PERSONALITY PROCESSES AND INDIVIDUAL DIFFERENCES

Functional and Dysfunctional Impulsivity: Personality and Cognitive Correlates

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The 3 studies reported here were designed to clarify the nature of the personality trait of impulsivity. Two types of impulsivity were distinguished. Dysfunctional impulsivity is the tendency to act with less forethought than most people of equal ability when this tendency is a source of difficulty; most previous work on impulsivity appears to have focused on this trait. Functional impulsivity, in contrast, is the tendency to act with relatively little forethought when such a style is optimal. The present work indicates that these two tendencies are not highly correlated and that they bear different relations both to other personality traits and to the manner in which certain basic cognitive processes are executed.

A substantial body of evidence suggests that individual differences in the personality trait of extraversion are associated with individual differences in the way basic cognitive processes are executed. These basic cognitive processes include the retrieval of information from short- and long-term memory (Bone, 1971; M. W. Eysenck, 1974; McLaughlin, 1968), signal detection (Harkins & Geen, 1975), probability learning (Wallasch & Gahm, 1960), and vigilance (Bakan, 1959).

Factor analyses of extraversion scales indicate that this broad trait consists of several closely associated traits. These include impulsivity, sociability, adventurousness, enthusiasm, high activity level, and boredom proneness (S. B. G. Eysenck & Eysenck, 1963, 1977, 1978; Gerbing, Ahadi, & Patton, 1987; J. P. Guilford, 1975; Howarth & Browne, 1972; Plomin, 1976).

Recently, researchers have attempted to identify the specific characteristics of extraverted individuals that account for the overall relation between extraversion and cognitive functioning. This research suggests that impulsivity is the component of extraversion that is most consistently associated with individual differences in the way very basic perceptual and memorial processes are executed (e.g., Anderson & Revelle, 1983; Dickman, 1985; Dickman & Meyer, 1988; H. J. Eysenck & Eysenck, 1985; H. J. Eysenck & Levey, 1972; Loo, 1979; Revelle, Humphreys, Simon, & Gilliland, 1980).

The present work was designed to examine in more detail this personality-cognition relation. The studies reported here sought to distinguish between different types of impulsivity and to determine which type accounts for the relationship found between broad measures of impulsivity and measures of cognitive functioning.

Impulsivity can be defined as the tendency to deliberate less than most people of equal ability before taking action. The consequences of this lack of deliberation for cognitive functioning seem to be viewed generally as negative. For example, there is a large body of literature on techniques for reducing impulsivity (e.g., Cole & Hartley, 1978; Denny, 1970; Heider, 1971; Kagan, Pearson, & Welch, 1966; Meichenbaum & Goodman, 1971; Nelson & Birkimer, 1978; Ridberg, Parke, & Hetherington, 1971; Zelniker, Jeffrey, Ault, & Parsons, 1972); there does not appear to be any corresponding body of work on training low impulsives to be more impulsive.

Recent work on the relationship between impulsivity and cognitive functioning, however, suggests that the consequences of impulsivity are not always negative. For example, when the experimental task is very simple, high impulsives' rapid responding has little cost in errors (Dickman, 1985). And when the time available for making a decision is extremely brief, high impulsives are actually more accurate than low impulsives (Dickman & Meyer, 1988).

One question raised by these findings is whether the factors that cause people to respond quickly and inaccurately when this style of responding is a source of difficulty are the same factors that cause people to respond quickly and inaccurately when this style is optimal. It could be that there is a general tendency to respond quickly and inaccurately that is sometimes a source of difficulty and sometimes beneficial. Or, it could be that there are two separate traits, one that results in rapid, inaccurate performance in situations where this is nonoptimal. The former trait will be referred to here as functional impulsivity, and the latter trait will be referred to as dysfunctional impulsivity. The studies described here sought to determine whether these two traits can be empirically distinguished.

Study 1

The aim of the first study was to determine whether it is possible to discriminate within the self-report domain between func-
tional and dysfunctional impulsivity. The approach taken was to write a large number of items designed specifically to tap these two types of impulsivity and then to factor-analyze subjects' responses to these items in order to see whether the two hypothesized factors would emerge.

Method

Measures

The item pool used in this factor analysis contained 17 items written to tap functional impulsivity and 23 items designed to tap dysfunctional impulsivity. There were also 23 filler items.

Procedure

The items were administered to 477 undergraduates (209 men and 268 women) who were serving in the study to fulfill a course requirement. Subjects were tested in groups of 10–20 persons. Each session lasted approximately half an hour.

Results

The correlation matrix for the 63 items was factor-analyzed using the principal axis method, with the communalities estimated iteratively. The criterion for factor extraction was an eigenvalue equal to or greater than 1. Seven factors met this criterion. The eigenvalues and the percentage of variance accounted for by these seven factors are presented in Table 1.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Eigenvalue</th>
<th>Variance accounted for (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8.8</td>
<td>23.0</td>
</tr>
<tr>
<td>2</td>
<td>6.0</td>
<td>15.0</td>
</tr>
<tr>
<td>3</td>
<td>2.8</td>
<td>7.2</td>
</tr>
<tr>
<td>4</td>
<td>1.7</td>
<td>4.2</td>
</tr>
<tr>
<td>5</td>
<td>1.2</td>
<td>3.0</td>
</tr>
<tr>
<td>6</td>
<td>1.1</td>
<td>2.7</td>
</tr>
<tr>
<td>7</td>
<td>1.0</td>
<td>2.6</td>
</tr>
</tbody>
</table>

The factor matrix was rotated using an oblique rotation (oblimin, with delta set to 0). The first two factors that emerged from this analysis clearly represented the two hypothesized components of impulsivity. The 11 items that loaded over .30 on Factor 1 had all been written to tap functional impulsivity, whereas the 12 items that loaded above .30 on Factor 2 had all been written to tap dysfunctional impulsivity (See Tables 2 and 3). No item loaded over .30 on both Factor 1 and Factor 2.

The items loading on the third factor appeared to reflect a concern about making mistakes. The items loading on the fourth factor seemed to represent the tendency to dislike jobs that require careful attention. The items loading on the fifth factor appeared to concern the tendency to plan ahead, to consider the long-range consequences of actions. The items loading on the sixth factor seemed to reflect the tendency to pause before making decisions. And the items loading on the seventh factor appeared to represent a dislike of acting quickly in general, whether the actions involve decisions or not.

Factor 1 (Functional Impulsivity) and Factor 2 (Dysfunctional Impulsivity) correlated .07. Functional Impulsivity correlated −.35 with Factor 6 (Pausing Before Decisions). Dysfunctional Impulsivity correlated .33 with Factor 4 (Disliking Jobs That Require Careful Attention) and −.57 with Factor 5 (Planning Ahead).

The 11 items that loaded above .30 on Factor 1 were combined to create a Functional Impulsivity scale; the internal-consistency reliability of this scale (Cronbach's alpha) was .83. The 12 items that had loaded above .30 on Factor 2 were also combined to create a Dysfunctional Impulsivity scale; the alpha for this scale was .86. The correlation between these two scales was .22.

Discussion

This study provided evidence that functional and dysfunctional impulsivity can be distinguished within the self-report domain. Both traits appear to involve the tendency to deliberate less than most people of equal ability before taking action. For individuals high in functional impulsivity, this tendency has positive consequences and is a source of pride, but for individuals high in dysfunctional impulsivity, this tendency leads to difficulties. The relatively low correlation between the two traits (.07 for the factors and .22 for the derived scales) provides evidence that the two traits are sufficiently independent to be worth examining separately.

Study 2

The aim of the second study was to clarify further the nature of functional and dysfunctional impulsivity by examining the relation between these two traits and other self-report personality measures. These included both measures of impulsivity and measures of traits that had previously been found to be related to impulsivity.

It was noted earlier that previous work on the consequences of impulsivity for cognitive functioning appears to have emphasized the dysfunctional aspects of impulsivity. Certain self-report measures of impulsivity also seem to reflect this bias. For example, the Narrow Impulsivity Scale (Narrow-I; S. B. G. Eysenck & Eysenck, 1978) is correlated more highly with psychoticism than it is with extraversion (S. B. G. Eysenck & Eysenck, 1978). It is less clear for other self-report measures of impulsivity whether they reflect functional or dysfunctional impulsivity to a greater degree. Gerbing et al.'s (1987) analysis of a large pool of items drawn from major impulsivity scales identified three second-order factors; two of these factors, (a) Spontaneous and (b) Carefree, seem to reflect functional impulsivity, whereas the third, (c) Not Persistent, seems closer to dysfunctional impulsivity. One aim of the present study, then, was to determine directly the extent to which previous self-report measures of impulsivity have focused on the positive versus the negative aspects of this trait.

A second question addressed by the present study was whether the two types of impulsivity bear different relations to other traits known to be related to impulsivity. To the extent that functional and dysfunctional impulsivity are distinct traits, their respective patterns of correlations with other traits ought to be different.
Table 2

| Items Loading Primarily on Factor 1, Functional Impulsivity, in Study 1 |
|-------------------------------------------------|-----------------|-----------------|
| Item                                                                 | Factor 1 loading | Factor 2 loading |
| I don't like to make decisions quickly, even simple decisions, such as choosing what to wear, or what to have for dinner. | -.79             | -.06            |
| I am good at taking advantage of unexpected opportunities, where you have to do something immediately or lose your chance. | .64              | -.10            |
| Most of the time, I can put my thoughts into words very rapidly. | .38              | .03             |
| I am uncomfortable when I have to make up my mind rapidly. | -.77             | -.07            |
| I like to take part in really fast-paced conversations, where you don't have much time to think before you speak. | .72              | .15             |
| I don't like to do things quickly, even when I am doing something that is not very difficult. | -.80             | .02             |
| I would enjoy working at a job that required me to make a lot of split-second decisions. | .54              | .18             |
| I like sports and games in which you have to choose your next move very quickly. | .57              | .19             |
| I have often missed out on opportunities because I couldn't make up my mind fast enough. | -.36             | .10             |
| People have admired me because I can think quickly. | .60              | .01             |
| I try to avoid activities where you have to act without much time to think first. | -.47             | .07             |

Method

Subjects

The subjects in this study, again, were undergraduates who participated to fulfill a course requirement. There were 188 subjects (78 male and 110 female).

Measures

A questionnaire was created containing the Functional and Dysfunctional Impulsivity scales, along with 23 filler items. This questionnaire will be referred to as the Impulsivity Inventory.

Four impulsivity scales used in previous research were administered in this study. One of these scales was developed by Revelle et al. (1980) on the basis of a factor analysis of the Eysenck Personality Inventory (EPI) Extraversion scale and will be referred to here as the EPI-I Scale. This impulsivity scale, and others derived in the same manner from the EPI, have been the most widely used self-report measures in research on impulsivity and information processing. The other impulsivity scales administered were the Barratt Impulsivity Scale, Version 5 (BIS-5; Barratt, 1965), the Narrow-I (S. B. G. Eysenck & Eysenck, 1977), and the Personality Research Form (PRF) Impulsivity scale (PRF-I; Jackson, 1967).

The scales used to measure impulsivity-related traits were ones whose validity had been established in previous work: (a) the General Activity Personality Research Form (PRF) Impulsivity scale (PRF-I; Jackson, 1965), the Narrow-I (S. B. G. Eysenck & Eysenck, 1977), and the Personality Research Form (PRF) Impulsivity scale (PRF-I; Jackson, 1967).

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The Functional and Dysfunctional Impulsivity scales showed a correlation of .23 \((p < .05)\) with each other. The internal-consistency reliability of the Functional Impulsivity scale (Cronbach's alpha) was .74 and that of the Dysfunctional Impulsivity scale was .85.

The correlations between the different impulsivity scales are presented in Table 4, along with the reliabilities of these scales. Both the Functional and the Dysfunctional Impulsivity scales correlated significantly with all of the other impulsivity scales (all \(p < .01\)). The Dysfunctional Impulsivity scale correlated significantly more highly with EPI-I, \(r(185) = -3.26, p < .01\); Narrow-I, \(r(185) = 7.65, p < .001\); and PRF-I, \(r(185) = 7.63, p < .001\). The two impulsivity scales showed an identical level of correlation with the BIS-5, \(r(185) = .46\). The correlations between the impulsivity scales and the scales measuring other traits are presented in Table 5. All of the correlations in the table are statistically significant \((p < .05)\). Comparisons between the correlations in Table 5 showed that the Functional Impulsivity scale correlated significantly more highly with the Venturesomeness, \(r(185) = 2.43, p < .05\), and...
Rhymia, t(185) = 3.63, p < .001, scales. The Dysfunctional Impulsivity scale correlated significantly more highly with the Order, t(185) = −2.62, p < .01, and Cognitive Structure, t(185) = −2.78, p < .01, scales. Impulsivity scale correlated significantly more highly with the PRF scales. The Dysfunctional Impulsivity factor correlated with a factor tapping a dislike of jobs requiring careful work and with a factor tapping a dislike of planning ahead, whereas the Functional Impulsivity factor did not correlate with either of these two factors; both of these characteristics are likely to have negative consequences for the individual.

Both functional and dysfunctional impulsivity showed significant, but small, correlations with the traits of boredom proneness and sociability. The two types of impulsivity did not differ in the strength of their correlations with these two traits.

It might be noted that these patterns of correlation provide some evidence concerning the relationship between the two types of impulsivity identified here and the five broad personality traits identified by Norman and others (e.g., Norman, 1963). Costa and McCrae (1988) have investigated the relation between the scales of the PRF and measures of five of these broad traits. The PRF scales that were found to be most closely associated with functional impulsivity in the present study were ones that Costa and McCrae found to be associated with the broad trait of conscientiousness. This provides additional sup-

### Table 3

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1 loading</th>
<th>Factor 2 loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>I will often say whatever comes into my head without thinking first.</td>
<td>.03</td>
<td>.72</td>
</tr>
<tr>
<td>I enjoy working out problems slowly and carefully.</td>
<td>−.23</td>
<td>−.43</td>
</tr>
<tr>
<td>I frequently make appointments without thinking about whether I will be able to keep them.</td>
<td>.15</td>
<td>.53</td>
</tr>
<tr>
<td>I frequently buy things without thinking about whether or not I can really afford them.</td>
<td>−.04</td>
<td>.66</td>
</tr>
<tr>
<td>I often make up my mind without taking the time to consider the situation from all angles.</td>
<td>.22</td>
<td>.64</td>
</tr>
<tr>
<td>Often, I don’t spend enough time thinking over a situation before I act.</td>
<td>.15</td>
<td>.85</td>
</tr>
<tr>
<td>I often get into trouble because I don’t think before I act.</td>
<td>.04</td>
<td>.79</td>
</tr>
<tr>
<td>Many times the plans I make don’t work out because I haven’t gone over them carefully enough in advance.</td>
<td>.18</td>
<td>.75</td>
</tr>
<tr>
<td>I rarely get involved in projects without first considering the potential problems.</td>
<td>−.11</td>
<td>−.65</td>
</tr>
<tr>
<td>Before making any important decision, I carefully weigh the pros and cons.</td>
<td>−.20</td>
<td>−.46</td>
</tr>
<tr>
<td>I am good at careful reasoning.</td>
<td>−.10</td>
<td>−.52</td>
</tr>
<tr>
<td>I often say and do things without considering the consequences.</td>
<td>−.003</td>
<td>.82</td>
</tr>
</tbody>
</table>

Discussion

This study provided additional support for the usefulness of making the distinction between functional and dysfunctional impulsivity. As in the first study, the correlation between the Functional and Dysfunctional Impulsivity scales was relatively low.

In addition, there were different patterns of correlations between each type of impulsivity and the other personality traits studied. Functional impulsivity was more closely associated with enthusiasm (i.e., rhymia), adventurousness, and activity than was dysfunctional impulsivity. The closer association between functional impulsivity and these traits could explain why functional impulsives are more likely to report benefiting from their impulsivity than are dysfunctional impulsives. Enthusiastic, active individuals who are willing to take risks are likely to be very productive; in such individuals, the sheer quantity of their output could well compensate for the high number of errors in that output.

Dysfunctional impulsivity was more strongly associated with disorderliness (i.e., the low end of the Order scale) than was functional impulsivity. And dysfunctional impulsivity was more strongly associated with the tendency to ignore hard facts when making decisions (i.e., the low end of the Cognitive Structure scale). Traits like disorderliness and a lack of concern about hard facts are likely to exacerbate the problems associated with acting without forethought, rather than compensating for those problems. This is consistent with the finding in Study 1 that the Dysfunctional Impulsivity factor correlated with a factor tapping a dislike of jobs requiring careful work and with a factor tapping a dislike of planning ahead, whereas the Functional Impulsivity factor did not correlate with either of these two factors; both of these characteristics are likely to have negative consequences for the individual.

Both functional and dysfunctional impulsivity showed significant, but small, correlations with the traits of boredom proneness and sociability. The two types of impulsivity did not differ in the strength of their correlations with these two traits.

It might be noted that these patterns of correlation provide some evidence concerning the relationship between the two types of impulsivity identified here and the five broad personality traits identified by Norman and others (e.g., Norman, 1963). Costa and McCrae (1988) have investigated the relation between the scales of the PRF and measures of these five broad traits. The PRF scales that were found to be most closely associated with functional impulsivity in the present study were ones that Costa and McCrae found to be associated with the broad trait of conscientiousness. In contrast, the PRF scales found here to be most closely associated with dysfunctional impulsivity were ones that Costa and McCrae found to be associated with the broad trait of conscientiousness. This provides additional sup-

### Table 4

<table>
<thead>
<tr>
<th>Impulsivity measures</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Functional Impulsivity</td>
<td>.74</td>
<td>.23</td>
<td>.34</td>
<td>.30</td>
<td>.23</td>
<td>.14</td>
</tr>
<tr>
<td>2. Dysfunctional Impulsivity</td>
<td>.85</td>
<td>.51</td>
<td>.26</td>
<td>.73</td>
<td>.67</td>
<td></td>
</tr>
<tr>
<td>3. EPI Impulsivity</td>
<td>.23</td>
<td>.63</td>
<td>.71</td>
<td>.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. BIS-S</td>
<td>.34</td>
<td>.65</td>
<td>.64</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Narrow Impulsivity</td>
<td>.65</td>
<td>.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. PRF Impulsivity</td>
<td>.21</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Italicized entries (in the diagonal) represent alpha reliabilities for the scales. EPI = Eysenck Personality Inventory; BIS-5 = Barratt Impulsivity Scale, Version 5; PRF = Personality Research Form.
port for the importance of distinguishing between these two types of impulsivity.

The present data also indicated that existing global self-report measures of impulsivity tap both functional and dysfunctional impulsivity. Although most of these global measures appear to tap dysfunctional impulsivity somewhat more than they do functional impulsivity, either of these two types of impulsivity could account for a particular association between a global impulsivity measure and another personality or cognitive variable.

Study 3

Having demonstrated that functional and dysfunctional impulsivity can be discriminated within the self-report domain, the next, and final, step in this sequence of studies was to determine which of these two types of impulsivity accounts for the previous finding of an overall relationship between impulsivity and the speed and accuracy of certain perceptual processes. As was noted earlier, the available evidence supports the view that individual differences in impulsivity account for the overall relationship between extraversion and information processing. Thus, it was expected that the findings of this study would represent a first step in explaining the large body of research on extraversion and information processing.

It was not clear from previous work which of the two types of impulsivity distinguished here, functional or dysfunctional, would account for the relationship between broad measures of impulsivity and measures of cognitive functioning. Both types of impulsivity correlated significantly with the measure of impulsivity used in most previous work on impulsivity and information processing, the EPI-I. And both types of impulsivity involve a self-reported tendency to act with relatively little forethought. Thus, on an a priori basis, it would seem that either type of impulsivity, or both, could account for the previous findings of a relationship between the EPI-I and cognitive functioning.

Study 3 was also designed to provide data bearing on the relationship between impulsivity and ability. Perhaps functional impulsiives proceed more rapidly than most people simply because they are very bright; because of their greater intelligence, they can proceed more rapidly than others without being any less accurate. Study 3 was designed to provide both speed and accuracy data, making it possible to determine whether high functional impulsiives were less accurate than other individuals, as well as being faster.

Table 5

<table>
<thead>
<tr>
<th>Present impulsivity measures</th>
<th>Measures of impulsivity-related traits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GA</td>
</tr>
<tr>
<td>Functional</td>
<td>.32</td>
</tr>
<tr>
<td>Dysfunctional</td>
<td>.21</td>
</tr>
</tbody>
</table>

Note. GA = General Activity; Vent = Venturesomeness; BP = Boredom Proneness; Rha = Rhathymia; Ord = Orderliness; CS = Cognitive Structure; Soc = Sociability.

Measures and Materials

The Impulsivity Inventory used in the previous study was used here as well. The cognitive task used in this study had previously been shown to be sensitive to individual differences in the speed and accuracy of basic perceptual processes (Cooper, 1976; Cooper & Podgorny, 1976; Dickman & Meyer, 1988). Subjects examined two complex geometric figures, presented side by side, and decided whether they were identical.

Each figure was created by removing one or more Xs at random from the periphery of an array of Xs that was 5 Xs high and 10 Xs wide. To enhance the goodness of these figures, the array was compressed vertically so that adjacent Xs touched each other both horizontally and vertically.

As in previous work, pairs of both simple and complex figures were used. To construct the simple figures, 8 Xs were removed at random until the figure contained between 18 and 22 corners. To construct the complex figures, 17 Xs were removed at random until the figure contained between 38 and 42 corners. (See Dickman & Meyer, 1988 for examples of figures of this type.)

The figure pairs were printed in booklets, 112 figure pairs to a booklet. There were two booklets, one containing only pairs of simple figures, and the other containing only pairs of complex figures. The figure pairs were in random order within each booklet. Subjects indicated whether the two figures in each pair were the same or different by marking one of two circles near the figures.

Procedure

Pretesting. In an initial screening session, 324 subjects completed the Impulsivity Inventory, in groups of 10 to 20. Again, the subjects in this study were undergraduates serving for course credit. This session lasted about 20 min.

The distribution of scores for each of the two impulsivity scales was divided into thirds. Individuals in the upper third of the distribution for each impulsivity scale were considered to be high on that trait, whereas individuals whose scores fell in the lower third were considered to be low on the trait.

Subjects for the main session of Study 3 were drawn from the four groups of subjects representing the possible combinations of high and low scores on the two impulsivity scales. Due to scheduling problems, not all of the eligible subjects were able to participate in the main session; the percentage of eligible subjects who participated in this session was very similar for the four groups. There were a total of 217 subjects in the main session, including 75 subjects who were low in both functional and dysfunctional impulsivity, 38 subjects who were low in functional impulsivity and high in dysfunctional impulsivity, 48 subjects who were high in functional impulsivity and low in dysfunctional impulsivity, and 56 subjects who were high in both functional and dysfunctional impulsivity.
Main session. In the main session, which lasted about 30 min, the two figure-comparison tasks were administered to subjects in groups of 2–5 individuals. Each session began with a practice set of figures. Subjects were given 2 min to compare 27 pairs of figures, printed on a single page. The practice figures were then scored, and subjects were given feedback on their performance. The subjects then completed the two test booklets. They were allowed 11.5 min to work on each of the two booklets; this amount of time was chosen so that no subject was able to complete a booklet. There was a 5-min break between booklets. The order of the two booklets was counterbalanced within each of the four subject groups separately. Subjects were instructed not to skip any figures and not to erase mistakes.

Results

The number of items completed by each subject was transformed into average time per item (TPI), in seconds. An overall score for the task was also computed by totaling the number of correct responses the subject made. Analyses of variance (ANOVAS) were carried out on TPI, error rate (ER), and score. The regression model was used rather than the unweighted means model because it was thought that the unequal sizes of the four subject groups reflected the relative sizes of these groups in the population as a whole, rather than being an artifact of the experimental procedure. The $\omega^2$ statistic was used to determine the percentage of variance accounted for by the significant effects.

For all three ANOVAS, there were three factors. The two between-subjects factors were Functional Impulsivity (low, high) and Dysfunctional Impulsivity (low, high). The within-subject factor was Figure Complexity (low, high). The means for TPI, ER, and score are presented in Table 6. All means presented here are weighted means, for the reasons noted earlier.

Table 6
Means for Time per Item (TPI), Error Rate (ER), and Score in Study 3

<table>
<thead>
<tr>
<th>Functional impulsivity</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TPI</td>
<td>ER</td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple figures</td>
<td>8.3</td>
<td>.07</td>
</tr>
<tr>
<td>Complex figures</td>
<td>10.1</td>
<td>.13</td>
</tr>
<tr>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple figures</td>
<td>7.7</td>
<td>.11</td>
</tr>
<tr>
<td>Complex figures</td>
<td>9.3</td>
<td>.15</td>
</tr>
</tbody>
</table>

None of the interactions were significant. These included Functional Impulsivity X Dysfunctional Impulsivity, $F(1, 213) = .69, MS_E = 5.52, p = .41$; Functional Impulsivity X Figure Complexity, $F(1, 213) = .18, MS_E = .29, p = .68$; Dysfunctional Impulsivity X Figure Complexity, $F(1, 213) = .14, MS_E = .23, p = .71$; and Functional Impulsivity X Dysfunctional Impulsivity X Figure Complexity, $F(1, 213) = 1.11, MS_E = 1.83, p = .29$.

Error Rate

The findings for ER paralleled those for TPI. The main effect of figure complexity was significant, $F(1, 213) = 116.05, MS_E = .2167, p < .001, \omega = .35$; the average ER on the complex figures (.14) was greater than that for the simple figures (.09). The main effect of functional impulsivity was significant, $F(1, 213) = 6.18, MS_E = .0495, p < .01, \omega = .03$, with high functional impulsives showing a higher average ER (.13) than low functional impulsives (.10). The main effect of dysfunctional impulsivity was again nonsignificant, $F(1, 213) = .12, MS_E = .0099, p = .73$.

Just as for TPI, none of the interactions were significant. These included Functional Impulsivity X Dysfunctional Impulsivity, $F(1, 213) = .17, MS_E = .0014, p = .68$; Functional Impulsivity X Figure Complexity, $F(1, 213) = .35, MS_E = .0066, p = .55$; Dysfunctional Impulsivity X Figure Complexity, $F(1, 213) = .64, MS_E = .0012, p = .43$; and Functional Impulsivity X Dysfunctional Impulsivity X Figure Complexity, $F(1, 213) = 2.55, MS_E = .0048, p = .11$.

Score

For score, the main effect of figure complexity was again significant, $F(1, 213) = 272.38, MS_E = 18202.65, p < .001, \omega = .56$; subjects on the average had higher scores for the simple figures (63.58) than for the complex figures (49.84). The main effect of functional impulsivity was significant, $F(1, 213) = 5.66, MS_E = 1544.42, p < .05, \omega = .03$; the average score for high functional impulsives (65.70) was higher than for low functional impulsives (61.62). The main effect of dysfunctional impulsivity was not significant, $F(1, 213) = 1.16, MS_E = 317.39, p = .28$.

The interaction between functional and dysfunctional impulsivity was nonsignificant, $F(1, 213) = .88, MS_E = 238.84, p =
that were used in the present study found a significant interaction between functional impulsivity and the speed and accuracy with which students carry out the processes involved in the comparison of visual stimuli. Dysfunctional impulsivity showed no such relation to these processes.

The fast, relatively inaccurate, information-processing strategy adopted by functional impulsives in this study did in fact appear to be functional under the conditions of the experiment. It yielded higher scores, that is, more correct answers within the allotted time, than the slower, more accurate style of low functional impulsives. Although subjects in the present experiment were not told explicitly that the criterion of good performance was the total number of correct responses, it seems likely that they assumed this to be the case, since it is almost invariably true for the type of time-limited paper-and-pencil tests with which students are most familiar, that is, course examinations.

It is not clear why dysfunctional impulsivity failed to show a relationship with speed or accuracy in the present study. One possibility is that dysfunctional impulsives adopt rapid, inaccurate information-processing strategies only under certain circumstances. For example, it may be that dysfunctional impulsives have a particularly difficult time carrying out slow, methodical information processing when they are under stress. From this point of view, the rapid error-prone information processing characteristic of dysfunctional impulsives reflects a breakdown in the control of information processing. This explanation resembles one offered by Block, Block, and Harrington (1974) to account for the fast, inaccurate performance of certain children on the Matching Familiar Figures Test (Kagan, Rosman, Day, & Phillips, 1964); that test, like the global impulsivity measures examined in Study 2, probably taps both functional and dysfunctional impulsivity. From this perspective, the failure to find an effect of dysfunctional impulsivity in the present study would be due to the fact that subjects did not perceive the present experimental situation to be particularly stressful.

The complex interaction between Functional Impulsivity, Dysfunctional Impulsivity, and Figure Complexity that approached significance for score is difficult to interpret. It may be that individuals who are both low in functional impulsivity and high in dysfunctional impulsivity have particular difficulties in carrying out tasks, such as comparing simple figures, where very rapid information processing is the optimal strategy.

It is worth noting that an earlier study using the same figures that were used in the present study found a significant interaction between impulsivity and figure complexity of a different sort; this interaction was significant for both speed and accuracy (Dickman & Meyer, 1988). In the earlier study, high impulsives slowed down less than other subjects when the figures were complex compared to when they were simple, and they showed a correspondingly greater increase in error rate on the complex figures. In that study, the EPI-I was used to measure impulsivity, and this scale, according to Study 2, taps both functional and dysfunctional impulsivity. Thus, it is possible that the earlier experiment was for some reason more stressful for subjects and that this caused dysfunctional impulsivity to affect performance more than it did in the present study. According to this view, the stress in that experiment interfered with the ability of dysfunctional impulsives to adopt the slow, careful strategy necessary for comparing the complex figures.

Whatever the reasons for the failure of high and low dysfunctional impulsives to differ in their performance in the present study, this study did clearly show that functional and dysfunctional impulsivity bear different relations to important aspects of cognitive functioning. This finding, in turn, provides strong support for the usefulness of distinguishing between these two types of impulsivity.

Finally, Study 3 also provided evidence bearing on the relation between functional impulsivity and cognitive ability. The possibility was raised earlier that high functional impulsives might act with less deliberation than other people simply because they are especially bright. According to this view, their greater intelligence allows these individuals to proceed more rapidly than most people, without being any less accurate. The present data, however, argue against this explanation; in the present study, the greater speed of functional impulsives was in fact accompanied by a significant cost in accuracy.

General Discussion

The three studies described here provide considerable evidence for the usefulness of distinguishing between functional and dysfunctional impulsivity. These two types of impulsivity differ in both their personality and their cognitive correlates. In Study 1, functional and dysfunctional impulsivity emerged as distinct factors in an analysis of self-report impulsivity items. In Study 2, these two types of impulsivity proved to bear different relation to other personality traits. And in Study 3, the two types of impulsivity showed different relations to the way certain very basic perceptual processes are executed.

At this point, it would seem that the best way to characterize functional impulsivity is to say that it represents the tendency to engage in rapid, error-prone information processing (i.e., to act with relatively little forethought) when such a strategy is rendered optimal by the individual's other personality traits. Dysfunctional impulsivity appears to represent the tendency to engage in rapid, error-prone information processing because of an inability to use a slower, more methodical approach under certain circumstances. It was suggested earlier that it might be stressful circumstances that interfere with dysfunctional impulsives' ability to engage in slow, accurate information processing; however, this is a possibility that must be confirmed by future research.

The present findings would seem to have several important implications for work on impulsivity and cognitive functioning. These findings raise the possibility that functional impulsivity
is the personality trait that is most responsible for the overall relationship between impulsivity and information processing and, at a broader level of analysis, between extraversion and information processing. And the present data strongly suggest that in order to discover systematic relationships between impulsivity and other personality traits and between impulsivity and cognitive processes, it will be necessary to distinguish between functional and dysfunctional impulsivity.

References


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