MMS

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1. If we simply pick one of the three shells at random, there is a one in three chance that we have picked the correct shell:

$$P = \frac{1}{3}$$

However, if the thimblerigger uncovers a shell which does not hide the ball first, and allows us to switch, things change. This is an example of the Monty Hall Problem[1] Intuitively, we would say that there is now a 50% chance that our choice was the correct shell, and that our overall odds have not changed — why would the thimblerigger revealing a loosing shell, which we have not even picked, alter our odds? However, we can actually increase our odds by switching our choice of shells to the remaining shell. See Table1 for a concrete example of why switching is smart. The table shows all possible results, and assumes that we always pick Shell 1.

Table 1: Monty Hall Paradox

Shell 1	Shell 2	Shell 3	Result if not switching	Result if switching
nil	nil	**ball**	loose	**win**
nil	**ball**	nil	loose	**win**
ball	nil	nil	**win**	loose

We can see that our odds of winning remain as one in three if we never switch, but increase to two in three if we do switch. Thus:

$$P = \frac{2}{3}$$

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[1]https://en.wikipedia.org/wiki/Monty_Hall_problem