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Harlan D. Mills

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Secrets of a Mississippi Riverboat Gambler

A Short Play in Two Parts

Harlan D. Mills

Part 1. A Chance Meeting

Part 2. An Illustrated Explanation

The Players

A Mark. A young man of obvious intelligence

A Gambler. An older man of no obvious intelligence

Darling Lolly
Hope you like this!
Love
Harlan
June 21, 1979

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Part 1. A Chance Meeting

Scene. The deck of an 1850 Mississippi riverboat, with the Mark at the rail and an enclosed deck behind.

M: (pantomime watching river and shore from boat rail)

M: (to audience): It takes a while to float down the Mississippi on a paddlewheel riverboat -- all the way from Saint Louis to New Orleans. The scenery is interesting, but after a couple of hours, every river bend and sand bar looks more and more like the last one.

Anyway, with a lot of time, and no place to go, it's pleasant to pass the day at the rail in the sun, just picturing that new job waiting in New Orleans. I was lucky to land a job like that by mail, managing a big new department of a dry goods wholesale house. I was even luckier in finding a cash buyer for that old general store in Dubuque. The folks worked hard to start that store, rest their souls, but Dubuque is Dubuque, and New Orleans is New Orleans, or so they say!

There is a poker game going on inside -- high stakes. But poker with strangers is a dangerous game. They all look like professionals in there, and everyone probably has an ace up his sleeve. Well, there are better things than gambling with strangers, especially after seeing that card sharp do those tricks at the medicine show. He could deal four of a kind to six fellows, and a straight flush to himself. Imagine what he could do in that game inside!

G: (enter with small carpet bag)

G: (to M) Howdy, friend, have you got a match?

M: Sure -- here, keep the box. I've got another.

G: Thanks, you're sure you can spare it?

M: Yes, thanks for asking. I've just sold the old family store, but stocked up on a few items, including matches, before taking inventory!

G: That's good thinking, friend. Where'd you come from?

M: Dubuque -- headed for New Orleans.

G: That's interesting -- your store in Dubuque?

M: Yes, going to a new job in New Orleans.

G: That's a long way. I've never been that far from home. In fact, never been on one of these river boats before. They creak a lot, don't they?

M: Yeah, but I guess you get used to it after a few days!

G: I suppose so. I've got to go to New Orleans, myself. My brother-in-law just passed away, so I've got to help my poor sister get her affairs straightened out. I don't know why she had to move so far away, anyway, but I guess it's the least I can do to help her now.

M: That's too bad, about your brother-in-law, I mean. I guess it is a long way to go, just to come back.

G: Well, I can't complain. It's a trip I'd never have taken, so I'll just make the most of it. Say, did you notice that poker game in there? I wonder if that goes on all the time on these riverboats? It looks to me like a fellow could lose his money pretty fast.

M: Yeah, I was thinking the same thing. I've seen a card sharp deal four of a kind to everyone around the table, and then deal himself a straight flush!

G: Is that right! I wonder how he could do a thing like that!

M: I think I've got it figured out. All but how he could keep all the cards straight while he was dealing.

G: Well anyway, that's beyond me. I can hardly shuffle a deck of cards without dropping them all over the place.

M: (to audience while G looks back at poker game)
It's sure pleasant to run into this guy. Too bad about his poor sister. He knows even less about what's going on in that poker game than I do. At least I can shuffle cards about as good as anybody! I wonder what he does for a living -- probably a school teacher, or works in a bank. He's sure no farmer, and you can tell by his hands he doesn't do manual labor. But he's pretty naive -- probably a school teacher!

M: (to G) I'll bet every player in there is a professional. They're not going to get my money, I can tell you!

G: Mine, neither -- not that I have so much, anyway. Going to help my little sister has just about put me in the poor house.

M: That's too bad, but I can tell you're the kind of guy who would put himself in the poor house to help someone else. I'm a good judge of character -- got that from giving credit at our old general store. You soon learn to tell a shifty eye, believe me!

G: I'd bet on that. I'd bet you really can tell a crook when you see one! I'm not so good at that -- too soft hearted, I guess.

M: Well, in my business, you've got to face facts, and that means being tough sometimes, even though it's unpleasant. I'm probably older than you think I am, and seen more shenanigans than you'd dream of, meeting traveling salesmen all the time, with their tricks!

G: I'm sure you're right.

M: By the way, what business are you in? A school teacher, I bet!

G: Thanks for the compliment, but I'm not nearly smart enough for that! I'm a bookkeeper in a harness factory back in St. Louis. Not a real bookkeeper, but I help our real one, and run errands for the owner sometimes. He even lets me get the payroll from the bank when he's too busy to do it himself!

M: Well, that's the mark of a trusted man! A good, honest employee is hard to find these days.

G: I suppose you're right. And I guess honesty is the best policy -- especially when you're not so smart!

M: (to audience, while G looks away) This poor guy doesn't think much of himself. He's got an honest face, but he does look pretty dumb. I'll bet people take advantage of him all the time. At least he knows enough not to gamble his money away. Speaking of gambling, I wonder if he'd like to match pennies. That's not really gambling. In fact, that's a game you can play with strangers. No matter how smart the other guy is, you can just flip your penny, and win half the time, no matter what he does. Of course if two guys walk up and want to play "odd man wins", watch out! They may even walk up separately, and pretend not to know each other, but I'd be on to that one! But matching pennies is a different thing. This poor guy probably doesn't even know about "odd man wins". I could just picture him getting taken by two slick talking traveling salesmen!

M: (to G) Did you ever match pennies, to pass the time of day?

G: No, how does it go?

M: (showing G how to match pennies) We both put a penny on the back of our hands, like this. If I match you, you give me your penny; if I don't match you, you get my penny.

G: What do you mean, match me? If both heads or both tails?

M: Yes, if both pennies are heads, or both are tails, that's a match. If one is a head, the other a tail, they don't match.

G: Say are you a professional gambler? No offense, but it seems to me that you'd win most of the time.

M: No, I'm certainly not a professional gambler, though I can tell one if I see one! And neither side should win more than half the time. But why do you think I'd win most of the time?

G: Well, I'm not so good at figuring things out, but you can win if both pennies are heads, and you can win if both pennies are tails, and I will win only if they are different. So two times out of three, you'd win!

M: I see what you're thinking, but it's the wrong way to figure it out. It may seem like I've got a better chance to win, but just to prove it's not so, I'll let you match me, if you'd rather. You can see it yourself, if you just look at it a little differently. If you like, flip your penny each time. Then, if I choose a head, you'll have a tail half the time and win, if I choose a tail, you'll have a head half the time and win. Either way, you win half the time, instead of only one time out of three. Got it?

G: I think I have. I was sure you weren't trying to put anything over on me, but it's a new game to me, so I couldn't figure it out so quick. You can match me. It's fine with me. Is this for real money? I mean do you keep my penny if you win it?

M: (with appropriate action) Well, it's up to you. We can play for fun or real. If we play for fun, we should count our pennies right now, so we can keep track of them. Let's see, I've got seven pennies here.

G: (with appropriate action) I've got eleven -- I'll give you two, so we can both start with nine -- does that make it fair? And it's all right that we get our own pennies back when we're playing for fun?

M: Right. Thanks for your two pennies, and now we both have nine. Let's match until one of us runs out. Then we can divide the pennies up and start again.

MG: (pantomime matching pennies, each pondering between tries, and choosing head or tail)

M: (to audience) It takes a while to float down the Mississippi. And matching pennies for fun doesn't make it seem much shorter after ten minutes, or so.

MG: (continue pantomime matching pennies, M usually winning)

G: I guess I'm not much competition for you. You seem to guess what I'm going to do next most of the time. I'd never want to play this back at the harness factory -- the fellows there would want to play for real, and would probably win like you are.

M: Well, I have been pretty lucky at out guessing you so far. But if you want to flip your coin, like I said earlier, I couldn't out guess the flip, and you'd win half the time.

G: Maybe I should try it -- you're sure it'll work?

M: Not every time, of course. But in the long run it's bound to. Not everyone knows this, but if you flip a penny, it will come up heads half the time and tails half the time, no matter what has happened before. If you've flipped ten heads in a row, a lot of people think it will be tails next time for sure. Not so, even after ten heads in a row, that same penny has half a chance of comming heads again!

G: You don't say! I guess I'd have thought the other way. If you really think that works, I'll try it. In fact, just to show you I believe you, I'd even be willing to try it in matching pennies for real!

M: Thanks for your confidence -- it will work. Here, let me give you back your eleven pennies, and we can play for real if you like.

G: This could be fun. I've never gambled like this before. I have another idea. I shouldn't admit this, but I have a few quarters in my bag, here, which I shook out of my piggy bank. I'm going to buy my poor sister a new hat when I get to New Orleans. But there'd be no harm in using

these quarters to match with on our way down there. After all, as you say, I shouldn't win or lose anything in the long run.

M: That's a splendid idea, but I've only got three quarters with me. I may run out, soon.

G: (with action) Well, that's easily fixed. Let me trade you some of my quarters.

M: Right, and here's a dollar for them.

MG: (pantomime matching quarters with M choosing, G flipping, and exchanging quarters for bills)

M: (to audience) Matching quarters for real is a lot more interesting than matching pennies for fun. It sure helps pass the time. I'd pity a sucker who wandered into that poker game in there. He could get trimmed. It's lucky I've run onto this pleasant, but innocent, fellow. In fact I wouldn't even care if he were a real gambler. I could always flip my quarter and he'd never get the better of me. I hadn't really thought about how safe a game matching quarters really was.

G: Well, we've been matching quarters for half an hour, and we're almost where we started. I believe you're right about the game being fair.

M: (with action) Right. Let's see, I've got 19 quarters, now, when I started with three, and I've bought quarters from you five or six times.

G: (with action) I think it was five times -- I've got five dollars here.

M: Then that means I've lost exactly four quarters in all this time. I'm a little sorry I gave you that tip about flipping your quarter. You're not only breaking even, but are four quarters up on me!

G: Just luck, and you'll probably win one back on this next match, ready?

M: (with action) Ready, oops you win, so I'm now five quarters down. But I'll get them back!

G: I'm sure you will. Say, I have an idea. I'm not very good at figuring things out, but I can see a way for you to win your quarters back faster than just one at a time. What if I'd pay you five quarters if you match me on heads, and one on tails. And to make things even, you'd pay me three quarters if you don't match me. Five quarters for a match on heads and one quarter for a match on tails makes six, which is just three quarters for each mismatch. You're better than I am at figuring this out, but doesn't that make it a fair game yet, and more interesting too.

M: Well, let's see. That might be a good idea at that. If we're both flipping our quarters, then two heads, two tails, a head and tail, and a tail and head will each come up one fourth of the time. I'll get six quarters in the first two cases with both heads or both tails, and you'll get six quarters in the last two cases. By golly, nothing could be fairer than that! That is a good idea. I can see that I am a good teacher -- you're learning fast!

G: I'm glad you think so. Shall we try it that way?

M: (to audience) I sure hope this poor fellow can really afford to lose if he's unlucky. He's flipping his quarter each time, just as I said. But he still may lose from bad luck. Well, anyway, New Orleans is a long way, and there'll be a lot of time for him to win his money back if he does hit an unlucky streak.

MG: (pantomime matching quarters in new game, paying each other 5, 3, or 1 quarters each time)

M: (to audience) I have to admit this is a lot more interesting than simply matching pennies. He seemed pretty glum when I matched on heads three times in the first five tries! But he's a good sport about it.

I wonder how he did think of this? Probably something about fives in bookkeeping that made him think of it.

MG: (continue pantomime matching quarters and changing quarters for bills G reaching into bag for more quarters once or twice)

M: (to G) I started out matching you on heads three times almost in a row. But my luck seems to be changing.

G: I'm sure it'll come back. In fact, you're the one who has just taught me that you can count on the luck evening out in the long run by flipping your quarter.

M: That's right. You've been pretty lucky just flipping. I believe I'll start flipping, rather than choosing, to see if my luck changes.

G: I hope it does. All I want is to just break even by the time we get to New Orleans. That's a long way off, so there's lots of time for the luck to even out.

MG: (continue pantomime of matching, M flipping also, and changing quarters for bills)

M: (to audience) Right now, I'm glad it's a long way to New Orleans. I'm sure I'll win my money back. After all, we both want that. Let's see I've broken two twenties so far, and a five, so I'm about fifty dollars in the hole!

M: I really have run into some bad luck. But I'm sure it'll even out soon!

G: I'm sure it will, too. If you think it will turn, I'd like to let you win your money back faster. How about matching for dollars, instead of quarters. That way, it should take you only one fourth as long to win your money back!

M: You're right, and it's mighty good of you to give me the chance to win it back faster. Let's do match for dollars -- same rules -- five dollars if I match you on heads, a dollar for a match on tails, and I pay you three dollars if we don't match.

G: All right, and as soon as we get back even, let's drop the stakes back to a quarter. This may be old hat to you, but I've never thrown money around like this before.

M: Agreed. When we get even, we drop the stakes back to a quarter.

MG: (continue pantomime M sometimes chooses, sometimes flips, G always flips, exchanging 5, 3, or 1 bills after each trial)

M: (to audience) Now, I'm even more glad it's a long way to New Orleans. My luck has got to change soon! And I'll win it all back. I'll be glad to quit, then. Let's see, I've broken three hundred dollar bills -- never thought I'd touch those on this trip! But it's only temporary -- my money isn't leaving the boat until we get to New Orleans, so I can win it back. All I need is a little time.

MG: (continue pantomime)

M: I see we're pulling into a small town. What is it?

G: Oh, I think this is Cairo. As a matter of fact, my boss at the harness factory comes from here. I'm taking a present to his mother for him. The boat docks here for twenty minutes, and I'll rejoin you. There may be some confusion when we push off, so if I don't see you then, I'll meet you here, as soon as we get out into the channel again.

M: Fine, I'll see you then. Don't lose my money in Cairo!

G: Don't worry. I won't. You've got all the way to New Orleans to win it back, and I hope you do!

G: (exit with carpet bag)

M: (pantomime boat leaving dock and M looking for G)

M: (to audience) I wonder what could have happened to my friend. Come to think of it, I don't even know his name. He is a lucky one though. Maybe the Lord makes up on luck what he withholds in brains. He may have gotten lost, back there in Cairo, running that errand for his boss. But it's just like him -- being put on by others. He'll probably go through his whole life being outwitted and used that way.

Well, anyway, my money is gone for a while. Three hundred and sixty dollars! But I'll see him when he lands in New Orleans. I'll simply meet the next riverboat in from up here and he'll be on it, I'm sure. After all, he does have to help his sister get her affairs straightened out.

But what if I don't find him -- and what if he's lost my money to a professional gambler before I find him. I hope he's got enough sense to avoid that.

Maybe, just maybe, I won't see that three hundred and sixty dollars again. Wow! I never though I could lose that kind of money! Don't know how it happened.

But there's one consolation. If I have lost the money, at least it went to a worthy cause -- to poor, dumb fellow with luck, who can probably use it. At least, I didn't lose my money to a Mississippi riverboat gambler!

Curtain

Part 2. An Illustrated Explanation

Scene. Dock at Cairo, with Gambler at a screen.

Screen 1.

G: (to audience) In matching pennies, the outcomes for the players can be seen in this table with two rows and two columns. The matcher chooses a row, marked H or T for tails, and non-matcher chooses a column. These outcomes are for the matcher. An outcome of one means that the matcher wins a penny. A minus one means the matcher loses the penny.

Matching pennies, with each player guessing, and trying to outguess the other, is a deep study in personal psychology. If one player can penetrate the other's thought process and find a pattern, he can win.

But even though such a deep analysis of the other player is possible, either player has a very simple resort. He can protect himself from being outwitted, by the simple expedient of flipping his penny, rather than choosing heads or tails by conscious decision. Of course, in doing so, he also foregoes the chance to outwit the other player too. That is, if the matcher flips his penny, he has half a chance of winning and half a chance of losing, no matter what the other player does. The long run average of these outcomes will then be zero. It is a fair game. But even with a zero average, one of the players may end up a winner just from luck, and chance variation.

Screen 2

For example, on 100 trials, a player flipping will win or lose five pennies or less about two-thirds of the time. We'll call those plus or minus five pennies, which define a two-thirds spread of possibilities, the "chance variation" of the game. Those five pennies are also the five percent of the 100 trials, on the first line of this table. But chance variation washes out, more and more, in longer games. The chance variation of a game of 1000 trials on line 2 is plus or minus some 15 pennies, but only 1.5 percent. Even so, the total amount a player is apt to win or lose by chance variation keeps increasing.

In spite of a player's hopes, about "his money", and winning it back, there is no tendency for lost money to return! Being a "fair" game means both players have an equal chance to win at the beginning of the game. It does not mean that a player behind has a better chance to catch up. In fact, the game is fair at the start of each new trial, independently of what has happened before. Sure enough, a player behind five pennies after a 100 trials may catch up in the next 100 -- but he is just as likely to lose another five pennies as he is to catch up.

Our young man from Dubuque knows something of these facts -- especially that no one can outsmart him if he flips his penny. He's a little fuzzy about the distinction between fair games and the tendency for money to return to its original owner. In fact, money never remembers who it's owner was, but owners often hopefully imagine so.

Enter now, the Mississippi riverboat gambler. Of course, we know by this time that he doesn't have a poor sister in New Orleans at all -- he never saw the inside of a harness factory -- and he carries those quarters around as tools of his trade.

In any case, the young man from Dubuque has a little knowledge -- just enough to be dangerous. And that little knowledge is used in several ways by the gambler, to develop a flexible scenario which is bound to part the young man from his money.

Indeed, this particular operation was a singular success in not gambling at all. Not only did the gambler get the money, but he left the young man with dignity and consolation. After all, the money went to a worthy cause, at least not to a Mississippi riverboat gambler! So there was value received, in entertainment, in self esteem, and in helping others! That meets the first rule of any good fleece - that the lamb never know that he has been sheared!

Screen 3

The final game in dollars has these outcomes. The young man from Dubuque could tell it was a fair game, too. If both players flip their

coins, each entry will occur one fourth of the time, with a net gain of zero for both players.

Even though the game is still fair, there is more excitement. Whereas in flipping pennies, a player could win or lose up to 5 pennies in a hundred trails by chance variation, in this new game, he could win or lose up to 15 pennies under the same circumstances. But, as the young man from Dubuque knows, he has just as good a chance as has his poor dumb friend at the rail -- that is, if both players flip their coins.

However, just suppose that poor, dumb friend at the rail does something a little different. Every third time, he intentionally turns up a tail; the other two times out of three he really flips his coin. That wouldn't be hard to pass off as plain flipping -- two times out of three, it is. The other time, a quick glance tells him whether to turn the flipped coin over to show, or not. Even so, what would be wrong with that anyway? It's not against the rules, it's not cheating.

Screen 4

Well, let's see what happens. First, suppose the gambler flips heads one time, tails one time, and then intentionally chooses tails on the third trial -- altogether, heads one time in three, tails two times in three. Now, if the Mark turns up heads, then one time in three the Mark wins 5, and two times loses 3. That is, the Mark loses a dollar on the average, every three trials. Next, if the Mark turns up tails, then one time in three he loses 3, and two times wins 1. That is, the Mark loses 1 coin, again, on the average, every three trials.

Screen 5

In any case, this result shows the central point. No matter what the Mark does, whether choosing or flipping, he loses. Matching dollars at ten seconds a trial is six times a minute, and 360 times an hour. Then one dollar every three trials means 120 dollars an hour -- not bad wages for the gambler. And, he doesn't have to be clairvoyant, he doesn't have to outwit the Mark turn by turn, and

probably couldn't if he tried. All he has to do is flip his coin, or seem to, and wait.

In fact, just as in the first game, even the gambler can't control the exact events that take place -- he doesn't need to. That 120 dollars an hour is the long range average of what will happen. But even an hour's results will depend on a certain amount of luck. In this case, the gambler's winnings can be as low as 90 and as high as 150 dollars from chance variation. The gambler may be a little lucky or unlucky in exactly how much he wins -- but there is no luck at all in his winning -- that's a sure thing!

It is interesting to note that our young friend from Dubuque made only one mistake. As long as he played the first game -- for whatever stakes -- he had an even chance. He was right in thinking that the other fellow couldn't outwit or outguess him. His mistake, of course, was in deciding that the new game was fair. From then on he did as well as he possibly could. He never got outwitted on any one trial, and the gambler never even tried to do that.

On the other hand, the gambler has only one problem -- to lead the play up to the new game. In the first game the gambler is just observing what happens, and riding with the waves of this small chance or that. No matter how the individual turns work out in the first game, he needs to find the words to lead the play up to the new game -- "winning your money back", "changing my luck", "lot's of time to break even", and so on. Once the new game is started, the gambler can just relax, again, ride the waves of this small chance or that, and harvest his reward without any deep and sinister strategy at all.

Well, here's my boat back to St. Louis. So long for now. But who knows, we may meet again some day!

Curtain

Matching Pennies
Outcomes to Matcher

MATCHER CHOOSES	NONMATCHER CHOOSES HEAD	NONMATCHER CHOOSES TAIL
HEAD	1	-1
TAIL	-1	1

Chance Variation in Match Pennies

NUMBER OF TRIALS	RANGE OF WON OR LOST	PERCENTAGE VARIATION
100	5	5
1000	15	1.5
10000	50	0.5

The Final Game in Dollars

Outcomes for Matcher

MATCHER	NONMATCHER HEAD	NONMATCHER TAIL
HEAD	5	-3
TAIL	-3	1

The Gambler's Strategy

Outcomes for Mark

	$\frac{1}{3}$ HEAD	$\frac{2}{3}$ TAIL	FOR 3 TRIALS
HEAD	5	-3	5-6=-1
TAIL	-3	1	-3+2=-1

AVCOM

MARK'S CHOICE	AVERAGE OUTCOME FOR MARK
HEAD	$\frac{1}{3}(5)+\frac{2}{3}(-3)=-\frac{1}{3}$
TAIL	$\frac{1}{3}(-3)+\frac{2}{3}(1)=-\frac{1}{3}$

GAMBLER'S WAGES/HOUR DOLLAR GAME

AVERAGE	120 DOLLARS
CHANGE VARIATION	95-150 DOLLARS

AVAGOM

IBM

Federal Systems Division

BETHESDA, MARYLAND
June 23, 1987

HARLAN D. MILLS RETIRES

Dr. Harlan Mills, IBM Fellow, will retire from IBM on June 30. Dr. Mills joined IBM as manager of Systems Analysis in Rockville in 1964. Two years later, he was appointed FSD mathematics consultant at Gaithersburg. In 1969, he became manager of Advanced Software Technology.

In 1973, Dr. Mills was named an IBM Fellow and was appointed to the Corporate Technical Committee. In 1977, he came to Bethesda as director of Software Engineering and Technology. He resumed his activities as an IBM Fellow in 1980.

Dr. Mills has taught at the University of Maryland since 1975. Prior to that, he taught at Iowa State, Princeton, New York and Johns Hopkins Universities. He has served on academic visiting committees at the Universities of Virginia, Toronto, Waterloo and at Catholic and Carnegie-Mellon Universities.

Dr. Mills served as a Governor of the IEEE Computer Society and as a Regent of the DPMA Education Foundation. He is the recipient of DPMA's 1985 Distinguished Information Sciences award.

Dr. Mills is a member of the Air Force Scientific Advisory Board and the SDIAC BMC^3 Working Group.

In addition, Dr. Mills has written or coauthored several books and numerous papers on mathematics, engineering and management.

Commenting on Dr. Mills' retirement, FSD President Gerald W. Ebker said: "Your IBM career has been distinguished by the brilliance of your technical achievements, which have long been recognized throughout the company and have contributed directly to the company's success. We want to thank you for the years of service you've provided to FSD and wish you the best of luck in your future endeavors."

R 6/26