



Aaron Brown

Table Stakes

Aaron Brown looks at the curious evolution of Poker

How well can a modern person understand the lives and concerns of people in the past? This tantalizing question arises when reading fictional works written more than a few decades ago, or when studying history. Jane Austen wrote 200 years ago, yet we effortlessly identify with the emotional and social conflicts she describes and there is not the least difficulty with the language. On the other hand, daily life in 1800 was totally different from today. Can we really understand people whose every waking activity was completely unfamiliar to us? People who ate, slept and worked in ways more primitive than our camping trips? People whose knowledge of history, geography and science was thoroughly distinct from modern views? Are we misled by familiar words to assign early 21st century meanings to an early 19th century plot?

Going back another two centuries to Shakespeare is more difficult. About half the characters and situations can be transposed seamlessly to today, the rest are frozen in their era. While the language is beautiful to the modern ear, each page contains some archaic usages, which require explanatory footnotes. Did Elizabethan audiences view *Macbeth's* witches a humorous dramatic device or a terrifying depiction of reality? That affects the interpretation of the play. When *Romeo and Juliet* is updated to the present, the characters only make sense if transposed from the top to the bottom of society (the petty delinquents of *West Side Story* instead of the aristocracy of Padua), the imperious Duke replaced by the comic bumbling of Officer Krupke and crucial plot elements like



I advise you to fold

arranged marriages, plague, poor communications technology and suicide omitted or downplayed (knife fights and unwise marriages still make sense to us).

Two millennia farther back, the *Iliad*, the *Gilgamesh* and older books of the *Bible*, are deeply mysterious. All of them have flashes that make sense today, but many of the word meanings have been lost and we can only guess about character motivations and beliefs. We know little about the people who first invented and heard these stories, nor how they were passed along, nor when

nor why they were first written down.

The clearest window we have into the past is reading debates. When people argue, they explain things that would be taken for granted in fiction or history. They not only tell you things, they tell you why they're true; and someone else tells you why they're not true. The poles of their disagreement illuminate the range of belief, and their areas of commonality define conventional wisdom.

The *Gilgamesh* opens with the famous line "Gaze upon the walls of Uruk, did not the seven sages lay their foundation?" Who were the seven

sages? What are we supposed to feel looking at a mud brick wall? Can we rely on modern English meanings of “gaze” and “sage”? It would tell us a lot more if another character said “Sages? Seven morons is more like it. Mud walls have been useless since the Hittites got bronze, we need stone.” That would give us some context to understand the meaning.

I’ve been thinking about this for the last year as I’m researching a book on Poker and finance (*The Poker Face of Wall Street*, John Wiley & Sons, February 2006). The modern economic world was born in the early 1800’s in the Mississippi River valley, but we have little documentary evidence about the birth until the 1850’s. While people did argue about finance, the ideas are hopelessly confused from our present perspective. No one had any idea what was going on (but they did have strong interests which taint the debate). Arguments about the game of Poker, which was invented at the same time and place, were more subtle, rational and disinterested. Moreover, they are based on timeless principles. We can compute the exact probability of getting dealt a pair of Aces, then or now. It hasn’t changed. We can only guess what return people expected from investments. Since Poker and finance involve the same core concepts of money, expected value and risk, we can learn about both by studying either and Poker writings are easier to understand.

Luck has nothing to do with it

You often hear that Poker is not a card game, it’s a gambling game that happens to use cards. That would annoy serious early Poker players, who insisted Poker is not gambling. The game was carefully designed so that each bet was a rational calculation, not a guess. The idea is familiar to financial quants as the riskless hedge argument in option pricing. Although an option seems to be a bet on the price movements of the underlying, under the Black-Scholes assumptions, its price can be computed precisely, with no uncertainty. If you buy or sell the option at that price and delta hedge, you take no risk.

Suppose I offer you a bet. Assume that it is a binding offer, if you accept then we have a bet. I have just given you a free option, you can take the bet if you feel it has positive expected value to

you, and decline it otherwise. Moreover, I’ve given you important information about my beliefs, since I must think the offered bet has positive expected value to me. The same problem occurs in trading, whoever first names a price or commits to a deal has a disadvantage.

There are a number of ways of equalizing the situation. We can agree on a spread, then I quote you a bet. You are committed to taking one side or the other, but you pay the spread. For example, suppose we want to bet on the World Series. We agree on a \$2 spread for a \$100 bet. I will give you a number that I am willing to bet on the American League team, if you put up \$100 minus that number on the National League team. When you hear my number you can pick whether to bet on the American League or National League team. If you pick American League, you pay my number plus \$1. If you pick National League, then you pay \$101 minus my number. Either way, I pay \$100 minus your bet, and the winner gets the \$100. If I say \$53, you can choose between putting up \$54 on the American League team against my \$46, or putting up \$48 on the National League team against my \$52. I’m selling you an option plus the information in my quote for \$2.

The trouble with schemes like this is they tend to be complicated and they don’t adapt well to more than two people. Moreover, the problem of agreeing on the correct spread amount is the same as the original problem of agreeing on the bet. Do we need a prior round to determine who is willing to quote the bet for the lower spread? This leads to an infinite regress.

In early poker, two to ten players were each dealt five cards from a standard 52-card pack (20 card poker, played by removing the card ranks 2 through 9, was sometimes played in 2 to 4 person games). Players bet in turn. At your turn you had three choices. You could fold (throw in your cards and take no further part in the hand), call (contribute the sum of any raises since your last bet) or raise (call, plus add some more to the bet). Betting ended when someone raised and all players remaining in the pot either called or folded. Then the hands were revealed and the highest one took the pot.

It was very important to Poker inventors that no one was ever forced to put money in the pot (that’s gambling) and that money was never

removed from the pot (that’s dishonest). Each player remaining in the hand at the end had made an equal contribution to the pot (that’s fair).

The problem is that it is irrational to make the first bet. Suppose there is some set of hands that you will bet on. Other players will only call your bet if their hand is better than the average hand you bet on. Therefore, you will either find that there is no bet, or that you are in a disadvantageous bet. You can only win by fooling people, betting on stronger hands than other players think you bet on. That’s deception, not Poker.

The solution was to require the first bettor, the player on the dealer’s left, to make a bet before looking at his cards. This is called a “blind” for obvious reasons. He was allowed to blind any amount, including zero, so he was not forced to put money in the pot. No player was allowed to call the blind, the initial bet had to be a raise of at least the blind amount (that is, players had to either fold or put in at least double the blind amount).

Clearly the players other than the “age” (the player on the dealer’s left who posted the blind) were not forced to bet. Since they would only bet with positive expectation, it would seem to follow that the age must have negative expectation. So why would anyone post a blind? Experience clearly showed that the age consistently made money, and the higher the blind, the more money he made. Although he had to put the first bet in the pot, in return he got to see what everyone else did before making his first decision. If several players called, or there were raises, he could throw away a good hand; if there was only a single late-position call, he could bet aggressively with a moderate hand. The option value he got by acting last more than made up for the cost of the blind.

In fact, the advantage of the age was so great, that the player to the age’s left was given the option of “straddling” the blind. He could post double the blind before seeing his cards, and then he got the advantage of acting last. The player to his left could straddle him by doubling again, and it kept going around the table until someone declined to straddle. Then people picked up their hands and began betting normally.

There is a mathematical inconsistency. The game is zero-sum, so all bets cannot have positive



expectation. But Poker is not designed to give everyone a positive expectation. All it claims is that there is a rational play available to each player at every turn. No one is forced to make a negative expectation bet. The age posts a blind because experience shows it is an underpriced option. The remaining players can evaluate the strength of their hands and determine if the implied odds offered by the pot are greater or less than their probability of having the best hand. Players who prefer the age position can straddle at every opportunity, players who dislike it can post zero or small blinds. It's easy to see the analogy between these concepts and competition to be regarded as a market maker in trading; or the decision whether to post prices; or the various ways markets charge traders to have the privilege of acting last.

Unlike most card games where the good card combinations are arbitrary and complex, Poker used a strict and simple system

The cold mathematics of this game gives a great advantage to precise calculation and discipline. Players with contrasting temperaments came up with the idea of an "ante." This is a confusing term because its first meaning was its modern meaning, a forced bet made by all players before seeing their cards. It was first used in print in 1857 by Thomas Frere (the book was called "Hoyle's" like many other books of card game rules, the real Hoyle was long dead and never heard of Poker). When draw poker was invented, "ante" came to mean any bet before the draw, but it later reverted to its original meaning. In modern poker there is usually an ante or two blinds, or both in later stages of poker tournaments. The player to the dealer's left makes the small blind, and the next player puts in twice that amount, called the big blind. This clearly preserves the idea of a blind with one straddle, although the amount of the blind is no longer optional. Interestingly, in modern play the blinds consistently lose money. This is because (a) you can now

call the blind, you are not forced to fold or raise, and (b) the amount of the blind is much higher in relation to the limit.

The ante aroused furious resistance from scientific players who felt it destroyed one of the founding principles of the game. The famous Poker player and writer John Blackbridge wrote scathingly in *The Complete Poker Player* (1875), "the ante turns Poker into a lottery, with the addition of a condition which the lottery system lacks, namely that all players *must* buy tickets." But this view did not prevail. Not only did antes or forced blinds become regular parts of the game, but their effect was enhanced by the impositions of limits on voluntary bets. By 1880, limits were typically 100 antes, by 1900, 20 antes. Modern games are not directly comparable, since they have more betting rounds, but the ratio of voluntary to invol-

untary bets is lower even than it was in 1900; and lower still in tournament play. In combination with the house "rake" in casino games, low limits, blinds and antes make Poker more like slot machines than the proud ancestral game.

During the same period as the Battle of the Ante, the American frontier was closing geographically and culturally. Financial exchanges and boards of trade were begun in the early 1800's simply as places anyone could come to bid or offer; by the end of the century they were institutions in which traders had to purchase memberships (ante) and abide by rules (limits) limiting positions and mandating disclosure. Laws were passed against the old-style "curb" exchanges and "bucket shops." More laws were passed against gambling, market manipulation and unfair competition (either too fierce or not fierce enough). Banks evolved from strictly private institutions, which could issue as many notes as the market would bear, to regulated institutions with steadily increasing legally mandated involuntary capi-

tal (silver) relative to voluntarily purchased assets (such as loans).

Another famous Poker player and writer, R. F. Foster (*Practical Poker*, 1904), wrote "[T]he scientific players brought their troubles on themselves by driving their less cautious opponents [to antes and limits]. Most people like to play, whether they hold court cards or not; and sitting out hand after hand, waiting for court cards, is not amusing, even if it has a percentage of two-elevenths in its favor financially ... The conservative players of the old days, who never came in on anything less than court cards, were continually throwing up their hands without putting up a chip, and the liberal players had no one to bet against."

Every hand in its place

The ranking of the hands in Poker was another early cherished principle. Unlike most card games where the good card combinations are arbitrary and complex, Poker used a strict and simple system. Among types of hands, the less frequent the type, the more higher the ranking. Within types of hands, the more frequent the type, the higher the ranking. This simple system leads to some nonobvious consequences.

Before flushes (around 1850) and straights (around 1875) were introduced, there were six types of Poker hand. The best was four of a kind, which you can get 624 ways out of the 2,598,960 possible Poker hands. Next was a full hand (so called because it was the only hand to use all five cards, it is now called a full house or boat), of which there are 3,744. These were followed by three of a kind (54,912 ways), two pair (123,552 ways), one pair (1,098,240 ways) and no pair (1,317,888 ways).

Within each class the system is reversed. Among hands with no pair, for example, the rank is based on the highest card. Of the 1,287 possible rank combinations, 495 are Ace high, which is the best. Next is King high (330 ways), Queen high (210 ways), Jack high (126 ways), Ten high (70 ways), Nine high (35 ways), Eight high (15 ways), Seven high (5 ways) and Six high (1 way). The same system is used for pairs and two pairs but the three highest types of hands (three of a kind, full hand and four of a kind) all hands within type are equally likely. Flushes are ranked

the same way as no pair hands. Straights are all equally likely, although they are easiest to get with middle cards (five to ten) and hardest with the highest and lowest cards (two, King and Ace).

For straight poker (five card hands dealt face down to each player, with a single betting round) it makes no difference. We could assign any ranking to any combinations of cards and it would not change game strategy. But virtually all Poker games since 1870 have betting before the full hand is revealed. In that case the Poker ranking system means that Aces are extremely valuable (hence the expressions “Ace in the hole” and “Ace up his sleeve”). A no-pair hand with an Ace will beat another randomly-selected no-pair hand 1,299,763 times out of 1,565,734 (83 per cent). The advantage is even greater for a pair of Aces against another one-pair hand and two pair including Aces against another two pair. It is slightly lower for Ace high flushes against other flushes and a straight with an Ace wins only half the time against another straight. For three and four of a kind, the Aces always win, and four full hands the Aces always win if they are the three of a kind and half the time if they are the pair.

If Poker were more consistent, we would rank hands starting with the lowest card. In that case the best no-pair hand would be a ten low (this would be a straight if straights were allowed), which you can get only 1 way. The next best would be a nine low (5 ways), eight low (15 ways), seven low (35 ways), six low (70 ways), five low (126 ways), four low (210 ways), three low (330 ways) and the worst hand would be a two low (495 ways). In this game the advantage of an Ace is much smaller. A no-pair hand with an Ace wins only 39,482,359 times out of 70,458,030 (56 per cent) against another random no-pair hand. With these rankings, players would bet more on partial hands that include pairs (or flush and straight possibilities if those are allowed) and less on high cards.

Many players felt that hands should be ranked strictly in order of rarity. They preferred lowball Poker, in which the worse regular-Poker hand wins. In theory, this means that the more common hand types are preferred, with the less common hand within type. But in practice, no one bets on a pair or higher in lowball, so essentially the less frequent a hand the higher the rank.

Lowball was considered less scientific, however, because the value of individual cards was less pronounced. A two in lowball is not as valuable as an Ace in regular Poker (some, but not all, variants of lowball allow you to count the Ace as low). That means seeing your first card or two tells you less about your probability of winning in lowball versus regular Poker. That, in turn, means scientific players are less likely to bet and action players are doing more gambling.

To a lesser extent, introducing straights and flushes has the same effect. Any first card is equally likely to be part of a flush as any other. For straights, the value of fives through tens (two and a half times as likely to be part of a straight than Aces, twos and Kings) makes it less likely that you would bet on an Ace or court card.

Why were straights and flushes finally accepted? It was a gambler’s argument, not a scientist’s. If you allow straights and flushes, then the rarest hand is a straight flush, a hand that is simultaneously both a straight and a flush. Why does that matter? Even the highest straight flush (called a “royal flush,” Ace, King, Queen, Jack and ten of the same suit) can be tied. That means no hand is a sure winner. Without straight flushes then four Aces, or four Kings with an Ace, cannot be beaten or tied. This is a serious problem in a game if you consider it unethical to bet on a sure thing.

Although the chance of two royal flushes coming against each other is astronomically remote (1 in 664,441,017,240) the argument for straights and flushes is not just theoretical. These hands materially weaken the advantage of high cards and pairs. There are 4,368 hands that beat three Aces in Poker without straights and flushes, 19,756 hands otherwise. Because straights and flushes take longer to develop than hands based on matching high cards, they change the strategic dimension. Players with high cards and matches tend to raise aggressively early, to prevent players with suited cards and connectors from staying in the pot and maybe completing their hands.

Crazy palefaces race to the bottom

In an earlier *Wilmott* article (“Time Enough for Counting”) I gave the mathematical argument for bluffing with your worst hands. This gave rise to a

debate about what was the worst Poker hand. The lowest hand in regular Poker with straights and flushes is seven-five-four-three-two with at least two suits. But this is almost a straight. In draw poker, for example, it’s a good hand because you would throw away the seven and draw to an open-ended straight (assuming Aces could be used low in straights as is usual today). It was good enough for the worst hand in Chicago, but in the South people preferred to call a nine high hand with only two consecutive cards (and no flush) the worst hand. An example is nine-seven-five-three-two. The reason for insisting on two consecutive cards is a hand like ten-eight-six-four-two is known as a “skip straight” or “Dutch straight,” and it is a ranked hand in some Poker games (between two pair and three of a kind). The nine high version occurs four times as often as the Chicago worst hand, roughly as often as a flush. If you use it as a randomized signal for an aggressive bluff, pretending to have a pat hand, about one sixth of the hands you represent as pat will be bluffs. This is a reasonable fraction. You still find traditionalists from the South who bet heavily on this hand.

Trade jargon was a language mixing English, Spanish, French and various native American words, with a simple grammar. It varied regionally, but allowed traders to communicate over a wide area. In Chinook jargon, the word “pelton” means fool, for Archibald Pelton who was found *non compos mentos* by Indians in Walla Walla, Washington. The Chicago low hand became known as a “Chicago Pelton” because only a fool would bet on it.

The nine-high version got its name from Mobilian jargon. The word “kolter” means to bluff, both in the sense of gain advantage by fooling and win from a position of disadvantage. It is also based on an experience with a European. John Colter, a member of both the Lewis and Clark and Manuel Lisa expeditions was captured by 200 revenge-minded Blackfoot Indians, who wanted to kill him in an interesting way. The chief asked if he could run fast and Colter, who could, replied “not very.” So he was stripped naked and given a short head start, after which the Indians competed to kill him with spears, arrows and tomahawks. Colter escaped by running 13 miles barefoot through scrub and thorns,



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dodging a spear and killing the attacker with its point (which he later used to get food), hiding all night underwater beneath a deadfall, then covering three hundred miles barefoot and naked.

The similarity of concept, sound and etymology caused these two hands to get confused. The Mobilian word got changed to “kilter,” probably by association with the phrase “out of kilter” (“kilter” is an old word that means “good order”), and sometimes “kelter.” The Chicago hand became “pelter.” There is an old story that the name comes from a tradition of betting one pelt on the hand (early Chicago was a fur trading post), or alternately that the holder won a pelt, but I know of no evidence for either version. Somewhere along the way the distinction between the two hands was lost and both names are now applied to both hands.

Playing card ranks have always been symbols of the social order. That Ace ranks over Kings is said to remind us that God rules us all, or that the meek shall inherit the earth, or that the one community is more important than its leader, or that it is possible to win from a position of great disadvantage (in modern Poker parlance, that “all you need is a chip and a chair”). Poker is supposed to represent an American attitude that rank is less important than fittedness, three twos beat two Kings even when the monarchs are allied with an Ace, Queen and Jack. The simple mathematics of hand rankings reflect the impartial rewards granted by a democratic free society. The pyramid of hand types, with less common hands on top of more common ones, shows the steep rewards available to the few in winner-take-all competition. But the inverted pyramid within type, with most of the hands near the top, tells us to cooperate, not compete, within class.

Burned at the stake

The final great Poker debate of the 19th century concerns the stake. Early Poker was never played for money, both because there wasn't a lot of money available and because it violated the spirit of the game. Today Poker is usually played with chips, which are issued either by a casino or, in home games, by a player designated as banker. The chips are merely a convenient substitute for money, they can be bought and sold any time. An exception is Poker tournaments, where chips need not represent specific amounts of money and there are strict rules concerning buying and cashing out.

In the early days, Poker was always played with checks. Each player brought his own, except that a stranger might barter for some from a local sponsor. Any kind of distinctive marker would do. By tradition, they were colored white (representing one), red (five) and blue (ten). At the end of each session, a player would redeem his checks that had been won by other players with checks he had won. If he was a net winner, he would end up with some extra checks of other players, if he was a net loser, other players would end up with his checks. Winners had the responsibility of collecting from losers. Often this was done in connection with another transaction. For example, if A wanted to trade his gun for B's horse, he might agree to throw in 200 checks. He might hold 50 of B's himself, and have received another 100 from C in some other trade. He would give these to B along with 50 checks of his own. Or players might play all winter in a mining camp, then settle up the net obligations for gold at the end of the following summer.

This system antedates the ring clearing that in

turn preceded modern futures exchanges. In the 1830's and 40's, commodity brokers would gather periodically and exchange offsetting contracts in exactly the same fashion that Poker players 20 years earlier had cleared checks. Today futures exchanges use clearinghouses, so offsetting trades are canceled immediately; and Poker games generally use a house or banker for the same purpose. But traditionalists fought for many years against the use of money or house chips at the Poker table. Poker was supposed to be a self-organized society of people, like a mining camp or hunting party, not a gambling game dependent on bankers or casinos. A Poker loss was an obligation of a different sort than wages owed or contractual payments.

Traditionalists lost all three debates. Today antes or compulsory blinds are nearly universal, limits are usually small relative to involuntary bets and the final tables of Poker championships have antes and blinds so large as to make the outcome almost as random as roulette. Modern games have several betting rounds before a player sees all of his cards, these are semi-blind bets (although at least they are entirely optional). Straights, flushes and straight flushes are firmly established; wild cards and high-low games offer even more variety of possible hands (although Dutch and round-the-corner straights, tigers and blazes are seldom counted). Poker is sometimes played with money, and even when played with chips they are bought for money immediately before the session and cashed in for money immediately afterwards.

Yet the game is more popular than ever. Probably no more than a few thousand people played much straight poker. Pure chance games like faro, chuck-a-luck and three card monty were far more popular on the American frontier. Poker had to add a little gambling, lose some mathematical precision and integrate itself better into society to become a mass pastime. But the game still embodies the principles that made it special. They survive as ghostly traditions with strong moral force among Poker players, even if they are honored only in the breach. I think a traditionalist, thawed out of some ice cave in the Rockies, would agree that the game's soul has survived the adulteration.