

# A critical evaluation of cognitive inhibition in dissociative identity disorder as inferred by negative priming in the flanker task: Limitations and the episodic retrieval alternative

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## Abstract

Studies examining negative priming in dissociative identity disorder (DID) using the flanker task have reported emotional context effects. Significant negative priming is evident when individuals with DID are assessed in a context deemed emotionally neutral, while in contexts designed to elevate anxiety, DID samples display reduced negative priming. Limitations and considerations are discussed around statistical power, generalizability and reliability, and the use of diagnostic groups over specific clinical symptoms. The negative priming findings in this growing body of work have been interpreted with reference to the functioning of cognitive inhibitory mechanisms. Explored is how the episodic retrieval account of negative priming, with its reliance on memory mechanisms, could account for the DID findings. Encoding and retrieval possibilities are discussed and it is concluded that a failure to encode the prime trial distractor stimulus, in contexts of heightened anxiety, could explain the experimental findings from an episodic retrieval perspective.

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Intuitively inhibition and dissociation fit neatly together. Dissociation is often described as present when an individual can access only some of a greater pool of information. For example, dissociative amnesia is reflected by the inability to retrieve autobiographical memories that are seemingly unforgettable, and so-called ‘switches’ in identity in dissociative identity disorder (DID) are often characterized by the seeming inability to access procedural, perceptual, semantic and/or episodic memories that were previously available. In these cases, the term inhibition could be utilised to account for what happened to the irretrievable information (e.g., it was inhibited) (e.g., Young, 1988). In this way both terms could be used interchangeably, so that in the case of amnesia, seemingly unforgettable memories could be ‘dissociated’ or ‘inhibited.’ In the case of DID, other dissociative identities could be described as ‘dissociated’ or ‘inhibited.’

Examining dissociative symptoms from the point of view of what is not experienced or accessible suggests the operation of inhibition. However, dissociative symptoms are not merely limited to these negative manifestations, but include acute positive symptoms, such as intrusive memories, ‘flashbacks’ and in the

case of DID, the actual ‘switch’ or alteration in identity at the moment it occurs (Van der Hart, Nijenhuis, & Steele, 2006). In these circumstances, the symptoms may be seen as associated with a breakdown in inhibitory functioning, so that irrelevant or otherwise inhibited information becomes activated in working memory. Thus inhibition and inhibition breakdown may be associated with different dissociative symptoms (e.g., inhibition with amnesia, inhibition breakdown with identity alterations) or different aspects or consequences of the same symptom construct (e.g., inhibition with amnesia, inhibition breakdown with intrusions of the amnesic content; inhibition breakdown with identity alterations, inhibition with the identity/memory characteristics of other dissociative identities).

Yet, the simple linking of inhibition and dissociation utilizes both terms in an unspecified, broadly defined way, which impedes theoretical precision and utility. Both dissociation and inhibition have been used in this descriptive manner (e.g., both have been used to describe the suppression of mental representations or environmental stimuli) (MacLeod, Dodd, Sheard, Wilson, & Bibi, 2003; Marshall, Spitzer, & Liebowitz, 1999; Steele, Dorahy, Van der Hart, & Nijenhuis, 2007a). But despite the overlap that semantics may broadly bestow on the terms ‘dissociation’ and ‘inhibition,’ their descriptive use alone is highly

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unsatisfactory.<sup>1</sup> The terms dissociation and inhibition have also been used to identify mechanisms or processes of explanation to account for certain clinical and non-clinical phenomena. Empirical and theoretical work has diligently sought to operationally define both constructs. Ongoing work in separate literatures continues to further differentiate what should and should not constitute the use of the terms ‘inhibition’ and ‘dissociation’ (Brown, 2006; Friedman & Miyake, 2004; Steele et al., 2007a). Such conceptual progress has allowed an examination of the relationship between dissociation and inhibition in the laboratory (e.g., Giesbrecht, Merckelbach, Geraerts, & Smeets, 2004). The focus of the current paper is a set of studies examining negative priming in DID. This area has been focused upon because of the need to develop an adequate explanation for the initially unexpected but potentially important findings that have emerged from this work.

## 1. Cognitive inhibition in DID

The series of studies examining cognitive inhibition in DID has utilized the flanker task in a two-trial procedure designed to infer inhibitory ability from the capacity to display negative priming. The flanker task requires participants to respond to a central stimulus piece (e.g., 3) while ignoring flanked distractor stimuli (e.g., 1 3 1) (Eriksen, 1995). To examine negative priming, the prime trial distractor stimulus becomes the probe trial target stimulus (e.g., 2 1 2 followed by 3 2 3). Negative priming is determined by comparing the response speed and/or accuracy to the probe targets in this so-called ignored repetition condition with probe targets in the baseline condition, where no relationship exists between prime and probe trials (e.g., 5 3 5 followed by 2 1 2). Reasoning that the onset of (positive) dissociative symptoms is often characterized by dissociated information breaking through into conscious awareness, these studies were initiated on the premise that the frequency of intrusive dissociative symptoms in DID would suggest a general weakening of inhibitory ability. In an effort to test this hypothesis, DID, depressed and non-clinical control participants ( $n = 20$ ) completed the flanker task with neutral word stimuli (e.g., *more gave more*) (Dorahy, Irwin, & Middleton, 2002). Given the high comorbidity of depression in DID, the use of a depressed sample provided a psychiatric comparison group, and one which shared many overlapping non-dissociative symptoms with DID. Although the control group showed a negative priming effect, neither the DID nor depressed samples demonstrated effective negative priming. Whilst the weakened general inhibition inferred from these results could be interpreted as a feature of psychopathology, a significant inverse relationship was found between dissociation and negative priming (Study 2). This finding indicated that those with higher dissociation showed reduced

negative priming ability, and provided tentative early evidence for a link between dissociation and cognitive inhibition.

In an attempt to more sensitively assess cognitive inhibition in DID, Dorahy, Irwin, and Middleton (2004a) replaced word stimuli in the Flanker task with single digit numbers. In addition, they assessed individuals with depression, posttraumatic stress disorder (PTSD) and schizophrenia, along with a DID sample and non-clinical control group. The comparison groups were chosen because many of their symptoms are evident in DID. As well as using a two-trial task of negative priming to assess inhibitory functioning, a one trial interference task was also utilized where target stimulus interference was compared between categorically related distractors (e.g., 1 2 1) and non-categorically related distractors (e.g., \* 3 \*). This task was designed primarily as a distraction task between flanker trials to make each flanker set (prime and probe trial) distinct. As such, a single categorically related or unrelated trial was presented before and after each two-trial flanker set (i.e., prime and probe). The addition of a single trial interference task also allowed the investigation of the relationship between interference and inhibition in each group. It has been of theoretical and empirical interest whether increased inhibition relates to decreased interference or whether these two processes are unrelated and occur at different stages of the information processing stream (Friedman & Miyake, 2004; May, Kane, & Hasher, 1995).

The DID, depressed, PTSD and control samples all demonstrated significant negative priming, and therefore unlike the flanker task using word stimuli, the DID sample showed effective cognitive inhibitory functioning using number stimuli. With reference to interference effects, all groups exhibited more interference to categorically related distractors, but the DID and control groups demonstrated significantly more interference than the psychosis sample. Consequently, the psychosis group showed no evidence of significant inhibition nor produced comparatively heightened interference, whilst the DID and control groups showed effective inhibition and greater interference. These findings are consistent with proposed differences between cognitive inhibition and resistance to interference/interference control (Harnishfeger, 1995; Nigg, 2000). Empirical work suggests inhibition occurs after selection and is therefore distinct from interference, which occurs at an earlier perceptual stage of processing (Friedman & Miyake, 2004; May et al., 1995).

Dorahy, Middleton, and Irwin (2004b) replicated the aforementioned negative priming findings using single digit stimuli in DID, depressed, PTSD and psychosis groups ( $n = 10$ ). The psychosis sample demonstrated no indication of negative priming while the DID group displayed effective negative priming. Thus, in DID cognitive inhibition deficits appear apparent with words but not numerical stimuli. Yet, in keeping with findings of studies discussed thus far, the depressed sample mimicked the DID group and demonstrated significant negative priming. Nonetheless, Dorahy et al. tentatively suggested that cognitive inhibitory ability in DID may differ from other psychiatric groups by covarying with the perceived emotional context of the experimental environment as manipulated with word and number stimuli. This idea was generated by DID participants suggesting that when words were used, regardless of their emotional con-

<sup>1</sup> With reference to inhibition, MacLeod et al. (2003) argue against the use of the term and concept in cognitive psychology and provide alternatives for it use. With reference to dissociation, some have argued that the term be discarded due to its non-specific meaning (e.g., Frankel, 1994), others have attempted to provide a conceptually more specific definition of the term (e.g., Holmes et al., 2005; Steele et al., 2007a, 2007b).

tent, anxiety was heightened on account of not knowing whether the next presented word would have idiosyncratic threat meaning. Single-digit numbers did not share this characteristic and therefore made the experimental context in which they were used less anxiety provoking, comparatively.

This tentative suggestion went beyond the available data, which suggested that if such an effect was evident it may not be isolated to DID, but could be present in depression as well. Yet, further studies motivated by this idea supported the view that DID samples demonstrate effective cognitive inhibition (as inferred by negative priming) when in experimental environments deemed relatively neutral, but fail to demonstrate effective inhibition when in contexts which elevate anxiety. *Sturgill and Ferraro (1997)* had suggested that negative priming may covary with anxiety in the general population, but they found only very weak evidence for this in the form of a statistical trend between state anxiety and negative priming in just one of their two priming tasks. Studies of DID participants have been more supportive of the anxiety-negative priming link.

Utilizing two discrete experimental contexts manipulated by instructions and word stimuli, DID, depressed and non-clinical control participants were assessed in a neutral experimental context followed by an anxiety-provoking experimental context (*Dorahy, Middleton, & Irwin, 2005*). These separate assessments were spaced on average a week apart and as well as a word naming task (e.g., naming neutral or negative words depending on context), participants completed a flanker task set-up to assess negative priming in each context. As DID participants had previously shown effective inhibition using single-digit numbers, these same stimuli were utilized. Self-report measures of anxiety were taken throughout testing in each context. The DID sample demonstrated significant negative priming in the neutral context. However, in the anxiety-provoking condition, where they reported elevated anxiety, there was no evidence of negative priming. Hence, this study indicated that state anxiety appears to be related to reduced cognitive inhibition in DID. The control group displayed effective inhibition in both contexts, while the depressed sample produced no negative priming across contexts.

Both the depressed and control groups failed to report higher anxiety in the negative context, so the interaction between anxiety and negative priming could not be effectively assessed in these samples. This failure to manipulate anxiety across contexts in the comparison groups undoubtedly represented a study limitation, impeding comparative interpretation of findings. Yet, it also highlighted the inherent difficulty in study designs attempting to evoke anxiety in groups that differ considerably in their sensitivity to anxiety, alterations in consciousness and dissociative experiences. Utilizing test stimuli capable of evoking heightened anxiety in non-clinical and depressed samples would in all likelihood have left the dissociative sample more vulnerable to alterations in consciousness and dissociative experiences. Such episodes in the experimental setting are not only distressing for participants, but often manifest in states and experiences (e.g., identity alterations; frozen, trance states) which disrupt responding and reduce the quantity of useable data points. In order to attain comparable data, the comparison samples therefore becomes a central consideration in studies using the

methodology described here to explore affect and information processing in DID.

In an effort to control anxiety between DID and a comparison sample, a further study, using the two-stage methodology described above, sampled individuals with generalized anxiety disorder (GAD) as well as those with DID ( $n = 12$ ; *Dorahy, McCusker, Loewenstein, Colbert, & Mulholland, 2006*). Individuals with GAD are sensitive to anxiety but do not experience pathological dissociation. Consequently, when used as a comparison group to DID, they heighten the experimental control of anxiety, which allows a greater isolation of dissociation in the DID sample. The GAD and DID groups were matched on age, gender, selective attention ability, state and trait anxiety and general psychiatric symptoms. With Subjective Units of Distress (SUDS) ratings at the beginning, middle and end of the flanker assessment in both contexts, the DID and GAD samples also displayed significantly greater self-reported anxiety in the negative context. A non-clinical group was also utilized to assess the validity of the negative priming task. The DID sample differed from both the non-clinical and GAD samples on trait and pathological dissociation.

In this study, like that of *Dorahy et al. (2005)*, the DID sample demonstrated significant negative priming in the neutral (non-anxiety-provoking) context, but no evidence of negative priming in the negative (anxiety-provoking) context. These results were interpreted as a weakening in cognitive inhibitory ability in DID with increased anxiety. The GAD sample demonstrated significant negative priming in only the negative context. However, these results were evident from tests to determine if negative priming in each group for each context differed from zero (simple effects analyses). The effect size was too small to show a significant interaction between group and context with the sample size used. Therefore, the study was unable to directly compare the two clinical samples across contexts in one statistical procedure and advocate that they responded differently. With the focus on the dissociative sample, all that could be concluded was that like the *Dorahy et al. (2005)* study, increases in anxiety appear to be related to the weakening of inhibitory ability in DID. This effect seems to be related to a combination of dissociation and anxiety.

It has been proposed that reduced cognitive inhibition with increasing anxiety in DID is an adaptive function (*Dorahy et al., 2006; Dorahy & Huntjens, 2007*). DID specifically, and dissociation more broadly, have been strongly associated with experiences of traumatic stress (e.g., *Briere, 2006; Middleton & Butler, 1998*). In particular, childhood abuse and neglect have been repeatedly linked to DID and heightened dissociative symptoms/experiences (e.g., *Irwin, 1994; Putnam, Guroff, Silberman, Barban, & Post, 1986*).<sup>2</sup> The unpredictable and often

<sup>2</sup> Despite the empirical link between childhood relational trauma and DID/dissociation, such experiences are by no means a sufficient condition for DID or pathological dissociative symptoms (e.g., *Briere, 2006; Van der Hart et al., 2006*). Included among other etiologically-significant variables may be, contextual factors such as family environment and access to psychological soothing/social support (e.g., *Gold, 2000; Kluff, 1993*); the nature of attachment to the

traumatic childhood environment that individuals who go on to develop dissociative symptoms and disorders are exposed to may cultivate the need to cognitively function with weakened cognitive inhibition. Sturgill and Ferraro (1997) suggest that “if a child finds the environment to be unpredictable and full of danger, it may very well be adaptive for she or he to pay attention to peripheral stimuli as well as more task relevant stimuli, and thus negative priming would be reduced or absent” (p. 292).

The findings from the DID studies suggest that rather than experiencing a general reduction in inhibitory ability, this capacity in DID may covary with anxiety; operating effectively in non-anxious environments, but weakening when anxiety and hypervigilance are heightened. Specifically, it has been proffered that weakened inhibition serves two purposes when anxiety is elevated in DID, which are most adaptive when threat detection and threat management become an imperative (Dorahy et al., 2006). Firstly, weakened inhibition, by reducing the focus of selective attention, permits the possibility of faster detection of threat stimuli on the periphery of awareness. Second, with weakened inhibition allowing more information to receive excitatory processing, the demands placed on the information processing system are increased. This demand increase is likely to have a deleterious impact on cognitive performance in all but those with a greater working memory span and the capacity to effectively divide attention (i.e., simultaneously process more than one channel of information). High non-clinical dissociators have been found to have a higher working memory span than low dissociators (e.g., De Ruiter, Phaf, Elzinga, & Van Dyck, 2004; Veltman et al., 2004). Moreover, both clinical and non-clinical individuals with a heightened proneness to dissociation have been consistently found to function cognitively more effectively when engaged in tasks requiring divided as opposed to selective attention (DePrince & Freyd, 1999, 2001, 2004; Simeon, Knutelska, Putnam, Schmeidler, & Smith, 2005). Weakened inhibition in DID has been argued to increase cognitive demands and thereby allow a greater opportunity for divided attention processing (Dorahy et al., 2006). This represents a more effective functional cognitive processing style for dissociative individuals during times of heightened anxiety and threat monitoring. These ideas have been incorporated into a cognitive model of dissociation (referred to as the Dissociative Processing Style) where cognitive inhibition plays a key role when threat monitoring systems are activated (Dorahy, 2006; see Fig. 1).

The dissociative processing style model proposes that a specific cognitive operating system characterizes individuals with pathological dissociation to help monitor and deal with threat. This system is activated by top-down cues, triggered for example by contextual information, which indicate the possible presence of danger. Once activated, this threat monitoring module operates to heightened cognitive processing demands in dissociative individuals by weakening cognitive inhibition. The increase in cognitive demands not only facilitates a more efficient processing strategy for dissociative individuals, because of

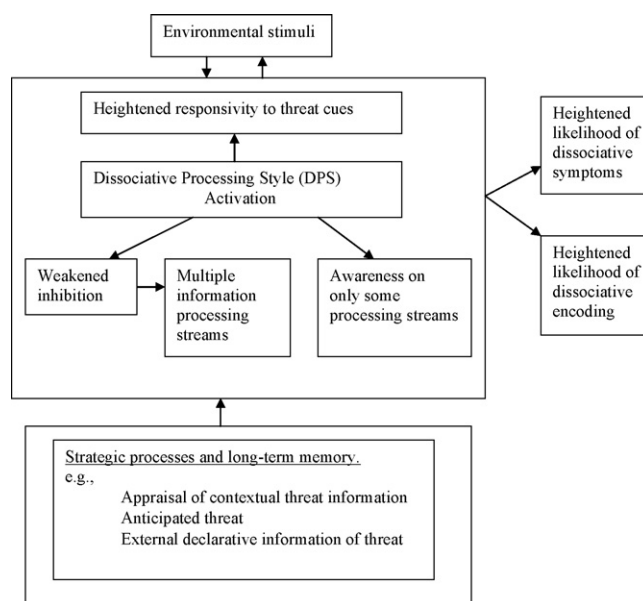


Fig. 1. Components of the DPS.

their superior ability to engage in divided attention processing, but also provides the potential for awareness to be focused on some processing streams, while others are ignored. Learning to avoid threat streams provides an element of psychological protection during traumatic events. For example, the little boy being severely and systematically physically abused by his mother can become aware of the color of her clothes, rather than the look of anger on her face, or her hand movements with the stick that strikes him. Rather than not being encoded, this more painful information is taken in outside awareness and often retrieved in flashbacks or recalled at a latter point in distressingly rich episodic detail (e.g., Brewin, 2003; Brewin, Dalgleish, & Joseph, 1996; Freyd, 1996; Holmes, Brewin, & Hennessy, 2004; Williams, 1994).

## 2. Empirical limitations and considerations

Empirical work using the flanker task has suggested an interaction between inhibitory functioning and anxiety in DID, and has lead to some cognitive theorising of the nature of dissociation. Yet, these studies to date are not without their limitations and methodological considerations. In addition, alternative explanations of the findings are also possible. If these limitations are understood and alternative accounts examined they may provide a framework for future research by identifying clear empirical and theoretical pathways from this foundational work. With this in mind, central limitations and considerations of the aforementioned empirical impetus will now be outlined, along with a non-inhibitory explanation of negative priming.

### 2.1. Statistical power

Firstly, statistical power (i.e., the ability to detect a significant effect) in the studies conducted thus far has tended to be relatively weak, particularly for analyses of interactions between

primary caregiver (e.g., Liotti, 1992), and experiencing trauma within a specific developmental window (e.g., Putnam, 1995, 1997).



diagnostic group and emotional context. Addressing this concern requires larger sample sizes, a more sensitive assessment of negative priming or a task that elevates anxiety more without heightening experiences like trance states or identity alterations that could be detrimental to data collection.

## 2.2. Generalizability and reliability

A further issue is the lack of generalisability regarding cognitive inhibition in DID due to the use of a single task (i.e., flanker) in the studies to date. Sturgill and Ferraro (1997) support the “conceptualization of negative priming as a multi-faceted phenomenon, which may not be generalizable across tasks, sensory modalities, or cognitive markers” (p. 302). The finding of generalizability failure across tasks is the primary reason that the flanker procedure has been systematically used in the progression of negative priming studies in DID thus far. Once a clear empirical picture of the markers and boundaries of cognitive inhibitory functioning has been developed using one task, generalizability across other tasks can be assessed.

Yet, rather than being a multi-faceted phenomena which resists generalization across tasks and sensory modalities, as indicated by Sturgill and Ferraro (1997), among others, negative priming may simply reflect an unreliable experimental marker (i.e., one not consistently producible). This potential concern goes beyond the studies of DID and bring into question the use of negative priming as a paradigm to infer potential explanatory mechanisms such as inhibition. Although it is now recognized that cognitive inhibition effects have poor reliability (Friedman & Miyake, 2004), limited reliability can not explain the differential pattern of effects observed within the DID group. DID samples across several studies have shown non-significant negative priming in experimental contexts where they reported elevated anxiety and significant negative priming in contexts deemed neutral. This consistent pattern of findings across numerous studies cannot be attributed to the unreliability of flanker task ignored repetition trials to produce negative priming.

## 2.3. Diagnostic groups vs. specific clinical symptoms

An issue when considering the value of the flanker studies in the DID samples described above is the use of diagnostic group (e.g., DID, GAD, non-clinical) as an independent variable. Persons (1986) has outlined the disadvantages of using diagnostic categories when attempting to study underlying psychological processes. These disadvantages include the lack of specificity and sensitivity when trying to determine which symptom or feature of a diagnostic category relates to the mechanism under investigation. This ultimately raises the question of experimental control and the precision of data interpretation. For example, in using a DID sample it is difficult to determine what symptoms or features of DID are actually associated with weakened negative priming during states of anxiety. Persons (1986) advocates a symptom-focused approach where the independent variable is a specific symptom. The methodology in the aforementioned studies has used diagnostic groups in an attempt to

isolate dissociation as the symptom that differentiates groups (self report measures of dissociation have been used to confirm this). However, dissociation does not represent a single symptom experience but rather a cluster of relatively heterogeneous experiences, generally assumed to be brought about by a breakdown in integrated functioning (e.g., Briere, 2002; Carlson & Putnam, 1993) or a particular structural organization of the psyche characterized as dissociation (Steele, Van der Hart, & Nijenhuis, 2007b; Van der Hart et al., 2006). Explanatory models differ to some degree on which symptoms represent dissociation and which do not (c.f., Butler, 2006; Carlson & Putnam, 1993; Holmes et al., 2005; Van der Hart et al., 2006). Nonetheless, future work may benefit from examining specific dissociative symptoms in clinical groups and their relationship to negative priming.

## 2.4. Attention or memory? The episodic retrieval alternative

The DID research findings have rested on the assumption that results are largely attributable to cognitive inhibitory functioning, even though other mechanisms may make a contribution. The accuracy of this assumption cannot be assumed, as Dillon and Pizzagalli (this issue) conclude. Both whether and how an alternative account of negative priming could explain the DID findings is the focus of the remainder of this paper.

Inhibitory accounts dominated initial explanations of negative priming, with, for example, distractor stimuli being suppressed from activation or impeded from influencing response channels (e.g., Neill, 1977; Tipper & Cranston, 1985). Inhibition is still argued to account for negative priming (e.g., Tipper, 2001) and has been particularly influential in the psychopathology literature (e.g., Fuller, Frith, & Jahanshahi, 2001). Yet, cognitive scientists have also proposed other possible explanations and mechanisms for negative priming that do not rely on inhibition (e.g., the mismatching hypothesis,<sup>3</sup> Park & Kanwisher, 1994; the temporal discrimination hypothesis, Milliken, Joordens, Merikle, & Seiffert, 1998). Perhaps the most influential of these is Neill and Valdes' episodic retrieval account (Neill, 1997; Neill & Valdes, 1992; Neill, Valdes, Terry, & Gorfein, 1992). Following studies examining the persistence of

<sup>3</sup> Using a set of tasks designed to compare the inhibition, episodic retrieval and feature mismatching theories of negative priming, MacLeod, Chiappe, and Fox (2002) found strong support for the feature mismatch account. The feature mismatch account (Park and Kanwisher, 1994) is specifically designed to address negative priming in tasks where a key perceptual feature (e.g., color, location) changes between prime distractor stimulus and probe target stimulus (see also Houghton & Tipper, 1994, and Tipper, 2001, for related discussion on template mismatching). For example, the target stimulus being presented in red and the distractor in green, would provide a feature mismatch in ignored repetition trials (i.e., the green prime distractor would become the red probe target; e.g., Tipper, 1985). Such a task requires two mismatches to be overcome; 1) the feature/perceptual mismatch and 2) the response mismatch. According to the feature mismatch account (Park & Kanwisher, 1994) and MacLeod et al's. (2002) findings, overcoming the feature mismatch is dominant in retarding probe responding and creating negative priming. However, as the studies of DID thus far have not been characterized by feature mismatches between prime distractor and probe target, this account will not be further examined.

negative priming over different intervals leading up to prime trials and also between the prime trial response and the probe trial presentation (response-stimulus interval; RSI), Neill and colleagues proposed the episodic retrieval theory of negative priming. Rather than being caused by inhibitory mechanisms, negative priming is a function of memory (Neill & Valdes, 1992; Neill et al., 1992). Examining whether negative priming might tap memory processes is very relevant to this paper, as DID is intimately associated with memory functioning.

Drawing on Logan's (1988) instance theory of automaticity, Neill and Valdes noted that when a stimulus is confronted, both it and the response to it are encoded (i.e., the episode, not just the stimuli, is encoded). If the next exposure to the stimulus requires the same response (i.e., if the current episode mimics the last episode) positive priming will occur, as the stimulus and response are already bound together, so the response can bypass slower controlled ("algorithmic") processes and be guided by faster automatic processes. In trial sets designed to evoke negative priming, the episode encoded from the prime trial includes a non-response to the distractor stimulus. When this stimulus is then presented as the target in the probe trial, automatic processes cannot be utilized to generate an accurate response. To overcome the conflict between a prior non-response episode and the current need for a response, slower controlled processes are required. Alternatively within this episodic retrieval framework, discrepant response outputs (i.e., non response vs. response) may lead to interference, or episodes that contain the required correct response may take longer to retrieve due to more recent episodic encoding of an incorrect response (Neill, 1997; Neill et al., 1992). Regardless of the actual episodic memory mechanism, memory processes provide an account for why a prime trial distractor produces a slowing of response to the probe target stimulus compare to control trial sets where the probe target stimulus does not contain a previously encoded non-response.

In comparing inhibition and episodic retrieval accounts, Neill, Valdes, and Terry (1995) note that negative priming from the former perspective is brought about by inhibitory influence on the prime distractor being *carried forward* to the probe. Episodic retrieval suggests that negative priming is the result of *backward retrieval* with the probe target triggering the prime trial episode. Whether episodic retrieval or inhibition best accounts for the negative priming data has been reviewed elsewhere (e.g., Fox, 1995; May et al., 1995; Neill et al., 1995; Tipper & Milliken, 1996) and debated. Neill initially proposed that episodic retrieval and inhibition were not mutually exclusive accounts, arguing that "[r]esponses may be slowed [i.e., negative priming] either because they are directly inhibited or because the lack of correct response information forces reliance on slower control processes" (Neill et al., 1992, p. 994). However, as more data in support of episodic retrieval came to light, he strengthened his belief in episodic retrieval as an adequate singular account of negative priming, but noted "... it is not possible [with the data available] to disprove the existence of an additional inhibitory mechanism" (Neill, 1997, p. 1302).

The applied clinical scientist is typically guided by the work of pure scientists when inferring the cognitive mechanism pro-

posed to explain an experimental effect. Evidence of the effect or alterations in it are thought to highlight the functioning of the explanatory mechanism in the clinical group of interest. Being influenced by an inhibitory account of negative priming, and attempting where possible to minimise the influence of episodic retrieval (see Kane, May, Hasher, Rahhal, & Stoltzfus, 1997; May et al., 1995, cf., Neill, 1997 who has critiqued these recommendations), weakened negative priming in clinical dissociators when in an anxiety-provoking context, has been attributed to weakened inhibitory functioning. Yet, as the evidence has not clearly identified whether an attentional mechanism (i.e., inhibition) or a memory mechanism (i.e., episodic retrieval) best accounts for negative priming (Tipper, 2001, has integrated both inhibition and episodic retrieval models to account for negative priming), it would be beneficial to examine the dissociative findings in light of an episodic retrieval account. This is particularly pertinent in that memory dysfunction has long been associated with pathological dissociation (Janet, 1907; Ludwig, Brandsma, Wilbur, Bendfeldt, & Jameson, 1972; Mitchill, 1816; Prince & Peterson, 1908; see Dorahy, 2001, for review).

## 2.5. Encoding and retrieval deficits in the episodic retrieval account

As the name implies, episodic retrieval accounts have often focused on the ease or difficulty of prime episode retrieval following probe presentations. Discriminability of prime episodes with reference to other (prime and probe) episodes, based on either temporal consistency (i.e., non-random timing intervals between stimulus presentations) or novelty of stimuli (i.e., unrepeated use of stimuli throughout experiment), increases the probability of episodic retrieval and produces negative priming (see Neill, 1997; Neill et al., 1992, 1995, for review). The negative priming studies in DID to date have utilized non-random timing between stimulus presentations (i.e., temporal consistency; e.g., 500 ms RSI and 2000 ms between one prime-probe set and the next). It is entirely possible that the negative priming found in 'emotionally-neutral' contexts was derived by temporal discriminability of the prime episode. Yet, temporal discriminability is unlikely to explain recent findings of reduced negative priming in anxiety-provoking contexts (e.g., Dorahy et al., 2005, 2006). The fact that temporal discrimination did not differ across neutral and anxiety-provoking contexts suggests negative priming should be evident in both contexts, according to this hypothesis.

As the numbers between 1 and 9 (with the omission of the two syllabled 7) were used it is possible that repeated stimulus use reduced episodic discriminability. Reduced episodic discriminability may be especially pronounced in the anxiety-provoking context as it was always conducted second (to reduce "carry-over" anxiety if completed first). So even though there was at least 1 day between testing, participants had prior exposure to the same stimuli, which may have reduced negative priming by reducing episodic discriminability. However, this account seems unlikely as neither the control or clinical comparison groups showed the same pattern of reduced negative priming as the DID sample in the second (anxiety-provoking)

test session. If stimulus discriminability had been responsible for reduced negative priming in DID, it is also likely that such an effect would be evident in at least the control group. Any DID-specific stimulus discrimination difficulties that may have lead to the result, can be ruled out. Despite the use of repeated stimuli in other studies which did not manipulate experimental context (i.e., participants only assessed in a perceived neutral context), negative priming has been found in DID samples (e.g., Dorahy et al., 2004a, 2004b).

As Neill and colleagues (1992) outline, encoding deficit may also explain weakened negative priming from an episodic retrieval standpoint. They note a failure to demonstrate negative priming in studies where (1) speed of target response was emphasized over accuracy (e.g., Neumann & DeSchepper, 1992, study 2), (2) prime distractors are masked (e.g., Allport, Tipper, & Chmiel, 1985) and (3) number of distractors is increased (e.g., Neumann & DeSchepper, 1992, cf., Yee, 1991). These particular instructional or methodological characteristics are likely to impact on the degree to which the ‘no response’ label can be successfully encoded with the distractor stimulus (Neill et al., 1992). Consequently, such conditions are less likely to generate negative priming.

However, it seems unlikely that encoding failures in the prime trial, brought about by any of these factors, can account for the DID negative priming results across the neutral and anxiety-provoking contexts. Firstly, the instructions given across all experiments were to ‘respond to the target stimuli as quickly but as accurately as possible’ (e.g., Dorahy et al., 2002). As reduced negative priming appeared to be selectively demonstrated in the anxiety-provoking condition only and distractor stimuli in all recent studies have been single-digit numbers and therefore non-threatening, recourse to speed-related encoding failure seems unwarranted. This explanation would be entirely possible if the distractor stimuli were of a threatening nature, as several researchers and theorists have noted the tendency in dissociative individuals to avoid threat cues by turning their attention away from them and potentially reducing their encoding likelihood (e.g., DePrince & Freyd, 2004; Foa & Hearst-Ikeda, 1996; Hermans, Nijenhuis, Van Honk, Hunjens, & Van der Hart, 2006; Simeon et al., 2005; Waller, Quinton, & Watson, 1995). Secondly, no study of negative priming in dissociative participants thus far has used either masked distractor stimuli or more than one distractor stimulus on the prime or probe trials. Thus, if encoding failure is responsible for the inability of dissociative participants to demonstrate negative priming when in anxiety-provoking contexts, it does not relate to the experimental design or procedures utilized to date, nor to the need (i.e., to avoid distractor threat cues) or instruction to respond quickly to the target stimulus. Something about the context of encoding or retrieval during states of heightened anxiety in DID may account for the effect, rather than the experimental design or procedure.

In short, weakened negative priming in anxiety-provoking contexts in DID may reflect a prime episode encoding problem or a probe retrieval problem. Importantly, anxiety appears to be the key variable, as individuals with DID demonstrate negative priming in non-anxiety-provoking contexts. From an episodic retrieval perspective significant negative priming suggests effective

(1) prime episode encoding of the stimulus-response association (i.e., ‘no response’ to the distractor stimulus) and (2) probe target-cued retrieval of this association. Studies of memory encoding and retrieval with dissociation and threat as independent variables, may provide some insights into an episodic retrieval explanation of the negative priming findings in DID.

## 2.6. *Encoding, threat and dissociation*

For encoding failure to explain the flanker results in the anxiety-provoking context participants must fail to selectively encode the distractor stimulus or their response (i.e., ‘no-response’) to it. Alternatively, they must fail to bind the response with the prime distractor stimulus, so that when the probe target is displayed they do not retrieve the prior response with the target stimulus. Whether the result of (Foa & Hearst-Ikeda, 1999), or merely associated with (Dorahy, 2006; Steele et al., 2007a, 2007b), dissociation, encoding failures have been linked to dissociation. This connection may be especially pronounced during times of increased anxiety.

Brewin and Saunders (2001) attempted to induce the effects of dissociation during the processing of a traumatic film by having participants engage in a divided attention task (sequence tapping) (see Kindt & Van den Hout, 2003, for discussion of the proposed effects of dissociation during processing). Divided attention was used as an analogue for dissociation in this study. The authors hypothesized that dissociation should lead to less distress at the time of the event but greater later intrusions. In contrast, findings showed less intrusions in those in the divided attention group and no difference in post-film distress compared to those simply watching the film. Despite randomization, those in the watch-only group had significantly higher trauma symptoms (as measured by the Impact of Events Scale) following exposure to the film. Therefore, it can be assumed the context was very anxiety provoking. The finding of reduced intrusions in the dual task condition was consistent with the idea that divided attention, when evoked with a tapping task, may not influence verbally accessible representations of the traumatic event, but impact on the encoding of perceptual and imagery representations (thus reducing later intrusions). According to Brewin’s dual representation theory, traumatic memories are encoded into two distinct memory systems, one storing a narrative, higher-order account, the other perceptual, imagery, low-order representations of the event (Brewin, 2003, 2005; Brewin et al., 1996). It is the failure to further process these latter representations that is argued to lead to intrusive symptoms (Brewin et al., 1996; Ehlers & Clark, 2000). Brewin and Saunders (2001) argued that the tapping task disrupted perceptual-based processing, producing less encoding of the traumatic stimuli at this level of representation, and subsequently fewer later intrusions.

As those in the dissociative condition seemed to have fully encoded the memory in a manner which allowed fuller processing and ergo less subsequent intrusions, it may in the absence of contradictory indicators and extrapolating somewhat, be assumed that they would fully encode the prime ‘no response’ directive with the distractor stimulus in a flanker task. Thus, this

study would not suggest that encoding failure could explain the DID findings.

Nonetheless, it must be acknowledged that methodological issues preclude making strong statements about the flanker task findings on the basis of the Brewin and Saunders (2001) study. For example, Brewin and Saunders (2001) used undergraduate (i.e., non-clinical) participants, who may show different encoding effects under stress than clinical dissociators. Further, this study induced dissociation in a manner which the authors suggested is unlikely to be analogous to dissociative processing under threat. The DID studies made no effort to determine if dissociative experiences were occurring during the flanker task. Thus, Brewin and Saunders (2001) used dissociation as a state variable in non-clinical dissociators while the DID studies used dissociation as a trait variable in clinical dissociators. Despite these methodological differences the Brewin and Saunders (2001) study offered no indication to suggest that encoding failure occurred in individuals in an anxiety-provoking context when simulating crude experimental analogues of dissociation.

Holmes et al. (2004) further explored the effects of encoding on later non-voluntary retrieval using both experimental and individual differences manipulations. They utilized the same trauma video footage implemented by Brewin and Saunders (2001) but instead of attempting to experimentally mimic dissociation they examined naturally occurring dissociative experiences evoked during the film. Consistent with Ehlers and Clark's (2000) clinical model and Brewin's own explanatory theory (i.e., Brewin et al., 1996), their results suggest that spontaneous dissociation at the time of encoding, as assessed by a state dissociation measure, may lead to greater perceptual processing (e.g., visual) and less verbal, conceptual processing (studies 1 and 2). Whilst the number stimuli used in most of the negative priming studies in DID are unlikely to evoke dissociative responses, like depersonalization, during processing, the word stimuli designed to manipulation anxiety may do. Yet, even if dissociation during encoding was present for the DID participants in the anxiety-provoking condition, Holmes et al.'s results would indicate that encoding of the prime distractor and basic 'no-response' instructions should occur, even if at worst only at a perceptual level.

In a study that used trait dissociation in non-clinical participants as an independent variable and presented trauma-related words like 'incest' and 'rape,' evidence was found for a failure to encode such stimuli, but only under divided attention conditions (i.e., participants rehearsed word stimuli and also responded by keyboard press to changes in print color; DePrince & Freyd, 2004). A list-presentation directed forgetting task was used. This procedure allows for the encoding of all stimuli as the instruction to 'forget' or 'remember' comes at the end of a word list. A directed forgetting effect (retrieving more remember than forget words) is attributed to the inhibition of list words given a 'forget' instruction. DePrince and Freyd (2004) initially hypothesized that high dissociators may be particularly prone to the inhibition of threat stimuli.

Yet, their results found no interaction between dissociation and instruction, indicating that high dissociators were no more prone to inhibit encoded stimuli. Rather an interaction was

present for dissociation by word category (i.e., neutral vs. trauma related) for to-be-remembered words in the divided attention condition. That is, within the divided attention condition, high dissociators showed reduced recall of trauma words and greater recall of neutral words compared to low dissociators. Such findings in the high dissociator group may be the result of failing to encode trauma-related words (i.e., avoidant encoding) or failing to bind the instruction 'remember' with the word (so that once instructed to retrieve 'remember' words, the stimulus is not activated). The recognition results seem to support the avoidant encoding hypothesis as high dissociators showed a strong trend towards ( $p = .09$ ,  $\eta_p^2 = .07$ ) recognizing fewer trauma and more neutral words than low dissociators in the to-be-remembered condition (the failure to bind stimuli with instruction should not affect word recognition). In short, DePrince and Freyd (2004) found less recall of trauma words in high dissociators during divided attention processing and this result appears related to avoidant encoding of threat stimuli in this group.

In another study DePrince and Freyd (2001) used the item-presentation method in the directed forgetting paradigm, which presents 'remember' or 'forget' instructions following each word stimulus, and thus emphasizes the selective encoding of 'to-be-remembered' words. They found that high non-clinical dissociators *remembered* fewer trauma words and more neutral words than low dissociators in the 'remember' condition during divided attention (i.e., remembering/forgetting presented word stimuli whilst keyboard pressing stimulus color changes). Yet the high dissociator group showed no tendency to avoid encoding threat stimuli, with no interaction found between dissociation and word category for *recognition* in the divided attention condition. Consequently, DePrince and Freyd found evidence of avoidant encoding under divided attention conditions in one study (2004), but not another (2001). Simeon et al. (2005) assessed clinical dissociators using an emotional Stroop task with neutral, dissociation- and trauma-related words in selective and divided attention conditions. They found evidence of encoding failure for all word types in the dissociative group, but only in the divided attention condition. They concluded that a divided attention strategy allows dissociative participants to more effectively avoid stimulus encoding by focusing on stimulus response (i.e., stimulus color). Thus, divided attention may offer a means by which clinical dissociators reduce the impact of distressing environmental stimuli, at the cost of encoding non-threatening information (DePrince & Freyd, 2004; Simeon et al., 2005).

## 2.7. Can encoding explanations explain the flanker findings?

The focus in this section has been whether weakened inhibition exhibited by DID participants in anxiety-provoking contexts could be explained by an episodic retrieval account in the form of distractor stimulus encoding failure or a failure to bind distractor stimuli with response instruction. Are any of these explanations able to account for the flanker data? The author is unaware of any experimental data assessing binding failures of percepts and cognitions with dissociation as an independent variable.



However, Kennedy et al. (2004) have offered a cognitive model of dissociation which suggests that dissociative symptoms are associated with disruptions in integrative information processing at early automatic stages of processing. Binding breakdowns at this level involve the failure to associate different aspects of experience, such as perceptual, cognitive and affective. This binding breakdown is expected to lead to fragmentary encoding and fragmentary re-experiencing, in the form of hallucinatory visual and auditory percepts, and even to trauma-related Schneiderian first-rank symptoms (Kennedy et al., 2004; Kluft, 1987; Ross, Anderson, & Clark, 1995). This type of profound deficit is only expected to emerge in the presence of overwhelming traumatic information. This level of anxiety-provoking context was not present during the flanker studies with DID participants. Hence, although a definitive conclusion is premature in the absence of empirical data, a binding failure of stimulus and no-response tag is not believed to account for weakened inhibition in DID in the anxiety-provoking context.

The cognitive avoidance hypothesis, which suggests an evasion of traumatic stimuli (e.g., Cloitre, 1992), especially by individuals with a higher propensity towards dissociation (e.g., DePrince & Freyd, 2004; Elzinga, De Beurs, Sergeant, Van Dyck, & Phaf, 2000; Foa & Hearst-Ikeda, 1996; See Dorahy & Huntjens, 2007, for discussion) also does not account well for an encoding failure explanation of the flanker findings. One premise of this hypothesis is that early semantic processing identifies distressing, traumatic stimuli and in an effort to reduce its impact, avoids further processing of such stimuli, reducing encoding possibilities. With the prime distractor stimuli in the flanker task being neutral, single-digit numbers, semantic appraisal would produce no motivation to avoid such stimuli. Consequently, with its emphasis on traumatic information, the cognitive avoidance hypothesis would not predict encoding failure of the flanker distractor stimuli.

However, if the *avoidant* processing hypothesis, with its emphasis on threat stimuli, was broadened to a more general *failed* processing hypothesis, an explanatory basis would be provided for lack of prime distractor encoding. Simeon et al. (2005) found a general reduction in the dissociative group to encode neutral, dissociative and trauma words in a divided attention condition. Presumably anxiety levels were elevated on account of the fearful dissociative and trauma words, but encoding disruptions were also present for neutral words. Like the flanker stimuli in the flanker task, these stroop words were distractor stimuli, and therefore attention (to some degree) could be deflected away from them. Yet, unlike the flanker task, the distractor and target stimuli in the stroop task are nested within the one stimulus complex. Consequently, in dissociative patients in what was likely an anxiety-provoking task, Simeon et al. reported general encoding reduction for all stimuli perceived (i.e., not just threat words). Given failure to encode perceived stimuli became a pervasive strategy not limited to threat information in dissociative participants, it is likely that distractors physically separate from target information (i.e., prime distractor stimuli in the flanker task) also fail to be encoded by anxious dissociative participants. Yet, in line with the existing experimental research, and Simeon et al.'s own findings, this would only be likely if partic-

ipants were engaged in dividing their attention (e.g., DePrince & Freyd, 2001, 2004). As a result, Simeon et al.'s findings and a broadening of the cognitive avoidance hypothesis in dissociative participants could account for a failure to encode neutral distractor stimuli in an anxiety-provoking context if divided attention was engaged in during processing.

Whilst divided attention was neither experimentally evoked nor assessed in the flanker studies, there are several reasons to believe it may occur spontaneously in dissociative individuals. First, clinical and non-clinical studies have shown that individuals with heightened dissociative tendencies function more naturally, effectively and efficiently when engaged in divided attention processing (e.g., DePrince & Freyd, 1999; De Ruiter, Phaf, Veltman, Kok, & Van Dyck, 2003; Kihlstrom, Glisky, & Angiulo, 1994; Simeon et al., 2005). Freyd and DePrince (2001) postulated that high dissociators may as a result actively engage in strategies that facilitate divided attention processing. Second, in his theoretical formulation of a dissociative processing style, Dorahy (2006) argues that divided attention processing has become a conditioned processing style in clinical dissociators activated by increases in anxiety/threat monitoring. If spontaneous divided attention was evoked in the DID samples whilst in the anxiety-provoking context (e.g., they were engaged in other self-induced cognitive activities while responding to target words), Simeon et al.'s findings would suggest that failed encoding of prime distractor stimuli is possible. With failed encoding of the prime distractor, no response conflict would be triggered by the probe target stimulus in the 'anxious' context and negative priming would not be present. A direct test of this theoretical proposition awaits.

## 2.8. *Retrieval, threat and dissociation: Can retrieval explain flanker findings?*

Dissociation has long been associated with memory retrieval deficits. For example, in a very detailed and colorful descriptive extension of a DID patient first presented in the medical literature by his phonological namesake (i.e., S. L. Mitchell, 1816), Mitchell (1888) lucidly highlighted retrieval deficits. In noting a switch in dissociative identity following a prolonged sleep, he wrote, "... she awakened, but in a state of unnatural consciousness. Memory had fled ... All of the past that remained to her was the faculty of pronouncing a few words ... Old things had all past away; all things had become new. Her parents, brothers, sisters, friends, were not recognized or acknowledged as such by her. She had never seen them before—never known them—was not aware that such persons had been" (p. 25). Dramatic as well as more subtle illustrations of amnesia following an alteration in identity in DID are abundant in the clinical literature (e.g., Putnam, 1989; Ross, 1989) and routinely observable in the clinical setting. Amnesia in DID is generally understood as a between rather than within identity phenomena, with experimental findings tending to show no retrieval deficits for information learned and recalled in the same identity (e.g., Eich, Macauley, Loewenstein, & Dihle, 1997). Even in their experimental assessment of autobiographical retrieval failure within a dissociative identity, Schacter, Kihlstrom, Kihlstrom,

and Berran (1989) offered a between-identity explanation (i.e., the personality assessed in adulthood was different to the personality that encoded childhood memories). Different degrees of amnesia have been proposed to characterize the relationship between dissociative identities. These could range from complete amnesia to co-consciousness (e.g., Ellenberger, 1970; Spiegel, Frischholz, & Spira, 1993). Where complete amnesia is thought to exist between identities the information encoded and stored in one identity is proposed to be unavailable for willed retrieval by the other identity. Theoretical models utilizing state dependent memory or the encoding specificity hypothesis have been proffered to explain interidentity amnesia (e.g., Bower, 1994; Putnam, 1995, 1997; see Dorahy & Huntjens, 2007).

*Theoretically*, this understanding can be used to account for the DID flanker findings. In the anxiety-provoking experimental context identity A encodes and stores the prime flanker and response tag, and identity B, ‘amnesic’ for the content of identity A, is evoked after the prime trial and responds to the probe. Failure of the episode encoded by identity A to cross the ‘amnesic barrier’ to identity B produces no negative priming. It is highly unlikely that such an explanation could ever account for the DID flanker findings. For one, alterations in identity are often associated with threat, and threat stimuli were presented *before* the prime trial. Consequently, it seems improbable that an identity alteration would occur *after* the prime trial (i.e., between prime and probe), and following the presentation of neutral (i.e., number) stimuli. More important, there is no indication in the DID clinical literature that identity alterations could be so accurately timed and precise when spontaneously activated. Precise, spontaneous alterations in identity to neutral stimuli are improbable in one individual, let alone a whole sample, particularly given the individual differences and variations so often noted in the triggering of identity alterations (Loewenstein, Hamilton, Alagna, Reid, & deVries, 1987).

Finally, a negative priming effect from an episodic retrieval perspective requires the retrieval of not only the prime distractor, but as importantly the response (i.e., no-response) instruction bound to that stimulus piece. The conscious retrieval in the probe trial of the prior response code is not required to produce negative priming, nor would it typically occur. Consequently, negative priming as explained by episodic retrieval can be understood to be a product of the implicit influence of prior learning (Schacter, Chiu, & Ochsner, 1993). No empirical studies to date have found deficits in implicit retrieval across ‘amnesic barriers’ separating two dissociative identities (e.g., Eich et al., 1997; Huntjens, Postma, Hamaker, Woertman, & Van der Hart, 2002; Nissen, Ross, Willingham, Mackenzie, & Schacter, 1988; Peters, Uytterlinde, Consemulder, & Van der Hart, 1998; see Dorahy, 2001, for review), even for threat stimuli (Huntjens et al., 2005).

No empirical evidence or supposition of logic supports the ‘switching’ hypothesis, a formulation unique to DID, as an account of the DID flanker findings. Therefore, it can be concluded that reduced negative priming in anxiety-provoking contexts is unlikely to be idiosyncratic to DID, but present in all pathological dissociators. Whilst further research may inform

the current conclusion, it seems at present that retrieval deficits cannot effectively explain reduced negative priming in DID samples when assessed in anxiety-provoking contexts.

### 3. Conclusion

If weakened negative priming in DID in anxiety-provoking contexts is robust enough to persist in statistically more powerful studies and proves to be both generalizable and reliable, it must be accounted for by something specific to the interaction between dissociation and anxiety. Non-dissociative clinical samples (GAD and depression) have not shown the same effect (Dorahy et al., 2005, 2006) and dissociative clinical groups do not demonstrate this effect when anxiety is not manipulated experimentally (Dorahy et al., 2004a, 2004b). Interpretations of weakened negative priming in anxiety-provoking contexts in DID have relied on an inhibitory account (Dorahy et al., 2005, 2006), where the cognitive concomitant of heightened anxiety is construed as reduced inhibition (Dorahy, 2006). This idea has prompted a line of reasoning which suggests that weakened inhibition may be adaptive for dissociative individuals in threat contexts. Arguably, weakened inhibition increases the depth of processing given to non-focal stimuli and thereby increases the speed of detection and orientation to threat cues (Dorahy, 2006). With the empirically solid connection between childhood relational trauma and dissociative disorders like DID, reduced inhibition may reflect one aspect of preparedness to threat in dissociative individuals which assists threat identification. It has been argued elsewhere, that despite the potential for faster orientation to threat on account of weakened inhibition, more rapid threat detection may not transfer to quicker responses in dissociative individuals (Dorahy, 2006; Dorahy et al., 2005).

The inhibitory account has several clinical implications. For example, with heightened dissociative experiences related to weakened inhibition, strengthening inhibitory ability may assist in the management of overlearned dissociative responses. Cognitive exercises designed to increase selective attention and promote awareness in the present moment, such as mindfulness training, may strengthen inhibitory abilities and reduce dissociative episodes. Such interventions have yet to be tested, but may prove to be particularly helpful in managing dissociative episodes in the relatively early stages of therapy for complex trauma disorders, before memory (trauma) work can begin and dissociative responses can be rendered redundant.

The episodic retrieval account of negative priming offers another way in which negative priming results in dissociative samples can be understood. With its reliance on encoding and retrieval, negative priming from an episodic retrieval point of view is accounted for by memory processes. Understanding negative priming findings in dissociative individuals through the use of memory processes is consistent with the strong clinical, theoretical and empirical traditions of viewing memory as central to the understanding of dissociation. A dominant narrative, especially in the pathological literature, is the relationship between dissociation and psychologically-derived retrieval

deficits (e.g., APA, 2000; Elzinga, Phaf, Ardon, & Van Dyck, 2003; Huntjens, Postma, Peters, Woertman, & Van der Hart, 2003; Nissen et al., 1988; Schacter et al., 1989). More recently encoding deficits have been highlighted in dissociative individuals, particularly during heightened stress (Cloitre, 1992; DePrince & Freyd, 2004; Foa & Hearst-Ikeda, 1996; Simeon et al., 2005). Nonetheless an episodic retrieval account of reduced negative priming in DID in anxiety-provoking contexts would implicate encoding, binding or retrieval processes. Despite the relationship between dissociation, anxiety and memory being an infantile area of experimental investigation, some tentative conclusions for the flanker findings from an episodic retrieval perspective can be drawn based on this review and current empirical knowledge. In the absence of overwhelming affect during encoding, there seems little reason to believe that the response instruction ('no-response') would not bind to the prime distractor stimulus piece. Moreover, there appears no indication that dissociative individuals should experience the implicit retrieval deficits required to render the bound prime distractor stimuli and its non-response directive unretrievable. Consequently, binding failure or retrieval deficits are not believed to account for weakened negative priming in DID in anxiety-provoking contexts. In a small literature base encoding failure has been related to dissociation, especially when engaged in divided attention processing. When presented in a divided attention condition with neutral and threat words, creating an anxious context, dissociative individuals show a general reduction in encoding (Simeon et al., 2005). While encoding failure is not dissociation (e.g., Dorahy, 2006; Holmes et al., 2005; Steele et al., 2007a, 2007b), it is argued to be associated with it, and is proffered from an episodic retrieval perspective as the most likely reason dissociative individuals demonstrate reduced negative priming in anxiety-provoking contexts.

Tipper (2001) has argued that determining whether inhibition or episodic retrieval is the best account of negative priming is "misplaced" (p. 329). He argued that the inhibition account has focused primarily on selection (i.e., prime trial processing) to the detriment of retrieval (i.e., probe trial processing), while the episodic retrieval account has had the opposite focus, concentrating on probe retrieval processes to the relative neglect of prime selection processes. He suggests that both inhibition and retrieval processes play a role in negative priming. Inhibition assists in the selection of target from distractor stimuli, and this inhibitory processing is encoding with the distractor stimuli. Retrieval of the prime trial distractor along with the inhibitory processing that characterized it, is cued by the probe target in ignored repetition conditions. Overcoming the mismatch between inhibitory and excitatory processing creates negative priming. From this viewpoint, inhibition aids selection, but makes little contribution to negative priming unless retrieval mechanisms activate prior inhibitory processing associated with the probe target stimulus. The current review suggests that prior inhibitory processing is not retrieved with probe target presentation in anxious dissociative individuals because the prime distractor stimulus is prone to encoding failure. The importance of studying the actual mechanism or mechanisms of negative priming in dis-

sociative individuals is underscored by the fact that negative priming seems to be an important cognitive marker associated with the interaction between dissociation and anxiety.

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