Summary of Risk Assessment Research at Ontario Shores Forensic Unit

David Nussbaum, Ph. D., C. Psych.
2nd Annual Research Day
Ontario Shores Centre for Mental Health Sciences
Whitby, Ontario
March 22, 2013
Outline:

1. What is Risk Assessment?: An Historical Overview
2. Why Do We Need Change? How Can We Change Optimally?
3. Aggression Theory
4. Decision-Making in the Face of Gratification and Uncertainty
6. Existing Empirical Evidence
7. Future Perspectives
What is Risk Assessment?

• The four basic RA questions are:
  • What might go wrong (Violent Recidivism)
  • What is the likelihood that it will go wrong?
  • What are the consequences of it going wrong?
  • What can be done about it?
  • The ultimate goal is to make an optimal set of decisions that will minimize cumulative risk.
• (Haimes, 2004)
### Traditional Approaches to Risk Assessments

<table>
<thead>
<tr>
<th>Phase</th>
<th>Descriptor</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1\textsuperscript{st} Generation</td>
<td>Unstructured Clinical Judgment</td>
<td></td>
</tr>
<tr>
<td>Modified 1\textsuperscript{st} Generation</td>
<td>Structured Clinical Judgment</td>
<td>HCR-20</td>
</tr>
<tr>
<td>2\textsuperscript{nd} Generation</td>
<td>Actuarial Prediction</td>
<td>VRAG, PCL-R-2</td>
</tr>
<tr>
<td>3\textsuperscript{rd} Generation</td>
<td>Social Psychology Based Empirical</td>
<td>LSI-R</td>
</tr>
<tr>
<td>4\textsuperscript{th} Generation</td>
<td>3\textsuperscript{rd} Generation + Case Management</td>
<td>LS/CMI</td>
</tr>
</tbody>
</table>
1st Generation: Unstructured Clinical Opinion

• Problem: Lack of any empirical evidence for predictive validity
Modified 1\textsuperscript{st} Generation: Historical, Clinical & Risk-20

Initially developed for use with Mentally Disordered Offenders
Historical (Static10)

1. Previous violence
2. Young age at first violent incident
3. Relationship instability
4. Employment problems
5. Substance use problems
6. Major mental illness
7. Psychopathy
8. Early maladjustment
9. Personality Disorder
10. Prior supervision failure
Clinical (Dynamic 5)

- 1. Lack of insight into mental disorder/need for medication/treatment
- 2. Negative attitudes
- 3. Active symptoms of major mental illness
- 4. Impulsivity
- 5. Unresponsiveness to treatment
Risk (Dynamic 5)

• 1. Plans (for future) lack feasibility
• 2. Exposure to destabilizers
• 3. Lack of personal support
• 4. Noncompliance with remediation attempts
• 5. Stress.

Note: Factor 2 (Impulsive Lifestyle) is the best predictor of impulsive (common) criminality in almost all studies that examine the two factors as well as the overall PCL-Total Score!

Factor 1 is better at identifying the rare criminal who is not impulsive but plans crimes such as stalkers and serial sexual predators.
Psychopathy
PCL-R-2

Factor 1:
Interpersonal/Affective

Inter-Personal:
Glib/Charm
Grandiose
Path. Lying
Manipulative
(Narcissistic)

Affective:
Lacks Guilt
Unempathic/Callous
Shallow Affect
No Responsibility
For Actions

Factor 2:
Social Deviance

Life-Style:
Boredom Prone
Parasitic L.S.
No R.L.T. Goals
Impulsivity++
Irresponsibility
(Financial etc.)

Antisocial:
Poor Behavioural Controls
Early Beh. Probs.
Juven. Delinquent.
Revocation Relea.
Crim. Versatility
The Violence Risk Appraisal Guide (VRAG; Harris, Rice & Quinsey, 1993)

- This is a static (historical) 12 item risk instrument used to predict the likelihood of Violent Recidivism.
- In the development of the VRAG, the authors used the occurrence of any violent charge as the outcome variable, even if the individual was found not guilty and someone else was convicted of the crime.
The Violence Risk Appraisal Guide (VRAG; Harris, Rice & Quinsey, 1993)

• This is a static (historical) 12 item risk instrument used to predict the likelihood of Violent Recidivism

• In the development of the VRAG, the authors used the occurrence of any violent 
  charge as the outcome variable, even if the individual was found not guilty and someone else was convicted of the crime.
The Violence Risk Appraisal Guide (VRAG; Harris, Rice & Quinsey, 1993)

- The VRAG consists of the PCL-R and 11 more variables.
- Scoring is relatively involved.
- Actuarial instruments offer group but not individual predictions.
Third Generation

- Social Learning/Criminogenic Theory
  - Risk Needs Responsivity Principles
- LSI/LSI-R
Level of Supervision Inventory (LSI-R)

- 1. School Adjustment (10 Items)
- 2. Work History (8 Items)
- 3. Career Goals (4 Items)
- 4. Finances (3 Items)
- 5. Health (5 Items)
- 6. Family Life (5 Items)
- 7. Sex/Relationships (7 Items)
- 8. Drug Use (3 Items)
- 9. Childhood/Adolescent Antisocial Behavior (12 Items)
- 10. General Questions (12 Items)
SAQ, Loza (2006)

- The SAQ is a **self-report questionnaire** containing 72 items divided among 8 subscales reflecting:
  - 1. Criminal tendencies (Antisocial attitudes, beliefs, behavior, and feelings.
  - 2. The Antisocial Personality Problems (Issues common to DSM-IV’s Axis II APD)
  - 3. Conduct Problems subscale (Childhood misconduct)
  - 4. Criminal History
  - 5. Alcohol and/or
  - 6. Drug Abuse,
  - 7. Anger, and
  - 8. Validity

Note: The 5 Anger scale items are not included in the total SAQ score to predict violence due to the author’s previous findings of no relationship in correctional samples between anger and recidivism (Loza & Loza-Fanous, 1999a, 1999b).

- Validity subscale items serve the dual purposes of testing truthfulness and predicting recidivism.
Fourth Generation

• Adds a Case Management component to insure that the recommended and appropriate intervention is administered as intended

• LS/CMS or:

• Level of Supervision Case Management System
• Originally published as:
  • Campbell, French & Gendreau, 2007
  • User Report # 2007-04; Ottawa, Public Safety Canada
  • Peer reviewed in CJ&B, 2010

• Meta-Analysis is a quantitative method for presenting a review of an entire literature
• Briefly, meta-analysis presents an average effect size (strength of association) between two variables across all available studies that meet specific criteria for scientific validity
• In this analysis, the reported effect size is the $Z^+$ statistic in the second last column.
<table>
<thead>
<tr>
<th>Measure</th>
<th>$k$</th>
<th>$N$</th>
<th>$M_r$ (SD)</th>
<th>$CI_r$</th>
<th>$M_r$ (SD)</th>
<th>$CI_r'$</th>
<th>$Z^+$</th>
<th>$CI_{z^+}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>HCR-20</td>
<td>11</td>
<td>1395</td>
<td>.25 (.15)</td>
<td>.14 to .35</td>
<td>.25 (.13)</td>
<td>.16 to .34</td>
<td>.22</td>
<td>.17 to .27</td>
</tr>
<tr>
<td>LSI/LSI-R</td>
<td>19</td>
<td>4361</td>
<td>.25 (.08)</td>
<td>.21 to .28</td>
<td>.25 (.09)</td>
<td>.21 to .29</td>
<td>.28</td>
<td>.25 to .31</td>
</tr>
<tr>
<td>$Adjusted^a$</td>
<td>18</td>
<td>3920</td>
<td>.23 (.06)</td>
<td>.20 to .26</td>
<td>.24 (.06)</td>
<td>.20 to .27</td>
<td>.25</td>
<td>.22 to .28</td>
</tr>
<tr>
<td>PCL/PCL-R</td>
<td>24</td>
<td>4757</td>
<td>.24 (.10)</td>
<td>.19 to .28</td>
<td>.24 (.10)</td>
<td>.20 to .28</td>
<td>.27</td>
<td>.24 to .30</td>
</tr>
<tr>
<td>$Adjusted^b$</td>
<td>20</td>
<td>2862</td>
<td>.22 (.10)</td>
<td>.17 to .26</td>
<td>.22 (.10)</td>
<td>.17 to .27</td>
<td>.24</td>
<td>.20 to .28</td>
</tr>
<tr>
<td>SIR Scale</td>
<td>17</td>
<td>5618</td>
<td>.24 (.13)</td>
<td>.18 to .31</td>
<td>.24 (.11)</td>
<td>.18 to .30</td>
<td>.22</td>
<td>.19 to .25</td>
</tr>
<tr>
<td>$Adjusted^c$</td>
<td>15</td>
<td>1962</td>
<td>.25 (.14)</td>
<td>.17 to .32</td>
<td>.24 (.12)</td>
<td>.18 to .31</td>
<td>.24</td>
<td>.20 to .28</td>
</tr>
<tr>
<td>VRAG</td>
<td>14</td>
<td>2082</td>
<td>.27 (.13)</td>
<td>.20 to .35</td>
<td>.27 (.11)</td>
<td>.20 to .33</td>
<td>.32</td>
<td>.28 to .36</td>
</tr>
<tr>
<td>$Adjusted^d$</td>
<td>13</td>
<td>1464</td>
<td>.26 (.12)</td>
<td>.18 to .33</td>
<td>.26 (.10)</td>
<td>.19 to .32</td>
<td>.27</td>
<td>.22 to .32</td>
</tr>
<tr>
<td>Crim History</td>
<td>9</td>
<td>2230</td>
<td>.23 (.15)</td>
<td>.12 to .35</td>
<td>.22 (.14)</td>
<td>.12 to .33</td>
<td>.23</td>
<td>.19 to .27</td>
</tr>
<tr>
<td>LS/CMI</td>
<td>3</td>
<td>841</td>
<td>.37 (.09)</td>
<td>.14 to .59</td>
<td>.38 (.14)</td>
<td>.03 to .73</td>
<td>.47</td>
<td>.40 to .54</td>
</tr>
<tr>
<td>PCL:SV</td>
<td>5</td>
<td>641</td>
<td>.29 (.11)</td>
<td>.15 to .43</td>
<td>.30 (.13)</td>
<td>.13 to .46</td>
<td>.20</td>
<td>.12 to .28</td>
</tr>
<tr>
<td>SAQ</td>
<td>8</td>
<td>1094</td>
<td>.33 (.03)</td>
<td>.31 to .36</td>
<td>.33 (.05)</td>
<td>.29 to .38</td>
<td>.37</td>
<td>.31 to .43</td>
</tr>
</tbody>
</table>
Reimann & Nussbaum, JIAFMHS, 2011

Receiver Operation Characteristics (ROC) Predicting # of Seclusions Corrected for Hospital Stay:

- Median Split Approximation
- Instrument/Scale | AUC  | S.E.  | Sig.   | 95% Confidence Intervals

<table>
<thead>
<tr>
<th>Instrument/Scale</th>
<th>AUC</th>
<th>S.E.</th>
<th>Sig.</th>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCL-R Total</td>
<td>0.686</td>
<td>0.050</td>
<td>0.001</td>
<td>0.587</td>
<td>0.784</td>
</tr>
<tr>
<td>PCL-R Factor 1</td>
<td>0.633</td>
<td>0.053</td>
<td>0.016</td>
<td>0.530</td>
<td>0.736</td>
</tr>
<tr>
<td>PCL-R Factor 2</td>
<td>0.712</td>
<td>0.049</td>
<td>0.000</td>
<td>0.617</td>
<td>0.808</td>
</tr>
<tr>
<td>VRAG BIN</td>
<td>0.634</td>
<td>0.053</td>
<td>0.015</td>
<td>0.530</td>
<td>0.738</td>
</tr>
<tr>
<td>VRAG Total Score</td>
<td>0.666</td>
<td>0.051</td>
<td>0.003</td>
<td>0.565</td>
<td>0.766</td>
</tr>
<tr>
<td>HCR-20 Total Score</td>
<td>0.692</td>
<td>0.050</td>
<td>0.001</td>
<td>0.594</td>
<td>0.789</td>
</tr>
<tr>
<td>HCR-20 Historical</td>
<td>0.663</td>
<td>0.051</td>
<td>0.003</td>
<td>0.563</td>
<td>0.762</td>
</tr>
<tr>
<td>HCR-20 Clinical</td>
<td>0.674</td>
<td>0.051</td>
<td>0.002</td>
<td>0.574</td>
<td>0.773</td>
</tr>
<tr>
<td>HCR-20 Risk</td>
<td>0.606</td>
<td>0.054</td>
<td>0.054</td>
<td>0.501</td>
<td>0.712</td>
</tr>
<tr>
<td>LSI-Total Score</td>
<td>0.666</td>
<td>0.051</td>
<td>0.003</td>
<td>0.565</td>
<td>0.766</td>
</tr>
</tbody>
</table>

Note: 56 Low and 55 High; N = 111
Rogue’s Gallery

1. Group the Following Criminals into Coherent Clusters
2. Name the Clusters
ID’s

Eric D. Harris; Hannibal Lecter; Major William Russell; Vincent Li

Paul Bernardo; Luka Magnotta; Andre Breivik; John Hinckley Jr.

Mark David Chapman; Theodore Kaczynski; Celine Lesage; Charles Manson
Fundamental Question:

Can an optimal prediction instrument be developed by disregarding that fundamentally different types of aggression are committed by different types of people in response to different circumstances - or - could consideration of these basic systems applied to risk assessment result in:

1. Better prediction of violent recidivism;
2. More focused interventions* for the individual’s particular needs;
3. Possibilities for monitoring effectiveness of interventions pre-release?
Identified Aggression Types

1. Instrumental/Predatory Aggression (Motivated by Opportunity for Tangible Gratification: Food in animals, Money or sex in humans)

2. Irritable Aggression (Initiated by Anger/Irritability/Frustration)

3. Defensive Aggression (Initiated by Fear of Being Attacked)

4. Unrealistic Defensive Aggression (Initiated by Delusion of Being Attacked)
Human Aggression Typology
Adapted from Moyer, 1967
Nussbaum, Saint-Cyr, & Bell (1997)

- Predatory Aggression
  - Non-emotional
  - Instrumental gain
  - Lack of empathy
  - Terminated by goal attainment
- Defensive Aggression
  - Emotion: Fear
  - Realistic & Non-realistic/delusional
  - Response to a perceived threat or actual attack
- Irritable Aggression
  - Emotion: Anger
  - Personal insult
  - Intense arousal
  - Terminated by exhaustion
• To answer the question, we have to briefly examine a few complexities of the underlying “engine” that drives behaviour…

• But not too technically 😊
Theoretical Postulates

• Executive Function (EF) or Regulation systems are centered in different parts of the prefrontal cortex.

• Cognitive EF: Dorsolateral PFC
• Motivational EF: Ventromedial PFC
• Emotional EF: Orbital-Frontal PFC
Motivational, Emotional & Cognitive Control Circuits: Prefrontal Cortex Regions
Figure 1.
A Central Psychobiological Model for Decision-Making in Motivational Contexts
(Nussbaum, Honarmand, Govoni et al., JOGS, 2011)

Key:
Red indicates inhibitory pathway
Green indicates activation pathway
Dashed line indicates synergistic effect within Approach or Inhibition components. Dotted line indicates paradoxical effects. (See text for details)
Empirical Support for Model

• **Background:**

• 1) Iowa Gambling Task (IGT; Motivational Decision-Making under conditions of risk/uncertainty)

• 2) Integrated Visual and Auditory Continuous Performance Test (Test of Attention and Cognitive Response Control/Cognitive Regulation)
- High immediate rewards
- Larger delayed punishments

- Moderate immediate rewards
- Smaller delayed punishments
- Net gain

Bad decks

Good decks

\[ A' \quad B \quad C \quad D' \]
Integrated Auditory and Visual (IVA; Sanford, 1994)

• 500 trials
• Person either sees a 1 or a 2 on the computer screen or hears a 1 or a 2 through earphones (preferred) or the computer speaker.
• Instructions: “Click the mouse button when you hear or see a ‘1’; Do not click the mouse button when you hear or see a ‘2’. Be as quick as you can but be careful too.”
• Generates individual scores for Attention (number of “1’s” detected) and Response Control (number of “2’s” clicked)
• IVA Response Control reflects cognitive impulsivity because there is no gain or other motivation for performing well.
• IVA Attention reflects ability to attend over about 20 minutes…very boring
Empirical Evidence I:
### BUT: Predatory Group OK with Cognitive DM: OCI IVA CPT Results

<table>
<thead>
<tr>
<th></th>
<th>Irritable</th>
<th>Predatory</th>
<th>Nonagg</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FS Response Control</strong></td>
<td>81.41a</td>
<td>95.08b</td>
<td>96.40b</td>
</tr>
<tr>
<td>Auditory RC</td>
<td>86.26a</td>
<td>94.44</td>
<td>98.46b</td>
</tr>
<tr>
<td>Visual RC</td>
<td>81.71a</td>
<td>97.36b</td>
<td>95.14b</td>
</tr>
</tbody>
</table>

| **FS Attention Quotient** | 80.50a    | 89.04     | 101.52b |
| Auditory Attention       | 82.44a    | 92.36     | 99.12b  |
| Visual Attention          | 83.97a    | 88.56a    | 103.12b |

- Note: All scales have a Mean of 100 and a SD of 15 like IQ scores!!

**Conclusion:** The Predatory group looks most like the unimpaired Non-Violent Criminals on a cognitive DM task (IVA Response Control), “in-between” on Attention Q., BUT are very impaired on the Motivational DM IGT.
Aggression Subtype

- Irritable (n = 34)
- Predatory (n = 25)
- Nonaggressive (n = 30)
Levi Offender Study at O.C.I., Brampton
Discriminant Analysis I: Violent vs. Non-Violent Offender Groups

Predicted Group

<table>
<thead>
<tr>
<th>Original</th>
<th>Non-aggressive</th>
<th>Aggressive</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-aggressive</td>
<td>22 (73.3%)</td>
<td>8 (26.7%)</td>
<td>30</td>
</tr>
<tr>
<td>Aggressive</td>
<td>9  (15.8%)</td>
<td>48 (84.2%)</td>
<td>57</td>
</tr>
</tbody>
</table>

*80.5% cases correctly classified

Variables utilized
- TCI Cooperativeness Scale
- IVA FS Attention Quotient
- STAXI - II Trait Anger
- Iowa Gambling Task - Block 5
- Letter Fluency
Levi Nussbaum & Rich, 2010
Offender Study at OCI, Brampton
Discriminant Analysis II: Model Sub-Types

## Predicted Group

<table>
<thead>
<tr>
<th>Original</th>
<th>Irritable</th>
<th>Predatory</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irritable</td>
<td>25 (78.1%)</td>
<td>7 (21.9%)</td>
<td>32</td>
</tr>
<tr>
<td>Predatory</td>
<td>8 (32.0%)</td>
<td>17 (68.0%)</td>
<td>25</td>
</tr>
</tbody>
</table>

*73.7% cases correctly classified

## Variables selected

- PAI - Drug scale, Aggressive Attitudes & Physical Aggression scale
- IVA - Full Scale Attention Quotient, FS Response Control Quotient
- STAXI - II Trait Anger
• Ontario Shores Data
• Contrasted prediction for Predatory/Instrumental and Irritable/anger Initiated Seclusion Room Placements using a variant scoring system for the IGT.
Iowa Gambling Task Scoring

- **Traditional Scoring Method**
  - # Advantageous (C+D) - # Disadvantageous (A+B)

**Alternate Scoring Method:** (Yechiam, Veinott, Busemeyer & Stout, 2007)

- **Cognitive Equation Measures:**

  - **Equation 1:** Attention to immediate reward/loss
    \[ v(t) = W \cdot \text{win}(t) - (1 - W) \cdot \text{loss}(t) \]

  - **Equation 2:** Memory of previous choice consequences
    \[ E_j(t) = E_j(t - 1) + \Phi \cdot [v(t) - E_j(t - 1)] \]

  - **Equation 3:** Deck Choice Consistency
    \[ Pr[G_j(t + 1)] = e^{\theta(t) \cdot E_j(t)}/\sum_k e^{\theta(t) \cdot E_k(t)} \]
Predatory Seclusions are best predicted by IGT Block 4 Traditional Score and IGT Block 3 Equation 2 Score

<table>
<thead>
<tr>
<th>Variable</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong></td>
<td></td>
</tr>
<tr>
<td>IGT Block 4 Traditional Score</td>
<td>-.442**</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
<td></td>
</tr>
<tr>
<td>IGT Block 4 Traditional Score</td>
<td>-.452**</td>
</tr>
<tr>
<td>IGT Block 3 Equation 2 Score</td>
<td>.328*</td>
</tr>
</tbody>
</table>

Note. $R^2 = .195$ for Step 1; $\Delta R^2 = .128$ for Step 2 ($ps < 0.05$) * $p < 0.05$  ** $p < 0.01$ Total $R^2 = .223$
## Irritable Seclusions best predicted by IGT Block 4 Equation 1 and 3 Scores and IGT Block 5 Equation 1 Score

<table>
<thead>
<tr>
<th>Step</th>
<th>Variable</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>IGT Block 4 Equation 1 Score</td>
<td>.338*</td>
</tr>
<tr>
<td></td>
<td>IGT Block 4 Equation 3 Score</td>
<td>.432**</td>
</tr>
<tr>
<td>2</td>
<td>IGT Block 4 Equation 1 Score</td>
<td>.544**</td>
</tr>
<tr>
<td></td>
<td>IGT Block 4 Equation 3 Score</td>
<td>.441**</td>
</tr>
<tr>
<td>3</td>
<td>IGT Block 4 Equation 1 Score</td>
<td>.775***</td>
</tr>
<tr>
<td></td>
<td>IGT Block 4 Equation 3 Score</td>
<td>.441**</td>
</tr>
<tr>
<td></td>
<td>IGT Block 5 Equation 1 Score</td>
<td>-.397*</td>
</tr>
</tbody>
</table>

Note. $R^2 = .114$ for Step 1; $\Delta R^2 = .144$ for Step 2; $\Delta R^2 = .107$ for Step 3 ($p’s < 0.05$) Total $R^2 = 0.365$ * $p < 0.05$  ** $p < 0.01$  *** $p < 0.001$
(Yet) Unpublished Ontario Shores Data

• Three Forensic Patient Types:
  – Predatory Aggression (“Hands-Off Mentally-Disordered Sex Offenders)
  – Irritable Aggression
  – Delusional Defensive Aggression
<table>
<thead>
<tr>
<th></th>
<th>Predatory (N = 7)</th>
<th>Irritable (N = 15)</th>
<th>Unrealistic (N = 19)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Estimated Intelligence</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NART IQ</td>
<td>92.25</td>
<td>92.36</td>
<td>97.50</td>
</tr>
<tr>
<td>(SD)</td>
<td>4.50</td>
<td>17.90</td>
<td>14.43</td>
</tr>
<tr>
<td>N</td>
<td>4</td>
<td>11</td>
<td>16</td>
</tr>
<tr>
<td>Shipley IQ</td>
<td>94.25</td>
<td>87.70</td>
<td>90.56</td>
</tr>
<tr>
<td>(SD)</td>
<td>11.17</td>
<td>18.61</td>
<td>14.43</td>
</tr>
<tr>
<td>N</td>
<td>4</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>WAIS-III IQ</td>
<td>95.80</td>
<td>73.22</td>
<td>86.13</td>
</tr>
<tr>
<td>(SD)</td>
<td>30.34</td>
<td>18.36</td>
<td>13.18</td>
</tr>
<tr>
<td>N</td>
<td>5</td>
<td>9</td>
<td>15</td>
</tr>
</tbody>
</table>

**Summary:** The Predatory group has the highest level of present cognitive functioning although there were no pre-morbid differences.
# IVA CPT Performance by Aggression Type

<table>
<thead>
<tr>
<th></th>
<th>Predatory (N = 6)</th>
<th>Irritable (N = 9)</th>
<th>Unrealistic (N = 14)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IVA Response Control</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>74.75 (SD 30.18)</td>
<td>71.89 (SD 38.73)</td>
<td>72.63 (SD 28.36)</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>Response Control Visual</td>
<td>84.75 (SD 26.54)</td>
<td>77.56 (SD 31.19)</td>
<td>81.71 (SD 26.51)</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>Response Control Auditory</td>
<td>74.50 (SD 22.72)</td>
<td>74.89 (SD 36.81)</td>
<td>70.57 (SD 28.99)</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td><strong>IVA Attention</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>81.8 (SD 6.38)</td>
<td>69.22 (SD 39.10)</td>
<td>49.14 (SD 34.86)</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>Visual Attention</td>
<td>90.75 (SD 16.70)</td>
<td>70.00 (SD 39.21)</td>
<td>54.43 (SD 36.79)</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>9</td>
<td>14</td>
</tr>
<tr>
<td>Auditory Attention</td>
<td>67.00 (SD 33.37)</td>
<td>74.78 (SD 35.87)</td>
<td>54.50 (SD 32.92)</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>9</td>
<td>14</td>
</tr>
</tbody>
</table>

- **Note:** All scales have a Mean of 100 and a SD of 15.
- **Summary:** The Predatory Group is better on (V) Attentional Ability.
Estimated Marginal Means of MEASURE_1

- Irritable
- Predatory
- Unrealistic

IGT.Blocks

Estimated Marginal Means
Nussbaum, Konomi & Nussbaum, 2012
(In Press, J. of IAFMHS)
<table>
<thead>
<tr>
<th>Scale</th>
<th>AUC</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAI Aggression Scale</td>
<td>.794</td>
<td>.003</td>
</tr>
<tr>
<td>PAI Aggressive Attitude</td>
<td>.782</td>
<td>.004</td>
</tr>
<tr>
<td>PAI Verbal Aggression</td>
<td>.732</td>
<td>.019</td>
</tr>
<tr>
<td>PAI Physical Aggression</td>
<td>.776</td>
<td>.005</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Reimann & Nussbaum, JIAFMHS, 2011
Receiver Operation Characteristics (ROC)
Predicting # of Seclusions Corrected for Hospital Stay:

- Median Split Approximation

<table>
<thead>
<tr>
<th>Instrument/Scale</th>
<th>AUC</th>
<th>S.E.</th>
<th>Sig.</th>
<th>Lower</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCL-R Total</td>
<td>0.686</td>
<td>0.050</td>
<td>0.001</td>
<td>0.587</td>
<td>0.784</td>
</tr>
<tr>
<td>PCL-R Factor 1</td>
<td>0.633</td>
<td>0.053</td>
<td>0.016</td>
<td>0.530</td>
<td>0.736</td>
</tr>
<tr>
<td>PCL-R Factor 2</td>
<td>0.712</td>
<td>0.049</td>
<td>0.000</td>
<td>0.617</td>
<td>0.808</td>
</tr>
<tr>
<td>VRAG BIN</td>
<td>0.634</td>
<td>0.053</td>
<td>0.015</td>
<td>0.530</td>
<td>0.738</td>
</tr>
<tr>
<td>VRAG Total Score</td>
<td>0.666</td>
<td>0.051</td>
<td>0.003</td>
<td>0.565</td>
<td>0.766</td>
</tr>
<tr>
<td>HCR-20 Total Score</td>
<td>0.692</td>
<td>0.050</td>
<td>0.001</td>
<td>0.594</td>
<td>0.789</td>
</tr>
<tr>
<td>HCR-20 Historical</td>
<td>0.663</td>
<td>0.051</td>
<td>0.003</td>
<td>0.563</td>
<td>0.762</td>
</tr>
<tr>
<td>HCR-20 Clinical</td>
<td>0.674</td>
<td>0.051</td>
<td>0.002</td>
<td>0.574</td>
<td>0.773</td>
</tr>
<tr>
<td>HCR-20 Risk</td>
<td>0.606</td>
<td>0.054</td>
<td>0.054</td>
<td>0.501</td>
<td>0.712</td>
</tr>
<tr>
<td>LSI-Total Score</td>
<td>0.666</td>
<td>0.051</td>
<td>0.003</td>
<td>0.565</td>
<td>0.766</td>
</tr>
</tbody>
</table>

- Note: 56 Low and 55 High; Total N = 111
### Table 1

*Optimal* Decision Accuracy of VRAG Bins at Ontario Shores

<table>
<thead>
<tr>
<th>VRAG Bin</th>
<th>10-year violent recidivism rates</th>
<th>Optimal decision accuracy by bin&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Cases&lt;sup&gt;b&lt;/sup&gt; in bin</th>
<th>VRAG bin percentage</th>
<th>Maximum correct decisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.08</td>
<td>0.92</td>
<td>1</td>
<td>0.7</td>
<td>0.64 0.92</td>
</tr>
<tr>
<td>2</td>
<td>0.10</td>
<td>0.90</td>
<td>16</td>
<td>11.3</td>
<td>10.17 14.40</td>
</tr>
<tr>
<td>3</td>
<td>0.24</td>
<td>0.76</td>
<td>21</td>
<td>14.9</td>
<td>11.32 15.96</td>
</tr>
<tr>
<td>4</td>
<td>0.31</td>
<td>0.69</td>
<td>28</td>
<td>19.9</td>
<td>13.73 19.32</td>
</tr>
<tr>
<td>5</td>
<td>0.48</td>
<td>0.52</td>
<td>38</td>
<td>27.0</td>
<td>14.04 19.76</td>
</tr>
<tr>
<td>6</td>
<td>0.58</td>
<td>0.58</td>
<td>24</td>
<td>17.0</td>
<td>9.86 13.92</td>
</tr>
<tr>
<td>7</td>
<td>0.64</td>
<td>0.64</td>
<td>8</td>
<td>5.7</td>
<td>3.65 5.12</td>
</tr>
<tr>
<td>8</td>
<td>0.82</td>
<td>0.82</td>
<td>5</td>
<td>3.5</td>
<td>2.87 4.10</td>
</tr>
<tr>
<td>9</td>
<td>1.00</td>
<td>1.00</td>
<td>0</td>
<td>0.0</td>
<td>0.00 0.00</td>
</tr>
</tbody>
</table>

Calculated Totals

66.28% 94.52/141

*Note.* 10-year violent recidivism rates based on Quinsey, Harris, Rice & Cormier et al. 1998

<sup>a</sup> Assumes that the VRAG works as described in its 10-year developmental sample

<sup>b</sup> N = 141
Summary to Date:

• Traditional risk methods are limited because they do not utilize what is known about:
  – 1. Aggression and its types
  – 2. Correspondences between brain processes, aggression initiation, and aggression regulation mechanisms
  – 3. The ability of existing personality and neuropsychological measures to measure individual differences in these domains
  – 4. Integrating these measures into risk assessment and intervention monitoring
Future Perspectives:

1. Utilize appropriate neuropsychological and personality tests and the aggression typology to maximize risk assessment.
2. Re-test patients annually to determine efficacy of interventions to aid decision-making regarding possible changes in ORB privilege or status levels.
3. Augment medications with computerized programs shown to improve cognitive abilities in a variety of patients.
4. Incorporate electrophysiological analyses into psychometric assessment to better identify which specific sub-system(s) are hyper or hypoactive to better identify intervention targets.
Electrophysiological Measures

1. GSR/EDR:
   - Reflects stress/nor-epinephrine/cortisol activity levels

2. Eye-Blink Frequency:
   - Reflects central Dopamine activity

3. EEG; Alpha, Beta 1 & Beta 2 Power:
   - Reflects relation vs. cognitive processing

4. Heart Rate Variability:
   - Reflects stress levels
Take Home Messages

• 1. Dividing violent offenders into biologically meaningful types will enhance risk prediction

• 2. Use of personality scales reflecting Anger will enhance risk for Irritable Aggression

• 3. Use of neuropsychological & electrophysiological measures reflecting motivational and emotional regulation;
  – Can enhance risk assessment for specific aggression types
  – Can be used to suggest specific interventions for different aggression types
  – Can be used to monitor responses to interventions prior to release

• 4. Can be used to reflect individual strengths