The Recognition Heuristic: Fast and frugal, but not as simple as it seems.

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Abstract

Two experiments examine the use of the recognition heuristic which states that, in the absence of other information, individuals make judgments on the basis on recognition alone. This has been shown to be adaptive (Borges, Goldstein, Ortmann & Gigerenzer, 1999) and in Experiment 1 we demonstrate that the heuristic is reliably employed when participants are placed under time pressure. Experiment 2 considers a possible confound of the adaptive recognition heuristic with a less-adaptive recognition-preference strategy and shows that both may be employed but that the recognition-preference strategy is not sufficient to account for the recognition heuristic. We discuss the implications of our results for the recognition heuristic and the rest of the adaptive toolbox (Gigerenzer & Todd, 1999).

Introduction

A recent approach to human judgment and rationality put forward by Gigerenzer and colleagues (Gigerenzer, 2000; Gigerenzer & Todd, 1999) emphasizes the real-time constraints of many decision-making and reasoning tasks. In doing so they have suggested that many so-called "biases" in human judgment are actually adaptive within real-world situations. The approach uses "fast and frugal" heuristics that have been shown to be highly effective in a number of situations (Goldstein & Gigerenzer, 1999; Borges et al., 1999) even when compared to more sophisticated methods that take into account multiple sources of information.

The recognition heuristic is one such strategy and is, furthermore, the first step in a number of fast and frugal strategies within what has been termed the adaptive toolbox (Gigerenzer & Goldstein, 1996). Simply stated, the recognition heuristic provides the following rule of thumb: "*If one of two objects is recognized and the other is not, then infer that the recognized object has the higher value"* (Goldstein & Gigerenzer, 1999, p. 41). So, for example, if an experimental participant is asked to judge which of two cities has the larger population, the participant will be following the recognition heuristic if they choose the city which they recognize. This leads to the less-is-more effect whereby participants using the recognition heuristic outperform other participants who recognize both cities and should, therefore, have more information available upon which to base their decision. The reason for this is that recognition of city correlates with the size of the city and hence may be a more effective cue than those used by more knowledgeable participants.

Having demonstrated the usefulness of the heuristic, Goldstein & Gigerenzer (2002) examined whether the heuristic was actually employed in practice. Data from 22 participants showed that all of them produced choice behavior consistent with use of the recognition heuristic. These data were, however, disputed by Oppenheimer (2003) who noted that the American participants tested by Goldstein & Gigerenzer may have accessed information other than mere recognition in making their choices. Goldstein & Gigerenzer required their participants to select the larger of the two in pairs of German cities. Oppenheimer suggested that the stimuli employed conflated recognition with knowledge that the recognized city was one of the largest cities in Germany.

In his study, Oppenheimer presented participants with towns or cities that were local to them and that were known to be small. In doing so, Oppenheimer demonstrated that the recognition heuristic is not an inevitable strategy when faced with forced-choice tasks where only one of the choices is recognized. Oppenheimer's participants proved smarter than the recognition heuristic by choosing the recognized city significantly less often than would be expected by chance. However, the differences between the studies by Goldstein & Gigerenzer (2002) and by Oppenheimer (2003) go beyond the choice of stimuli. One aim of the current paper is to consider how differences in procedure may have contributed to the reported contradictions in choice behavior between the two studies. In doing so we will provide a more balanced view of the place of the recognition heuristic in decision-making generally and in the adaptive toolbox in particular.

The key methodological difference between the two studies was the time pressure that participants experienced. In the Oppenheimer study (Experiment 1), participants made 10 choices over a five-minute period, an average of 30 seconds for each choice. In Oppenheimer's Experiment 2, participants were given a week to return the booklet containing their answers. In contrast, in the Goldstein & Gigerenzer study (Experiment 1), participants made between 300 and 435 choices during a single experimental session. Although Goldstein and Gigerenzer did not specify how long their participants had to complete the task, it is likely that their participants had substantially less time per

choice than the 30 seconds for each choice taken by participants in the first Oppenheimer study (as, if this were the case, participants who had 435 choices to make would have taken over 3 ½ hours). We suggest that participants will be much more likely to use so-called "fast and frugal" strategies when tasks put them under time pressure. This situation basically reinstates the constraints under which boundedly rational approaches such as the use of fast and frugal heuristics are presumed to operate (Simon, 1956). It alos provides an alternative explanation, besides the difference in stimuli, of why participants were much more likely to use the recognition heuristic in the Goldstein and Gigerenzer study than in Oppenheimer's experiment.

In the two experiments that we report we therefore replicated the general procedure of Oppenheimer (2003) but gave participants a strict time limit for the experimental session. In order to address the issue of the confound in the stimuli identified by Oppenheimer we chose English towns or cities whose soccer teams played in the UK First Division, not in the Premier League, as the recognizable stimuli. The town or city names would thus have been familiar to the participants without being considered a large or major city as large cities in the UK (e.g., London, Liverpool, Manchester) tend to have soccer teams in the Premier League. The city names used as the (hopefully) unrecognizable stimuli were the fictional cities invented by Oppenheimer, all of which had made-up but (to UK participants) foreign-sounding names.

The general situation experienced by the participants therefore is one where the recognition heuristic is applicable (only one of the names is recognized) and there is no other information upon which to base a choice. The recognized name is not known to be a particularly large city (unlike the Goldstein & Gigerenzer study). Equally, the participant has little time with which to consider what they know of the recognized town or city or attempt to infer anything regarding the unrecognized city (unlike the Oppenheimer study). Under these circumstances the recognition heuristic is the only tool available in the adaptive toolbox. In Experiment 1 we consider whether, with these potential confounds identified and controlled for, participants will make use of the recognition heuristic. Failure to observe the use of the single simplest heuristic in the toolbox under such circumstances would be a severe setback to the fast and frugal heuristics research agenda.

Experiment 1

Participants and Procedure

The participants were 50 adult volunteers. The 30 men and 20 women who took part had an average age of 28 years (range 17-62; standard deviation 11.2). Each participant was presented with a four-page experimental booklet. The instructions told them that they would be presented with pairs of names of towns, and that their task was to circle the town with the largest population in each pair. Participants were given one minute to complete the task, timed with the stopwatch. In order to encourage them to work quickly, participants were given updates on the time at 15-second intervals. On completion of the first part of the task participants were then given a list of all of the towns used in the experiment (both real and fictional) and were asked to circle those out of the list that they recognized.

Materials and Design

The materials used in this experiment were based on those used by Oppenheimer (2003). We created a group of stimuli where participants could show the recognition heuristic by pairing the names of 10 real English towns with the names of 10 fictional towns (taken from Oppenheimer; see Appendix). The English towns were selected from the list of towns with First Division soccer teams, and each was paired with three different fictional towns, giving 30 recognition heuristic items in all. In addition, we created two groups of filler items. The first group consisted of pairs of real towns and cities taken from a list of 8, which contained four international towns/cities (e.g., Limerick) and four English towns (e.g., Bradford). Each participant received 10 pairs of this type. The second type of filler item consisted of pairs of the fictional towns. Participants each received 9 pairs of this type[1]. Therefore, each participant received 49 choice pairs in total, of which 30 were of the critical recognition heuristic type. The order of presentation of these pairs was randomized across participants.

Results

Coding Some participants did not complete all 49 choices in the allotted time. In addition, some participants either failed to recognize a real place name, or erroneously recognized a fictional place name. Therefore, on the basis of the number of items that they had completed, and their responses to the recognition task, we calculated for each participant: (a) the number of times that they could have used the recognition heuristic, (b) the number of times that they did use the recognition heuristic. The second figure divided by the first gave us a figure for the proportion of responses that conformed to the recognition heuristic.

Analysis One sample t-test showed that, by participant, the proportion of responses attributed to the recognition heuristic was significantly greater than would be expected by chance, $t = 3.55$, $df = 49$, $p = .001$ (2-tailed). These data are shown in Figure 1 (overleaf).

[1] There should have been 10 pairs of this type, but, due to a printing error with the materials, participants only received 9 pairs.

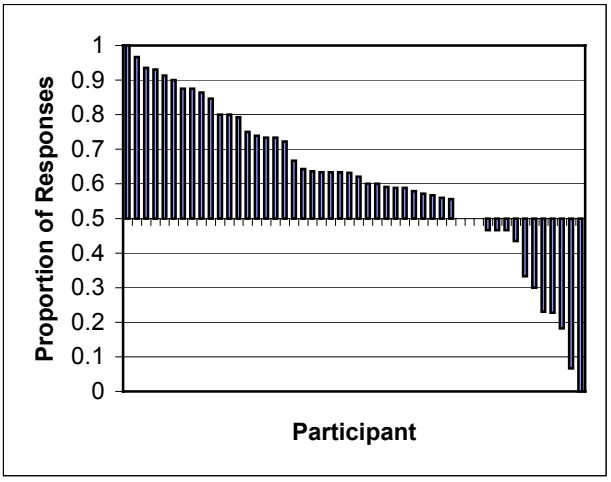

Figure 1: Proportion of Recognized Items Chosen by Participant (Experiment 1).

Further analysis of the choices made by individual participants shows that 23 out of the 50 participants showed evidence of use of the recognition heuristic at levels greater than chance, binomial $z > 1.28$, $p < .05$. Interestingly, a further 6 participants showed the reverse pattern, using the recognition heuristic significantly less often than chance, binomial $z > 1.66$, $p < .05$.

Discussion

These data confirm Goldstein & Gigerenzer's contention that participants use recognition in choice behavior when no other information is available. Use of this recognition heuristic may, however, be limited to situations when the participant is under time or other pressure. We should note that our participants did not use the recognition heuristic as frequently as those of Goldstein and Gigerenzer. This may have been due to the materials we used, and hence may provide some support for Oppenheimer's position. Additionally, not all the participants used the recognition heuristic consistently in their responses in our experiment and a significant subgroup of participants appeared to be using quite the opposite strategy. This was confirmed by the spontaneous self-reports of some participants. There are drawbacks to analyzing individual participants' data in this manner, for example, if participants were responding at random we might expect some individual participants to appear to use the recognition heuristic purely by chance. However, we are following a precedent in the literature (Goldstein & Gigerenzer, 2002; Rieskamp & Hoffrage, 1999) in attempting to identify individual strategies rather than averaging over potentially very different strategies. To answer some of these questions, we therefore ran a further experiment to examine whether altering the form of the question for the same choice stimuli would influence use of the recognition heuristic.

One possible explanation of our data is that participants, rather than using the recognition heuristic in the manner suggested by Goldstein & Gigerenzer (1999), were using recognition in a different way. For example, one participant reported deliberately choosing city names he did not recognize on the assumption that these foreign-sounding cities must be larger than the local towns that he knew. This use of recognition could explain the pattern of choice displayed by those participants who showed significantly less choice of recognized towns than would be expected by chance. This explanation is consistent with the data reported by Oppenheimer (Experiment 1).

If participants are capable of using recognition in a strategic and less rigid way than suggested in the formulation of the recognition heuristic, we would expect to see recognition effects not only in judgments of which of two cities is the larger but also in judgments of which of two cities is the smaller. According to the formal account of the recognition heuristic asking which of two cities is the smaller is equivalent to asking which is the larger. So participants would, paradoxically, be expected to use the recognition heuristic to choose the unrecognized city (since it is inferred that the unrecognized city is smaller of the two). However, if participants merely choose the recognized city because of some learned preference (e.g., Zajonc, 1968) or strategy we might expect them to continue to choose the recognized city. This hypothesis is tested in Experiment 2.

Experiment 2

Method

The participants were 42 adult volunteers. The 24 men and 18 women who took part had an average age of 21 years (range 18-48; standard deviation 4.5). The procedure and materials for this experiment were the same as that of Experiment 1. The only difference being that instead of making judgments of which of two towns was the larger, participants made judgments of which of two towns was the smaller.

Results

Coding We once again assessed participants' usage of the recognition heuristic taking into account the number of items completed and the participants responses to the recognition task in calculating a proportion of choices of the recognized item.

Analysis In this experiment, one sample t-test by participant failed to show that choice of recognized item varied significantly from chance, $t = 1.0$, $df = 41$, $p > .05$. These data are shown in Figure 2. Examination of Figure 2 also suggests, however, that some individual participants did use the recognition heuristic reliably in their responses.

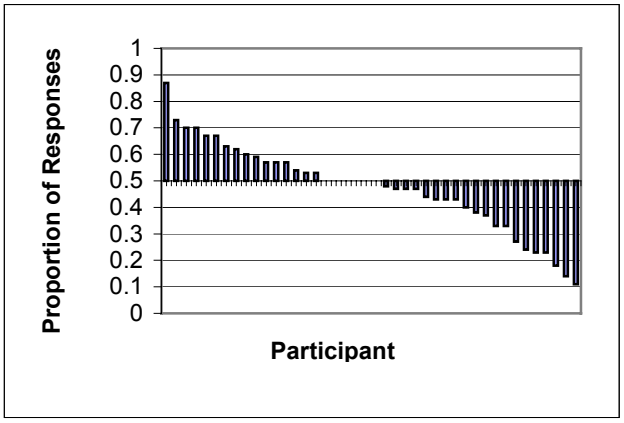

Figure 2: Proportion of Recognized Items Chosen by Participant (Experiment 2).

Further analysis of the choices made by individual participants shows that 10 out of the 42 participants showed evidence of use of the recognition heuristic at levels greater than chance, binomial $z > 1.28$, $p < .05$. A further 7 participants showed the reverse pattern, using the recognition heuristic significantly less often than chance, binomial $z > 1.28$, $p < .05$.

Discussion

The results of this experiment are intriguing because exactly the same stimuli and presentation conditions were used as in Experiment 1 yet we find a different pattern of results. The choice that participants needed to make was also identical to the previous experiment - judging the relative sizes of two towns or cities. The only thing that changed was the framing of the question, from asking which of the two was larger, to asking which was smaller. Some participants ($n = 10$) used a recognition heuristic to judge the smaller of the two towns, however, others ($n = 7$) used a diametrically opposed strategy. Consequently, the sample as a whole did not significantly differ from chance in their choice behavior. In this experiment, therefore, although all the preconditions for using a recognition heuristic were met, only a minority of participants did so.

Analysis of individuals' data showed that some participants *did* reliably use the recognition heuristic in their choices. It also showed that, as in the previous experiment, some participants used the even simpler strategy of always picking a town they recognized, regardless of the framing of the question. However, only a small group of participants appear to use this strategy, which, in the previous experiment, would have been indistinguishable from the recognition heuristic.

General Discussion

The recognition heuristic is an adaptive strategy in decision-making because of the correlation between recognition and magnitude. When a choice is made between the larger, or the more numerous, of two items it is frequently the case that the recognized item is, in fact, the larger or more numerous of the two. This is formalized within the recognition heuristic by stating that "when an individual only recognizes one of two items, the individual will judge the recognized item to be greater in whatever dimensions are positively correlated with recognition" (Oppenheimer, 2003, p. B2; see also Goldstein & Gigerenzer, 1999; 2002). Oppenheimer questioned the unthinking use of the recognition heuristic in his study. However, both Oppenheimer's study and the earlier reports by Goldstein & Gigerenzer confound choosing the recognized object because of the inferred correlation between recognition and magnitude and choosing the recognized object on some other basis, for example preference due to mere exposure (Zajonc, 1968).

In our studies, the two possible strategies of use of the recognition heuristic as a means of inferring relative magnitude and simple choice of the recognized item regardless of the question were examined in Experiment 2. We found that some participants do indeed choose the recognized item regardless of the framing of the question, a strategy indistinguishable from the recognition heuristic in standard formulations of the problem. However, the number of participants who use this strategy is small and although it might exaggerate the effect ascribed to recognition heuristic elsewhere, it cannot account for it.

The recognition heuristic was demonstrated in our Experiment 1 using similar materials to Oppenheimer (2003) and a similar procedure to that of Goldstein & Gigerenzer (2002). The majority of our participants did use the recognition heuristic as a "fast and frugal" means of decision-making when placed under time pressure, a constraint that was absent in the Oppenheimer (2003) study. However, the heuristic is not automatically applied as the number of participants showing it was reduced in our Experiment 2. This was despite the fact that the choice to be made was identical and the heuristic would therefore have equivalent adaptive value in both situations. The recognition heuristic is the single simplest heuristic in the adaptive toolbox and makes up the first principle in more complex decision-making algorithms such a take-the-best (Gigerenzer & Goldstein, 1996). Establishing the situations when the recognition heuristic is employed is a necessary prerequisite for evaluating the applicability of the fast and frugal tools within the adaptive toolbox. There have been very few experiments on this. The current study goes some way towards addressing this issue. We suggest that our results also throw up some interesting avenues for future research. For example, a future study could vary the degree of time, or other, pressure on participants and examine the effects of this on the frequency with which a recognition strategy is used.

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Appendix

Towns and Cities used in Experiments 1 & 2

Fictional
Papayito
Al Ahbahib
Las Besas
Weingshe
Rio del Sol
Heingjing
Rhavadran
Gohaiza
Schretzberg
Svatlanov

Real
Norwich
Ipswich
Preston
Wigan
Sunderland
Crewe
Coventry
Gillingham
Sheffield
Burnley

Filler
Limerick
Toledo
Berkley
Haifa
Stoke
Rotherham
Bradford
Derby