http://www.philly.com/philly/news/nation_world/Mystery_of_lottery_legend_Joan_Ginther_yields_clues_to_finding_75_million_prize.html#8qpmoYr2hrU7sm7H.99

Lottery mystery yields clues to $7.5 million prize

Investigating Joan Ginther, who won millions four times, led to discoveries about how winners might be found.

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Third in a three-part series.

Ever notice that instant lottery tickets are consecutively numbered? Ever wonder if those numbers could help in a hunt for riches?

They theoretically can, at least in Texas.

They helped us create a list, predicting the whereabouts of a missing $7.5 million ticket.

A $50 scratch-off game called $7,500,000 Fortune started out with three top prizes among about 190,000 packs of tickets.

Our list of likely suspects for the last big prize is much, much shorter -- just 332 packs, all from the early part of the game -- and includes not only pack numbers but the retailers last known to have those packs.

You'll find a link to the list at the end of this story.

No guarantees or even recommendations are being made, especially since each pack of 20 costs $1,000 each.

The idea of personally chasing this grail was tempting, but without a bunch of money to burn (Dallas Mavericks owner Mark Cuban never replied to an emailed invitation), a decision was made to simply spill the beans and see what happens.

Maybe folks who were going to play anyway will make or break the case.

First, a plea to the public:

If you bought a ticket for $7,500,000 Fortune and haven't scratched it, do so as soon as possible!

You might have already won $7.5 million. And you could save others from a wild goose chase.

Second, a plea to Texas:

No fair pulling the suggested tickets from stores.

Players were promised three top prizes in $7,500,000 Fortune, so Texas should live up to that guarantee. The game has already made lots of money, and no cheating was involved in creating our list.

This theory was developed while probing the mystery of lottery legend Joan Ginther, who won four multimillion-dollar prizes worth $20.4 million.

Judging from her relentless buying habits – she may have bought tens of thousands of tickets in at least eight games over eight years -- Ginther did not use this strategy.

It relies on three key pieces of information: (1) Texas reveals the pack numbers of tickets that win top prizes. (2) Prizes in instant games are NOT randomly distributed. (3) The process of elimination is a powerful help in playing scratch-offs.

Texas didn't share winners' pack numbers until the fall of 2012, two years after Ginther won her last multimillion-dollar prize.

Of great help in analyzing this scratch-off theory were James Harvey and Yuran Lu, who beat the Massachusetts lottery's Cash WinFall game and now run a startup called ZeroMailer, a way to manage email lists.

Here are some eye-opening insights into how scratch-off lotteries truly work.

1. Pack numbers

Most lottery tickets have a few sets of numbers and scannable codes.

One is a UPC or barcode, familiar on many products. Another is a security or verification code, used to verify that a ticket is a winner. It can resemble the QR codes that smartphones can scan.

Then there's usually a number used for tracking inventory, above another kind of barcode. Tickets are printed in "packs" or "books" – back-and-forth folded stacks wrapped in clear plastic – with a specified number of tickets per pack. In games printed by the country's dominant scratch-off printer, Scientific Games, each pack is also assigned a number and that number is also printed on the tickets in that pack.

Check out the above copy of one of Ginther's winning tickets, obtained from the Texas Lottery. See the circled numbers? The left ones show the match that won $2 million. The right one is the number of the pack this ticket came from. The set of digits to the left make up the game number – Millions & Millions was Game 836. The digits to the right of the pack number form the ticket number, indicating the ticket was No 20 in the pack.

So she won Game 836 with the last ticket in pack 80836. (The repetition of 836 is likely just coincidence.)

Simply put, these numbers tell when a ticket was printed among the thousands and thousands in each game, and if there's any predictable pattern to how prizes are distributed, an analysis of pack numbers could reveal that.

Texas isn't worried. It publishes the pack numbers for every grand-prize scratch-off win – information we were unable to find on any other state lottery's website.

Furthermore, in response to right-to-know requests, the Texas Lottery also provided the pack numbers of all 28 of Ginther's instant wins, as well as pack numbers of winners from most of its games with prizes of $1 million or more.

Those numbers were used to look for patterns.

None emerged in Ginther's case, except that she rarely bought tickets from the first 30 percent of the tickets printed.

Amazingly, however, Ginther wasn't far off from a fifth multimillion-dollar win. Tickets she bought for a game called Ultimate Casino Jackpot had pack numbers essentially placing her within 1 percent of the $7.5 million prize. But the cost of the intervening tickets was more than $125,000, even after allowing for her tax break on gambling losses.

2. Prizes NOT random

By themselves, pack numbers are no help. The trick is to connect them to prizes, or patterns of prizes.

Randomness would rule this out – unless a player had inside help – because true randomness is unpredictable.

In scratch-off games, however, the prize distribution is not truly random. For example, there's zero chance every ticket in a pack will be a loser. Take Joker's Wild, a $5 Texas instant game. There were at least 18 winners of $5 to $20 in each pack of 75 tickets, according to the closing analysis. This promise even has an acronym: GLEPS, for Guaranteed Low-End Prize Structure.

The Texas Lottery even goes so far as to tell gamblers: "There will be no more than 21 winners per pack." That's not randomness. And it's useful information. Once a pack has produced 21 winners, it's time to give up on that pack, for example.

Whether Ginther took advantage of this is unclear, since no evidence was found that she returned any unscratched tickets. Attempts were unsuccessful to contact her or Sun Bae, the owner of Times Market in Bishop, the store where Ginther bought her two biggest scratch-off prizes.

Even more important, prizes are spread throughout the game to guarantee there's no chance all of the biggest prizes will turn up near the beginning. The game would have to shut down early and lose a ton of money.

Indiana has even posted online a consumer-protection document declaring that lotteries try to "ensure the even distribution of winning tickets throughout a game."

Or, as Massachusetts specifies, "an equal number of high level winners must be distributed randomly within specified equal segments of the game."

Basically, the prizes should be fairly consistent among parts of the print run known as "pools."

Yet, there are assurances about prizes being "randomly distributed."

It sure sounds contradictory.

A solution is to shuffle sections separately. If you shuffle three decks of cards together, the locations of any kind of card would be truly random. If you shuffle them separately, you'll have an ace of spades in the first 52 cards, another in the second 52, and a third in the last 52.

That's apparently what happens in scratch-off games.

"Every game is going to touch on the even distribution of prizes in the game," said Joe Bennett, vice president for game development at Scientific Games, which prints scratch-off tickets in every state with a lottery except for Michigan. "There are rules that we program into the software that says, one winner's going to be in the first 5 million, one in the second 5 million."

It's easy to confirm with a visit to www.txlottery.com. Texas posts timely updates of the pack numbers of grand prize winners, and those numbers correspond to the order in which tickets were printed.

Look at the pack numbers for the first six $2.5 million winners in Texas' $500 Million Frenzy: 123258, 234176, 417131, 536684, 662186 and 746257. Each roughly fits into a 10-percent slice of the game, which has ten $2.5 million winners. (The actual numbering is rarely exact, since extra tickets are budgeted into each print run, to allow for testing and the removal of packs rejected because of defects or prize-distribution reasons.)

See where this is going? Figure out yet how players can take advantage?

It ties in with the third key element, the process of elimination.

3. Process of elimination

As sales of scratch-offs continue, the number of tickets left, naturally, goes down. That means the odds of finding a big winner go up -- until one of them disappears.

In Part Two of this series, we pointed out how, for example, there were 3.6 million tickets in $140,000,000 Extreme Payout, and how Ginther bought her $10 million winner when two of the three big winners were remaining, along with about 45 percent of the tickets.

In a truly random game, that's two shots out of about 1.6 million tickets, or 1 in 800,000 tickets. In reality, the odds were half as long. Forget the last third of the game. The portion of the game she was playing had one winner left in 400,000 tickets.

Players can look for this information online in many states. In the ideal setup, a single chart lists, for every prize level, how many tickets were printed, and either how many winners have been found, or how many winners are left. This information can help estimate the percentage of tickets sold, and whether the top prize percentage is relatively high.

Washington and Connecticut, for example, have one list with all this information for all games. California, Virginia, Missouri, North Carolina and Arkansas have some of the most helpful game pages. Other states have all the information, but it's in separate places. Pennsylvania, for example, has a list of all games' remaining prizes, but players have to go to the "complete game rules" for each game to find the list of prizes printed. Some states, like New Jersey, give only the top remaining prizes.

Note that the odds are still likely to be quite lousy.

That said, let's look at a high-priced Texas game with a huge prize that should have already been found.

$7,500,000 Fortune has 3.8 million tickets with 20 tickets in a pack. That's 190,000 packs per game. With three top prizes, the expectation is that each third of the print run, with about 63,000 packs, should produce one of the winners.

Now find the numbers for the two winners found so far. Go the game's main page, then look at the top of the column under "remaining prizes." See how the "2" for the number of remaining top prizes is colored, indicating a link? Click on that to find details about the winners.

The two winning pack numbers so far: 84139 and 157033.

Where's the one for the first third of the game, the first 63,000 packs? Even allowing a 10 percent variation (which, analysis shows, is a good rule of thumb), the first big prize should have appeared in the first 70,000 packs. Pack 84139 is 20 percent too high.

Timing also supports the theory. Almost a full year elapsed before either top prize was claimed, and in Texas tickets are generally delivered with the lowest pack numbers first.

That ties in with the most intriguing part: Those 70,000 packs have been almost completely picked over.

Almost every pack with a lower number shipped to retailers had been activated as of early June, according to data obtained through a right-to-know request submitted to the Texas Lottery.

But 331 packs with numbers under 75,000 had yet to be "activated," or officially logged into the system as ready to be sold.

If the winner is in one of those 331 packs, the odds have improved tremendously – to 1 in 6,620 tickets instead of about 1 in 1.27 million.

Calm down, take a deep breath.

Even if this theory is correct, it might be impossible to find the missing winner. The winning ticket might have already been bought, and tossed in a drawer, forgotten. Or it might have been misread and trashed. Complaints are not uncommon about how confusing scratch-offs can be to read. Weirdly, for example, two of Ginther's tickets had a phony symbol for the top prize, as well as the real one.

Tickets can also get lost, stolen, or destroyed by flood or fire. These things happen when millions of tickets are scattered around a state.

The theory could even be right without the winning pack number making the list. The retailer might have opened it and still have tickets left.

And, of course, the theory might be wrong, since lotteries never share all their secrets.

Perhaps most worrisome of all is that few high-priced instant games in Texas ever produce all of the possible winners. The most likely reason is that Texas tends to close games when about 85 percent of tickets have been sold. A winner could land in the last 15 percent and never get shipped. No system exists to verify that every winner was actually printed and shipped in the first place, because, for security reasons, no human is allowed to know the whereabouts of any winner.

Just for amusement and treasure-hunting gamblers' purposes, here is the list of unactivated packs of tickets with pack numbers below 75,000 for $7,500,000 Fortune, along with the names and locations of the retailers last in possession of them.

Will there be a new member of the Joan Ginther club?