Name:_____   Section: (day/time) _____

AMS5 - MIDTERM
Tuesday May 5th, 2015

A Normal Table is on the last page of this exam.
You must explain all answers and/or show working for full credit.

1. Read the Abstract (background/methods/findings/conclusions) of the article *"Placebos Without Deception: A Randomized Controlled Trial in Irritable Bowel Syndrome"* printed at the end of this exam.

    (a) What is the hypothesis that the study is investigating?

    (b) Does this describe a Randomized Controlled Double Blind Trial? Explain your answer.

    (c) Why are *"matched patient-provider interactions"* important?

    (d) What did the study conclude?

[TURN OVER]

1

2. (a) What is the probability that a family with 3 children has 2 boys and 1 girl. What assumptions did you make?

(b) What is the probability that a family with 4 children has 3 boys and 1 girl.

(c) A family has 2 boys and 1 girl. When their fourth child arrives, what is the probability that they have 3 boys and 1 girl?

3. Estimate the probability

p(person is pregnant | person is a woman).

Explain your answer.

4. At the start of the first class we rolled a regular 6-sided die 10 times and recorded the total number of pips. The frequency distribution of the recorded totals is given in the table below.

Class Interval (total # pips)	Frequency
<6	1
6-15	0
16-25	4
26-30	23
31-35	60
36-40	51
41-50	26
51-60	0
>60	4

(a) Which of these can be considered to be outliers? How did you decide they were outliers?

(b) On the graph paper on page 5 plot a histogram of the distribution of the data, excluding the data you consider as outliers. Label the axes.

(c) The frequency counts between 41 and 45 pips were

# pips	Frequency
41	6
42	7
43	4
44	5
45	2

What is the exact 95th percentile value of the total number of pips?

(d) Does the distribution of the data appear to follow the normal curve? Explain briefly.

(e) The mean and standard deviation of the total number of pips are 35.9 and 7.5 respectively. Using the Normal Approximation, what is an approximate value for the 95th percentile of the data? Explain why this is different from the value found in c).
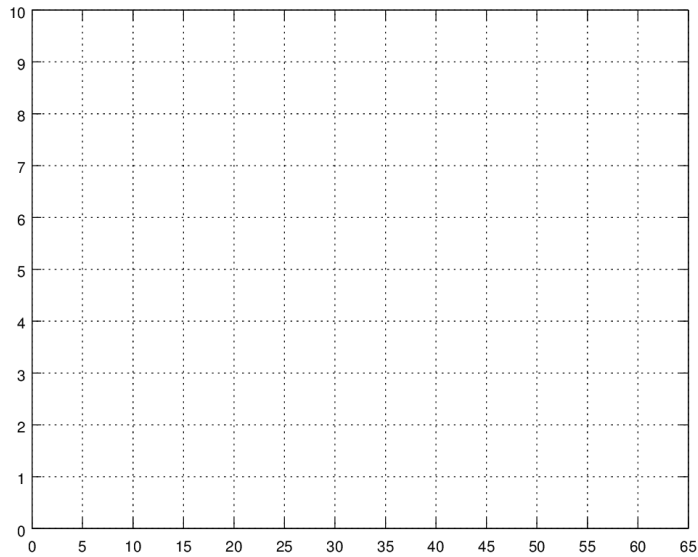
5. At the end of a level of "Jelly Splash" if the player has any remaining moves, they are converted into *"splashes"*.

   If there is one remaining move, one position is chosen at random and all the jellies in the row and column occupied by that position are exploded. 2500 bonus points are scored for the jelly under the chosen position, and 250 bonus points are scored for each of the other exploded jellies.

   If there are two remaining moves, two distinct positions are chosen at random, and all the jellies in the affected row(s) and column(s) are exploded, scoring bonus points as above (2500 for the jelly under the chosen position, and 250 for each of the other exploded jellies).

   For the board shown here

5
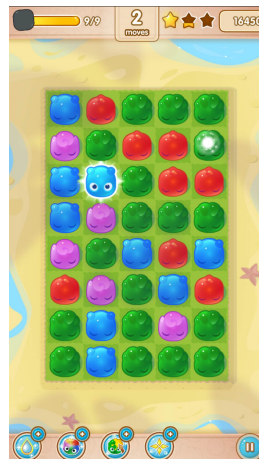
(a) If the player has 1 move left, how many bonus points are scored?

(b) If the player has 2 moves left, how many bonus points are scored if the two positions chosen are

    i. in the same row (but not in the same column)?

    ii. in the same column (but not in the same row)?

    iii. in neither the same row nor the same column?

(c) What are the probabilities of each of the three scores found in part b).

BONUS QUESTION (You can get full marks on this exam without answering these questions. If you do give correct answers, you will get extra marks. You cannot score more than 100% on the exam, however.)

6. Why is this cartoon funny?
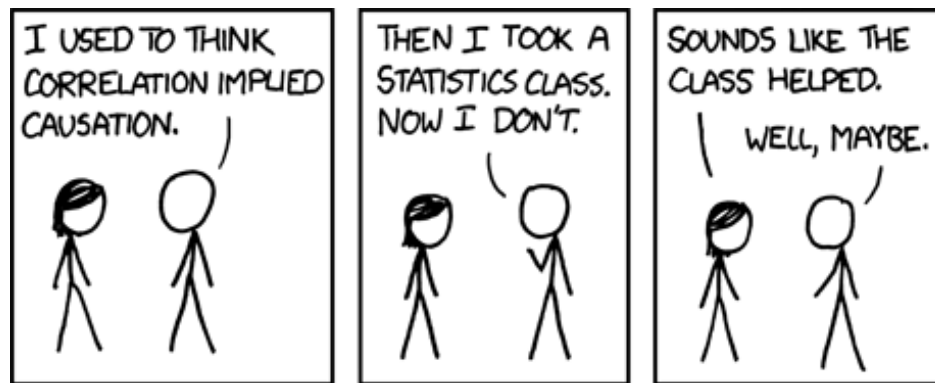
(xkcd.com)

Placebos without Deception: A Randomized Controlled Trial in Irritable Bowel Syndrome

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Abstract

Background: Placebo treatment can significantly influence subjective symptoms. However, it is widely believed that response to placebo requires concealment or deception. We tested whether open-label placebo (non-deceptive and non-concealed administration) is superior to a no-treatment control with matched patient-provider interactions in the treatment of irritable bowel syndrome (IBS).

Methods: Two-group, randomized, controlled three week trial (August 2009-April 2010) conducted at a single academic center, involving 80 primarily female (70%) patients, mean age 47±18 with IBS diagnosed by Rome III criteria and with a score ≥150 on the IBS Symptom Severity Scale (IBS-SSS). Patients were randomized to either open-label placebo pills presented as "placebo pills made of an inert substance, like sugar pills, that have been shown in clinical studies to produce significant improvement in IBS symptoms through mind-body self-healing processes" or no-treatment controls with the same quality of interaction with providers. The primary outcome was IBS Global Improvement Scale (IBS-GIS). Secondary measures were IBS Symptom Severity Scale (IBS-SSS), IBS Adequate Relief (IBS-AR) and IBS Quality of Life (IBS-QoL).

Findings: Open-label placebo produced significantly higher mean (±SD) global improvement scores (IBS-GIS) at both 11-day midpoint (5.2±1.0 vs. 4.0±1.1, $p<.001$) and at 21-day endpoint (5.0±1.5 vs. 3.9±1.3, $p=.002$). Significant results were also observed at both time points for reduced symptom severity (IBS-SSS, $p=.008$ and $p=.03$) and adequate relief (IBS-AR, $p=.02$ and $p=.03$); and a trend favoring open-label placebo was observed for quality of life (IBS-QoL) at the 21-day endpoint ($p=.08$).

Conclusion: Placebos administered without deception may be an effective treatment for IBS. Further research is warranted in IBS, and perhaps other conditions, to elucidate whether physicians can benefit patients using placebos consistent with informed consent.

Trial Registration: ClinicalTrials.gov NCT01010191

## Introduction

Placebo treatment can have a significant impact on subjective complaints. [1] Furthermore, recent studies have shown measurable physiological changes in response to placebo treatment that could explain how placebos alter symptoms. [2] A critical question is establishing how physicians and other providers can take optimal advantage of placebo effects consistent with their responsibility to foster patient trust and obtain informed consent. Directly harnessing placebo effects in a clinical setting has been problematic because of a widespread belief that beneficial responses to placebo treatment require concealment or deception. [3] This belief creates an ethical conundrum: to be beneficial in clinical practice placebos require deception but this violates the ethical principles of respect for patient autonomy and informed consent. In the clinical setting, prevalent ethical norms emphasize that "the use of a placebo without the patient's knowledge may undermine trust, compromise the patient-physician relationship, and result in medical harm to the patient." [4] Nevertheless, a recent national survey of internists and rheumatologists in the US found that while only small numbers of

Tables

Area (percent) — Height (percent)

−z   o   z
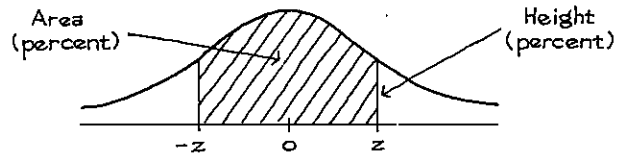
A NORMAL TABLE

z	Height	Area	z	Height	Area	z	Height	Area
0.00	39.89	0	1.50	12.95	86.64	3.00	0.443	99.730
0.05	39.84	3.99	1.55	12.00	87.89	3.05	0.381	99.771
0.10	39.69	7.97	1.60	11.09	89.04	3.10	0.327	99.806
0.15	39.45	11.92	1.65	10.23	90.11	3.15	0.279	99.837
0.20	39.10	15.85	1.70	9.40	91.09	3.20	0.238	99.863
0.25	38.67	19.74	1.75	8.63	91.99	3.25	0.203	99.885
0.30	38.14	23.58	1.80	7.90	92.81	3.30	0.172	99.903
0.35	37.52	27.37	1.85	7.21	93.57	3.35	0.146	99.919
0.40	36.83	31.08	1.90	6.56	94.26	3.40	0.123	99.933
0.45	36.05	34.73	1.95	5.96	94.88	3.45	0.104	99.944
0.50	35.21	38.29	2.00	5.40	95.45	3.50	0.087	99.953
0.55	34.29	41.77	2.05	4.88	95.96	3.55	0.073	99.961
0.60	33.32	45.15	2.10	4.40	96.43	3.60	0.061	99.968
0.65	32.30	48.43	2.15	3.96	96.84	3.65	0.051	99.974
0.70	31.23	51.61	2.20	3.55	97.22	3.70	0.042	99.978
0.75	30.11	54.67	2.25	3.17	97.56	3.75	0.035	99.982
0.80	28.97	57.63	2.30	2.83	97.86	3.80	0.029	99.986
0.85	27.80	60.47	2.35	2.52	98.12	3.85	0.024	99.988
0.90	26.61	63.19	2.40	2.24	98.36	3.90	0.020	99.990
0.95	25.41	65.79	2.45	1.98	98.57	3.95	0.016	99.992
1.00	24.20	68.27	2.50	1.75	98.76	4.00	0.013	99.9937
1.05	22.99	70.63	2.55	1.54	98.92	4.05	0.011	99.9949
1.10	21.79	72.87	2.60	1.36	99.07	4.10	0.009	99.9959
1.15	20.59	74.99	2.65	1.19	99.20	4.15	0.007	99.9967
1.20	19.42	76.99	2.70	1.04	99.31	4.20	0.006	99.9973
1.25	18.26	78.87	2.75	0.91	99.40	4.25	0.005	99.9979
1.30	17.14	80.64	2.80	0.79	99.49	4.30	0.004	99.9983
1.35	16.04	82.30	2.85	9.69	99.56	4.35	0.003	99.9986
1.40	14.97	83.85	2.90	0.60	99.63	4.40	0.002	99.9989
1.45	13.94	85.29	2.95	0.51	99.68	4.45	0.002	99.9991