A response to comments

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Alex Blaszczynski pointed out the relevant issue of filtering bias when processing
real-world data. The data that I researched may not be a perfectly representative
sample of Polish casino gamblers, for each casino in Warsaw is different and each
caters to slightly different players. Some casinos target young, yuppie-style
gamblers, others are favored by older and richer high rollers, etc. However, the
purpose of the study was not to estimate any actual statistical distribution of
gamblers, such as "20% of the gamblers are money-oriented investors and 80%
are arousal-seeking consumers." Instead, I tried to present the different money
management strategies found among players.

Some data filtering may bias the research even in an exploratory study, for certain
patterns may be entirely excluded from the sample, and other, exotic patterns may
be overreported. However, the only criterion for inclusion in my sample was the
number of visits during a 6-month period—no additional filtering was applied. On
the technical side, the casino staff recorded financial data with paper and pencil.
These reports were not initially available in electronic form—this is why coding was
so time-consuming and complicated, for one has to split paper reports into names
and numbers, code each separately, and then encrypt them for safety reasons. All
in all, my research was based on data provided by the casino operator, but I had
the opportunity to see the original data source and to check its integrity. In addition,
I spent many nights in that casino, observing players' behaviors—their betting
patterns, emotional reactions, and verbalizations during the game.

I do agree with Alex's statement that "judging intent and motive from behaviour is
difficult and open to the observer's biases." To reduce the risk of overinterpretation,
I chose the most commonly recognized motives to gamble: the desire to win
money and arousal. I tied them to simple money management statistics like
frequency of wins and *hold* percentage. (Hold is a good approximation of the
average length of play.) The criteria used to categorize gamblers were simple:
short-duration gambling, which involves lesser losses and high frequency of wins,

is attributed to orientation toward winning and long duration, while high-turnover gambling is attributed to orientation toward consumption. This is a bit simplistic, but probably not oversimplified, as I do not claim that these two factors explain 100% of a player's motivation. Socialization, for example, may constitute the third factor, which cannot be measured quantitatively. The investor may socialize by taking breaks between his or her bets, while the consumer may socialize during his or her long stretches sitting at the gaming table.

To make inferences from behavioral patterns is difficult, but I still think it is much more reliable than interviews: even if we eliminate all issues with questionnaire design, like order effects, we will still face the fundamental problem of people being unable to provide reliable reports about their mental processes (Nisbett & Wilson, 1977).

Coupling the data from interviews about subjective motives to the observation of behavior patterns would be infinitely useful. However, I do not expect that motivations inferred from behavioral data would correspond with motives declared in interviews. Self-reports of casino gamblers are useful, but retrospective evaluations of a gambling session should not be taken at face value. There is strong evidence that retrospective evaluations are ruled by a very different mechanism than instant evaluations. For example, Kahneman, Wakker, and Sarin (1997) observed that, under certain well-defined conditions, medical treatment that was more painful in an objective sense (it had similar intensity reported in instant evaluation but longer duration) was retrospectively evaluated as less painful. If a similar mechanism applies to the pleasure from gambling, researchers will face the following dilemma: the player may declare, "Today I gambled too much and I regret it," while, in fact, he or she gambled less than usual. When behavioral measure and retrospective self-report contradict each other, which one should we trust?

Eugene Christiansen's comments are clearly made from the viewpoint of casino management and accounting. They constitute a genuine example of how different people—academic researchers, gamblers, and casino managers—may approach the same thing from an entirely different angle. While my primary position is academic research, I spent quite a lot of time analyzing casino data and discussing problems with casino managers of all levels, including casino directors and CEOs of gaming companies. I also know many gamblers, and even occasionally gamble myself. The perspectives taken by researchers, gamblers, and casino managers are so different that they invariably lead to some misunderstandings. Let me illustrate this with an issue raised by Eugene—the role of *hold, handle, drop,* and *win* in casino gambling.

Some financial statistics that are irrelevant for a casino may prove extremely important for behavioral research and vice versa. Gross gaming revenue is the ultimate variable for casino managers, but it is irrelevant for my study, since my

research is focused on the behavior of individuals. Because of the law of large numbers, for the casino "whether player X wins or loses is immaterial." But again, it is not immaterial for player X! When writing, "From the consumer's point of view, win or gross gaming revenue, not drop or handle, is consumption (consumer spending on gaming)," Eugene attempts to frame the individual consumer's point of view as a mirror image of the casino's point of view, but this is misleading with games of chance. We should not equate consumption of gambling with "spending on gambling"—these are very different concepts. We could metaphorically equate consumption of hamburgers with the $2.99 spent in a burger shop, but to be precise, a statement of the form "$10 billion consumption of hamburgers" is only a synecdoche, a shortcut for "people consumed hamburgers worth $10 billion." One unit of consumption is a hamburger, and $2.99 is the *price*. If gamblers consume anything, they consume bets. Therefore, economic studies that quantitatively estimate the utility of gambling assume handle as a measure of consumption (see, for example, [Golec & Tamarkin, 1998](); [Johnson, O'Brien, & Shin 1999]()). While handle is a measure of the consumption component, it is not the ultimate measure of the entire gambling experience. There is a linear relation between handle and expected losses. If we reduce gambling to consumption, we must end up with a conclusion that the more a gambler loses the happier he or she is, which is clearly false.

From the casino's viewpoint, *win* stands for gaming revenue. If we assumed that the consumption of gambling is parallel to the consumption of hamburgers, we would equate it with the price. But there is a catch: even if casino games have negative expectations, they also have high variance, and a minority of players report positive balances even after many visits. Does this mean that they pay a negative price or have negative spending? To make things worse, two gamblers playing the same game for the same time could pay a very different price. Should they accuse the casino of price discrimination? Nonprofessional gamblers neither spend nor earn money in a casino—they simply lose or win.

It may prove useful to introduce the following thought experiment: to compare casinos to insurance companies. Technically, insurance is "gambling in disguise." By buying an insurance contract we accept a wager contingent on the future state of the world. If nothing happens, we will lose. If something bad happens, the insurance company will lose. Just as in a casino, wagers with insurance companies have negative expectations. A casino has its house edge; an insurance company has its claims ratio. It is usually assumed that the premiums constitute the price of an insurance contract. But insurance premiums have more in common with drop or handle than with win (casino win would be analogous to the insurance premiums earned minus claims paid).

From the consumer's point of view, casino statistics hardly translate to

microeconomic variables like *price* or *spending*. The reason for this is simple, and it is included in the title of my paper. Gambling cannot be reduced to consumption, for it constitutes a genuine amalgam of consumption and investment. Playing at the roulette table has as much in common with eating hamburgers as with stock market day-trading. Gamblers want to win, but winning is negatively correlated with the amount consumed. Therefore, gamblers do not maximize consumption, they try to *optimize between consumption and investment*. This is one of the most subtle optimizations behavioral scientists have ever studied. The casino industry has found it convenient to equate gambling with consumption, because a consumption or an entertainment perspective would destigmatize gambling. However, this policy eventually backfired with the growing demand for consumer protection for gamblers.

I agree about the usefulness of the concept of *player's bankroll*, for it definitely solves many measurement problems outlined in my paper. Unfortunately, this variable cannot be recorded in casino databases unless we x-ray players' pockets and analyze their credit card statements. My analyses were based on the values of drop, because these data are easily available. Note that for a large sample of observations, players' average bankroll may be estimated, at least roughly, from the drop: not by linear transformation, but by positional statistics such as the ninth decile. Moreover, even if data on players' bankroll were available, drop would still remain an interesting variable. This is because of the framing process in a gambler's mind, the so-called mental accounting (Thaler, 1980; Thaler & Johnson, 1990). For example, the size of the bet is affected not only by a total bankroll but also by the amount of chips available to a player—this applies to any bet, not only a maximum bet.

Many of Eugene's comments refer to the distinctions between games of pure chance and games of mixed chance, and skill and how it affects behavioral patterns. I am aware of the existence of professional gamblers, but my study is focused on casual gamblers who play games with negative expectations. In Polish casinos, single-zero roulette is definitely the most popular game. The players presented in my study play mostly or only roulette, so the skill factor does not really matter. I also analyzed quantitatively the betting decisions of many Polish blackjack players (see Dzik, 2003). There were no card-counters among the regular players; there weren't even any regular gamblers who stuck perfectly to basic strategy. Eugene, if I understood him correctly, would put all of my players into the same basket, because he uses a casino perspective with house edge as the ultimate measure of a player's strategic position. But such a perspective seems to miss the point of my study: I was trying to show that some evident differences in players' statistics could be attributed neither to random noise nor to the types of games they played. A casino focuses on turnover and percentages; an individual player is interested in excitement and monetary wins or losses—these are very different

perspectives. If we limit our focus to handle and house edge, we end up treating gamblers like mindless automatons who are programmed to play a predetermined number of standardized bets. Ironically, most laboratory studies of gambling behavior also suffer from this fallacy. Laboratory experiments usually assume the length of play to be an independent (exogenous) variable. There is, say, a fixed number of 20 trials, and player's decisions are tested during each trial. But such an experimental design prohibits the gambler from making the most important strategic decision: the decision to stop playing!

Do gamblers who play a game of pure chance like roulette make meaningless decisions? Of course not: they choose the duration of the game and the size of their bets and these are meaningful choices. Let me explain this with an example. X and Y are equally well off gamblers, and they both play six-deck blackjack betting $10 per hand. X plays a perfect basic strategy game (house edge = 0.4%), while Y make occasional errors, so the house edge for her is 1.0%. On the other hand, X often gets a strong gambling urge and plays from dusk till dawn, making on average 250 bets per night. Y imposed on herself a strict limit of not playing more than 2 hours and firmly sticks to it; she makes, on average, 60 bets per night. X's average loss is $10 per visit, and Y's is only $6. Eventually, the more skilled player incurs greater losses than his less skilled counterpart. To explain the riddle we might say, "player X is more skilled, but player Y is more responsible." But why not say, "player X is more skilled in basic blackjack strategy, but player Y has better skills in self-control"? There are dozens of more exotic examples to illustrate why, even in games of pure chance, players' strategies are sometimes highly meaningful.

Let us recall the algorithmic approach outlined in my paper. A gambler has a bankroll of $500 and makes a $25 bet in roulette. She plays either to win an additional $1,000 or to lose it all. It can easily be proved that her dilemma whether to bet on a sixline (a bet covering 6 numbers) or on a column (a bet covering 12 numbers) is highly meaningful. For her choice of objectives, sixline betting is a less costly strategy, because bets with higher skewness shorten the average duration of the game, thus reducing the handle.

I have to end with the somewhat heretical conclusion that any gambling game is, in fact, a game of mixed chance and skill. The skill to manage time and money is meaningful, and—unlike the skill of overcoming house edge—it refers to every gambler and every gambling game. While gamblers are bound to lose in roulette, their choice of objectives still has enormous impact on how much they lose. I hope everyone agrees that this does matter!

Finally, I will refer to Eugene's comments about casino internal analyses and customer relationship management (CRM) files. When I wrote about the lack of field studies of real gambling, I meant, of course, as published academic papers.

Technically, casino CRM systems estimate a player's value in much the same way investors calculate the net present value of a capital investment. I tried to find the motives behind players' decisions; this is a much broader approach. Access to casino CRM files may prove highly useful to academic researchers and it would benefit both sides. An academic approach may enrich the scope of routine casino analyses; for example, it may help to develop tools for the early detection of problem gambling. Both sides must realize, however, that such studies may result in paradigm-breaking conclusions. They may put the entire gaming industry into a new (not necessarily unfavorable) perspective and redefine the framework of problem gambling research.

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