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**New paradigms in theory building and offender assessment: the pictorial  
modified Stroop task and the Implicit Association Test**

**Caoilte Ó Ciardha, Ph.D.**

**Overview**

There is a growing trend in research relating to sexual offending to look beyond the surface cognitive products of offenders and to attempt to understand the cognitive structures and processes that underpin offending behaviour. Theory building and the application of a new understanding of these structures and processes will be hampered without valid and reliable paradigms with which to test hypotheses regarding the cognitions of offenders. Indirect measures offer potential as adjuncts to more established methods of exploring the cognitive processes of individuals. This chapter focuses on two measures in particular; the IAT and the pictorial modified Stroop task. The chapter summarises my own findings with these two tasks before discussing the implications of these findings for broader research involving indirect cognitive tasks applied to sexual offending.

**Introduction**

While it is often reported that sexual offenders against children do not need to have a deviant sexual interest in children in order to offend, it is sometimes forgotten that deviant sexual arousal is almost certainly necessary in offending. Even where a sexual assault does not include an erectile response there is likely to be a degree of psychological arousal present. Offenders, therefore, may not have an ingrained stable deviant sexual interest but may find themselves deviantly aroused at the time of the

offence. This arousal would not necessarily be replicable using plethysmography etc. We can consider an ingrained stable deviant sexual interest as an offence facilitative cognitive structure. In truth it is likely to involve a complex network of structures and probably cognitive processes as well. Deviant arousal on the other hand can be considered a cognitive (and usually also a physiological) product. If the cognitive product of deviant arousal can emerge in offenders who hold non-deviant sexual interest as well as those holding deviant sexual interest then deviant arousal must be capable of emerging from other cognitive structures and processes, not just those associated with an individual's ingrained sexual interests. In order to be able to explore the cognitive structures and processes implicated in offending behaviour, there needs to be a consensus regarding the value and role of different experimental paradigms. The arguments made in this chapter do not draw a distinction between deviant interest (or arousal) towards pre-pubescent and post-pubescent children, though the inclusion of this distinction in the debate may prove useful in the future.

### **The need for new paradigms in theory building and offender assessment**

Social deficits, emotional problems, cognitive distortions and deviant sexual interest are implicated by many theorists as state factors (e.g. Ward & Beech, 2006) in offending. Ward and Beech (2006) hypothesise that deficits in neuropsychological functioning interact with ecological and situational factors to bring about these state factors. If deviant sexual interest is not a major factor in the offending process of one offender, then situational deviant arousal is likely to emerge from the other state factors and the traits that underpin them. In a similar way state factors could interact with each other in many ways to produce offence-facilitative cognitive or behavioural products such as the misinterpretation of childish behaviour as sexual (cognitive) or

substance abuse relapse (behavioural). Understanding the interaction of state factors in offending will be a further step in refining integrated theories of sexual offending like that proposed by Ward and Beech (2006). Tasks adapted from the cognitive psychology literature, used in a sophisticated manner may allow researchers to build up a picture of these interactions.

Until relatively recently, the overwhelming majority of research on sexual offending focused on the surface manifestations of state factors, i.e. behavioural, physiological and cognitive products. However there is an increasing focus in recent years on methods of assessment that may be able to delve deeper into the cognitions associated with these factors (Gannon & Polaschek, 2006). The broad field of cognitive psychology offers a variety of techniques that may be adapted to the exploration of the phenomenon of sexual offending. Among the techniques already under investigation are the Implicit Association Test (Banse, Schmidt, & Clarbour, 2010; Brown, Gray, & Snowden, 2009; Gray, Brown, MacCulloch, Smith, & Snowden, 2005; Mihailides, Devilly, & Ward, 2004; Nunes, Firestone, & Baldwin, 2007), the modified Stroop task (Ó Ciardha and Gormley, under review A; Price & Hanson, 2007; Smith & Waterman, 2004), the choice reaction time task (Giotakos, 2005; Gress, 2008), viewing time (Abel et al., 2004; Glasgow, Osborne, & Croxen, 2003; Gress, 2005; Harris, Rice, Quinsey, & Chaplin, 1996; Laws & Gress, 2004) and rapid serial visual presentation (Beech et al., 2008). The utility of many other tasks have not yet been explored.

The development of such indirect task for use in the study of sexual offending may serve two main purposes. The first, as mentioned, is to allow researchers and theorists

to explore beyond the surface products of various state factors in an attempt to further understand how such factors may interact or uniquely contribute to offending behaviour. For example they may allow the development of more sophisticated testable hypotheses regarding the interaction between cognitive distortions and deviant sexual interest. An example of such a research question might be to explore whether offenders without a strong deviant sexual interest have more pronounced distorted implicit theories that may be driving the offending behaviour. In short, a sophisticated battery of measures in addition to existing (surface) measures and the normal clinical relationship may allow us to build up a fuller theoretical understanding of the relative contributions of different factors we hypothesise to be implicated in offending. The second purpose served by the development of indirect tasks for use with offenders is their potential, once validated, in the assessment of offenders. If found to be reliable and valid, some of these measures could offer insight regarding treatment targets, risk, treatment efficacy, and more. It should be stressed, however, that the adaptation of indirect tasks for assessment use needs to be placed on a firm theoretical footing. Before using them clinically with offenders, we need to reach a consensus about what they are measuring and also regarding the best methodology for the tasks.

The current literature focuses mainly on the potential of implicit or indirect tasks to tap into deviant sexual interest. Mihailides et al (2004) was the only study that explicitly set out to explore cognitive distortion, in the form of Ward and Keenan's (1999) implicit theories. Sexual interest offers an accessible starting point in demonstrating the worth of cognitive tasks since findings can be compared with and possibly validated against evidence from penile plethysmography, clinical evaluation,

self-report and behavioural/offence characteristics. However, these tasks offer a wider potential as well. But first they need to have their utility established along with their validity and reliability and a theoretical context in which to interpret findings.

### **Specific tasks with potential**

As mentioned, a growing number of indirect tasks are being applied to the investigation of sexual interest, both deviant and non-deviant (IAT, viewing time, CRT tasks, modified Stroop tasks, RSVP tasks etc.). Penile plethysmography (PPG) may also be seen as an indirect task since it is attempting to measure sexual interest indirectly through the measurement of physiological arousal. While many different approaches offer potential this chapter focuses on two in particular; the IAT and the pictorial modified Stroop task. The chapter will outline the results of a series of studies using both measures and will briefly talk about the CRT task as well as it features in one of the studies summarised.

This chapter concentrates on the IAT and the pictorial modified Stroop task for several reasons. First is the pragmatic reason that these tasks have been the focus of my own research to date. Second is that the processes involved in both tasks are theoretically quite different. The IAT is an associative task, whereas the pictorial modified Stroop task involves placing a demand on attentional processes. This difference is demonstrated by the fact that the IAT involves a speeding up of responses when stimulus pairings are presented to the participant that they find congruous, while on the other hand a modified pictorial Stroop task involves a slowing down of responses to salient images (taken to indicate an attentional bias towards that stimulus category). This difference allows an a priori assertion that the

tasks are truly different in either the cognitive processes or structures that they are tapping into. Similarly to the pictorial modified Stroop task, the CRT involves the interpretation of slowed reaction times to certain stimuli. As will be discussed, however, there may be some interesting differences between a CRT task and the pictorial modified Stroop task.

**The Implicit Association Test (IAT).** The IAT (Greenwald, McGhee, & Schwartz, 1998) is an indirect method that attempts to measure the strength of associations between concepts (Nosek, Greenwald, & Banaji, 2007). It involves sorting individual stimuli into one of four categories with the use of only two buttons. Therefore, two categories have to be paired on each button. The logic behind the task revolves around the assumption that it should be easier to carry out the task when the concepts that are paired are associated in the participant's cognitive structure than when they are not associated. Thus the task would be easier for most people if the concepts of flower and pleasant were paired than if insect and pleasant were paired since for most people the former two concepts are clearly more closely associated than the latter two concepts. Versions of the IAT has been used recently to explore its utility in the study of sexual interest and distorted cognition among offending and non-offending participants (Banse et al., 2010; Brown et al., 2009; Gray et al., 2005; Mihailides et al., 2004; Nunes et al., 2007; Ó Ciardha & Gormley, 2009; Snowden, Wichter, & Gray, 2008). While many of these IAT tasks have differed quite significantly in methodology, the published IAT results have typically demonstrated that the task can demonstrate group differences, which suggests the task is indirectly tapping into sexual interest.

The fact that the task seems to be picking up on the strength of associations between certain concepts indicates that schemas are likely to be underpinning the effect. However since schemas related to sexual interest are likely to be complicated and multifaceted in their associations it remains unclear whether an IAT designed to measure a component of that network of associations might not be discreet enough to measure anything other than the orientation. Consider the following example: An IAT designed to examine Ward and Keenan's (1999) children are sexual beings implicit theory would be seeking to see whether there were associations in the offender's thematic network of children's ability to decide about sex, their interest in sex etc. In order to test this, the IAT would have the concepts of child and also sex or sexual. An offender who held the cognitive distortion might show an IAT effect. However an offender who doesn't have the children as sexual beings distortion but does have a sexual interest in children along with an entitlement implicit theory (i.e. the offender does not see the child as sexually curious, receptive or capable but will use them for sexual gratification regardless) could still show an association between sex and children. It is probable therefore that the IATs will measure an overlap between cognitive distortions and sexual interest, though it is likely that much of this overlap is a result of how sexuality, both deviant and non-deviant is represented in cognition.

**The Pictorial Modified Stroop Task.** The (traditional) Stroop task is a very common task used to demonstrate the individual's tendency to automatically read words. When the words presented are names of colours, this tendency to read interferes with the participant's ability to name the colour of the fonts in which words are presented when these font colours and colour names are incongruous. In this way the task demonstrates a conflict between a to-be-ignored stimulus (i.e. the colour



names) and a to-be-attended-to stimulus (i.e. the font colour). The modified Stroop task uses a similar design to explore whether certain salient stimuli can interfere with the participant's ability to quickly name the colour font. This paradigm has been used to demonstrate many different types of attentional bias; e.g. the reaction of violent offenders to words relating to aggression (Smith & Waterman, 2003), attention to alcohol related words among drinkers (Cox, Yeates, & Regan, 1999), responses to gambling related words among gamblers (Boyer & Dickerson, 2003), and many more. The pictorial modified Stroop task simply uses pictorial stimuli instead of words and asks the participant to name the colour in which that picture is tinted (or the colour of a border surrounding the image in some designs). Ó Ciardha and Gormley (2009) showed that this design is likely to be tapping indirectly into the sexual interest of normal (non-offending) participants. The results of this study are summarised later in this chapter (labelled Study 1)

A pictorial modified Stroop task using potentially sexually salient stimuli is designed to produce a sexual content induced delay, much as the choice reaction time (CRT) task is. In this way it should operate as a fairly simple indirect measure of sexual interest. If one tries to locate its temporal location on Spiering Everaerd, and Laan's (2004) information processing model of sexual arousal, Stroop interference would probably be occurring at two points. The first would be at a pre-attentive stimulus encoding stage and would be responsible for any so-called fast component in the Stroop. A fast component is an interference effect of stimulus content that is apparent on an individual trial, where the attention has been 'grabbed' (McKenna & Sharma, 2004). It is also possible that this is not a truly pre-attentive process but occurs at early point of the attentive stage where the experience is not yet subjectively

available. A slow effect, on the other hand operates between trials (McKenna & Sharma, 2004). It is related to the higher order rumination of the stimuli content and possibly to the activation of associated concepts related to that stimulus category. This is likely to occur during the attentive stage of sexual arousal described by Spiering et al. (2004). While involving a conscious and possibly subjectively available experience this process would not be as subjective an experience as that of a viewing time task, for example. The series of studies outlined below gave some consideration to whether the pictorial modified Stroop task was driven by fast or slow effects. If fast components exist a randomised presentation of stimulus types should still yield an effect, whereas an effect driven by slow effects should be more apparent when similar stimuli were blocked together.

**The Choice Reaction Time Task.** Wright and Adams (1994) used a choice reaction time (CRT) paradigm, where participants had to identify the location of a dot situated on slides of nude males, nude females or neutral scenes, and found that 95% of participants (male and female) showed increased response latencies in line with their stated sexual preference. The same authors later replicated their findings and demonstrated that clothed images yielded a similar but weaker pattern of results (Wright & Adams, 1999). Giotakis (2005) adapted the CRT paradigm for use with rapists, child molesters and controls and was able to demonstrate the potential of the procedure through identifying group differences between offenders and controls. Gress (2008) found unclear results using a CRT task with adult sexual offenders, youth non-offenders, and university students. A viewing time measure administered for comparison yielded clearer group differences than the CRT measure. Gress interprets this result in light of methodological concerns with the CRT. All the CRT

tasks mentioned used randomised stimulus presentation. On the face of it the CRT task seems a very similar task to the pictorial modified Stroop in that to-be-ignored pictorial stimuli are competing with to-be-attended to stimuli and that a delay in responding to a certain stimulus type is interpreted as indicative of an attentional bias (or sexual interest in the case of potentially sexually salient stimuli).

**The relationship between the IAT, pictorial modified Stroop and CRT tasks.** It has already been suggested that the pictorial modified Stroop task (and the CRT task) is a measure of sexual interest based on the fact that sexually salient stimuli will induce a delay or an increase in attention as a component of the sexual arousal process. In addition it was suggested that an IAT would demonstrate a facilitation effect when concepts that are associated with sex in the sexual schema of an individual are paired together in the tasks. Given that cognitive distortions/implicit theories relating to sex and sexual interest are likely to overlap considerably there is likely to be considerable overlap between a Stroop task designed to assess sexual interest and an IAT designed to assess sexual associations. There is also likely to be overlap between both types of measure since neither is likely to be a 'pure' measure of association or interest. The degree of convergence or divergence between the results of the IAT and the pictorial Stroop task (and later the CRT task) may give some indication of the differences between the processes/structures being measured by the tasks. However, it may be that the tasks lack sufficient refinement to give such an indication.

**A summary of research findings**

The research summarised in this section is from a series of studies contributing to the author's doctoral thesis. Where individual studies have been published or are under review, this is highlighted in the text. All studies are included in the doctoral thesis (electronic copy available on request; Ó Ciardha, 2010)

**Study 1.** The first study (Ó Ciardha & Gormley, 2009; Ó Ciardha and Gormley, under review A) piloted the pictorial modified Stroop procedure and two Implicit Association Tests, the Gender-Sex IAT and the Age-Sex IAT. The pictorial modified Stroop task used images of adults and children in bathing suits tinted over in four colours (red, green, blue, and yellow). Stimuli were taken from the Not Real People image set (NRP; Laws & Gress, 2004) or were created by the author by morphing different images together. Control images were of large cats. Stimuli were blocked together by type; i.e. adult male images were all presented as one block, as were adult females, child males etc. The Gender-Sex IAT stimulus categories were of male and female words along with sexual and furniture (control) words. The inclusion of a control category instead of an opposite to sex category was because we believed that it would be difficult to create a coherent category of non-sexual words. This issue is addressed in more detail in Ó Ciardha and Gormley (2009). Study 5 (summarised below) explores this issue a little further. The Age-Sex IAT included the same sexual and furniture categories but these were paired with concept categories of adult and child.

The study found that both the pictorial Stroop and the Gender-Sex IAT significantly discriminated between gay and straight non-offending participants. Both also correlated with each other and produced greater accuracy in classifying participants

by sexual orientation when used together. Results of the Child-Sex IAT, suggested that there was no difference between the strength of participants' child-sex and adult-sex associations. This may have indicated that the task was not performing as expected. Alternatively, the results may have also indicated that individuals for whom sexuality and children are not problematic may simply not have strong schema relating to age and sex.

**Study 2.** The second study used a clustered version of the pictorial modified Stroop task (Ó Ciardha & Gormley, under review A) and two IATs, which were identical to the IATs used in study 1, with a sample of offenders against children from a community treatment centre and a prison setting. Clustered presentation meant that adult male images, for example, were still presented together but were now in several smaller blocks of stimuli. The results of the study indicated that the pictorial modified Stroop task identified differences on a group level between the patterns of responding of those participants most likely to demonstrate a sexual interest in children (extrafamilial offenders and those admitting a sexual interest in children) and those least likely (intrafamilial offenders and control participants). However, when looked at on an individual level the results of the study did not reliably discriminate offenders from non-offenders. So while the task showed promise in identifying group differences, it lacked sufficient accuracy to categorise individual participants according to predicted sexual interest. It should be noted that making predictions about the sexual interests of offenders and non-offenders based on sexual/offence histories and self-report is fraught with difficulties.

The results of the Child-Sex IAT in study 2 indicated that a strong effect of order of trial type presentation may have been moderated somewhat in line with the hypothesis that offenders would have an association of the concepts of child and sex. While these were suggestive of an influence of group (i.e. offender vs. control), the results were inconclusive, due to an influence of order of trial type presentation. This order effect, which was found for both IATs, had not been found in study 1. The lack of an order effect in study 1 may have been due to the fact that the sample were relatively homogenous and typically young, computer literate, and highly educated. The study 2 participants, on the other hand, were typically older, less educated, and had less computer experience. Thus, switching between different task configurations in the IAT may have proved more challenging to this group of participants.

**Study 3.** The third study in the series explored the utility of a pictorial modified Stroop task and its relationship to penile plethysmography (PPG) results using a sample of child molesters and rapists from the Sand Ridge Secure Treatment Center (SRSTC). The tasks were part of a larger multi-method study conducted at the SRSTC (Thornton, McKee, & Ó Ciardha, 2009). It should be noted that the pictorial modified Stroop task used in this study did adopt some clear methodological differences to those used in the other four studies. Results of the PPG measure in this study suggested that the child molesters and the rapists who participated in this study did not differ greatly in terms of their overall arousal response to underage stimuli (with the possible exception of preschool aged children). Among offenders who reached a clinically significant level of arousal, as measured by PPG, child molesters did differ from rapists in their arousal responses but this difference was mostly explained by lower arousal to adult stimuli among molesters rather than a greater

arousal to underage stimuli. The pictorial modified Stroop task also showed a degree of similarity between both offender types, with a matching pattern of longer reaction times to older stimuli. The pictorial modified Stroop task used in this study was not able to differentiate between child molesters and rapists and did not demonstrate a clear relationship with the PPG. While measures of gender preference for both tasks did correlate with one another, other indices or responses to individual stimulus types did not.

**Study 4.** The fourth study (Ó Ciardha and Gormley, under review B) compared the results of three versions (blocked, clustered and random) of the pictorial modified Stroop task using a sample of straight participants. Results indicated that when stimuli were presented in a blocked design, the pictorial Stroop task produced larger effects than both the random and clustered designs. The clustered design also produced a significant difference between responses to adult male and female stimuli though with a smaller effect size than that of the blocked design. Randomised stimulus presentation did not produce a significant effect. While demonstrating a strong case for the use of a blocked design in such experiments the risk of order effects is a cause for concern, if one is considering the utility of these tasks for individual assessment. Since participants typically improve over the course of the task, the order in which blocks are presented could potentially exaggerate or mask effects.

**Study 5.** The fifth study (Ó Ciardha and Gormley, under review C) explored the relationship between a blocked pictorial Stroop design and a blocked CRT task. It also compared both these tasks with a pictorial Gender-Sex IAT that used a non-

sexual category instead of the neutral category adopted in studies 1 and 2. The study found that a blocked version of the CRT task did not clearly tap into sexual orientation. There was very little evidence for any effect of sexual interest on the task. The study found that an IAT that used an opposite to sex category and pictures of males and female as the gender category stimuli was able to predict sexual orientation with a high degree of accuracy. This IAT performed better in categorising participants by sexual orientation than the IATs in previous studies.

Interestingly a pictorial Stroop design that was not preceded by a traditional Stroop task did not seem to perform as well as the one that was used in previous studies. All previous studies had included a traditional Stroop task in order to allow participants to get used to the task and also to compare differences in cognitive speed across groups. The pictorial modified Stroop task performed better when it it was presented to participants last rather than first in the battery of tasks. As with study 1, the IAT and pictorial Stroop tasks were significantly correlated.

### **Interpreting the results**

Taken together the results of the series of studies indicate that both the pictorial modified Stroop task and the Implicit Association Test are capable of tapping indirectly into the sexual interest of participants. It is clear also that subtle methodological differences are important when it comes to maximising the size of the effects found. Importantly, the findings of the studies that looked specifically at the performance of offenders using these tasks demonstrated compelling but ultimately inconclusive findings. This suggests that further refining of these measures is needed to establish their utility as research or assessment tools for use with offenders.



**What are the tasks measuring?** These studies were based on the hypothesis that the pictorial modified Stroop task measures attentional components of the arousal process. It was also suggested that the CRT task taps into this process. On the other hand it was suggested that the Gender-Sex and Age-Sex IATs measure schema that may be related to sexual interest. Therefore, while both the pictorial modified Stroop task and the IATs (and later the CRT task) were hypothesised to be indirect measures of sexual orientation or sexual interest, it was suggested that both are measuring separate processes/structures that typically correspond to orientation/interest.

The results of the studies, taken as a whole, did not disprove this theory. However, the results provided only limited support for it. Evidence in favour of the suggestion that both are measuring different structures or processes would come from a clear agreement between results of the different tasks in cases where, theoretically, there should be no conflict between schema, arousal and self-reported sexual interest, i.e. control participants. There should also be a disagreement between tasks in some cases where there is a potential disagreement between schema and arousal and, possibly, self reported sexual interest. An example of this would be cases where offenders hold the “children as sexual beings” implicit theory (Ward & Keenan, 1999) but do not have a sexual interest in children or vice versa. In the absence of a validated objective measure to indicate the presence of distorted implicit theories surrounding sex with children, an exploration of this question was relying on both the Stroop and the IATs to demonstrate clear group differences between non-offenders and offenders. Having a large number of offenders demonstrating a Stroop effect towards children, consistent with offence characteristics and admitted sexual interest in children, and a

large number of offenders demonstrating a child-sex association in the Age-Sex IAT would facilitate a discussion on what degree of overlap there was between the two measures. A large amount of overlap would indicate that both were in fact measuring the same thing or that schema and arousal were closely matched in this sample. Less overlap would suggest that both were measuring separate things. Unfortunately, the IAT results in study 2 were not clear enough for such a comparison. In addition, if either the Age-Sex IAT or the pictorial modified Stroop scores were taken as a 'pure' measure of sexual interest/associations towards children, the current studies' findings would be indicating that many of the control participants have such 'deviant' interests or associations. While, it is not unlikely that some control participants would have deviant sexual interests or distorted cognitions relating to children, it is more likely, given the numbers involved, that the tasks used in study 2 did not have sufficient sensitivity or specificity to adequately discriminate those who did from those who didn't.

**An overlap between tasks?** Despite the difficulties highlighted above in determining the relationship between the Stroop task and the IATs, some of the other results of the various studies do shed light on the relationship. Both studies 1 and 5 found a correlation between the results of the Stroop task (for adult stimuli responses) and the Gender-Sex IAT. The correlation was between medium and large, depending on the method of calculation (and on task order in the 5<sup>th</sup> study), but no greater than  $r = .6$ . Both the Stroop and the IAT significantly predicted sexual orientation in both studies and in both studies a logistic regression indicated that both scores combined had a better ability to classify participants by their sexual orientation. These findings

are consistent with the theory that both measures are measuring distinct constructs that are likely to largely agree in the case of control participants.

However, the findings are also consistent with the alternative explanation, that both the IAT and Stroop task are measuring the same construct but contain a certain amount of error. This explanation is unlikely given the difference between the two tasks, i.e. that one measures a slowing down in response to certain stimuli, while the other measures a speeding up. There is no clear evidence however, from the current findings that discounts this alternative totally. The complete lack of an Age-Sex IAT effect in study 1, despite the fact that the task was almost methodologically identical to the Gender-Sex IAT and despite the fact that the pictorial modified Stroop task measured a bias towards adult images in that study suggests a certain divergence between the underlying cognitive constructs/processes being measured by both the IAT and the pictorial modified Stroop paradigms.

It was suggested earlier that the pictorial modified Stroop task is measuring an attentional component of the arousal process. This chapter uses the information processing model of arousal hypothesised by Spiering et al. (2004) to theorise how this attentional component might relate to other components of the arousal process. It was expected that there would be a relationship between the results of the pictorial modified Stroop task and sexual arousal as measured by the penile plethysmograph (PPG). Study 3 found little by way of a clear relationship between the measures. A gender preference index calculated for both tasks did correlate and both indicated a similar pattern of responding for both rapists and child molesters. Neither was able to significantly predict group membership (i.e. rapists or child molesters), though the

PPG result was approaching significance for participants with clinically significant arousal levels, and both were almost equivalently successful in discriminating offenders against males only from offenders against females. Despite this, when the two measures were broken down into response times and arousal towards different categories of sexual partner/victim there was no clear pattern of correlation between the tasks.

While this result, runs counter to the hypothesis that both tasks would be clearly related, further studies involving the two measures would need to be conducted before a more solid conclusion could be drawn. Although the pictorial modified Stroop task from study 3 used the same stimuli as has been used previously, it was programmed in a different institution, using different stimulus presentation software and included some design changes. One of these design changes involved the method of responding to the task. In the SRSTC pictorial modified Stroop task participants responded to the images by selecting one of four coloured buttons on the screen using the mouse. Selecting on-screen responses via mouse may influence the manner in which the participant attends to the stimuli. While the pictorial modified Stroop task used in the study was clearly able to tap into sexual interest, methodological issues may have impacted on the strength of that effect and thus the strength of the relationship between that effect and the PPG results. In addition, the fact that the PPG was not able to identify group differences between the arousal towards underage stimuli between a sample of rapists and child molesters may indicate that there could be certain concerns about the reliability of those PPG results in this case.

**Fast versus slow effects.** As mentioned above, it was suggested that the pictorial modified Stroop task was tapping into the attentional components of the arousal process<sup>1</sup>. It was suggested that this attentional component could influence the pictorial modified Stroop effect in three ways. First, a so-called ‘fast’ effect could occur when the participant’s attention is grabbed during a pre-attentive stimulus encoding stage. Second, there could be so-called ‘slow’ effects involving a slowing down of responses to subsequent tasks as result of the initial attention grabbing ‘fast’ effect. The likely cause of this would be that the demands of processing the original image would impact on the processing of any subsequent stimuli. Third, there could be additional slow effects as a result of higher order rumination or the activation of associated concepts surrounding the type/category of stimuli that are being presented at the time.

The results of study 4 which compared a random, clustered and blocked design, taken with the results of studies 1, 2 and 5 indicate clearly that a blocked pictorial modified Stroop yielded the most robust effect. Taken together, these indicate that it is the higher order rumination or activation of associated concepts that drives the pictorial Stroop effect more so than fast or carry over effects. If fast and carry-over effects were sufficient to explain the phenomenon there would be very little difference between blocked and clustered performance. If fast effects alone were sufficient there would be very little difference between all three designs. It is not clear from the current series of studies what role, if any fast and carry over effects play or whether rumination etc. is sufficient to explain the entire phenomenon.

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<sup>1</sup> Clearly any assumed link between the pictorial modified Stroop task and arousal must take into account the limited relationship between the task and PPG results in study 3.

**A possible qualitative difference between child and adult stimuli.** There may be a difference between what is being measured by the pictorial modified Stroop task when adult images are presented versus when child images are presented. While the findings of the various studies demonstrate quite clearly that an individual's pattern of responding is typically quite indicative of their sexual interest, individual responses to child stimuli can vary quite considerably, even among control participants. While, it is possible that deviant sexual interest is quite widespread and may, indeed, explain some of the responses observed, an alternative or additional explanation would seem necessary to explain the phenomenon more fully. It is possible that individual responses to child stimuli are contributed to by factors other than arousal-related attention. Indeed, it is likely that this is also the case for adult stimuli; however other variables may have more of an impact when child stimuli are presented. Increased reaction times may reflect a certain discomfort with the stimuli or perhaps a fear of having responses that seem "deviant". This fear of performing badly on the task may encourage the participant to be more meticulous in responding, and thus have a slowed reaction time, or simply to be distracted by the thought of doing badly on this particular set of images. Further alternative explanations could include concerns about the quality/realness of some of the images used from the NRP image set (Laws & Gress, 2004). Additionally, since this chapter is contending that the pictorial modified Stroop effect for sexually salient images is driven primarily by a rumination effect and possibly by the activation of associated concepts, it is possible that such rumination does not always relate directly to the stimulus category. It could be that some features, or perhaps particular images from the set presented, can have a greater influence than others on what is being ruminated on. It is possible that images of older children had a greater influence on the rumination of some participants, thus

making their responses seem potentially more deviant. Indeed both the results of the pictorial modified Stroop task and the PPG measure in study 3 did indicate a large degree of ephedophillic sexual interest across the entire sample of rapists and child molesters. This explanation is not sufficient to account for all the unexpected responses to child image categories, since in some cases the image category with the slowed reaction time was not the category which would have been predicted by the participant's self-reported sexual interest or by their adult stimuli Stroop results.

**What the study findings can tell us about the CRT task.** The studies did not focus in sufficient detail on the CRT task to explore exactly what is being measured by that task. However, based on the findings that a blocked CRT design did not produce a sufficiently strong effect to overcome the influence of order and (potentially) any differences in the inherent difficulty in locating the dot across image types, it seems that rumination may not factor in the CRT task to the same degree as in the Stroop task. Given that previous studies did find a CRT effect using randomised presentation of trials (Giotakos, 2005; Santtila et al., 2009; Wright & Adams, 1994, 1999), it may be that a CRT effect for sexually salient stimuli is driven by fast effects, i.e. by attention capture during the pre-attentive stimulus encoding stage of arousal. If it is the case that a pictorial modified Stroop task is driven by slow effects and a CRT task is driven by fast effects, it may be the degree of integration between the to-be-ignored stimuli and the to-be-attended-to stimuli that creates the distinction. A participant carrying out a pictorial modified Stroop task can focus his attention anywhere on the animal or person depicted and be able to respond quickly. This may lull the participant into focusing on those features of a given stimulus type that they find pleasing, thus allowing rumination and the activation of associations while

maintaining an acceptable performance on the task. Acceptable performance is referring to the level of speed and accuracy on the task that the participant feels is sufficient to be considered to be doing the task correctly by the researcher. This expectation would be self-imposed by the participant, since the researcher only tells the participant to go as fast as they can while making as few mistakes as possible. In the CRT, in order to maintain an acceptable performance, the participant may have to work a little harder to ignore the to-be-ignored stimuli, since the stimuli and target are less integrated than in the Stroop task. In this way, a slowing down of responses on the CRT task would be where the participant has had their attention 'grabbed' by the to-be-ignored stimuli. The CRT design by Giotakos (2005) may have produced a slightly different effect since stimuli were presented first without the dot for two seconds, at which point the dot was superimposed on the image. Therefore, the task measures the degree to which the participant was able to refocus their attention after looking at the image for two seconds. It is possible that this method would capture more than one process.

### **The broader context**

Given that the results of studies involving offending participants were not as clear-cut as had been hoped, there is a limit to the conclusions that can be drawn regarding cognitive distortions and deviant sexual interest in offenders. Future pictorial modified Stroop tasks and IATs that follow on from the methodological findings of these studies may well shed more light on the cognitive process involved in deviant arousal and offence-related schema. The combining of these tasks with other implicit measures along with clinical investigations and inventories of distorted cognition/implicit theories may well prove a fruitful avenue of research.



The influence of methodological differences on findings raises an important point for those seeking to explore the utility of indirect measures in theory building and as assessment measures. In addition to mixed findings in the studies summarised above, other researchers have also found conflicting results. For example CRT studies have not always found an effect (Gress, 2008). In addition, word versions of the modified Stroop task have found that offenders (Price & Hanson, 2007; Smith & Waterman, 2004) and victims of sexual violence (Dubner & Motta, 1999; Foa, Feske, Murdock, Kozak, & McCarthy, 1991) both can to have attentional bias toward offence related-stimuli. On the other hand IAT results have seemed to be fairly consistent despite differences in methodology. In essence therefore, as researchers, we must start approaching the examination of tasks such as these with methodological rigour, systematically manipulating variables of interest in order to establish an optimum technique. Furthermore, the results we obtain need a theoretical backdrop with which to understand them. For example, we don't have a clear theoretical framework to date of how deviant sexual interest is represented in cognition. Earlier in the chapter it was mentioned that sexual interest is likely to involve a complex interaction of cognitive structures and processes. Spiering and Everaerd (2007) explain that (non-deviant) sexual memory can be located in explicit long-term memory through recollections of sexual encounters, fantasies, attitudes about sex, and understanding of sexual costs and rewards and in implicit long-term memory through "innate sexual reflexes, learned (automatized) sexual scripts and classically conditioned sensations" (p. 767). It is quite possible that some or all of these aspects of memory could be compromised in an individual with deviant sexual interest. Using such a framework to build a

theoretical viewpoint of deviant sexual interest may allow us to more accurately understand what the results of different tasks are telling us.

Where more sophisticated theoretical frameworks do exist such as in the area of cognitive distortion (i.e. the judgement model of cognitive distortion Ward, Gannon, & Keown, 2006) indirect tasks such as the IAT, again with clear consideration given to optimal methodology, could be utilised to test out some of the hypotheses arising out of those frameworks. Additionally, state factors like cognitive distortions and deviant sexual interest are likely to interact. While the findings of the studies summarised here did not clarify the interaction of such factors, the potential of such tasks to do so remains, once properly validated tasks have been developed along with theoretical contexts in which to place the results.

## **Conclusion**

The findings of studies 1-5 demonstrated that the pictorial modified Stroop task and the Implicit Association Test can tap into sexual interests and associations. They also demonstrated that in most cases the two measures were related to one another. The results were less clear regarding attention and associations to child stimuli among both offending and control participants. It was not clear whether this lack of clarity was wholly as a result of a lack of sensitivity within the tasks or an indicator that sexual associations and interest towards children were phenomenologically different to those towards adults. A lack of clear results from the IAT task in the study comparing IAT and pictorial Stroop results of sexual offenders against children impacted on the ability to address whether there was a divergence of responses to the different tasks for offenders. Such a divergence would have added more weight to the

suggestion that the pictorial Stroop task measures sexual arousal-related attention and that the IAT measures schematic sexual associations possibly relating to implicit theories. Despite this, the clear but imperfect correlations found between the pictorial Stroop and IAT tasks, despite the fact that one is measuring a slowing down of responses to a sexually salient stimuli, while the other is measuring a speeding up towards a concept pair, strongly indicates that both are indirectly measuring related cognitive processes or structures through different routes. The suggestion that these different routes are related to schema and arousal needs be further explored by future research. While the Implicit Association Test and the pictorial modified Stroop task are both paradigms that offer clear potential for use in the assessment of sexual offenders, both need to be further tested and validated. Importantly the influence of adjustments in methodology should be tested and a clear understanding of the processes measured by each task should be established so that the emerging field involving cognitive or indirect approaches to forensic assessment can establish best practices in experimental design and a framework by which to explore the cognitive processes of sexual offenders.

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