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Verifying the representativeness heuristic: A field experiment with real-life lottery tickets

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Abstract: Despite having the same probability of being drawn, certain number combinations are more popular than others among the lottery players. One explanation of such a preference is the representativeness heuristic (RH). Unlike previous hypothetical experiments, in the present experiment we used real-life lottery tickets, involving a high payout in case of winning to elicit true preferences. To verify if people prefer randomly-looking number combinations, participants were to choose a preferred ticket. To validate if it is likely to be caused by RH, we correlated preference for "random" sequences with the belief in dependence between subsequent coin tosses. We confirm that people strongly prefer random sequences and that a non-trivial fraction believes in dependence between coin tosses. However, there is no correlation between these two tendencies, questioning the RH explanation. By contrast, participants who have an (irrationally) strong preference for number combinations also tend to make (irrationally) specific predictions in the coin task. Unexpectedly, we find that females are considerably more likely to belong to this group than males.

Keywords: decision bias, gambler's fallacy, gender difference, hot hand fallacy, lottery choice, misperception of randomness, number preference in lotteries, representativeness heuristic

JEL codes: C93, D01, D81, D91

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1. Introduction

It has been argued that the perception of random events is often tainted by the *representativeness heuristic* (RH), in which "subjective probability of an event, or a sample, is determined by the degree to which it: (i) is similar in essential characteristics to its parent population, and (ii) reflects the salient features of the process by which it is generated" (Kahneman and Tversky 1972). A number of important phenomena have been linked to this tendency. The decision maker may fail to sufficiently account for the prior distribution, instead focusing too much on the conditional probabilities (base rate neglect, see: Bar-Hillel 1980; Koehler 1996). For example, a physician may overestimate the probability of a rare disease given a positive test result, because she focuses on the test's high (but not perfect!) sensitivity and specificity, largely ignoring the low prior (Gigerenzer 2002; Labarge et al. 2003). Likewise, legal professionals may incorrectly judge that suggestive incriminating evidence represents a proof beyond reasonable doubt even if it was highly implausible that the defendant was guilty (or even present at the scene) in the first place (Lindsey et al. 2003).

Another class of manifestations of RH involves misguided reasoning based on a random sample. Lay people and researchers alike may be inclined to expect the moments of even a small sample to resemble those of the underlying distribution and therefore insufficiently account for sampling variation. This leads to designing underpowered studies and drawing unjustified conclusions (Tversky and Kahneman 1971).

The same applies to random time series (Sundali and Croson 2006; Oskarsson et al. 2009; Barron and Leider 2010). Because even a short sequence "should" be similar to the underlying random process, the use of the heuristic leads to expecting reversal of any recent "tendency" (negative autocorrelation), a bias dubbed gambler's fallacy. Then again, RH makes even a relatively short series of identical realizations seem highly implausible. Therefore, whenever it arises in the context of individual performance, such as in sports, the spectators tend to believe that the player is experiencing a "hot hand", even if in truth independent random trials are observed.

One domain in which RH is important (and easy to verify because the functional form and parameters of the underlying random process are precisely known) is that of gambling. In particular, gambler's fallacy may lead to chasing losses: a win is "due" after a streak of losses. Such behaviour creates an important characteristic of pathological play (Fortune and Goodie, 2012). A less dangerous but equally telling pattern is that lottery players avoid recently drawn combinations (Clotfelter and Cook 1993; Suetens et al. 2016). Other types of preference for some combinations of numbers over others are also often reported. Specifically, most players seem to tend to spread numbers rather evenly (Lien and Yuan 2015; Wang et al. 2016) and especially to prefer "randomly looking" combinations, such as {12, 23, 24, 27, 31, 39} over distinctive ones, such as {1, 2, 3, 4, 5, 6}, even if they represent identical gambles (Riedwyl 1991; Holtgraves and Skeel 1992; Ladouceur et al. 1995; Hardoon et al. 2001; Chóliz 2010). Clearly, {1, 2, 3, 4, 5, 6} is *not* representative of the uniform distribution on 1−49. For example, it has a much lower mean and variance. For this reason, it may be perceived as less likely to come up in a drawing.

Interestingly, many popular, yet misleading Lotto "systems" reinforce the RH-based preference for some combinations over others. For example, Dunkin (2014) claims that "the balls are naturally drawn by chance. You are not supposed to violate the natural randomness of things… endeavour to choose your number combinations to have a semblance of randomness. Avoid number groups patterns, because statistically, such patterns are drawn at a rather low probability." Regardless of whether it is inspired by such worthless advice or arises naturally, the misguided belief that some combinations are better than others, is also likely to contribute to excessive, pathological play.

In this project, we were trying to 1) establish if indeed most people prefer randomly-looking combinations over distinctive combinations, 2) measure the strength of this preference, and 3) verify if it is likely to be caused by the representativeness heuristic. With these goals, we gave our 472 participants drawn from the general population two different tasks. First, we asked them to choose between two tickets for the popular Multi Multi lottery game. The numbers on one of them were randomly generated, while those on the other one, were highly distinctive (e.g., {35,40,45,50,55,60,65,70,75,80}). The participants were then invited to reconsider their choice after a small cash bonus was added to the unwanted option. The RH predicts clear preference for the "Random" over "Distinctive" tickets.

In the second task, they were asked to (hypothetically) predict the outcome of the fourth coin toss after a sequence of three heads (or three tails). The RH proposes that even in a small sample, about half the tosses should bring heads (H), so that, say, after a sequence of HHH, the tail should be expected (*reversal*). We thus seek to verify if people who prefer "Random" combinations of numbers on their ticket are the same people who rather expect a head after three tails and a tail after three heads. We believe that this kind of cross-task verifications represent a highly valuable stress test of important deviations from rationality in judgment and decision making, such as the RH.

2. Design and procedures

The main task involved a choice between lottery tickets. For this purpose, a popular Multi Multi game from Totalizator Sportowy (a state-owned monopolist in the field of numbers games and lotteries in Poland) was selected. The game involves guessing up to ten from 1-80 numbers. Twenty numbers are subsequently randomly drawn (twice daily) and the number of hits determines the payoff.

The main advantage of using Multi Multi in our experiment is that it is an (almost) non-parimutuel game. Strictly speaking, there is a varying small bonus on top of the guaranteed prize to be shared among those who select ten numbers and get all of them right. However, unlike in Lotto, its expected value is negligible (and most people may be even unaware of the bonus, let alone of its strategic consequences). This means that every combination of, say, 10 numbers represents nearly the same probability distribution over possible prizes, see Table 1. In other words, any combination is essentially as good as any other.

We could have avoided the potential issue of having to share the bonus, by asking our subjects to choose between tickets with less than 10 numbers selected. However, betting on 10 numbers is the most popular way of playing and it gives a chance for the highest prize.

Table 1: Distribution of prizes

# of hits out of 10*	10	9	8	7	6	5	4
Prize in PLN**	250,000	10,000	520	140	12	4	2
Probability	1/8,911,711	1/163,381	1/7,384	1/621	1/87	1/19	1/8
* There is no prize for less than four hits.							
** 1 PLN is ca .24 EUR.							

Every choice involved one “Random” and one “Distinctive” ticket, each with ten numbers in an ascending order. In Random tickets the ten numbers were generated using the “quick pick” random generator. For Distinctive tickets, one of six very specific combination was always used, see Table 2.

Table 2: Types of "Distinctive" combinations

Level\Delta	1	5
Low	L1: {1,2,3,4,5,6,7,8,9,10}	L5: {5,10,15,20,25,30,35,40,45,50}
Medium	M1: {1,2,3,4,5,76,77,78,79,80}	M5: {5,10,15,20,25,60,65,70,75,80}
High	H1: {71,72,73,74,75,76,77,78,79,80}	H5: {35,40,45,50,55,60,65,70,75,80}

The experiment was run on several days of August−October 2017. The participants were approached at several locations in the city of Warsaw, including two metro stations, the central train station, a shopping centre, a farmer's market, outside of an office building, a sports centre, a central roundabout and a crossing of two streets nearby one of the lottery offices. They were greeted and told that the researcher was a representative of the University of Warsaw, conducting a very brief study (see Appendix A for the wording of a typical interaction). Those who agreed to participate were presented with two Multi Multi tickets for the nearest drawing and asked to indicate which one they liked better (with an understanding that they would afterwards receive it for free). Once they stated their preference, they were asked the same question again, this time the experimenter offering either 0.5 PLN or 1 PLN in cash as a bonus associated with the hitherto unwanted ticket (explaining that this was the last choice to be made). We registered if participants *stayed* with their initial choices or *switched*, lured by the bonus, with the understanding that this was their final choice of the ticket. They were then asked to justify their choices.

Subsequently, they were asked to answer a simple question aimed at identifying biases in perceptions of random sequences:

> "If we toss this coin (or any other) three times, and three times in a row we get heads/tails, then what is more likely to come up the fourth time?"

This task was not incentivized, as any attempt to do that, that we could think of, would lead to one of more severe problems (longer and more complicated interaction with the participant, sample selection, need for deception, spill-over from the first task). Finally, the participants reported their gambling habits and their age and then were free to go; the experimenter would additionally register place, approximate time, and sex of the participant.

The experiment used a 6x2x2x2 (six types of Distinctive tickets; Distinctive ticket displayed on the right vs. on the left; .5 vs. 1 offered as a bonus for the unwanted ticket; three heads vs. three tails in the coin tossing sequence) fully randomized between-subject design.

The initial 258 observations were collected by the same experimenter – a young woman. As a clear gender effect was observed, which will be explored shortly, additional observations were collected by a male to check if this effect was due to an interaction with the gender of the experiments rather than the gender of the participant per se.

About 52.5% of participants were female. Age varied between 9 and 86 years with the mean of 36.5 and standard deviation of 16.0 years. These statistics are similar to those of the entire national population.

Data availability: The datasets generated during the current study are available from the corresponding author on reasonable request.

3. Results

Table 3 shows the fraction of people choosing Random vs. Distinctive. Overall, there is a very clear preference for the former (p<.001, z=8.65). For either choice, the majority stayed with their initial choice even if the inferior ticket was improved by a cash bonus. While the bonuses were small in absolute value, they amounted to 20% or 40% of the ticket price (and ca. 40% or 80% of the expected payoff from the ticket). Moreover, expectedly, there was a somewhat stronger tendency to switch for the highest bonus.

Table 3: Participants' choices in the main task

Initial preference	Random		Distinctive	
	69.9% (330)		30.1% (142)	
When non-preferred option improved by:	Stay	Switch	Stay	Switch
bonus .50 PLN	88.9% (136)	11.1% (17)	84.6% (66)	15.4% (12)
bonus 1.00 PLN	81.4% (144)	18.6% (33)	78.1% (50)	21.9% (14)

What were the reasons for this clear preference for Random tickets? The justifications that the participants gave in response to our open-ended question were not always completely coherent. However, some clear (and not mutually exclusive) themes could be identified, see Table 4 (and Table B1 in Appendix B for typical justifications belonging to each category).

Among those who preferred the Distinctive ticket, justifications categorized as referring to a "nice sequence" were most commonly used. A fair share of participants also mentioned that some of their favourite numbers (often associated with dates) were involved. Those with a strong preference (choosing to Stay, foregoing the bonus) were relatively likely to say they just picked intuitively, without much thinking. Participants with a weak preference (the two Switch columns) relatively often mentioned they were in fact indifferent.

Participants with a clear preference for Random very often said these numbers were indeed “More random”, some also saying they were “More spread”. However, only one in six explicitly said they yielded a higher chance of winning (and this was even less common in other groups).

Table 4: Prevalence of justifications of the choice in the main task

Justification\ Choice	Distinctive, Stay	Distinctive, Switch	Random, Switch	Random, Stay	Total
	n=116	n=26	n=50	n=280	n=472
Nice sequence	**32.8%**	**42.3%**	6.0%	5.4%	14.2%
Favourite numbers	**30.2%**	11.5%	8.0%	13.2%	16.7%
Indifferent	12.1%	**34.6%**	**42.0%**	6.8%	13.3%
Intuition	25.9%	7.7%	2.0%	13.6%	15.0%
Aware (of the same prob.)	9.0%	3.8%	12.0%	1.8%	2.8%
Higher probability	6.0%	0.0%	10.0%	17.1%	12.7%
More spread	3.4%	3.8%	12.0%	8.9%	7.6%
More random numbers	0.9%	0.0%	**28.0%**	**50.0%**	**32.8%**

Values above 20% printed in **bold.**

Perhaps the most striking pattern that can be seen in our data is the difference between the genders, see Table 5. Male participants were much more willing to switch when offered money to do so than females. This tendency was not affected by experimenter’s gender. However, there was an interaction affecting initial decisions: less responders chose Random, when genders matched. Tables B2 and B3 in Appendix B show that these effects are robust when we control for other variables. The latter make little difference overall; notably, self-reported gambling habits are not correlated to observed choices.

Table 5: Gender effects

Experimenter	Female		Male	
	53.6% (253)		46.4% (219)	
Participant	Female	Male	Female	Male
	55.7% (141)	44.3% (112)	48.9% (107)	51.1% (112)
Initially random	68.1% (96)	77.7% (87)	71.0% (76)	63.4% (71)
Among initially random: Switch...				
for .50 PLN	4.5% (2)	13.2% (5)	6.5% (2)	20.0% (8)
for 1.00 PLN	13.5% (7)	24.5% (12)	8.9% (4)	32.3% (10)
Among all: Switch...				

for .50 PLN	6.7% (5)	16.3% (8)	8.2% (4)	20.7% (12)
for 1.00 PLN	10.6% (7)	27.0% (17)	12.1% (7)	29.6% (16)

We now move on to behaviour in the second task, see Table 6. Overall, a very substantial fraction predicted reversal (a head after three tails or vice versa). Prediction of continuation (e.g., a tail after three tails) was less common. These findings are broadly consistent with previous research (Oskarsson et al. 2009). There was a clear participant's gender effect, with more males providing the normatively correct answer, i.e., 50/50, regardless of the gender of the experimenter. Again, variables such as age and self-reported gambling made little difference.

Table 6: Behaviour in the coin task

Experimenter	Female		Male		Total
Participant	Female	Male	Female	Male	462*
50/50	37.2% (51)	58.3% (63)	35.8% (38)	56.8% (63)	46.5% (215)
Reversal	38.7% (53)	25.9% (28)	43.4% (46)	27.9% (31)	34.2% (158)
Continuation	24.1% (33)	15.7% (17)	20.8% (22)	15.3% (17)	19.3% (89)
					*10 of 472 responses invalid

Looking across the tasks, the only clear link was that those willing to switch to another ticket in the first task were much more likely to say that the chances were 50/50 (and, not surprisingly, less likely to predict reversal or continuation) in the coin task, see Table 7. The differences for 50/50 and reversal were significant at .001 in two-sided tests of proportions (z=-5.38), whereas the difference for prevalence of predictions of continuation was only significant at .09 (z=1.70). These effects were equally strong in males and females and robust in controlling for other variables, see Appendix B. Importantly, we do not observe any link between initial preference in the ticket task and behaviour in the coin task.

Table 7: Behaviour across the two tasks

	Distinctive, Stay	Distinctive, Switch	Random, Switch	Random, Stay
	n=115	n=26	n=49	n=272
50/50	36.5%	61.5%	81.6%	43.0%
n=215				
Reversal	37.4%	19.2%	10.2%	38.6%
n=158				
Continuation	26.1%	19.2%	8.2%	18.4%
n=89				

4. Discussion

In the present study, we tried to establish if people in fact prefer randomly-looking combinations over distinctive ones and verify if the representativeness heuristic may be the cause of such preferences. We confirmed the clear preference for "random" combinations, even when switching would bring about an additional payoff. We also found behaviour consistent with RH in the coin task: by far not all participants gave the normatively correct 50/50 response. Of the remaining two, reversal was the considerably more common answer, but continuation was also present and the two seemed to have similar determinants (see Table B4). This would appear to support the view that, paradoxically, both expectations of a reversal and of continuation in a series of actually independent trials may result from the RH, as proposed by Gilovich et al. (1985). Seemingly unjustified expectations of continuation are most frequently observed in skill-based trials, e.g., in sports (and then referred to as hot-hand fallacy). This made some authors, including Ayton and Fischer (2004) propose that they arise from natural fluctuations in human performance, while expectations of reversals (gambler's fallacy) from characteristics of sequences of natural events. Moreover, some recent studies question statistical validity of hot-hand fallacy findings at all (Miller and Sanjurjo 2014). In this sense, our observation that expectations of reversal and continuation co-exist in the same (not skill-based) task and that they have similar correlates yields some support to the RH interpretation against these alternative views.

However, importantly, we see no correlation between preferring the random sequence (either initially or strongly, i.e., preferring it, even against the bonus) in the ticket choice and choosing reversal (or continuation) in the coin task. What the RH predicts, some participants did in the first task, while others in the second. It is therefore unlikely that the same representativeness heuristic drives both irrational behaviours. This may be less surprising in view of the older result (Shaham et al., 1992) largely disregarded in later literature, of extremely low consistency of representativeness scales: various postulated manifestations of the RH (base rate neglect, sample size neglect etc.) apparently do not correlate – they are observed in different individuals. Likewise, large differences were found within individuals, who were evincing various levels of measured biases, including representativeness, under different tasks, e.g., tasks with realized vs. paper losses (Imas, 2016). Again, susceptibility to the RH did not appear to be a stable behavioural trait.

Nevertheless, there is some link between our two tasks: there is a general tendency to either be rational in both of them, seemingly understanding both random processes correctly (switching when offered the bonus and predicting 50/50) or to be irrational in both: staying with the initial preference and predicting a specific coin toss outcome. This appears in line with findings of heuristic-based probability judgments being negatively correlated with the Need for Cognition Scale and positively with the Faith in Intuition Scale (Shiloh et al. 2002). Likewise, cognitive reflection, as discussed by Toplak et al. (2011) may be an explanation for the rationality/irrationality in both tasks. According to Frederick (2005), individual preferences, particularly regarding time and risk, may partly be expressions of cognitive ability. He proposed the Cognitive Reflection Test (CRT), as a simple measure of a disposition to resist giving the answer that first comes to mind. Toplak et al. (2011) identified the CRT as an important predictor of the use of heuristics in various contexts. It could thus shed light also on our results. However, because our study only involved a brief interaction in the street, the measure was difficult to employ in practice. If it could be implemented, we would expect higher CRT scores to be a moderate predictor of rational choice in both tasks.

One observation that corroborates this hypothesis is that Frederick (2005) and others (Brañas-Garza et al. 2015) found men to score significantly higher than women on the CRT; recall that men were also more often rational in both our tasks. In fact, gender is the only variable that we do observe to be significantly related to irrational behaviour in both tasks: less women than men were willing to change the ticket to get the bonus and women more often than men predicted a particular outcome of a coin toss rather than said they were both equally likely. A way to look at this result, which is complementary to the CRT approach, is in terms of rational vs. experiential processing of information. The low-rational individuals may show context-specific behaviour, being prone to make use of actually irrelevant information (such as the outcomes of the three coin tosses when predicting the outcome of the fourth) and to ignore relevant information (such as the availability of a bonus) (Ayal et al. 2011). In this sense, our results seem also consistent with the findings that females' judgments and decisions are more context-specific (Croson and Gneezy 2009) and based on relatively experiential rather than rational style of decision-making (Epstein 2003; Sladek et al. 2010) resulting in a greater susceptibility to biases in probability judgments (Dohmen et al. 2009). It is also possible that switching was relatively unattractive to women because it was intuitively perceived as riskier, a feature that females tend to be less comfortable with (Eckel and Grossman 2002; 2008). Finally, it could also involve more anticipated regret (Spranca et al. 1991) which could selectively discourage women who are sometimes found to be disproportionately affected by emotional reactions (Eriksson and Simpson 2010).

Alternatively, it is also possible that the "*stayers*" in our study simply hesitated to abandon the status quo. This consideration is unlikely to explain the gender effect though, given the findings that females are *less* prone to the bias (Burmeister and Schade 2007). Then again, the status quo bias is often explained in terms of loss aversion and some studies observed it to be stronger in females (Rieger et al. 2011; Rau 2014). Clearly, further research is needed. One modification of our design that could exclude status quo bias as a factor would involve asking participants right away if they preferred the *random* ticket or the *distinctive* one supplemented with the bonus.

An important lesson specifically for the gambling industry is that the representativeness heuristic per se is not likely to push people to play more. Indeed, in our experiment it did not systematically make the participants prefer one type of bet over another. Moreover, the RH-driven behaviours were not related to self-reported gambling habits and, in the case of the coin task, were actually less common in males, who generally gamble more.

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Appendix A: The protocol

<u>Verbal version:</u>

[INTRO] Hello, I'm conducting a scientific study, can I take 3 minutes of your time? In return, I have a lottery ticket for you, already paid for, for a Multi Multi game from Lotto.

[If YES, then:]

[MAIN] So, in the Multi Multi game, out of numbers from 1 to 80, 20 numbers are being drawn, and you can bet on up to 10 numbers − and so is in the present case. The prize depends only on how many numbers from the chosen ticket will be drawn (the less, the smaller the prize), whereas if all 10 numbers are drawn, there is a guaranteed prize of 250.000 PLN, regardless of the numbers that others chose.

I have two tickets here − they differ only in the betted numbers. Please have look at them and choose one of these two tickets, with the numbers you prefer.

1A) [If he/she is indifferent, they select one according to their own criteria and indicate which one.]

1B) [If they prefer one, they indicate which one.]

2) And what if to this other one [which they didn't select] I will add 50gr/1zł, which ticket will you choose?

[YES- they choose the other one and $]:

- Why did you initially choose this one?
- Why did you change your mind?

[NO- they stay with their first choice]

- Why did you choose this one?

I have just three more short questions:

1. If we toss this coin (or any other) three times, and three times in a row we get heads/tails, then what is more likely to come up the fourth time?

2. Do you sometimes play the lottery, Lotto or other games of chance?

And the last question:

3. How old are you?

That's all, thank you, have a nice day.

Appendix B: Additional tables

Table B1

CATEGORY	PARTICIPANT'S JUSTIFICATION OF THE CHOICE
Indifferent	Indifferent between the two tickets since they both have the same probability of being drawn
More random numbers	On the chosen ticket: the numbers are more random
Favourite numbers	On the chosen ticket: • there are my favourite numbers • there are my lucky numbers • there are my numbers • there are numbers which are important to me
Nice sequence	On the chosen ticket: • there is a nice sequence • I like the sequence • the sequence looks nice • I like the numbers here more • I like smaller numbers • I like higher numbers
Higher Probability	There is a higher probability that these numbers will be drawn
Intuition	• I chose it automatically • I don't know why I chose this one • I chose this one because it was on the right/left • It was my intuition to choose this one • I had a feeling to choose this one • I chose it randomly
More spread	On the chosen ticket: • the numbers are more spread • the numbers are more scattered • there are numbers from the whole range • the numbers are not sequential
The following justifications were counted both as More random numbers and More spread	On the chosen ticket: • the numbers are more diversified • the numbers are less systematic • the numbers are not every 5
Aware (of the same probability)	This category was used when a participant, regardless of their choice, stated that they are aware that both tickets have/should have the same probability of being drawn

Table B2: Determinants of initial choice of the random ticket (probit regressions)

	(1)	(2)	(3)	(4)
	initially_random	initially_random	initially_random	initially_random
initially_random				
medium	-0.493**	-0.491**	-0.544***	-0.547***
high	-0.272	-0.287	-0.352*	-0.361*
seq_5	-0.179	-0.182	-0.219	-0.217
nr_on_the_right	-0.113	-0.100	-0.109	-0.098
male		0.038	-0.014	0.265
age		-0.003	-0.006	-0.005
gamb_inten		0.056	0.064	0.063
morning			0.384**	0.418**
friday			-0.080	-0.213
monday			-0.264	-0.270
location dummies	NO	NO	YES	YES
male_experimenter				0.055
male_male_experimenter				-0.501
_cons	0.937***	0.928***	0.919**	0.898**
N	472	472	459	459

Table B3: Determinants of switching (only among those with ini==0; probit regressions)

	(1)	(2)	(3)	(4)
	switch	switch	switch	switch
switch				
medium	0.017	0.010	0.023	0.022
high	0.291	0.344	0.374	0.366
seq_5	-0.479**	-0.519**	-0.527**	-0.538**
nr_on_the_right	0.128	0.095	0.080	0.067
male		0.646***	0.676***	0.520*
age		-0.012	-0.012	-0.012
gamb_inten		-0.020	-0.037	-0.030
price_difference		0.009*	0.008*	0.009*
morning			0.202	0.193

friday			0.375	0.415
monday			0.060	0.060
location dummies	NO	NO	YES	YES
male_experimenter				-0.143
male_male_experimenter				0.328
_cons	-1.006***	-1.582***	-1.716***	-1.663**
N	330	330	317	317

Table B4: Determinants of specific predictions in the coin task

	(1)	(2)	(3)	(4)
	reversal	reversal	continuation	continuation
main				
initially_random	-0.033	-0.023	-0.345*	-0.342*
switch	-0.692***	-0.673***	-0.275	-0.286
male	-0.264*	-0.281*	-0.204	-0.211
age	0.008*	0.006	0.009*	0.010*
gamb_inten	0.014	0.018	0.085	0.093
heads_three_t	-0.018	-0.044	-0.110	-0.077
morning		-0.204		0.097
friday		0.035		0.077
monday		-0.278		0.104
location dummies	NO	YES	NO	YES
_cons	-0.522*	-0.173	-1.006***	-1.610**
N	472	459	472	472

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