Understanding cognitive failures: What’s dissociation got to do with it?

AMANDA SCHURLE BRUCE, WILLIAM J. RAY, AND RICHARD A. CARLSON
Pennsylvania State University

Intuitively, cognitive failures and dissociation seem to encompass overlapping mental phenomena. This study used a large sample to examine the nature of the relationship between these constructs. Exploratory factor analysis (EFA) and confirmatory factor analyses were performed on the Cognitive Failures Questionnaire (CFQ). The single factor resulting from the EFA of the CFQ correlated significantly with all factors from the Dissociative Experiences Scale (DES). A conjoint item-level factor analysis using all items from both measures was performed, and two factors resulted. The first included all items from the CFQ and appeared to describe an absorption-like phenomenon. The second factor’s highest positively loading items assessed more pathological forms of dissociation. Based on our results, we conclude that the CFQ and DES are assessing similar cognitive processes and that cognitive failures, as measured by the CFQ, overlap with nonpathological dissociation.

Traditionally, the field of clinical psychology has been concerned with individual differences and psychopathology, whereas cognitive psychology has been interested in understanding basic cognitive mechanisms. The purpose of this study was to draw from cognitive principles and clinical processes to better inform both fields of study concerning lapses of awareness. Lapses of awareness tend to be referred to in cognitive psychology as cognitive failures and in clinical psychology as dissociation. Intuitively, these constructs seem to encompass common and perhaps overlapping mental phenomena. Cognitive failures are thought to include perceptual, attentional, memory, and action-related mental lapses (Broadbent, Cooper, FitzGerald, & Parkes, 1982). Similarly, the defining feature of dissociation is the disruption of a person’s usually integrated cognitive processes, such as consciousness, memory, identity, and perception (American Psychiatric Association, 2000). The purpose of this study was to examine the nature of the relationship between these constructs using two often-studied measures that are known to be correlated (Merckelbach, Muris, & Rassin, 1999; Wright & Osborne, 2005). This approach complements efforts to understand cognitive failures and dissociations in terms of basic
cognitive processes measured using laboratory tasks (DePrince & Freyd, 1999; Freyd, Martorello, Alvarado, Hayes, & Christman, 1998; Robertson, Manly, Anfrade, Baddeley, & Yiend, 1997; Wagle, Berrios, & Ho, 1999; Wright & Osborne, 2005).

The Cognitive Failures Questionnaire (CFQ) is a self-report measure that was designed to assess mental lapses (Broadbent et al., 1982). Although primarily a cognitive assessment tool, the CFQ has been compared with a commonly used clinically oriented dissociation questionnaire, the Dissociative Experiences Scale (DES; Bernstein & Putnam, 1986). The DES was designed to measure mental processes such as absorption, depersonalization, amnesia, and other trancelike experiences (Ray, June, Turaj, & Lundy, 1992). Recently, factor analyses of the DES have produced conclusive findings, usually yielding some combination of absorption, depersonalization, derealization, and amnesia (Ray, 1996). For example, an EFA using a large nonclinical sample of undergraduates determined a four-factor solution including absorption or derealization, depersonalization, segment amnesia, and in situ amnesia (Ray & Faith, 1995). More recently, a confirmatory factor analysis (CFA) on the DES among a nonclinical sample of undergraduates verified a similar solution. The resulting three factors included amnesia, depersonalization, and absorption (Stockdale, Gridley, Balogh, & Holtgraves, 2002). Previous researchers argued that the DES assesses a general form of cognitive control (Frankel, 1990, 1996; Hacking, 1995). Furthermore, they assert that cognitive control is related to different types of memory, attentional processes, and imagination (Frankel, 1990, 1996; Hacking, 1995).

Assuming that high dissociators have little cognitive control, a lack of cognitive control has the potential to predict high scores on the DES (Reason, 1993). Beginning in the late 1970s, Reason used the term absent-mindedness to describe such a lack of cognitive control. Examples of these slips or errors include forgetfulness, spacing out, and daydreaming. Interested in clarifying the variation in human errors, Broadbent et al. (1982) used the term cognitive failures to refer to all different types of errors or lapses: perceptual, attentional, memory, and action. Broadbent’s CFQ, which assesses cognitive failures, is designed to assess the frequency of everyday slips and errors such as forgetting appointments or bumping into things.

Originally, the CFQ was thought to measure a single construct. Broadbent et al. (1982) summarized evidence that indicated that the CFQ measures a single, stable traitlike phenomenon with adequate internal consistency. More recently, however, this assumption has been called into question (Larson, Alderton, Neideffer, & Underhill, 1997). One currently debated question is, How many different types of cognitive failures does the CFQ measure? Several studies have determined factor
structures of the CFQ but have yet to reach a consensus on a stable factor structure (Broadbent et al., 1982; Matthews, Coyle, & Craig, 1990; Larson et al., 1997; Pollina, Greene, Tunick, & Puckett, 1992; Wallace, 2004). One common finding among studies was that the CFQ contains a substantial general factor and a smaller factor relating to failures in processing people’s names (Larson et al., 1997; Matthews et al., 1990; Pollina et al., 1992). Only one published study has used CFA on this measure. Wallace (2004) suggested that a four-factor solution may produce the best fit.

The central goal of this study was to better understand the relationship between cognitive failures and dissociation using the DES and the CFQ by determining whether particular types of cognitive failures are associated with specific factors identified in studies of dissociative processes. Previous research indicates that cognitive failures, which include lapses in attention and episodes of absent-mindedness, can be conceptualized within the dissociative spectrum (Merckelbach et al., 1999). We hypothesized that cognitive failures would be more strongly related to the nonpathological types of dissociation.

In addition, we aimed to reexamine the factor structure of the CFQ in hopes of producing some solid evidence for a stable factor structure using the complementary procedures of exploratory and CFA with more than 1,000 participants (Hoyle, 2000). Considering that the CFQ is no longer in the early stages of its research, a CFA with such a large sample size provides a more convincing statistical procedure to determine a stable factor structure. The sole study using CFA on this measure suggested that a four-factor solution produced the best fit. However, all factors were very highly correlated with each other (Wallace, 2004). This, in addition to Broadbent’s initial broad conceptualization of cognitive failures and the common finding across several studies that the CFQ assesses a unitary construct, led us to expect to find a good fit with a single-factor model.

EXPERIMENT

METHOD

Participants

One thousand forty undergraduate students from a large public university took part in this study for course credit (54% female, 46% male). The participants ranged in age from 17 to 22 years (mean = 18.8, standard deviation = .82). Ethnicity and other demographic information was not recorded. Subjects were recruited from an introductory psychology class, which draws students from a variety of majors.
Design and procedure

At the beginning of the semester, participants were given a set of questionnaires that included the DES and the CFQ. There was a separate response sheet for marking answers. The questionnaires were distributed in a group setting, with all participants in the same room. The set of questionnaires was completed within a 2-hour block of time.

The DES is a 28-item self-report measure of dissociation developed by Bernstein and Putnam (1986). On the questionnaire, participants are asked to indicate what percentage of the time they experience the phenomenon or event described in the question. These answers should be limited to times when the person is not under the influence of drugs or alcohol. Examples of DES items include #3, “Some people have the experience of finding themselves in a place and having no idea how they got there,” and #20, “Some people find that they sometimes sit staring off into space, thinking of nothing, and are not aware of the passage of time.” Responses on the original DES involved placing a tick on a 100-mm line to indicate what percentage of the time is spent in the various experiences. This method is time-consuming to score, and we instead used Carlson and Putnam’s (1993) DES-II alternative response set. The alternative responses are in 10% increments on a scale from 0% (never) to 100% (all of the time).

Research has demonstrated reliability and validity for the DES using data from both clinical and nonclinical populations (Bernstein & Putnam, 1986; Carlson & Putnam, 1993; Holtgraves & Stockdale, 1997; Ray & Faith, 1995). Internal consistency is high (Cronbach’s $\alpha = .93$) (Bernstein & Putnam, 1986). Internal consistency is a function of the sample used; therefore, in heterogeneous samples, it will be higher. Test–retest reliabilities between .79 and .96 have been found (Bernstein & Putnam, 1986; Frischholz et al., 1990; Pitblado & Sanders, 1991). Split-half coefficients ranging from .83 to .93 have been reported (Carlson & Putnam, 1993). The DES has been found to be effective in detecting and confirming dissociative identity disorder, posttraumatic stress disorder, and dissociative disorder not otherwise specified (Gleaves, Eberenz, Warmer, & Fine, 1995).

Developed by Broadbent et al. in 1982, the CFQ is a 25-item self-report measure of failures in attention, perception, memory, and action. Participants are asked to indicate on a 5-point scale how often they have experienced each failure in the past months, from 0 (never) to 5 (very often). Examples of CFQ items include #2, “Do you forget why you went from one part of the house to the other?” and #19, “Do you daydream when you ought to be listening to something?” One study determined that CFQ’s reliability is high, possessing an internal consistency (Cronbach’s $\alpha$) ranging from .85 to .89 (Broadbent et al., 1982; Merckelbach et al., 1999). It also has high test–retest reliability. Broadbent et al. (1982) reported values of $r = .82$ and $r = .80$ over an extended period of up to 2 years. Broadbent claimed that the CFQ should be used only to assess the single construct of cognitive failure. He supported his claim by stating the high internal consistency of the scale. However, it is unclear what this construct specifically refers to. Our study aimed to further elucidate the concept of cognitive failures.
RESULTS

The reliability of the data from both scales was found to be high. Internal consistency (Cronbach’s $\alpha$) was .91 for the DES and .90 for the CFQ. A plotted distribution of the DES data revealed that the data were slightly positively skewed, as expected, mean = 55.3, standard deviation = 14.25, skewness = .72, kurtosis = .30. The mean DES score was slightly lower than reported in other undergraduate samples (Ray & Faith, 1995). Analyses of the CFQ data revealed that the distribution was normal, mean = 65.2, standard deviation = 13.42, skewness = .35, kurtosis = .41. The mean CFQ score was slightly higher than reported in other undergraduate samples (Merckelbach et al., 1999).

Several different methods were used to explore the relationship between the CFQ and the DES. An exploratory factor analysis (EFA), specifically principal components analysis, was performed on the CFQ. Oblique (obliman) rotation, which assumes the factors are correlated, was used to produce the best fit of factors. A scree plot was used to graph the eigenvalues. There was a sharp break in the curve after the first factor; therefore, only one factor was retained. This factor had an eigenvalue of 7.69 and accounted for 30.78% of the variance. The second factor had an eigenvalue of 1.44 (5.74% variance). The third factor had an eigenvalue of 1.21 (4.86%). The fourth factor had an eigenvalue of 1.10 (4.39%) The fifth factor had an eigenvalue of 1.06 (4.22%). Precise individual item loadings from the EFA of the CFQ can be obtained upon request.

Next, a CFA was performed on the CFQ. Analyses were performed on a PC using EQS 5.7 for Windows. As suggested by the EFA, a model consisting of a single factor was evaluated for goodness of fit. Goodness of fit was indicated by the Bentler–Bonnet Normed Fit Index (NFI) and the Comparative Fit Index (CFI). The value of the NFI indicates the proportion in the improvement of the overall fit of the researcher’s model relative to the null model (Kline, 1998). The CFI can be interpreted in a similar way to the NFI, except that it is not influenced by sample size (Kline, 1998). Practically, fit values approaching 1.0 indicate a better match between the proposed model and the theoretical model. The NFI was .82, and the CFI was .84. These indices fell below the recommended .90 (Kline, 1998), suggesting rejection of the single-factor model by this criterion. However, the EFA performed on the CFQ did produce a single-factor model, as have most past studies. We therefore used the single general CFQ factor to explore relationship between cognitive failures and aspects of dissociative experience.

The previously determined DES factors of absorption or derealization (being unaware of external events while engaged in some activity, being absorbed in fantasy, or feeling as if fantasy were real), depersonalization
(feeling as if one’s body is not one’s own or feeling as if experiences are not real), segment amnesia (forgetting experiences in one’s life), and in situ amnesia (awaking to the current situation not remembering how one got there) were used to compare with the single general factor of the CFQ (Ray & Faith, 1995). For specific item loadings of the DES factors, please refer to the Ray and Faith (1995) study. The correlations (Table 1) between the single general CFQ factor from the exploratory factor analysis and the four predetermined DES factor scores were all statistically significant ($p < .01$). Confidence intervals (95%) are also included in Table 1.

Finally, a conjoint item-level factor analysis using oblique rotation was performed as an EFA on all items of the DES and the CFQ. This analysis treats the DES and CFQ as a single instrument, exploring the factor structure of the total set of items from the two instruments. A scree plot was used to graph the eigenvalues. There were marked breaks in the curve after the first and second extracted factors; therefore, two factors were retained. The first factor had an eigenvalue of 12.77 and accounted for 24.09% of the variance. The second factor had an eigenvalue of 3.48 (6.56%). The third factor had an eigenvalue of 1.82 (3.43%), the fourth factor had an eigenvalue of 1.73 (3.26), and the fifth factor had an eigenvalue of 1.40 (2.64%). The correlation between Factors 1 and 2 was $- .48$. On the first factor, the highly loading items came from both the DES and CFQ. Seven of the 10 most highly loaded DES items came from the absorption factor of the DES. Four of the top five most highly loaded CFQ items were also among the top five most highly loaded items on the general factor resulting from the EFA. Therefore, it appears that in general, the items that loaded highly onto the first factor of the conjoint item-level factor analysis were those that described absorption-related phenomena. The items that loaded highly onto the second factor of the conjoint item-level factor analysis exclusively came from the DES. The majority of the top-loading items came from the two memory-related factors of the DES. Notably, 5 of the top 10 highest-loading items came from Waller’s (1995) DES-T questionnaire, which was designed to measure pathological forms of dissociation.

Table 1. Factor correlations with Cognitive Failures Questionnaire general factor

<table>
<thead>
<tr>
<th>Dissociative Experiences Scale factor</th>
<th>Pearson’s $r$</th>
<th>95% Confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Absorption or derealization</td>
<td>.455**</td>
<td>.41–.50</td>
</tr>
<tr>
<td>2. Depersonalization</td>
<td>.336**</td>
<td>.29–.39</td>
</tr>
<tr>
<td>3. Segment amnesia</td>
<td>.407**</td>
<td>.36–.46</td>
</tr>
<tr>
<td>4. In situ amnesia</td>
<td>.361**</td>
<td>.31–.42</td>
</tr>
</tbody>
</table>

**$p < .01$.**
Therefore, it seems that the second factor of the conjoint item-level factor analysis represents experiences that fall toward the pathological end of the dissociative spectrum and does not include experiences captured by the CFQ. All precise individual item loadings can be obtained from the authors upon request.

DISCUSSION

The current study used a variety of statistical procedures and a sample of more than 1,000 participants to better understand the relationship between dissociation and cognitive failures. Based on Broadbent et al.’s (1982) original theoretical conceptualization of cognitive failures and past studies’ examination of the CFQ (Wagle et al., 1999) we tentatively expected that there would be a general cognitive failure factor. An EFA determined that all items of the questionnaire loaded reasonably highly onto a single, general factor, which is consistent with Broadbent’s original claim that analysis of the CFQ results in a single latent factor of cognitive failure. Because there is no firm consensus in the literature as to a stable factor structure of the CFQ, the next logical step was to perform a more statistically convincing procedure such as CFA, which several studies have called for (Matthews et al., 1990; Larson et al., 1997; Pollina et al., 1992). Although the values were not far from being accepted, the single-factor model fell short of standard criteria for fit indices. Only one published study has done a CFA on the CFQ. Wallace (2004) determined that a four-factor solution produced the best fit. However, all factors were very highly correlated with each other in this analysis, and our interpretation of our EFA results is that the CFQ lacks the psychometric properties needed for a theoretically meaningful interpretation of more than a single factor. It may be the case that, as Matthews et al. (1990) suggested, the restricted scope of coverage of the items of the current CFQ render accurate factor analysis impossible. We therefore treated the CFQ as reflecting a single broad construct.

Dissociation in nonpathological populations as measured by the DES has been shown to be made up of four stable factors: absorption or derealization, depersonalization, segment amnesia, and in situ amnesia (Ray & Faith, 1995). A study using CFA substantiated this finding (Kwan, 1999). To further articulate the nature of the single CFQ factor, it was correlated with these four factors from the DES. All correlations between the factors of the DES and the single factor of the CFQ were significant, and there was little variation in the strength of the correlations between the factors. The correlation between the DES factor of absorption and the general factor of the CFQ was the highest correlation among those determined,
which lends support to the notion that cognitive failures are most similar to the nonpathological forms of dissociation. However, the fact that there was not more deviation in the correlations substantiates the notion that the CFQ may be tapping into a global, diffuse range of cognitive dysfunction.

Finally, a conjoint item-level factor analysis was performed to examine the structure of the two instruments taken together. Two factors were retained. The first factor contained all items from the CFQ and highly loaded items from the absorption factor of the DES. The items that loaded onto the first factor of the conjoint item-level factor analysis suggest that this factor represents nonpathological, absorption-related phenomena. The items that loaded highly onto the second factor of the conjoint item-level factor analysis exclusively came from the DES, with the majority of the top-loading items from the two memory-related factors of the DES. In addition, all the items from Waller’s (1995) DES-T questionnaire, which includes a subset of the original DES scale designed to measure pathological forms of dissociation, loaded in a positive direction onto the second factor (Waller, Putnam, & Carlson, 1996). The items that loaded highly onto the second factor of the conjoint item-level factor analysis suggest that this factor represents experiences that fall toward the pathological end of the dissociative spectrum, including various types of amnesia.

Results from the conjoint item-level analysis helped illuminate the relationship between cognitive failures and dissociation. Based on the items that load highly on the two factors, it can be concluded that the CFQ is measuring a more nonpathological form of dissociation including more common experiences such as “spacing out,” whereas the DES covers a broader range of cognitive processes. Therefore, the overlap between cognitive failures and dissociation pertains to the more benign manifestations of dissociation, and the pathological form of dissociation operates independently of it. The origin of the association between cognitive failures and dissociation is unclear. Future research should attempt to further investigate this association.

The next step in this line of research would be to examine the relationship between empirical tests of cognitive abilities such as attention and memory and self-report measures such as the CFQ and DES. For example, working memory often is conceived as a system incorporating both storage and executive control functions. Wright and Osborne (2005) provided evidence that scores on the CFQ are not related to individual differences in short-term storage capacity, but VomHofe, Mainemarre, and Vannier (1998) presented data suggesting that CFQ scores are related to performance on cognitive inhibition tasks. Inhibitory control is important in a variety of attentional functions (Friedman & Miyake, 2004). Though not yet supported by a broad range of empirical evidence, these observations
are consistent with the link found here between cognitive failures and the absorption aspect of dissociative experience. If one could accurately identify the types of cognitive failures that occur and test them empirically, one might gain insight into the organization of higher-order mental functions. This insight would be invaluable for both theoretical and practical applications in cognitive and clinical psychology. Future research should also consider exploring the origins of the link between dissociation and cognitive failures, potentially examining the role of sleep disturbance. Outside the realm of psychology, this information could be used to help prevent human errors, which contribute to a variety of dangerous situations, including more than 90% of traffic accidents (Martin, 1983; Treat et al., 1977).

This study was the first to complete a factor analysis including items from both the DES and CFQ. In addition, it was only the second study to use CFA on the CFQ. This study is also important because it extends earlier work by looking at subdimensions of dissociation (i.e., subscales of the DES). Although the CFQ lacked the psychometric properties necessary to produce a stable factor structure through CFA, we were still able to further clarify the relationship between the overlapping constructs of cognitive failures as measured by the CFQ and dissociation as measured by the DES. Previous studies have determined that the CFQ and DES are highly correlated, a finding replicated here. This study goes above and beyond such findings. Having such a large sample size allowed us to conclusively affirm that the CFQ and the DES are assessing similar cognitive processes. The overall conclusion of the study is that the CFQ measures the same things as the DES, but the DES has questions that tap something different. The association of the CFQ and DES is based primarily on non-pathological processes, whereas dissociation includes more pathological types of cognition. These important findings have implications for future cognitive and clinical research in this realm.

Notes
Correspondence about this article should be addressed to Amanda Schurle Bruce, 82 9th Street, Providence, RI 02906 (e-mail: a_schurle@yahoo.com). Received for publication February 7, 2006; revision received May 5, 2006.

References


