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ABSTRACT

Psychologists and psychiatrists are regularly used during civil commitment and other hearings to prognosticate dangerousness for the courts. In this process, the judiciary has shown almost complete deference to the recommendations of forensic specialists despite a number of early studies that did not support a clinician's ability to predict violence. This study examined if the Cognitive Control Battery (CCB) can contribute to discrimination in a model that includes known predictor variables and if the CCB can discriminate violent juveniles based upon actual episodes of violence. A stepwise discriminant analysis was used on a calibration sample (N=175) of dangerous and non-dangerous juvenile inpatients. Forty-five demographic, psychosocial, and cognitive variables were employed. The resulting statistical model was cross-validated on the remainder of the sample (N=175). Results indicated that 58.6% of the cross-validation sample was correctly classified. Moreover, the CCB demonstrated that dangerous youths processed aggressive/neutral stimuli differently than non-dangerous youths. Results did not suggest that cognition (or type of cognitive style) could be viewed as a cause of violence. Recent advances in cognitive psychology (e.g., the CCB) may assist policymakers, judges, and forensic clinicians to make more informed choices concerning dangerous juvenile inpatients. (ABL)

PREDICTING DANGEROUS JUVENILE INPATIENTS: THE ECOLOGICAL VALIDITY OF COGNITIVE CONTROLS

by

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Abstract

A stepwise discriminant analysis was used on a calibration sample (n=175) of dangerous and non-dangerous juvenile inpatients. Forty five demographic, psychosocial, and cognitive variables were employed. The resulting statistical model was cross-validated on the remainder of the sample (n=175). Results show that 58.6% of the cross-validation sample was correctly classified. Moreover, the Cognitive Control Battery (CCB) demonstrated that dangerous youths process aggressive/neutral stimuli differently than non-dangerous youths. Results are discussed in terms of the ability of cognitive psychology to adopt an ecological perspective and contribute to forensic assessment.

Psychologists and psychiatrists are regularly used during civil commitment, and other hearings, to prognosticate dangerousness for the courts (Barefoot v. Estelle, 1983). In this process, the judiciary has shown almost complete deference to the recommendations of forensic specialists despite a number of early studies that did not support a clinician's ability to predict violence (Cocozza and Steadman, 1978; Ennis and Litwack, 1974). More recent research on clinical and actuarial prediction (Convit, Jaeger, Lin, Meisner, and Volavka, 1988; Klassen & O'Connor, 1989; McNiel & Binder, 1987) has reported higher levels of accuracy. This increase in predictive accuracy is attributed to following the suggestions of Monahan (1984) and includes integrating actuarial methods with clinical methods, using situational variables, and maximizing base rates by targeting a population.

Despite the advances reported in this "second generation" of research on dangerousness further inquiry is indicated. For example, one type of potential predictor variable that has been neglected by recent research is the psychological test. This is perhaps due to early research (Megargee, 1970) that suggested no psychological test was able to retrospectively discriminate violent individuals, let alone predict them. Conversely, recent research indicates that violent youths generate different profiles on tests of observable cognitive processes (Santostefano & Rieder, 1984). Hence, it is the purpose of this study to make a unique contribution to the research on violence by incorporating cognitive test data in a statistical scale to predict violence. This will be done in an effort to determine if cognitive test scores can contribute to the classification of violent juveniles. Let me now turn to a brief review of the research on cognition and violence.

Cognition and Violence

Cognition is typically operationalized as "mental activity" or the processes of receiving, encoding and using information. Thus, cognitive psychologists typically study perception, memory, attention, language acquisition, and problem solving strategies. However, the majority of this research has been composed of laboratory methods which have elided the study of in vivo cognitive processes. Neisser (1976) stated that cognitive psychology is "Lacking in ecological validity, indifferent to culture, even missing some of the main features of perception and memory as they occur in everyday life...". In other words, cognitive psychology has seldom used its empirical paradigm to study real world problems. Fortunately, research on cognition and aggression is beginning to surface. Let me now briefly review how cognitive psychological instruments (concerned with process not content) have been related to aggression.

The most common cognitive variable that has been linked to violence research is IQ. Blumstein, Farrington, & Morita (1985), in reviewing the literature on career criminals, reported that violent inmates tended to have lower IQ scores than non-violent criminals. While this finding may be true in nomothetic research studies it remains to be shown if this trend will hold up during idiographic investigations. Furthermore, the use of IQ scores in a prediction model is likely to raise serious concerns from an ethical and legal standpoint. Aside from IQ, the only research on cognition and aggression has been concerned with how low-aggression and high-aggression juvenile process neutral and aggressive information (Santostefano & Rieder, 1984; Moncata 1990). Let me turn to a brief review of this cognitive paradigm (viz., cognitive control theory) and how it may serve as a tool in predicting violence.

Cognitive control theory (CCT), a process view of cognition, stems from the work of Klein (1951) and Klein and Schlesinger (1949) who during their studies of perception observed adults consistently using similar cognitive strategies. Klein hypothesized that these cognitive processes were designed to coordinate and balance environmental demands with internal emotions and motives. Furthermore, Klein viewed these processes as "cognitive controls" since their function was to reorganize cognition to serve adaptation. This theory has been extensively elaborated and studied from a biodevelopmental perspective (Santostefano 1969, 1978, 1985) resulting in normed psychometric instruments for children and adolescents (Santostefano, 1988).

Considerable research has demonstrated that cognitive controls are stable and measurable constructs. Factor analytic research (e.g., Santostefano, 1978) has repeatedly shown that people use five basic cognitive processes when dealing with information; these factors have been shown to be stable across different populations. Accordingly, from this paradigm, cognition is viewed as a manager (i.e., an ego mechanism) that employs five cognitive controls to balance between our personal inner demands and those of the outer environment.

The five basic cognitive controls follow a developmental hierarchy and are explained as follows.

Body-ego-tempo regulation: concerned with the images and symbols one uses to coordinate bodily movement. For example when asking a child to perform slow and fast tempos a young child will say "fast as a bunny".

Focal Attention: the breadth and vigor one uses when scanning a visual field (e.g., trying to find the ESC key on an unfamiliar computer, or scanning a map for locations).

Field Articulation: ability to attend to relevant stimuli and subordinate irrelevant stimuli. Succinctly, this construct can be construed as a measure of distractibility (or vis-a-vis attention).

Leveling-sharpening: one's ability to maintain clear visual memories and compare them to present perceptions. This construct often comes into use when one misplaces keys and needs to recall a clear visual image (while scanning the room) of where they were left.

Equivalence range: the manner in which items are grouped together in logical categories. This control begins on a global level (such as a child saying "these are all papers") and becomes more differentiated resulting in higher level abstractions (e.g.,"these are legal cases on point"). (It is important to note that for this study Body-Ego and Equivalence range measures were not included due to a lack of normative data.)

Each cognitive control is nested within the others, such that each is dependent, to an extent, upon controls lower in the hierarchy. For example, compiling legal cases for trial (Equivalence Range) is contingent upon moving slowly through the library (Body-Ego), scanning the card catalogue (Focal Attention), distinguishing relevant articles (Field Articulation), and recalling the locations of index books (Leveling-Sharpening).

It is important to note that cognitive control theory does not subscribe to the polarized view of "good" and "bad" assessments of cognitive functioning. For example, leveling information, attending to irrelevant information or narrow scanning is not necessarily bad. Rather, responses such as these can be good, if they serve to facilitate adaptation.

From the beau ideal of cognitive control theory, violence is seen as the loss of cognitive control over aggressive impulses. Santostefano (1985, p. 197) has stated:

> ...one main reason for the child's habitual lack of control over physical aggression is the fact that the autonomy cognition should maintain between reality stimuli (especially those suggesting aggression) and fantasies (especially those concerned with aggression) collapses abruptly. With this collapse a specific detail in reality is centered (e.g., someone's eyes; position of the hands) and fused with the requirements of the aggressive fantasies, resulting in "exaggerated apperceptions" of imminent danger to one's integrity and/or safety (e.g., "The glare in his eyes--like he was ready to kill," "the way he held his hands; He was going to swing"). Sometimes cognitive autonomy collapses in response to an inanimate object, which is suddenly used in an aggressive way (e.g., "I saw the brick on the ground and the next thing I knew it was flying." "His shirt was hanging out; I just pulled it and tore it.

This passage illustrates one of the most salient themes of cognitive control theory. Specifically, an individual must be able to reorganize cognition, while flexibly shifting between inner and outer demands, to effectively serve adaptation (Gutherie, 1967; Santostefano, 1978; Shapiro, 1972). A privation of homeostatic flexibility in this mechanism often leads to maladaptive action, sometimes manifest as aggression. This concept is known as cognitive coordination (formally cognitive-affective balance) and is of central importance in understanding aggression.

In an effort to understand the relationship between cognitive coordination and aggression Santostefano and Rieder (1984) studied 160 inpatient children admitted to a private psychiatric hospital. Reasons for admission include conduct disorders, attention deficit disorders, and psychotic disturbances. Males (mean age = 12.6) and females (mean age = 12.9) were separated into high-aggression and low-aggression groups as distinguished by an action test of aggression. Each subject was examined in terms of the leveling-sharpening cognitive control and its ability to reorganize in response to aggressive and non-aggressive stimuli. Results reveal that high-aggression children were better able to remember and compare (sharpen) aggressive information while low-aggression children were less able to remember and compare (level) aggressive stimuli. Conversely, when presented with neutral information, high-aggression subjects performed less efficiently than low-aggression subjects on comparing present perceptions to past memories. This finding lends support to the hypothesis that aggressive children more easily gather aggressive information in the environment, since it is syntonic with their inner world. Furthermore, this is due to the relative ease (low anxiety) with which an aggressive person's cognition can reorganize to assimilate aggressive stimuli. From these results, it is logical to conclude that individuals with a propensity toward aggression have an internal world filled with aggressive thoughts and a cognitive structure which seeks aggressive events in the environment. Thus, an aggressive cognitive style more easily manages aggressive stimuli than neutral stimuli--a maladaptive cognitive maneuver.

In an attempt to further explore the use of cognitive controls to discriminate between aggressive and non-aggressive individuals Moncata (1990) performed a nomothetic investigation on four groups (n=381) differing in degree of violence. The sample consisted of (a) normal school children, (b) outpatient children with no history of violence, (c) inpatient children with a moderately violent history (e.g., assault and battery) and (d) incarcerated juvenile offenders with a chronic record of violent crime such as robbery, murder, and rape. All subjects were given the cognitive test measuring leveling-sharpening with both the neutral and aggressive stimuli. A 2 x 4 analysis of covariance (with age as the covariate) and repeated measures on the leveling-sharpening variable revealed significant differences ($p < .01$) between the groups. Specifically, the higher aggression groups were better able to sharpen the aggressive stimuli than the low aggression groups. In addition, the higher aggression groups leveled considerably with the neutral information.

In an effort to predict aggressive behavior in the classroom Santostefano and Moncata (1989) studied 114 inpatient juveniles. Upon admission, subjects were given the neutral and aggressive versions of the leveling-sharpening cognitive control test. Daily records of classroom violence were reported by the clinical educators. Results displayed that subjects who maintained a cognitive style that was concordant with the aggressive stimuli displayed significantly more ($p < .005$) violent episodes in the classroom per thirty days of admission. (Concordant is used here to explain the hypothetical relationship between one's inner word [i.e., fantasies/metaphors] and stimuli in the environment.)

In summary, the use of the Cognitive Control Battery (CCB) shows some merit in distinguishing violent juveniles. However, it is the purpose of this study to ascertain: (a) if the CCB can contribute to discrimination in a model that includes known predictor variables and; (b) if the CCB can discriminate violent juveniles based upon actual episodes of violence.

METHOD

Subjects

The sample in this study was selected from admissions to a private psychiatric hospital between 1981 and 1986. The sample of Caucasian male (N = 147) and female (N = 203) juvenile inpatients (mean age = 12.5 years) was admitted to the hospital via referral from a psychiatrist, judge, or social worker. The medical record of each subject was analyzed to determine the primary reason for admission. Accordingly, each subject was then placed in one of two groups: Group (I) was defined as a "non-dangerous" group and included youths who had been hospitalized for problems other than harming others (e.g., depression, severe learning disabilities, property destruction). Group (II) was defined as a "dangerous group" and included juveniles who had been hospitalized due to violent behaviors (e.g., threatening parents with a gun, pushing mother down the stairs, beating a teacher). The calibration and cross-validation sample was obtained by randomly spliting the entire sample (N = 350)

Measures

The predictor variables used in this study were based upon the literature of known correlates of violent behavior. Two variables were not included: (1) The history of previous crime (which was not applicable to this latency age population), and (2) race (which was not used due to the homogeneity of the sample). Hence, variables employed can be broken down into demographic/biographical data, IQ score (WISC-R) and scores on the Cognitive Control Battery (Santostefano, 1988). All data was collected by a psychologist, psychiatrist, or social worker during intake interviews or during diagnostic assessment procedures given on admission. Variables included: sex; age; IQ; parent's education/income; history of parent's and sibling's criminal behavior, psychological disturbance, and drug/alcohol abuse; history of child abuse; family discord, and whether the family unit was intact.

Data derived from the Cognitive Control Battery (CCB) was also part of a standard battery of tests given to each child upon admission. The CCB is designed to provide an objective measure of the manner in which a person processes information. Accordingly, the CCB evaluates the way a person copies, produces, engages, and manages information in the environment (see appendix A or Santostefano, 1988 for more detailed scoring information). The CBB includes three tests: (1) The Scattered Scanning Test (appendix B) provides a measure of the Focal Attention cognitive control (viz., it measures the way a subject scans a field of visual information). (2) The Fruit Distraction Test (appendix C) measures field articulation or one's ability to selectively attend to relevant information while subordinating external distractions and internal thoughts and fantasies. (3) The cognitive control of Leveling/Sharpening as measured by both the Leveling/Sharpening House Test (LSHT) and the Leveling/Sharpening Shoot Out Test (LSST) (appendix D). It is designed to assess the manner in which information is held in memory and compared to present information. The LSHT consists of 60 achromatic pictures of a house. The Leveling/Sharpening Shoot Out test (LSST) is identical to the LSHT except that the scene is a picture of two cowboys engaged in a shoot out. The subject is shown each picture for five seconds and asked to identify when something has changed. During the sequence of the 60 cards 19 items are omitted cumulatively. If a subject correctly identifies an item has disappeared it is scored as a correct response. However, subjects often report changes in the scene that are perceptual errors/slips. These errors/slips are conceptualized as a momentary breakdown in cognitive balance when one's inner world is projected upon the stimulus. These errors/slips fall into two categories: (1) Type A error - subjects often report distortions of the stimuli in the scene, such as stating "the tree has moved" (when it remained stable). (2) Type B error - reporting a change or appearance of a stimuli that was never included in the scene such as stating "a bird disappeared" (when, in fact, a bird was never included in the scene). It is important to note that factor analytic investigations (Calicchia, 1989) have shown that errors/slips load under a separate factor which is not correlated with age or cognitive efficiency. Furthermore, the LSHT and the LSST also load on separate factors. This finding suggests that processing neutral and aggressive information are distinct phenomenon, even if each requires the same cognitive process.

Procedure

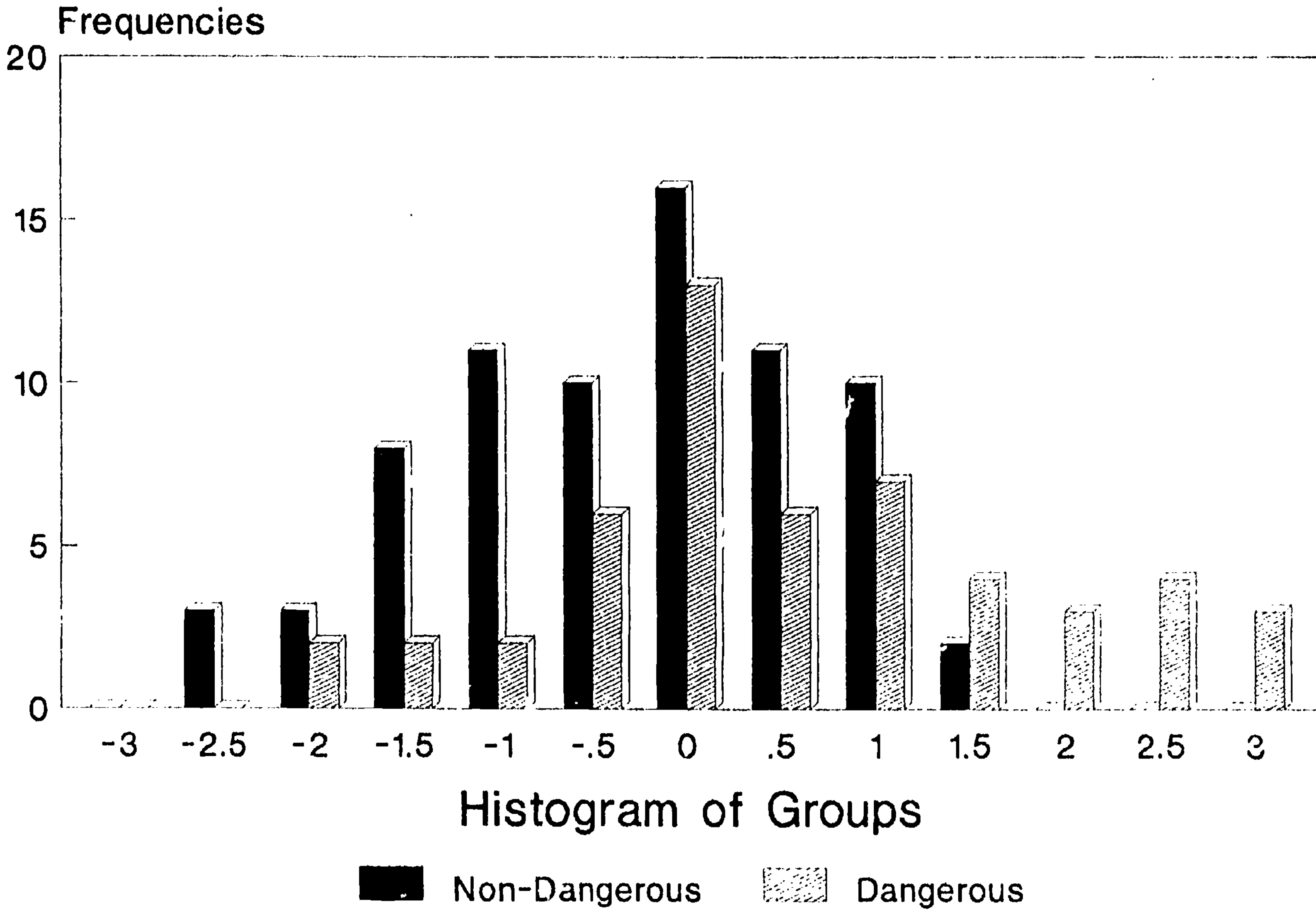
The analysis took place in three steps. First, a stepwise discriminant analysis was employed on the calibration sample to determine what combination of variables best distinguished the groups. (A discriminant analysis was used rather than a logistic regression, since the study is exploratory in nature and can benefit from the classification procedures available with this technique [Cleary & Angel, 1984]). Second, the coefficients generated by the calibration sample were cross-validated on a separate sample in order to avoid overestimating the power of the classification procedure. This process provided a more accurate estimate of classification accuracy, since each sample carried a different sampling error. Third, the CCB was removed from the analysis to measure the discrepancy in classification accuracy.

Results

The stepwise discriminant analysis (see figure 1) yielded one significant function (Wilk's lambda = .86, X^2 = 49.5, df = 14, $p < .0001$, $R_c = .38$). As can be noted in table 1, the variables which significantly discriminated between the two groups were composed of demographic, situational and cognitive variables. Among the demographic variables the most powerful predictor variable was being a male (F-to-Remove = 6.73, $p < .05$), having a parent who had been arrested for a crime (F-to-Remove = 3.86 $p < .05$), and coming from a discordant home environment (F-to-Remove = 3.00, $p < .10$). Contrary to the existing literature, this analysis showed that IQ scores, age, income, parents education, and child abuse were not significant predictors within this population.

A number of items on the CCB distinguished the groups. For example, the dangerous group made significantly more errors (*F*-to-Remove = 6.65. $p < .05$) on the Fruit Distraction Test and required more time (*F*-to-Remove = 11.93, $p < .01$) to complete the task. Moreover, the dangerous groups made significantly fewer perceptual errors on the Shoot-Out test (*F*-to-Remove = 5.16, $p < .05$) than the non-dangerous group (see Figure 2). Furthermore, the dangerous group was more efficient (e.g., more correct responses) when processing neutral information than aggressive information (*F*-to-Remove = 10.02, $p < .01$). Whereas the difference between these two

FIGURE 1
CANONICAL DISCRIMINANT FUNCTION 1



Wilk's lambda = .86
Chi-Sq = 49.6, df = 14, p < .0001
Canonical Corr = .37

means is significant its practical difference is negligible. As can be noted in Table 2, 58.6% of the cross-validation sample was correctly classified compared to 71% of the calibration sample. Lastly, when the CCB was removed from the analysis the canonical correlation associated with the first discriminant function decreased from $R_c = .38$ to $R_c = .28$ and classification accuracy was reduced 9% (see Figure 3).

TABLE 1

Stepwise Discriminant Analysis on Dangerous Groups

Step	Group Means[a] Non-Dangerous	Group Means[a] Dangerous	F-to-Remove	Discriminant Coefficient
1. Distraction Baseline Error	1.03 (1.52)	1.67 (1.96)	11.93**	.68
2. Aggressive Stim Type A Errors	.20 (.40)	.12 (.33)	5.16*	-.35
3. Internal Distractions	16.47 (18.45)	22.57 (22.78)	6.65*	.46
4. Gender	.43 (.49)	.58 (.49)	6.73*	.33
5. Delinquent Parents	.11 (.32)	.16 (.37)	3.00	.28
6. Efficiency Neutral Stim	33.93 (10.67)	32.82 (11.12)	10.02**	-.77
7. Efficiency Aggressive Stim	36.89 (9.33)	38.03 (9.59)	5.84*	.58
8. Distraction Baseline Time	26.64 (19.79)	30.01 (19.40)	4.35*	-.47
9. External Distractions	.04 (1.39)	.11 (1.82)	3.01	.28
10. Family Discord	.69 (.46)	.77 (.42)	3.80	.32
11. Type A Error Neutral Stim	.38 (.48)	.45 (.50)	1.90	.22
12. Type B Error Aggressive Stim	.143 (.35)	.141 (.35)	1.26	-.17
13. Scanning distance	213.83 (44.35)	207.72 (54.20)	1.31	-.18
14. Family Intact	.46 (.49)	.47 (.50)	1.10	.17

[a]Group standard deviations reported in parenthesis
*p<.05. **p<.01. (df = 1, 350)

TABLE 1 (continued)

Stepwise Discriminant Analysis Summary

Code in Appendix	Variable
1. FDT2E	Fruit Distraction Test - Card 2 Errors
2. SOA	Shoot Out "A Changes"
3. FDT42	Fruit Distraction Test - Card 4 minus 2 Time
4. SEX	Sex of patient (0=female, 1=male)
5. DELINQ	Delinquency of parents (0=no, 1=yes)
6. HEFF	Cognitive efficiency (neutral stimuli)
7. SOEFF	Cognitive efficiency (aggressive stimuli)
8. FDT2	Fruit Distraction Test - Card 2 Time
9. FDT32E	Fruit Distraction Test - Card 3 minus 2 Errors
10. DISCORD	History of family discord (0=no, 1=yes)
11. HA	House "A Changes"
12. HB	House "B Changes"
13. SSTTD	Scattered Scanning Test Total Distance
14. FIN	Current family intact (0=no, 1=yes)

FIGURE 2
NUMBER OF "SLIPS" WITH
NEUTRAL AND AGGRESSIVE INFORMATION

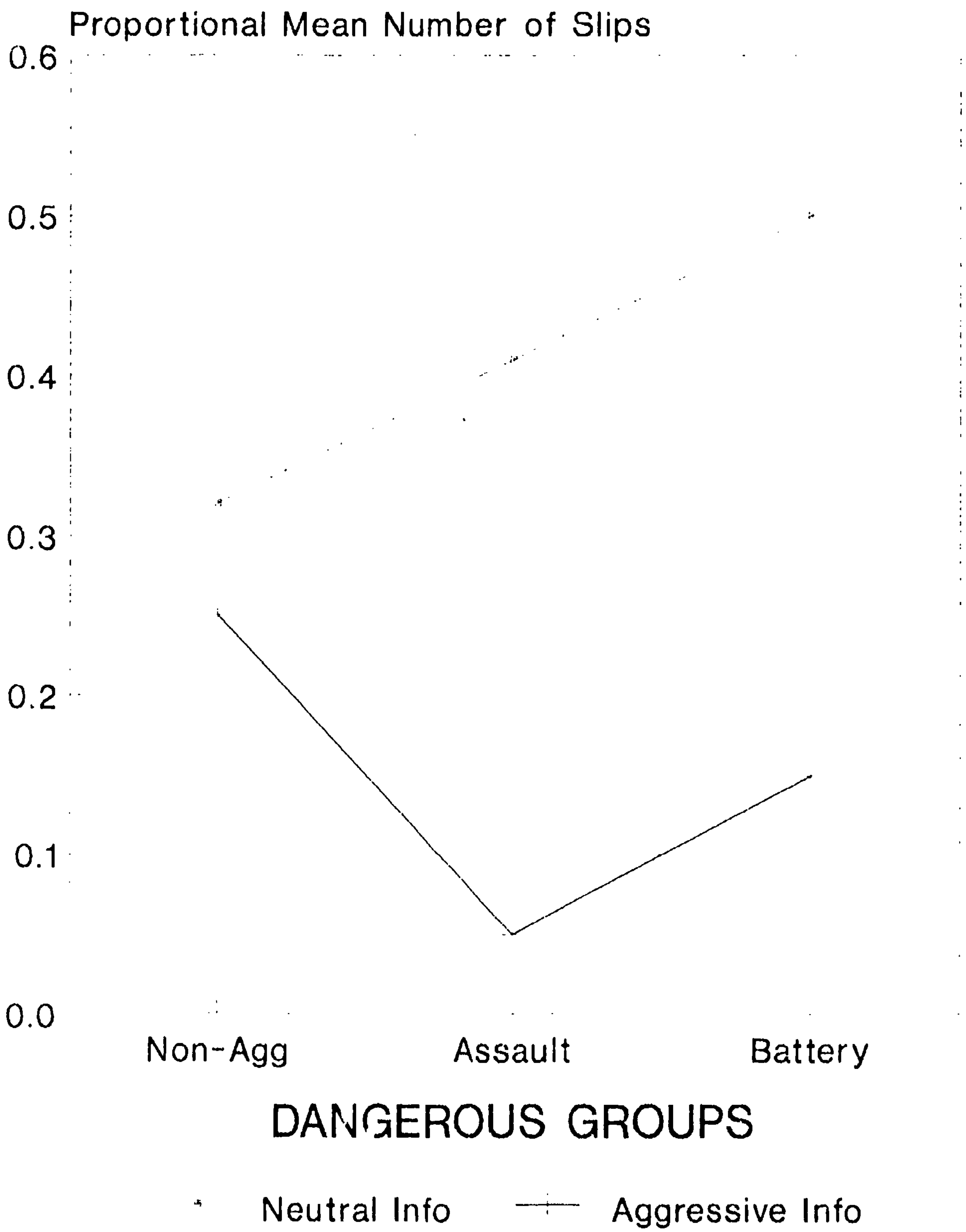


TABLE 2

Classification Results Table
for Cases used in the Analysis

Actual Group	No. of Cases	Predicted Group Membership	
		Non-Dangerous	Dangerous
Non-Dangerous	152	112 (73.7%)	40 (26.3%)
Dangerous	94	32 (34.0%)	62 (66.0%)

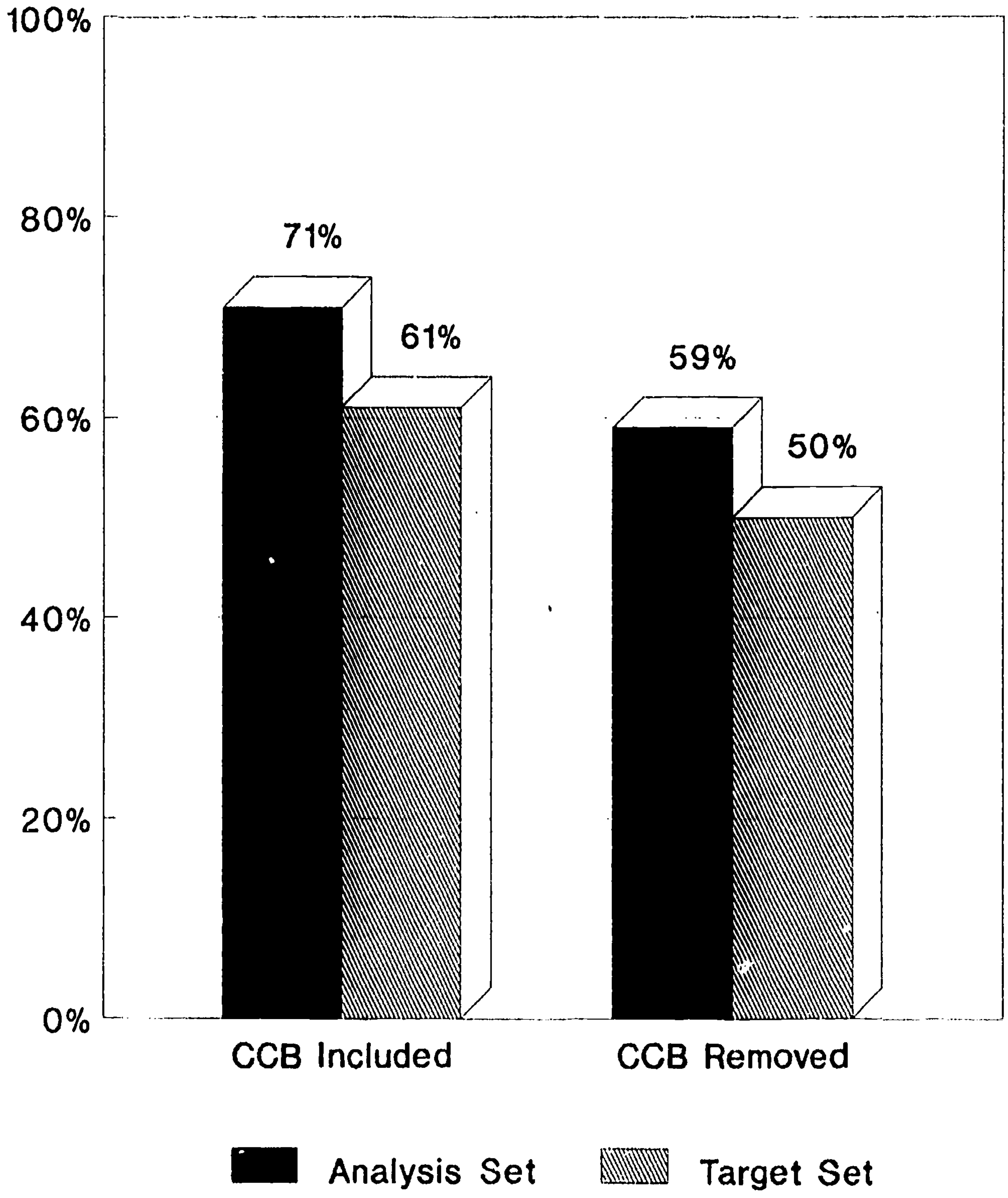
Percent of "Grouped" Cases Correctly Classified: 70.73%

Classification Results Table
for Cases not Selected in the Analysis

Actual Group	No. of Cases	Predicted Group Membership	
		Non-Dangerous	Dangerous
Non-Dangerous	71	49 (69.0%)	22 (31.0%)
Dangerous	33	21 (63.6%)	12 (36.4%`

Percent of "Grouped" Cases Correctly Classified: 58.65%

FIGURE 3
PERCENTAGE OF GROUP CORRECTLY CLASSIFIED



Classification results derived from canonical discriminant function 1

Discussion

The results suggest that the Cognitive Control Battery (CCB) is able to significantly contribute to discrimination and classification in a model that includes known predictor variables. This finding that may serve to help us understand how cognition operates as a mechanism to either facilitate or subvert adaptation. For example, if dangerous juveniles produce fewer errors/slips when the stimuli is aggressive, we can hypothesize that violent juveniles may not experience the anxiety commonly associated with engaging in violent events. Therefore, a violent juvenile maintains a cognitive style that does not misperceive aggressive stimuli, but rather distorts or embellishes neutral stimuli. This cognitive style is non-adaptive in a peaceful culture that incarcerates individuals for violent acts.

It is important to note that our findings do not suggest that cognition (or a type of cognitive style) can be viewed as a cause of violence. Cleary the relationship between cognition and violence has many moderating variables and the causes and solutions to social problems (viz., violence) can not be understood from a purely cognitive paradigm. However, this study does make clear that cognition can be studied from an ecological perspective. That is, how cognitive processes work in day to day life during purposeful activity. Furthermore, many complex social issues (e.g., dangerousness) may be better understood if cognitive scientists adopt a more ecologically oriented view and participate in applied research projects (e.g., utilizing quantitative cognitive assessment strategies as an aid to forensic clinical prediction).

From a legal perspective the use of this test to aid in forecasting violence is unlikely to raise serious objections under constitutional or due process grounds since the CCB has been shown to be unrelated to "controversial variables" such as income, SES, or IQ (Santostefano, 1978). Variables such as these are often used in prediction and are racially skewed (i.e., there usage may violate substantive due process safeguards). However, further research needs to move beyond the retrospective analysis presented here and employ cross-validation procedures on a prospective basis to answer these and other questions.

In conclusion, recent advances in cognitive psychology (e.g., the CCB) may assist policy makers, judges, and forensic clinicians to make more informed choices concerning dangerous juvenile inpatients. Therefore, it is suggested that cognitive psychologists embrace an ecological perspective and continue to collaborate with legal professionals in order to develop a more accurate, unbiased, and egalitarian system for depriving liberty.

Appendix A

Cognitive Control Battery

The Cognitive Control Battery (CCB) is designed to provide an objective measure of the manner in which a person processes information. Hence the CCB evaluates the way a person copies, produces, engages, and manages information in the environment. The CCB is a complex instrument indicative of the current "state of the art" in cognitive psychology. A brief explanation of its scoring system is warranted here (for a more detailed discussion see Santostefano, 1988).

The Scattered Scanning Test (SST) (see appendix B) provides a measure of the Focal Attention cognitive control (viz., it measures the way a subject scans a field of visual information). In order to control for individual tempo rates (of body motility) the subject is asked to cross out a series of 18 geometric shapes in two rows at slow, regular and fast speeds. This test, known as the Motor Tempo Test (MTT), is designed to control for individual differences in motor speed.

After a series of practice trials the subject is presented with an 17 x 22 sheet of paper with 200 random geometric shapes. The subject is then required to mark specific shapes (e.g., circles & crosses) as quickly and accurately as possible in 30 seconds. The examiner follows along (on a separate sheet of paper) and indicates the sequence of marks. The SST provides the following scores:

Motor Tempo Time (MTT) - the number of seconds the subject needed to mark 18 shapes when asked to proceed at a "regular" speed.

Number of Correct Shapes Marked (SSTC) - the number of correctly marked shapes (NC) in the geometric matrix.

Total Distance (SSTTD) - the cumulative distance (in centimeters) between each of the correct geometric shapes delineated.

Mean Distance (SSTAD)- this score equals the total distance covered divided by the number of correctly marked shapes minus one.

Ratio I (SSTRI) - this score equals NC x MTT x .01, and measures the vigor of the visual scan while controlling for individual motor tempo.

Ratio II (SSTRII) - this score equals TD x MTT x .01, and measures the breadth of the visual scan while controlling for individual motor tempo.

The Fruit Distraction Test (FDT) measures one's ability to selectively attend to relevant information while subordinating external distractions and internal thoughts and fantasies. This is known as the cognitive control of

Field Articulation. To begin the test the subject is given a practice strip with colored bars and asked to name the colors as quickly as possible. For further practice the subject is handed a full size card with 50 color bars (Card I) and asked to name each color as quickly as possible (see appendix C). When the training is complete the subject is given a full size card with pictures of 50 fruit (Card II), which correspond to the colored bars previously presented. The testee is then asked to name each color as quickly as possible, performance is timed and errors recorded. Card III is the same as card II except that next to the colors there exists small pictures (e.g., shoe, clock); the subject is asked to again read the colors while ignoring the external distractions. Card IV is an array of the fifty fruit which are incorrectly colored, the subject is asked to name the correct color of the fruit; thus measuring a subjects ability to concentrate and ignore internal thoughts. The FDT test scores are operationalized as follows.

Card II Time (FDT2) - the number of seconds it takes the subject to complete the items on Card II.

Card II Errors (FDT2E) - the number of errors in naming the colors.

<u>Card III - Card II Time</u> (FDT32) - the number of seconds to complete Card III minus the number of seconds to complete Card II.

<u>Card III - Card II Errors</u> (FDT32E) - the number of errors on Card III minus the number of errors on Card II.

<u>Card IV - Card II Time</u> (FDT42) - the number of seconds to complete Card IV minus the number of seconds to complete Card II.

<u>Card IV - Card II Errors</u> (FDT42E) - the number of errors on Card IV minus the number of errors on Card II.

The cognitive control of Leveling/Sharpening is measured by the Leveling/Sharpening House Test (LSHT). It is designed to assess the manner in which information is held in memory and compared to present information. The LSHT consists of 60 achromatic pictures of a house with six practice cards (see appendix D). The subject is shown each picture for five seconds and asked to identify when something has changed. During the sequence of the 60 cards 19 items are omitted cumulatively. The test results in the following scores:

First Stop Score (HSTOP) - the number of the card (1-60) when the first correct change was perceived.

Number of Correct Changes (HCOR) - the total number of items identified by the subject that had been removed from the scene.

Leveling-Sharpening Ratio Score (HRATIO) - is the average number of cards, after a change was introduced, that it took the subject to correctly identify the change.

Incorrect changes are perceptual errors, occurring when a subject identifies an item has changed, when it has not. Each occurrence receives one point, the two types are:

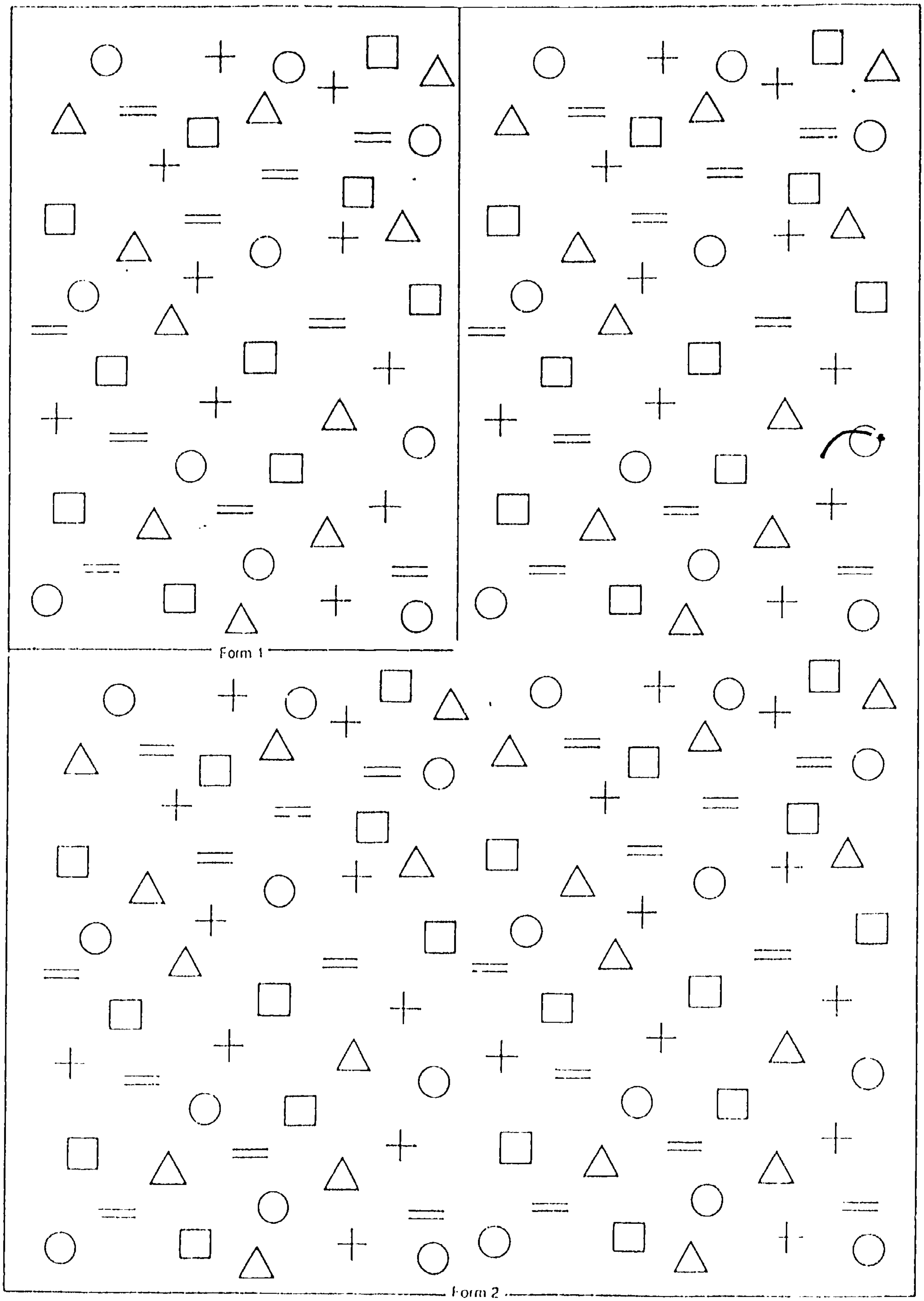
"A" Change (HA) - this score occurs when a subject incorrectly states a detail on the card has changed. For example "the fence moved" when in fact it did not. This phenomenon is conceptualized as a cognitive slip and is a analogous to a slip of the tongue.

"B" Change (HB) - occurs when an item is perceived as missing which was never present. For example, "the bird is gone" when a bird was never in the scene. This phenomenon is a gross perceptual distortion.

The Leveling - Sharpening Shoot Out test (LSST) is analogous to the house test (LSHT) except that the scene is a picture of two cowboys engaged in a shoot out (see appendix F). (Research has shown (Santostefano, 1978) that this scene evokes aggressive fantasies with children). The LSST generates the same scores as the LSHT described above (SOSTOP, SOCOR, SORATIO, SOA SOB).

APPENDIX B

Scattered Scanning Test (SST)



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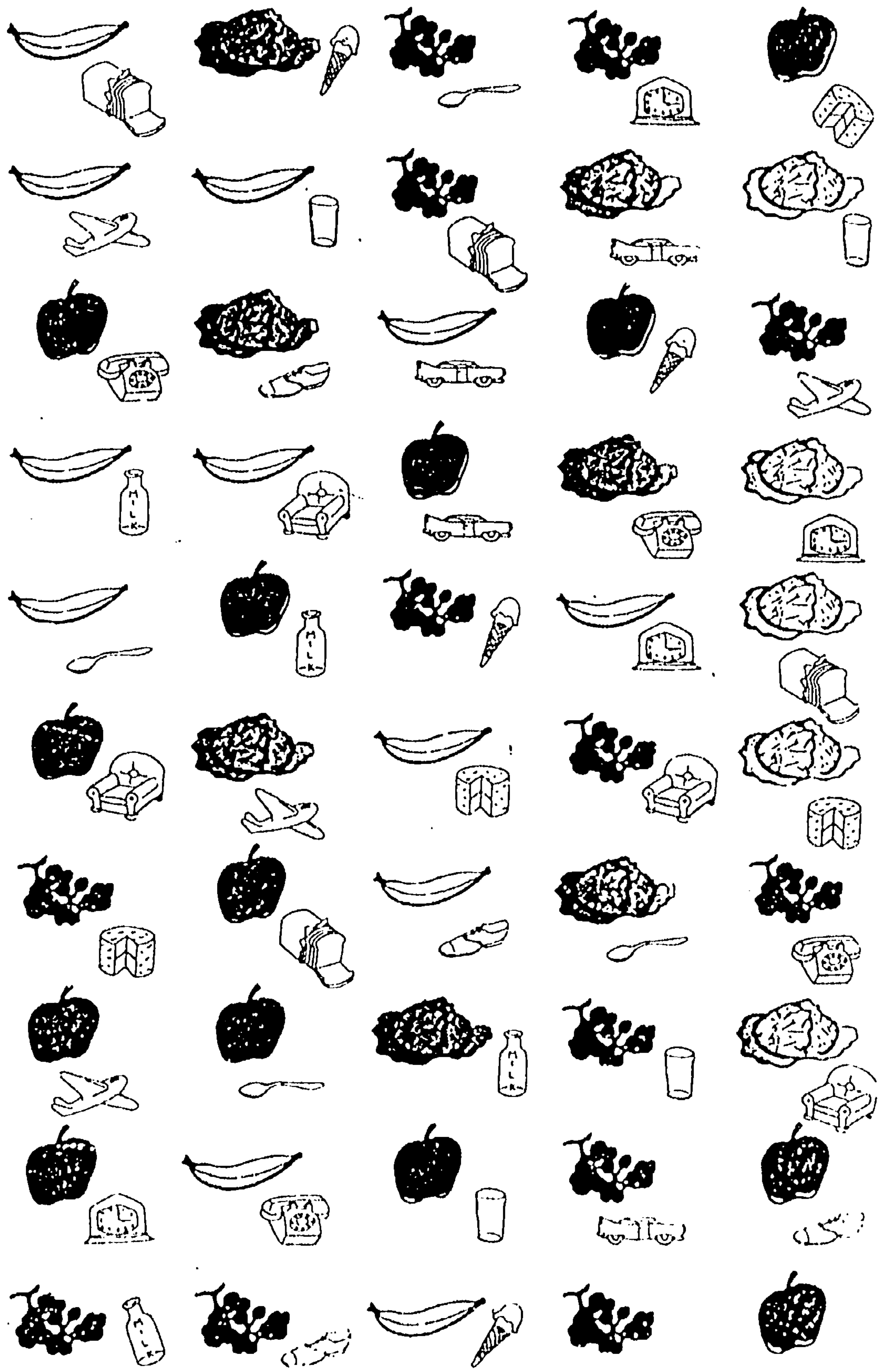
APPENDIX C

Fruit Distraction Test (FDT)



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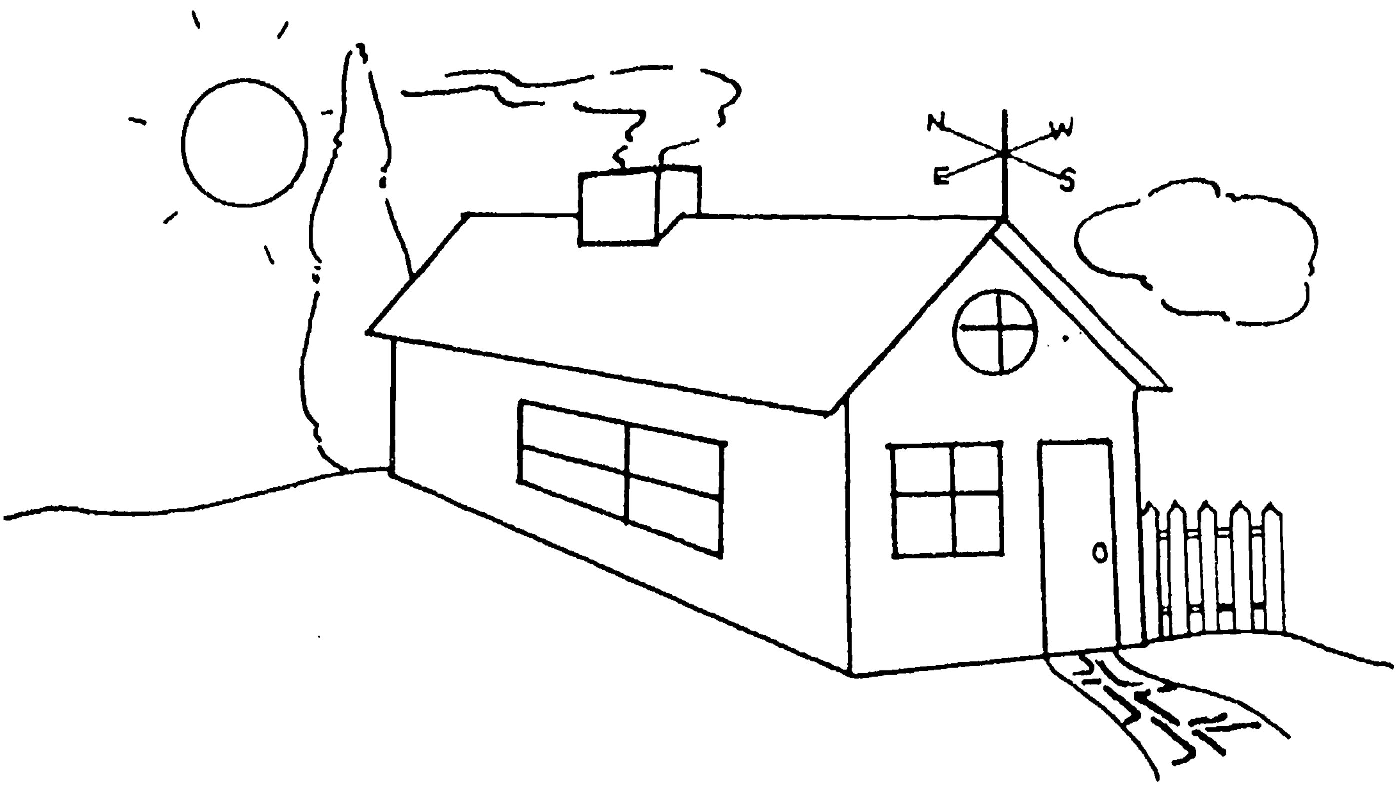
L-S HOUSE TEST



Correct Perceptions	Errors/Slips
Fence Board	Smoke new
Weather Vane	Tree Shorter
Oval Window	Birds gone
Flagstones	House longer
Tree	Smoke moved

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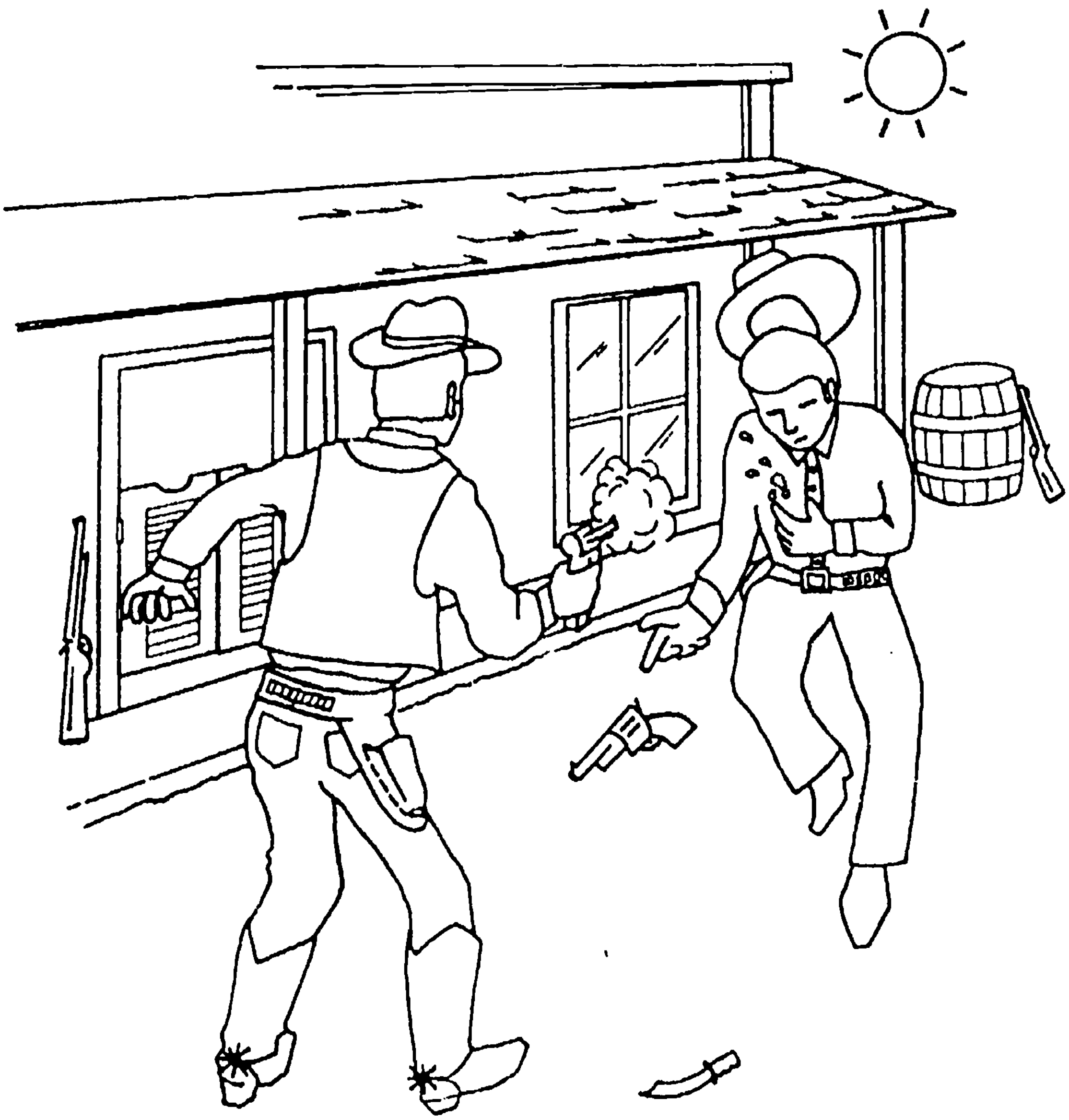
L-S SHOOT - OUT TEST



Correct Perceptions	Errors/Slips
Rifle barrel	Blood now
Sun rays	Sun moved
Dagger	Gun lower
Buttons/collar	Person in window
Pistol/shooter	Rifle longer

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