

# **The Colour Purple: The Effect of Questionnaire Colour on Mail Survey Response Rates**

*Mike Brennan & Jan Charbonneau*

While many techniques have been employed to improve response rates to mail surveys, the most effective, such as pre-paid incentives and reminders, add to the cost and effort of conducting a survey. However, there are other techniques that do not, and yet may also be effective. One of these is the colour of the questionnaires used. This study examined the effect on response rates of four different questionnaire colours: red, green, blue and purple. In a survey of 1600 New Zealand residents drawn at random from the New Zealand Electoral Roll, the different coloured questionnaires generated significantly different response rates, ranging from 60% to 71%. The most effective colour overall was purple. Purple was also the most effective colour with both male and female respondents, across all age groups, and with each response wave.

Keywords: Mail survey, colour, response rates

## **Introduction**

Given the long recognised and ongoing decline in mail survey response rates (Bednall & Shaw 2003) researchers have to continually seek out new and better ways to encourage respondent participation. This has prompted countless studies to investigate ways of increasing both response rates and response speed, with considerable success. It is generally accepted that the most effective way to achieve a faster response in mail surveys is to offer a small “pre-paid” incentive, and the most successful type of prepaid incentive is cash (Church 1991, Edwards et al 2002). Another effective way of increasing response rates is to increase the number of contacts with non-responders (Dillman 1978, 2000, Chiu & Brennan, 1990). However, both of these procedures add to the expense of the survey, and in countries such as New Zealand, sending cash via mail is now illegal.

There are, however, other techniques that can be used improve response rates in mail surveys, yet add nothing to the cost of the survey. These relate to elements of the survey envelope (e.g. size, colour, form of address, personalisation of address, type of postage, logo), the cover letter (layout, tone, letterhead, signature, status of researcher, content), and the questionnaire itself (colour, length, layout, types of questions, topic). For details of such studies, see Dillman 1978, 2000, Linsky 1975, Kanuk & Berenson 1975, Heberlein & Baumgartner 1978, Yu & Cooper 1983, Harvey 1987, Fox, Crask & Kim 1988, Brennan 1992, Edwards et al 2002. This paper is concerned with just one of these elements: the colour of the questionnaire.

Given that researchers have to choose a colour for their questionnaires, even if this is white, it is surprising to find that there are only 13 published studies on the effect of questionnaire colour on survey response rates. Three studies have reviewed this work (Buttle & Thomas 1996, Etter, Cucherat & Perneger 2002, and Hartley and Rutherford 2003). All but three of the 12 studies reviewed by Hartley and Rutherford (2003) found no difference in the response rates generated by white or a coloured questionnaire (Dunlap 1950, Gullahorn & Gullahorn 1963, Pucel, Nelson & Wheeler 1971, Pressley & Tullar 1977, Jobber & Sanderson 1983, Fullerton & Dodge 1988, Greer & Lohtia 1994, Buttle & Thomas 1996, Hartley 2000).

Bender (1957) also reported no effect due to colour, but he tested combinations of different coloured questionnaires and envelopes where the colours did not match, so conclusions cannot be drawn from his study about the specific effects of questionnaire colour.

Of the three studies that have found colour effects, one found a significantly higher response from pink than white for one of two conditions (Matteson 1974); one found yellow more effective in one of two conditions (Blythe & Essex 1981); and one found blue/yellow to be more effective than black/white (LaGarce & Washburn 1995, LaGarce & Kuhn 1995). Matteson (1974) achieved response rates of 24.3% (pink) compared to 19.7% (white) to a form letter, but 32.3% (pink) compared to 31.5 (white) when a semi-personal letter was used. No details are available for the Blythe & Essex (1981) conference paper, cited in Jobber & Sanderson (1983). In the LaGarce & Kuhn study, where colour increased response rates from 7.7% to 18.3%, the colours used were associated with the program the survey was addressing, and were familiar to respondents.

Curiously, almost all of the previously published studies involved surveys of executives or members of professional associations, with two targeting graduates or university staff. None of the studies carried out separate analyses for gender, or age, and none involved surveys of the general public. However, since many mail surveys are of members of the general public, it would be useful to know whether colour has an effect on response rate among this sector, and whether these effects vary with age or gender. This paper reports a study that examined these factors in a mail survey of the general public.

## Method

A sample of 1600 New Zealand residents was randomly selected from the 2005 electoral roll, and randomly assigned to one of four treatment groups for an experiment on incentives. Within each of these four experimental groups, respondents were randomly allocated one of the four versions of the questionnaire (bright red, lime green, turquoise blue, bright purple) – See Figure 1. Thus the questionnaire colour experiment was balanced across the incentive experiment. The questionnaires were identical except for colour, and for the format of a single question near the end of the survey.



Figure 1. Questionnaires

The survey was conducted between August 31 and October 21, 2005. A reminder was sent 16 days after the first mailing, and a second reminder was sent 13 days after that.

In the mailings in which a questionnaire was sent (first and third for three groups; first and second for one group), the surveys were sent in a white A4 envelope with the University's logo in the top left-hand corner. The other mailing was in a white A5 envelope, identical to the A4. The cover letters were on white A4 University letterhead, signed by both researchers. The incentive (when used), was a flat, square, foil-wrapped chocolate, and was stapled to the cover letter. The eight page questionnaire, on the topic of "Reality TV", was in the form of an A4 booklet (A3 folded). A reply paid envelope was provided in all mail-outs. Undelivered mail (GNAs) and ineligible respondents (advised as offshore or deceased) were removed

## Results

### Response rates

The response rates associated with each colour of questionnaire are reported in Table 1. After three waves (i.e., two reminders) the response rates for the four colours ranged from 60% to 71%, with a mean of 64%. The differences between the colours were highly statistically significant, and of managerial significance. The purple questionnaires generated a response rate 6% higher than the next best colour (blue) and between 10% - 11% higher than the green and red questionnaires.

**Table 1. Response Rate by Questionnaire Colour**

	Questionnaire Colour				Total %
	Red %	Green %	Blue %	Purple %	
<b>Valid</b>	59.7	61.2	65.2	71.0	64.3
<b>Non-Response</b>	40.3	38.8	34.8	29.0	35.7
<b>N</b>	390	389	385	390	1554

Note.  $X^2 = 12.99$   $df = 3$   $p = .005$

### Effect by Age Group

A break-down of response rate by age-group is provided in Table 2. It is apparent that the purple questionnaire produced the highest response rate regardless of age group of respondents.

For all colours, the highest response was from respondents in the 51-70 age bracket. Red performed poorly for respondents under 30 or over 70, green performed very poorly for respondents under 30, and blue performed quite well for all age-groups, but not as well as purple. While the results suggest age-related colour effects, the differences in response rates

for the four questionnaire colours are non-significant at the .05 level for all age brackets except the 18-30 group ( $p=.056$ ), which appears to have an aversion to green and red.

**Table 2. Effect of Questionnaire Colour on Response Rate: by Age Group**

Age Group	N	Questionnaire Colour					X <sup>2</sup>	p
		Red	Green	Blue	Purple	Overall		
		%	%	%	%	%		
<b>18-30</b>	303	<b>50.0</b>	<b>45.8</b>	62.8	<b>64.2</b>	55.4	7.51	.06
<b>31-50</b>	624	62.7	59.5	64.6	<b>69.0</b>	63.9	3.20	.36
<b>51-70</b>	450	66.3	73.0	68.2	<b>75.8</b>	<b>71.1</b>	3.12	.37
<b>70 +</b>	177	<b>53.3</b>	61.2	64.1	<b>75.0</b>	63.3	4.62	.20
<b>Overall</b>	1554	59.7	61.2	65.2	<b>71.0</b>	64.3		

Note: df = 3

### Effect by Gender

The response rate by gender is shown in Table 3. For both males and females, the colour of the questionnaire made a significant difference to the response rate, with purple was the most effective colour for both males and females. There also appear to be gender differences for the colours other than purple. Males did not respond very well to red, while females did not respond as well to green.

**Table 3. Effect of Questionnaire Colour on Response Rate: by Gender**

Gender	N	Questionnaire Colour					X <sup>2</sup>	p
		Red	Green	Blue	Purple	Overall		
		%	%	%	%	%		
<b>Male</b>	767	<b>52.3</b>	61.7	61.4	<b>67.6</b>	60.6	9.62	.02
<b>Female</b>	787	67.4	<b>60.7</b>	69.4	<b>74.1</b>	<b>67.9</b>	8.80	.03
<b>Overall</b>	1554	59.7	61.2	65.2	<b>71.0</b>	64.3		

Note: df = 3

## Effect by Wave

There has been some suggestion that colour would be effective because coloured questionnaires would be easier to find among other clutter once put down. This would suggest that the effect of colour would be greatest among non-respondents sent a reminder, since this reminder is normally a letter, so a respondent has to find the questionnaire sent in an earlier posting in order to respond. Thus one would expect to see the greatest effect of colour in wave 2. As can be seen in Table 4, the purple questionnaire generated the highest response rate during every phase of the survey, both when a questionnaire was supplied (waves 1 and 3) and when only a reminder letter was sent (wave 2). Although the differences between the colours are not statistically significant for any wave, it is curious that green elicited a much lower response than both blue and purple in wave 2, whereas purple elicited a much higher response than the other three colours in wave 3. The reasons for these results are not apparent, although sampling error cannot be ruled out.

**Table 4. Effect of Questionnaire Colour on Response Rate: by Wave**

Wave	N	Questionnaire Colour					X <sup>2</sup>	P
		Red	Green	Blue	Purple	Overall		
		%	%	%	%	%		
1	1554	35.1	33.6	36.5	<b>38.0</b>	35.8	1.38	.71
2	744	19.0	16.6	22.5	<b>23.3</b>	20.3	3.42	.33
3	581	26.5	28.7	27.5	<b>36.3</b>	29.6	3.95	.27
<b>Overall</b>	1554	59.7	61.2	65.2	<b>71.0</b>	64.3		

Note: Wave 1 includes all four treatment groups. Waves 2 and 3 exclude Treatment Group 3 which received a replacement questionnaire with the first reminder but not with the second.

## Discussion

Our results indicate that questionnaire colour can indeed affect mail survey response rates, and that the most effective colour overall is bold purple - at least in this study, with this topic, population and shade of purple! Purple achieved the highest response rates by a significant margin among both males and females, in each age category, and in each wave. This result was counter-intuitive to us, as purple seemed to be the least attractive colour, and to be the colour most likely to make the questionnaire difficult to read.

The question as to why this colour should be more effective is pure speculation. As noted by Hartley & Rutherford (2003), several suggestions have been made regarding possible reasons for colour effects, including "psychological effects". For example, "Blue for instance, is viewed as a cool colour and typifies restraint. Yellow connotes warmth, whereas the colours red and orange project warmth and action" (Wright, Warner, Winter & Ziegler, 1997) - see also Gaw, Cheskin & O'Brian, 1945, Plack & Schick 1974 and Hemphill 1996. However,

studies by Weller & Livingston (1988) and Godar (2000) did not find strong “psychological effects” due to paper/background colour.

An alternative view is that certain colours are simply easier to see, and therefore make it easier to find a questionnaire that has been put aside when the respondent decides to complete the survey, or when a reminder letter arrives (Pressley & Tullar 1977, Fullerton & Dodge 1988, Greer & Lohtia 1994, Hartley 2000). However, this does not explain the effect in our study, as all four colours were visually intrusive. Furthermore, purple was the most effective colour both when a questionnaire was provided as well as when it was not. Perhaps a combination of perceptual and emotional factors was at play, given that purple has strong association with both royalty and a market leading brand of chocolate.

Of course, while a response rate of 71% (purple questionnaire) or even 65% (blue questionnaire) is very respectable, we cannot tell from our study whether these colours performed any better than white would have done (cf Pressley & Tuller, 1977). However, our results do indicate that both blue and purple achieve good response rates across all age groups and both genders, whereas red and green do not, and that purple is superior to blue. These results demonstrate clearly that colour can indeed have an effect on response rates in mail surveys of the general public, and deserves further consideration.

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**Mike Brennan is a Senior Lecturer and Jan Charbonneau is a Lecturer, in the Department of Marketing, Massey University.**