

Rata's talk for...



OMG21

The **colour** distribution of m&m's

History of m&m colour distribution (standard plain packet)

	1941	1976	1987	1995	2008	2017 (US: TN, NJ)		2021 NZ
Red	?	-	20	20	13	13	12.5	?
Orange	-	20	10	10	16	20	25	?
Yellow	?	20	20	20	14	13	12.5	?
Green	?	10	10	10	20	20	12.5	?
Blue	-	-	-	10	24	21	25	?
Brown	?	40	30	30	13	13	12.5	?
Other	Violet	Tan	Tan	-	-	-	-	?

1941- 2008: <https://www.pleacher.com/mp/mlessons/stat/mobmars.html>

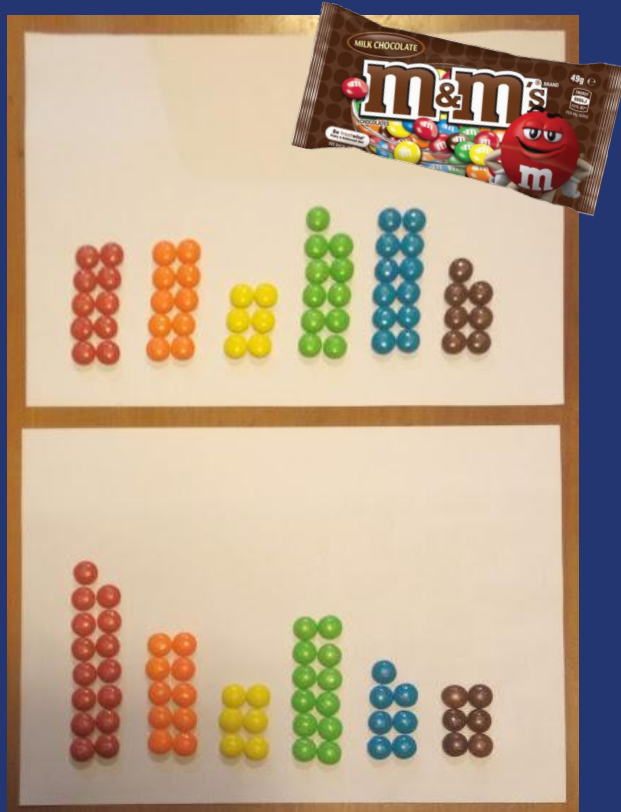
2017 data: <https://blogs.sas.com/content/iml/2017/02/20/proportion-of-colors-mandms.html>

Rata getting the data...



Sample size = 3973 m&m's
(3629.5 plain, 226.5 crispy, 117 peanut)

Small packs of m&m's (49g & 13.5g bags)



Bags and buckets of m&ms



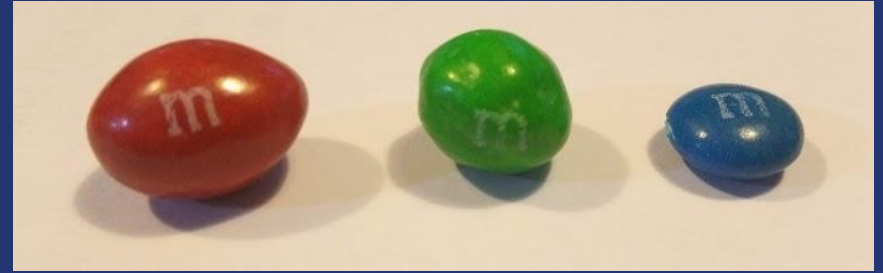
180g bag



345g family bag



Peanut and crispy m&m's



Peanut (red), crispy (green) and plain (blue) m&m's



Value and mass

*345 g plain m&m bag is cheapest per m&m, at 1.71 cents per m&m

*Peanut m&m is has most mass, with average of 2.9g per m&m.

*Best price per gram is 345g bags of plain or peanut m&m's.

(Prices are the mean over 4 stores: Pak n Save, The Warehouse, New World and Countdown.
Mass according to what's printed on package)

Plain m&m (Australia)

1920g net / 2045.5 candies
= 0.939g (3sf)

Plain m&m (China)

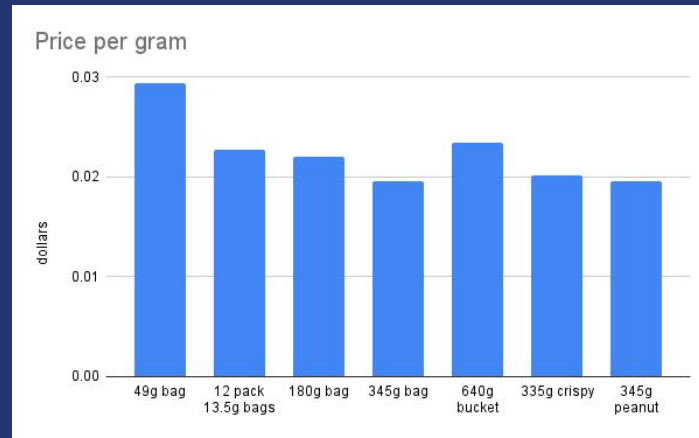
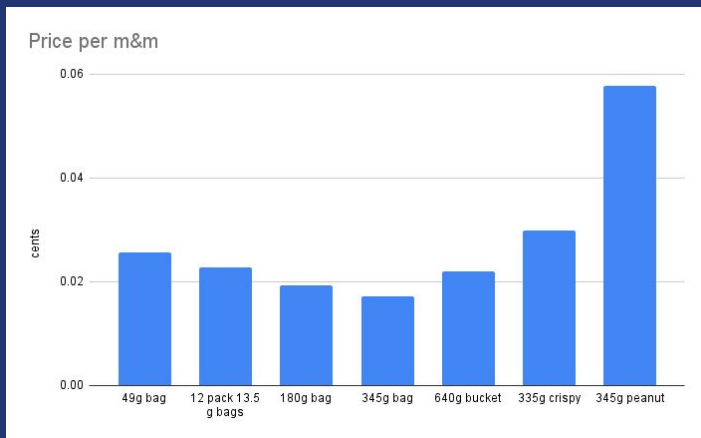
1382.5g net / 1584 candies
= 0.873g (3sf)

Crispy m&m (Australia)

335 g net / 226.5 candies
= 1.5g (2sf)

Peanut m&m (China)

345g net / 117 candies
= 2.9g (2sf)



m&m's of each colour in various packages (plain m&m's)

	13.5g bag (n=9) C	49g bag (n=4) C	180g bag (n=4) C	345g bag (n=1) C	640g bucket (n=3) A	Total	2021 NZ
Red	24	44	132	67	351.5	618.5	17.0%
Orange	32	39.5	111	58	382	622.5	17.2%
Yellow	25	30	148	69.5	259	531.5	14.6%
Green	18	42	142.5	65	284	551.5	15.2%
Blue	20	36	140	54	419	669	18.5%
Brown	25	33.5	146	82	350	636.5	17.5%
Total	144	225	819.5	395.5	2045.5	3629.5	100%

The two m&m's factories that supply NZ: Australia and China

Ballarat M&M factory, colour proportions



China M&M factory, colour proportions



Breakout Activity - some things to investigate

- So, what's our confidence that plain m&m's manufactured in Australia and China do actually have different colour distributions?
- Mark has brought some mystery m&m's, and we can use a chi squared test to determine whether they're more likely to be from Australia or China.

$$\chi_c^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

Expected proportions from Rata's data

Australia	China
0.172	0.169
0.187	0.152
0.127	0.172
0.139	0.169
0.205	0.158
0.171	0.181

M&M facts

- m&m's were the first candy in space, in 1981, and they were also the official snack of the 1984 Olympics
- You can buy “first communion” m&m's
- There are times when doing this experiment won't work. At Christmas, m&m's produces bags of red and green only, and for the first 71 days of 2004, m&m's had no colour.