Natural Experiment:
Family Violence and Football

Natural Experiment Example

Academic Title:

Family Violence and Football:
The Effect of Unexpected Emotional Cues on Violent Behavior

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Family Violence and Football:
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Media Title:

CRUSHED EXPECTATIONS
Domestic Violence Rises 10 Percent After NFL Upsets

Card, David and Gordon Dahl, "Family Violence and Football: The Effect of Unexpected Emotional Cues on Violent Behavior," *Quarterly Journal of Economics*, Vol. 126, No. 1, pp. 103-143, February 2011.

Why Does Family Violence Occur?

Family violence is one of the most common yet perplexing forms of criminal behavior.

We usually think of families as "protective," but:

- Estimates of the number of physical assaults inflicted on women by an intimate partner (IP) range from 2.5 to 4.5 million per year in the U.S.
- Implied risk of physical assault for an adult woman by an IP is roughly 1% per year

One theory (among many): Violence is triggered when conflictual interactions escalate out of control

How to Evaluate this Theory?

Theory: Violence arises when emotions get out of control
- Suggests an important role for emotional cues
- Recent economic theories imply strongest cues should come from unexpected and upsetting events

- *Note: this does not mean that individuals have no responsibility for their actions*
- *Note: other factors could also be at play*

Could we test this theory with a randomized controlled experiment or a lab experiment?
- o Ethical issues?
- o Unnatural setting?

Natural Experiment:
Cues from Football Games

Can't run a lab experiment, but can use a natural experiment

Football games are emotionally laden events
- Analyze effects of the emotional cues associated with wins and losses of professional NFL teams
- Could the disappointment of an unexpected loss cause inappropriate and abusive behavior?

Natural experiment will not be whether a team wins or loses (which is not random), but whether a team wins or loses unexpectedly (which is random)…

Theory: Gain-Loss Utility

Gain-loss utility: emotions and expectations
- Loss aversion / prospect theory (Kahneman & Tversky)
- Kahneman received the 2002 Nobel Prize in Economics for this work on the psychology of decision-making
- A nontechnical introduction to many of the ideas can be found in his 2011 book "Thinking, Fast and Slow"
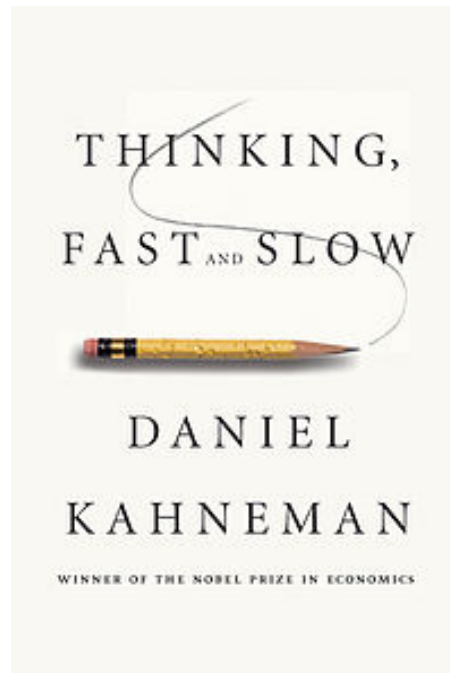
Gain-Loss Utility

Hypothesis: Individuals frame gains and losses around a reference point, with stronger reactions to losses than gains

Translation: Gain-loss utility says 2 things:
- Happiness depends not on actual outcomes, but on outcomes judged relative to expectations
- Unexpected disappointments have a larger impact compared to pleasant surprises
- Expectations (reference points) play an important role in modulating emotions

Example: Next year's salary raise at your job
- Anticipated raise: Get a 2% raise when expecting 2%
- Negative shock: Get a 2% raise when expecting 4%
- Positive shock: Get a 4% raise when expected 2%

Natural Experiment:
Cues from Football Games

We test our theory using police records of reported family violence on Sundays during the regular NFL season

We analyze the effect of wins and losses by the local team on same-day reports of family violence incidents in the local team's geographic market

We assume the reference point for the emotional cue associated with the game outcome is the expected probability of a win

We focus on the effect of "upset losses" – situations where the home team was expected to win but actually lost – relative to the counterfactual of a "predicted win"

Why Football?

1) Strong attachment to local NFL teams
   - Average Sunday afternoon home game attracts one-quarter of all television households
   - Home team games attract 3 times as many viewers

2) Existence of a well-organized betting market

   - Can infer the expected outcome of each game, which serves as the reference point
   - Assuming the game outcome is random conditional on the pre-game point spread, any difference in violence following a loss versus a win represents a <u>causal effect</u>

3) Structure of NFL competition and detailed game statistics

Evaluating the Effect of Emotional Cues

Match police-reported episodes of family violence in cities and counties with a "home" NFL team

Classify games based on the Las Vegas point spread into 3 categories: home team likely to win, opposing team likely to win, or game expected to be close

Key identifying assumption: Outcome of an NFL game is random, conditional on the Las Vegas pre-game spread

Conditioning on spread, any difference in violence following a win or a loss is the causal effect of the game outcome

Test for reference point behavior: Is impact of a loss greater when the home team was expected to win?

Test for asymmetry in utility function: Compare the effects of upset losses and upset wins
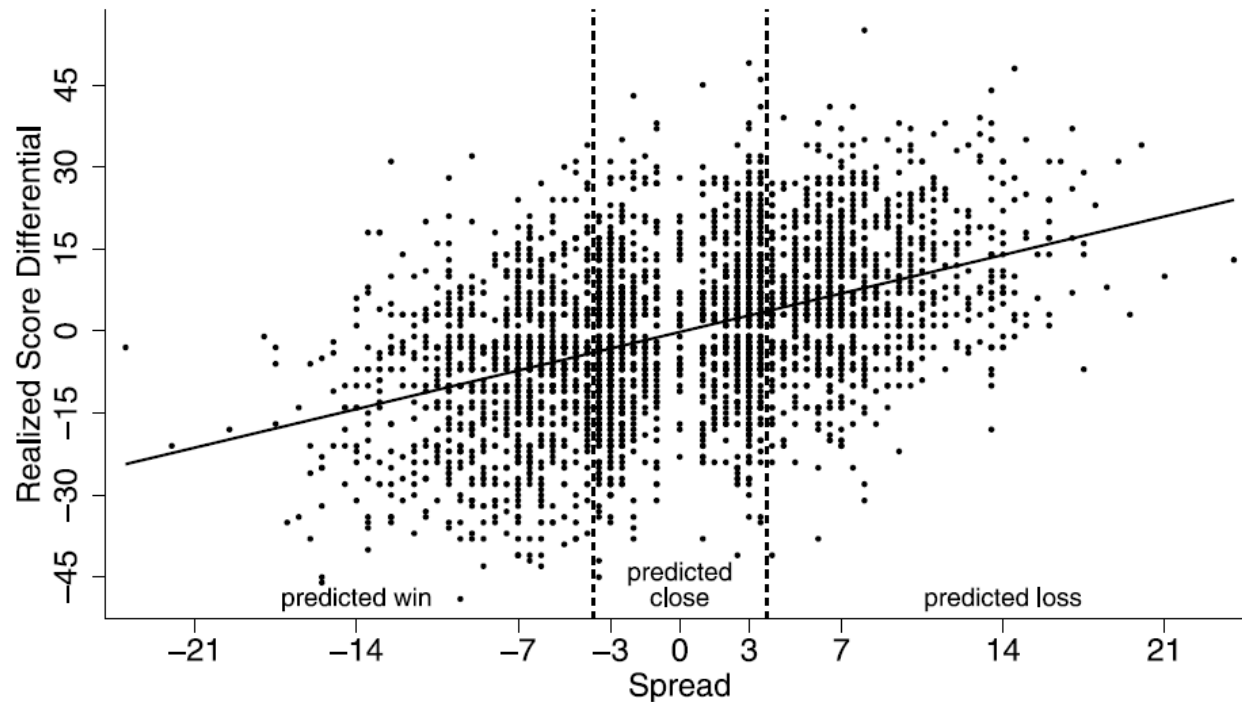
FIGURE II

Final Score Differential versus the Pregame Point Spread
Realized score differential is opponent's minus local team's final score. The plotted regression line has an intercept of -0.17 (s.e. $= 0.21$) and a slope of 1.01 (s.e. $= 0.03$).
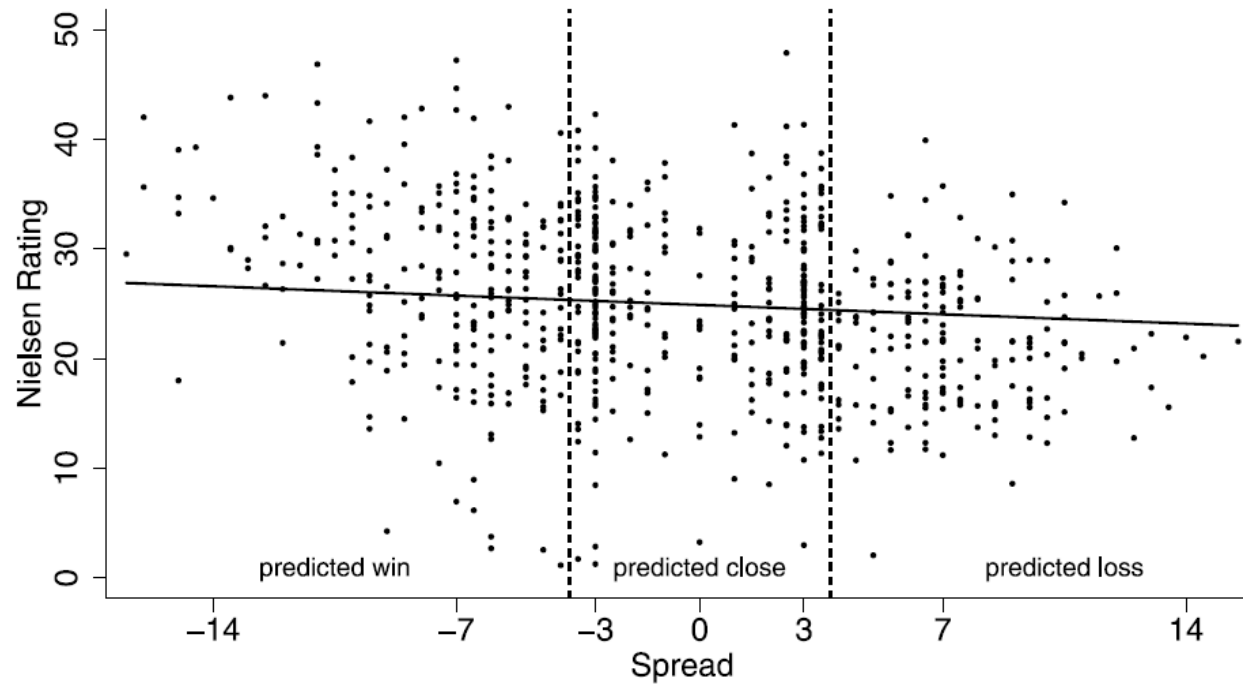
Test of identifying assumption

11

FIGURE IV
Television Audience for Local Games and the Spread

Do people like to watch their team win?

Table 4. Unexpected Emotional Shocks from Football Games and Male-on-Female IPV Occurring at Home.

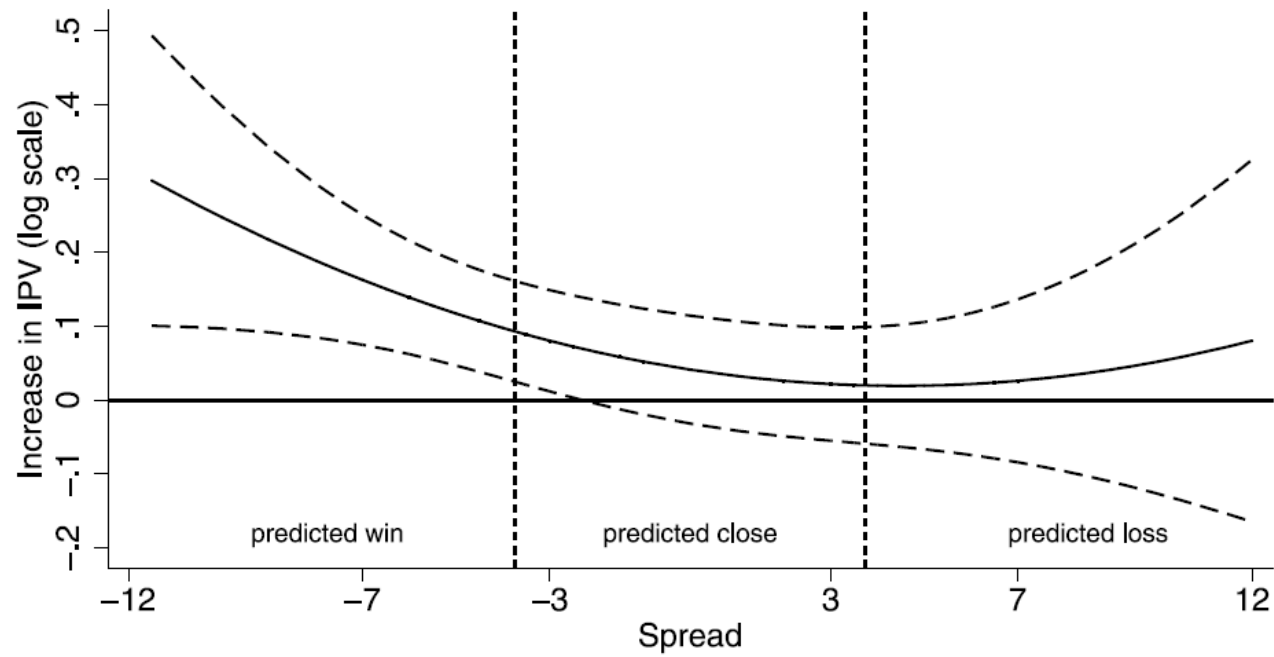|	Poisson Regression Intimate Partner Violence, Male on Female, at Home				
	(1)	(2)	(3)	(4)	(5)
(a) Loss × Predicted Win *(Upset Loss)*	.112	.099	.100	.096	.100
	(.034)	(.032)	(.032)	(.031)	(.031)
Loss × Predicted Close *(Close Loss)*	.031	.030	.032	.025	.026
	(.026)	(.024)	(.024)	(.024)	(.024)
(b) Win × Predicted Loss *(Upset Win)*	.001	.007	.016	.010	.007
	(.037)	(.027)	(.027)	(.029)	(.029)
Predicted Win	-.014	-.019	-.018	-.009	-.081
	(.028)	(.025)	(.025)	(.024)	(.035)
Predicted Close	-.022	-.012	-.013	-.010	-.080
	(.025)	(.030)	(.028)	(.030)	(.043)
Predicted Loss	-.016	-.007	-.016	.006	-.071
	(.023)	(.021)	(.021)	(.021)	(.039)
Non-game Day	---	---	---	---	---
Nielsen Rating					.003
					(.001)
Agency Fixed Effects	X	X	X	X	X
Season, Week of Season, & Holiday Variables		X	X	X	X
Weather Variables			X	X	X
Nielsen Data Sub-sample				X	X
Loss Aversion Test:					
p-value for row (a) = – row (b)	.02	.01	.00	.01	.01
Number of Agencies	764	764	764	747	747
Observations	79,386	79,386	79,386	73,522	73,522

FIGURE V

Differential Increase in Violence for a Loss versus a Win, as a Function of the
Spread, for Highly Salient Games

14

Table 6. Shocks from Emotionally Salient Games.

	Poisson Regression Intimate Partner Violence, Male on Female, at Home			
	Game Type = Still in Playoff Contention (1)	Game Type = Traditional Rivals (2)	Game Type = Sacks≥4, Turnovers≥4, or Penalties>80 yds (3)	Game Type = Highly Salient: (1) & [(2) or (3)] (4)
<u>More Salient Games (Game Type = 1)</u>				
(a) Loss × Predicted Win *(Upset Loss)*	.126	.197	.151	.172
	(.034)	(.046)	(.048)	(.045)
Loss × Predicted Close *(Close Loss)*	.054	.011	.027	.082
	(.031)	(.053)	(.038)	(.046)
Win × Predicted Loss *(Upset Win)*	.027	.156	.083	.063
	(.048)	(.080)	(.040)	(.059)
<u>Less Salient Games (Game Type = 0)</u>				
(b) Loss × Predicted Win *(Upset Loss)*	-.016	.080	.070	.028
	(.080)	(.034)	(.037)	(.041)
Loss × Predicted Close *(Close Loss)*	-.003	.035	.042	.018
	(.030)	(.026)	(.034)	(.028)
Win × Predicted Loss *(Upset Win)*	.002	-.011	-.024	-.004
	(.039)	(.030)	(.033)	(.027)
Non-game Day	---	---	---	---
Salience Test:				
p-value for row (a) = row (b)	.11	.01	.17	.01
Number of Agencies	764	764	764	764
Observations	79,386	79,386	79,386	79,386

Note: Predicted Win, Predicted Close, and Predicted Loss omitted from slides to save space, but are available in the paper.

Updating of the Reference Point

So far, we have focused on the gap between actual game outcomes and fans' <u>pre-game</u> expectations

However, viewers receive new information during a game

Do viewers have rigid expectations or fully rational updating?

Why this matters: If people update quickly, then this will mute the size of a shock which evolves over time. With very quick updating, there will only be micro shocks.

Result: No evidence of reference-point updating based on the halftime score

Summary of Key Empirical Findings

1) When a team suffers an "upset loss" in a regular season Sunday game, police reports of IPV at home by men on women in the local area rise by 10% relative to predicted win

2) Consistent with reference point behavior, there is no significant effect for losses when the game was expected to be close

3) "Upset wins" also have no effect, suggesting an important asymmetry in the reaction to unanticipated losses and gains

Summary of Key Empirical Findings

4) The spike in violence is concentrated in a narrow window after the end of the game (1 pm games vs. 4 pm games)

5) Unexpected losses in more salient games matter more (i.e., traditional rivalry, home team still in playoff contention)

6) No evidence of reference-point updating based on the halftime score

Conclusions

A 10% increase in IPV for an upset loss by the local NFL team, with a 17% increase for highly salient games. Compare this to:

- Christmas day +18%, Thanksgiving +20%, Memorial Day +30%, New Year's Day +31%, July 4th +29%
- 8% increase on hot days (max temp > 80°)

More broadly, our findings provide confirmation of rational reference point formation and suggest that gains and losses have asymmetric behavioral effects

20