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Blackjack playing strategies and beliefs: A view from the field

By Will Bennis
University of Chicago
Chicago, Illinois, U.S.A.
E-mail: w-bennis@uchicago.edu

Abstract

A great deal of research on the psychology of gambling has been conducted that has looked at non-experienced gamblers in laboratory or classroom settings. Yet there has been comparatively little research examining the practices and beliefs of actual gamblers within their natural gambling context. The current research contributes to the naturalistic study of casino gamblers. It reports the results of 10 weeks of ethnographic participant observation conducted in 1999 in two Indiana riverboat casinos located about ½ hour from Chicago. The research examines blackjack players' strategies for and beliefs about winning as explained and understood by the gamblers themselves. It uses blackjack's basic strategy and card counting as organizing principles around which to discuss and assess these strategies and beliefs.

Keywords: blackjack, decision making, gambling, ethnography, casinos

Introduction

Gambling is a large and growing industry in the United States and around the world (Gu, 2002; Morais, 2002). According to Britain's Global Betting & Gaming Consultants, gamblers risked an estimated US$900 billion on wagers around the globe (Morais, 2002). In Europe between 1986 and 1996, legalized casinos expanded from 20 to 32 countries (Gu, 2002). In the U.S. alone, revenues from legal gambling grew from $3 billion in 1975 to over $60 billion in 2000, a more than 20-fold increase (Volberg, 2002). In 2002, Americans spent more on legal gambling than on movies, theme

parks, spectator sports and video games combined (Morais, 2002)

A common explanation for the widespread choice to gamble, as well as the continuation of gambling behavior to the point where it becomes a problem, is that gamblers have biased or irrational cognitions, both about their chances of winning and about how best to play the games once the choice to gamble has been made (Baucum, 1985; Cornish, 1978; Kweitel & Allen, 1998; Ladouceur, 1993; Lesieur & Rosenthal, 1991; Wagenaar, 1988; Walker, 1985, 1992). At the same time, a number of researchers have suggested that too much of this research has been conducted in laboratory contexts using non-gamblers (Lesieur, 1984; Walker, 1992). Psychological research examining how gambling strategies and beliefs about winning are influenced by the structure and dynamics of the gambling environment — and, in particular, the sociocultural environment — is exceedingly rare (Cornish, 1978; Eadington & Cornelius, 1994; Wildman, 1999). Ethnographic work exploring casino gamblers' subjective understandings and rationales for their beliefs is nearly as difficult to come by (for some exceptions to this see Hayano, 1978; Hayano, 1982; Henslin, 1967; Lesieur, 1984; Oldman, 1974).

The current study takes a step toward addressing this paucity of real-world research. It involves field observations from 10 weeks of ethnographic participant-observation conducted in the spring of 1999 on two Indiana riverboat casinos located about ½ hour from Chicago. The focus will be on the practices and beliefs surrounding casino blackjack play: what common strategies do blackjack players use when playing the game and how are these strategies understood by the players themselves? Most of the fieldwork was conducted either on a casino shuttle carrying passengers to and from downtown Chicago hotels or at blackjack tables in the two casinos. A few additional conversations took place in other venues as well — at the casino buffet, waiting in line to board the ship, and, in one case, during an interview with a floor supervisor.

Why ethnographic participant-observation research?

Ethnographic participant-observation can be distinguished from purely observational methods in that the researcher attempts to live within the community being studied and to participate in their lifestyle and practices as opposed to standing outside the community. Where a non-participant-observer often approaches subjects with pre-existing categories or concepts to be measured, the participant-observer tends to seek out the categories and concepts widely shared by members of the group being studied. At the same time, "observation" is a key component of the research method, in that maintaining an outsider's perspective while coming to understand the insiders' perspective is seen as one of the goals. My role as participant, then, was as a fellow gambler, who traveled to the casinos; risked, won, and lost money; and engaged with the other gamblers as one of them. For a detailed description of participant-observation as a research methodology see J.P. Spradley's *Participant Observation* (1980).

There are three main strengths that I believe make ethnographic participant-observation ideal for studying gambling behavior in context. First, it reduces the distorting relationship between "observer" and "observed" that often occurs in purely observational, experimental or survey studies, where the subjects of study may be keenly aware of and consciously or unconsciously influenced by the presence of the researcher. Second, participant observation allows the researcher a richness of content that is not available with methods involving pre-arranged questions and pre-determined causal variables. Participant observation allows the researcher to be surprised with relevant information that may have been inadvertently screened out by other research methods. Third, and most importantly, participant observation allows the researcher richer access to the practices, values, beliefs and experiences of the people being studied compared with other methods. It allows the researcher to share the subjective experiences of members of the community (in this case, the subjective experience of gambling). It also opens the researcher up to both implicit and explicit values and beliefs that will often not be visible to non-participant observers or to others more markedly *outside* the community being studied. This current project is primarily concerned with how the sociocultural context influences gambling decisions. To understand this, a rich sense of this context is essential: what are the gamblers' world views, what are their values and beliefs, how is information structured and selectively available within the gambling environment and what are the components and dynamics both of that environment and of the gambling experience. Non-participant observation, an experimental paradigm, or structured interviews are simply not as well-suited to answer these questions. Participant observation, on the other hand, is ideal.

At the same time, two important shortcomings to ethnographic participant observation should be stated up front. First, the researcher often has no means through which to identify causal relationships (such as among thought processes, the environment and behavior). The real world is inherently messy, with few if any controls to allow for correlating independent or dependent variables or for replicating results in cases where apparent causal relationships can be identified. Without the ability to rule out confounding variables, to measurably quantify results or to replicate findings, it is difficult to be sure whether ethnographic findings are really findings at all or simply the idiosyncratic outcome of a complex mish-mash of cause and effect. The second weakness is that what the researcher observes and remembers is necessarily subjective since there are no concrete criteria for what to record or what to attend to, and there is no permanent record to refer to for verification that what seemed significant actually is or what one remembers actually occurred.

Research psychologists, and cognitive psychologists in particular, tend to be implicitly attuned to the weaknesses of ethnographic method or any attempt at a holistic understanding of human behavior. Much of their education has been devoted to learning about the inherent biases and failings of human subjectivity, and much of their approach is designed

specifically to overcome these shortcomings through the use of careful control, replication and hypothesis testing. Yet they also tend to be relatively unreflective about the shortcomings of reductionism and the ways in which behavior in context is more than the sum of individual psychological processes. The psychologists' concerns are just, and the findings presented in this paper should be seen as tentative. At the same time, the shortcomings of experimental methods and the benefits of ethnography are also undeniably true. The current study should be seen, then, as just one part of a larger research program, the part important primarily for its absence from the larger whole, which is currently unbalanced on the side of experimental, quantitative research.

My background in blackjack

My own background and experience with blackjack has contributed importantly to my decision to study this particular game and to the lens through which I have interpreted and evaluated players' performances. As such, a few of the details of this background will be provided here. Just after turning 21, I bought a used copy of Edward O. Thorp's *Beat the Dealer* (1966) in preparation for an upcoming drive through Nevada. Although I did not know it at the time, Thorp is widely viewed as the father of contemporary card counting. *Beat the Dealer* is for card counters something akin to what *The Origin of Species* must be for evolutionary biologists: the first great book on the subject, esteemed for its theoretical and scientific rigor, still held in high regard and a classic in the field. During the trip, I only had time to learn the simplest and least effective card counting system provided in the book, and the "basic strategy," the statistically best way to play each hand given: a) a particular set of rules, b) normally distributed cards, and c) a player whose goal it is to maximize expected winnings (or minimize expected losses). Knowing the basic strategy by heart is a prerequisite for the successful implementation of any card counting system. I was lucky during my few hours of play and won $50, a great achievement as far as I was concerned, and, along with the excitement of trying to clandestinely beat the casinos at their own game, this was enough to cement my interest in blackjack.

For the next two years after that, I read several books on card counting, eventually learning advanced methods. I spent several holidays with friends in Las Vegas, sometimes raising money from friends and family to allow me to bet at higher stakes tables, ironically losing more during trips when I gambled my own money and winning more during trips when I had "investors." During this time, I learned that casino counter-measures used to thwart card counters were effective enough to make earning significant money essentially impossible. I also learned that the variance in wins and losses, even when betting with the minimum stakes possible, was beyond what I could afford, given the potential reward. My interest in card counting dwindled. A significant observation that I made during this period was that most experienced players not only systematically violated basic strategy, but also that they often adamantly and vociferously opposed many of the basic assumptions of card counting and, apparently, of probability theory.

The choice to study blackjack players was largely influenced by this background and experience with the game.

The use of basic strategy and card counting in blackjack, both as normative models and as organizing structures for describing actual blackjack play are largely a result of my path into blackjack and the theoretical perspective which that path provided. Had I first learned blackjack from extensive experience in the casinos, as did most of the gamblers I observed, I believe that my normative evaluation of these players, and my understanding of their actual decision processes, would be considerably different. In particular, I think I would be more inclined to see the players' strategies and beliefs as both more reasonable and more correct than I currently do. Had I first learned about blackjack as a gambling clinician or researcher, I believe my evaluation and understanding would again be considerably different. In this case I might be more prone to see the strategies and beliefs as a consequence of irrational or biased cognitive and motivational processes.

The remainder of this paper will be organized into three sections. The first section will provide details regarding the game of blackjack itself. This includes blackjack rules as offered in the casinos where I conducted my fieldwork, and an introduction to both the basic strategy and card counting. The second section will present the ethnographic findings. Finally, the conclusion will summarize these findings and consider what has been learned of relevance to the study of gambling behavior and problem gambling. A glossary of blackjack-specific terms that will be used throughout the article can be found in the Appendix.

Background on blackjack

Casino blackjack is a somewhat complicated game with its own vocabulary, as many as five types of choices per hand, significant consequences on one's chances of winning depending on these choices, and a variety of rules and norms surrounding play. This section will provide a useful background on casino blackjack. Part one will introduce the rules of the game in the casinos where I conducted my fieldwork. Part two will discuss the two most widely acknowledged normative models for how to play casino blackjack: basic strategy and card counting. Both of these assume the goal of blackjack should be to win as much (or lose as little) as possible over the statistical long run. Blackjack-specific vocabulary will be defined as it is introduced, but the author recognizes there is a lot to digest. For that reason, a glossary of blackjack terms has been included in an appendix as a reference.

Blackjack rules

The goal of blackjack is to get a higher point total than the dealer without *busting* (getting more than 21 points). All cards are worth their face value with two exceptions: face cards (jacks, queens and kings) are each worth

10 points, and aces are worth either one or 11, depending on which makes a better hand. In Indiana, blackjack is played on a felt-top table with seven places for players (as compared to the six places in the image below) who sit around a crescent-shaped table facing the dealer, a casino employee. As few as one person can play, and one person can play more than one hand, although the minimum bet per hand is higher for players who wish to play more than one hand per round. Each player competes only against the dealer, not against the other players.

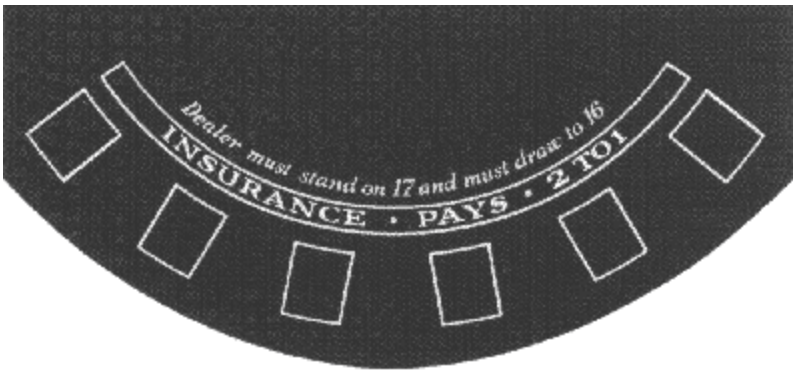


Figure 1

Before the cards are dealt, players place their bets in front of them on the felt in a circumscribed space. Players can bet as much as they would like constrained by a minimum and maximum bet as indicated by a sign at each table. During fieldwork, minimums at the casinos ranged from $5 to $100; maximums ran from $1,000 to $10,000. Bets are made in the form of casino chips that have various monetary values signified by both a color code and a printed dollar amount. These may be purchased from the dealer at the table. Once all bets have been placed, two cards are dealt face up to each player and two cards to the dealer, one face up and the other face down. The latter is known as the *hole card.* Players are not allowed to touch their cards; instead they signal their play choices using hand motions or by placing additional chips on the table.

Cards are dealt from a plastic box called a *shoe,* which holds either six or eight normal decks of cards that have been shuffled together. The total number of decks depends on the casino and on the table's betting limit. A blank plastic card is inserted about two-thirds of the way into the shoe after shuffling. When the plastic card is reached after several rounds of play, that particular round is finished, and all of the cards are again shuffled to begin the next round.

The payout system in blackjack works as follows: If the player busts or if the dealer does not bust and the player gets a lower point total, the player loses and the dealer takes the player's bet. If the player and the dealer have the same amount, called a *push*, no money is won or lost, and the player may take his or her original bet back, leave it out for the next round, or add to it. If the player has a higher point total than the dealer, or if the player does not bust and the dealer does, then the player wins the amount

of their original bet.

If the first two cards are an ace and a 10-value card, the player or dealer has a *blackjack.* Blackjack is the most powerful hand in the game, winning against all other hands, including other hands worth 21 points that are not blackjacks. The player also receives a bonus for blackjack of an additional one half of the original bet (assuming the dealer does not also have a blackjack, in which case the player and dealer push).

Once the hands have been dealt, play proceeds with the first player to the dealer's left, who must make all of his or her play choices before the next player's turn. Players have up to five different choices in blackjack: *hitting, standing, doubling down, splitting,* and *taking insurance* or *even money.* The two most common choices are between *hitting* or *standing* which involve, respectively, either taking additional cards or not taking additional cards and ending the turn.

Doubling down is an option on the player's first two cards. This requires doubling the original bet. At this point the player receives exactly one additional card, no more, no less. If players would like to *double down* for less than the amount of their original bet, they may.

Splitting is an option if the player's first two cards have the same value, including any two 10-value cards, such as a 10 and a king. Splitting requires the player to match his or her original bet, as with doubling down. The dealer then usually asks whether the player wishes to double or split. Once "split" is indicated, the dealer separates the two cards placing one of the bets in front of each card, and dealing a second card to each original, so that the two cards make two new hands which are then played separately. If the split cards are aces, the player can only receive one card to each ace, and if this new card is a 10-value card, the hand only counts as a normal 21, not as a blackjack. With all other split hands, the player may hit, stand and double down as though playing a new hand.

If the dealer's face-up card is an ace, players are given the option to take *insurance* before they begin play. The insurance bet is a side bet that the dealer will have a blackjack. The standard insurance bet is half the amount of the player's original bet, although players are allowed insurance for less than half if they wish. If the dealer has a blackjack, the insurance bet pays the player two to one, covering the amount of the player's original bet; hence, the name. If the dealer does not have a blackjack, the insurance bet is lost, and play commences as normal.

If a player has a blackjack, given the insurance choice, this player has the option to take either *even money* or *insurance.* If the player takes even money, the dealer pays out the amount of his or her original bet before checking the hole card for a blackjack, thus guaranteeing the player a win. If the player does not take even money, play commences as usual, such that the player wins 1.5 times his or her original bet if the dealer does not

also have a blackjack. The player may also push, neither winning nor losing, if the dealer does have a blackjack. Taking even money results in an identical outcome to taking insurance for the full amount, although many players (and many casino employees) do not realize this. In both cases, a player with blackjack will win exactly the amount of their original bet, whether or not the dealer ends up having a blackjack.

Before participants commence play, the dealer checks for a blackjack (with either a 10-value or ace up-card) using a mirror built into the table. If the dealer has a blackjack, all losing bets and the corresponding cards are removed from the table, except double down or split bets, which are returned to the player. If the dealer does not have a blackjack, play commences as usual. If any players have blackjacks, they are also paid immediately and their hands removed from the table. During a player's turn, if they bust, their bet is immediately removed and their cards taken away, such that even if the dealer subsequently busts, the player still loses.

When all the players have finished playing their hands, the dealer turns over his or her hole card. The dealer must then hit or stand by a set of predetermined rules that do not depend on the players' cards. If the dealer's total is 16 or less, the dealer must hit. If the total is 17 or more, the dealer must stand. Thus, even if every player at the table has an 18 and the dealer only has a 17, the dealer must stand, losing to all players at the table.

While this set of rules is standard for the casinos where I conducted my fieldwork, there are a number of common blackjack rule variations in the U.S. and around the world. The common rule variations include:

1. the number of decks used, which commonly include one-, two-, four-, six-, and eight-deck games;
2. whether or not the player may double down after splitting;
3. whether or not the player may double down on any two cards, or only a subset, usually limited to 10 and 11, or to nine, 10, and 11;
4. whether the dealer hits or stands with a *soft 17* (a soft hand is a hand with an ace in which the ace could be valued as either a one or 11, thus a soft 17 is a hand with an ace and other cards valuing a total of six);
5. whether the dealer waits until after play choices have been made to check for a blackjack and then keeps or returns double-down and split bets; and
6. whether or not the player may surrender, which involves giving up half of one's bet after the cards have been dealt but before any play choices have been made, and throwing in one's cards.

These rule differences all have repercussions for how people play their hands, for how they ought to play their hands given the goal of maximizing expected value, and for the casino's advantage assuming optimal play. A number of conventions also vary from casino to casino, such as whether the cards are dealt face up or down (they are dealt face down in single- and double-deck games), whether the player can take insurance with a blackjack or just even money, whether the player can insure or double for less, and whether people can bet on other players' hands.

Normative models

Before discussing how people actually play blackjack, it is worth discussing how one might expect people to play blackjack assuming that their goal is to maximize expected winnings [1] or to minimize expected losses. Strategies that contribute to maximizing expected winnings will be divided into two types: 1) the basic strategy, which corresponds to the statistically best way to play each hand given that the player is not keeping track of cards removed from play; and 2) card counting, which involves tracking cards removed from play and adjusting betting and playing strategies in order to increase the likelihood of winning. I have used these normative models as organizing structures to help sort out and evaluate the various playing strategies used by players in the casino. In other words, I have asked, to what degree do playing strategies correspond to or vary from normative strategies, and how are such variations understood by the players?

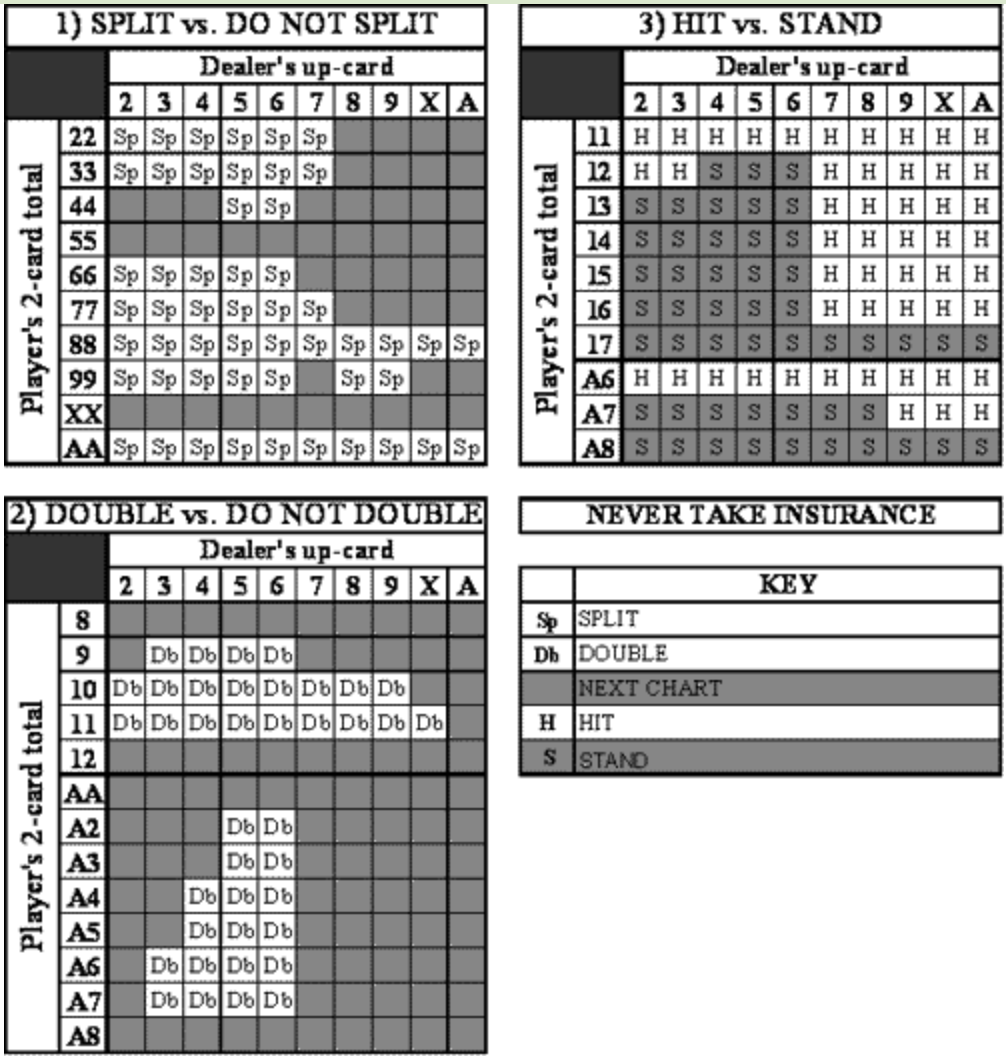
I refer to these systems as normative because they serve to increase the player's expected returns (or decrease their expected losses). Thus, for example, if the player has a 10 and a four for a total of 14, and the dealer has a 10, the player will have three choices — to hit, to stand or to double down. Each of those choices has a different expected return to the player. Hitting will cost players an average of 46.31% of their original bet, standing an average of 54.02% and doubling down an average of 93.20% (Farmer, 2002). As such, for this particular hand the normative strategy is to hit, which while costing the player nearly half of his or her bet, on average, is still less costly than the other two possible choices..

At the same time, both basic strategy and card counting should be seen as tentative measures of normative behavior. Although it is often implicitly or explicitly assumed that a rational assessment of gambling choices should be based on the implications of these choices for expected return, the gamblers themselves may get more out of other aspects of the gambling experience. In this case the expected return — and thus both basic strategy and card counting — will be a poor standard for the normative assessment of gambling behavior. The degree to which basic strategy and card counting are appropriate measures will be discussed later when presenting the ethnographic findings, in which the utility of the gambling activity is examined in more detail.

The basic strategy

The *basic strategy* indicates the best way to play each hand without using either a counting system or cheating. People often refer to this as *playing by the book.* A correct basic strategy for a particular set of blackjack rules was not calculated until a team of statisticians did so in 1956 (Baldwin, Cantey, Maisel & McDermott). Correct basic strategies for various rule changes were not determined until the 1960s when high speed computers were programmed to simulate all of the different hand combinations millions of times in order to determine the true odds for a specific play choice (Revere, 1980; Thorp, 1966). Using this system, researchers were able to determine the exact statistical difference between, for example, hitting an "ace, seven" against a dealer's six versus standing or doubling down.

Playing strictly according to the basic strategy will usually decrease the casino's expected return to below one per cent, although this will vary depending on the rules at a particular establishment. (If the casino has a one per cent expected return, then for every $100 a gambler risks, the casino will retain one dollar, on average over the long term). The expected cost to the player for perfect basic strategy at the casinos where I conducted my field research is 0.43% and 0.45%, respectively, depending on whether six or eight decks are used (Janecek & Tesinsky, 2003). The basic strategy provided below (Figure 2) is specific to the rules for blackjack at the two riverboat casinos in Indiana where I conducted my field research.



1) SPLIT vs. DO NOT SPLIT

Player's 2-card total	Dealer's up-card 2	3	4	5	6	7	8	9	X	A
22	Sp	Sp	Sp	Sp	Sp	Sp				
33	Sp	Sp	Sp	Sp	Sp	Sp				
44				Sp	Sp					
55										
66	Sp	Sp	Sp	Sp	Sp					
77	Sp	Sp	Sp	Sp	Sp	Sp				
88	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp
99	Sp	Sp	Sp	Sp	Sp		Sp	Sp		
XX										
AA	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp	Sp

3) HIT vs. STAND

Player's 2-card total	Dealer's up-card 2	3	4	5	6	7	8	9	X	A
11	H	H	H	H	H	H	H	H	H	H
12	H	H	S	S	S	H	H	H	H	H
13	S	S	S	S	S	H	H	H	H	H
14	S	S	S	S	S	H	H	H	H	H
15	S	S	S	S	S	H	H	H	H	H
16	S	S	S	S	S	H	H	H	H	H
17	S	S	S	S	S	S	S	S	S	S
A6	H	H	H	H	H	H	H	H	H	H
A7	S	S	S	S	S	S	S	H	H	H
A8	S	S	S	S	S	S	S	S	S	S

2) DOUBLE vs. DO NOT DOUBLE

Player's 2-card total	Dealer's up-card 2	3	4	5	6	7	8	9	X	A
8										
9		Db	Db	Db	Db					
10	Db	Db	Db	Db	Db	Db	Db	Db		
11	Db	Db	Db	Db	Db	Db	Db	Db	Db	
12										
AA										
A2				Db	Db					
A3				Db	Db					
A4			Db	Db	Db					
A5			Db	Db	Db					
A6		Db	Db	Db	Db					
A7		Db	Db	Db	Db					
A8										

NEVER TAKE INSURANCE

	KEY
Sp	SPLIT
Db	DOUBLE
	NEXT CHART
H	HIT
S	STAND

Figure 2

Card-counting systems

Card-counting systems are used by players to reduce the casino's advantage further, and under certain conditions, to give the player an advantage. Unlike roulette and many other casino games, events are not independent in blackjack because cards are removed from play without being replaced for several rounds. This changes the statistical makeup of remaining cards as well as the optimal playing strategy and the odds of winning subsequent hands. Thus, a true optimal strategy will incorporate past cards played out of the shoe and will vary both betting and playing strategies accordingly. Systems that do so are called card-counting systems.

It should be noted that even these systems do not involve *optimal* strategies in terms of expected value. To keep track of the exact make up of all the cards in the deck, to calculate their ratio to one another, and then to determine the exact best playing strategy and the player's consequent expected value based on this information is not reasonable for even the

most gifted card counters because it is cognitively too difficult for the unaided human mind. It is possible to do so with the aid of a computer, but illegal. Instead, card-counting systems rely on rules of thumb (heuristics) based on the recognition that when the remaining cards are relatively rich in nines through aces, the player has an advantage. When the remaining cards are relatively rich in twos through sevens, the casino has an advantage.

For nearly all card-counting systems, the counter assigns positive values to low cards that have been removed from the shoe (usually from +1 to +3, depending on the particular card value and its effect on player advantage), and negative values to high cards (usually from –1 to –3). The counter then adds these values together to obtain a *running count.* Since the statistical significance of a particular count depends on the number of cards remaining to be dealt, advanced systems usually require that the count be normalized by dividing this number by some fraction of the number of decks remaining to determine the *true count.* When card-counters determine that they have an advantage, they bet as much as they can get away with and that their bankroll allows. [2]

The count also affects the playing strategy. For most hands, there is a particular count at which the player varies from the basic strategy, whether this involves choosing to hit, stand, split, double or take insurance in violation of the basic strategy. When the count is low, there is a lower relative frequency of high cards remaining in the deck. Both the player and the dealer are thus less likely to receive high cards. The player will therefore both hit more often and double down and split less often than the basic strategy would prescribe. When the count is high, there is a higher relative frequency of high cards remaining to be dealt. Thus the player will hit less often and double down and split more often than usual.

Even skilled card counters will have a difficult time making a living counting cards, and I doubt it is possible for any to make an impressive living. The reason for this is that the casinos take several precautions in order to foil proficient card counters. Dealers, pit bosses and casino surveillance systems all keep a lookout for potential card counters. Knowing what to look for, it is not difficult to spot. If the casino determines the counter is sufficiently skilled to warrant interference, they have the option to either bar the player entrance to the casino, or simply to instruct the dealer to shuffle the cards every time the player increases his or her bet, among other possibilities. Thus, while card-counting strategies can give the player a slight statistical advantage over the casino, it is probably no more than one per cent given the best realistic casino conditions (Uston, 1981). The exact advantage depends largely on particular casino norms and their system for handling card counting as well as on the range of techniques used by the card counter.

Ethnographic findings

The ethnographic findings are divided into five parts. Part one discusses the degree to which players adhere to basic strategy and discusses cases for which they systematically deviate from this strategy using what will be termed "pseudo-basic strategy." Part two considers players' systems for keeping track of and responding to cards removed from the shoe, which is referred to here as "pseudo-card counting systems." Part three examines systems players use to affect the quality of cards received. Part four explores systems used to help players determine the size of their bets during a particular round. Part five asks the question of whether it is appropriate to assume players are trying to maximize their expected return. Finally, part six summarizes these research findings.

Pseudo-basic strategy

Of the 75 or so players I observed during my ethnographic work, not one used the basic strategy consistently. The fact that no one did so is particularly surprising since the strategy can be learned in less than an hour and some variation of it has been printed in nearly every blackjack book published over the last 35 years. The gift shop in both Indiana casinos sold books with the basic strategy in them. Nonetheless, even most of the more experienced players consistently violate the basic strategy on particular hands. For example, nearly all players take even money on a blackjack, and a clear majority stand on 16 against a dealer's 10, even though both plays violate the basic strategy.

An obvious question is "Why?" Do experienced players know the basic strategy and choose not to use it? Do they just not know it? Or have they learned some skewed version of it from other people at the table? The answers to these questions are unfortunately hard to come by, but it appears that a partial "yes" is appropriate to each. Many experienced players knowingly violate the basic strategy. In some cases this is because they do not believe basic strategy is entirely accurate, while in other cases it is because they have conflicting strategies that override basic strategy. More commonly, experienced players know *of* the basic strategy, believe it works, *and believe they play according to it,* but what they have learned from playing in casinos is not faithful to the strategy.

One problem in completely understanding this phenomenon is that, just as players' knowledge of basic strategy is usually partial, so is their knowledge of exactly what the term "basic strategy" means and why the strategy should be trusted. Patrons commonly refer to "playing by the book," and they are often aware of subtle discrepancies in play that are part of the basic strategy. At the same time, it is not clear what "playing by the book" or "basic strategy" means to these players other than "the right way to play." As such, it will be useful to distinguish between the actual basic strategy (the best way to play each hand given that the player is not keeping track of cards removed from the shoe) and pseudo or folk basic strategy (the players' conceptions of the best way to play each hand, independent of whether or not these conceptions are correct).

The following dialogue may demonstrate the complexity of the issue. This conversation took place between myself, a Nepalese man with the pseudonym Arvind who has lived in Chicago for the last six years, and an American woman from Chicago whom I will call Susan. Both consider themselves experienced blackjack players. This conversation began shortly after a brief description of my research interests.

"I'm the dealer and I have a two showing and you have a two. What do you do?" Susan asked this question of Arvind. (Here, the player's "two" is shorthand for 12.)

"I hit," he says.
"What about a three against a two?" she asks.
"A 13 against a dealer's two?" (I ask to be sure.)
"Yes, yeah, if the player has a 13 and the dealer has a two up."
"I stand then," Arvind said.

This is pure basic strategy. It represents a cutoff between when to hit and when to stand and is a common test in blackjack books for how well a person knows basic strategy. The statistical difference between whether it is better to hit or to stand on these two plays is small, and the cutoff itself violates a larger pattern in the basic strategy, [3] yet the most experienced players usually adhere to basic strategy in this particular circumstance. At other points in my conversation with them, Susan said she played "by the book," and both of them said they played "by the odds." All of these comments apparently indicated their recognition that a standard best way to play existed and they both adhered to it. When I asked what "the book" meant, Arvind explained, "You know, to play how you're supposed to play… by probability."

Nonetheless, when asked whether they take even money on a blackjack, both players said they did, which violates basic strategy, although the rule not to take even money is easy to remember. In addition, Susan was convinced that standing on a 16 was better than hitting when the dealer has a 10, and Arvind believed that taking insurance on a good hand (a 19, 20, or 21) was right. Both of these plays are common violations of basic strategy. Thus, one can see that while some understanding of basic strategy, or at least of a "correct" way to play, informs blackjack playing strategy, it does so only partially and somewhat unpredictably for many players.

Three of the most common violations of basic strategy will be discussed below. These include 1) taking even money, 2) insuring good hands, and 3) standing with "bust hands" against the dealer's seven through ace. There are other plays that appear to systematically violate the basic strategy. I did not get a clear sense of how frequently they occur or the reasons behind them, however, so I will not discuss them here.

Even money

The most common exception to the basic strategy at the Indiana casinos seems to be taking even money with a blackjack when the dealer has an ace showing. Most players do this, and they will sometimes vocally criticize other players for not doing so. The argument that commonly goes along with this play is, "You should always take a sure thing." The argument does not make complete sense to me, because the very act of betting in blackjack seems to reject the goal of a sure thing. The risk here, that the dealer will not get a 10 underneath, involves one of the few gambles available in the casino (not taking the "sure thing") in which the odds are in favor of the player. Nonetheless, players adhere to this deviation from basic strategy rather consistently, choosing not to gamble in one of the rare cases where the odds are in their favor to do so. And it does provide the player a sure opportunity to make a profit on that particular bet, which in that respect is a sure thing.

Insuring good hands

Another common play that violates the basic strategy is the decision to take insurance, which should never be made according to basic strategy. A conversation between myself and Arvind, inspired by Susan, demonstrates this point.

Susan volunteered that she never takes insurance, and Arvind responded, seeming somewhat surprised, "Oh, you don't?"
"You take insurance?" I asked.
"I play by the odds," he said.
"What do you mean?" I asked. "Do you always take insurance?"
"No, no, only when it makes sense. If I have a 19 or a 20."

I am not sure here what he meant by, "I play by the odds." Statistically speaking, the insurance bet is not affected by the quality of the player's hand, but rather by whether or not the dealer gets a blackjack, an independent event. Nonetheless, the strategy suggested by Arvind is a common one, although the alternative play, "Never take insurance," is perhaps equally or more common.

Standing with "bust hands" against the dealer's seven through ace

Another common violation of basic strategy is for players to stand with a 14, 15, or 16 — against a dealer's seven, eight, nine, 10 or ace. As the player's cards approach 16, and the dealer's card approaches 10, this violation appears to become more and more common. It also becomes more and more reasonable, statistically speaking, in terms of expected return. The difference between hitting or standing when the player has a 16 and the dealer has a 10 is almost insignificant in terms of the odds of winning or losing. What is interesting here, though, is the degree to which players favor the incorrect play. In Indiana, a majority of players seemed to stand with a 16 against a dealer's 10. Often they will urge other players to stand as well.

The following conversation between Susan and Arvind while riding on the shuttle bus provides the standard argument for standing with a 16 against a dealer's 10, as well as the standard argument for not doing so. Susan is continuing to ask Arvind about how he plays in order, it seems, to assess his blackjack skill. In this case, she has just asked him what he does with a 16 against the dealer's 10:

"Sometimes I hit and sometimes I stand," Arvind said.

"What, you don't play it consistent?" Again, the important role of consistent play is stressed. "Do you go with your *gut* ?" Her emphasis on the word gut sounded a bit disparaging as though she thought this was irrational or the sign of a bad blackjack player. "A dealer in Las Vegas once explained it to me this way," she continued, "the casino always hits on 16 and stands on 17 no matter what, and the casino has the advantage right? So it couldn't be better to stand on 16 when the dealer has a good hand or the casino would do it, too. You have to assume the dealer has 20." (The last sentence involves a somewhat separate argument from the rest.)

The first part of her argument states that a person should hit 16 because the dealer hits 16, and therefore it must be a good strategy since the casino has the advantage. This part of her argument does not mesh with some of her other avowed playing strategies, however. For example, earlier in the conversation she had said that she stands on a thirteen when the dealer has a two(12) showing. According to her current explanation, one would expect her to hit, since the dealer always hits a 13. On the other hand, if she did not allow herself this inconsistency in beliefs her performance would be affected for the worse. The use of inconsistent strategies that apply in some contexts and not in others is common among blackjack players, and it tends to improve the quality of their play.

Also notice the second part of her argument. "You have to assume that the dealer has 20," is not something that one "has to assume." In fact in more than two-thirds of the cases, the dealer will not have a 20, since fewer than one-third of the cards in the deck are 10-value cards, and a 10-value card would be required to give the dealer a 20. But the heuristic of assuming that the dealer has a 10 underneath is a common one that players often use to decide how to play.

In line with the previous example, however, it should be noted that the common practice of using this heuristic never, in my experience, disregards context. Thus, players who say, "always assume the dealer has a 10," do not mean, "even if you have an 18." They generally override this rule with another one, "Never hit with 17 or higher." This turns the heuristic from one that would be disastrous in terms of expected value to one that is quite functional.

"Listen to how I think of it," Arvind said. "You can hit and get an ace or a two or three, and the dealer still wins if he has a 20."

"Yeah but you'll lose if you don't hit. It's a 16 against the dealer's 20. You have to assume that."
"The dealer might bust," Arvind said.
"Not likely with a 10 showing," she said.

These two views represent fairly common perceptions among experienced players on both sides of the issue. Susan's argument is the more commonly accepted; Arvind's is more sophisticated in terms of probabilistic reasoning, incorporating some of the issues that make hitting versus standing with a 10 against a 10 such a close call. As mentioned earlier, however, the basic strategy calls for hitting instead of standing, the play that Susan has argued for. (Although recall that earlier Arvind said that sometimes he hits and sometimes he stands). Statistically the difference is almost arbitrary.

Pseudo-card counting

As with the basic strategy, a superficial knowledge of card counting is common, although it plays a less significant role in affecting playing strategies. Most players — beginners and experienced ones — have heard of card counting. Among beginners there is a common misunderstanding that this involves memorizing the specific cards that have been played out of the deck. Many if not most long-term players realize that card counting simply involves ascribing a positive or negative point value to the cards depending on whether they are good or bad for the player. Indeed, in my experience, most players who are relatively well-experienced know that high cards and aces remaining in the *shoe* are good for the player and low cards are bad. They also know that they should hit more when there are a disproportionate number of low cards remaining and stand more when there are a disproportionate number of high cards. Furthermore, many casino blackjack players say that they count cards, although they generally qualify it with terms such as "a little" or "when I want to get serious." Among the players from whom I was able to get a sense one way or the other, a clear majority deviate from their usual strategy in response to cards that have been removed from play.

At the same time, when pressed for details, even these players who call themselves card counters do not know the fundamentals, including a correct basic strategy. For these players, card counting usually means paying attention to cards that have been dealt out of the deck and using that information to inform subsequent plays. While these systems usually do involve a valid concern with the proportion of tens to non-tens expected to occur, they are not systematic. There is no predetermined "count" or relative frequency of cards at which point these players will increase or decrease their bets or change their playing strategies. Indeed, there is generally not an attempt at estimating overall relative frequencies at all. Thus, just as players make choices according to a pseudo-basic strategy that takes into account their own two-card total and the dealer's up-card, players also use pseudo-card counting systems that are sensitive to cards removed from the shoe and the directional consequences of these cards.

Unlike actual card counting systems, however, these strategies do not change the odds to the players' favor, and in most cases players would almost certainly do better to stick to their pseudo-basic strategies. The exception is in cases where these pseudo-basic strategies are wrong, in which case, of course, anything that leads to a change will improve their lot.

There tend to be three main pseudo-card counting strategies, all of which may or may not be used by a particular gambler. First, and least frequently, players may attempt to estimate relative frequencies of tens to non-tens remaining in the shoe. Thus, like actual card counters, they will be attuned to how many cards have been dealt since the previous shuffle, and they will have been watching for what appears to be a disproportionate frequency of tens or non-tens. If they think many more non-tens have been removed than usual, they may increase their bet for the following round, take insurance if the dealer has an ace, double down with hand totals of 11 or less, and stand more often than they normally would with potentially busting hands. This group is the most sophisticated of the pseudo-card counters. They tend to be very experienced and serious players and they have often studied card counting at some point in the past. Since they do not have a method for estimating actual ratios of tens to non-tens, and since they do not know what ratio would be significant for particular strategy or bet changes, they are still largely involved in guesswork. While such players will commonly be encountered at the blackjack table, they nonetheless make up a small minority of perhaps five or 10 per cent of all people at the table or perhaps less.

Players of a second type are far more common. Often people from the first group fall into this category as well. While these players are also concerned with the relative frequency of tens to non-tens, they are not focused on the total number of cards dealt from the shoe. They believe that if tens and non-tens are approximately equally represented in a deck of cards, then even small samples from the shoe should approximate this distribution. If the small samples do not do this, then these players expect subsequent cards to "even things out," or bring the short-term relative frequency back to approximately 50/50 (or whatever distribution they see as normal). When asked, most of these players will be fully cognizant of the fact that there are a certain number of high and low cards in the deck, and that when low cards are removed, this leaves a certain number behind, but they have the additional expectation that even small samples of cards from the shoe should represent the larger distribution. This corresponds to what Tversky & Kahneman (1974) call the representativeness heuristic, and more particularly what they call the "law of small numbers" (Tversky & Kahneman, 1971). This is the belief that small sample sizes should be more representative of the population from which they are drawn than is warranted. The belief is taken a step further in this case, however, and in a related expression of what is commonly termed "the gambler's fallacy" (Kahneman, Slovic & Tversky, 1982). These players do not simply believe the unrepresentative frequency of high or low cards is less usual than it in fact is. They also believe that it will

tend to be set right by the cards that immediately follow (as opposed to being gradually and randomly set right through the course of the shoe, as is in fact the case). As a consequence, members of this group see the current round of play as the most important. Since it is easier to simply pay attention to the current round, they tend to do so. Unlike the first group, these players generally do not use this information in making betting decisions; rather, they use it only to decide how to play their hands as well as to try to influence what cards the dealer will subsequently receive.

A third group is similar to the second, and might be seen as simply a more extreme version. For members of this group, the most recent cards are also the most diagnostic of future probabilities, but for this group this is true even if it is clear that a representative sample of high and low cards have occurred. Thus if three tens are followed by three fives, players commonly believe a high card is due to occur, since the three low fives occurred most recently. This corresponds to a sequential response bias (Wagenaar, 1972) and was identified by Keren and Wagenaar (1985) in their study of blackjack players in the Netherlands. Even the most experienced players express a specific concern with the most recent cards, independent of relative frequency. This is true even if the six cards are all displayed side by side face up on the table, and even if there are exactly the same number of each type of card. Because the most recent cards are seen to be the most predictive of the cards that immediately follow, these players often prefer to sit at the final spot before the dealer, which is commonly called *third base,* using a baseball analogy. There they will sometimes take cards when they normally would not, or not take cards when they normally would, specifically to influence what cards the dealer will subsequently receive. For example, if a high card is judged "due" and this high card would help the player but also hurt the dealer, the player may stand and leave the high card for the dealer.

While the first of these three pseudo-card-counting systems is relatively rare, the latter two, in one form or the other, are quite common and used by a clear majority of long-term blackjack players at the Indiana casinos visited for this fieldwork. Nonetheless, while all three systems can in some respect be seen as expressing a kind of gambler's fallacy, it should be noted that they are closely tied to the structure of blackjack and the fact that events are not independent in this particular game. Most of these same players would not use corresponding *betting* strategies, increasing their bets after a series of losses or decreasing their bets after a series of wins. And two players expressly stated (after being asked) that the same strategy would not work in roulette.

In all three cases, such "card counting" systems are generally worse than using basic strategy, since the disproportionate frequency of high or low cards generally needed to justify changing one's strategy tends to be rather larger than the players expect. There are several exceptions to this however. One example is with hitting or standing on a 16 against a dealer's 10, for which just one additional 10 in a six-deck shoe is sufficient

to make standing instead of hitting the preferred play. Furthermore, that particular hand is one in which players are most sensitive to these contextual cues, as observed earlier in the conversation with Arvind. Since the players are selective about which hands depend on previous cards removed from the deck, the total cost to their expected return may be quite small. Nonetheless, the net result of such strategies is almost certainly negative, assuming the only consideration is expected value.

Luck and natural order

Beliefs about luck and the ability to affect luck play an important role in blackjack, although I am unsure whether most of the players notice this, and I am not comfortable with the term "luck" as a descriptor since players do not always use the term. When a person comes to join the table they will ask, "How's the dealer?" meaning, "Are people winning or losing?" If a shoe is going particularly well for the players or if a number of blackjacks come up for them, a player at the table will often ask, "Who cut that?" and players may then agree to have the same player cut the deck for the next shoe. If a player's first card is an ace, other players, sometimes two or three seats away, will lean over and tap the table in front of the card, saying loudly, "good luck." The dealer will do the same thing even more consistently than the players. [4] If a player is sitting in a particular spot that receives several blackjacks, other players will ask jokingly if they can trade places. Still, even though these practices are shared by most people at the table, it is unclear whether people generally think they make a difference, or whether they are just going along with the fun or trying something that cannot hurt, even if there is little hope it will help.

My experience at the table suggests that any of these options can be the case, depending on the context. Players will sometimes retract playing advice when asked for a reason with statements such as, "It really just depends on how the cards fall that hand," or they may defend such advice with a smile and, "It can't hurt to try." In other contexts, though, most players seem to believe that there are ways of systematically affecting the quality of the cards for better or for worse. In these cases, it is not at all clear that the players would refer to their beliefs as anything other than rational.

Often the players themselves seem conflicted, as the following example suggests. I was playing blackjack with a friend and I left to go to the bathroom, and when I returned, we both played another hand and he won. He then said, "I lost consistently while you were gone, and now I'm winning again." What is interesting here is that my friend had already told me he did not believe such factors influenced the cards, and he repeated it again shortly after saying this, yet he still felt compelled to mention it, as many other blackjack players tend to do.

The cases in which most players seem to sincerely believe the quality of the cards can be affected all appear to involve a concern with maintaining

proper card order or disrupting improper order. These beliefs involve a number of factors that influence the order of the cards, including whether or not one plays "correctly" (according to the common pseudo-basic strategy), whether or not one plays consistently (recall Susan's concern that Arvind might play with his gut rather than playing consistently), how many hands are being played and where a person is sitting.

The concern with playing "correctly" is one of the most dominant. Most experienced players do not like to play with inexperienced players specifically because they believe it will hurt their chances of winning. This is a second reason many players will watch a table before joining. They like to determine the quality of the other players at the table before risking their money. The belief seems to be that if a person plays badly, they change the run of the cards that the other players "normally" would have received, and for whatever reason, this change tends to be for the worse.

Another important influence related to proper order concerns playing consistently. For example, the following exchange occurred between me and a floor supervisor I interviewed:

" What do you do with a 16 against a dealer's 10?" I asked him.
"Hit," he responded without hesitation.
"Do other players generally play this way, too?" I asked.
"Be consistent, that's the most important thing."
"Why does it matter?"
"Keeps the cards running," he said.

At this point, a dealer who was listening to our conversation gave his own answer to my question: "Because it keeps other players happy," he said. "If you have seven players you have seven experts who all think they know the right way to play."

"You don't want to change up the cards," the floor supervisor said. "If the cards are running hot, you don't want to change'em up."
"So cards run in streaks?" I asked.
"Yup," he said.

"I still don't quite understand the consistency issue. I would have thought that it would just be random whether a change in how other people play helps you or hurts you."

The dealer nodded his head and said, "That's exactly right."

The floor supervisor said, "But if the cards are running well you don't want to mess that up."

The dealer said again, "The reason you play consistently is to keep the other players happy. That's it."

What is perhaps most interesting about this exchange has to do with the role of this dealer. He seems not to believe that card order can predictably affect one's chances of winning and losing, and one might suspect, as I did, that this indicates more prolonged experience with blackjack. The opposite turned out to be true, however. He later said that he did not know how to play blackjack well at all and did not like to play cards. The floor supervisor, on the other hand, had at least a rudimentary knowledge of card counting, and he believed he knew how to play blackjack well. Furthermore, experienced blackjack players seemed nearly uniform in their concern with proper order. Something about the blackjack experience seems to promote a belief in the importance of proper order — whether or not such a belief is warranted — that less experienced blackjack players might not have.

Two other examples that involve concern with proper order are worth mentioning to highlight the strength of this concern. In the first, I was playing blackjack next to a man in his mid 40s.

"Do you always stand with a 16?" I asked him after he contradicted me by urging my friend to stand with a 16 against the dealer's eight.

"I do," he said. But then he smiled, and said, "Of course, whether or not it's smart to do really depends on how the cards go. It's most important just to play consistent."

After a pause, so that I did not seem argumentative, I asked, "How is it that playing consistently affects your game?"

"Not your game, the other players." The player to his right, a woman in her early 40s nodded in reaction to his response and occasionally shook her head in reaction to my questions. (I interpreted her to be showing disapproval at my apparent ignorance.)

"It's important that everyone is consistent so you know how they're going to play their hand."

"So you change the way you play depending on how the other players play?" I asked, knowing this was not the case, but not quite understanding the logic behind the "consistency" argument.

"No, I don't change the way I play, but if everyone plays consistently, we can get a sense of how the cards are falling. If people keep changing the way they play, then that messes up the way the cards fall. But it really depends on how the cards are falling. Doesn't matter how you play really. If people at the table are losing, I'll lower my bet until something changes. Or if we're winning and then someone leaves the table or a new person comes, I'll lower my bet to see how things are going. But it really just depends on if you're getting the right cards or not."

Later someone did join the table, and the man I had been speaking to said loudly enough for everyone to hear that he would pull back his bet — as he did so — to see what kind of luck the new person would bring.

In the final example, I am again speaking with Susan and Arvind on the shuttle. I asked Susan why it made a difference how other players at the table played and she explained that you want to play with all experienced players because inexperienced players "throw the cards off." They hit when they should stand and stand when they should hit.

Arvind nodded his head and said, "That's right." Susan said that players need to play consistently, and they need to play according to the book.

"So, the other players who don't play right actually change the odds for the worse for you?" I asked.

"That's right," she said as Arvind nodded his agreement. "It also just gets frustrating when you lose because someone else took a card they shouldn't have. Good players don't like to play with beginners because they throw the cards all off. You're playing by the book and someone plays wrong and it ruins things for the whole table. You gotta keep the other players in mind too. You can't just play for yourself."

Susan then began to talk about a man who came in for one or two hands and then left the table. This was given as an example of a person who did not "keep the other players in mind."

"So that's bad etiquette to come in for just a hand or two?" I asked.

Arvind nodded and said, "Oh, yeah."

Susan said, "Yes. It throws off the cards. Changes things up. Even if there's an empty spot where no one's playing, but the cards are running well for everyone, it's not polite to join the game. You should wait."

"Until the end of the shoe?" I asked.

"Yes," she said, "I always ask before I enter a game in the middle of a shoe, and I tell people to wait out until it's over if the cards are running well. If the cards are so-so, you win, lose, win, lose, then it doesn't matter. If the cards are bad, then you want a person to join the shoe." As she spoke, Arvind nodded regularly, showing his agreement.

"So this sounds like a concern with streaks of luck rather than something statistical," I said. When I asked the question I recognized that the issue of proper order may be quite distinct from beliefs about luck.

"Well, yes," she said, "I mean if the cards are running well you just shouldn't mess with that."

As with other discussions I have had with players about consistency, I am not sure what to make of these. It seems that these players are concerned with getting or keeping the cards in a certain pattern or order whereby they are winning more than losing. A number of factors are important, because they allow players to identify, and if necessary change, these patterns. Playing well or "by the book," playing consistently and playing the same number of hands from one round to the next sustain the patterns. Playing poorly, playing inconsistently or changing the number of hands from one round to the next disrupts the patterns. Keren and Wagenaar (1985) made many of these same observations in their interviews with Dutch casino patrons.

Betting systems

There are a number of systems, in addition to pseudo-basic strategy and pseudo-card counting, that players use in the belief that they increase their chances of winning. This section will focus on *betting* systems. Betting systems can be distinguished from other systems in that they are not believed to alter the likelihood of winning a particular hand. Instead they involve varying one's bet from one round to another with the goal of betting more on the winning rounds and less on the losing ones. Betting systems thus depend on methods for predicting which hands are more likely to win, and which hands less likely — before the deal takes place — and betting more or less accordingly. Card counting involves a betting system because part of the player's advantage comes from betting high when the odds are in the player's favor and betting low when the odds are in the casino's favor. It also involves a playing system, since it uses the basic strategy to minimize the casino's advantage, and it deviates from the basic strategy in certain cases when justified by the count.

I will discuss six blackjack betting systems here. The first three all involve increasing the size of one's bets when losing and/or decreasing the size when winning. They include: 1) increasing one's bet after an improbable series of losses because a win is due, the classic example of the gambler's fallacy, 2) negative progression betting systems such as the Martingale system and 3) chasing. The second three involve increasing the size of one's bets when winning and/or decreasing the size when losing. They include: 4) increasing one's bet after an improbable series of wins because the player is "hot" or on a roll, 5) positive progression betting systems and 6) betting big with the house's money. None of the systems are normative from an expected value point of view except to the degree that they lead to higher or lower average bets. It is also important to note that while all of the first three systems will sometimes be used, none of them are common. Often they are explicitly condemned whereas all of the last three systems appear to be the norm among experienced players and are taken to be signs of a good blackjack player. This is surprising since the first three strategies are most commonly associated with gamblers' false beliefs in the literature. As far as I am aware no previous research has identified the overwhelming preference among *experienced* blackjack players (and in my experience, gamblers more

generally) for increasing bets when winning as compared to increasing bets when losing.

Bet high after several losses because a win is "due": The gambler's fallacy

In blackjack, players will sometimes bet more after losing a number of hands with the belief that they are "due" for a win, expressing the gambler's fallacy. Although the gambler's fallacy may be the best known false belief commonly held by gamblers, and it does influence violations of basic strategy, it plays almost no role in blackjack betting strategies. Experienced players, in particular, almost universally endorse a system, described below, that may be seen as directly contrary to this fallacy.

Negative progression betting systems

Another well-known betting system that involves increasing the size of one's bets when losing is the Martingale system, a member of a class of negative progression betting systems. They are called *negative* progression rather than *positive* progression, because the bet is increased after a loss rather than after a win. With the Martingale system, players start with a large amount of money and begin with a unit bet, doubling it each time until they win, then returning to the base bet. Each time the player wins, he or she is ahead an additional unit bet. Players who use this strategy reason that the odds are small that the casino will win several times in a row, and infinitely small that the casino will keep winning forever. These two claims are true. As long as the players have enough money to keep doubling their bet, and the casino's maximum bet is high enough, they will eventually win.

This strategy is often co-expressed with the gambler's fallacy. So, for example, a gambler may wait for red to occur three times in roulette before placing their first minimum bet on black. At the same time, the system itself should not be taken as an example of the gambler's fallacy. The gambler's fallacy concerns events that have already occurred which are incorrectly judged to affect future probabilities. Martingale systems concern series of future events for the casino that are, in fact, increasingly improbable the longer the required series. Thus, Martingale systems, unlike common expressions of the gambler's fallacy, do usually work. That is, players will win more often than they will lose. The problem occurs when the player experiences the inevitable losing streak (i.e. when the player loses enough times in a row to deplete the entire bankroll or to reach the maximum bet allowed by the casino). In such cases, the cost to the player will be high enough on average to deplete all of the smaller wins, plus the loss of the casino's expected return on the total amount bet.

If players are looking for a way to maximize their chances of leaving the casino a winner on a particular visit and are not concerned with the high potential loss, Martingale-type systems work (Turner & Horbay, 2003). Furthermore, the success or failure of Martingale involves high variance, so that an individual's experience with it over even several months of

gambling may result in more money won than lost, providing many with apparent confirmation that the system works. Even then, if a player has had one big loss that cancelled out all winnings, she or he can often chalk this up to a failure to stick to the system. (This could include perhaps not bringing enough money to reach the casino limit, or perhaps losing faith in the system and backing off after the $1000 bet and, just then, finally winning.). A player can also reasonably chalk a loss up to bad luck, since one or two losses out of several wins are not, in themselves, enough to know whether it is a failure in the system or simply the downside of random variation that led to a net loss.

As a result, many novice- and intermediate-level players use Martingale-type systems, but nearly all long-time players have learned not to use it, either from personal experience or vicariously through the experience of others. I encountered a few players who stopped using this system while still believing it probably works. After even one big loss, the conclusion, "I just can't stomach the risk," can outweigh the possibility of a winning system.

Players I have spoken with who continue to use this system do not seem to recognize this risk. The Nepalese man, Arvind, for example, told me very confidentially and confidently that he used this system for blackjack.

"Do you win at blackjack?" he asked.

"No," I said, "I don't think anyone can win at blackjack over the long run unless they count cards."

He surprised me by telling me that he thinks blackjack can be beaten, "if you have enough money and some luck," that is.

"You mean [you can win] over the long term betting on a regular basis?" I asked.

"Yes. But you need a lot of money. Here is what you do…" He went on to tell me the Martingale betting strategy that I just described.

Most players who use this system use it in roulette, not blackjack, and until this point I had never had anyone say outright that they believed blackjack could be beaten using such a system. There are two reasons the system might be less common in blackjack. First, the near 50/50 nature of blackjack is less salient than in roulette where it can easily be seen that half the numbers are red and half black, half even and half odd, once the zeroes are removed from the equation. It is in part this apparent 50/50 wager that makes the mathematics of Martingale so compelling. Second, even though blackjack provides relatively good players with a higher expected return than roulette, much of this benefit comes from the opportunity to *split* and *double down,* and from the three-to-two payout for a blackjack. The probability of losing an individual round in blackjack is

actually higher than in roulette, even for the perfect basic strategy player, and so the system will fail more often than in roulette. There are several similar systems to Martingale that involve systematic increases in bets with losses and decreases with wins. These systems are generally uncommon in blackjack, however, so they will not be discussed further.

Chasing

Rather than being a betting system, the term chasing usually implies a loss of control. It is the act of betting higher and higher amounts in the hopes of recouping unwanted losses. As with Martingale, chasing works more often than not, since just one win will be enough to recoup the losses, but in the event that it does not, and the gambler continues to lose until the losses can no longer be recouped with a single bet. The consequences can be devastating. I did not meet any blackjack players in Indiana who recommended chasing, though I observed what appeared to be chasing a few times, and two players admitted they were doing so. Experienced players who were not in the act of chasing universally condemned it, while many of these same gamblers admitted they occasionally lost control and did it. Since chasing usually works, it makes sense that it would be appealing specifically after a gambler has lost more than they feel they can afford to lose. Chasing offers a way out. It also makes sense that after a gambler has lost even the available money with which to chase, and subsequently come to terms with that loss, that they would see chasing as the potentially devastating practice that it is.

Bet high after several wins because the player is "hot": The hot hand cognitive illusion

Players using this system wait for a particular outcome to occur significantly more often than usual and then bet on it to occur again. When blackjack players use this system, it seems to come from a belief in patterns of luck. Players, the shoe, a particular spot and dealers all get "hot" or "cold", and many players bet low when they believe they or their cards are cold or the dealer is hot and bet high when they believe the contrary. This has been identified as the "hot hand cognitive illusion" (Gilovich, Vallone & Tversky, 1985) and was described specifically for gamblers, and blackjack players in particular, as a belief in luck as distinct from chance (Keren & Wagenaar, 1985; Wagenaar & Keren, 1988). Nearly all experienced players increase their bets after wins and decrease them after losses, often with the explicit justification that they are hot. Indeed, many players will not sit at a table until they have seen whether the dealer is hot or cold. Unlike the three previous systems that involve increasing bets after losses, the belief that luck runs in identifiable streaks and can be bet on to the player's advantage, appears to be shared by a clear majority of experienced blackjack players. Many players believe that betting high when the cards are hot and low when the cards are cold is the single most important factor to winning in blackjack. While they accept that long-term probability favors the casino, many of these players believe they can use their knowledge of streaks to take

advantage of short-term fluctuations in luck, and by doing so gain an advantage over the casino.

Positive progression betting

Far more common in blackjack than Martingale and other negative progression systems are positive progression systems whereby players systematically increase their bets after wins. Usually this involves increasing bets by some fraction of the previous bet until a loss occurs, then either returning to the base bet or reducing the bet by the same fraction that it was increased. Often there are stopping rules such as, "return to the base bet after three wins." Often the increase depends on the overall bet size such that the player may stop increasing by half once the bet reaches $50. Often the maximum bet size depends on the total amount of money the player has won or lost during the playing session such that the player will progress to higher maximum bets the more they have won. The systems may be more or less codified and depend more or less on intuition from one player to another. Positive progression betting usually co-occurs with a belief that outcomes run in streaks as discussed above, and it is difficult to separate one from the other. This betting system tends to be the behavioral expression of the belief in streaks.

Betting with the house's money

Many players bet more when they are ahead overall for the day. Experimental researchers (Thaler & Johnson, 1990) similarly found that people tend to be more risk-seeking with money won than money earned. The researchers labelled this the "house money" effect in recognition of this being a common characteristic among casino gamblers. It should be noted that not only are casino gamblers more risk-seeking after winning, but they tend to believe such a strategy is normative.

Thus, an informant who came to the casino with me explained after I had a particularly successful playing session, "Will, Anna and I were talking, and we agreed that you really need to bet your money when you're up like that. It's the only way you'll ever really win. You have to bet big when you get some money from the casino."

I said, "Yes, but my way I won't lose it all either."

"Well, that might be true," she explained, "but you'll never have a really big win either."

Do gamblers really play in order to maximize expected return?

Perhaps the reason for common violations of the basic strategy is that the players have other goals in addition to or instead of maximizing their winnings. One question I had, then, was what other reasons patrons had for playing the game. What were their goals? Along with the hope of winning, there are three main goals that the game of blackjack appears to

satisfy. All three may be interdependent, though, and I was unable to clearly distinguish between them.

The first goal was simply to have a good time. As the floor supervisor I interviewed put it, "Some people are just bored. I mean, what do you do in Indiana ?" Several players, including the regulars I spoke with — most of whom were from Chicago — confirmed this notion. One woman, in explaining why she chose one casino over the other, said, "They take your money wherever you go, but at least they can be friendly about it." Another said he would come to the casino every day if he could afford it. And at least three others stated that they gambled for enjoyment, not because they expected to win. Variations on the phrase, "I just come to have fun; I don't expect to win," are common enough that they might be considered cultural scripts.

A second reason, which cannot be cleanly distinguished from the first, may be the desire for social interaction. Players did not talk about this, but the behavior at the tables and on the shuttle suggests that part of the experience of the game involves friendly interaction with other people. Shuttle drivers and patrons often know each other by name and they speak about other players and drivers who are not present by name as well. People at the table often come to the casino together or know one another from past casino experiences. Players also frequently comment on other players' cards, complimenting them when the cards are good, sympathizing when the cards are bad, wishing one another luck, and offering advice on how to play. Although players at some tables did not speak at all, for the most part blackjack appeared to be a friendly social experience.

The desire for fun or for social interaction notwithstanding, the hope of winning seems to be a constant characteristic of blackjack players. A distinction should be made here between players who *expect* to win, and those who expect to lose but still *hope* to win. It became apparent from different conversations that many players expected to win. One floor supervisor said that many people played in order to make a living, although I could not tell how successful such people were or what fraction of the patrons had this in mind. A dealer said that 99 per cent of players thought they had a system to beat the casino. Several players also told me that they had winning systems.

In my experience, though, most players know the odds are against them and that they will probably lose. Nonetheless, I never encountered anyone who gave me an indication that they did not at least hope to win, and conversations frequently referred to past great wins by the speaker or people who were observed to win large amounts. While having fun and social interaction are certainly part of the experience, the hope of winning, even among gamblers who know the odds are against them, also plays an important role.

The interaction of these goals can have important repercussions and

could explain a number of violations of basic strategy. For example, one player hesitantly made the choice to double down, saying, "What the heck, I came here to gamble," a reason that was given by another player for never taking insurance. Another player explained that she never splits her tens because it makes everyone else at the table so upset, even though she sometimes likes to do it when she is playing alone. Another said, "I always split twos no matter what. Splitting is much more fun and twos often turn into a good hand, so why not." In a last example, a player explained that he knows taking even money is a bad play statistically, but that he likes to do it because, "it's the worst feeling in the world to get a blackjack and then not win anything at all." All of these are examples where other goals besides maximizing expected value influence playing decisions.

Finally, it is worth noting a possible relationship between the betting systems discussed in the previous section and gambler utility. The first three betting systems, all of which call for higher bets when losing, have unique consequences on winning experience from the latter three systems, all of which call for higher bets when winning. Using these latter systems, players will actually leave the casino as winners less often than when using Martingale-type systems or chasing, since they will tend to bet higher amounts specifically when they are ahead, increasing the probability that they will lose all of their winnings. At the same time, the average and maximum size of their winning sessions will be larger, since on the less common occasions when these gamblers do end their gambling sessions as winners, they were making larger than usual bets. Finally, the average and maximum size of their losing sessions will tend to be smaller, since on the occasions when these gamblers are losing, they will lower their bet sizes, thus risking less while also reducing the probability of breaking even.

The differential structure of winning and losing experiences may play a significant role in why increasing bets when winning and decreasing them when losing is far more popular than the opposite set of strategies, particularly among the most experienced players. An occasional big win, while avoiding costly large losses, may have more utility to the gambler than an occasional big loss with few if any big wins, even if the favored strategies result in fewer winning sessions and even if both sets of strategies have the same, slightly negative, expected value. Indeed, Turner (personal communication, 2003) observed that positive progression betting systems create a payout structure similar to that built into the design of slot machines, the most popular casino gambling activity of all. Perhaps the utility of an occasional big win outweighs the cost of frequent though affordable losses, even if the objective sum of these losses over the long term is greater than the sum of the wins.

Summary of research results

It should be recognized that experienced players conform well to the basic

strategy, but they also make a number of choices that systematically violate it. Players themselves often believe that these violations correspond to the basic strategy and refer to their strategies as "playing by the odds," "by the book" or "by basic." Others realize their own plays violate the strategy published in books, but they believe the books' strategies are wrong and that their own personal basic strategy is correct. As such, it is worth distinguishing these folk- or pseudo-basic strategies from the actual mathematically-derived basic strategy. The violations of basic strategy seem to involve a partial misunderstanding or ignorance of what basic strategy really means, as well as a belief in the norms at the table, which occasionally differ systematically from basic strategy.

Proficient card counters are exceedingly rare. Nonetheless, experienced players use a number of techniques related to past cards removed from the shoe and incorporate basic tenets of card counting, though these systems probably hurt the players more than help them in terms of expected value. Just as the folk conceptions of basic strategy might be termed pseudo-basic strategy, these folk conceptions of card counting might be termed pseudo-card counting, in order to distinguish them from the more precise mathematically-derived methods.

There are also a wide range of practices and beliefs related to the ability to influence the outcome of cards. These sometimes include idiosyncratic methods such as carrying a lucky charm or circling one's chair at the beginning of every shoe. More often they include practices acknowledged by the group to work, such as having a particular person cut the cards, or tapping on the table when a player gets an ace to wish them luck in getting a blackjack. The most common practices and beliefs have to do with a concern with proper order. Players will pay attention to how many hands are dealt at the table, the playing strategies people are using and how well people are playing, and try to keep this all consistent if the gamblers are doing well, or change it if the gamblers are doing poorly. They will urge others to play consistently and to play according to group norms with the explanation that to do otherwise is bad for the entire table.

Another factor affecting blackjack strategies are betting systems that use previous sequences of wins and losses to determine how to bet. One set of strategies calls for increasing one's bets when losing and decreasing one's bets when losing. A second set of strategies calls for increasing bets when winning and decreasing bets when losing. Although all systems are relatively well known, the first set of systems are quite rare among experienced players (except, perhaps, chasing), and none of them are condoned as good strategies, whereas the second set of systems are widely practiced and condoned among even the most experienced players.

For the most part, blackjack players seem concerned with maximizing their winnings. However, they also have additional goals. These include a desire to have fun or to be entertained, a desire for social interaction and unique goals related to both the hope of winning and the subjective

experience of winning that cannot be reduced to expected value.

Conclusion: Implications for research into gambling behavior and problem gambling

At the beginning of the article it was noted that a number of researchers see gamblers' false beliefs about winning and their suboptimal strategies as an important factor in why so many people gamble and why some people become problem or pathological gamblers and others do not. The implication is that the biased or irrational cognitions of the gambler are the source of these false beliefs and suboptimal strategies. These claims suggest three important questions: 1) Do frequent gamblers really tend to have false beliefs about winning and suboptimal strategies for doing so? 2) If so, do these false beliefs and suboptimal strategies contribute to their decision to gamble and to their progression from occasional gambling to problem gambling? And 3) are the false beliefs and suboptimal strategies really the consequence of biased or irrational thinking on the part of the gambler? I will consider each of these questions with reference to the research findings.

Before delving in, however, two caveats are important. First, gamblers are a diverse group and blackjack players are no exception. For one subset of blackjack players the answers to all of these questions are undoubtedly "yes." Many blackjack players have persistent false beliefs about their chances of wining. These false beliefs likely directly contribute to their decision to gamble and to their difficulty in stopping. Furthermore, the source of these false beliefs may often be the biased or irrational cognitions of the individual, either through the expression of traditional heuristics and biases or through motivated reasoning. For another subset of players, the answers to all three questions are likely "no." These players understand the probability and dynamics of the games they play as well as can be expected of any skilled practitioner. They gamble either because they have a system for winning which seems reasonable, given the available information about the activity, or because they have other reasons for gambling besides the expectation of winning money. This discussion will focus on the group most commonly observed during the ethnographic research, and this group does not fall neatly into either of these two extremes.

Second, the quality of the data obtained during the ethnographic research does not allow me to categorically answer any of these questions, particularly the second. I have few means by which to know whether blackjack players' false beliefs and suboptimal strategies led to their choice to play blackjack, and I have even fewer means to assess causes of problem gambling behavior that were not a category of inquiry for the study. At the same time, the ethnographic findings have implications for all three questions, and these implications will be considered here.

Do frequent blackjack players really tend to have false beliefs about

winning and suboptimal strategies for doing so?

The short answer to this question is "yes." Experienced blackjack players have false beliefs in a number of areas: about the best way to play each hand; about the impact of cards removed from the shoe; about their ability to influence which cards they and others will receive; about the predictable nature of patterns of wins and losses and what might influence these patterns; and about the relationship between past wins or losses and future probabilities of winning or losing. At the same time, it should be recognized that most of these false beliefs have only a minor impact on the player's expected return. This may be particularly true since deviations from basic strategy seem to be limited to hands for which violating basic strategy is the least costly. Furthermore, the one set of strategies that have the largest impact on the players' expected returns — betting strategies that influence average bet sizes — have important consequences for the gambling experience that may provide utility beyond expected value. Thus, while blackjack players may be incorrect to believe increasing their bets after wins increases their chances of being a long-term winner, these strategies may have survived and thrived specifically because they tend to contribute to other positive features of the gambling experience. As such, the long answer to this question may be that gamblers have both true and false beliefs and better and worse strategies, but the false beliefs and suboptimal strategies tend not to have serious negative implications and may provide benefits and safeguards about which not even the gambler is consciously aware.

Do these false beliefs and suboptimal strategies contribute to their decision to gamble and to their progression from leisure gambler to problem gambler?

This research suggests that experienced blackjack players have a rich set of strategies and beliefs, many of which have unquestionably developed in the context of the blackjack playing experience. Their strategies and beliefs, both true and false, provide part of the structure of the blackjack playing experience and undoubtedly contribute to the utility of playing blackjack. In part at least, the game is enjoyable because it involves learned skills that more experienced players actually use.

This is not simply the illusion of control (Langer, 1975) or the illusion of skill, even if the consequences of the strategies do not improve one's chances of winning. For example, although I studied card counting, I might nonetheless make systematic errors in keeping the count that lead me to raise my bets and to deviate from the basic strategy in cases where I should not. If I do this frequently enough, I may perform worse than a player who simply bets the minimum and plays by the basic strategy. Even if this is the case, my decisions are still based on a trained skill, and the application of this skill significantly contributes to my enjoyment of the game and the utility I get from playing.

Similarly, experienced blackjack players may be better than beginners at

noticing patterns in outcomes and these likely influence their probability of winning during a particular gambling session because of their corresponding betting systems. Also, they probably do apply unique skills (that I, for example, do not have) for deciding when to take cards or not take cards based on which cards were removed from the deck. And all of this undoubtedly contributes to their enjoyment of blackjack and to their decision to play, just as their correct beliefs and working strategies do.

Do these strategies and beliefs contribute to problem or pathological gambling? Probably "yes" for some players, probably not for others. False beliefs and suboptimal strategies likely contribute to problem gambling in three ways. First, from an impulse control perspective, they contribute to the enjoyment and the "action" of the gambling experience, including many of the features that make it difficult to stop playing, even for a beginning gambler. Second, also from an impulse-control perspective, they make it more likely that the player becomes committed to the game to a point when their own best judgment and self-control, which originally may have been adequate to stop them from gambling, is not adequate any longer. Third, to the degree that these false beliefs lead gamblers to incorrectly believe they can win, they make it more likely that gamblers will lose more than they can afford, with serious consequences.

At the same time, most of the gamblers I encountered sincerely enjoy the blackjack playing activity and seem to have developed healthy strategies for playing over an extended period without risking too much. Specific playing strategies, while not perfect, are correct more often than not, and the endorsed betting systems seem designed to specifically ensure that players will not lose more than they can afford while still having the chance to occasionally experience a big win, which for many gamblers may be precisely what attracts them to the gambling activity.

Are false beliefs and suboptimal strategies really the consequence of biased or irrational thinking on the part of the gambler?

This, for me, is the most important question. An implicit assumption in much gambling research is that their suboptimal strategies and false beliefs are consequences of shortcomings in the reasoning processes of the individual; correct their biased and irrational cognitions and the problem will be solved, this view suggests. The current research suggests that the false beliefs are, to an important extent, the consequence, not the cause, of gambling activity. The most experienced players have a rich set of strategies and beliefs that they appear to have learned during the gambling experience. These are largely shared and reinforced by their gambling community and carry with them complex models of cause and effect, as well as apparent empirical verification — both from the personal experience of the players and from the experience of other "experts" within the domain, including casino personnel.

In my view, these strategies and beliefs are as rational and unbiased as other strategies and beliefs commonly used during decisions made

throughout much of a healthy individual's life. That is, they are neither rational and unbiased, nor irrational and biased. Rather they involve the best judgments available to the players given their gambling experiences and the available information, with occasional motivated reasoning mixed in for good measure. It was not a matter of unbiased or rational cognition any more than it was a matter of biased or irrational cognition that led me to the belief that I could make good money counting cards in blackjack, or to the subsequent belief that I could not. Nor is it a matter of unbiased or rational cognition that led me to the conclusion that these players do not improve their expected return by increasing their bets after a win, or that led them to their conclusion that they can. Rather, these beliefs depend importantly on complex structural features of the environment within which they and I developed our strategies and beliefs. These include not just the physical structures, but also the information available, the belief systems of other members of the community and the complex experiential feedback given the environmental structure and dynamics.

I have no empirical evidence that the cards do not get hot or cold in ways that are predictive of future outcomes. I accept that they do not because of my training and experience outside the gambling domain, just as the gamblers accept that they do because of their training and experience inside the gambling domain. I have never been able to convince an experienced blackjack player who holds these beliefs that they are wrong (and I have tried several times), but in my view this is not because they are being irrational. Indeed, they can often provide better empirical evidence and rational arguments than I can. I am sometimes forced to admit that I take it on faith that hot and cold streaks, beyond the unpredictable expectations of random variation, do not occur.

The implication here is that the persistence of erroneous beliefs held by gamblers may depend more on characteristics of the gambling environment than it does on the irrational or biased quality of the gamblers' reasoning. Indeed, once the structure and dynamics of the gambling environment are taken into account, many of the strategies and beliefs that originally seem biased or irrational may be seen to be inseparable from the gambling context, including its sociocultural context, and to be both rationally and empirically justified.

Notes:

(Click on the note number to return to the text.)

1 "Expected winnings" will also be referred to as "expected value" and "expected return" in different parts of the text.

2 The size of the player's bankroll turns out to be a very important factor for card counters. With an advantage of one or two per cent, even skilled card-counters will usually end up significantly down at some point during their playing period just due to normal random variation. Among mathematicians interested in gambling, the study of risk management, or the proportion of one's bankroll that should be risked

given a particular advantage and a particular variance, is something of a sub-field in its own right.

3 The pattern can be constructed from the following dictum: "Always stand when both you and the dealer could bust by taking one more card, assuming that the dealer has a 10 in the *hole.*" The exception, as discussed during this conversation, is when the dealer has a two or a three showing, and the player has a 12, in which case the player should hit.

4 I thought at first that the dealer was trained to do this, and that perhaps the players learned it from them, but I later noticed that not all dealers engaged in the practice, and those who did were sometimes inconsistent (in one case, this behavior was directed favorably toward those players who were tipping the dealer).

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Appendix: Glossary of blackjack terms

basic strategy/playing by the book:

The *basic strategy* indicates the best way to play each hand without using a counting system (or cheating), assuming the player's goal is to maximize expected return. It is often referred to as *playing by the book.* It depends on the make up of both the player's cards and the dealer' s up-card, and it varies slightly depending on the particular blackjack rules in one casino or another.

blackjack:

In addition to being the name of the game, *blackjack* is a two-card 21 (i.e., any 10-value card with an ace). It beats all other types of 21 (i.e., all 21 with three or more cards). If the player gets a blackjack the casino pays the player three to two.

bust:

Busting is the act of getting a point total higher than 21, which results in an automatic loss. If both the player and the dealer bust, the player still loses. This is the only tie in which the player loses and is the source of the casino's advantage in blackjack.

busting hand/bust hand:

Busting hands or *bust hands* are hands lower than 17 that will exceed 21, and thus bust, if they are hit with a 10. That is, they are hand totals from 12 to 16. When the dealer has a two through six showing, these hands are also commonly called busting hands, since it is often assumed that the dealer has a 10-value hole card and these are in fact the up-cards for which the dealer is most likely to bust.

card counting/card counters:

Card counting is a method for keeping track of past cards removed from the deck in order to give the player an advantage. Card-counting systems usually require the player to 1) assign plus and minus values to low and high cards, respectively; 2) add these values as the cards are removed from play; 3) normalize this sum based on the number of cards remaining to be dealt; and 4) adjust playing and betting decisions according to the this normalized number. Under ideal circumstances, using such systems can give the player an advantage over the casino.

dealer:

The *dealer* works for the casino. Players win or lose depending on how their cards perform against the dealer's cards. The

dealer must play according to predetermined rules set by the casino that do not depend on the players' hands. Usually these rules require the dealer to *hit* with 16 or less and to *stand* with 17 or more, although hitting with a *soft* 17 is also common.

double down:
Players who *double down* are required to double the size of their initial bet. In turn they get exactly one additional card. Players have the option to do this after the deal, but only with their initial two cards or with the new two-card hand created after *splitting.*

even money:
See *insurance.*

first base/third base:
First base refers to the first person to the dealer' s left. This is the first person to play after the deal. *Third base* refers to the player closest to the dealer's right. This is the last person to play before the dealer.

floor supervisor:
See *pit.*

hard hand/soft hand:
Hands without an ace or hands for which the ace can only legally be used as a one are called *hard hands.* If the ace can be used as either an 11 or a one, this is called a *soft hand.* For example, if the player (or dealer) has an ace and a five this is referred to as a soft 16 (not a soft six). The dealer often refers to it as "six, 16, " to indicate the two different possible values. Players can hit this hand without risk, since even receiving a 10 would only make the hand a hard 16.

hit:
Hitting is the act of taking an additional card. Players tap their fingers or move their hands toward themselves to indicate that they want to hit.

hole card:
The *hole card* is the face down card in the dealer's hand. Players do not get to see this card until after they have finished making their play choices.

insurance/even money:
If the dealer has an ace showing, players have the option to place half their initial bet onto a special spot to take *insurance.* The dealer then looks at his or her hole card. If there is a 10-value card, thus giving the dealer a blackjack, the insurance bet pays two to one, thus covering the initial bet. If the player has a blackjack when the dealer has an ace up, the player has the option to take *even money.* That is, the player can win

exactly the amount of their original bet, before the dealer checks his or her hole card for a blackjack. This compares to not taking even money and either winning three to two for the blackjack, or pushing and winning nothing if the dealer ends up having a blackjack. Taking even money turns out to be monetarily identical to taking insurance. Both plays have a negative expected return.

pit/pit boss/floor supervisor:

Table games are arranged in an oval so that all of the players are on the outside facing dealers who are inside. The inside of this oval is known as the *pit. Pit bosses* are the highest level of manager within a pit. *Floor supervisors* are similar to pit bosses except that their domain is smaller. They are responsible for supervising anywhere from one to four tables depending on the game and the time of day, whereas the pit boss is responsible for the entire pit.

push:

When the player and the dealer tie (have the same point total) this is called a *push.* The player neither wins nor loses.

shoe:

The *shoe* is a plastic box that holds the decks after they have been shuffled. The dealer draws cards from the shoe to deal to the players. Blackjack games use from one to eight decks. One or two deck games do not use a shoe; four, six, and eight deck games do.

soft hand:

See *hard hand.*

split:

If the first two cards dealt to a player are the same (including any two 10-value cards), the player has the option to double his or her bet, *split* the two cards and play them as two separate hands. Players can split the same card up to three times in a single hand (thus playing up to four separate hands). Players can only split aces once, and they are not allowed to hit after each ace is made into a two-card hand. If either or both of the split aces get tens, they are not treated as blackjacks but instead as standard twenty-ones. That is, they lose to a dealer blackjack, push to a dealer's 21, and only payout one to one, rather than three to two.

stand:

Players *stand* when they have finished making all play choices, except when they bust. In other words, standing involves the choice to stop taking additional cards. Players signal this by holding their hand (flesh and blood, not cards) horizontally

above their cards and waving it back and forth.

third base:
See *first base*.

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For correspondence:
Will Bennis, Doctoral Candidate
Committee on Human Development & Department of Psychology
University of Chicago
5730 S. Woodlawn Ave.
Chicago, IL 60637
U.S.A.
E-mail: w-bennis@uchicago.edu

Will Bennis is a PhD candidate in Psychology and the Committee on Human Development at the University of Chicago. In February 2004, he will begin a postdoctoral fellowship at the Center for Adaptive Behavior and Cognition at the Max Planck Institute for Human Development in Berlin. His research concerns how belief systems and the sociocultural environment influence decision-making processes and conceptions of rationality. His particular focus is on casino gamblers' strategies for and beliefs about winning.

Editorial Contact: phil_lange@camh.net
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