Deciding the Price of Fame

Caren A. Frosch
(c.frosch@reading.ac.uk)
School of Psychology, University of Reading
Reading, U.K., RG6 6AL

C. Philip Beaman
(c.p.beaman@reading.ac.uk)
School of Psychology, University of Reading
Reading, U.K., RG6 6AL

Rachel McCloy
(r.a.mccloy@reading.ac.uk)
School of Psychology, University of Reading
Reading, U.K., RG6 6AL

Abstract

Previous studies of ignorance-driven decision-making have either analyzed when ignorance should prove advantageous on theoretical grounds, or else they have examined whether human behavior is consistent with an ignorance driven inference strategy (e.g., the recognition heuristic). The current study merges these research goals by examining whether – under conditions where ignorance driven inference might be expected – the type of advantages theoretical analyses predict are evident in human performance data. A single experiment shows that, when asked to make relative wealth judgments, participants reliably use recognition as a basis for their judgments. Their wealth judgments under these conditions are reliably more accurate when some of the target names are unknown than when participants recognize all the names (the "less-is-more effect"). These data are robust against a number of variations on the size of the pool from which participants have to choose and the nature of the wealth judgment.

Keywords: Simple Heuristics; one-reason decision-making; wealth judgments.

Introduction

As part of the research program into "simple heuristics that make us smart" (Gigerenzer, Todd, & the ABC research group, 1999) Goldstein and Gigerenzer (2002) reported the results of studies showing that, in two-alternative forced choice tasks (2-AFC), it was theoretically reasonable to suppose that limited knowledge could produce superior performance than more complete knowledge. The task they examined was a magnitude inference task where the aim was to indicate which of two target cities was the most populous. They argued that a more populous city was likely to be encountered more frequently (e.g., mentioned in national and international media) and therefore more frequently recognized, providing a correlation between recognizability and city size. The size of this correlation provides a cue with a certain level of validity (recognition validity or RV) when attempting magnitude inferences. Knowledge of the city also provides a cue to size with a certain level of validity (knowledge validity or KV) when confronted with relative magnitude judgments. Goldstein and Gigerenzer (2002) showed that when RV > KV, the proportion of correct magnitude judgments made should be highest amongst groups who recognized only a limited number of cities (the "less-is-more effect").

Goldstein and Gigerenzer further showed that, in experimental studies, participants were overwhelmingly likely to infer that the recognized city of a pair had a larger population than the unrecognized city, a strategy that they referred to as "the recognition heuristic". The recognition heuristic as outlined by Goldstein & Gigerenzer (2002) states simply that, given a choice of two options where only one of the options is recognized, infer that option has the greatest magnitude. However, since Goldstein & Gigerenzer's study, further empirical research has indicated either that the applicability of the recognition heuristic is more limited than previously supposed (Bröder & Eichler, 2006; Newell & Fernandez, 2006; Newell & Schanks, 2004; Richter & Späth, 2006) or that the less-is-more effect predicted by theoretical analysis was absent from empirical results (Pachur & Biele, in press; Pohl, 2006). Despite concluding that their findings are "in line with" the less-is-more effect, other studies (e.g., Snook & Cullen, 2006) have been unable to formally test for less-is-more effects because of methodological limitations.

Previous research into the recognition heuristic by the current authors (Beaman, McCloy & Smith, 2006; McCloy, Beaman & Goddard, 2006) has expanded the 2-AFC task beyond the paired choices examined by Goldstein and Gigerenzer (2002) and has also introduced the "wealth judgment" dimension, requiring participants to indicate the wealthiest or the poorest of a set of N choices (where N = 2 or 3). In two independent sets of studies we examined experimentally whether choices were consistent with the use of a recognition-based strategy for 2- or 3-AFC tasks where recognition validity was self-evidently moderate or low and, by simulation, whether the less-is-more effect was to be expected in N-AFC tasks where N > 2. The experimental results indicated that the use of recognition as a guide to inference was moderated by the type of question asked (wealthiest or poorest) with the poorest question eliciting fewer recognition-based judgments (McCloy & Beaman, 2004; McCloy et al., 2006. N.B., "poorest" judgments required participants to reverse the direction of the inference and hence to choose the unrecognized name). Simulation studies also indicated that the range of situations or parameter values for which a less-is-more effect would be apparent would be smaller for poorest questions than for richest (Beaman et al., 2006). However, because the empirical studies – by design – used stimuli in which recognition validity was both low and perceived to be low it was not possible to directly relate the results of simulation and empirical research, to examine whether the less-is-more advantage was actually present in those situations where participants were apparently making use of a recognition-based inference strategy.

The current study aims to address this issue and examine whether less-is-more effects can occur in a variety of magnitude inference tasks (2-, 3- and 4-AFC with richest and poorest questions) or whether, as some authors have suggested they are absent from empirical data (Pachur & Biele, in press; Pohl, 2006). The study also examines whether the form and extent of the less-is-more effect is predicted by a process model of the recognition heuristic (Beaman et al., 2006).

Experiment

Method

Participants We tested 26 Psychology students who took part for course credit. There were 23 women and 3 men with a mean age of 22 (range 18-45 years).

Materials and Design Participants were presented with between 2 and 4 names taken from the Sunday Times Rich List 2006 (an annually produced list of the richest individuals in the UK and estimates of their actual wealth) and asked to identify either the poorest or the richest person. The task was presented using E-Prime software on a PC running Windows 2000. Previous research has demonstrated that people frequently employ the recognition heuristic when making judgments about these sorts of materials (e.g., McCloy et al., 2006). For this experiment we deliberately chose materials with high recognition validity, that is, the richest people in the set were generally recognized by participants in previous experiments and the poorest people in the set were generally not recognized.

Overall participants made 122 judgments; half of these were in response to the question of who is poorest and the other half to the question of who is richest. We used the same combination of names for the richest and poorest question, that is there were 61 unique name groupings and each name combination appeared twice. The materials were presented in a different random order to each participant.

The experiment was wholly within participants. The independent variables were the frame of the question (richest / poorest), the number of names presented in each grouping (2, 3, or 4), and the number of names recognized in each grouping (0, 1, 2, 3, or 4). The dependent variables were the option chosen by participants (recognized / unrecognized) and the accuracy of the option choice.

Procedure Participants were presented with four practice trials, during which they were asked to identify the smallest or the largest of four numbers. Participants were required to respond within 5 seconds. If they failed to respond the experiment moved on to the next slide. They also received feedback during the practice trials of 'correct', 'incorrect' or 'no response detected' (if they did not respond within the required time limit). For the main task participants were presented with 122 trials during which they were asked to identify the richest or the poorest of between 2 and 4 persons. On completion of the first part of the task, participants were presented with the 27 names used in the experiment individually and asked to indicate whether they recognized each of these names from before participating in the experiment, by pressing 'y' for yes and 'n' for no.

Results

Analysis of our stimuli indicated that the actual wealth of the individuals presented to the participants correlated moderately with the number of times they were recognized, $r = .343$. However, this analysis included an outlier (James Dyson, the vacuum cleaner manufacturer) who was seldom recognized despite being one of the wealthiest individuals on the list. Once he was removed from the analysis, the correlation improved to $r = .729$ ($p < .001$) indicating that the recognizability-wealth correlation was of sufficient size to provide high recognition validity.

Analysis of participants' performance was carried out by number of options (2-, 3- & 4-AFC) and by type of judgment (richest/poorest). In all cases where recognition could be used, that is when 0 < number recognized < N, the choice was consistent with the use of a recognition-based inference, 1-sample *t*-test, $p < .001$ in all cases. For the "richest" question, this involved testing against the probability of choosing a recognized option by chance. For the "poorest" question this involved testing against the probability of choosing an unrecognized option by chance.

Having established that participants made use of the recognition heuristic in order to complete the task we examined the less-is-more effect by calculating the proportion of correct inferences. The proportion of correct inferences for 2-AFC tasks are shown in Figure 1. Paired sample *t*-tests showed a significant less-is-more effect (greater number correct where 1 is recognized than where both are known) for the poorer question ($t = 3.26$, $df = 25$, $p = .003$) but a non-significant less-is-more effect for the richer question ($t = 1.9$, $df = 25$, $p = .069$), both tests 1-tailed and Bonferroni corrected. The values depicted in Figure 1 were taken as estimates of the recognition and knowledge validities to use for performance predictions of 3-AFC and 4-AFC tasks. The recognition validity was estimated as the average of the proportion of correct inferences where only one item was recognized in 2-AFC richest and poorest questions and the knowledge validity was estimated as the average of the proportion of correct inferences where both items were recognized in 2-AFC richest and poorest questions. These estimates form the basis of the predicted less-is-more effects shown in later figures. Estimated RV was used directly to predict less-is-more effects in 3-AFC and 4-AFC tasks and estimated KV was varied according to the function KV' = 2KV/n where n is the number of options recognized. This function was built in to reflect the assumption that correctly judging the richest of n known individuals is likely to become more difficult as n increases.

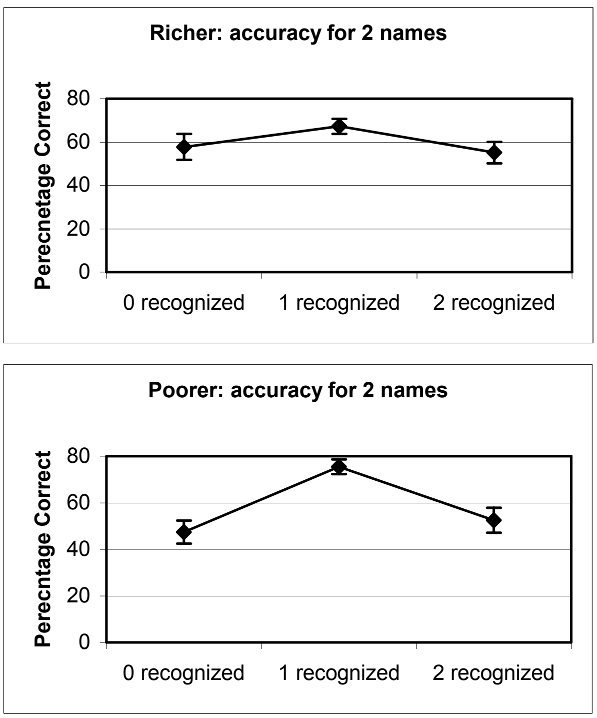

Figure 1. Percentage correct inference as a function of number recognized and question type. Bars are standard error.

The process model of the recognition heuristic makes the following assumptions:

1. Decision-making is on the basis of one reason only.
2. A recognized person is always assumed to be richer than an unrecognized person.
3. In N-AFC situations where N > 2, decisions are made whether to further consider an individual on the basis of knowledge only after, and independently of, decisions to consider an individual on the basis of recognition alone.

As an example, for a 3-AFC "who is richest?" task where two individuals were recognized, the two known individuals would immediately be considered richer than the unknown individual. An independent decision would then be taken, on the basis of knowledge, as to which of those two known individuals was the richest. Similarly, for a 3-AFC "who is poorest?" task, two known individuals would be immediately excluded from analysis, leaving only the single unknown individual. However, if only one individual was known the exclusion of this individual would leave two unknown individuals and choice between these two would be effectively random and performance levels at chance. Thus, according to this model, the appearance of the less-is-more effect is a function of either RV and KV or RV and chance, depending upon the number of options, the number recognized and the nature of the question (richer or poorer; see Beaman et al., 2006 for further details). The data provided by the experimental study for 3-AFC richer and poorer tasks is shown in Figure 2, together with the predictions of the process model as outlined above.

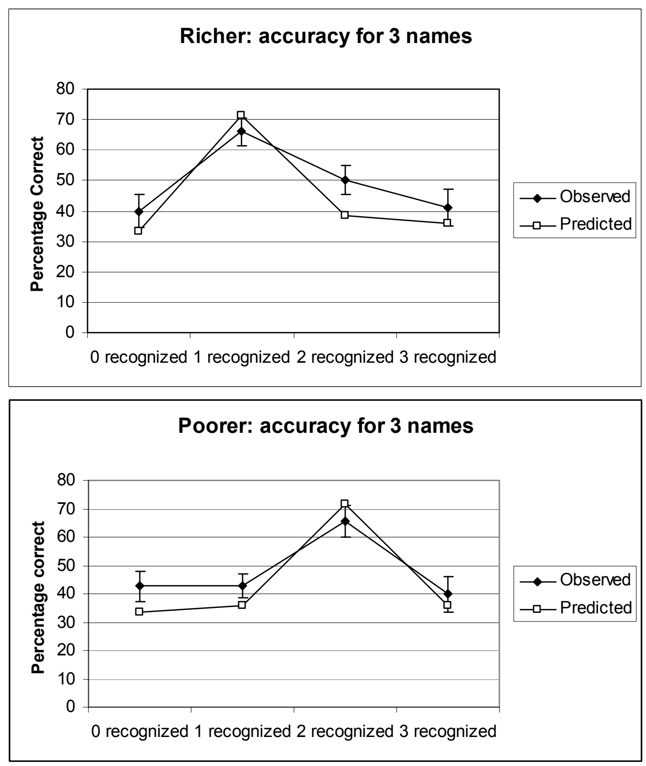

Figure 2. Percentage correct inference as a function of number recognized and question type. Bars are standard error. Predicted values represent the calculated percent correct given the recognition and knowledge validities estimated from the 2-AFC task combined as indicated by the process model of the recognition heuristic.

Statistical analysis of the less-is-more effect shows that, relative to total recognition (i.e., recognizing all 3 individuals), there were reliable advantages for recognizing only one name when asked the richer question, t = 2.99, df =

23, $p = .014$ and for recognizing two names when asked the poorer question, $t = 2.61$, $df = 23$, $p = .032$. The remaining two comparisons (recognizing two names when asked the richer question and recognizing one name when asked the poorer question) were not statistically reliable (both *p*s > .05, all analyses were 1-tailed and Bonferroni corrected).

The same procedure was carried out for the 4-AFC task. The data from this task are shown in Figure 3.

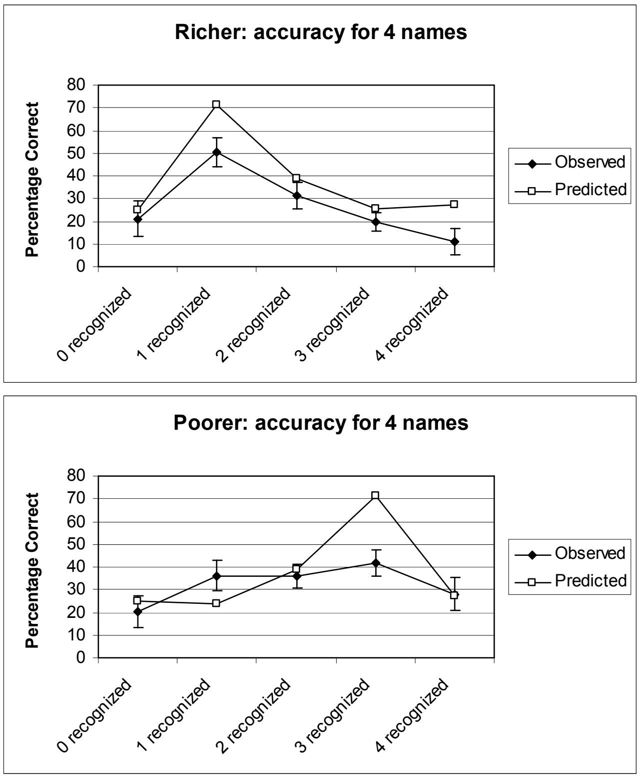

Figure 3. Percentage correct inference as a function of number recognized and question type. Bars are standard error. Predicted values represent the calculated percent correct given the recognition and knowledge validities estimated from the 2-AFC task combined as indicated by the process model of the recognition heuristic.

Statistical analysis of the results of the 4-AFC task indicate that significant less-is-more effects occurred for the richer task when only 1 or 2 individuals were recognized (compared to when all 4 individuals were recognized), $t = 4.57$, $df = 20$, $p < .002$ and $t = 4.3$, $df = 19$, $p < .002$ respectively, but not when 3 individuals were recognized ($p > .05$). For the poorer questions none of the key comparisons showed reliable less-is-more effects (all *p*s > .05, all tests are 1-tailed and Bonferroni corrected).

Discussion

The results of this experiment indicate that, contrary to previous reports (Pachur & Biele, in press; Pohl, 2006) less-is-more effects are empirically verifiable. The experiment also indicates that the less-is-more effect appears in multi-option decision tasks and – to a limited extent – for "poorer" tasks as well as for "richer" tasks. This finding is in line with previous predictions (Beaman et al., 2006). The process model of the recognition heuristic implemented here also gains some support. Predicted performance levels for 3-AFC tasks are generally accurate although the model is less successful in predicting the performance of participants in 4-AFC tasks. There are two possible reasons for this, which arise from limitations in the methodology employed.

The first possibility is that the usefulness of recognition for decision judgments is underestimated because the observed accuracy data include all participants' responses and not merely those responses that are identifiably consistent with use of the recognition heuristic. For example, the 4-AFC "richer" question data includes responses from a minority of participants who did not choose the single recognized item when only one item is recognized. If this decision was incorrect it would obviously drive down the performance levels for this data point. Restricting the comparisons of the process model to those whose outputs are consistent with using a recognition-driven strategy may quite plausibly increase the accuracy of the predictions. However, it is important to note that, within the sample of names used in the experiment, the correlation between wealth and chance of being recognized was not perfect. Importantly, within the subset of names which were highly recognized there was no strong correlation between recognition and wealth.

The second possibility is that the estimated recognition validity should be varied in a similar manner to the estimates of knowledge validity. Knowledge validity was varied as a function of n, the number or possibilities under active consideration, under the assumption that judging the richest of any 4 individuals would always be more difficult than judging which was the richest of 2 individuals, even when all individuals are known and cues to wealth can be applied. Recognition validity remained invariant, however. One could argue (Anderson, personal communication) that RV should be varied as a function of the number of options recognized and the number of options available. This argument assumes that the "correct" target item is more likely to be a member of a set of 999 recognized items (from 1000) than a member of a set of only 2 recognized items (from 1000). The denominator also needs to be taken into account as, by the same logic, a target is more likely to be a member of the same set of 2 recognized items if there are only 3 options available than if 1000 options are available. For the current set of predictions, however, we made the simplifying assumption that recognition validity would not vary substantially when n, the number of recognized items, is only free to vary between 1 and 3 and N, the number of choices is similarly limited to a range of 2-4.

These caveats notwithstanding, the empirical work reported here supports Goldstein and Gigerenzer's (2002) contention that less is (sometimes) more and shows how this varies as a function of the number of options available and the question type. Although the wealth judgment dimension employed here was used because of its intrinsic, albeit casual, interest for our undergraduate participants rather than for any real value nevertheless the results we have obtained may potentially have some applied or "real-world" significance. For example, the recognition heuristic is currently under investigation for purposes of predicting the results of sporting events (Andersson, Edman, & Ekman, 2005; Bennis & Pachur, 2006; Pachur & Biele, in press; Snook & Cullen, 2006) and our results suggest that, by obtaining prior estimates of the recognition validity of lay people and the knowledge validity of experts, we can estimate the future accuracy of both groups' predictions of the results of future sporting fixtures with a fair degree of accuracy and, importantly, ascertain whether the opinions of the general public or the professional pundits are the most reliable guide.

The current results also speak to theoretical issues. The basis of the "simple heuristics" research program is to examine the efficacy of decision processes where the number of cues investigated are limited and decisions are frequently based upon one or more cues that are consulted independently (i.e., that they are noncompensatory, see for example, Take The Best or the Priority Heuristic, Brandstätter, Gigerenzer & Hertwig, 2006; Gigerenzer & Goldstein, 1999). This contrasts with another well-established research program that examines decision-making under the assumption that cues are weighted and combined (i.e., that they are compensatory) and a number of authors have been critical of the noncompensatory use of recognition cues (Bröder & Eichler, 2006; Newell, 2004; Newell & Fernandez, 2006; Pohl, 2006; Richter & Späth, 2006; but see Pachur & Hertwig, 2006). Whilst the current data cannot completely resolve this debate, we note that our implementation of a process model of the recognition heuristic provides a reasonable prediction of human competence by making a series of independent decisions in a noncompensatory manner. This is consistent with the suggestions made by some consumer marketing researchers that product choice amongst consumers begins with the independent formation of a "consideration set" that may be based on recognition information (e.g., Coates, Butler & Berry, 2004, 2006). The process also has the advantages of parsimony and, in the absence of other evidence, is to be preferred on these grounds.

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