



# Frustration, euphoria, and violent crime<sup>☆</sup>



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## ABSTRACT

We exploit a series of natural experiments that use real crime data to investigate the effect of a violation of expectancies on violent crime. We study two types of violation of expectancies that generate the emotions of frustration and euphoria. Our empirical designs exploit differential expectations (as measured by the odds of soccer games in the betting market) while maintaining the outcome unchanged (a loss in a soccer game for frustration, a win in a soccer game for euphoria). We find that frustration is followed by a spike in violent crime whereas euphoria is followed by a reduction in violent crime. The two effects are concentrated in a narrow time window after the end of the game: 1 h.

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## 1. Introduction

When subjects are exposed to a violation of expectancies they experience an emotional reaction. If reality is worse than expected the resulting emotion is called frustration and if reality is better than expected the resulting emotion is called euphoria or elation (Amsel, 1992; Flaherty, 1996). Here, we exploit a series of natural experiments that use real crime data in order to study the link between frustration, euphoria, and violent crime.

The ideal experiment on the effects of frustration and euphoria involves a manipulation of expectations while maintaining the outcome unchanged, an approach that, so far, has been restricted to lab experiments in animals. A typical lab experiment involves two phases. First, subjects in the treated group are trained to respond for a reward of a constant value, creating the expectancy of the same reward in the future. Second, the reward is diminished (frustration) or increased (euphoria) without prior notice, so that expectancies are violated. Finally, the effect of frustration or euphoria is addressed by comparing the behavior of subjects in the treated group to those in a control group that receive the same output but that are not exposed to a violation of expectancies. Under the emotional state of frustration animals show significant changes in physiology (Tranel, 1983; Otis and Ley, 1993; Scheirer et al., 2002; Papini, 2003), neural activity (Abler et al., 2005), and behavior (Crespi, 1942;

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Weinstein, 1981; Vacca and Phillips, 2005). In particular, frustration causes an increase in aggressive behavior for birds (Dantzer et al., 1980), pigs (Duncan and Wood-Gus, 1971), and rats (Tomie et al., 1993), among other vertebrates.

In humans, the potential causal relationship between frustration and aggression (the so called frustration-aggression hypothesis) has been present in the literature of experimental psychology for more than seventy years (Dollard et al., 1939; Berkowitz, 1962). However, the empirical support for this hypothesis is meager (Whitley and Kite, 2010), probably because it is difficult and ethically problematic to induce experimental subjects to behave aggressively (Gottfredson and Hirschi, 1993; Baumeister et al., 2010). To overcome the difficulties faced by lab researchers, we exploit a series of natural experiments that use real crime data in order to explore the link between frustration, euphoria, and violent property crime. Our setup exploits a unique database that includes the exact time of all crimes reported in Montevideo, Uruguay, between 2002 and 2010. We focus on property crime: theft (property crime without violence) and robbery (property crime with violence). We combine these data on crime with a database that includes the results of all soccer games played by the main Uruguayan teams between 2002 and 2010, and with a database that includes the odds in the betting market. The combination of information from the betting market and the actual result of the game allow us to categorize periods as being of predominant frustration, euphoria, or no-surprise. We find that frustration is followed by a spike in violent crime, thus providing empirical support to the frustration-aggression hypothesis. We also find that euphoria is followed by a reduction in violent crime. The spike in violent crime after frustration and the dampening in violent crime after euphoria are concentrated in a narrow time window after the end of the game: 1 h.

There is a vast literature on the impact of incidental emotions (emotions triggered by a prior experience that is irrelevant to the current situation) such as happiness, fear, and anger on decision making (Vohs et al., 2007). Incidental emotions influence how much people help (Manucia et al., 1984), trust (Dunn and Schweitzer, 2005), and are willing to share in an ultimatum or in a dictator game (Andrade and Ariely, 2009). Incidental emotions also influence economic decision making such as risk-taking behavior (Kugler et al., 2012) and pricing of different products (Lerner et al., 2004). We contribute to this literature by providing the first estimates of the effect of the incidental emotions of frustration and euphoria on decision making, in particular on the decision to engage in violent crime.

Close to our approach is the recent paper by Card and Dahl (2011), who explore the relationship between family violence and the emotional cues associated with wins and losses by professional football teams in the US. Under the assumption that outcomes are as random conditional on expectations, they estimate the causal effect of an upset outcome of the game. Their main finding is that upset losses (losses when expected to win) by the home professional football team lead to an increase in police reports of at-home male-on-female intimate partner violence. The estimation of the impact of an upset outcome involves two different things happening together: the impact of the outcome of the game and the impact of a violation of expectancies. Our contribution to this literature is to isolate the impact of the violation of expectancies from the impact of the outcome of the game. We believe this is important, since a violation of expectancies may arise in very different settings and situations that are not necessarily related to sports.

More generally, our findings provide support to Koszegi and Rabin's (2006) prediction that individuals frame gains and losses around a rationally expected reference point (for a review of the literature on the importance of reference points in observed behavior, see Della Vigna, 2009). Our paper is also related to the literature on the link between sports and violence (Sivarajasingam et al., 2005; Gantz et al., 2006; Rees and Schnepel, 2009; Priks, 2010; Quigg et al., 2012).

The paper continues as follows. Section 2 describes the data and presents the statistical methods. Section 3 presents the experimental designs and reports the results. Section 4 concludes.

## 2. Data and statistical methods

### 2.1. Data on crime

The database on crime was obtained from the Police Department of Montevideo and includes more than 835,000 felonies occurred in Montevideo from January 2002 to December 2010 (Montevideo, the capital of Uruguay, has a population of 1.5 million of inhabitants). It comprises the universe of criminal incidents recorded, with information on the date and the exact hour of the incident.

A critical feature of the database is that includes real-time information. The time of the offense is recorded as soon as the crime is reported. Under the usual procedure, the police officer takes detailed information from the victim that includes the time of the incident. Given the precision required for our research, this is a key advantage relative to other sources of crime information such as victimization surveys. Although victimization surveys avoid the usual under-reporting problem of police-recorded offenses, the exact time of the occurrence is generally missed since the victim is asked to recall the details of an event that occurs several months ago.

We focus on property crime, which encompass the two most frequent types of crime: theft and robbery. Theft is defined as depriving a person of property without the use of violence (60 percent of all police-recorded offenses in Montevideo in the period 2002–2010), whereas robbery is defined as depriving a person of property with the use of violence or threat of violence (10 percent of the offenses in our database). Violence is defined as an intentional use of physical force or power.

Summary statistics are reported in Table 1.

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