Scientific Revolutions, Addiction & Gambling Disorders

Where Are We & Where are We Going?

Discovery Conference 2015

Howard J. Shaffer, Ph.D.

Division on Addiction
Research - Education - Training - Understanding
Things Are Changing
When I Started Thinking About the Syndrome Model...

Marijuana was illegal and people could smoke cigarettes everywhere
Funding Declarations

- National Institute on Alcohol Abuse & Alcoholism
- National Institute on Mental Health
- The Center for Substance Abuse Treatment
- National Center for Responsible Gaming
- Robert Wood Johnson Foundation
- bwin.party
- DUNES of East Hampton
- Davies Ward Phillips & Vineberg, LLP
- Massachusetts Gaming Commission
- Foundation for Advancing Alcohol Responsibility (FAAR)
- Heineken USA
- Iowa Department of Public Health
- Nevada Department of Public Health
- Massachusetts Department of Public Health
- Massachusetts Council on Compulsive Gambling
- University of Nevada, Las Vegas
Richard A. LaBrie, Ed.D.

Provided the personal and profession support and methodological guidance to advance gambling studies
“That is the essence of science: ask an impertinent question, and you are on the way to a pertinent answer.”

Jacob Bronowski, *The Ascent of Man*, ch. 4 (1973)
David A. Korn, M.D.

Provided the conceptual, intellectual and practical stimuli to move gambling research and treatment into the public health domain


Objectives

∗ Consider the epistemology of addiction and gambling disorder - examine how we know these and other things

∗ Consider the natural history of science and how it influences knowing

∗ Review some addiction-related research that challenges traditional views about gambling disorder and reflects our stage of scientific development
Epistemology

How Do We Know What We Know?
Ideas Have Consequences

• How we think determines what we know
• What we know influences how we think
Ideas Have Consequences

Without a clear understanding of addiction:

* Researchers will find it very difficult to reach consensus about addiction etiology, prevalence rates, and the necessary and sufficient causes that stimulate addiction or recovery.

* Clinicians will encounter diagnostic and treatment matching difficulties, and satisfactory treatment outcome measures will remain lacking.

* Public policymakers will find it difficult to establish regulatory legislation, determine treatment need, establish health care systems, and promulgate new guidelines for health care reimbursement.
John F. Kennedy

“The great enemy of the truth is very often not the lie - deliberate, contrived, and dishonest - but the myth - persistent, persuasive, and unrealistic.”

Yale University Commencement Address, 1962
Scientific Revolutions
The Natural History of Scientific Paradigms
A student asked Wittgenstein, “weren't people stupid before Copernicus to think that the sun rotated around the earth?”

“Perhaps so, but what would it have looked like if the sun did rotate around the earth?”
Science develops through a series of identifiable but unpredictable phases:

- pre-paradigmatic
- paradigmatic or “normal science”
- revolutionary science

Pre-Paradigm Science
Characterized by intense polarization between competing views

Normal Science
Dominant paradigm or conventional wisdom

Research
Gambling Problematically  Intemperate Gambling
Type 3     Problem Gambling     Type 2
Probable Pathological Gambling
Gambling Addiction     Irresponsible Gambling
Excessive Gambling     
Pathological Gambling
Compulsive Gambling     
Disordered Gambling
Responsible Gambling
Normal Science
Dominant paradigm or conventional wisdom

Research

Most findings confirm conventional wisdom

Anomalous findings found flawed and not replicable
“Truth always rests with the minority, and the minority is always stronger than the majority, because the minority is generally formed by those who really have an opinion, while the strength of a majority is illusory, formed by the gangs who have no opinion—and who, therefore, in the next instant (when it is evident that the minority is the stronger) assume its opinion ... while Truth again reverts to a new minority.”

“Whenever you find yourself on the side of the majority, it is time to pause and reflect.”

— Mark Twain
“I woke up one morning and all of my stuff had been stolen... and replaced by exact duplicates.”
“Most institutions demand unqualified faith; but the institution of science makes skepticism a virtue” (p. 547).

The Vast Majority of Disordered Gambling Studies Evidence Unacceptably Low Response Rates

- Have gambling studies been representative of the community?
- Have gambling studies been representative of gamblers?
- Have gambling studies been representative of gambling disorders?
- If any of these circumstances exist, what do we really know about gambling and gambling disorders?
Distinguishing the Message from the Messenger
Skepticism from the Street
I am a Skeptic: This Makes Me Difficult

* Science worships skepticism & I am a certified skeptic

* Consider the common claim that PG is unidimensional (based on Factor Analysis & Cronbach’s Alpha)
  
  * More likely that Factor Analysis & high alpha measures (high internal reliability) reflect one dimension of PG - which truly is multidimensional

* Seemingly concordant inter-measure correlations are dominated by influence from the non-cases

* Different measures don’t identify the same cases
Irresponsible vs. Disordered

- Even DSM5 is ambivalent about gambling
- Consider the DSM Cautionary Statement
- Overwhelming impulse to act vs. unwillingness to resist impulses to act
Pre-paradigm or Paradigm?

Considering the Stage of Scientific Development
Considering Anomalies

Pre-paradigm or Revolutionary Science?
Is Pathological Gambling an “addiction”?  

Carlton K. Erikson, Ph.D.  

“It remains unclear to what extent ‘disordered gambling’ is a mental health issue, or results in health problems (rather than resulting in social/financial harm).”

“The field is not without controversy.”

Jeffrey Derevensky
April 29, 2011
Personal Correspondence
Has there ever been an era of normal science for intemperate gambling?
Distinguishing Science Junk from Junk Science

Science Junk  Junk Science
9-DOT PROBLEM
Experiencing a Paradigm Shift
DID YOU FEEL THAT, ZIPPY?

YEH... BUT JUST BARELY.

IT WAS EVER SO SUBTLE.

HARDLY NOTICEABLE.

WHAT WAS IT?

A PARADIGM SHIFT.
Grand Illusions
Gathering Evidence, Interpretation, & Prediction
David Copperfield
A Grand Illusionist
You can see 6 different cards.
Think on one.
Just think on it.
Do not touch it
Do not click on it.
I will find the card on your mind.
Now look straight into my eyes and think on your card...
I do not know you,
I could not see the card you have chosen...
...but I know exactly the card that is on your mind...
¡Look!
¡¡Your card is gone!!
¿Surprised?

DAVID COPPERFIELD
Assumptions & Misdirected Focus
Twin Pillars of Conceptual Misunderstanding & Misdiagnosis
When is Addiction, Addiction?

Syndrome Disorder?

Manic Episodes

Gambling Disorder

Personality Disorder

Depression

Other Unknown Disorders
AA/AD, DA/DD, ND, &/or PG (98%)
CD &/or ADD &/or IED (27%)
PTSD &/or GAD (20%)
MDD &/or DYS (12%)
Bipolar (8%)
No Disorders (1%)

Diagram % = Lifetime % with given combination of disorders

AA/AD = Alcohol abuse or dependence; DA/DD=Drug abuse or dependence; ND=Nicotine dependence; PG=Pathological gambling; CD=Conduct disorder; ADD=Attention deficit disorder; IED=Intermittent explosive disorder; PTSD=Post-traumatic stress disorder; GAD=Generalized anxiety disorder; MDD=Major depression; DYS=Dysthymia; Bipolar=Bipolar I or II.
“Faith” is a fine invention
When Gentleman can see—
But Microscopes are prudent
In an Emergency.

Emily Dickinson, the Complete Poems, no. 185 (1955)
Research that Challenges Traditional Views about Gambling Disorder

Pre-paradigm or Revolutionary Science
"...the fate of all scientific endeavors is oblivion and the lucky scientist dies well before the first cracks appear in his edifice" (p. 58).

"For sure progress depends on the ability of future generations to dismiss the past. Airplanes were not developed because men sang the praises of Icarus flapping his waxen wings" (p. 59).

Challenges to Conventional Wisdom

- Exposure & Adaptation
- Pareto & the Proportion of Revenue from Disordered Gamblers
- Remembering & Reporting Wins & Losses
- Games & Gamblers
- Psychiatric Comorbidity
- How do gamblers end gambling
- Self-report versus Behavioral Evidence
- Reluctance of Investigators to Share Data
Exposure & Adaptation


Certain social events and technologies (e.g., television gambling, advertising, Internet, dance music on the radio) are the social equivalent of exposure to germs (McGuire, 1964)

- Exposure leads to “infection”

- Infection changes experience, behavior, & health

- More exposure means an increased likelihood of “infection” for a larger segment of the population
Gambling as a Public Health Toxin: Exposure Predictions

- Occupational
  - Elevated evidence of infection among employees of establishments that involve objects of addiction

- Time & Space
  - Clustering near temporal & geographic toxin epicenters

- Relationship
  - Direct relationship between exposure & “infection”
Comparing the General Population & Casino Employees

Shaffer et al., 1999; Shaffer & Hall, 2002
Temporal Epicenters: The Effect of Legalized Gambling Expansion

- Gambling opportunities have increased dramatically during the 20th and early part of the 21st centuries.
- Gambling opportunities are beginning to recede during the 21st century.
- Prevalence rates have remained relatively stable during the past 40 years with only a transient spike during the 1990s.
Regional Exposure Model

* Dose
  * Quantity (e.g., number of casinos or gambling related advertising)

* Potency
  * Strength (e.g., extent of gambling venues or employees in a state)

* Duration
  * Time (e.g., elapsed years of legal drinking or gambling)
Regional Index of Gambling Exposure (RIGE)

- Quantitative application of REM
  - $b_1 f(D_1) + b_2 f(P_2) + b_3 f(T_3) + \ldots + b_i f(X_i) + \text{error}$

- Where
  - $b =$ weight, permitting for non-linear relationship
  - $D =$ dose, types of gambling
  - $P =$ potency, strength of gambling exposure
  - $T =$ elapsed exposure to gambling
  - $X =$ standardized environmental public health factors
<table>
<thead>
<tr>
<th>State</th>
<th>Establishments</th>
<th>Employees</th>
<th>Venues</th>
<th>Casinos Years</th>
<th>RIGE</th>
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</thead>
<tbody>
<tr>
<td>Nevada*</td>
<td>330</td>
<td>193,988</td>
<td>6</td>
<td>70</td>
<td>8.28</td>
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<tr>
<td>New Jersey</td>
<td>12</td>
<td>45,955</td>
<td>6</td>
<td>25</td>
<td>0.21</td>
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<tr>
<td>S. Dakota*</td>
<td>76</td>
<td>2,671</td>
<td>6</td>
<td>12</td>
<td>-0.55</td>
</tr>
<tr>
<td>Colorado*</td>
<td>65</td>
<td>6,723</td>
<td>6</td>
<td>11</td>
<td>-0.65</td>
</tr>
<tr>
<td>Mississippi</td>
<td>33</td>
<td>31,531</td>
<td>6</td>
<td>9</td>
<td>-1.04</td>
</tr>
<tr>
<td>Louisiana*</td>
<td>20</td>
<td>15,026</td>
<td>6</td>
<td>8</td>
<td>-1.08</td>
</tr>
<tr>
<td>Illinois</td>
<td>10</td>
<td>9,963</td>
<td>6</td>
<td>11</td>
<td>-1.15</td>
</tr>
<tr>
<td>Iowa*</td>
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<td>5,500</td>
<td>6</td>
<td>12</td>
<td>-1.23</td>
</tr>
<tr>
<td>Missouri</td>
<td>12</td>
<td>15,000</td>
<td>6</td>
<td>9</td>
<td>-1.32</td>
</tr>
<tr>
<td>Indiana</td>
<td>8</td>
<td>9,250</td>
<td>6</td>
<td>8</td>
<td>-1.46</td>
</tr>
</tbody>
</table>

*Tribal casinos not included
Missouri Self-Exclusion Patterns: Exposure to Casinos, Racinos & Racetracks

Self Excluders per 100,000
- 105 - 304
- 61 - 104
- 31 - 60
- 21 - 30
- 8 - 20
- 2 - 7
- None

Map showing the distribution of self-excluders across Missouri counties, with varying shades indicating different exposure levels.
“...current data shows that when gambling activities are legalized, economies will be plagued with 100% to 550% increases in the numbers of addicted gamblers (probably within one to five years, but almost certainly within fifteen years).”

John Warren Kindt
On Certainty

“It ain’t what you don’t know that gets you in trouble; it’s what you know for sure that ain’t so.”

Mark Twain
Adaptation

Social Learning & Prevalence Rates
Typical Course of Infection

* Exposure leads to a rapid increase of infection
* Viruses target the most vulnerable
* Incidence rates slow
* People who are not yet infected are more resistant
* Decline becomes evident
* People recover, prevalence rate declines
Typical Course of Infection

- Exposure Event
- Time
- Number of Cases

- Infection among the resistant
- Population Evidence for Recovery
- Rapid Infection Increase among the most vulnerable
Adaptation among Internet Gamblers

![Graph showing the adaptation among Internet Gamblers with two lines representing the sum of bets for the full sample and the top 1% of bettors over a span of days.]
Adaptation Predictions

* Occupational
  * Elevated evidence of infection among gaming employees

* Space & Time
  * Clustering near temporal and geographic toxin epicenters

* Relationship
  * Pattern of increase, followed by leveling, and gradual reduction
Missouri Self-Exclusion Enrollments by Time

Rates of Disorder by Time

Developing Immunity
The Repetitive Cycle of Exposure & Adaptation
Pareto Principle
Examining the Percentage of Revenues from Disordered Gamblers

“...in any population which contributes to a common effect, a relative few of the contributors account for the bulk of the effect.”

Pareto’s Principle

- About 20% of customers, “the vital few,” are responsible for about 80% of the activity.
- 80%, “the trivial many,” are responsible for the remaining 20% of activity.
About 1% of customers, “the vital few,” are responsible for about 80% of the activity.

99%, “the trivial many,” are responsible for the remaining 20% of activity.
Study Details

- 1,440 surveys from subscribers to the Internet betting service provider, bwin.party

- Brief Biosocial Gambling Screen (BBGS)
  - During the past 12 months, have you become restless, irritable, or anxious when trying to stop and (or) cut down on gambling?
  - During the past 12 months, have you tried to keep your family or friends from knowing how much you gambled?
  - During the past 12 months, did you have such financial trouble as a result of gambling that you had to get help with living expenses from family, friends, or welfare?

- Standard betting activity records

Do Problem Gamblers Drive Internet Gambling?

- **Fixed Odds bettors**
  - 16% of subscribers (vital few) responsible for 80% of Turnover
  - 84% (trivial many) responsible for 20% of Turnover
    - 47% of vital few were BBGS+
    - 24% of trivial many were BBGS+
Do Problem Gamblers Drive Internet Gambling?

- Live Action bettors
  - 5% of subscribers (vital few) responsible for 80% of Turnover
  - 95% (trivial many) responsible for 20% of Turnover
    - 52% of vital few were BBGS+
    - 30% of trivial many were BBGS+
Do Problem Gamblers Drive Internet Gambling?

- Casino bettors
  - 5% of subscribers (vital few) responsible for 80% of Turnover
  - 95% (trivial many) responsible for 20% of Turnover
    - 56% of vital few were BBGS+
    - 35% of trivial many were BBGS+
Comparing the Accuracy of Online Gamblers’ Self-reported Outcomes with Actual Outcomes

- Included a sample of 2,150 bwin.party active subscribers participated in this study
- Grouped players by active fixed odds, live action, and online casino play history
- Participants randomly assigned to report their wins or losses for last 3 or 12 months
- Participants completed the BBGS
Gambler Groups

- Accurate Estimators of gambling outcomes
- Favorably Biased
  - Under-estimating losers
  - Over-estimating winners
- Unfavorably Biased
  - Under-estimating winners
  - Over-estimating losers
Fixed Odds Results

* 3-month reports were more accurate than 12-month reports.
* About 10% of the gamblers accurately estimated outcomes.
* About 51% of the gamblers were favorably biased, of which about 82% were losers who underestimated their losses.
* About 36% were unfavorably biased, of which about 68% were losers who overestimated their losses.
Gambling Experience & Gambling Problems

- Bias was positively correlated with gambling experience
- Among favorably biased gamblers there were fewer participants with gambling problems (BBGS+)
- BBGS+ gamblers estimated their 3-month outcomes unfavorably
  - they overestimated losses and underestimated winnings
- This association was absent among the 12-month cohort
Games or Gamers?
Involvement: Set, Setting, & Activity

European Adult Sample

Secondary data analysis of data from the British Gambling Prevalence Survey 2007 (BGPS)

Goal: to determine the relative ability of games to predict gambling-related disorder, with and without controlling for gambling involvement
We used weighted data representing 8,968 observations characteristic of the general population.

52% women and 48% men.

14% of the sample was 16-24, 35% was 25-44, 31% was 45-64, and 19% was aged 65 and over.

About 0.6% (N=51) of the full sample reported 3+ DSM gambling symptoms during the past year and about 0.3% (N=27) reported 5+ DSM gambling symptoms during the past year.
Our Findings: Top Games

- **Any gambling symptoms;**

<table>
<thead>
<tr>
<th>Virtual Gaming Machines</th>
<th>Spread Betting</th>
<th>Casino Table Games</th>
<th>Other Sports Betting</th>
<th>Betting on Dogs</th>
</tr>
</thead>
</table>

- **3+ gambling symptoms;**

<table>
<thead>
<tr>
<th>Spread Betting</th>
<th>Virtual Gaming Machines</th>
<th>Other types</th>
<th>Betting on Dogs</th>
<th>Casino Table Games</th>
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</table>

- **Mean number of gambling symptoms; and,**

<table>
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</tr>
</thead>
</table>

- **Mean number of gambling types played**

<table>
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<th>Spread Betting</th>
<th>Virtual Gaming Machines</th>
<th>Casino Table Games</th>
<th>Internet Gambling</th>
<th>Other Sports Betting</th>
</tr>
</thead>
</table>
Our Findings: Any Problems

<table>
<thead>
<tr>
<th>Scratch</th>
<th>Other Lottery</th>
<th>Football Pools</th>
<th>Bingo</th>
<th>Slots</th>
<th>VGMs</th>
<th>Casino Tables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet</td>
<td>Horses</td>
<td>Dogs</td>
<td>Other Sports</td>
<td>Spread</td>
<td>Private</td>
<td>Other</td>
</tr>
</tbody>
</table>

**INvolvement**
Our Findings: Any Problems

We observed the same basic pattern for the prediction of 3+, 5+, and 7+ symptoms. Game effects were completely eliminated, or reduced after controlling for involvement.
Psychiatric Comorbidity
Antecedent or Consequent to Gambling?

Antecedent & Consequent Comorbidity

★ Prior DSM-IV anxiety, mood, impulse-control, and substance use disorders predicted the onset and persistence of PG (73%)

★ PG predicted the subsequent onset of generalized anxiety disorder, post-traumatic stress disorder (PTSD) and substance dependence (25%)

★ For 73% of the sample, comorbidity preceded PG

★ For 25% of the sample, comorbidity followed PG
Gambling Disorder & Treatment

!* None of the NCS-R respondents with PG reported having ever received treatment for gambling problems*

!* However, 49.0% were treated at some time for other mental disorders*
Considering the Future

What Does the History of Science Foretell for the Field of Gambling?
The necessary tools for improving addiction treatment might be already available – all that is required to enhance the use of these devices is a rethinking of addiction.
Toward the Future

* Era of cross-sectional prevalence studies is over; it’s time to transition from studies of distribution to prospective studies of determinants

* Cottage industry dedicated to gambling disorder research or treatment will diminish or disappear — gambling research & Tx will become integrated into general health care activities
The validity of gambling disorder will find its place—as science or science junk—as soon as we identify junk science and pseudoscience.

In the 9-dot tradition, we will begin again with a new object of addiction and a scientific revolution will have been completed.
Toward the Future

Unless we can demonstrate efficacy and impact, “Responsible Gambling” programs will become obsolete

RG activities have yet to demonstrate that they can meaningfully prevent or reduce the incidence & prevalence of gambling-related problems
“If they don’t depend on true evidence, scientists are no better than gossips.”

Herbert Flowerdew to Fred Fairly, in *The Gate of Angels*, ch. 3 (1990).
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🌟 David Korn
🌟 Ryan Martin
🌟 Sarah Nelson
🌟 Michael Stanton
🌟 Matthew Tom
Internet Resources

* www.divisiononaddiction.org
* www.basisonline.org
* www.thetransparencyproject.org
* www.expressionsofadddiction.com
* On Twitter: @howard_shaffer