings show that at least in the context of spider fear individuals are characterized by disorder-related automatic affective associations. The potential importance of such differences is illustrated by the findings pertaining to the next question.

Do automatic and deliberated affective associations predict different types of disorder-related behavior?

The results of the study described in Chapter 3 showed that in the context of spider fear automatic disorder-related associations best predicted spontaneous fear responses, whereas a fear questionnaire best predicted relatively strategic avoidance behavior. Meanwhile, in a subsequent study (Chapter 4, Study 1) automatic fear-related associations failed to predict relatively spontaneous responses, although this was probably due to the particular measure of spontaneous responses that was used. However, automatic disorder-related associations did show incremental predictive validity, next to self-reported fear, for participants' overt avoidance behavior. The additional variance that was explained by the automatic affective associations with spiders may reflect relatively spontaneous components involved in overt avoidance. All in all, the studies suggest that automatic and more deliberated associations, indeed, predict different types of behavior.

Are changes in dysfunctional affective automatic associations related to changes in disorder-related symptoms?

This third question was answered affirmatively in Chapter 5. The results show that automatic affective associations with spiders changed over the course of a single-session exposure treatment. However, no evidence emerged to suggest that residual negative automatic affective associations are predictive of symptom return. Thus, as yet we have no evidence to suggest that automatic affective associations are causally related to spider fear.

Can specific automatic (e.g., harm or contamination-related) affective associations be assessed beyond more global affective associations?

The studies described in Chapter 6 that addressed this final question seem to suggest that specific automatic (i.e., harm or contamination-related) affective associations can successfully be assessed beyond the effects of more global affective evaluations. However, because of the particular indirect measure that was used, these results should be interpreted with caution.

Discussion of empirical findings

So what can we learn from the studies presented in this thesis and how do these findings relate to other studies in this field of research? In the following I will discuss some of the empirical data available for disorders in which initial negative associations are potentially important, and 'disorders' in which initial positive associations may be an important factor. In the context of negative associations I will limit the discussion to findings for spider fear as most of the available data, including the data in this thesis, stems from this domain. In the context of positive associations I will focus on findings for smoking and alcohol (mis)use, and discuss some data on eating disorders. However, before discussing the empirical data , it is first important to consider what exactly we have measured.

Did we measure automatic affective associations?

Although we assumed that the measures we used are valid measures of automatic affective associations, in the sense of being initial and unintentional, this was not formally tested in any of the present studies. As mentioned earlier, it has become clear that this assumption may have been incorrect with respect to the IAT that was used. This was the principal reason for exploring the merits of the EAST. The validity of both the affective Simon task (AST) and the EAST as indices of automatic (i.e., unintentional) associations is supported by the fact that even though participants are instructed to give a positive or a negative response depending on a non-evaluative stimulus feature (e.g., color or form), performance nevertheless varies as a function of stimulus valence. Because stimulus valence is an irrelevant feature of target stimuli and should be ignored, the interference it causes can be taken as a reflection of involuntary processing of the stimulus valence. In that sense the results can be interpreted as reflecting automatic (i.e., unintentional) affective associations with the target stimulus (cf. De Houwer & Eelen, 1998). One concern that has been raised, however, is that strong Simon effects in the error data may reflect a response strategy based on the deliberate rather than the unintentional evaluation of the target stimuli. Imagine a participant who ignores the task instructions and intentionally sorts all the stimuli on the basis of their valence. He or she would then press the positive key, or say 'Positive', in response to all target stimuli that are deliberately evaluated as positive. Consequently, half of these trials would be correct, because the irrelevant stimulus feature (e.g., form or color) would also dictate a positive response. The other half of the trials would be wrong, because the relevant stimulus feature would dictate a negative response. The inverse reasoning would hold for responses to the negative target stimuli. As a result all trials on which the valence of the stimulus and the response are congruent would be correct, whereas all incongruent trials would result in an error. The result is a strong Simon effect in the error data that does not reflect the unintentional influence of the valence

of the target stimuli. The fact that the expected pattern of EAST results in the studies presented in this thesis predominantly emerged in the error data, could thus be due to such a strategy. It seems reasonable to assume, however, that a participant would only employ a response strategy that does not correspond with the task instructions if this strategy would enhance task performance (cf. task recoding explanation of the IAT effects). In the EASTs used in the present studies the above mentioned strategy would be rather inefficient. That is, participants still had to give the correct response after making an error, and were explicitly instructed to make few errors. For this reason it seems unlikely that the EAST effects presented in this thesis would be influenced by such strategies. Meanwhile, for EASTs that do not include error feedback and mandatory correct responses this alternative explanation may hold. As in the AST also no error feedback is provided and each stimulus disappears after any sound, also strong error based AST effects may be a consequence of a deliberate response strategy. However, as the AST does not require participants to switch between different sorting tasks it may be preferable over the EAST. That is, in the EAST interindividual differences in task switching abilities may influence the size of the EAST effects independently of the strength of automatic associations.

For the IAT it has been convincingly shown that the effects do not necessarily reflect automatic associations in memory, and several alternative accounts have been proposed. A recent account, that is compatible with other accounts of IAT effects, for instance in terms of semantic associations (e.g., Greenwald et al., 1998) or salience asymmetries (Rothermund & Wentura, 2001; 2004), was proposed by De Houwer, Geldof, and De Bruycker (in press). They argue that the IAT is a general measure of target-attribute similarities rather than an exclusive measure of relatively automatic target-attribute associations. Because (dis)similarities can occur on many features and dimensions, and may depend on characteristics of the individual as well as context, it may even be that several different similarity effects interact within a single task.

The crucial implication of such alternative accounts of effects generated by indirect measures of 'automatic associations' is that research findings should be looked upon critically, and that certain findings may have to be re-interpreted. I will elaborate on this issue discussing the data in the following sections.

Negative automatic affective associations

Cognitive models assume that anxiety disorders, including specific phobias, critically depend on dysfunctional cognitive structures (i.e., schemata) that guide information processing in a disorder congruent manner (e.g., Beck, Emery, & Greenberg, 1985; Williams, Watts, MacLeod, & Mathews, 1997). Within this general framework, it has been proposed that particularly in the anxiety disorders it is important to distinguish between automatic and more deliberated processes (e.g., Beck & Clark, 1997; Williams et al., 1997). There is a considerable amount of evidence from several lines of research that indeed automatic processing biases are involved in anxiety disorders (see for instance Harvey, Watkins, Mansell, & Shafran, 2004). It has become clear that one important characteristic of anxiety is the involuntary prioritization of processing information that is relevant to current concerns (e.g., Harvey et al., 2004). Importantly, the extend to which stimuli are relevant is likely to depend on how they are initially evaluated. As

such, automatic affective evaluative associations can be conceptualized as reflecting (part of) the dysfunctional memory structures (or schemata) that are assumed to bias information processing.

Findings in the context of spider fear

The findings presented in this thesis provide clear support for the idea that automatic affective associations are involved in fear of spiders. We found high spider fearful individuals to be characterized by automatic fear-related negative associations with spiders that predicted spontaneous fear responses (Chapter 3), showed incremental predictive power for overt avoidance behavior (Chapter 4, Exp 1), and were to some extent related to symptom changes following a successful exposure treatment (Chapter 5).

In contrast to these findings de Jong, van den Hout, Rietbroek, & Huijding (2003) found high and low spider fearful individuals to display similarly negative attitudes toward spider related words using the AST. One explanation for these discrepant findings may be that because spider pictures resemble the feared stimulus more closely than words, the pictorial EAST used in the present studies was more sensitive than the verbal AST used by de Jong et al. (2003). Especially given the culturally negative connotation of spiders, pictorial stimuli may be required to differentiate between high and low spider fearful individuals. Because a spider phobic individual is not afraid of the word spider but the animal described by that word, pictures may provide a more direct threat cue (e.g., Teachman, Gregg, & Woody, 2001).

Findings by Ellwart, Becker, & Rinck (in press), that do show differences between high and low spider fearful individuals using an EAST, provide further support for the idea that automatic associations are important in the context of spider fear. These authors assessed high and low spider fearful individuals' automatic evaluations of ambiguous words after being primed with pictures of babies or pictures of spiders. They found that the high fearful individuals evaluated the ambiguous words as significantly more negative than low fearful individuals after being primed with spiders, whereas the groups evaluated the words similarly after being primed with babies. This study provides elegant support for the idea the activation of pertinent fear associations in memory influences the automatic evaluation of ambiguous stimuli. Seemingly further corroborating these findings, Teachman and colleagues found that, relative to snake phobic (Teachman et al., 2001) and low fearful individuals (Teachman & Woody, 2003), spider phobic individuals categorized stimuli significantly faster when spiders and bad shared one and snake and good the other response key, than when the response mappings were reversed (i.e., spider + good, snake + bad). Meanwhile, these IAT findings may well reflect similarity effects rather than automatic associations. In both studies the category spiders was in all likelihood most salient for the high spider fearful individuals. With respect to the attribute categories the category bad was probably more salient than the category good. Given these salience dissimilarities exactly the reported pattern of results would be expected, without having to assume (automatic) target-attribute associations. It is also not necessary to assume that the IAT assessed target-attribute associations for explaining the finding that the IAT effects had incremental predictive validity for overt avoidance behavior (Teachman et al., 2003). That is, the more a spider is feared the more salient it is likely to become. Therefore, high IAT salience effects may in this case be expected to correlate with relatively strong avoidance.

Such a salience similarity account may also explain the apparently contrasting results reported by de Jong et al. (2003). Also using an IAT, they found that both high and low spider fearful individuals responded similarly faster when spiders and negative shared one and neutral and positive shared the other response key, than when the response requirements were reversed. In this study spiders were contrasted with a neutral category. Given their negative cultural stereotype, spiders were probably the most salient category for the high as well as the low fearful individuals. This may explain the similar pattern of results in both groups. Nevertheless, one may still have expected spider fearful individuals to display more negative IAT effects than low spider fearful individuals. However, the use of stimulus words rather than pictures may have provided an insufficiently strong threat cue for such differences to rise above the effects of the negative stereotype (see above).

Potential salience similarity effects also complicate the findings with respect to more specific affective associations. In the study described in Chapter 6 one would expect the attribute categories dirty and threatening to be more salient than not-dirty and not-threatening for both the high and the low spider fearful individuals. With respect to the target categories, obviously, spiders should be most salient for the high fearful individuals, whereas the contrast category may have been more salient for the low fearful individuals. Given such salience similarities between the target and the attribute categories, exactly the reported pattern of results would be expected with or without assuming (automatic) target-attribute associations to determine the IAT effects. However, the finding that only the dirty IAT correlated with a self-report measure of spider-disgust, while both the threat and the disgust IAT correlated significantly with self-reported spider fear, does suggest that the similarities were not merely based on global valence, but based on the threat and disgust context provided by the task. It therefore seems likely that target-attribute associations were involved. This would also be in line with the finding by Teachman et al. (2001) that even when using their good-bad IAT as a covariate, differences between the spider and snake fearful individuals remained on the danger-safety, afraid-unafraid, and disgusting-appealing IAT. At the very least these findings suggest that the threatening and disgusting features of spiders are somehow independently related to spider fear. Nevertheless, no firm conclusion in terms of automatic target-attribute associations can be drawn. To further explore specific automatic associations it would be necessary to employ alternative indirect measures that are less susceptible to strategic response strategies, and non-associative interpretations of the effects. Perhaps the EAST could also successfully be used to assess such specific affective associations. Meanwhile, a disadvantage that remains is that the performance giving a specific response is measured relative to another response. Thus assessing automatic associations with specific evaluative categories remains a challenge for future research and may require new measurement procedures.

Taken together, although we have no evidence to draw conclusions on whether automatic associations are causally related to the maintenance of spider fear, the available evidence seems consistent with a cognitive conceptualization of specific fears as being characterized by dysfunctional structures in memory that are activated relatively automatically and are involved in fear responses.

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Positive automatic affective associations

Similar to cognitive conceptualizations of emotional disorders, recent models of addictive behaviors propose that the prioritization of disorder-salient information may be the core process underlying compulsive drug use and craving (Lubman, Peters, & Mogg, 2000). Intuitively one would expect that what is considered appetitive will depend on how it is (initially) evaluated. It has been suggested for smoking and drinking that one of the reasons why individuals continue with their habits in spite of the negative consequences is the initial activation of positive associations with relevant cues. Thus, positive automatic associations may function as a relatively uncontrollable motivator for continued (ab)use. In a similar vein it has been proposed that the automatic positive evaluation of food items is involved in overeating. An automatic preference for fat-food would be hard to continuously inhibit, leading to bad eating habits, overeating and / or binges. On the other hand, for undereaters, patients with anorexia nervosa, it can be hypothesized that they would show an absence of or reduced positive automatic associations with palatable food items (e.g., Roefs, 2004).

Findings in the context of smoking and drinking

In apparent contrast with the idea that positive automatic associations are important in smoking, a series of IAT studies, including study 1 reported in Chapter 2, consistently found smokers to respond faster when smoking stimuli were paired with negative attributes than with positive attributes (Swanson et al, 2001, Exp 3; Sherman, et al, 2003, Exp 1; De Houwer, Custers, & De Clerq, in press, Exp 1; Perugini, 2005, Exp 1). In a similar vein, IAT studies in the context of drinking seemed to suggest that drinkers endorse negative automatic associations with alcohol (Wiers, van Woerden, Smulders, & de Jong, 2002; Wiers, van de Luitgaarden, van den Wildenberg, & Smulders, 2005; De Houwer, Crombez, Koster, & De Beul, 2004; de Jong, Wiers, & van de Braak, 2005). These findings led researchers to conclude that global positive affective associations were not a very important factor in smoking and drinking behaviors (e.g., Wiers et al., 2002; Huijding, de Jong, Wiers, & Verkooijen, 2005). In the context of drinking it has been proposed that independent of affective processes other factors are important driving forces in smoking behavior. More specifically, the incentive sensitization theory of Robinson & Berridge (e.g., 1993; 2003) poses that, independently of drug liking, drug wanting is the major culprit in addictive behaviors. I will shortly return to this issue in the section 'conclusions and future research'.

However, the above mentioned studies all relied on the IAT and their results may therefore reflect target-attribute salience similarities, rather than negative automatic associations with smoking. That is, compared to the relatively positive contrast categories that were used in the studies pertaining to smoking, the target category 'smoking' is likely to have been the most salient category for both smokers and non-smokers (e.g., because of its negative cultural connotation). In a similar vein, it is well conceivable that for both heavy and light drinkers the target category 'alcohol' is more salient than the contrast 'soda', especially when the study concerns alcohol. Within the attribute categories (i.e., positive and negative), the negative category was probably most salient (e.g., Rothermund & Wentura, 2004). On the basis of these salience similarities exactly the reported pattern of IAT effects would be expected. In apparent contrast with such an explanation (Wiers et al., 2002) did find differences between heavy and light drinkers using an IAT that aimed at assessing automatic arousal (rather than va-

lence) associations. However, it should be noted that the effects of the valence and arousal IAT in that study were both in the same direction. Moreover, the group differences in either IAT did not differ significantly from each other. Perhaps most importantly, the arousal IAT effects can be explained in terms of salience similarities as well. That is, for both groups the target category 'arousal' was likely to be more salient than the contrast category 'sedation', and 'alcohol' was probably more salient than 'soda' (see above). The differences that were found in a number of these studies between smokers and non-smokers and between heavy and light drinkers may have been caused by an additional similarity effect in terms of the intended target-attribute associations. Nevertheless, the similarity account (De Houwer, Geldof, & De Bruycker, in press) suggests that the direction of IAT effects should be interpreted with caution because they may depend on the type of target and attribute categories used and the type of similarities that the IAT focuses upon.

This idea seems to be indirectly supported by several studies. A recent study by De Houwer, Custers, and De Clerq (in press) in which a 'personalized IAT' (Olson & Fazio, 2004) was used, smokers were found to be significantly faster when smoking was paired with positive rather than with negative. The important difference with previously used IATs was that the general valence categories pleasant and unpleasant were replaced by the categories 'I like' and 'I dislike'. In addition, participants were instructed to respond on the basis of personal preference, and therefore received no error feedback. This strategy may have focused smokers on similarities in terms of their personal appreciation of smoking rather than its negative cultural connotation. This may also explain why positive IAT effects emerged in study 2 reported in Chapter 2. Given their structural and procedural similarities it seems reasonable to assume that similar processes underlie IAT and stIAT effects (cf. Wigboldus et al., 2005). The finding that smokers responded faster when smoking related pictures were paired with positive attributes than with negative attributes, whereas the opposite pattern emerged for non-smokers, may well reflect the use of pictorial stimuli that focused on the sensory aspects of smoking. Such a context manipulation may have caused similarity effects in smokers to reflect the intended similarities in pleasantness, whereas in non-smokers the pictures were more similar to the negative attributes. In line with this suggestion Sherman et al. (2003) found, using an affective priming task, that smokers showed positive attitudes towards the sensory aspects of smoking, but negative attitudes towards packaging information that included the surgeons general warning.

In the context of drinking, a study by Jajodia and Earlywine (2003) suggests caution in interpreting the direction of IAT effects. In this study two IATs were employed, in both of which 'alcohol' and 'mammals' were used as target categories. The attribute categories were 'positive' and 'neutral' in one and 'negative' and 'neutral' in the other IAT. The results showed positive alcohol IAT effects emerged on the positive IAT and negative IAT effects emerged on the negative IAT. Although these findings were interpreted as evidence for ambivalent attitudes toward alcohol, exactly such a pattern of results would be expected on the basis of salience similarities.

More direct evidence that the negative IAT effects reported earlier should be interpreted with caution follows from two studies in the context of alcohol (De Houwer, et al., 2004; De Jong, Wiers, and van de Braak, 2005). Both studies used the EAST to assess heavy drinkers' automatic evaluative associations with alcoholic drinks, and

found neutral or ambivalent rather than negative automatic associations with alcoholic drinks. Importantly, de Jong et al. (2005) found the EAST-score, and not the IAT-score to be related with participants scores on the Rutgers Alcohol Problems Index (RAPI).

Taken together, it seems premature to conclude that smokers' and heavy drinkers' automatic associations with smoking and drinking are negative, and that automatic affective associations are no driving factor in these behaviors. Since the available studies almost exclusively used the IAT as the indirect measure of automatic attitudes, solid conclusions cannot be drawn. The evidence, however, does suggest that smokers and drinkers endorse ambivalent rather than negative automatic attitudes, and it appears that the threshold for activating positive versus negative associations is context dependent. In our own studies (Chapter 2) no evidence emerged to indicate that a smoking-relevant context increases the accessibility of positive automatic associations with smoking. Yet, it might be that effects of a specific setting may only emerge when it elicits a strong urge to smoke (cf. Sherman et al., 2003). If indeed this would be the case, the crucial next step would be to test the causal status of automatic associations in individuals' smoking behavior.

Findings in the context of eating disorders

In a series of studies Roefs and colleagues found no differences between either high and low restraint eaters (Roefs, Herman, Macleod, Smulders, & Jansen, 2005), and obese and low restraint eaters (Roefs, Stapert, et al., 2005; Roefs, et al., in press) with respect to their affective associations with food. The only study that did find a difference between these groups was an IAT-study that focussed on the fat-content of food. In discussing the results the researchers themselves already pointed out that this pattern of results was probably due to features of the IAT. In her dissertation on this subject, Anne Roefs (2004) eventually concluded that in the context of adult obesity there are no differences between normal and obese individuals with respect to their initial automatic evaluation of food. Interestingly, Craeynest, et al. (2005) did find affective associations with food to differentiate between obese children and normal weight children. That is, on an EAST, children were generally faster pressing the positive key than the negative key in response to food stimuli, and this effect was found to be stronger in obese than in normal weight children.

Although these findings may seem to contradict the studies reported by Roefs (2004), they may also reflect different stages in the development of obesity. It has been suggested that also in overeating food 'wanting' may be an important factor next to food liking. In fact, it is proposed that as addictions develops liking becomes less important, whereas wanting is the most important factor in the maintenance of continued substance (ab)use. Germane to this suggestion, obese children and restrained eaters have been found to be more impulsive than lean controls (Nederkoorn, Braet, Van Eijs, & Jansen, 2005; Nederkoorn, Van Eijs, & Jansen, 2004). Perhaps the greater liking of food as a child, together with being relatively impulsive (which in turn may require more effort to restrain oneself from eating), may initially lead to overeating and obesity. While the wanting of food and related craving increases over time, global affective associations with eating may become less and less positive.

With respect to under-eaters it has been shown that in extreme under eating a lack of affective responses to food may be involved (Roefs, Stapert, et al., 2005). However, as yet this is the only published study available on this topic and several questions remain. For instance, whether the affective responsiveness of anorexia patients truly

extinguished or whether positive or negative associations with certain aspects of food remain. Relatedly, the lack of automatic affective responses could also be due to a general anhedonia rather than a specific extinguished appetitive response to food.

Conclusions and future research

Shortly reviewing some of the available evidence in different fields of research has shown that whereas automatic affective associations are clearly involved in some disorders, like spider fear, their role may be less important in others, like addictive behaviors and eating disorders. Exploring such differences over disorders is an important way of increasing our understanding of the factors that may be involved in these disorders. Whether or not automatic affective associations are crucially involved in a particular disorder may make quite a difference in the way a disorder should be understood and treated. Knowing whether a pertinent association is activated automatically or not is theoretically important in itself, but may also make a difference in selecting the treatment of choice. For instance, exposure therapy seems particularly effective for disorders that involve relatively uncontrollable (fear) responses, whereas disorders in which more conscious deliberations (or ruminations) are important may be more efficiently treated using an intervention that challenges higher order beliefs.

It has become clear that researchers should remain critical with respect to the measurement instruments that are used to assess automatic associations. Recent studies critically testing the processes that may underlie the IAT effects underscored the importance of a critical attitude towards (newly developed) measurement instruments. Whereas the task at first seemed to provide an excellent tool for assessing automatic associations (e.g., Greenwald & Nosek, 2001), it is now clear that its' effects cannot be simply interpreted in terms of automatic target-attribute associations (e.g., Rothermund & Wentura, 2001; 2004; De Houwer, Geldof, & De Bruycker, in press). Partly because of such measurement issues, there are at this stage a great deal of loose ends and a lot of questions awaiting further research.

In the context of spider fear the present findings clearly support the cognitive conceptualization of specific fears as being characterized by dysfunctional representations in memory, that are activated relatively automatically, and that are involved in fear responses. However, it remains a question whether these associations are a causal factor in the onset and maintenance of specific fears, or merely an epiphenomenon. As a first step, prognostic studies could test the predictive validity of automatic affective associations in the etiology and return of complaints, as well as examine the clinical relevance of including indirect measures of automatic associations. Although the present results in the context of spider fear do not support the idea that automatic affective associations are involved in the return fear in the short run, a predictive relation may exist for complaints at a later stage. Furthermore, predictive relations may be found in other disorders. To explore this issue a prospective approach is currently used to assess whether automatic associations between the self and vulnerability and/or anxiety are a vulnerability factor for developing PTSD symptoms in a sample of Dutch peace keepers. In a similar vein indirect measure of automatic associations between the self and anxiety/depression are included in a large scale longitudinal study into vulnerability factors for anxiety and depression (the Netherlands Study on Depression and Anxiety; NESDA).

To more definitely answer the question of causality, however, it would be necessary to specifically manipulate automatic affective associations and assess subsequent changes on a relevant outcome measure. Most important for the question of causality in the context of the maintenance of a disorder would be to unlearn the dysfunctional association, and test for a subsequent drop in symptoms. Alternatively, but more relevant to the question of whether automatic associations are involved in the onset of a disorder, one could learn participants specific associations, and then test them for the emergence of specific symptoms. Although obviously such research would be difficult to realize due to ethical concerns. One way of changing automatic associations could be by using evaluative conditioning procedures. Baccus, Baldwin and Packer (2004), recently showed that an evaluative conditioning task, disguised as a computer game, was successful in specifically enhancing automatic associations with the self. It would be a small step to use such an approach to examine the effects of experimentally manipulated automatic self-associations on anxious behavior, for instance during a stressful speech. A similar approach could be adopted to examine the causal role of automatic related associations in other types of disorders.

Another issue that remains as yet unresolved is the role of specific affective associations. Our findings in the context of spider fear provided preliminary evidence indicating that specific harm and contamination-related associations can be assessed beyond the influence of global valence. However, the data warrant no straightforward inferences on whether such associations are crucially involved in spider fear. Meanwhile, this is both theoretically as well as clinically an important issue as different associations (e.g., harm or contamination-related) may differently explain the observed emotions (e.g., fear and/or disgust) and might require a somewhat different approach during treatment. Therefore, future research should focus on identifying and/or developing adequate measures to assess such specific affective associations. Although perhaps the EAST might prove suitable for such assessments a limitation that remains is that the performance giving a specific response is measured relative to another response (e.g., dirty vs. not-dirty). Subsequently, it would be important to establish what specific affective associations may be involved in what disorders. Examples of such endeavors are the above mentioned prospective study on PTSD (i.e., anxiety and vulnerability-related evaluative associations) and the NESDA (i.e., anxiety and depression-related evaluative associations). Further explorations are currently taking place with respect to the role of automatic harm and disgust-related associations in the context of vaginism and dyspareunia.

Important questions also remain with respect to the context dependency of disorder related automatic associations. There is evidence that suggests that automatic associations depend on what aspect of a particular stimulus is made salient (e.g., Mitchell, Nosek, and Banaji, 2003). What is salient can be determined by the particular stimuli that are used, but also by more general context effects (see for instance Blair, 2002, for an overview). The various studies in the context of smoking seem to corroborate this idea (see also Chapter 2). However, to what extent such context effects influence the accessibility and/or activation of pertinent automatic associations in psychopathology remains unclear. Perhaps the ideal approach would be to explore the changes in automatic associations when systematically varying potentially important contextual factors, using multiple indirect measures of automatic associations. Such research would yield a more comprehensive understanding when pertinent dysfunctional associations are activated. One area in which this may be particularly important is the

understanding of treatment effects and relapse. This issue is closely related to studies focusing on context effects on the extinction of conditioned (affective) responses. It has been argued that the process of extinction involves 'learning the exception to the rule' rather than 'unlearning' particular associations (e.g., Bouton, 2002). Contextual influences of extinction procedures on conditioned human fear responses have been demonstrated in both lab (e.g., Vervliet, Vansteenwegen, Baeyens, Hermans, & Eelen, 2005; Vansteenwegen, et al., 2005) as well as in clinical studies (Mineka, Mystkowski, Hladek, & Rodriguez, 1999; Rodriguez, Craske, Mineka, & Hladek, 1999; Mystkowski, Craske, Echiverri, 2002). It would be important to see to what extent the context dependent accessibility of dysfunctional automatic affective associations may be involved in the return of such fear responses.

Similar context effects may be involved in relapse into habitual smoking. Related to this, Dols, van den Hout, Kindt, & Willems (2002) found that the urge to smoke depends on the expectation of smoking and that this expectation could easily be manipulated using simple contextual cues (the color of a computer screen). A better understanding of context dependent activation of automatic associations may thus provide clues for more effective interventions and relapse prevention.

In the context of addictive behaviors and eating disorders the role of automatic affective associations remains somewhat unclear. Related to this, an important question that has arisen concerns the contribution of 'wanting' and 'liking'-related automatic associations in the onset and maintenance of these disorders. According to the incentive sensitization theory (Robinson & Berridge 1993; 2003) the crucial factor driving addictive behaviors, including smoking, are changes in the brains' reward circuitry. These changes lead to an increased incentive salience of drug cues, causing them to trigger learned motivational responses. Although these changes take place in the reward system, Robinson & Berridge (2003) argue that the 'wanting' of a substance is independent of the 'liking of it. Part of this wanting is an increased psychomotor response to cues related to the substance, that includes increased attention, arousal and approach. In line with this theory there is some evidence that smokers show relatively stronger automatic approach responses to smoking stimuli than do non-smokers (e.g., Mogg, Bradley, Field, & De Houwer, 2003; Bradley, Field, & Mogg, 2004). Robinson and Berridge (2003) argue that over the development of an addiction liking becomes less and less relevant for continued use, while 'wanting' becomes the crucial factor driving the addiction. Thus, even though wanting may eventually be the crucial factor, one would expect liking to be at least initially involved in the development of addictions. To further explore the contribution of wanting and liking-related associations in the onset and maintenance of addictive behaviors it might be worthwhile to compare measures of automatic wanting-related and liking-related associations in the prediction of addictive behaviors and relapse. This could for instance be done by including both measures of automatic approach-avoidance responses as well as measures of automatic affective associations in a prospective study that tracks the development of substance dependency in at risk youth, or the maintenance of treatment gains after successful treatment. Alternatively, automatic affective drug associations might be experimentally manipulated, for instance through evaluative conditioning procedures (see also above).

Another interesting avenue for further research follows from the idea that not only an understanding of dysfunctional associations in the patient but also in the therapist may be important for tailoring and improving effective interventions. That is, dysfunctional automatic associations in the therapist may unintentionally promote ineffective

or even counterproductive interventions. In a first exploration of this intriguing issue Houben, Gijsen, Peterson, de Jong, and Vlaeyen (2005) assessed automatic and self-reported evaluations of certain movements in physiotherapy students who had almost completed their studies. In particular, participants' automatic evaluations of certain physical movements in terms of threat-value were assessed. They found that the automatic evaluations of the movements had independent predictive validity for treatment advice. Importantly, the automatic and deliberated evaluations of the movements as harmful showed a minimal correlation. This suggests that the incorrect automatic evaluation of a movement as harmful (or harmless) guides treatment advice, independent of whether the individual explicitly *knows* the movement is actually harmless (or harmful). It is conceivable that similar effects can adversely influence treatments in a range of fields. For instance, Teachman, Gapinski, Brownell, Rawlins, and Jeyaram (2003) found evidence for a strong anti-fat bias in the general public. Such a bias could undermine treatment effects in weight control training programs. For these reasons, it is important for future research to further explore the impact of dysfunctional automatic associations on the part of the therapist on treatment effects.

To conclude, a lot of important questions await further research before we can properly evaluate whether it is important to distinguish between automatic and more deliberated associations in psychopathology. However, this field of research is still young and rapidly developing. As the measures that are used to assess automatic associations are only just beginning to become fully developed and understood it is perhaps not surprising that we have no definite answers yet. However, I believe that the available evidence does converge to a positive answer to the question of whether this endeavour is relevant. Whatever the final verdict, it appears that assessing the role of automatic associations in psychopathology is simply a necessary step to adequately test the dominant cognitive models.