

# Attention Deficits and Divorce

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**Objective:** Building on previous work on the role of attention deficits associated with the regulation of executive control in psychiatric disorders, we examine whether these attention deficits are related to an interpersonal disturbance, the experience of divorce.

**Method:** Attentional capacities of 95 randomly selected couples from the general population were measured with a well-established task, the Attentional Network Task, which assesses the efficiency of 3 attention networks (that is, alerting, orienting, and executive control). Among the 190 participants, 32 had experienced a divorce in the past. ANCOVAs were used to compare divorced people in marital or cohabiting unions with people in first unions in their performance on this purely cognitive task.

**Results:** Our findings indicate that divorced people who are currently living in a cohabiting relationship show significantly lower executive control than other adults living as couples, after controlling for sex, age, income, and education. This subgroup of divorced people not only exhibit greater difficulty in responding to some stimuli while ignoring irrelevant ones but also manifest cognitive deficits in conflict resolution.

**Conclusions:** This study highlights the links between attention and the long-term maintenance of intimate relationships. Our results may have important implications for the identification of people at risk for divorce.



## Les déficits d'attention et le divorce

**Objectif :** S'inspirant de travaux précédents sur le rôle des déficits d'attention associés à la régulation du contrôle exécutif dans les troubles psychiatriques, nous examinons si les déficits d'attention sont liés à une perturbation interpersonnelle, l'expérience du divorce.

**Méthode :** Les capacités attentionnelles de 95 couples choisis au hasard dans la population générale ont été mesurées par un instrument bien établi, la tâche de réseau attentionnel, qui évalue l'efficacité de 3 réseaux d'attention (c'est-à-dire, l'alerte, l'orientation, et le contrôle exécutif). Sur les 190 participants, 32 avaient fait l'expérience du divorce par le passé. Des analyses de covariance ont servi à comparer le rendement à cette tâche purement cognitive des personnes divorcées, vivant dans des unions maritales ou de cohabitation, avec celui de personnes dans une première union.

**Résultats :** Nos résultats indiquent que les personnes divorcées vivant actuellement dans une relation de cohabitation démontrent un contrôle exécutif significativement plus faible que les autres adultes vivant en couple, après contrôle pour le sexe, l'âge, le revenu et l'instruction. Ce sous-groupe de personnes divorcées non seulement montre plus de difficulté à répondre à certains stimuli tout en ignorant ceux qui sont sans pertinence, mais il manifeste également des déficits cognitifs dans la résolution de conflit.

**Conclusions :** Cette étude met en évidence les liens entre attention et maintien à long terme de relations intimes. Nos résultats peuvent avoir d'importantes implications pour l'identification des personnes à risque de divorce.

The stressful nature of marital disruption for adults and children, as well as its association with psychiatric symptoms or behavioural problems,<sup>1-3</sup> makes divorce a major health concern. Many risk factors for divorce have been identified, including lower marital satisfaction and more maladaptive personality characteristics.<sup>4-6</sup> Although research on risk factors of divorce has become more and more sophisticated in recent decades, gaps in our understanding remain. For instance, many marriages that ended in divorce would have been difficult to identify a few years prior to breakup.<sup>1</sup>

Inspired by the plea of Posner and Rothbart (see Posner and Rothbart<sup>7</sup> and Posner<sup>8</sup>) for the integration of cognitive neurosciences of attention with areas of research dealing, for instance, with social disturbances,<sup>7,8</sup> we investigated whether attention deficits are related to divorce. Attention research explores how voluntary control and subjective experience regulate actions.<sup>7</sup> To investigate if individual differences in attention can be linked to marital instability, we used a purely cognitive task, the ANT, to examine how 3 attention networks relate to people's marital stability history.

Based on decades of behavioural and neuroscience studies, Posner and his colleagues argued for the separation of the human attentional system into 3 networks.<sup>7</sup> More specifically, alerting is aimed at maintaining a state of sensitivity to incoming stimuli, while orienting is responsible for the movement of attention to attend to sensory events. Finally, executive control involves mechanisms for resolving conflict among responses, and responding to some stimuli while ignoring extraneous stimuli.<sup>7,9-11</sup> Executive control is also involved in the regulation of emotions. The networks can be grouped according to their stability across time. MacLeod et al<sup>10</sup> suggested that executive control is more trait-like, while alerting and orienting are more statelike.

Since its inception in the field of cognitive neurosciences,<sup>12</sup> many studies have established the usefulness of the ANT for characterizing attention deficits among clinical populations. More specifically, in light of studies on psychiatric disorders known to have deleterious effects on interpersonal relationships, there is evidence that executive control in particular could be associated with marital stability. These recent studies showed that people with BPD,<sup>13</sup> chronic, but currently abstinent, methamphetamine abusers,<sup>11</sup> and, as children, with attention deficit hyperactivity disorder or fetal alcohol spectrum disorder,<sup>14</sup> had poorer executive control than comparison groups. The strong evidence relating these psychiatric disorders to relational difficulties,<sup>13,15</sup> as well

### Clinical Implications

- Attention deficits, as measured by an experimental task exempt from social desirability, are related to the occurrence of divorce.
- Cognitive neurosciences of attention can further our understanding of marital instability.

### Limitations

- The design of our study is cross-sectional and the measure of divorce is retrospective.
- The probability sample is relatively small.

as the well-known association between poor relationship functioning and marital instability,<sup>4</sup> lead us to posit a link between executive control and divorce.

Further, it has been shown that, for patients with BPD, the extent of impairment in executive control was associated with the quality of the therapeutic alliance.<sup>9</sup> Adults showing deficits in executive control react in more chaotic manners in their everyday life, including in therapy. Rather than experiencing stability by controlling their automatic responses, they were more likely to be controlled by their emotions.<sup>9</sup> Work on the therapeutic alliance has emphasized the role of executive control in the maintenance of short-term relationships. Additionally, these results suggest that executive control could also have an influence on the maintenance of long-term relationships.

We built on past work, relating deficits in executive control to specific psychiatric disorders, by testing whether these same deficits could be linked to a relational outcome of great significance, the experience of divorce. We studied couples and examined each person's history of previous divorce. By doing so, we ascertained that differences could not be explained by being single or not. We first compared the whole sample of couples in first unions with divorced people in marital or cohabiting unions. We then sorted the comparison group of people in first unions into married and cohabiting people and compared them with divorced people in marital or cohabiting unions. In light of previous research, we hypothesized that the efficiency of the executive control network should differ according to marital stability history, but that no significant group differences should emerge for alertness or orienting.

## Method

### Participants

Our study was based on 190 Canadian adults coming from 95 couples randomly selected from the general population. To participate, couples had to be living in a marital or cohabiting union. Overall, 66% of the couples were married and 34% were simply cohabiting. Three couples were same-sex couples in cohabiting unions. Partners had been living together an average of 17.87 years (SD 16.57). The mean number of children was 1.77 (SD 1.34). The median annual income ranged from \$30 000 to \$40 000 for women

### Abbreviations

ANT	Attentional Network Task
BPD	borderline personality disorder
DAS	Dyadic Adjustment Scale
RT	reaction time

**Table 1 Group demographics**

Variable	Total <i>N</i>	Women <i>n</i>	Men <i>n</i>	Age, mean, years	Age at breakup, mean, years	Years since breakup, mean	RT <sup>a</sup> Mean	Accuracy Mean	DAS <sup>a</sup>
Second-order unions									
Divorced and remarried	13	8	5	59	37	20	618	0.98	110
Divorced and cohabiting	19	10	9	43	36	6	598	0.98	121
Nondivorced									
Overall	158	79	79	44			598	0.98	116
Married	112	55	57	50			598	0.98	114
Cohabiting	46	24	22	29			599	0.97	123
Total	190	97	93	45					116

<sup>a</sup> Adjusted means controlling for sex, age, income, and education.  
DAS = Dyadic Adjustment Scale; RT = reaction time

and from \$40 000 to \$50 000 for men. Demographics are presented in Table 1.

### Procedure

Recruitment was carried out through random digit dialing, which has the advantage of including unlisted numbers that would be missed with a telephone book. On the telephone, we indicated that we were looking for adult couples and asked if a couple was living in this home. If so, we asked to speak to one member of this couple to explain the research project. Interested couples came to our laboratory. Partners first gave their written informed consent. Then they answered questionnaires and performed the ANT. All couples received \$25 as financial compensation. The protocol was approved by the university's institutional review board.

### Materials

All participants completed the ANT,<sup>12</sup> illustrated in Figure 1, to assess the efficiency of the 3 attention networks: alerting, orientation, and executive control. The ANT is a purely cognitive task, exempt from the effects of social desirability. The participant's task was to identify the direction of a centrally presented arrow. The target arrow was surrounded by flanker arrows that pointed in the same direction (congruent condition), by flanker arrows that pointed in the opposite direction (incongruent condition), or by lines (neutral condition). In addition, the target arrow was preceded by one of the following cue conditions: no cue, a centre cue, a double cue, and a spatial cue located at the location of the upcoming target. Each participant undertook 288 experimental trials, one-fourth in each of the 4 cue conditions. As in the founding paper of the ANT task,<sup>12</sup> the RTs and error rates for each cue condition are presented in Table 2 as a function of group. The score for each attention network was obtained by a subtraction based on RT data from accurate trials only. The alerting score was

computed by subtracting RT in the double cue condition from RT in the no cue condition. The orienting score was computed by subtracting RT in the spatially valid condition from RT in the centre cue condition. The executive control score was computed by subtracting the RT in congruent trials from the RT in incongruent trials.<sup>13</sup> Lower scores reflect more efficient executive control.

Subjects also answered a demographic questionnaire that included questions on their marital stability history (for example, "In the past, have you ever experienced a divorce?"). To further describe the groups, participants evaluated their level of dyadic adjustment in their current relationship using the DAS.<sup>16</sup> The instrument provides a global score, which can range from 0 to 151, with higher scores reflecting higher levels of dyadic adjustment. In our study, alpha for the global scale was 0.91.

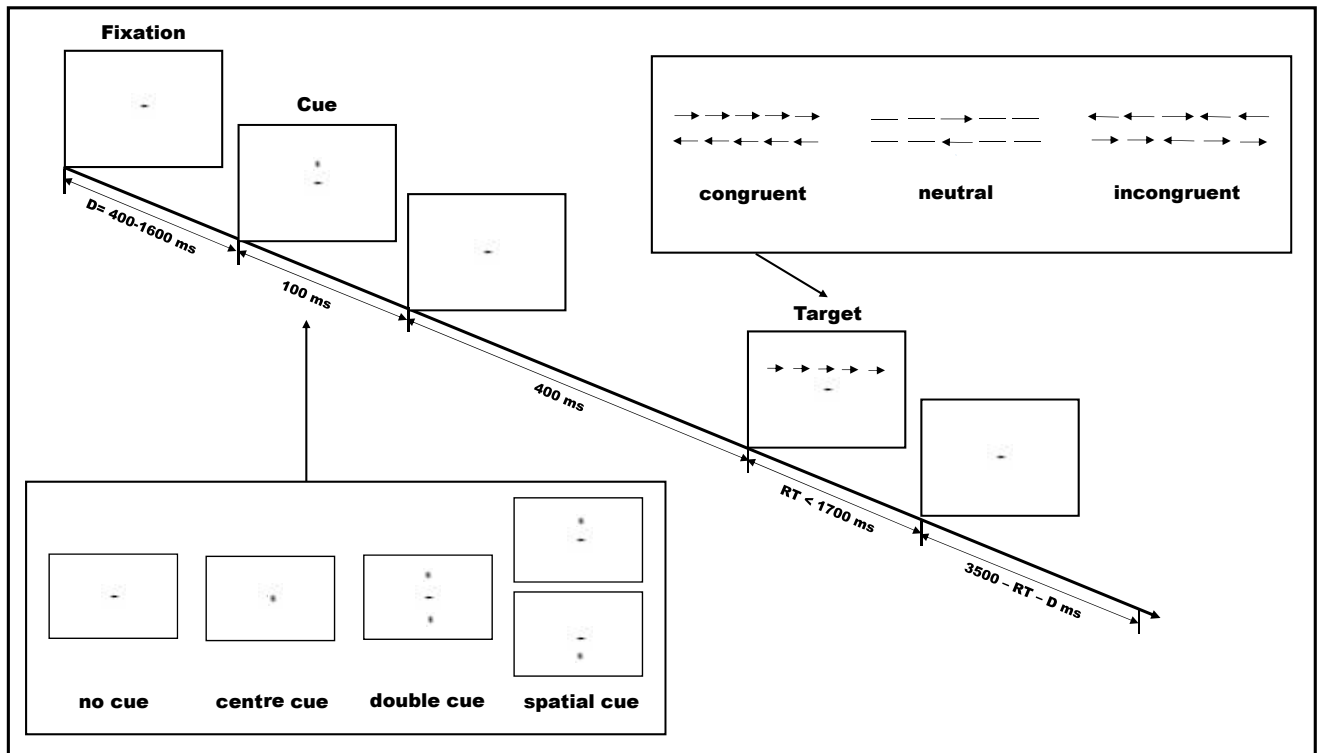
### Statistical Analyses

ANCOVAs were used to compare RTs and DAS scores. For all variables, 2 series of analyses were computed. The first series compared divorced people in marital or cohabiting unions with people in first unions. The second series was aimed at providing the most complete picture by contrasting divorced and nondivorced people in married and cohabiting unions. In all analyses based on RTs and DAS scores, sex, age, income, and education served as covariates. Significant ANCOVAs were followed by post hoc comparisons (Student–Newman–Keuls method). IBM SPSS Statistics, version 21,<sup>17</sup> was used for all statistical procedures. For all analyses, the 0.05 level of significance was adopted.

### Results

Groups were first compared on DAS scores. Results revealed no differences when comparing people who were remarried, divorced but currently cohabiting, and in first unions,  $F < 1$ ,  $df = 2/170$ . However, when the sample was sorted into 4

**Figure 1 The Attentional Network Task experimental procedure**

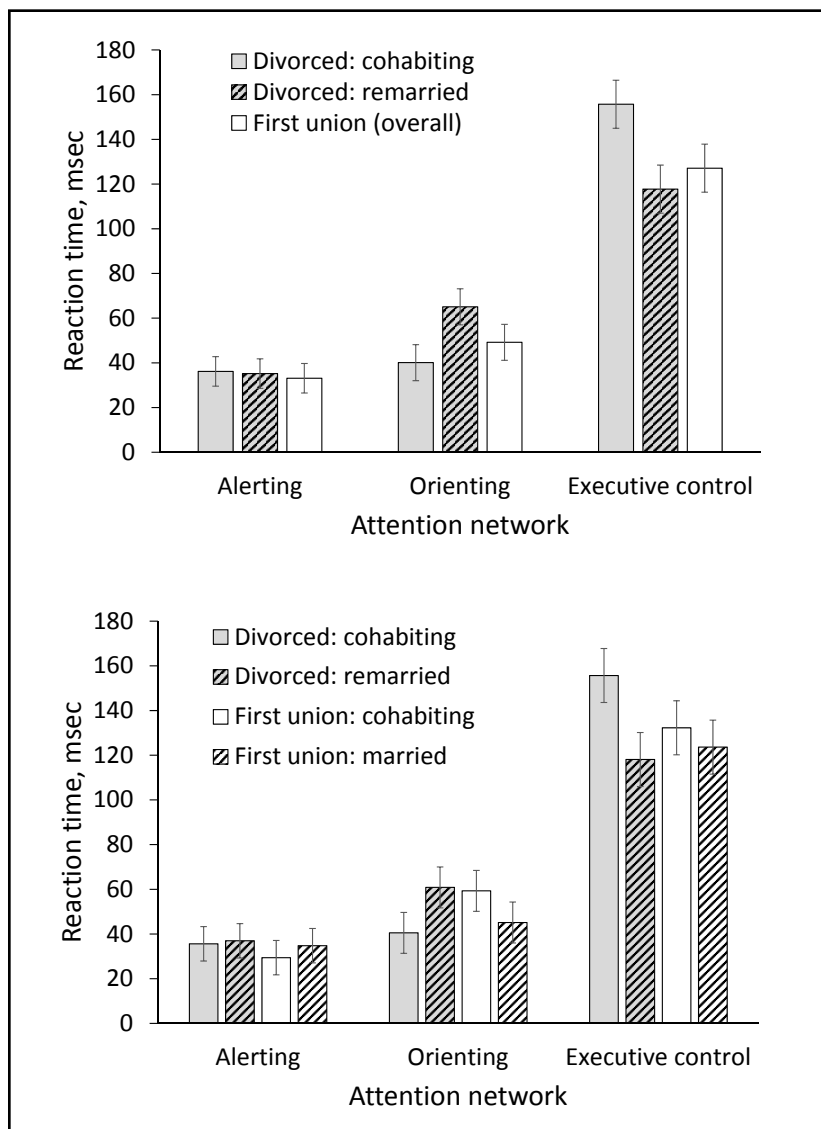


The sequence of events is displayed along the diagonal arrow, and all cue and target conditions are represented in the lower and upper rectangles, respectively. Target location varied randomly, with the constraint that, overall, the target appeared equally often above and below the fixation point. ms = millisecond; RT = reaction time

**Table 2 Mean reaction times, measured in milliseconds, and error rates (%) under each condition as a function of group**

Variable	Cue condition			
	None	Centre	Double	Spatial
<b>Divorced and remarried</b>				
Congruent	672 (1.04)	641 (0.69)	636 (0.69)	588 (1.39)
Incongruent	781 (3.47)	790 (4.17)	766 (4.17)	715 (2.08)
Neutral	662 (0.69)	641 (0.35)	631 (1.39)	587 (0.35)
<b>Divorced and cohabiting</b>				
Congruent	566 (0.23)	538 (0.93)	530 (0.23)	509 (0.46)
Incongruent	698 (4.63)	701 (6.71)	688 (5.09)	635 (2.78)
Neutral	572 (1.85)	533 (1.39)	531 (0.93)	503 (0.46)
<b>Nondivorced (overall)</b>				
Congruent	588 (1.01)	559 (0.78)	548 (0.78)	519 (0.86)
Incongruent	695 (4.34)	691 (6.90)	678 (5.72)	621 (3.94)
Neutral	577 (1.47)	550 (1.52)	543 (1.47)	512 (0.66)
<b>Nondivorced and married</b>				
Congruent	614 (0.99)	587 (0.91)	574 (0.91)	547 (1.07)
Incongruent	725 (3.96)	722 (6.15)	709 (5.07)	655 (3.80)
Neutral	601 (1.44)	576 (1.40)	567 (1.49)	540 (0.74)
<b>Nondivorced and cohabiting</b>				
Congruent	529 (1.04)	494 (0.47)	489 (0.47)	454 (0.38)
Incongruent	628 (5.21)	619 (8.62)	607 (7.20)	545 (4.26)
Neutral	523 (1.52)	490 (1.80)	490 (1.42)	449 (0.47)

**Figure 2 Adjusted means controlling for sex, age, income, and education as a function of group**



Error bars represent 95% confidence intervals computed after Loftus and Masson's procedure.<sup>18</sup>

groups (that is, divorced and nondivorced people in married or cohabiting unions), a significant difference was found,  $F = 3.36$ ,  $df = 3/169$ ,  $\eta_p^2 = 0.06$ , and showed that cohabiting people in first unions were more adjusted than married people in either first or second unions.

Concerning the ANT, as is usually the case, participants were very accurate at the task (Table 1). Accuracy represents the proportion of trials for which participants correctly identified the direction of the central arrow. Results of the main analyses for the ANT task are displayed in Figure 2. In this figure, error bars represent confidence intervals based on the error term used in the ANCOVA, leading to comparable conclusions between the ANCOVA and the inspection of the confidence intervals.<sup>18</sup>

As hypothesized, there were no differences between groups for alerting scores, irrespective of group composition (that is, people in first unions, divorced and remarried people, and divorced and cohabiting people; divorced and nondivorced people in married or cohabiting unions),  $F = 0.11$ ,  $df = 2/161$  and  $F = 0.37$ ,  $df = 3/160$ . For orienting scores, there was no difference when people in first unions were compared with divorced and remarried and with divorced and cohabiting people,  $F = 1.96$ ,  $df = 2/161$ . However, when the sample was split into 4 groups, there was an overall effect,  $F = 2.81$ ,  $df = 3/160$ ,  $\eta_p^2 = 0.05$ . The only significant difference was between divorced and remarried and divorced and cohabiting people. Because the effect on orienting scores was only found in 1 of the 2 analyses, and is not of particular theoretical interest, the effect will no longer be discussed.

The critical finding was the predicted significant difference in executive control when the 2 groups of divorced people were compared with people in first unions,  $F = 4.18$ ,  $df = 2/161$ ,  $\eta_p^2 = 0.05$ . Post hoc comparisons revealed that divorced participants who were now cohabiting exhibited a significantly poorer executive control than the other 2 groups, which did not significantly differ one from the other. When cohabiting and married people in first and second unions were compared, once more there was an overall difference between groups,  $F = 3.10$ ,  $df = 3/160$ ,  $\eta_p^2 = 0.06$ . Again, post hoc comparisons revealed that divorced participants who were now cohabiting exhibited a significantly poorer executive control than the other 3 groups, which did not differ one from the other.

## Discussion

Our findings indicate that, compared with other adults living as couples, divorced people who are currently cohabiting show deficits in the attention network associated with the regulation of executive control. By comparison with adults in first unions or remarried people, divorced people in cohabiting unions manifest cognitive deficits in conflict resolution and a vulnerability to distraction. Similarly to people with BPD<sup>13,19</sup> or substance abuse disorder,<sup>11</sup> they exhibit greater difficulty in responding to some stimuli while ignoring irrelevant ones. Our results cannot be explained by demographic confounders, such as age, sex, income, or education, or by common-method variance.

Because all divorced adults in our sample are currently involved in couple relationships, results cannot be explained by the negative consequences of being single. However, we asked ourselves if part of the results could be explained by divorce-related emotional disturbance. The most noteworthy fact that militates against this assumption is that executive control has been shown to be strongly heritable.<sup>20</sup> The ability of attention to control distress can be traced to early infancy.<sup>7,21</sup> Nevertheless, it is possible that the experience of divorce could exacerbate the attention deficit that was already there before divorce. Taken together, our study and previous research provide converging evidence of the role of attention in the maintenance of close relationships, rather than the opposite.<sup>9</sup>

Results show that deficits in executive control are observed only among divorced people currently in cohabiting relationships. Note that divorced people who are currently cohabiting were originally married. In other words, from a personal history viewpoint, on their first relationship formation, they decided to get married exactly as divorced people who remarried and as married and never-divorced people. However, their low levels of executive control may have led them to divorce and prevented them from remarrying. Further, although the levels of dyadic adjustment of divorced and unmarried people were similar to the ones in the other subgroups at the time they were assessed, we believe that their attention deficits could render them more likely to break up with their new partner.

Two aspects of our study must be pointed out. First, it is likely that, by studying only people who entered new unions after a breakup, we selected divorced adults who have the mildest deficits in executive control. That is, we do not expect that all people with severe attention deficits would be successful in developing new relationships after a divorce. Although results were significant with the current methodology, we believe that larger differences in executive control may be observed with a sample of divorced adults not currently in second-order relationships. Second, one might think that some adults in second-order unions may have lived with a partner who has low executive control, while they themselves have high executive control. It is likely that a portion of these healthy people were included in our study in the divorced but remarried group.

Our results on executive control may further our understanding of the mechanisms underlying the intergenerational transmission of divorce.<sup>22</sup> There is solid evidence that, when compared with adults from intact families, adults from divorced families show higher incidences of divorce.<sup>23–25</sup> One well-known explanation for this phenomenon is that marital attitudes are learned in the family of origin.<sup>26</sup> Without ruling out this learning process, prior results on attention networks revealing strong heritability for executive control<sup>20</sup> provide an additional explanation. Indeed, some divorced parents could have passed their deficits in executive control to their young, which, in turn, would leave them more vulnerable to divorce.

## Conclusion

Building on previous work on the role of executive control deficits in psychopathology,<sup>13</sup> our study revealed an association between executive control and a major relational consequence, the experience of divorce. We believe that attention deficits should become a variable of interest for researchers, clinicians, agencies, and policy-makers serving not only individuals but also families or couples. It is our hope that, in the near future, current results could lead to a finer-grained and more efficient assessment of people at risk for divorce and to a better understanding of potential relational consequences of attention deficits.

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