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**A Missing Link in Behavioural Economics? A Portmanteau
Experiment on the Relevance of Individual Decision Anomalies for
Households.**

by

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Abstract.

Although households are responsible for many important decisions, they have rarely been the subject of economics experiments. We conduct a series of linked and incentivized experiments on decision-making, designed to see if the anomalies typically found in individual choice experiments are found when the subjects are couples from long-term relationships. Specifically we investigate the endowment effect, the compromise effect, asymmetric dominance and the ‘more is less’ phenomena. Comparing the results with two control groups (students and non-student individuals) we find broadly the same pattern of anomalies in individuals as we do in couples. Thus behavioural patterns that appear in individual choices appear relevant for decisions made by established couples.

Keywords: Household choice, Experiment, Family, Anomalies, Endowment Effect, Compromise Effect, Asymmetric Dominance, ‘More is less’.

JEL Codes: C920, D130, D80.

Introduction.*

One large portion of the experiments on individual decision-making has been devoted to examining the robustness of the standard models of individual choice. To truncate a huge and ongoing endeavour into a few words: while results continue to attract controversy, a significant number of experiments have found *anomalies* – i.e. deviations from the predictions of rational choice models. This paper reports an experiment designed to test for anomalies in the choice behaviour of established couples, married and unmarried. A simple motivation is that the majority of adults actually live with other adults, typically in some form of long-term relationship. Yet despite the importance of multi-person households, there is actually very little experimental evidence on decisions made by natural groups such as couples. Perhaps they do not behave in a similar manner to individuals.

Before moving on it is worth stating that in this paper the word ‘anomaly’ is used without its usual connotation of irrationality. With individual decisions, choice models often have clear predictions about what is rational and what is not. An anomaly is then a systematic deviation from rational behaviour. With collective choice, as in the household, behaviour depends on the preferences of the individuals and on the nature of the game that is played between them. Since the exact structure of the latter is often not observable, conclusions about rationality or its absence are harder to obtain.¹ Here, for want of a better word, we use the term anomaly as

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¹ For instance, the endowment effect is usually interpreted as evidence against the rational choice model. In the context of two person bargaining, to avoid protracted disputes players might use the

shorthand for ‘behaviour such that if it was observed within individual choice it would be typically be interpreted as a deviation from rational choice’.

A specific reason for investigating household choices lies in attempts by behavioural researchers to link experimental data with that drawn from the field - for instance, the Benartzi and Thaler, 1995, explanation of the familiar equity premium paradox. Since identification of anomalies from non-experimental data is problematic, usually the empirical strategy is to show that the field data is consistent with the chosen anomaly and then to rule out other possible explanations as far as is possible. A basic problem with such a strategy is that many decisions in the real world are made jointly, by couples (or by a household) and not individually as in the laboratory, or even in typical field experiments. Thus the researchers are trying to tie field data generated from the collective decisions of households to results gleaned from individual choice experiments. There is therefore a missing link in the chain of evidence: experimental tests of decisions made by couples. We aim to narrow the gap between field and laboratory, by reporting an experiment on couples living together in established relationships. Because there is an almost complete lack of findings on the topic we test for several effects in one experiment. Our aim therefore is not to probe the detailed factors which determine the strength or causes of particular anomalies. Rather it is to provide broad-brush evidence on a topic, which though important, currently lacks data.²

status quo as the default choice if no Pareto improvement upon it is possible. It is hard to label ‘irrational’ an endowment effect caused by such a bargaining rule.

² In fact, although there are now some good experiments on group decision-making in an economic context, there is little evidence on anomalies in group choice.

In the experiment we compare the behaviour of couples to individuals with similar backgrounds to the couples (hereafter labelled *individuals*) and to undergraduate students. Our results are basically that couples exhibit anomalies in more or less the same way as the non-couples. In other words, there is no evidence that two heads are better than one; nor is there any evidence that being in a couple makes anomalous choices more likely.

The plan of the remainder of the paper is as follows: in the next section we provide a brief background to the experiment and consider the relevant literature. In section 3, we describe the experimental procedure with results presented in the following section. Section 5 concludes the paper.

2. Background and Design.

There are a few economic experiments which examine household decision-making.³ Bateman and Munro (2005) use established couples as subjects and test some core theories of the household, while Peters et al, 2004, conduct a voluntary contributions game using family and non-family groups. Iversen et al, 2006, uses a game of voluntary contributions in Uganda to see if partners maximize the surplus available to the household as a whole. Meanwhile, Ashraf , 2005, conducts an experiment using Filipino couples, testing whether the savings decisions of household members is affected by the transparency of their choices, while Carlsson et al, 2009, study the relative power of Chinese spouses in joint decisions. Out of these papers only Bateman

³ There is a longer, but intermittent tradition of experiments on couples within marketing science (e.g. the interesting study by Corfman and Lehmann, 1987). Experiments in this line are rarely incentivized and the focus has not been on testing economic models.

and Munro (2005) tests a standard choice model.⁴ The paper rejects expected utility theory for the household, finding the same Allais-type behaviour in joint decisions as have become the norm in individual decision-making (Kahneman and Tversky, 1979).

While household-based experiment are rare, in the last 10 years there have been a number of significant experiments on group decision-making in economics (e.g. Blinder and Morgan, 2005 or Kocher and Sutter 2005), typically using groups assembled for the purpose of the experiment. The emphasis of many of these experiments has largely been on demonstrative, intellectual tasks (Laughlin, 1982) – i.e. situations where there is a clear normative principle for picking one option rather than another and where once someone in the group has had a ‘eureka’ moment and explained the solution to others, it is readily accepted. In these situations, in non-economics experiments groups usually perform better than individuals (e.g. Argot et al, 1990 for Bayes Theorem). In experiments with economic incentives similar results have been obtained. Blinder and Morgan, 2005 for instance find that groups outperform individuals, while Kocher and Sutter, 2005 conclude that groups learn faster than individuals and outperform them in turns of earnings.⁵ A smaller set of papers has considered deviations from standard models of choice within group decision-making. Bone, Suckling and Hey, 1999, for instance find that groups of two individuals deviate from expected utility theory in a manner similar to individuals. More recently, Sutter 2007 produces evidence that myopic loss aversion is present in group decision-making but weaker compared to that found in individual decisions. Meanwhile Charness et al,

⁴ Whether deviation from expected utility represents an anomaly as defined above is of course disputed. See Loomes and Sugden, 1982 for one view that expected utility theory represents ‘an unnecessarily restrictive notion of rationality’ p.820.

⁵ Groups also seem to coordinate more successfully, compared to individuals. E.g

2007 show that groups are less likely to violate first order stochastic monotonicity and Bayes Theorem compared to individuals, but that behaviour is not completely anomaly-free even in groups of three.

The relevance of this group decision-making literature for household decisions is not clear. Obviously couples are an example of a two person group but they differ from the typical experimental group in a number of fairly specific ways. Fundamentally, the partners are not thrown together for the purposes of the experiment – they have a prior ongoing relationship. Conceivably, this may make couples more uninhibited in their discussions compared to decisions made by groups of strangers. On the other hand, the couple's relationship also continues after the experiment ends, which suggests that in making decisions couples may well have regard to the long-run effects of the manner of their discussions and the way in which any disagreements are resolved. This may make one person hesitate to point out the stupidity of a partner's mistakes. Alternatively it may give partners reasons to be clear in their reasoning. Third, the members of a household are typically bound together by emotions (of love and altruism) rather than say economic circumstances. This may not just affect the ranking of different options, but also affect the way in which disputes are avoided and resolved (Messick 1999). In short therefore, the rules that govern decision-making and interaction within couples might be rather different to those between partners in a financial relationship or in a situation where it is not important to demonstrate commitment and affection. This point is often stressed in the social psychological literature on relationships (Morton, 1978, Clark and Grote, 2003) and it suggests there is no clear theoretical reason why, first, couples' decisions should resemble those made by experimental groups and secondly no compelling argument why anomalies should be stronger or weaker within couples compared to individuals.

We therefore wish to conduct an experiment to offer some direct evidence on the issue. We explore four kinds of anomalies commonly found in (riskless) individual choice experiments. All of them involve manipulations of the frame in which choices are made. They were picked on the basis of their simplicity, their familiarity to us and their relevance to choices made regularly in markets by households and individuals.

1. Endowment effect. In standard models of the consumer, preferences are not related to endowments. Hence the proportion of individuals who prefer bundle A to bundle B when randomly endowed with A should be equal to the proportion who prefer A to B when endowed with B. Since pioneering work by Knetsch and Sinden, 1984, the endowment effect has become a standard laboratory anomaly (e.g. Bateman et al, 1997), especially in single shot experiments. In field experiments (e.g. List, 2003) and repeated choice its status is more disputed, but to date it has been found in over 100 experiments and field settings (Munro, 2009).
2. Compromise effect. A compromise effect occurs in the context of comparisons between choices made from two sets of goods, $\{A,B\}$ and $\{A,B,C\}$ Simonson, 1989. Like the endowment effect, it is commonly found in individual choice experiments with or without incentives (e.g. Herne, 1999). In the choice set, B is chosen to be a convex combination of A and C. A strong compromise effect occurs if the probability B is chosen is higher when C is present in the choice set. The strong effect is a rejection of the notion of complete preferences since it implies that for some decision-makers, the ranking of A versus B depends on the presence or absence of option C. A weak compromise effect occurs if the probability that A is chosen falls when C is in the choice set. Such a result is

incompatible with consistent preferences if those preferences are convex, because by convexity someone who prefers A to B will also prefer A to C.

3. **Asymmetric Dominance.** In asymmetric dominance two goods, A and B are the focus of the experiment. In one treatment there is a choice from the set {A,B}. In the second treatment there is an additional option, D. D is the decoy good – a commodity that is inferior to one of the main goods (but not necessarily the other), in the sense that for anyone whose preferences satisfy strict monotonicity one good is preferable to the other. This good is the ‘target’. According to standard theory the presence of the decoy should not affect the proportion choosing the target; according to many researchers, the proportion choosing the target is higher in the presence of the decoy. Following Huber, Payne and Puto, 1982, evidence for asymmetric dominance effects has become widespread in the experimental and consumer research literature, environmental valuation (Bateman et al, 2008) and even in studies of animal behaviour (Shafir et al, 2002). For instance Simonson and Tversky (1992) examined choices between receiving \$6 and a Cross pen (a US branded pen) and found that including a less attractive pen in the choice raised the percentage of subjects choosing the Cross pen from 36 to 46%. Asymmetric dominance has also been observed in field experiments, most notably in the work of Doyle et al. (1999), who used tins of baked beans in a supermarket and found that offering a decoy (in the shape of the half-size tin of one brand at the same price as the full-size tin) raised market share of the target from 19% to 33%.
4. **‘More is less’ preference reversal.** Consider two goods, A and A’. A’ is the same as A plus a small item which valued separately would have positive value. Compared to A the additional item is of low value. Given a straight choice, A’ is chosen over A. In early

work involving hypothetical choices, Hsee (1998) reports average willingness to pay of \$24 for a dictionary with 10,000 words when subjects were valuing that dictionary alone, but \$5 less if they simultaneously asked to value a dictionary of 20,000 words. In Slovic et al's 2002 pioneering study, the goods are lotteries and A is created from A' by adding a small probability of a negative outcome. Again, though people valued A over A'. One interpretation of the results is that, with goods of uncertain value the added bit provides a signal that the rest of the good is not worth much. In a widely-cited field experiment involving graded baseball cards, List, 2002, finds that individuals place a higher value on the bundle A compared to bundle A'.

These four anomalies can be summarised through the device of Figure 1 which shows goods or bundles of goods differing along two dimensions, x and y.

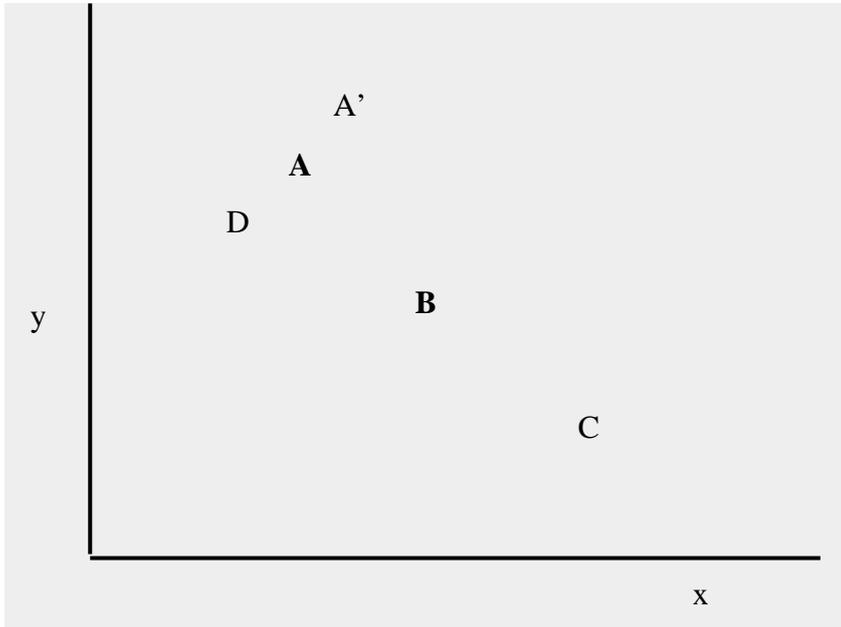


Figure 1. A Summary of Four Choice Set Anomalies

1. With the endowment effect A is preferred to B out of the choice set {A,B} when A is the

endowment, but B is preferred when B is the endowment.

2. With the compromise effect, A is preferred to B when C is absent and the choice set is {A,B}, but B is preferred to A when the choice set is {A, B, C}.
3. With the asymmetric decoy effect, B is preferred to A when D is absent and the choice set is {A,B}, but A is preferred to B when D is present and the choice set is therefore {A, B, D}.
4. With the 'more is less' phenomenon A is preferred to B, when the choice set is {A, B}, but B is preferred to A' when the set is {A',B}.

These four anomalies are well-documented, but in specific instances, with particular goods or parameters, sometimes reported behaviour does not deviate from the null hypothesis of rational choice. For instance, Morrison, 1997 finds an endowment effect with mugs but not with chocolate. We therefore run parallel experiments with individual participants and with students so that we could make a firmer comparison between the behaviour of individuals and couples.

3. Method.

Individuals and couples were recruited through flyers, email and word of mouth from the communities living around Egham and Englefield Green, small commuter towns on the fringes of London, UK. In the adverts we simply stated that we wished to recruit couples (or individuals) to understand decision-making and made it clear that participants would expect to receive prizes for participation. We also set up stalls at a Christmas party run by the Parent-Teachers Association (PTA) at a local village school, offering similar information to couples and individuals passing by our room. For couples and individual subjects in these groups, we asked

that participants be over 21.⁶ Additionally couples had to be living with a partner that they had been with for over one year. For the student experiment, we used all the members of a 2nd year economics undergraduate class at Royal Holloway, University of London (which is based in Egham).

The non-student experiments discussed here have the same basic format. Subjects were given a brief one-to-one introduction from one of the experimenters and then led through the written instructions and examples at the front of the printed questionnaire. The questionnaire also included descriptions of the goods and details of the incentive mechanism. Subjects were then invited to make a series of choices in their own time. After completing the main part of the questionnaire, all participants filled in a brief demographics questionnaire. A random lottery procedure (bingo chips drawn from a bag) was then used to select the question that was to be for real. The subjects' answers determined their prize, for which they signed a receipt.

For the endowment effect, we added the following to the basic design. Once subjects were seated they were randomly allocated one of the two endowments and told that this was theirs to keep. At the end of the experiment once the random lottery had been executed we showed them the alternative endowment and invited them to swap their initial endowment for the alternative. If they chose to do so, the prizes were swapped. Otherwise they left the venue with their original

⁶ Although individuals and couples were drawn from the same population we did not attempt to randomly allocate subjects to the individual or couples treatment. Our reasons are pragmatic: as other researchers have found (e.g. Corfman et al, 1987 or Bateman and Munro, 2005), recruitment of couples is slow, costly in terms of effort and rarely results in large samples. Much of the trouble arises from the need to get often busy people with two jobs and children, into the same room at the same time. Thus when a couple indicated that they were available we used them in the couples version of the experiment.

endowment. This offer was a surprise: they were not told that they would have the opportunity to swap until they had completed all parts of the rest of the experiment.

For the student sessions the basic format was similar to the above. The first key difference was that not everyone won a prize. Instead students were issued with raffle tickets and 9 winners were chosen publicly. Thereafter we used the random lottery to determine their individual prizes. The second difference was that the experiment was conducted in a large group (a lecture). For this group we produced two versions of the questionnaire and distributed them randomly. In one version of the questionnaire subjects were told that they would win endowment A and in the other version they were told they would win endowment B. In both versions, at the end of the questionnaire (several pages later) they were invited to swap their endowment for the alternative, both of which were present in the lecture hall. To sum up therefore, this version of the experiment was incentivized, but more weakly than other sessions. This made it closer to the classical, hypothetical student-subject style experiment that was the origin of many famous anomalous results (e.g. Kahneman and Tversky, 1979).

We used a variety of goods, most of which would have been familiar (at least in outline) to the participants. The cheaper food products used in the questions (handmade chocolates and mince pies⁷) were taken to the experiment sessions. The other prizes were delivered to homes (or office addresses) of participants in the week after the experiment. We used suppliers such as Amazon or Oddbins (a wine merchant) that would be familiar to and trusted by the participants. For the food gifts, we used a local grocery store, which was also the source of the endowment

⁷ Mince pies contain (minced) candied fruit rather than meat. They are a traditional Christmas food in the UK.

effect goods. This grocery store, located in the nearby Windsor royal estates is well-known in the area for high quality and typically organic products. For the asymmetric dominance question we used a branded juicer (retail value approximately £50), the juicer plus a £5 department store voucher, and a £35 shoe store voucher. For the ‘more is less’ preference reversal we used selections of luxury grocery products, including wine, honey and biscuits. We labelled these as hampers. Total retail value was around £45.

Most of the data reported below uses this basic design. For the couples and individuals our sample sizes are quite small. So, for some of the issues we use additional data from two related experiments run on couples (Munro, McNally and Popov, 2008). The locality and sampled population (local community events including church services, a fair run by Royal Holloway and a heritage open day, also run by the college in which the older college buildings were made open to the public) for these experiments was almost identical. Many of the questions are the same and the payment procedures were the same, but the format differed. In one of the ancillary experiments the endowment effect test procedure was omitted. In the second ancillary experiment we were mostly interested in the difference between individual and joint decision-making within households so most of the questions were seen and answered twice: first separately and then jointly. Because of this important difference, we use data from that experiment cautiously – to try to see if sample sizes determine our results. In fact the ancillary data does not turn insignificant hypotheses into significant⁸.

⁸ This may look selective, so it is worth adding that where we have the data available, it does not turn significant results into insignificant.

4. Results

We have 133 economics students in our core sample, 31 couples and 30 individuals. The experiment lasted about 10 minutes per couple and the average cost of the prizes was just under £28 (around US\$44). All the couples were in heterosexual relationships and mean ages were 43.5 (for men) and 36.4 for women. The couples had an average of 1.7 children and had been together for around 16.5 years while 66% were married. For the individuals, 88% were married and they had been with their partner for 19.7 years on average. They typically had 1.56 children and were slightly older than the couples (48 for men and 38 for women). Fifteen individuals were men. None of the differences between the couples and individuals sub-sample were significant which reflects the large variance in ages and time together. The oldest person in the samples was 81 and the largest number of years together was 50.⁹ For the students the variation in ages was much smaller. Mean age for this group was 20.2 for men and 20.0 for women. Out of the 133, 72 were male and nearly all were Economics majors.

We take each of the effects in turn.

Compromise effects.

To test for the compromise effect we had three goods: 6 bottles of wine, USB memory sticks and MP3 players. The retail value of the wine was about £30; the USB sticks sold for around £10 and the MP3 players could be bought for £20-25. None of this price information was given to participants. The USB and MP3 player questions were ‘classical’ compromise effect

⁹ We do not report demographic details of the ancillary data here, except to say that it was very similar.

questions in which the goods were introduced and quantitative details of their characteristics were presented to the subjects. There were 4 characteristics for the USB drive and five for the MP3 players. Figure 2 shows a three option question for the USB drives (see Appendix for the other goods). For the wine the only relevant characteristic was the proportion of bottles that were red or white. In all cases we presented subjects with either two or three choices. The two options A and B were chosen such that the B was a compromise between A and the third option, C. With the USB and MP3 players, for couples and individuals, subjects saw both the 3 option and the 2 option question. For the students, we had a between subjects design in which each participant saw only one of the variants for each good.

A Choice Question. These USB Pen drives have **1Gb storage** (about 1, 000 good quality photos) and they are from well-known manufacturers. The **read speed** information tells you roughly how long it takes to read all the information off a full drive. The **write speed** information tells you roughly how long it takes to fill the drive when copying files from your computer.

	USB Pen Drive 1	USB Pen Drive 2	USB Pen Drive 3
Length	6cm	7cm	7.3cm
Weight	7g	7.5g	10g
Write speed	4 minutes 10 seconds	3 minutes 20 seconds	2 minutes 47 seconds
Read speed	1 minute 40 seconds	2 minutes 23 seconds	2 minutes 47 seconds
We prefer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Figure 2 USB drive question with 3 options.

For all 3 goods the hypothesis tested was:

- H0: Proportion choosing option 1 is unaffected by the presence of option 3.
- H1: Proportion choosing option 1 is smaller when option 3 is present.

Table 2 shows the results for the USB drives. We can see that there is a significant departure from the null hypothesis for two groups. In the case of students the difference is

significant at the 1% level; for the couples the difference is significant at the 5% level. For individuals there is some switching away from option 1, but it is not significant.

Table 2. Testing for a Compromise Effect with USB pen drives.

	Students	Couples	Individuals
% choosing option 1, 2 options available	69.1	48.4	63.3
% choosing option 1, 3 options available	33.8	29.4	56.7
Test	Between subjects, Fisher's exact	Within subjects McNemar	Within subjects McNemar
Sample size	133	31	30
P value for null hypothesis	0.000	0.038	0.342

Our results for MP3 players are very similar as figure 3 shows. Using the same statistical tests as for USB drives, we get a p-value for the null hypothesis of 0.003 for students, 0.02 for couples and 0.180 for individuals. So, both couples and students show strong evidence for compromise effects, but individuals do not

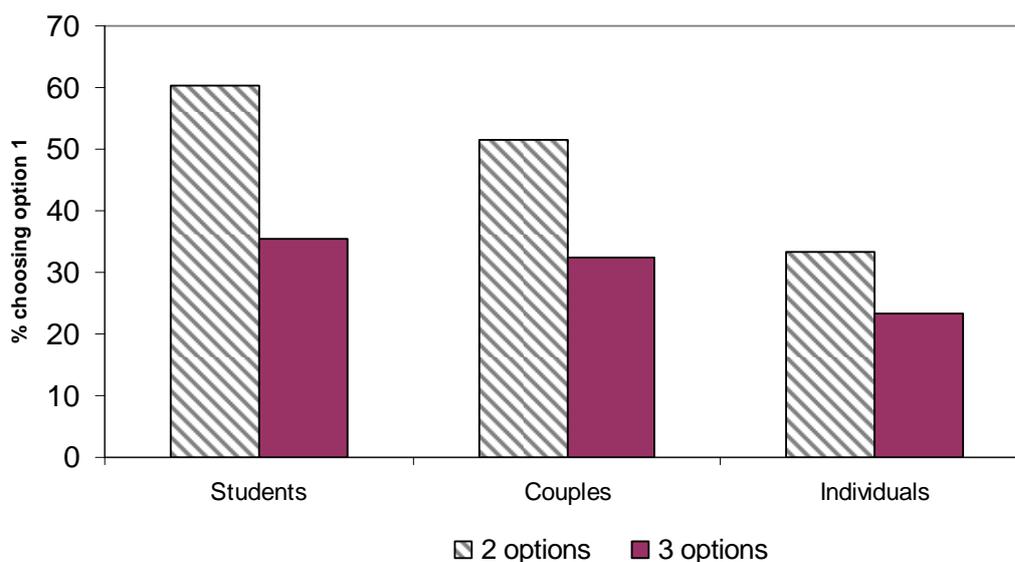


Figure 3. Compromise and MP3 players.

Our final compromise question uses wine. The three goods are 6 bottles of red wine, 6 bottles of white wine and a mix of 3 bottles of red and 3 bottles of white from a popular and trusted mid-range supplier. The last option is clearly a compromise between the first two. It differs from the other questions however, in that the value of the different attributes (red and white) is probably clearer to most participants compared to the technical data provided from the technology products. Moreover there is only one dimension to consider. Our sample here differs slightly from the electronic goods. For students it is the same group of people and the same between subjects design. For couples and individuals we have a between subjects design here. With only 30 or so subjects in each group in the main experiment, that obviously makes the sample size small. But we also asked the wine question as part of another experiment and we pool the ancillary data. The boosted sample size does not change the results which are clearly non-significant (see Table 3 below).

Table 3. Testing for a Compromise Effect with Wine.

	Students	Couples	Individuals
% choosing all Red, 2 options available	25.0	26.7	20.0
% choosing all Red, 3 options available	12.5	25.6	28.6
Test	Between subjects, Fisher's exact	Between subjects, Fisher's exact	Between subjects, Fisher's exact
Sample size	132	69	29
P value for null hypothesis	0.050	0.560	0.834

Note: 1 couple, 1 student and 1 individual did not answer this question for personal reasons.

Asymmetric Decoy.

The three goods were as follows: A voucher with a face value of £40 that can be exchanged for theatre tickets at a large number of locations across the UK; an electric juicing machine and the same juicer plus a £5 gift voucher for a leading UK department store (which was named in the experiment). In this context, the dominated decoy is the electric juicer machine without the department store gift certificate. Domination was obvious and no-one chose the dominated outcome. The concept of an electric juicer is well-known, but it is unlikely that many people in our sample would be well-acquainted with all the various types available and typical prices.

The hypothesis to be tested was:

H0: the proportion choosing the voucher is unaffected by the presence of the decoy

H1: the proportion choosing the voucher is lower when the decoy is present.

Results are summarised in Table 4 which incorporates some data from other experiments.

	Students	Couples	Individuals
% choosing Theatre voucher, no decoy	63.3	58.3	42.8
% choosing Theatre voucher, decoy present	58.5	46.7	56.7
Test	Between subjects, Fisher's exact	Between subjects, Fisher's exact	Between subjects, Fisher's exact
Sample size	132	69	44
P value for null hypothesis	0.350	0.251	0.880

For the students, though the pattern of choices is consistent with a decoy effect, there is nothing strong enough to produce statistical significance. The conclusion is the same for the couples. For the individual subjects, the difference between treatments is also not significant and in fact runs in the opposite direction. These results are not materially altered by confining the data set to the main experiment. Our conclusion is that there is not much evidence of any asymmetric decoy effect in this example. Possibly the near –cash nature of the department store voucher did not create a decoy effect, but the key point is the equivalence in behaviour between couples and other subjects.

Testing for an endowment effect.

Recall that to test for the endowment effect we used two goods: a box of six luxury mince pies and a small pack of handmade chocolates. Unlike the other goods we took the mince pies

and chocolates to the experiments. They were both on show throughout the experiment and subjects were able to examine the alternatives before making up their minds. For the students the endowment was contingent, in the sense that each participant knew what his or her endowment would be if they were one of the randomly selected winners. For the couples and individuals the endowment was actually given to the participants at the start of the experiment.

The null and alternative hypotheses are,

H0: the proportion who prefer Chocolates is independent of endowment.

H1: the proportion preferring Chocolates is larger when it is the endowment.

Results are summarised in Table 5.

	Students	Couples	Individuals
% choosing chocolate given chocolate endowment	86.7	53.8	73.3
% choosing chocolate given mince pies endowment	46.1	14.3	30.7
Test	Between subjects, Fisher's exact	Between subjects, Fisher's exact	Between subjects, Fisher's exact
Sample size	133	31	30
P value for null hypothesis	0.000	0.037	0.029

Although the percentages choosing the chocolates differ between groups the effect of endowment is consistent: for students, couples and individuals we find a significant ($p < 0.05$) endowment effect.

More is less

For the test we have a question involving a choice between two bundles of products from a local luxury foods retailer. In bundle A we offer 3 bottles of red wine. In bundle B, there is one bottle of white wine plus an assortment of other products including honey and marmalade. The total price (not revealed to participants) of the bundles was similar. To make bundle A' we added a small pack of organic shortbread fingers worth around £2.75. The notion here is that the actual value of the bundles, particularly the wine, would normally be unknown to the subjects. The presence of the shortbread might signal that the red wine was not that valuable and hence lead to the 'more is less' effect. To save some time, this question was not faced by the student subjects. The results are shown in Table 6.

Table 6. Testing for 'More is less'

	Couples	Individuals
% choosing A from {A,B}	45.8	70.3
% choosing A' from {A',B}	40.0	60
Test	Between subjects, Fisher's exact	Between subjects, Fisher's exact
Sample size	31	30
P value for null hypothesis	0.44	0.40

As can be seen there is no statistically significant evidence of an effect. We also elicited selling prices for the A and A' Hampers, by asking subject to state whether they would sell the hamper at

a series of prices that rose from £1 to £20 in £1 increments. We told each subject that if this question was selected by the random lottery, then they would face a second random lottery to determine which price would apply. If the price was such that they were not willing to sell, then they would receive the hamper. Otherwise we would pay them in cash at the end of the experiment. When we test the null of no difference in median selling prices, Fisher’s exact test provides a p-value of 0.26 for the couples and 0.56 for individuals. Thus again we find no evidence for less-is-more. Finally, in our earlier experiments we had another less-is-more between-groups comparison: subjects chose between a £35 Theatre voucher and a juicer (A). In one treatment, we added a £5 store voucher to the juicer to create bundle A’. Out of 56 subjects, 22 chose option A’ rather than option B, while out of 34 subjects just 8 chose option A over option B. Thus ‘more is more’ within this group and we obtain a p-value for the null (against a one-way alternative) of 0.963 using a Fisher’s exact test.

5. Discussion.

A summary of the main results can be found in Table 7.

Table 7. A summary of the results.

	Endowment Compromise Effect Asymmetric					More is less		
	Dominance							
Group	Chocolate/ Mince pies	Wine	USB	MP3	Juicer	Hamper choice	Hamper selling price	Juicer
Students	Yes	Yes	Yes	Yes	No	-	-	-
Individual	Yes	No	No	No	No	No	No	-

s

Couples	Yes	No	Yes	Yes	No	No	No	No
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In this experiment we have searched for evidence of the kinds of anomalies often found in individual choice. We use established couples while individuals and economics students providing points of comparison. We find no evidence of a ‘more is less’ effect with our subjects; nor do we find any evidence of asymmetric dominance in any of the three groups. For the compromise effect we find clear evidence in couples and students but no effects that are significant at the 95% level within individuals. For a simple test of the endowment effect we obtain significant departures from the null hypothesis for all the three groups of subjects.

Our focus in the paper is on the behaviour of couples, but it is worthwhile pausing and noting the absence of significant effects for asymmetric dominance and ‘more is less’ for our subjects. Of course, according to standard theory we should expect this absence, so perhaps our results do not require clarification. When monotonicity has previously been rejected, it has typically been the case that the goods being value are unfamiliar. In this situation, the extra added to bundle A to create A’ can act as a signal of the quality of A. If this signal is sufficiently negative, then more can appear to be worth less. Such effects are likely to be sensitive to both the size of the increment, to the nuances of signalling and to the sensitivity of consumers to changes in perceived quality. Perhaps in List’s case, trading card collectors were highly attuned to issues of quality. Meanwhile, when asymmetric dominance decoy effects have been found it is usually the case that decoy shares the same characteristics as the target. For instance, in Doyle et al, 1999, the decoy was simply a smaller tin of beans priced at the same level as the large tin. This makes comparison between decoy and target relatively straightforward and helps emphasise the ‘bargain’ nature of the target. In our case the difference between the target and decoy was a

voucher which had different characteristics to the target. Perhaps this just emphasised the irrelevant nature of the decoy.

Whatever the interpretation of the non-significant results, the salient feature of our data is that couples behave in a similar manner to individuals: there is no evidence that two heads may be better than one, when it comes to consumer choice and there is no evidence that two heads are worse either. Rather, when choosing as a couple, partners exhibit the same patterns of anomalies that are shown by individuals. Earlier results on tests of expected utility theory in Bateman and Munro, 2005, can be read in the same way: couples and individuals deviate from standard theory in similar ways. If we take all these results at face value a number of consequences follow. First, in terms of the motivation for this paper, it appears that there is evidence for the missing link between experiments on individuals and tests in the wild for anomalies that employ household data. Secondly, given that in decision tasks where there is a right answer, groups appear to make fewer errors compared to individuals, our results suggest that anomalies of the kind explored here are not driven by the kind of cognitive errors that lead to failures of Bayesian reasoning.¹⁰

We have stressed that in a first-step, portmanteau experiment such as this one, not all questions can be answered about the existence of anomalies in the decisions made by couples. We have not for instance, ruled out the existence of asymmetric dominance decoy effects or the ‘more is less’ preference reversal with couples in other situations. Moreover, there may be other anomalies where one can find differences between couples and individuals. Given that in many countries (e.g. the USA, UK or Japan) fewer than 1 in 3 adults live in households without adults,

¹⁰ There is a need for caution here, because in principle, anomalies in individuals and couples could be driven by different processes. E.g. the compromise effect might indeed be a cognitive error in individuals, but a result of bargaining protocols in couples.

there is need for further experimental research on the economic behaviour of groups in general and couples in particular.

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Appendix A. Typical questions from the experiments.

1. Compromise effect questions.

A Choice Question. These USB Pen drives have **1Gb storage** (about 1, 000 good quality photos) and they are from well-known manufacturers. The **read speed** information tells you roughly how long it takes to read all the information off a full drive. The **write speed** information tells you roughly how long it takes to fill the drive when copying files from your computer.

	USB Pen Drive 1	USB Pen Drive 2	USB Pen Drive 3
Length	6cm	7cm	7.3cm
Weight	7g	7.5g	10g
Write speed	4 minutes 10 seconds	3 minutes 20 seconds	2 minutes 47 seconds
Read speed	1 minute 40 seconds	2 minutes 23 seconds	2 minutes 47 seconds
We prefer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	A case of 6 bottles of red wine from Oddbins	A mixed case of 3 bottles of red wine and 3 bottles of white wine from Oddbins	A case of 6 bottles of white wine from Oddbins
I prefer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A Choice Question. These MP3 players are all from respected manufacturers. The **battery life** information provides a guide to the running costs. The **capacity** information provides a guide to how many songs can be stored.

	MP3 Player 1	MP3 Player 2	MP3 Player 3
Battery life	9 hours	15 hours	16 hours
Weight	55g	51g	44g
Radio/Video	Radio + Video	Radio	-
Capacity	512 Mb	512 Mb	1 Gb
Warranty	1 year	1 year	1 year
I prefer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. Endowment effect question.

You were given a **selection of 6 Luxury chocolates** from the Windsor Farm Shop as a reward for taking part. Would you prefer to keep them or would you prefer to swap them for the **mince pies**?

Keep

Swap

3. More is less question (the item highlighted here in bold represents the ‘more’ element).

Hamper 1

3 bottles of red wine (Pinot Noir)
pack of Windsor shortbread fingers

Hamper 2

1 bottle of White wine (Flint Dry)
Organic Biscuit selection (box)
Duchy organic Heather Honey
Old English chutney
English marmalade

We prefer

4. Asymmetric Dominance question.

1. **Cookworks Signature whole fruit juicer** **A Cookworks Signature whole fruit juicer + £5 Marks and Spencer Voucher** **A £35 Theatre Voucher**

I prefer