The odds of winning the National Lottery are 14 million to one. Why do people play?

"A lottery is a Taxation
Upon all the Fools in creation"

Henry Fielding, The Lottery, 1792, sixteen years before the UK Lottery was denounced by parliament as “radically vicious” and abolished eighteen years later.

“They like to win, but they do not consider their probability of winning.”

Wagenaar, Paradoxes of Gambling Behaviour, 1988, seventeen years before Camelot announces that it is the biggest programme of civic regeneration since the 19th Century1.

Thirteen years on from its emergence into British consciousness, the National Lottery is struggling to attract the levels of interest, and more importantly, demand, which it experienced in its opening years. Having peaked in 1997/8 2, just three years after Camelot was awarded its first seven-year lottery contract to run the scheme, the National Lottery brand has attempted to grow by means of innovation in its diverse portfolio of games3. However the bi-weekly Lotto draw4, which constitutes the largest part of National Lottery revenue, is experiencing a long-term trend of declining sales5. This is not to say that the game is unpopular – according to Camelot, over 65% of UK adults play regularly, making Lotto the most popular form of gambling in this country.

The economic side

The lottery is classified as soft-core gambling, in contrast to most casino games, which are termed hard-core. The distinction is based on the relative sums of money spent on both forms, and their power to turn into an addiction (compulsivity). The lottery is also distinguished by the relatively infrequent opportunities

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2 Mintel International Group, Lotteries [Leisure Intelligence], 2004, p2
3 For instance, Dream Numbers, a game introduced this year http://www.camelotgroup.co.uk/pressreleases/2006/May/EndYearResults2006.pdf
4 The draw to which this question refers. There are in fact many games under the name of the National Lottery, including the three extra draws of Dream Number, Thunderball and Hotpicks, and a range of scratch-cards.
to play, and the relatively long delay between bet and outcome. Also, the payouts are organized so that there is one disproportionately large prize, with several smaller, more attainable, rewards. While the odds on winning the Lotto jackpot are 13,983,815 to one, there is a 51 to one chance of winning any of the prizes. Lastly, the simplicity of a lottery is noteworthy – in the case of Lotto, choosing six numbers from 1 to 49.

The approach used within standard economics to evaluate decisions made in the face of risk and uncertainty is the expected value model\(^6\). In the context of a lottery, the model is used to compare the price of the ticket to the amount the lottery player could expect to take as a yield. This last part is calculated as the average value of the payout multiplied by the probability of one ticket winning. Typically for lotteries, the expected value is negative, and tends to range from about -30\% of the ticket price to -70\% or more. This is curious, as most hard-core gambling features a higher expected value. Roulette, for example, has an expected value of -5\%\(^7\). In the specific case of the UK lottery, the Lotto, on a £1 ticket the expected value is about 71 pence. In other words, the value from playing the Lottery is 29\% less than the ticket price. Therefore, the expected value model predicts that people will not play Lotto.

In practice, people do play the lottery and this suggests that the expected value model ignores other utilities that are gained from a £1 lottery ticket, in addition to the 71 pence in expected value. These utilities include, firstly, the opportunity to take part in an aspect of popular culture – banter with friends and family, and speculation over numbers and near misses. Secondly, there is the ‘warm glow’ effect of having indirectly donated money to charity (29 pence per ticket). Finally, in the small scrap of paper there is the possibility of winning a life-transforming sum of money. Referred to as ‘buying a dream’ this factor is considered by many to constitute the largest utility from playing the Lottery.

**The insufficiency of the conventional economic approach**

Do ticket-buyers weigh up these utilities and consider them to more than make up for the 29 pence gap? Perhaps subconsciously, but there is also a theory that many of those who spend on lottery tickets suffer from psychological misconceptions which mean that in fact, they do not consider the Lottery in rational terms. This is evidenced by the case of the competing Dutch lotteries in the 1980s: the State Lottery and the Giro Lottery. The former had an expected value of -30\%, with 2 million players. The Giro Lottery was

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\(^5\) Lotteries [Leisure Intelligence], 2004, p2

\(^6\) As used in Willem Wagenaar’s Paradoxes of Gambling Behavior, 1988, and Stephen Creigh-Tyte and Lisa Farrell’s 1998 paper The Economics of the National Lottery

\(^7\) According to The Times, in ‘The Lottery – It Shouldn’t Be You’, January 27, 2006, “Casinos typically pay out more than 97 per
launched with an expected value of -75% and therefore no rational player should have preferred to play it rather than the State lottery. Nonetheless, it was able to attract 1.2 million players. This suggests that as long as a lottery keeps to “tacitly accepted properties of a fair structure”\(^8\), such as the low cost of a ticket, and sufficiently life-transforming power of the main prize, it will attract demand.

More evidence to suggest that, in general, Lotto players do not think rationally, lies in the price elasticity of demand for Lotto tickets, which has been shown to lie close to unity\(^9\). This means that a 50% decrease in the price of a Lottery ticket will result in roughly a 50% increase in the quantity demanded. However, the expected elasticity for rational consumers would lead to significantly, and disproportionately greater demand as the price neared the expected value of the Lottery ticket and went below it. This is because the money spent on a ticket priced at its expected value (or less) would effectively be a worthwhile investment.

**Heuristics and biases**

The psychological misconceptions that might make players more likely to buy a lottery ticket can be divided into two categories: intuitive discovery processes, named ‘heuristics’, and partialities which hinder objective consideration of an issue, correctly termed ‘biases’\(^10\). Willem Wagenaar calls these a “bag of tricks”\(^11\) which, together, may go some way to explaining the mind set of lottery participants, and in particular the failure of feedback – that is, why continued losses do not disillusion players.

There are two main biases:

Confirmation bias happens when a person neglects the principle of regression to the mean. This is to say that a person might think that they are on a winning streak, or ‘getting closer’, because they have had two near misses with their numbers. Some players believe that certain numbers have a higher likelihood of winning, as evidenced by sites such as lotterygen.co.uk which present statistics of ‘hot’ numbers.

Hindsight bias occurs from thinking that a loss was predicted – in other words, that not winning was inevitable. This encourages the person to think that they will win on the next gamble, because they believe that their predictions hold fast.

\(^{8}\) Paradoxes of Gambling Behavior p70  
\(^{9}\) Farrell et al., 1996  
\(^{10}\) Hogarth, 1981
Five heuristic explanations are identified:

Problem framing is when a player attributes losing to a lack of skill, possibly subconsciously. Therefore in the case of the lottery, every new selection of numbers is a new attempt to refine technique. Buying tickets regularly is important for the process of improving.

Similarly, flexible attribution results from players considering skill to have had a hand in a near miss, but losing to be down to other factors such as buying the ticket from the wrong place, or at the wrong time.

Lottery companies along with the media publicize the winners of the jackpot. This leads people to consider a higher ‘availability’ of the prize than that which actually exists. It therefore causes them to overestimate the probability and consider the lottery more worthwhile. Camelot, the owners of the National Lottery contract, have emphasized availability in past advertising campaigns with slogans such as ‘it could be you’.

Anticipatory regret applies to hard-core players who keep the same numbers for every game they play. They feel compelled to buy tickets every Wednesday and Saturday for fear that on the day they do not play, the numbers will come up.

Illusory correlation is the belief in luck affecting the chance of success in a game. For instance, superstitious people who believe in lucky days might consider their odds improved, and thus be more likely to buy a ticket. This is similar to the gambler’s fallacy of failing to understand that success in the lottery is independent of success in other events.

These mental quirks are all made more likely by another heuristic: ‘reduction of complexity’. This occurs when lottery players fail to realize what really determines the odds of winning the jackpot, and do not consider the scale of the game in correct proportion. But even these psychological misconceptions do not satisfactorily account for regular lottery play. They may explain why people buy impulsively, such as in the case of availability or illusory correlation, and may show some characteristics of hard-core players, as in the case of flexible attribution and problem framing, but they do not account for the constant demand for lottery tickets by 27 million adults in the UK.

Many critics and certain newspapers claim that the National Lottery encourages gambling among those...
who can least afford it\textsuperscript{13}. It is sometimes suggested that heuristics and biases are, by their nature, a feature of lower-income groups, which are more poorly educated. Therefore if heuristics and biases constituted a large part of the reasons for which people play the lottery regularly, some correlation between income and regular lottery play would be observed. A BRMB/Mintel study of 964 adults gives the following data on the proportion of people in the five standard socio-economic groups who play National Lottery games regularly:

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<tr>
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<th>Saturday</th>
<th>Wednesday</th>
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<tbody>
<tr>
<td>AB</td>
<td>61%</td>
<td>34%</td>
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<tr>
<td>C1</td>
<td>62%</td>
<td>33%</td>
</tr>
<tr>
<td>C2</td>
<td>73%</td>
<td>38%</td>
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<tr>
<td>D</td>
<td>64%</td>
<td>40%</td>
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<td>E</td>
<td>52%</td>
<td>33%</td>
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From ‘Participation in NL games over the past 12 months, by gender, age, and socio-economic group, May 2004’ (Mintel International Group, Lotteries [Leisure Intelligence], 2004, p32).

These data question the view that lower socio-economic groups play the lottery more. The middling C2 group is most dedicated to the National Lottery, but others do not lag far behind. An explanation is needed to account for the fact that 61\% of the (relatively well-educated) AB demographic play the Saturday Lotto on a regular basis.

**Prospect Theory**

Perhaps, then, we must return to seek an explanation for why people playing the lottery may actually be behaving rationally. The heuristics and biases described above suggest that the human mindset when buying lottery tickets is significantly more liable to inconsistencies than in general, that is, they seek to explain lottery playing behaviour as a deviation from rationality. Normative theories of gambling, accounts which attempt to explain lottery gambling “without essentially changing the nature of the game”\textsuperscript{14} use the rational mind as the point of reference. Prospect Theory (Kahneman and Tversky 1979) is the key normative theory that can be applied to lottery play.

To explain Prospect Theory, it is necessary to consider the condition under which lottery play is

\textsuperscript{13} The Times puts forward such views in ‘The Lottery – It Shouldn’t Be You’, January 27, 2006.

\textsuperscript{14} Paradoxes of Gambling Behavior p71
economically rational (discarding the value of utilities such as those described above). This condition comes in the form of the following inequality:

Expected value ≥ C

The constant C represents the price of a ticket. The inequality is not flexible, but Prospect Theory suggests that the actual value of C to a person is. The price of a ticket is considered with reference to a person’s financial status quo; Hence, if the person is comfortable enough that the amount they spend on the lottery every week is irrelevant to them, C can be discarded (replaced by a value of 0), satisfying the inequality and making lottery play notionally rational.

Prospect Theory questions the idea in traditional economics that the rational person seeks to take care of every penny he owns in order to maximize his utility. Instead the argument is that the values placed on winning and losing are not directly related to the probability of such events occurring. Of course, one could still argue that this is an irrational conceit and that it is absurd for a so-called ‘rational’ person to consider a weekly £4\(^{15}\) sum of money irrelevant in the long run, seeing as the possible savings over the years would have some transforming power, even if the little pound coins going one by one did not.

Prospect Theory combines forcefully with the power of social pressures to convince people to play the Lottery. If one's friends all believe that the weekly 'charge' for being a participant in the Lotto draw is so small as to be negligible, the sentiment is likely to extend to oneself.

The Lotto has also spawned lottery syndicates, where the individual contributes and the syndicate selects numbers so that, for instance, the individual only needs to get two correct numbers in order to win a fair amount of money. Here, in a similar way as the social pressures above, Prospect Theory can combine with convenience to make the Lotto draw more appealing. These syndicates, which have won a quarter of all Lottery jackpots\(^{16}\), have a number of ways to make the Lottery more appealing to those put off by the overwhelmingly weak odds for the single player. Ultimately, though, the rewards are proportional to the amount of money put in. Certainly in terms of expected return there is no advantage to playing in a syndicate.

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\(^{15}\) £4 is roughly the average weekly spending on lottery tickets by a regular player. 

\(^{16}\) http://www.national-lottery.co.uk/player/information.do?info=newsandinfo
The role of Camelot

Camelot, the UK lottery provider now a year into its third contract, is able to alter demand for the Lotto draw to some extent, although its influence certainly does not provide the motivations for lottery play. Its innovations have been many and frequent (although occasionally with dire results). It has exploited the lack of restrictions on advertising that would normally apply to gambling companies, starting off with high-profile TV and radio campaigns back in 1994, and progressing swiftly on through a range of slogans, logos and affiliations. Hiccups, such as the flop which was the 'don’t live a little, live Lotto’ campaign with Billy Connolly, and Lotto’s unfortunate link to the Millennium Dome, were noticeable in slowing sales. Successes, such as the 'fingers-crossed' logo (which, as a result of Camelot’s influence, now must be carried by all National Lottery-funded charities) and the proliferation of the 'it could be you' catchphrase have contributed to creating a recognizable brand. Camelot have a strong incentive to increase revenue of the National Lottery - half a pence from each pound ticket goes directly to the firm's profit. Furthermore, the £1 price of a ticket has stayed constant since the lottery began, meaning that Camelot’s profits have to try and conquer both inflation and the reduction in Camelot’s take from 1% profit to 0.5% profit that was made a few years ago after pressure from OFLOT, the regulatory board that oversees lotteries.

The role of a technologically advanced and widespread retail network is important in maximizing revenue. After all, without the opportunity to buy the highly non-essential tickets, there would be little effective demand. As it stands, Camelot can boast that more than 96% of UK households are within two miles of a Lottery terminal.17 Also, in 2002 a program was undertaken to overhaul these machines, tripling the number of lottery tickets available per minute (this number continues to rise). Moreover, tickets have been available online, on mobile phone, and even (through a deal with BSkyB) on digital TV since four years ago. All this goes to suggest that the ease with which one can play without any apparent disruption to one's lifestyle is a factor in determining demand,

Camelot aims to make this ease not just a question of lifestyle, but also of financial affordability, with its stubborn refusal to raise the Lotto ticket price. Equally importantly, especially with the growth in charitable awareness in the West, Camelot started in 2002 to make playing Lotto easy on one's conscience as well, by emphasizing the benefits to society from the 29 pence per Lotto pound that goes to good causes. This is

17 Lotteries [Leisure Intelligence], 2004, p24
evidenced by the advertising campaign of that year which featured beneficiaries of National Lottery 'fingers-crossed' charities saying a televised 'Thank you' to NL players, accompanied by the slogan 'You played, the nation won'. No doubt this feeds into the utility of the ‘warm glow’ from buying a Lotto ticket, hence giving people a justification to spend the money. The trend of focusing on charity continues - a quick look at the prominent position of the 'Good Cause Counter' on Camelot's website confirms this.

**The decisive factor**

Ultimately, the ideas behind Prospect Theory form, in my opinion, the largest part of the answer to the question 'Why do people play Lotto?' It is noticeable that Lottery players very rarely consider themselves to be wasting money – this supports the notion that Lotto-buying money is marginal, suitable for expenditure on non-essential goods– and rarely experience addiction. The utilities, as laid out above, play a supporting role – the excitement, the dream, and the deliberation and discussion over numbers – even if these utilities are, and are recognized by players to be petty, cheap thrills.

To quote Diane Thompson, the CEO of Camelot, the Lotto draw is a 'harmless flutter'\(^{18}\). This is a neater and less circumspect way of articulating Prospect Theory. It is a phrase which comes closer to what the regular Lotto ticket buyer might think to himself – and that, after all, is the key to understanding why people play.

\(^{18}\) From her letter to The Times, 9 September 2007
Bibliography

Bruno Bernard, Lotteries in Europe (1994)


D Kahnerman and A Tversky, Prospect Theory: An Analysis of Decision Under Risk (1979)

Mintel International Group, Lotteries (Leisure Intelligence) (2004)


Willem Wagenaar, Paradoxes of Gambling Behaviour, 1988

Online
http://freespace.virgin.net/john.hewitt1/pg_gloss.htm for guidance on the definition of a heuristic in the psychological context
http://wordnet.princeton.edu/perl/webwn?s=bias likewise, for the definition of bias in the psychological context

Note: because of the outdated nature of many of the reports available at the British Library on the National Lottery (due to copyright law), some of the quoted figures above may have changed in the last few years.