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Faro: A 19th-century gambling craze

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Abstract

We examine an extinct game of chance known as faro for clues that might help us understand modern gambling. By all accounts, faro has gone from being the most common game of chance and the most common casino gambling game in the United States during the 19th century to being almost nonexistent and nearly forgotten. It is so much forgotten, in fact, that films about the Old West usually show cowboys or miners playing poker. Only recently have images of faro made their way back into movies. We examine why the game was popular, as well as the role of cheats, who likely contributed to its demise. Through a combination of historical records and computer simulations, we evaluate mistaken beliefs about the profitability of the game and find that if played honestly, faro can yield a profit for the casino comparable to other table games. We also explore what lessons we can draw from this game. Of particular interest are the parallels between faro and our modern experience with electronic gambling machines. **Key words**: history of gambling, problem gambling, faro.

Introduction

In our modern age, we can sometimes be lulled into believing that today's society is utterly different from that of the past. In some respects, this is true. There was no 19th-century equivalent of voice mail or Bluetooth connectivity (wireless Internet and telecommunications). But human nature has not really changed all that much.

Today's newspapers and journals run stories about the seductive nature of slot machines, video lottery terminals (VLTs), and other electronic gambling machines (EGMs) (e.g., Green, 2004; Murse, 2004; Dorion & Nicki, 2001; Turner & Horbay, 2004), and most recently with Internet poker. Several articles on pathological gambling have noted the unprecedented growth of the gambling industry in recent years (e.g., Wynne & Shaffer, 2003; Korn, Gibbins, & Azmier, 2003), while others have noted that today's children are growing up as the first generation to be exposed to wide-open gambling (e.g., Gupta & Derevensky, 1998; Stinchfield, 2003). In a recent conference on problem gambling, a speaker asserted that problem gambling was only really an issue with "electronic" forms of gaming.

But gambling has existed for thousands of years. Can we learn about the nature of gambling problems by examining the past?

One hundred and seventy years ago, and more than fifty years before the invention of the mechanical slot machine, the game of choice for gambling in America was not poker, craps, lotteries, or roulette, but faro.

Faro was the mainstay of every important gambling house north of the Rio Grande, and the ruin of thousands who tried to beat it. No other card or dice game, not even poker or craps, has ever achieved the popularity in this country that Faro once enjoyed, and it is extremely doubtful if any has equalled Faro's influence upon American gambling or bred such a host of unprincipled sharpers (Asbury, 1938, p. 6).

According to Briggs (2002), "if you had gone to any American gambling town around the time of the Civil War—and almost *every* town was a gambling town at that time—the most popular game by far would have been faro."

Before the invention of the slot machine, the game of faro held the dubious honour of being the leading cause of premature bankruptcy in America. According to Arnold (1978), it was the most popular game in America in the last half of the 19th century. Faro was by no means limited to the United States, but was a worldwide phenomenon. It was banned in France in 1691, in England in 1738, and in the United States at numerous times (Asbury, 1938). Faro was at least in part responsible for the antigambling riots in the Mississippi Valley in the 1830s that resulted in the lynching of several professional gamblers. But somehow it always reemerged to despoil the next generation of players.

Faro was a casino card game but it was played in a manner quite different from any of the common gambling games available today.

Faro was a "banking" game in which any number of players could play against the dealer or the house, referred to as the "bank." But in the 1800s, there was often no clearcut distinction between the person dealing (or banking) the game and the players. Faro dealers often travelled with their gaming equipment from town to town, setting up their faro banks and often risking their personal fortunes in a saloon for a fee or running a "house" bank in exchange for a piece (percentage) of the action (Howard, 2004). In one kind of gambling venue called a "wolf trap" (Asbury, 1938), anyone could open up a game as the dealer and set the stakes according to the size of his or her bankroll. The house provided the equipment and chips and the dealer provided the bankroll. However, at the same time, casinos in the modern sense of the word also existed at which faro was dealt by professional card dealers.

The game makes its appearance in classic works of art and literature. For example, in Tolstoy's novel *War and Peace*, Dolokhov uses a brace (rigged) faro game to cheat Nicholas into a 43,000 rouble debt with which he hopes to manipulate Nicholas into giving up Sonya. In Tchaikovsky's opera *The Queen of Spades*, the main character is obsessed with finding the secret magic sequence that is guaranteed to win the last turn of the game. Faro also figures prominently in gambling stories of the Old West era. Doc Holliday, for example, was "an itinerant Faro dealer, toting the table apparatus with him wherever he travelled" (Briggs, 2002). It is said that Doc Holliday's principal income for most of his adult life was from dealing and playing faro (Howard, 2004). The game was also the inspiration for the name of the small mining town of Faro in the Yukon Territory of Canada.

Despite this illustrious history, in modern times even references to the game of faro have all but disappeared. For example, books, western films, and serials of the 1940s through the spaghetti westerns and popular western TV shows of the 1970s all disregarded faro in favour of poker (Howard, 2004). Today, it is essentially an extinct game of chance. It is not even mentioned in the current edition of *Hoyle's Rules of Games* (Morehead & Mott-Smith, 2001) nor in any other contemporary "how-to-gamble" book that we have investigated. Even by 1938, Asbury doubted if there were a dozen faro banks in operation in the United States. The game died in the United States during the early part of the 20th century as the temperance movements achieved increasing political power and eventually culminated in the Volstead Act. However, bans on faro and other games began as early as 1902 in New York (Asbury, 1938). Arizona banned the game in 1907 (Howard, 2004). By 1920, gambling had pretty much been outlawed across the nation. Nevertheless, even after the close of the prohibition era, faro's reputation as a fleecing operation for the unwary lingered and this perhaps was what prevented any revival

in customer interest in the game. The fate of faro was not unique. A game called bunco also disappeared around the same time from gambling venues, leaving behind only its name (as in the Bunco Squad) as a lasting reminder of its reputation. In addition, it is likely that the belief that an honest faro game is not profitable also prevents modern casinos from offering the game. About the only reminders that can be seen today of this once preeminent game are on the Internet. One Web site where faro can be played (for entertainment only) is "Wichita Faro" at http://www.gleeson.us/faro (Gleeson, 2004)). The game is also revived or relived at Old West oriented events for nostalgic purposes (see Howard, 2004; http://www.bcvc.net/faro/images.htm). It is not currently offered by any commercial casino that we know of.

The roots of faro

The roots of faro can be traced back to a 15th-century Italian game called "Basset" (Nelson, 2004). Asbury (1938) speculates that its roots go back even further to the game of "Landsquenet" played by Teutonic foot soldiers in the 1400s. It pretty much attained its modern form at the court of King Louis XIV in France (Nelson, 2004; Asbury, 1938; USPC, 2004); however, additional rules continued to evolve throughout the 19th century (Fox, 1882). Legend has it that it received its French name, "pharaoh," because an Egyptian king's face appeared on the backs of the cards (Asbury, 1938). Its English name, "faro," was derived from a misspelling of the word.

Faro was also known as "Bucking the Tiger." According to Asbury (1938), this was because during the 1830s a faro playing kit was often carried in a mahogany box with a Royal Bengal Tiger painted on the cover. Players adopted the tiger as the presiding deity of the game. The name also fits because of the fast pace of the game, the large stakes played, and the devastating losses suffered by some players (and dealers).

The rules for bucking the tiger

Faro was a fairly simple game of cards. Its rules of play had elements of roulette, craps, and baccarat. Like roulette, it used a betting board (called a "layout") where a player would place bets on which number would come up next. The punter could bet on a single number or a group of numbers. All cards were dealt in an invariant sequence of two cards: a loser card followed by a winner card. Each sequence of two dealt cards was called a "turn." A losing turn occurred if a card matching the case (2, 3, A, etc.) that the player had bet on was turned over first. A winning outcome for the player occurred if a card matching the case (2, 3, A, etc.) that the player had bet on was turned over second. If both cards were

the same case (e.g., 2 and 2) as the card the player had bet on, the player lost half his or her bet.

The cards were dealt from a box that is somewhat like the shoe used in baccarat and blackjack, however the cards were face up and visible through a window in the top of the box.. As in craps, a bet was not always resolved on each turn, but could stay on the betting board for several turns until that number came up as either a winner or a loser. Faro was a banked game. As in modern blackjack, a dealer set up the game, dealt the cards, collected the lost bets, and paid off all winning bets. It is one of the oldest banked games. Unlike in blackjack, the player did not try to beat the dealer's hand. Instead, the player bet that a specific number would come up as a winning number before it came up a loser.

The bets were placed on a betting board or "snap" that was somewhat like the betting board for roulette (see Figures 1 and 2). The snap sometimes had folding legs, hence the name "snap." In its most basic form, the faro table was a long rectangle covered in green felt. Glued on top of the felt was a layout of a suit of cards (usually spades) that was arranged in two rows of evenly spaced cards. These cards were then lacquered to protect them from damage during the brisk game play. The A through 6 occupied the row nearest the dealer's side of the table, and the 8 through K were in the row nearest to the players' side of the table. The 7 was on the far end of the rows, midway between the two rows of cards. Figure 1 illustrates the basic layout of the betting board as seen from the player's perspective. Figure 2 illustrates what a faro table might have looked like as seen from the dealer's perspective.

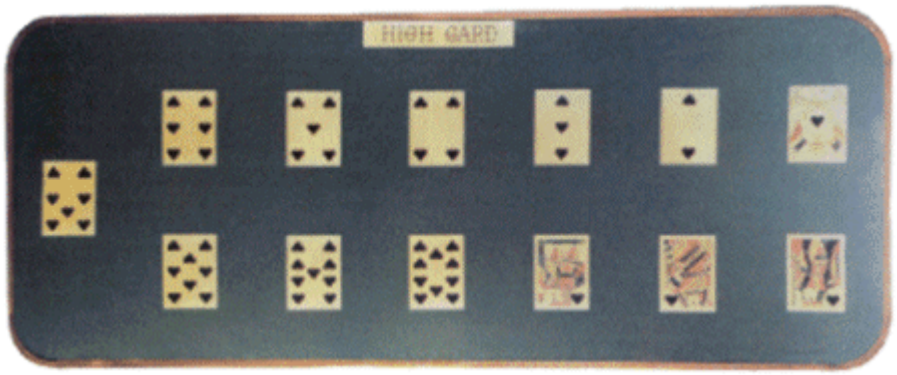

Figure 1
A faro betting board or snap as seen from the player's perspective

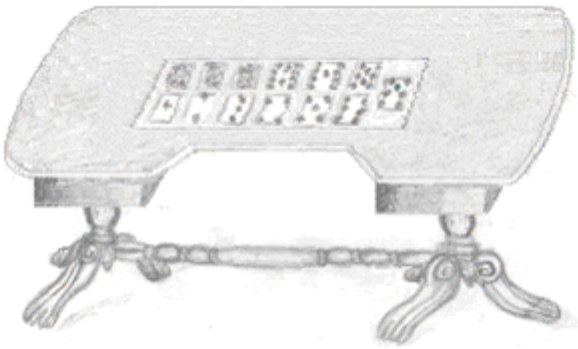

Figure 2
A faro table as seen from the dealer's perspective

Players placed bets on the betting board on what cards would be drawn as winners or losers. Bets on a single number were called flat bets. As with roulette, players could also bet on a group of cards by placing a bet between two or four numbers. A bet placed in the middle of the square made by the A, 2, K, and Q was a bet on the Grand Square. The J, 10, 3, and 4 formed the Jack Square. Numerous other compound bets were possible.

The dealer often worked with two assistants: the lookout and the case-keeper. The lookout paid off and collected all the bets and kept a watchful eye on the players. The case-keeper (also called the "coffin driver") usually sat across from the dealer. He or she kept track of or counted the cards that had been dealt using a device called a case counter or cue box that was similar to an abacus or the score counter used in pool (see Figure 3). The cards were counted so that people would be able to call the turn—bet on the exact order of the last three cards to be dealt. In addition, players would often make larger bets when only a single card of a particular case was left in the deck (see below under "Game of skill or chance?"). Case keeping also made it harder for the dealer to cheat the player. It was customary to tip the case-keeper because accurate case keeping was an advantage to the player, not the dealer (Howard, 2004). The case-keeper was sometimes one of the players rather than an employee of the house. Players also sometimes kept tabs on the game by recording the cards that had been dealt on notepads or special forms designed for that purpose.

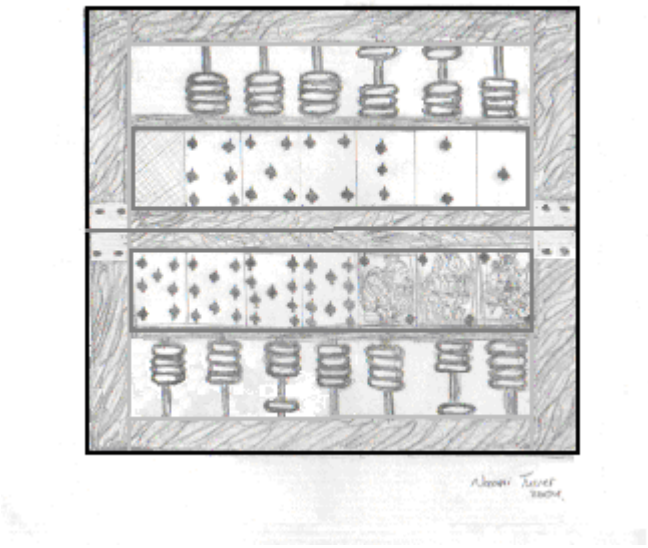

Figure 3
A case counter

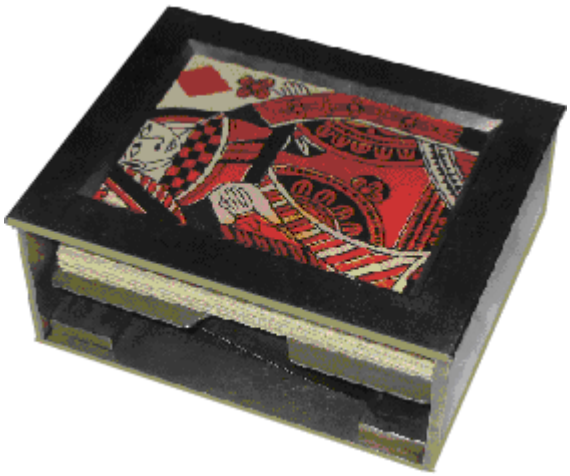

Figure 4
A faro dealing box

The game used a standard 52-card deck with four suits; however, the suits were of no relevance in the game. The dealer would shuffle the cards and place the deck on the table face down. Beginning in the 1820s, the cards were placed face up in a distinctive dealing box (see Figure 4), similar in function to the "dealing shoe" used in modern blackjack. However, unlike the blackjack shoe, it was spring loaded and had an open top and the cards were placed in it in a squared stack, face up. The first card in the deck was called the "soda card" and was a dead card, i.e., neither a winner nor a loser. This is similar to the way the first card in a blackjack shoe or poker deck is "burned."

As in roulette, the check or chip values were generally set by the player at the time of purchase and each player had a unique chip color or design to set their chips apart from the others. If it was a house game, even the dealer may not have been aware of the values being won or lost. The relevance of that becomes apparent when people are playing large stacks of chips. One player's tower of chips may be worth less than one chip of the next player.

Faro shares many features with modern games of chance, but the 13-card layout, case counter, copper tokens, and face-up dealing box are all distinctive items that were only used in faro. While other games may have layouts, shoes, tokens, and counting devices, none are quite like those employed in faro. However, the most distinctive feature of the game was the game play. In a typical lottery and in most other games of chance, winning numbers are drawn. All other numbers lose. But in faro, on each turn, only one winning card and one losing card were drawn. Bets on all other numbers were neither winners nor losers.

Game play

After the bets were placed and the soda card was removed, the first turn began. The second card was revealed and was counted toward the bank; that is, any bets placed on that specific card rank/case were lost to the house. The next card to come up was the "winner" card. Any bet placed on this card won even money (1:1). That means that a person placing a bet of $1 won $1 (and got the original bet back as well). At the time, to make the payout seem more appealing, this was often referred to as "two-for-one" rather than "one-to-one odds."

Each pair of cards (loser and winner) was called a "turn." If the winner and loser cards were the same in any particular turn, the dealer took half the bet from anyone that had bet on that specific card rank, any high-card bet, or any other compound bet that included that card. If a player bet on a case (card rank) that did not come up as a winner or a loser, then the bet normally remained on the board for the next turn. Between turns, players were in general allowed to take back, change, or add to any unresolved bets. However, according to Fox (1882), at some periods in the past dealers required that all bets remain on the board until resolved.

Compound bets

A player could also bet on a combination of cards (also know as a split). A player that bet on the Grand Square would win if an A, 2, K, or Q came up as a winner card, lose if any of those cards came up as a loser. If both the winner and the loser card were in the Grand Square, but were not the same, the bet would be treated as

a push (neither a win nor a loss). However, as with single card bets, if both the winner and loser were the same, the punter would lose half of their bet A bet on the Grand Square or any other compound bet would also pay off at 1:1 if any of the cards in the Grand Square came up as a winner. A compound bet of $1 on the Grand Square was exactly the same as placing four separate $1 bets on the A, K, Q, and 2. This is quite different from roulette, where a compound bet (e.g., a corner bet on four numbers) pays less than a bet on a single number. The negative aspect of compound bets was the increased chance of a split.

Coppering a bet

Beginning in 1853, a player could also bet that a card would come up as a loser (on the first draw of each turn). This is somewhat like making a "don't pass" bet in the modern game of craps. In order to bet that a card would lose, the punters placed a penny (later replaced with a hexagonal copper token) on top of the stakes of betting chips. "Coppering" a bet essentially reversed the bet, allowing it to win on the first (losing) draw and lose on the second (winning) draw. This worked for flat bets, compound bets, and any other wagers allowed on the layout (Howard, 2004). According to Fox (1882), when coppered bets were first introduced, many dealers did not like them because they believed that the reversed bet somehow shifted the odds in the player's favour.

High card

In most games after the 1840s, there was a "high-card" bar across the top of the layout (nearest the dealer). Players who placed wagers on the high-card bar were betting that the winning card (the second card drawn) would be higher than the losing card (the first card drawn). High cards were ranked from lowest (A) to highest (K). This bet could also be coppered to reverse it and bet on the losing card (first draw) being higher than the winning card (second draw). Winning punters were paid off 1:1. This was a popular play, because punters betting on (for or against) the high-card bar got action each turn, while punters betting on single cards or splits might not have gotten any action on their bets for several turns. In later years, some dealers also offered bets on even/odd, rows, and other unusual wagers, each having a specific place on the dealer's layout (Howard, 2004). Thorp (1976) notes that in some variations this particular bet had no house edge.

Betting the turn

When the deck was down to the last three cards, the dealer offered the players an opportunity to "call the turn." This meant betting on the exact order of the last three cards in the deck. Calling the turn

was apparently the most popular bet in the game (Briggs, 2002) and a source of great excitement, often drawing a crowd in the establishment (Howard, 2004). The action in Tchaikovsky's opera *The Queen of Spades* centres around the main character's attempt to find a magic sequence to guarantee winning on the last turn. Its popularity was likely due to the payoff odds of 4:1 and perhaps an illusion of control or skill. Interestingly, the last turn has a much larger house advantage than the other bets.

Fast-paced gaming action

Faro was probably the fastest table game ever devised. As noted above, this was mainly due to its simplicity: unlike blackjack or baccarat, where a minimum of four cards had to be played, in faro only two cards had to be shown for each turn. There were no complicated rules for drawing additional cards as in baccarat; no decisions to hit, stand, or split by the individual player as in blackjack; no waiting for a ball to roll around a wheel as in roulette; and no need to keep track of a player's points as in craps. Craps is also a very fast game, but in addition to the player having to shake, roll, and recover the dice, the dealer often has stop to check over the dice to make sure the player is not substituting loaded dice into the game. In faro, only the dealer handled the cards. With just two cards per turn and many bets not being resolved on each turn, a player making only a single bet might have had to wait several turns before winning. However, the players could have had several different bets on the board at the same time, as is often the case in craps today. The speed of the game was also greatly enhanced by having separate people working as lookout to collect and pay off the bets and case-keeper to keep track of the cards dealt. Based on his experience dealing faro in Old West reenactments, Howard (2004) estimates that, depending on the number of players, faro can be played at a rate of two turns per minute, or two to three times faster than blackjack or roulette. It is likely that the game was even faster when played with experienced gamblers (rather than with tourists, as is currently the case in Old West reenactments). The potential speed of the game is another reason for the name "Bucking the Tiger."

Dead money

In poker, dead money refers to money contributed to a pot by players who are no longer actively involved in the hand because they have folded. In tournaments, it has also come to be used as a term for players who have no chance of winning. In faro, "dead money" would be a good term to describe bets placed on the last card in the deck. The last card was also known as "hoc" and bets made on the last card were said to be "in hoc." One rule variation was that the dealer would claim all money bet on the last or hoc card. This was known as "hockelty" (Fox, 1882). Thus, bets on the

dead card counted for the house (Asbury, 1938, p. 8; Fox, 1882). However, depending on the dealer's preferences or the house's rules, sometimes bets on the dead card could also be grabbed by the first person who noticed that the bet was dead (Briggs, 2002; Carson, 2001). If dead bets could be grabbed by the first player to notice that the bet was dead, this was likely a great source of conflict between faro players. When one considers the number of handheld firearms that figure prominently in stories of the Old West, "dead money" may be a particularly apt term.

Rule variations

Faro was a game played around the world for more than two centuries, and during that time there were various changes in the rules and the types of bets allowed (Howard, 2004). According to Fox (1882), many of these rule changes were a reaction to players or dealers who cheated. For example, the cards were originally held in the hand and dealt from a face-down deck, but with a handheld deck, it was possible to manipulate the game by dealing from the bottom of the deck. The introduction of dealing boxes eliminated this cheat. However, when faro dealing boxes were first introduced, players were suspicious because the original design concealed the cards. It was not until an open-faced, spring-loaded dealing box was designed in 1825 that the box was accepted by players. That box became a standard piece of equipment for the game (see Figure 4). Similarly, the cue boxes that were used to count the cards were introduced in part to prevent the dealer from cheating by drawing two cards at the same time from the box or by stuffing the box with extra cards to increase the chance of a tie. The cue box did not eliminate cheating, but it made cheating more difficult. Coppering a bet, dealing boxes, calling the last turn, hockelty, and allowing bets to be changed or removed are just some of the rule changes that occurred over time.

House edge

Asbury (1938) cites several sources that claim that faro has a small or even nonexistent house edge. As further evidence, he cites the fact that the casinos in Monte Carlo have never offered a game of faro. Other sources that we have found on the Web seem to have a mixed view of the house edge. Estimates range from "very low" to about 2%. Several editorial columns on various gambling Web sites note that it's a pity that the game is no longer available because it had such a small house advantage. At the same time, the lasting reputation of the game is that it was a cheater's game and that the odds were skewed heavily in favour of the house as a result. Asbury (1938) essentially says the game is only profitable if the dealer cheated. However, many people who have heard of the game today believe that players' odds in even a straight faro game

were very poor when compared to contemporary casino games (Howard, 2004).

According to Thorp (1976), the 1962 *Collier's Encyclopedia* lists the edge as at least 4%, but mathematicians believe it to be nearer to 15%. Other sources (as cited by Thorp) provide a wide range of approximations to the edge in faro. Thorp, a well-known mathematician, has also added to the discussion and presents a set of mathematical proofs for various estimates. His analysis produced several different estimates for computing the edge. Thorp's paper is filled with mathematical formulas and is therefore somewhat hard to follow. Our approach was to use computer simulations to explore the house edge in this game.

House edge simulation

In the following section, we investigate the mathematics behind an honest game of faro to see how it compares with modern games of chance. According to Asbury (1938), determining the house edge is very difficult: "Many mathematicians have set their brains to work to discover the exact percentage on Faro, but in every instance have ignominiously failed" (p. 11).

With modern computers, it should be easy to program a simulation that can precisely determine the house edge of any particular game, given a particular set of assumptions. During regular play, the only time the casino had an advantage in faro was on a split—when two identical cards were drawn on a turn; then, the house took back half the bet. For the regular bets on the cards, the house edge came entirely from splits. Once three cards from a particular case were drawn, the player could wager bets without any house edge whatsoever. On the first turn, the chance of a split is 3/50 or 6%. According to simulations, over the course of the deck, the chance of a split is about 5.9%; however, the house only had an advantage if the player bet on the card that split. If a player suffered from all splits, then the player lost money at a rate of 2.94% (see Epstein as cited by Thorp, 1976), but this house edge only applied if the player bet on every card on the board (e.g., a high-card or odd/even bet). This is the theoretical upper limit to the house edge of faro on rank cards. The theoretical lower limit is a house edge of zero that could be obtained if the player only placed a bet on a case card (only one card is left of a particular rank).

All other estimates have to make assumptions about how the player plays. As is shown below, Thorp's (1976) estimates based on one set of assumptions derive one set of house edge estimates, while a different set of assumptions derives a different set of house edge estimates.

Note that we treated all 25 turns in the same manner, but according to some sources flat bets might not normally have been placed on the last turn. In fact if dead bets could have been claimed by the dealer (hockelty) or any other player, it would have been very foolish to make any flat bet on the last turn. In this simulation, we have computed the cost of flat bets and hockelty separately.

We conducted a number of simulations of the game to attempt to determine the house edge. We found that the number of simulations needed was very large because the volatility of the game made it difficult to measure the house edge accurately. As a result, we ran a simulation of 1 million decks and 25 million turns of the cards. This number, however, exceeded the repeat cycle of the random number generator (RNG) (16.7 million) we were using to conduct our simulations, so we had to construct a separate RNG (based on Wichman & Hill, 1982), which we used to randomly sample from the computer's RNG. Note that we did not use the Wichman and Hill generator itself. We used it to sample from the computer's RNG. Depending on the value generated by the Wichman and Hill generator, the computer would skip between zero and five RNG numbers. The computer would thus generate a different set of numbers each time it passed through the repeat cycle of the computer's RNG. An analysis of the net result found no repeats, runs, biases, subcycles, or other deviations from a random distribution after going through several billion numbers.

Results

Randomly selected flat bets

For flat bets, the computer was programmed to search for a card that was still alive (at least one card left in the deck) but not to preferentially look for case cards (only one card left in the deck—no chance of a split). A bet on a single number is often called a flat bet. Each deck consists of 25 turns, so in total our simulation played out 25 million turns of the cards. A bet remained on the board an average of 4.4 turns before being resolved as a win, a loss, or a split. The simulated player made a total of 5,673,873 resolved bets. The simulated player's bets were resolved by a split 3.8% of the time. On each split the simulated player lost half of its bet. Betting at a rate of $1 per turn, the player lost a total of $109,964. Table 1 lists our various estimates of the player's expectation in a game of faro, including random betting, selecting the soda card, and strategic betting.

The house edge percentage on flat bets, however, depends on how it is measured. With blackjack, slot machines, and lotteries, a bet in which you neither win nor lose (a push, breaking even, and winning a free ticket, respectively) is counted in the payback to determine the total house edge. In craps, however, a bet is not

counted until it is resolved as either a win or a loss. The problem with the house edge in faro is that a bet will stay unresolved on the board for an average of 4.4 turns until it is resolved as a win, a loss, or a split. The house edge depends on how we treat the unresolved bets. If we use blackjack as our model and treat an unresolved bet as a push, then the house edge in faro is equal to $109,964 divided by the total number of turns (25 million) or 0.44%. This is indeed a small house edge. However, if we use craps as our model and only count the payback on a bet after it is resolved one way or the other (win, loss, or split), then the house edge equals $109,964 divided by 5,673,873 resolved bets or 1.94%. Since an unresolved bet can neither win nor lose, it seems that craps is the more appropriate model for the game.

The edge we've computed, 1.94%, is larger than the edge for passline bets in craps (1.4%), banker or player bets in baccarat (1.17% and 1.37%, respectively), and even-money bets on a European roulette wheel (1.3%). It is also higher than blackjack and some video poker games when played with an optimal strategy. However, this estimate of the house edge in faro is smaller than that realized in Caribbean stud poker, American roulette, and most slot machines (for more information on the house edge of various casino games, see Wong & Spector, 1996; Cardoza, 1997). Thus, faro, on average, does not offer better odds than other games. However, a unique feature of faro is that there are circumstances in which a gambler may place bets without any house edge whatsoever (see "Game of skill or chance?" section below).

Fixed bets: One bet per deck

Thorp (1976) provides a number of different estimates for the house edge based on different assumptions: –1.5% for the soda card, –2.02% for an unsoda card, and –1.98% for a randomly selected card. These estimates are based on picking a card to bet on and then playing it only until the bet is resolved. Our first simulation had the player randomly placing a bet for every turn, and the result equalled the situation of betting against the soda card. Our simulation of faro based on Thorp's assumptions came very close to his calculations.

Fixed bets for the entire deck

We also simulated what would happen if the player continued to bet on the soda or unsoda cards until the end of the deck. Much to our surprise, we found that the player is in fact better off selecting a card and sticking to it for the entire deck than randomly changing bets after each play. Continuing to bet on the soda resulted in a player expectation of –1.006%, while betting on any other fixed card resulted in a player expectation of –1.56%. (Note that these

figures roughly match Thorp's (1976) calculations on page 455 for fixed bets for *m* = 3 and *m* = 4, respectively.) This analysis also revealed that playing the soda card to the end of the deck results in a lower house edge (1.0%) than cashing in after one resolved bet (1.5%) and a much lower edge than placing random bets (1.9%).

Optimal bets

Modelling an optimal strategy in a game with a negative player expectation is a little absurd because in truth the optimal strategy is not to play at all. Nonetheless, we also modelled in the result of strategically selecting cards with the lowest number of cards remaining in the deck, but maintaining the same size bet. In this case, the house edge was 0.195%. The house edge for optimal bets is lower than in any game currently available in a casino. A lower percentage could be achieved if the players increased their bets after case cards became available (one card of that rank left in the deck). Using a variable bet strategy, Thorp (1976) argued that the lowest bound possible for the edge in faro games is less than 0.0006%. However, it should be noted that faro dealers were aware of this strategy and countered it with a lower maximum bet on case cards than on doubles (e.g., Asbury, 1938, p. 447). For example, a player was allowed to bet $10 on doubles (two cards left in the deck) but only $5 on singles (one card left in the deck).

Table 1
Estimates for the house edge in faro based on playing through the entire deck of cards (25 turns with no hockelty)

	Net loss	Resolved bets	House edge
1. Random flat bets on live cards	–109964	5673873	–1.9382
2. One bet per deck	—	—	—
– Soda bets	–15066	1000000	–1.5066
– Unsoda bets (not on the soda card)	–20024.5	1000000	–2.0025
– Bet on randomly selected card	–19955.5	1000000	–1.9956
3. Bets on every turn	—	—	—
– Bet on soda card left on until all cards are drawn	–29002	2883910	–1.0058
– Bet on unsoda until all cards drawn	–59683	3805473	–1.5687
– Fixed flat bet on any card until all cards drawn	–56254	3735210	–1.5064
– Bet on rank with fewest remaining cards	–7048.5	3617485	–0.1951

Compound bets

As stated above, as in roulette, the player has the option of betting on two cards at a time or a square of four cards (e.g., the Grand Square—K, Q, A, and 2). Howard (2004) calls these "split bets," but we will use the term "compound bets" to avoid confusion with the situation when both the winner and the loser card are the same case, which is referred to as a split. As with any other game, a bet on a combination of cards increases the frequency of bet resolution (wins and losses). A win on any card within a compound bet pays off the full amount (1:1). However, the most interesting aspect of compound bets in faro is that they make the chance of a split more likely. For example, suppose a player places a bet on the Grand Square. The player wins even money if the K, Q, A, or 2 comes up as a winner; loses if K, Q, A, or 2 comes up as a loser; and splits if any of these four ranks splits. In our simulation, compound bets were only placed if all of the numbers were live (at least one card left for each member of the compound).

The results of the simulations with compound bets are shown in Table 2. After 1 million decks of cards, the simulated player betting on the Grand Square had a net loss of $124,141.50 and 7,757,699 resolved bets, which translated into a house edge of 1.6%. Betting on an entire row produced a house edge of 1.79%. A fixed bet on the Grand Square had a slightly higher house edge (1.6%) than a fixed bet on a randomly selected card (1.506%), but the actual dollar losses during the simulation ($124,141.50) were more than twice as great as the fixed bet on a single number ($56,254). A bet on the Grand Square resulted in a greater loss than even a randomly selected card ($109,964). This is because the Grand Square bet is resolved more often and the multiple cards mean that the chance of a split is greater.

We also computed the effect of randomly varying which square (e.g., A-K-Q-2, Q-J-2-3, J-10-2-3, etc.) or which row (A-2-3-4-5-6 or 8-9-10-J-Q-K) was selected. Varied compound bets led to a slightly lower house edge than fixed compound bets (e.g., 1.57 vs. 1.60) but a larger actual loss (e.g., –$143,099 vs. –$124,141). What is interesting here is that randomly selecting compound bets had the opposite effect of randomly selecting flat bets. This is because the search algorithm for random compound bets placed bets on compound bets that were still live (at least one card was left for each rank). This algorithm resulted in a greater number of compound bets being placed for combinations that included case cards compared to fixed compound bets. The larger actual losses, however, are also due to the fact that more bets were placed.

Another type of compound bet, the high-card bet, had the virtue of being resolved on every turn. According to our simulations, the high-card bet had a house edge of 2.95%. Note that, according to

Thorp (1976), the high-card bet sometimes was available with no house edge (splits were treated as a push).

Calling the turn

The actual probability of correctly calling the exact order of the last three cards is 1 in 6 because there are six possible combinations with the three cards. However, the payback for a win was four for each unit bet (plus the player gets his or her bet back), meaning that on average for every six bets made, the player would get back five units, for a payback percentage of 5/6 or 83.3% or a house edge of 16.66%. However, if two of the last three cards were the same case, quaintly called a "cat hop," the payback for correctly calling the last turn would only be 2:1. Since there are only three possible combinations of three cards when two are the same, a payout of 2:1 has no house edge. The net result when we factor in the occasional cat hop is that a bet on the last turn netted the dealer a 13.9% house edge. If all three cards were the same rank, it was called a "case" and no bets were taken. Some variations of the game rules allowed the players to bet on which of the last three cards was the odd colour (e.g., with two reds and one black, should that black card come up first, second or third). This bet was identical to the cat hop and had no house edge, however in our simulation, "calling the turn" was skipped if all three were the same.. A player who made random flat bets throughout the game and then called the turn would be playing up against a net house edge of 3.7% ([–109,964 + (–138,831)]/(5,673,873 + 997,566)). Using this same figure for the turn, we can estimate that a person pursuing an optimal strategy, who then also bets the turn, would have a net house edge of 1.75% ([–109,964 + (–7048.5)]/ (5,673,873 + 997,566)).

Table 2
Estimates for the house edge for compound bets in faro based on playing through the entire deck of cards (25 turns with no hockelty)

	Net loss	Resolved bets	House edge
Grand Square (fix 4 cards)	–124141	7757699	–1.600
Fixed row bet (6 numbers)	–173564	9680315	–1.793
Random square bet (4 cards)	–143099	9114807	–1.570
Random row bet (6 numbers)	–195423	10982080	–1.779
High card (13 numbers)	–738370	25000000	–2.954
Last call	–138831	997566	–13.917

Summary: The house edge for various bets

From this analysis, the house edge in faro clearly depends on how the game is played and the rules that are applied. Assuming that the player wants to place a bet on each turn of the cards until the end of the deck, the relative values of different betting strategies are as follows: The best bet is always to bet the rank with the fewest remaining cards in the deck. After that, the next best bet is a bet on the soda card until the card is dead. Third best is to randomly select a number at the beginning of the game and play that number until it is dead. A close fourth place goes to betting on a card other than the soda and keeping to it until the end of the game. Fifth place is one of the compound bets such as the King Square or a row bet. Sixth place is to randomly select a card on each turn. Seventh place is the high-card bet. Finally, the worst bet in a fair game of faro is to call the turn.

Dead money

In our simulation, a total of $277,663 in random flat bets was left on a dead card during the last turn. If dead bets went to the dealer, then the house edge on a flat bet placed when only three cards remained in the deck would be a house edge of approximately 31.3% according to our simulation. However, the true value of a dead bet is difficult to determine because it depends on how often people placed or left flat bets on single numbers during the last turn. It also depends on the rules of a particular game. A flat bet on the last turn has nearly a one in three chance of being in hoc (a bet on the second to last turn has a one in five chance of being in hoc). If the cost of dead bets is added to the cost of random flat bets, a person making random bets on a table where the dealer collected all dead bets would in fact be playing against an estimated house edge of 6.2% ([–109,964 + (–295949)]/(5,673,873 + 887,848)). If the dealer claims hockelty and does not allow the removal of unresolved bets, then the player's best option is to stop betting several turns before the end of the deck.

Ignoring dead bets or the last call, the house edge in the game of faro has an upper limit of 2.95% (high-card bet) and a lower limit of 0% (zero-edge bets). But the exact value depends on the assumptions one makes. Random bets yield a relatively high house edge of 1.9%, a fixed bet on a randomly selected card yields a lower house edge of 1.5%, and a fixed bet on the soda yields an edge of only 1.06%. The drop in edge from one situation to another is related to the reduced chance of a split when betting on a card that has already come up. When the computer randomly changed cards after a resolved bet, it increased its exposure to splits. Compound bets similarly increase the player's chance of a split compared to a single flat bet. The game can be played without any house edge at all. However, assuming that gamblers want to play

continuously (and not wait for a case card to occur), the best strategy—selecting the rank with the fewest remaining cards—yields a very small house edge of 0.195%. However, note that the amount of action (resolved bets) is highest for high-card bets and random bets and is lowest for a fixed bet on the soda card and optimal bets. Excluding last turn and Thorp's (1976) one-bet estimates (which are based on only one resolved bet per deck), the relationship between resolved bets and house edge is $r(12) = .80$, $p < .01$. A player looking for a lot of action may not select the best strategy.

The confusion over the house edge in faro likely has to do with (a) how the house edge is computed (all bets or only resolved bets), (b) different assumptions about betting (e.g., sticking to one card or changing cards), (c) the strategy of the player, (d) the type of bet placed (e.g., flat bets, last turn, high card), (e) rule variations related to dead money and hockelty, and (f) the number of bets considered (first bet or on bets throughout the deck). There is no single house edge for faro because the edge depends on how the game is played.

Game of skill or chance?

Faro was a game of pure chance. However, the player was actively involved in making decisions about which card would come up as a winner or a loser and the order of the cards for calling the turn. It is likely that the design of the game of faro created a strong illusion of skill. Tchaikovsky's opera *The Queen of Spades* is about a man who believes there is a secret skill to calling the turn.

Although there is no real skill involved in playing faro, there are two circumstances in which a player can bet without any house edge at all. One is the cat hop, when two of the last three cards are the same; the other occurs when three cards of a particular case have been turned, so that a split is no longer possible and a straight (flat) bet is placed on that card. If the game is played strategically, an astute player can eliminate any house edge by only playing under these circumstances but cannot achieve a long-term win in the game. Such strategic play, however, does not qualify as skill because there is no real learning process of gradual improvement in ability. To play optimally, a person simply has to place bets only on case cards and cat hops.

The modern game of craps also has one type of bet that has no edge: the free-odds bet. However, a free-odds bet can only be placed after an initial pass or come bet point has been set. Unlike the free-odds bet, a bet on a case card or a cat hop did not require first making another bet. The only other means of playing without a house edge in a casino is to play in a game with a considerable

degree of skill (e.g., blackjack, poker).

Cheating

Because of faro's simplicity, it was quite easy to cheat at the game. Simply drawing the second card or the bottom card instead of the first could shift the game strongly in the dealer's favour. Because the cards never left the hands of the dealer, the dealer most often did the cheating. According to Asbury (1938) and every other source we have looked at, faro games were most often run dishonestly. Asbury outlines numerous ways in which games of chance were rigged to provide the "professional gambler" with a certain edge over the "suckers" that played. Dealers often roughed up the back of a card with sandpaper or stripped off the edges of certain cards to help them tell the cards apart while they were being shuffled or when they were in the dealer's box. By using these techniques they could control which cards were winners and which were losers. Various other methods were devised to ensure that the house would win. Many dealing boxes were rigged so that the dealer could tell what cards were coming up. Others had special levers or plates that made it possible for the dealer to draw two cards at a time, thereby shifting the sequence of a stacked deck in a manner most advantageous to the dealer. Collectors of antique gambling paraphernalia note that dishonest dealing boxes were quite common (Howard, personal communication).

In some cases, according to Asbury (1938), first-class casinos ran "square" (honest) games unless a large bet was made or the player had been excessively lucky, in which case the dealer would be instructed to "protect the house." In other "skinning houses" or "brace houses," the casinos pulled out all the stops to ensure that they took the players' money as quickly and efficiently as possible.

The amazing thing is that the game remained popular long after it had become widely known as a "cheater's paradise" (Briggs, 2002). He explains the tolerance of cheating as follows:

> Partly it's the simple psychology of communal betting. You get the same atmosphere at a Craps table, where people throwing money down on a table, sometimes betting on the same numbers together, can produce a sort of temporary group madness. It's also a *fast* game. You don't really have time to grieve over your losses. And as time went on, the casinos added a few proposition bets to the table as well—you could bet odd/even, for example, or you could bet that the next card would be higher or lower than a certain number. The cumulative effect was to make it a very lively, very noisy, very social game. The Blackjack table is a

snoozefest by comparison.

The intense social environment of faro is illustrated in Figure 5. Figure 6 shows a modern faro game offered at an Old West reenactment (see also http://www.bcvc.net/faro/images.htm). As the photos in Figures 5 and 6 demonstrate, faro had the power to rivet the attention of all onlookers as the next turn's outcome was anticipated.

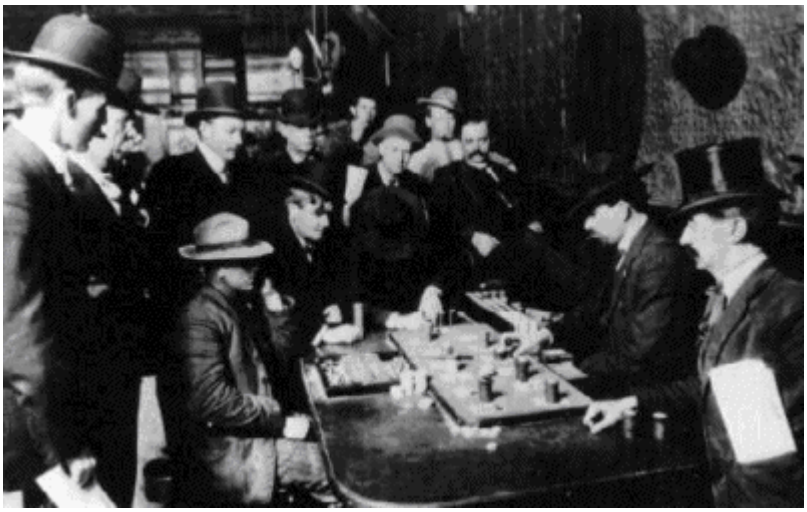

Figure 5
The social environment of faro: "The Faro Game"
By Camillus S. Fly, Orient Saloon, Bisbee, Arizona, circa 1900

Figure 6
A modern game of faro at an Old West reenactment with the second author as dealer

The players were often not innocent either. Some players used horsehair or silk thread tied to a chip at the bottom of a stack so

that after a card had been turned they could subtly move their bet onto the winning number. This tactic was also used with copper tokens to remove the token from a bet if it did not lose on the first draw. The lookout's main job was to keep an eye on the players. It is likely that many of the players who persisted in trying to beat the tiger were trying to outsmart or outcheat the dealer.

Another reason for the game's continued popularity in spite of the cheating was that dealers and gambling establishments incorporated a number of measures into the game to give the illusion of propriety. By all appearances, faro must have been a relatively honest game. The open-faced dealing box, case-keeper, coppered bets, and other rules (see Fox, 1882) restricted the amount of cheating by the dealer. Dealers and players, however, found ever-newer methods of cheating, but these methods provided only a relatively small added advantage compared to an honest game. For example, an extra card in a two-card dealing box (one that allows the dealer to draw two cards, thereby shifting the order of a stacked deck) provides the dealer with one or two turns in which he could make a score (Fox, 1882). In contrast, in poker, card mechanics could cheat by dealing themselves (or a confederate) good cards from the bottom of the deck every time they dealt, though smart ones would have strung along their marks to achieve a larger payoff (see Blackbridge, 2004; Twain, 2004). Similarly, a three-card monte or thimble rig thrower can cheat on every deal by plain sleight of hand (see Asbury, 1938, for further comments). The restrictive equipment and rules built into the game of faro likely helped sustain interest in the game by providing punters with some confidence in the security and veracity of the game.

However, it is important to note that the selling point of many of the first-class casinos during the last decade of the 19th century was their outward appearance of honesty and impeccable integrity. Canfield, who ran very popular and successful first-class casinos in New York during the 1890s, is well known for arguing that it is "unnecessary for a gambler who ran banking games to use crooked paraphernalia" (Asbury, 1938, p. 419) because the house advantage was sufficient to guarantee profit. This renewed emphasis on an honest game in the 1890s might have been an attempt to counter the growing negative view of gambling held by the general public. It was ultimately unsuccessful, and the antigambling movement, fuelled by corruption, scandals, and a rising temperance movement, grew in strength and eventually led to the widespread prohibition of gambling in the early 20th century.

Although the cheating in faro did not seem to affect the popularity of the game during the 19th century, the lasting reputation of the game is that it was a cheater's game and that the odds were skewed heavily in favour of the house. As we have illustrated in this

paper, however, the house edge compares well with many modern games of chance.

From the casino's point of view, however, the game might be seen as potentially unprofitable because it can be played with no house edge at all. Epstein (1976) attributes the game's demise to the small house edge if the game is played optimally. However, Canfield's casino was apparently very profitable (see Asbury, 1938), yet he is famous for claiming to run honest casinos. People were apparently aware of the lack of an edge on a case card because the casinos protected themselves by imposing a smaller betting limit on "singles." Perhaps the players were not playing in an optimal manner or perhaps the casinos were saved by gamblers ruin (if two people persistently play a game, the person with the smaller bankroll is most likely to lose in the long run; Weisstein, 2005).

Nonetheless, a simple rule change to require bets to remain on the board until resolved or converted into a call of the turn would guarantee a profit even if the players only made bets on case cards (e.g., a house edge of 1.75% per resolved bet was computed assuming an optimal strategy plus last turn).

What does faro teach us about modern gambling?

Faro was a popular game and appears to have been very addictive, based on historical accounts. How addictive the game was is impossible to measure. Fox (1882) estimated that there were more than 300,000 faro players in the United States at that time and that two thirds could be called regular players. However, Fox does not explain how he derived this estimate. Prevalence research on pathological gambling did not exist at the time, so we have no definite idea of the extent of problems related to faro. However, given that the game was at least in part responsible for antigambling riots during the 1830s, we can surmise that problems were quite common.

Despite its demise and loss of status as the gambler's game of choice, faro's lessons are strikingly contemporary and help us understand many of the phenomena associated with gambling today. In particular, there are interesting parallels between faro in the 19th century and EGMs of today (see Turner & Horbay, 2004, for a lengthy discussion of EGMs):

1. Speed is important. Faro could be played very quickly. With faro, the emotional roller coaster of winning and losing could be compressed into a single turn of the cards. The speed of the game likely contributed to its popularity and to the gambling problems associated with it. Speed has also been

implicated as a key feature of today's problems with EGMs.

2. The social aspect of the game did not protect people from problematic play but may have contributed to the problem. The electrified social environment surrounding a faro game may have served to blunt any cautious appreciation by players of their losses. EGMs are generally seen as nonsocial games and the lack of social context is believed to contribute to the problem. The lesson from faro is that a social context does not prevent problems.

3. Knowing the odds is not enough. Faro remained popular long *after* it became known as a cheater's paradise (Briggs, 2002). If faro continued to be popular in spite of the well-known and widespread cheating, how can we hope to combat problem gambling with information about the odds of a game? With faro, the challenge was to outsmart the dealer or keep him or her honest. Today, gamblers believe they can figure out how to beat the odds by playing a system or looking for machines that are due. This is not to say that the odds should not be made public, but that we should not expect too much from a full disclosure of the odds. What is needed perhaps is greater public access to information on the real meaning of a house edge as it applies to the players—that in the long term the player cannot beat the odds.

4. Our modern age is not the first age of widespread gambling. There was a time in America when a game of faro could be found in nearly every saloon in every town. Just after the American Civil War, Washington, DC, apparently had 150 gambling dens of various kinds (USPC, 2004), and, in 1855, the mining town of Columbia, California, boasted a population of over 15,000 with 40 saloons hosting 143 registered faro banks (Howard, 2004). Today, EGMs are approaching that same level of availability and now make up a large percentage of problematic gambling (Dorion & Nicki, 2001; Rush, Moxam, & Urbanoski, 2002; Smith & Wynne, 2004).

5. Deception in the form of cheating was apparently a common part of the faro game, but faro equipment and rules such as card boxes and coppered bets were designed to give the gambler some confidence in the veracity of the game. Today, EGMs do not cheat their customers per se, but features such as weighted virtual reels, larger numbers of winning symbols on the first two reels, multiple betting lines, and numerous small prizes are used to give the player the illusion that the odds are better than they really are (see Turner & Horbay, 2004, for a lengthy discussion). Faro equipment in part served the same purpose—to give the player an illusion that the game was more honest than it really was.

6. The changing availability of gambling from prohibition to wide open and back to prohibition holds a cautionary lesson for the gambling industry and anyone who depends on it for their livelihood. The gambling industry's existence has historically depended on the mood of the general public toward gambling. In the 1830s and again toward the end of the 19th century, both moral panic (Cohen, 2002; Turner, 2005) and outrage over gambling-related corruption resulted in a backlash that led to a ban on gambling. There are signs today of growing negative attitudes toward EGM gambling (e.g., Green, 2004; Shiflett, 2002; Pinkerton, 2003; Murse, 2004). Judging from the fate of faro, odds are that if the industry does not take steps to avoid problems, the cycle may turn once again to prohibition (see Rose, 1986, for comments). However, antigambling groups should take comfort in this historical lesson: casinos and even specific games of chance do not last forever.

7. Political corruption, problem gambling, and antigambling movements are not new phenomena. Similarly, the struggle between pro- and antigambling forces has been played out many times in the past. Today, the struggle is over slot machines, VLTs, and Internet gambling; 150 years ago, it was over the rapid turning of cards.

Faro was more than a mere card game; it was a social phenomenon, many of the features of which were to be repeated later in the 20th century. The prospect it held out of apparently quick and effortless winnings conferred a power to corrupt. The dealers, the gambling establishments, the players themselves, and the local authorities were not immune to its temptations. Corruption in the gambling industry (lotteries, casinos, etc.) triggered a backlash against gambling during the 1830s and again around the turn of the 20th century and resulted in widespread prohibition. Perhaps faro's essential lesson is that we need to carefully scrutinize any gambling phenomenon that begins to show these telltale characteristics.

References

Arnold, P. (1978).
The encyclopedia of gambling: The games, the odds, the techniques, the people and places, the myths and history. Glasgow: Collins Publishers.

Asbury, H. (1938).
Sucker's Progress: An informal history of gambling in America. New York: Thunder Mouth Press.

Blackbridge, J. (2004).

Frauds in playing and poker sharps. In J. Stravinsky (Ed.), Read 'em and weep: A bedside poker companion. New York: HarperCollins Publishers. (Reprinted from The Complete Poker Player, 1880.)

Briggs, J.B. (2002).
The ghosts of faro. The Vegas Guy. Retrieved January 20, 2006, from http://www.joebobbriggs.com/vegasguy/vg20021210.html

Cardoza, A. (1997).
How to win at gambling. New York: Cardoza Publishing.

Carson, B.C. (2001).
The soldier's respite. Retrieved January 20, 2006, from http://www.shasta.com/suesgoodco/respite/

Cohen, S. (2002).
Folk devils and moral panics (3rd ed.). London: Routledge.

Dorion, J.P., & Nicki, R.M. (2001).
Epidemiology of problem gambling in Prince Edward Island: A Canadian microcosm. *Canadian Journal of Psychiatry, 46*, 413–417.

Epstein, R. (1976).
Theory of gambling and statistical logic (Rev. ed.). New York: Academic Press.

Fox, R. (1882).
Faro exposed, the gambler and his prey. New York Police Gazette.

Gleeson, S. (2004).
Wichita Faro. Retrieved January 20, 2006, from http://www.gleeson.us/faro/

Green, R. (2004, May 11).
Upping the ante. Hartford Courant, pp. A1, A8, A9.

Gupta, R., & Derevensky, J.L. (1998).
Adolescent gambling behavior: A prevalence study and examination of the correlates with problem gambling. *Journal of Gambling Studies, 14*, 319–345.

Howard, M. (2004).
Bucking the tiger—The traditional game of faro. Retrieved January 20, 2006, from http://www.bcvc.net/faro/

Korn, D., Gibbins, R., & Azmier, J. (2003).
Framing public policy towards a public health paradigm for gambling. *Journal of Gambling Studies, 19*, 235–256.

Morehead, A.H., & Mott-Smith, G. (2001).
Hoyle's rules of games. New York: New American Library.

Murse, T. (2004, June 29).
Slots would "exploit" elderly and poor, GOP officials claim here. *Lancaster Online.* Retrieved January 20, 2006, from http://www.lancasteronline.com/pages/news/local/7296

Nelson, W. (2004).
Faro. The gentleman's page: A practical guide for the 19th century American man. Retrieved January 20, 2006, from http://www.lahacal.org/gentleman/faro.html

Pinkerton, S. (2003, June 18).
Liz's Story. *The Adelaide Advertiser*.

Rose, I.N. (1986).
Gambling and the law. *Los Angeles: Gambling Times*.

Rush, B., Moxam, R.S., & Urbanoski, K. (2002).
Characteristics of people seeking help from specialized programs for the treatment of problem gambling in Ontario. *Electronic Journal of Gambling Issues, 6*. Retrieved January 20, 2006, from http://www.camh.net/egambling/archive/pdf/EJGI-issue6/EJGI-issue6-complete.pdf

Shiflett, D. (2002, July 1).
Video poker, flushed: Or, the rotting of a "fruit machine." *National Review*. Retrieved January 20, 2006, from http://www.findarticles.com/p/articles/mi_m1282/is_12_54/ai_87130364

Smith, G.J., & Wynne, H.J. (2004).
VLT gambling in Alberta: A preliminary analysis. Alberta Gambling Research Institute. Retrieved January 20, 2006, from http://www.abgaminginstitute.ualberta.ca/20.cfm

Stinchfield, R. (2003).
A comparison of gambling by Minnesota Public school students in 1992, 1995, and 1998. *Journal of Gambling Studies, 17*, 273–296.

Thorp, E.O. (1976).
Probabilities and strategies for the game of Faro, in W.R. Eadington (Ed.), *Gambling and Society* (pp. 443–466). Springfield, IL: Thomas Publishers.

Turner, N.E. (2005).
A review of Sucker's Progress: An informal history of gambling in America by Herbert Asbury, 1938. *Journal of Gambling Issues, 13*. Retrieved January 20, 2006, from

http://www.camh.net/egambling/archive/pdf/JGI-Issue13/JGI-Issue13-turner.pdf

Turner, N.E., & Horbay, R. (2004).
How do slot machines and other electronic gambling machines actually work? *Journal of Gambling Issues, 11*. Retrieved January 24, 2006, from http://www.camh.net/egambling/issue11/jgi_11_turner_horbay.html

Twain, M. (2004).
The professor's yarn. In J. Stravinsky (Ed.), *Read 'em and weep: A bedside poker companion*. New York: HarperCollins. (Reprinted from Life on the Mississippi, 1882.)

USPC (United States Playing Card Company). (2004).
Casino games. Retrieved January 20, 2006, from http://www.usplayingcard.com/gamerules/casinogames.html

Weisstein, E.W. (2005).
Gambler's ruin. From MathWorld—A Wolfram Web Resource. Retrieved January 20, 2006, from http://mathworld.wolfram.com/GamblersRuin.html

Wichmann, B.A., & Hill, I.D. (1982).
An efficient and portable pseudo-random number generator. *Applied Statistics, 31*, 188–190.

Wong, S., & Spector, S. (1996).
The complete idiot's guide to gambling like a pro. New York: Alpha Books.

Wynne, H., & Shaffer, H.J. (2003).
The socio-economic impact of gambling: The Whistler symposium. *Journal of Gambling Studies, 19*, 111–121.

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