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Brief article

Not so fast! (and not so frugal!): rethinking the recognition heuristic

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Abstract

The 'fast and frugal' approach to reasoning (Gigerenzer, G., & Todd, P. M. (1999). *Simple heuristics that make us smart*. New York: Oxford University Press) claims that individuals use non-compensatory strategies in judgment – the idea that only one cue is taken into account in reasoning. The simplest and most important of these heuristics postulates that judgment sometimes relies solely on recognition. However, the studies that have investigated usage of the recognition heuristic have confounded recognition with other cues that could also lead to similar judgments. This paper tests whether mere recognition is actually driving the findings in support of the recognition heuristic. Two studies provide evidence that judgments do not conform to the recognition heuristic when these confounds are accounted for. Implications for the study of simple heuristics are discussed.

Keywords: Recognition heuristic; Judgment; Heuristics; Fast & Frugal

1. Introduction

How complex is human reasoning? While there is general agreement among psychologists that there are limits to our processing ability, it is not universally agreed upon what those limits are. Ever since Herb Simon's (1955) epiphany of bounded rationality – the idea that cognitive capacity is constrained – many approaches to the study of judgment have emphasized simplicity and limited computation in accounting for agents' behavior. Such accounts are very attractive because they are elegant and straightforward, but before accepting them we should examine the evidence with a critical eye.

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One outlook that has recently garnered a great deal of attention is Goldstein and Gigerenzer's (1996) 'fast and frugal' reasoning. Goldstein and Gigerenzer (1996) posit one-cue, non-compensatory judgment – the notion that individuals consider only the single most valid cue that discriminates between options; all other cues are ignored (for further discussion on the evidence for non-compensatory judgment, see Payne, Bettman, & Johnson, 1993; Tversky, 1969). A variety of fast and frugal heuristics are thought to exist, which together form an 'adaptive toolbox'. Individuals facing a judgment task will select the most ecologically valid of the heuristics for the particular task, which allows high accuracy despite using such simple strategies (Gigerenzer & Selten, 2001). Several of these simple heuristics have been identified, and several studies substantiate their use (Dahmi & Ayton, 2001; Gigerenzer & Todd, 1999; but see Newell & Shanks, in press).

The simplest of these strategies is the recognition heuristic (Goldstein & Gigerenzer, 1999, 2002) which takes advantage of the fact that people have excellent recognition memory (Standing, 1973) and that there are a wide range of dimensions that positively correlate with recognition. According to the recognition heuristic, 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. For example, because city size is positively associated with recognition, the recognition heuristic would predict that recognized cities would be judged as larger than unrecognized cities. The heuristic is non-compensatory; no other information aside from recognition is taken into account in the judgment. In fact, the "inconsequentiality of further knowledge" (Goldstein & Gigerenzer, 1999) is an essential feature of the heuristic. The entire point of the heuristic is that it is extremely simple so that minimal cognitive processing is required.

This is an important heuristic not only for its elegant simplicity, but also because it is the first step in a variety of other fast and frugal heuristics from the adaptive toolbox (Gigerenzer & Goldstein, 1999; Simon, 1990). Computer simulations of the recognition heuristic have shown it to yield highly correct predictions despite the limited processing requirements (Goldstein & Gigerenzer, 2002). Further, the recognition heuristic has garnered a great deal of attention. For example, Kahneman and Frederick (2002) describe how the recognition heuristic is a challenge to dual-process theories of judgment, because it doesn't fit well into most prominent classification schemes for heuristic processing.

Given the theoretical importance of the recognition heuristic, surprisingly little research has been done to investigate the extent of its use. The empirical evidence for the recognition heuristic comes from a series of studies done by Goldstein and Gigerenzer (1999). The researchers examined Americans' population estimations for the 30 largest German cities by creating an exhaustive list of pairings, and having participants make forced-choice judgments of which city in each pair was larger. Participants were also asked which cities they recognized. The researchers found that if only one city in a pair was familiar, then that city was judged to be larger about 93% of the time.

However, by using the 30 largest German cities as their sample, the researchers conflated recognition with knowledge that the city was large. That is, most people not only recognize the city Berlin, but they also know that Berlin is one of the largest cities in Germany. Therefore, it is impossible to determine whether the judgments were due to mere recognition or rather from knowledge that the recognized cities were large. Under

these conditions almost any model of judgment – simple or complex – would predict similar results.

However, it is possible to tease apart the predictions of the recognition heuristic and more complex models of reasoning. The recognition heuristic posits that individuals will use no information aside from mere recognition to make city size estimations. As Goldstein and Gigerenzer (2002) put it, "if one object is recognized and the other is not, then the inference is determined; no other information about the recognized object is searched for and, therefore, no other information can reverse the choice determined by recognition". The recognition heuristic would therefore predict that individuals would judge a recognized city as larger than an unrecognized city *even if the recognized city were known to be small*. To test this counterintuitive prediction, a population estimation study was run using local cities, which were both highly recognizable and known to be small. This provides a stronger test of whether the recognition heuristic is actually used.

2. Experiment 1

2.1. Participants

Fifty members of Stanford University community were recruited from the dining facilities at the student union to participate in this study. Surveys typically took under 5 minutes to complete. Upon completion of the survey, participants were thoroughly debriefed. Participants were not compensated for their participation.

2.2. Design and stimuli

Participants made forced-choice judgments of city population size. Six pairs of cities were created, such that a local (Bay Area) city was paired with a fictional city. Using fictional cities as decoys ensured that the participants would not recognize any of the non-local cities.

Bay Area cities were selected from the apartment listings in the classified section of a local newspaper. The first six cities with listings were chosen. These were Berkeley, Cupertino, Foster City, Fremont, Milpitas, and Sausalito. A set of 19 fictional city names was created to serve as decoys. Nine were discarded for arousing suspicion in pilot subjects. The remaining decoys were: Al Ahbahib, Gohaiza, Heingjing, Las Besas, Papayito, Rhavadran, Rio Del Sol, Schretzburg, Svatlanov, and Weingshe. The pairings were counterbalanced across different versions of the questionnaire.

To prevent participants from guessing the experimental hypothesis and to lower the possibility of demand characteristics, several distracter pairs were created. The four extra fictional cities were paired to create two questions in which neither city was recognized. Additionally two pairs were created in which both cities would be recognized. The cities for these pairs were: Memphis, Boise, Kyoto, and Oxford.

The instructions for the survey read as follows: "Below are several pairs of cities. Your job is to try and determine which city in each pair is more populous; please put an 'X' in the space next to the city you believe has a larger population. If you do not recognize some

of the cities, please circle the name of the cities you don't recognize, but try your best to make an accurate judgment anyway."

2.3. Results

2.3.1. Coding

The distracter trials were not considered in the analysis. A trial was only considered in cases where the recognition heuristic could possibly be applied – when a subject recognized the local city, and did not recognize the fictional city (as in Goldstein & Gigerenzer, 2002). A total of 81 trials met this criterion.

2.3.2. Results

Data are summarized in Fig. 1. On average participants judged the local city to be larger on only 37% of the trials. Subjects were significantly less likely to judge the local cities to be larger than one would expect by chance ($\chi^2 = 4.25$, d.f. $= 1$, $P < 0.05$). Additionally, participants showed patterns inconsistent with the recognition heuristic for five of the six target cities, and for all cities participants were significantly less likely to judge the recognized city as larger than what has been found in previous studies (Goldstein & Gigerenzer, 1999, 2002).

2.4. Discussion

The recognition heuristic predicts that participants will base their judgments of city size solely on whether or not the city is recognized – recognized cities will be judged as larger than unfamiliar cities. However Experiment 1 showed that when participants know that a recognized city is small, they tend to judge the recognized city to be smaller than an unrecognized city. People clearly are using information beyond recognition when making

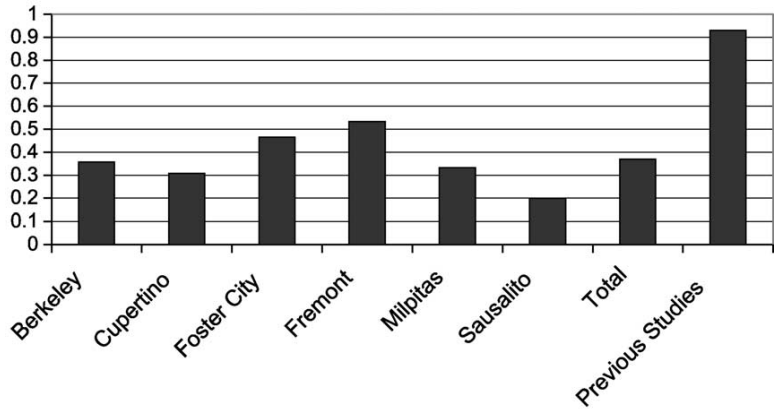

Fig. 1. Percentage of participants who judged the recognized city to be larger in Experiment 1.

judgments about city size. These results are intriguing because they are not predicted by the recognition heuristic. However, several issues remain that must be addressed.

Although the cities in the above study were randomly sampled from the population of local cities, they were not randomly sampled from the population of cities as a whole. Participants might notice that the questionnaire seems to disproportionately sample from local cities. Knowing that the local cities are small, participants might decide that the recognition heuristic is non-adaptive in that environment, and might choose a different heuristic from the adaptive toolbox. Perhaps if cities were representatively sampled, participants would be more likely to use the recognition heuristic.

Further, Experiment 1 is limited in that it is a fairly conservative test of the recognition heuristic. The fact that a city is known to be small is a cue that directly contrasts with recognition. Although the recognition heuristic would predict that no cues aside from recognition are considered, a reasonable revision to the heuristic could be that very strong cues which are directly related to city size take precedence over recognition, but that the recognition heuristic is still an accurate description of human behavior in general.

To address these concerns, a second experiment was run. Rather than using cities that were known to be small, Experiment 2 focused on cities that were not known to be large. That is, cities that are recognized for reasons unrelated to size and that participants are unlikely to know the size of. Cities are recognized for many reasons. Therefore, cities can be selected so as to appear to be randomly sampled, eliminating the potential problem of non-random sampling influencing the selection of the heuristic. Additionally, this is a much less conservative test of the recognition heuristic because there are no cues that directly contrast with recognition.

3. Experiment 2

3.1. Participants and design

One hundred and seventy-two Stanford University undergraduates completed the survey to fulfill part of a course requirement. The survey was included in a packet of 20 unrelated one-page questionnaires. Packets were distributed in class, and participants were given a week to complete the entire packet.

3.2. Stimuli and procedure

As in Experiment 1, participants made forced-choice judgments of city population size. Six pairs of cities were created, such that a target city was paired with a fictional city. Target cities were selected by considering reasons why participants might recognize a city, and selecting a city to represent each reason. The cities selected (with reasons in parentheses) were: Chernobyl (nuclear disaster), Cupertino (close proximity), Los Alamos (espionage), Nantucket (popular limerick), New Haven (well known university), and Timbuktu (popular expression).

The fictional cities, distracter trials, and instructions remained the same as in Experiment 1.

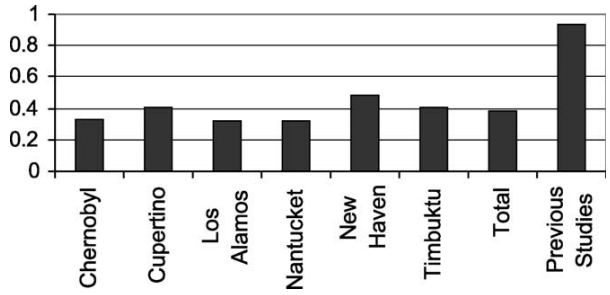

Fig. 2. Percentage of participants who judged the recognized city to be larger in Experiment 2.

3.3. Results

3.3.1. Coding

The distracter trials were not considered in the analysis. A trial was only considered in cases where the recognition heuristic could possibly be applied – when a subject recognized the target city, and did not recognize the fictional city (as in Goldstein & Gigerenzer, 2002). A total of 410 trials met these criteria for consideration.

3.3.2. Results

Data are summarized in Fig. 2. On average, participants judged the target cities to be larger on slightly over 40% of the trials. Subjects were significantly less likely to judge the target cities to be larger than one would expect by chance ($\chi^2 = 16.44$, d.f. $= 1$, $P < 0.01$). Additionally, participants showed patterns inconsistent with the recognition heuristic for all six of the target cities, and for all cities participants were significantly less likely to judge the recognized city as larger than what has been found in previous studies (Goldstein & Gigerenzer, 1999, 2002).[1]

4. General discussion

The recognition heuristic would predict that participants would judge recognized cities to be larger than unrecognized cities. In fact, participants were *less* likely than chance to judge the recognized cities as larger. This occurred despite the fact that the recognized cities were of unknown size. This challenges the notion of widespread usage of the recognition heuristic. Judgments failed to conform to the recognition heuristic not only in the presence of strong opposing cues, but also in situations where recognition may actually be the best cue available.

[1] To ensure that the results were not merely an artifact of inter-country comparisons, an analysis was run on trials in which the cities appeared to come from the same country. For example, Svatlanov and Chernobyl are both Russian names. The results for intra-country trials are indistinguishable from the rest of the sample. The results hold even when the country is held constant.

Nevertheless, one could argue that there are many strategies available in the adaptive toolbox (Gigerenzer & Selten, 2001) and that under some circumstances people use the recognition heuristic, but that in these particular studies, participants selected other strategies. However, this interpretation is problematic. One difficulty is that many of the other heuristics that are thought to exist in the adaptive toolbox use the recognition heuristic as a first step (Gigerenzer & Todd, 1999). Therefore, if people are not using the recognition heuristic, they could not be using many of the other heuristics either.

One might argue that participants are simply using the strategies that do not rely on the recognition heuristic. However, this argument is equally problematic for the recognition heuristic, because it leads to the question of how participants choose which strategy to use. One cannot argue that selection is contingent upon the type of judgment being made (e.g. size estimations) nor upon the category of object being judged (cities) because that would not account for the fact that the present studies found no evidence for the recognition heuristic despite using *the same task* as in the original studies (Goldstein & Gigerenzer, 1999).

In fact, the only way in which the present studies differed from the original studies was in the individual items that were used. Therefore, to argue that a different heuristic was selected, one must contend that heuristics are selected based upon the cues associated with individual items (e.g. Berlin is a capital, and capitals are usually large, thus the "It's a capital" heuristic should be selected). However, this method undermines the efficiency of the recognition heuristic. The point of the recognition heuristic is that only one cue (recognition) need be considered to make a judgment. If one must use multiple features of individual items in order to determine that the recognition heuristic is applicable, then this is no longer single-cue decision making, and the judgment process is not as fast or frugal as hypothesized.

One of the difficulties in using forced-choice tasks to demonstrate the usage of a heuristic is that it isn't always clear what strategy people are using when they make a judgment. Judging a recognized city to be larger than an unrecognized city could be a demonstration of the recognition heuristic, but it could just as well be due to a number of other judgment strategies. For example, tallying strategies, weighted additive models, and regression models would each utilize all of the available cues for a city, and large cities are likely to have many cues that positively correlate with size (e.g. airports, sports teams, etc.). Therefore, in situations in which a recognized city is large, all of these strategies would emulate the recognition heuristic. Since previous demonstrations of the recognition heuristic have conflated recognition with actual city size, any of these strategies could account for the data. The present studies removed that confound, and found no evidence for the use of the recognition heuristic.

This is not to say that recognition is not an important cue in judgment. Recognized objects are by definition more available than unrecognized objects, and there has been a great deal of evidence supporting the notion that availability has a large influence on judgment (Tversky & Kahneman, 1973). It is impossible to conclusively demonstrate that there are no circumstances under which non-compensatory use of recognition as a judgment cue occurs. Nevertheless, until evidence supporting the recognition heuristic is found in a study that dissociates the recognition heuristic from other judgment strategies,

it would be premature to conclude that the recognition heuristic is actually used. Given the present studies, a more parsimonious account suggests that it is unlikely that recognition is the sole cue used in judgment, as has been previously hypothesized (Goldstein & Gigerenzer, 2002).

It seems more likely that people are taking into account more information than a single cue, and in general are engaging in more complex reasoning. While it is beyond the scope of this paper to speculate as to the exact reasoning strategies that are being used, it is hoped that these demonstrations will inspire researchers to investigate complex processing, rather than limiting themselves to the study of highly simple strategies.

Non-compensatory strategies may be attractive because of their efficiency and simplicity. However, the methodological decisions made in studying a phenomenon can artificially validate a theory. An important empirical challenge in testing fast and frugal accounts of cognition is presenting people with problems that are sufficiently complex to allow for complex reasoning to occur. If we don't deal with the complexity that exists in real problems, we may discover a misleadingly simple story about cognitive processes.

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