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FACTORS AFFECTING THE PERCEIVED VALUE OF COINS *

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Subjects were asked to judge the relative values or assign absolute values to coins similar to the proposed new UK 20p and £1 coins along with other metal blanks, prior to the announcement of the new coins. Preliminary studies indicated that while a 'yellow' (gold-coloured) coin would not normally be rated higher in value than the blank 5p coin, the addition of extra thickness and an elaborate edge enhanced its apparent relative value. It was also shown that seven-sided 'white' (silver-coloured) coins were rated as more valuable than 12-sided or circular coins of about the same diameter. The absolute values assigned to such coins followed a similar trend to the relative values. Seven-sided white coins were assigned higher values than 12-sided white coins, and thicker yellow coins were assigned higher values than thinner ones. In the final study the effect of edge characteristics and colour were examined independently. For smooth circular, milled circular and seven-sided coins, 'red' (copper-coloured) coins were perceived as least valuable, and white and yellow coins were equally often assigned to intermediate and high values. For red, white and yellow coins, smooth circular coins were rated least valuable and seven-sided coins as most valuable. It appears that people assign learned 'rules' about features indicating value in a systematic and independent manner.

Introduction

In 1971, Britain's currency was decimalised. The system introduced comprised six coins, of values $\frac{1}{2}$, 1, 2, 5, 10 and 50 pence, with the £1 note equal to 100 pence. The $\frac{1}{2}$, 1 and 2 pence coins are circular coins with smooth edges of diameters 17.1, 20.3 and 25.9 mm respectively, minted in a 'red' (copper-coloured) alloy. The 5 and 10 pence coins are also circular, with milled edges, of diameters 23.6 and 28.5 mm respec-

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tively, minted in a 'white' (silver-coloured) alloy. The 50 pence coin has seven smooth edges, is of 30.0 mm diameter and again is white in colour. (These six coins are shown in fig. 1.) Thus in this set of six coins, red ones are less valuable than white, and among coins of the same colour, small coins are less valuable than larger ones. Also, smooth edged circular coins are less valuable than milled edged circular coins which are in turn less valuable then the sole seven-sided coin.

In January 1981 it was announced that two new coins would be introduced into the British currency – a 20p coin in 1982 and a £1 coin in 1983. These coins were deemed necessary given the inflation that had taken place since decimalisation in 1971. The £1 note today has less spending power than did the ten-shilling note when it was replaced by the "50p" coin in 1969. Therefore higher value coins are needed, particularly for the operation of vending machines.

For various economic and psychological reasons it was decided that both of the new coins should be small relative to their value compared with other coins present in the system. Small coins are cheaper to produce, easier to handle and would bring the UK coin system into line with those of other nations. Also people do not like carrying large weights of change in their pockets. The introduction of the 20p would remove a large number of 10p's from circulation, reduce the weight of change in the average purse or pocket, and leave room for the new £1 coin to be introduced later.

However, the introduction of new high-value coins of relatively small size potentially poses two psychological problems. First, given that there is little room in the system of sizes to fit in new coins of discriminably different diameters, there arises the possibility of confusion between new, high-value coins and old, low-value ones. Bruce (1981) and Bruce et al. (1983) report work conducted to assess how well different versions of the proposed coins would be discriminated from existing coins. The second psychological problem, which is the concern of this paper, is that people would probably be unhappy if new high-value coins did not look valuable. Within the initial set of six decimal coins there was some relationship between their actual size and their monetary value, and other work suggests a close association between the size and value of coins. Relatively valuable coins are judged as being larger than their actual size (Bruner and Goodman 1947; McCurdy 1956), a point which will be discussed further below.

The initial specification for the two new coins were for both to be 22

mm in diameter – in between the size of the present 1p and 5p coins. The 20p coin was to be 7-sided, "white" in colour (i.e., like the 5, 10 and 50p coins) and of similar thickness to the 5p coin. The £1 coin was to be modelled on the old sovereign – round, "yellow" in colour (like gold), of a thickness of 2.8 mm or more and hence very heavy for its diameter, and with an elaborate edge in which lettering would be cut into a regular milling (hereafter referred to as 'incuse' lettering). Fig. 1 shows examples of blank versions of these coins with the six original decimal coins for comparison.

It was assumed that the seven sides of the 20p coin would make the coin appear like a small 50p – i.e., that this shape might confer apparent value to the coin, and that the thickness, colour and edge features of the £1 would also act to make these coins in turn appear valuable. In the context of a programme of research aimed primarily at assessing the discriminability of new coins from old, we conducted a number of studies of the perceived values of metal discs of around 22 mm diameter with differing colour and edge features, to assess to what extent such assumptions were valid.

All the studies reported here were conducted on fairly representative

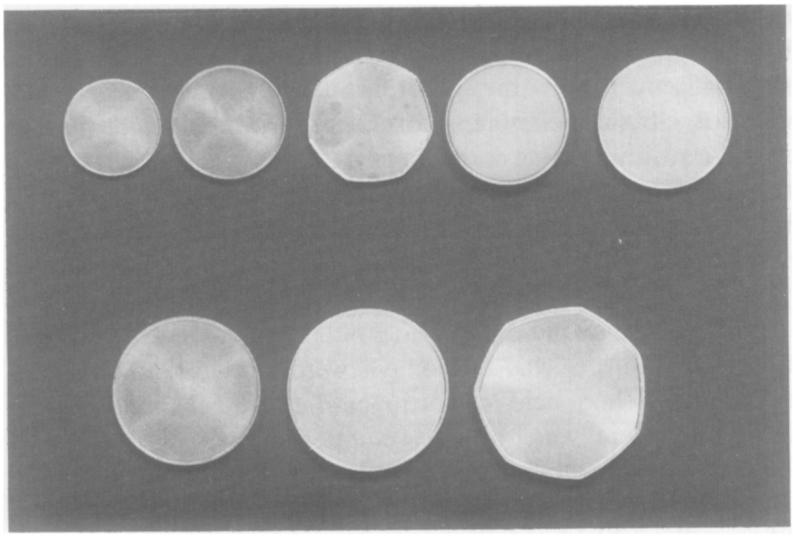

Fig. 1. The two new coins (20p and £) shown with the other six decimal coins for comparison of their sizes. From left to right, top row: $\frac{1}{2}$p, 1p, 20p, £1, 5p; bottom row: 2p, 10p and 50p blanks. See text for their actual sizes. (N.B. The specified diameters for the new coins have been altered very slightly since this research was conducted. The coins illustrated correspond to those used for this research.)

samples of the general public, before the announcement of the new coins. Thus while our subjects' judgements of relative and absolute value were undoubtedly based on their experience with coins in the British currency, they were unlikely to be affected by their expectations about the specifications of coins to come.

The first studies described were preliminary investigations in which we asked the applied question of how models of the new coins would be perceived in value compared with the existing coins closest in size – the 1p and 5p. Thus factors of colour, size and edge features were inevitably partially confounded. The results of this work led us to conduct a further experiment, which we report in more detail, in which such confounding features were removed.

Preliminary studies

When it was decided that the £1 coin should be "yellow" in colour it was assumed that this would make it look like gold, and hence seem valuable. However, no other yellow coin exists in the present UK currency, and many people might associate a yellowish alloy with the colour of the old, predecimal, threepenny piece (a small, thick, 12-sided coin of diameter similar to the proposed new £1). In this first study we attempted to discover how the general public would perceive the relative value of a blank yellow coin of 22 mm in diameter compared with blank red and white coins corresponding to the existing 1p and 5p, and hence of similar though not identical size. Different groups of subjects handled different versions of the yellow coin to see whether the addition of the features of thickness and an elaborate edge, which were planned for the £1, would have the desired effect of increasing the apparent relative value of the coin.

A total of 135 subjects was tested. All were students at an Open University Summer School held in Nottingham in 1980. They were aged 18–65 years, and there were roughly equal numbers of males and females. Subjects were allocated in equal numbers to one of three conditions. In the first condition subjects were given a 1p blank, a 5p blank and a yellow blank of 22 mm diameter, 1.8 mm thickness (comparable to the 5p) which they were allowed to handle. Thus the fact that both the white and yellow coins had milled edges, unlike the red coin, could be detected by the subjects. In the second condition

subjects were given a 1p blank, a 5p blank and a yellow blank of 22 mm diameter and 2.8 mm thickness to handle. In the third condition subjects were given a 1p blank, a 5p blank and a 22 mm yellow blank of 2.8 mm thickness with an incuse inscription added to the milled edge. In each case the subjects were asked to rank order the three coins according to their apparent relative values. The numbers of subjects assigning each of the red, white and yellow coins to first (least valuable) second and third (most valuable) ranks in this study (total $N = 135$) is as shown in table 1.

Table 1a shows that subjects are consistent in assigning lowest rank to the 1p blank, and have a tendency to assign the yellow coin to second rank given this selection of coins. This confirms a similar result obtained with a sample of 80 subjects shown these three coins only, but with edge features concealed (Bruce 1981).

Table 1b suggests that the additional thickness of the 2.8 mm yellow coin leads rather more subjects to assign it to the highest rank, though on average the 5p blank is still more often selected.

Table 1c, however, suggests that the addition of an inscription to the yellow coin does increase its apparent value – the yellow coin is now the most popular choice for highest rank despite its somewhat smaller diameter then the 5p.

This first study therefore indicates that while a yellow coin of diameter intermediate between the 1p and 5p would not tend to be perceived as more valuable than the 5p, the addition of thickness and an elaborate edge of the type planned for the coin have the desired effect of increasing its apparent relative value.

Table 1
The number of subjects assigning 1p, 5p and yellow coins with different thickness and edge features (a, b and c) to ranks 1 (lowest), 2 and 3 (highest).

	Type A			Type B			Type C		
	1p	5p	1.8 mm yellow	1p	5p	2.8 mm yellow	1p	5p	2.8 mm yellow (+insc)
Rank 1	36	3	6	35	2	8	44	1	0
Rank 2	7	13	25	7	18	20	0	32	13
Rank 3	2	29	14	3	25	17	1	12	32
Concordant rankings:	1p < yellow < 5p			1p < yellow < 5p			1p < 5p < yellow		

In the second study we assessed the apparent value of the 7-sided 20p coin. Again, it was assumed that the 7 sides on the coin would be associated with the existing 50 p and enhance the apparent value of the smaller 20p. Here the perceived relative values of circular, 12-sided and 7-sided white coins were assessed. Eighty Open University students were each shown four coins. One was a blank 5p coin, the others were all 22 mm in diameter. Of these, one had 12 sides, one had seven sides, and one had seven sides along with a raised broad border (planned as a feature of the design of the 20p). The coins were mounted so that the milling on the 5p was not visible. The subjects were asked to rank order the four coins according to their apparent relative value. The numbers of subjects assigning each of the four white coins to first (least valuable), second, third and fourth (most valuable) ranks is shown in table 2.

This table indicates that there is a fairly strong tendency for subjects to assign the 5p and 12-sided blanks to first and second ranks, the plain seven-sided coin to third rank and the seven-sided coin with the border to the highest rank. These results then support the assumption that "seven-sidedness" is now a feature associated with relatively high value coins.

These studies raised several further questions. First we have looked at relative values only. If subjects were asked to assign an absolute value to the yellow coin, how often would they judge the value to be as high as £1? This question was addressed in the next study.

This study was conducted in conjunction with an experiment on the relative discriminability from existing coins of three white coins of 22 mm diameter and about the same thickness as the 5p (12-sided, 7-sided and 7-sided with border) and two yellow coins of 22 mm diameter (1.8

Table 2
The number of subjects assigning each of the white coins to ranks 1 (lowest), 2, 3 and 4 (highest).

	Type of coin			
Rank	5p	12-sided	7-sided	7-sided + border
1	39	29	1	11
2	22	33	17	8
3	6	12	45	17
4	13	6	17	44
Concordant ranking:	5p < 12S < 7S < 7S + border			

mm and 2.8 mm in thickness).

The subjects tested here were 146 members of the general public, aged 16–65 years, of both sexes, who were recruited by advertisement in a local paper. The study was conducted during the Autumn of 1980. For the purposes of the discriminability experiment subjects were assigned at random to one of five conditions, with between 25 and 33 subjects in each. In each condition subjects were exposed to only one of the five trial coins, i.e. the 12-sided, 7-sided and bordered 7-sided white coins and the 1.8 mm and 2.8 mm thickness yellow coins. Subjects spent a period of 2 hours in which they performed tasks involving finding these "new" coins from mixtures of the old coins by sight or by touch alone. At the end of the discrimination experiment, each of the subjects was asked to imagine that the "new" coin they had been handling was to be introduced into our coin system and to assign a value to it.

The values assigned to each of the white and yellow coins are summarised in table 3. This table of results generally supports the earlier results. For the white coins, the 7-sided versions are both more often given values between 11 and 50p than is the 12-sided version. A chi-squared test was performed on the data for the white coins only, collapsing the three rows in table 3 into two rows containing the numbers of subjects assigning values of less than 10p and more than 10p. The test indicated that the frequencies in this table are significantly different ($\chi^2 = 14.02$, $d.f. = 2$, $p < 0.001$). However, this study does not confirm the observation in the previous study that the raised border added to the perceived value of the 7-sided coin.

For the yellow coins, it is clear that the thin version of the coin is

Table 3
A summary of the absolute values assigned to three different coins and two different yellow coins.

Assigned value	Type of coin				
	(a) White			(b) Yellow	
	12-sided	7-sided	7-sided	1.8 mm	2.8 mm
⩽10p	25	8	13	20	10
11–50p	7	18	17	4	8
> 50p	1	1	1	1	12
Total number of subjects	33	27	31	25	30

almost always perceived as low in value, while the thick version is quite often given a value greater than 50p. A chi-squared test was applied to the data for the yellow coins, as displayed in table 3. This showed that the frequencies differ significantly ($\chi^2 = 13.63$, $d.f. = 2$, $p < 0.001$).

Thus this study on perceived absolute value both largely bears out the results obtained when relative values were requested, and at the same time indicates that a fair proportion of the subjects tested "correctly" assigned values of 11–50p for the 7-sided white coins, and values of over 50p for the thick version of the yellow coin.

Main study

In the preliminary studies it was observed that yellow coins tended not to be perceived as more valuable than white coins of slightly larger diameter. However, either the size or the colours might have been the deciding factor there. It was also observed that 7-sided white coins tended to be perceived as more valuable than 12-sided or circular white coins. This may be an effect of 7-sidedness per se, or it might be the specific combination of 7-sidedness with a white metal (cf. the 50p) which influences the decision.

In the main study it was decided to explore the effects of colour and shape of coins on their perceived relative and absolute values using coins of identical diameters and thicknesses and with colour and edge features varied systematically. Such blanks were not available at the time when the preliminary studies were conducted, but were provided and used in the major study reported here. The effect of colour was assessed on three different types of coin (smooth circular, milled circular and 7-sided) which were identical in diameter (all 22 mm). The thicknesses of the blank coins used in this study were all the same, approximately equal to the thickness of the existing 5p coin. The effect of shape was assessed on three different colours of coin (red, white and yellow) again all 22 mm in diameter, and of the same thickness.

Method

A total of 180 members of the general public was tested. Subjects were approached in shopping centres in Beeston, Nottingham and Basings-

toke. Approximately one half of the subjects were between 18 and 40 years of age, and one half between 41 and 65 years of age. Roughly equal numbers of male and female subjects were tested.

These 180 subjects were each randomly assigned to one of six conditions (30 subjects in each), such that roughly equal numbers of males and females, and older and younger subjects occurred in each. In each of the six conditions subjects were shown one set of three blank coins of 22 mm diameter and asked first to rank order the three coins according to their apparent value, and second to imagine that the blanks were to be introduced into our coin system and assign values to them.

The six different sets of coins tested were:

(1) Red, white and yellow smooth circular coins.
(2) Red, white and yellow milled circular coins.
(3) Red, white and yellow 7-sided coins.
(4) Smooth circular, milled circular and 7-sided red coins.
(5) Smooth circular, milled circular and 7-sided white coins.
(6) Smooth circular, milled circular and 7-sided yellow coins.

Results and discussion

The number of subjects out of the 30 tested on each set who assigned each coin to first, second and third ranks is as shown in table 4.

Looking first at the effect of varying colour across different types of coins (sets 1–3) one sees a consistent pattern. Red coins are almost always assigned to the lowest rank, while white and yellow coins are roughly equally assigned to second and third ranks. It therefore appears that while the slightly different size of the yellow coin may have had some effect of lowering its apparent value in Study 1, the primary factor of importance is its colour. Subjects do not all tend automatically to perceive a yellow coin as more valuable than a white one. Only about half will tend to assign the yellow coin to highest rank. This may well be due to the ambiguity of the yellow alloy – is it gold or brass? When testing subjects it was noticed that some subjects spontaneously labelled the yellow coin either as "gold" or "brass" and that their rank always reflected this.

Turning now to the effect of edge features on each of three different

colours (sets 4, 5 and 6), here again we see a remarkably consistent pattern. For each colour, the smooth coin is generally seen as least valuable and the seven-sided coin as most valuable. This suggests that 7-sidedness per se is now perceived as a "valuable" feature, even for the yellow coins (where it was thought possible that the older subjects

Table 4
The numbers of subjects assigning coins in the different sets used in Study 3 to ranks 1 (lowest), 2 and 3 (highest).

	Coin set			Coin set		
	Red	White	Yellow	Smooth	Milled	7-S
(1) Smooth						
Rank 1	25	0	5			
Rank 2	5	12	13			
Rank 3	0	18	12			
Concordant ranking	Red < Yellow ⩽ White					
(2) Milled						
Rank 1	24	3	3			
Rank 2	3	15	12			
Rank 3	3	12	15			
Concordant ranking	Red < White ⩽ Yellow					
(3) 7-Sided						
Rank1	28	1	1			
Rank 2	1	16	13			
Rank 3	1	13	16			
Concordant ranking	Red < White ⩽ Yellow					
(4) Red						
Rank 1				25	0	5
Rank 2				5	22	3
Rank 3				0	8	22
Concordant ranking				Smooth < Milled < 7-S		
(5) White						
Rank 1				23	6	1
Rank 2				6	22	2
Rank 3				1	2	27
Concordant ranking				Smooth < Milled < 7-S		
(6) Yellow						
Rank 1				26	4	0
Rank 2				3	23	4
Rank 3				1	3	26
Concordant ranking				Smooth < Milled < 7-S		

tested might have compared the 7-sided yellow coin to an old 3p-piece).

In table 5 are summarised the median and modal absolute values assigned to the coins in each set. Here again a high degree of consistency is observed. Red coins are almost always given values of less than 5p, even though the precise specification of the red coins presented here was unfamiliar. White coins are usually given values of between 5 and 10p, though occasionally greater. The yellow coins show higher average values than the white, despite the results of the ranking studies. This is due to the fact that those subjects who perceived the yellow coin as more valuable than the white tended to assign high values (e.g. £1) to the yellow coin, while those subjects who perceived the white coin as more valuable than the yellow tended to assign lower values to the white (generally less than 50p). Therefore there was some asymmetry in the absolute values given the coins which was not represented in the rank ordering initially provided by the subjects.

Table 5
The median and modal absolute values (new pence) assigned to the coins in the different sets.

Type of coin	Median	Modal
(1) Smooth		
Red	1.5	1
White	5	5
Yellow	10	5
(2) Milled		
Red	2	2
White	10	5
Yellow	25	10
(3) 7-Sided		
Red	2	2
White	15	10
Yellow	23	100
(4) Red		
Smooth	1	1
Milled	4	2
7-Sided	5	2
(5) White		
Smooth	5	5
Milled	10	10
7-Sided	50	50
(6) Yellow		
Smooth	7.5	10
Milled	10	10
7-Sided	50	50

General discussion

The studies reported suggest that the features planned to be incorporated in the specification of the new 20p and £1 coins should indeed act to enhance their apparent value relative to coins of similar sizes.

The final study indicates in addition that subjects seem to apply 'rules' about value-conferring features in a remarkably consistent way. Presumably these 'rules' are learned through experience with a particular currency. One feature which was *not* varied in our studies was that of size. Previous work in the area suggests an intimate link between size and value. The judged size of coins is affected by their apparent value (Bruner and Goodman 1947; McCurdy 1956). Recently Lea (1981) demonstrated that subjects' estimates of the size of a '5p' coin were smaller than their estimates of a 'one shilling' coin. Likewise their estimates of the size of a '10p' coin were smaller than their estimates of the size of a 'two shilling' coin. The specifications of the 5p and one shilling, and the 10p and two shillings coin are the same – only the designs and the names of the coins were changed after decimalisation. This suggests that subjects' size judgements may have been influenced by the real drop in value of these coins between predecimalisation and 1976 when Lea's study was conducted.

It would be interesting, therefore, to vary the size of blank coins alongside features such as colour, edge and thickness to discover which of these factors is most important in determining perceived value, and how subjects perceive different combinations of these features. In more extensive studies the methods of conjoint analysis could be applied. Our research cannot answer the question of whether subjects would treat multiple attributes in the simple additive way suggested by our data, or whether, in combination, some attributes (perhaps size) would assume greater importance than others. It would be interesting to see to what extent the current market research models such as the expectancy-value model (Kotler 1980; Wilkie and Pessemier 1973) were applicable in this situation. Of course the results of any further studies will now be influenced by the introduction of small, high value coins. In the past, the public's association of size with value must be influenced in part by the correlations which have existed within our coin system between size and value among coins of the same colour. After the new coins are introduced and have been circulating for some time any such association will presumably be weakened. Likewise, while the yellow

alloy planned for the £1 was not spontaneously perceived as of high value when this research was conducted, it almost certainly will be soon after the coin is introduced.

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