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Impulsivity and Attention-Perception Features in Relation to Juvenile Delinquency

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ABSTRACT: The aim of this study is to determine how effective two nonverbal psychological tests are in providing an accurate criminological diagnosis: the Attention-Perception Test (Toulouse-Piéron's Test) and the Gibson Spiral Maze Test (Gibson's Test). We studied 144 subjects (95 male and 49 female) ranging in age from 12 to 21 years, all of whom were either from centers under the administration of the juvenile court or the provincial prison of Granada (Spain). A control group of 218 schoolchildren aged 11 to 18 years (101 male and 117 female) from 4 schools located in areas of different socioeconomic status was also studied.

Our results showed that impulsivity and attention-perception appear to be complementary traits which provide information useful for criminological prognosis.

KEYWORDS: psychiatry, jurisprudence, juvenile delinquency, human behavior

Criminological diagnosis often requires the use of a battery of psychological tests which bring to light those personality traits that bear most directly on the subject's potential capacity for social adaptation and adjustment and allow us to formulate a prognosis, albeit with certain reservations, of his or her dangerousness. The majority of cases however do not lend themselves easily to either of these two goals, and the problem becomes even more complex when we are faced with maladjustment in the context of juvenile delinquency. These persons are still in the process of psychosocial maturation and are hence highly vulnerable to a long list of biographical and environmental factors which are as difficult to define in precise terms as they are to predict. To this must be added the subjects' frequent uncooperativeness and insincerity, commonly motivated by their desire to obtain lighter sentences, more favorable terms of probation, or rehabilitation as a result of a misleadingly optimistic criminological report. In the face of these obstacles, any instrument that mitigates these difficulties would obviously be of great use.

The purpose of this study was to determine the effectiveness of two nonverbal psychological tests in obtaining an accurate criminological diagnosis: the Attention-Perception Test (Toulouse-Piéron's Test) and the Gibson Spiral Maze Test (Gibson's Test). Our subjects were juvenile delinquents and minors brought before the juvenile court for a variety of reasons related to inadaptive behavior or family problems.

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Material and Methods

A total of 144 subjects (95 male and 49 female) ranging in age from 12 to 21 years inclusive (mean age 16.12 years; standard deviation [SD] 2.77) were studied. All subjects were from centers under the administration of the juvenile court or prison of Granada (Spain) and in all represented 98.63% of all persons between these ages confined in these 2 institutions. A series of clinical psychological, psychometric, and psychobiographical tests including the Eysenck Personality Inventory (EPI) [1], which evaluates two dimensions of personality neuroticism and extroversion, and also includes a sincerity scale, the State Trait Anxiety Inventory (STAI) [2]; Cattell's Culture Fair Intelligence Test [3]; the Attention-Perception Test of Toulouse Piéron [4]; and the Gibson Spiral Maze Test (Gibson's Test) [5] was administered to each subject. The Toulouse-Piéron Attention-Perception Test was provided by TEA Ediciones S.A. (Madrid, Spain). Described in 1911 by Toulouse and Piéron in their studies on experimental psychology [4], it consists of 1600 small pictures arranged in 40 rows. One fourth of the pictures (10 in each row) are identical to each of the models shown at the top of the page. The subject's task is to mark in 10 min all those pictures which are the same as the model indicated by the tester. The test is of use in assessing resistance to fatigue, speed, and persistence of perception and concentration. Gibson's Test belongs to the group of psychomotor instruments designed to evaluate speed, precision, and other general features of muscular expression in response to a controlled stimulus. First used in 1964 [6], the test material consist of a 235-cm-long spiral maze formed by thick black lines. The route contains obstacles at various points formed of small circles. The variables are counted as the number of errors made and the time needed to complete the test.

Sociofamilial and school backgrounds were noted as well as previous history of asocial behavior. The examination concluded with an individual assessment, carried out independently by two tutors or prison officials, of various areas of behavior (impulsiveness, peer sociability, conflict, and overall behavior during confinement). Statistical treatment of the data was performed with the following BMDP programs (biomedical computer programs) developed at the University of Los Angeles (California) in 1964: simple analysis of frequencies, association between variables, multivariate analysis, discriminant analysis, analysis of variance, and multiple linear regression.

Toulouse-Piéron's Test and Gibson's Test were administered to a control group consisting of a stratified random sample of 218 schoolchildren aged 11 to 18 years (101 male and 117 female) (mean age 14.04 years; SD 1.63) from 4 schools located in areas of different socioeconomic status.

Results

The scores obtained on the Attention-Perception (Toulouse-Piéron's) Test and Gibson's Test are presented in Tables 1 and 2, respectively. Comparison of the means for the three groups of young people showed the Attention-Perception Test to yield a statistically significant difference ($P < 0.001$) between subjects in the prison and the juvenile court centers and between the latter group and schoolchildren (control group) ($P < 0.001$). The lowest scores were obtained by minors (mean score 110.40) and the highest by schoolchildren (control group) (mean score 156.20) (Fig. 1).

When the mean scores on Gibson's Test were analyzed, all possible comparisons between the three groups revealed statistically significant differences ($P < 0.001$). As Fig. 2 illustrates, the greatest number of errors were made by subjects with criminal backgrounds (that is, individuals in prison, followed by subjects in juvenile court centers). No correlation however was noted between age and the number of errors in Gibson's Test. Statistically significant differences were found between all three groups in the time needed to complete the test. Subjects from the prison sample took the least time (mean time 34.24 s), while individuals from juvenile court centers were the slowest (mean 48.07 s) (Fig. 2).

TABLE 1—*Toulouse-Piéron Attention-Perception Test scores.*

Score	Prison		Juvenile Court		Control Group	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
< 60	6	12.0	22	23.4	11	5.0
61-120	12	24.0	29	30.9	52	23.9
121-180	13	26.0	31	32.9	75	34.4
181-220	10	20.0	6	6.4	48	22.0
> 220	9	18.0	6	6.4	32	14.7
Total	50	100.0	94	100.0	218	100.0

TABLE 2—*Gibson's Test—number of errors and time in seconds.*

	Prison		Juvenile Court		Control Group	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
ERRORS						
0-4	1	2.0	12	12.8	64	29.3
5-10	8	16.0	25	26.6	96	44.0
11-16	13	26.0	27	28.7	39	17.8
17-25	9	18.0	18	19.1	16	7.3
26-30	5	10.0	3	3.2	1	0.5
> 30	14	28.0	9	9.5	2	1.0
TIMES,						
0-35	32	64.0	24	25.5	78	35.7
36-45	10	20.0	22	23.4	87	39.9
46-55	6	12.0	16	17.0	39	17.8
> 55	2	4.0	32	34.1	14	6.4

Table 3 summarizes the main causes leading to confinement in the institutionalized samples. In the first of two correlation matrices, only those variables relating to test scores, criminal backgrounds, and behavior during confinement for all 144 subjects were included (Table 4). The second correlation matrix (Table 5) contained data for the 94 minors placed in protection and rehabilitation centers. Toulouse-Piéron's Test scores were found to be directly correlated with age and indirectly correlated with school background. Additionally, the overall score on Gibson's Test calculated with the formula $\sqrt{E^2 + T^2}$, where E is the number of errors and T the time needed to complete the test [5], was indirectly correlated with age and with the Toulouse-Piéron's Test score in the juvenile court center sample (Table 5) and with the Toulouse-Piéron's Test score only in the prison sample (Table 4). Both matrices, in which number of errors and time needed on Gibson's Test were used independently, demonstrated a statistically significant correlation with social maladjustment (number of arrests, previous juvenile court record, and drug abuse) and both overall conduct and behavior during confinement (Tables 4 and 5).

Percentiles of anxiety as measured by the STAI in subjects brought before the juvenile court are shown in Table 6. Anxiety scores fell within the range compatible with normality. Of this sample, 52.1% scored below the 47th percentile, although high scores were obtained for the anxiety trait, 69.2% placing above the 55th percentile, with a mean of 62.98 (Table 6). Anxiety trait as measured by the STAI showed a statistically significant correlation with

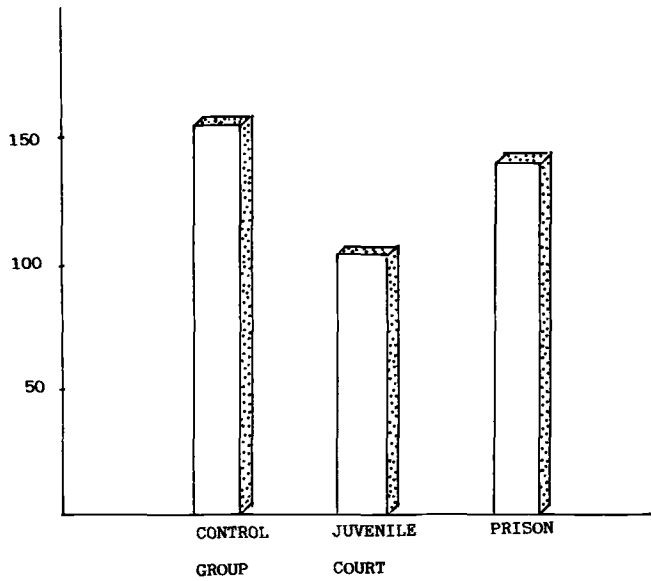


FIG. 1—Toulouse-Piéron Attention-Perception Test scores.

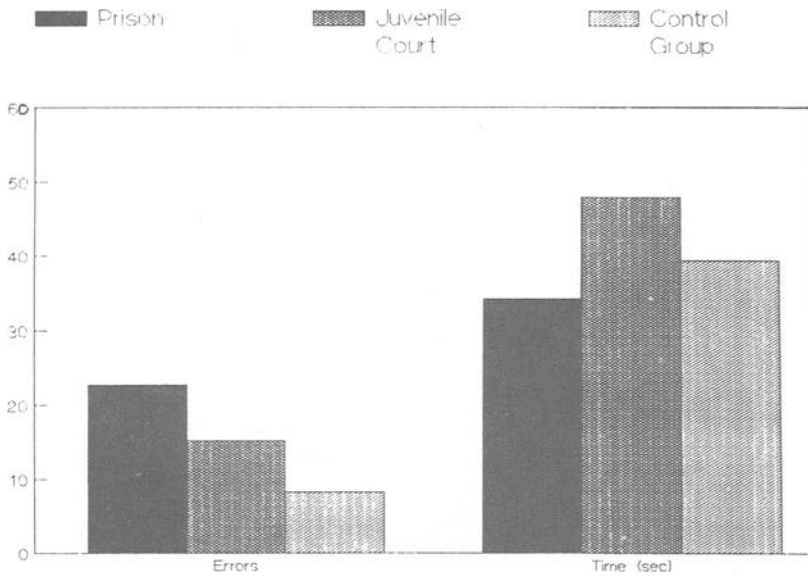


FIG. 2—Gibson's Test. Number of errors and time (s).

behavior during confinement (Table 5); those subjects scoring highest were also reported to create more conduct-related problems.

Discriminant analysis was performed on the prison sample with reason for first arrest as the grouping variable, categorizing the first crimes as violent or nonviolent. All data together with the results of the jackknifed classification of the results are shown in Tables 7 and 8. Variables demonstrating a statistically significant association with scores on Toulouse-

TABLE 3—*Main causes leading to confinement.*

	<i>N</i>	%
Drug traffic	4	2.78
Crimes against property	61	42.36
Crimes against persons	8	5.56
Crimes against sexual freedom	6	4.17
Running away from home	10	6.94
Confinement by familiar conflict	55	38.19

Piéron's Test and Gibson's Test as shown by the chi-square test are presented in Table 9. Stepwise multiple linear regression analysis with number of arrests as the dependent variable yielded the figures shown in Table 10.

The principal components' analysis for all 144 subjects is summarized in Table 11, which presents variables relating to Toulouse-Piéron's Test and Gibson's Test scores, criminal background, and behavior during confinement. Factor 1 explained 29.93% of the total variance, with criminal background (previous juvenile court record and number of arrests) and the score on Gibson's Test as principal components, together with age and peer sociability.

Discussion

On the basis of the present results, impulsiveness and attention-perception deficit can be said to distinguish subgroups characterized by different patterns of criminal behavior. As discriminant analysis revealed, the Attention-Perception Test (Toulouse-Piéron's Test) facilitates classification of the present sample into persons whose first arrest was for a violent or nonviolent crime. Low scoring individuals were usually those who committed nonviolent offenses, and make up the group of habitual delinquents, most of whom were recidivists arrested for nonviolent crimes against property. Their impaired capacity to analyze reality makes them less able to adapt not only socially, but also in terms of what could be called "appropriate" criminal behavior. Tarter et al. [7] have noted an indirect correlation between achievement in the Symbol Digit Modalities Test, which examines visual scanning and attentional capacity, and the seriousness of offenses committed by juvenile delinquents.

The correlation found between the Toulouse-Piéron's Test score and the subject's age may be related to the greater acquisition of attention habits and skills from a specific age onwards (around 13 to 14 years), after which attention habits become permanently incorporated into the subject's makeup. On the other hand, the opposite trend was seen in the correlation between the Toulouse-Piéron's Test score and variables related to Gibson's Test. Those subjects with a greater attention-perceptual capacity made fewer errors and needed less time to complete the latter, a finding entirely in keeping with the results of the two tests.

Previous studies have drawn attention to the relationship between impulsiveness as evaluated by latency time and the number of errors per test and juvenile delinquency. Olweus [8] found hyperactivity, poor control over impulses, and attention disorder to be associated with behavioral alterations in adolescents. Other studies have also linked inattention and impulsivity with antisocial behaviors [9-11].

After studying 33 imprisoned delinquents, Oas [12] reported that impulsiveness was present in the context of juvenile delinquency, although not necessarily in relation to the type of offense or the number of crimes committed. Saunders et al. [13], however, have challenged the relationship between juvenile delinquency and an impulsive personality.

It would seem logical for persons whose ability to perceive and integrate reality is limited to experience difficulties in adapting to their environment. Impulsiveness would further lead them to commit acts which they would not otherwise perform had they stopped to reflect upon the likely consequences of their behavior.

TABLE 4—Correlation matrix of 144 subjects from juvenile court and prison. n = 144.

	Age	Toulouse-Piéron	Gibson—Errors	Gibson—Time	Gibson—Total	Number of Arrests	Prev. Juv. Court Rec.	Impulsivity	Conflictiv.	Peer Sociability	Overall Behavior
Age	1.000										
Toulouse-Piéron	0.317	1.000									
Gibson—errors	0.188	-0.151	1.000								
Gibson—time	-0.519	-0.176	-0.562	1.000							
Gibson—total	-0.473	-0.236	0.051	0.775	1.000						
Number of arrests	0.391	0.000	0.308	-0.212	-0.030	1.000					
Previous juvenile court record	-0.647	-0.106	-0.239	0.309	0.214	-0.541	1.000				
Impulsivity	0.066	0.109	-0.114	0.132	0.097	-0.001	0.009	1.000			
Conflictivity	-0.022	0.117	-0.221	0.126	0.013	0.008	0.074	0.547	1.000		
Peer sociability	0.692	0.290	0.056	-0.237	-0.210	0.263	-0.521	0.317	0.189	1.000	
Overall behavior	-0.013	-0.075	0.296	-0.253	-0.093	-0.020	-0.025	-0.138	-0.173	-0.198	1.000

TABLE 5—Correlation matrix with data for the 94 minors under juvenile court jurisdiction.

	Age	Neuroticism (EPI)	Extroversion (EPI)	State Anx. (STAI)	Trait Anx. (STAI)	Toulouse-Piéron Errors	Gibson—Time	Court Record	Prev. Juv. Arrests	Number of Alcohol	Hashish	Amphetamines	Sedatives	
Age	1.000													
Neuroticism (EPI)	0.100	1.000												
Extroversion (EPI)	0.008	-0.004	1.000											
State anxiety (STAI)	0.014	0.327	-0.152	1.000										
Trait anxiety (STAI)	-0.055	-0.550	-0.136	0.623	1.000									
Toulouse-Piéron	0.240	-0.068	0.177	-0.218	-0.129	1.000								
Gibson—errors	-0.105	-0.050	-0.079	0.015	-0.054	-0.232	1.000							
Gibson—time	-0.344	-0.029	-0.004	0.101	0.067	-0.064	-0.517	1.000						
Previous juvenile court record	0.143	-0.173	0.110	-0.089	-0.189	0.221	-0.314	0.168	1.000					
Number of arrests	-0.020	0.117	0.145	-0.172	-0.045	-0.086	0.400	-0.320	-0.407	1.000				
Alcohol	0.202	0.176	-0.130	0.006	0.010	-0.192	0.333	-0.358	-0.499	0.657	1.000			
Hashish	0.013	0.134	-0.188	-0.106	0.026	-0.097	0.413	-0.345	-0.513	0.774	0.710	1.000		
Amphetamines	-0.046	0.090	-0.219	-0.081	-0.065	-0.104	0.376	-0.281	-0.337	0.805	0.608	0.727	1.000	
Sedatives	-0.015	0.185	-0.265	-0.108	0.029	-0.129	0.350	-0.271	-0.399	0.736	0.617	0.857	0.829	1.000

TABLE 6—*State Trait Anxiety Inventory. Percentiles of minors under juvenile court jurisdiction.*

Percentile	State Anxiety		Trait Anxiety	
	N	%	N	%
1-23	25	26.6	9	9.5
24-47	24	25.5	16	17.0
48-54	8	8.5	4	4.3
55-75	26	7.6	27	28.7
76-100	11	11.8	38	40.5

TABLE 7—*Summary of the discriminant analysis on the prison sample with reason for first arrest as the grouping variable.*

Step	Variable Entered	F Value to Enter or Remove	Number of Variables Included	U Statistic	Approximate F Statistic	Degrees of Freedom
1	Var. 30 ^a	5.84	1	0.89	5.85	1 48
2	Var. 4 ^b	7.69	2	0.77	7.18	2 47

^aSociability.^bToulouse-Piéron's Test.TABLE 8—*Jackknifed classification of the discriminant analysis.*

Group	Percent Correct	Number of Cases Classified into Group	
		Nonviolent Crimes	Violent Crimes
Nonviolent crimes	60.9	14	9
Violent crimes	63.0	10	17
Total	62.0	24	26

TABLE 9—*Relationship between tests and other variables.*

Association	χ^2	df	Probability
Toulouse Piéron's Test—reason for first arrest	8.37	2	P < 0.025
Toulouse Piéron's Test—sociability	7.11	2	P < 0.05
Number of errors. Gibson's Test—previous record in the juvenile court	8.40	2	P < 0.025
Number of errors. Gibson's Test—conflict with authority	6.90	2	P < 0.025
Time. Gibson's Test—impulsiveness			P < 0.025 ^a

^aIn this case the statistical association was tested by the Fisher test.

TABLE 10—Multiple linear regression analysis with "number of arrests" as dependent variable.

Step	Variable Entered	Multiple		Increase in RSQ	F to Enter	Number of Independent Variables Included
		R	RSQ			
1	Var. 3 ^a	0.3079	0.0948	0.0948	14.8671	1
2	Var. 10 ^b	0.3940	0.1553	0.0605	10.0977	2

^aNumber of errors—Gibson's Test.

^bSociability.

TABLE 11—Principal components. Factor 1. Sorted rotated factor loadings (pattern). Subjects from prison and juvenile court.

Variables	Factor 1
Previous juvenile court record	-0.845
Number of arrests	0.765
Age	0.724
Sociability	0.682
Total score—Gibson's Test	0.000
Time—Gibson's Test	-0.257
Toulouse-Piéron's Test	0.000
Number of errors—Gibson's Test	0.355
Overall behavior	0.000
Impulsiveness	0.000
Conflict with authority	0.000

It is clear that we are dealing with groups of social outcasts in whom problems rooted in their environment together with the nature of their contacts with legal or judicial institutions or both generate a high degree of anxiety. Our sample contained minors who scored high on the anxiety trait as measured by the STAI. We believe the anxious response to represent a mode of reaction which defines and reflects a behavioral model likely to be correlated and associated with socially maladjusted behaviors as a consequence of the subject's responses to the environment.

Canepa [14] observed that young people showing persistently antisocial behavior also frequently manifest specific psychological traits such as impulsiveness, affective indifference, egocentrism, aggressiveness, and scepticism. More recently, this same author has interpreted these traits as the symptomatic expression of conflict, modifiable by environmental factors which can alter personality development [15-17].

In another study, Howard et al. [18] demonstrated an association between anxiety, neuroticism, and impulsiveness in 60 males characterized as antisocial. In our opinion, the anxiety trait leads to a mode of response to perceived reality which negatively influences both the subject's behavior and his or her self-perception of the same leading to a downward spiral likely to favor the appearance of behaviors incompatible with social adjustment.

Although criminal behavior is the result of a complex web of variables that are difficult to define with precision, a finding of note in the present study was that when multiple linear regression analysis was performed using the number of arrests as the dependent variable, the number of errors on Gibson's Test together with peer sociability were found to explain 14% of the dependent variable.

Impulsiveness and attention-perception appear to be complementary traits that provide a useful means of classifying individuals for criminological prognosis. To date, no simple, reliable, and sensitive test has been developed which is capable of either explaining the complex phenomena involved in criminal or maladjusted behavior or both or providing us with an accurate prognosis. For any given case, all those tests that tell us something about the subject's capacity to relate to his or her environment and give us information as to how the individual modulates his or her responses are a valuable source of material which help us to reduce the margin of error in the final diagnosis. The problem is evidently still far from being solved, and we should heed any means that allow us to improve the accuracy of our prognoses.

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