

A Literature Review on Availability Heuristic Implicated in Different Fields

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Abstract: Decision-makers involved in economic activities are faced with the constraints of a complex environment and with the limitations of their cognitive ability. In other words, people are bounded rational. Therefore, psychological factors affect people's judgments and decisions under uncertainty, including the availability heuristic. The availability heuristic refers to that people judge the probability of event according to the ease of recalling the instances. It was first proposed by Tversky and Kahneman, and is an ecological cue that people often use in making decisions. Although the availability heuristic has received a lot of attention, there is still a lack of systematic research literature on the mechanism of availability heuristic and its application in real life. This essay aims to investigate the origin and definition of availability heuristic, and then identify the underlying mechanism as well as the determinants of the availability heuristic to explain how the availability heuristic is applied in the cooperation relationship, financial markets and consumer behavior in real world.

Keywords: heuristics, availability heuristic, applications, literature review

1. Introduction

When making judgments and decisions, due to the limitation of time and cognitive ability, people cannot collect all possible solutions through arithmetic methods and statistical knowledge and then select the best option from these solutions, as the rational people assumed by neoclassical economics [1, 2]. People tend to use mental shortcuts and have imprecise control over the answers to questions. They substitute the answers to difficult questions with relevant or more straightforward answers under the influence of heuristics [3]. According to Gigerenzer and Gaissmaier [4], heuristics is a strategy that ignores partial information and can sometimes be used to make decisions faster and more frugal than complex methods. Tversky and Kahneman suggested that heuristics are useful, but sometimes owing to incomplete information, judgement using heuristics may be biased, that is, heuristics can draw correct reasoning results or lead to systematic errors, and past experiences or knowledge may be conducive to our quick judgment, but may also interfere with our decisions [5].

In the 1970s, Tversky and Kahneman published a series of well-known studies that demonstrated people's use of heuristics for problem-solving and decision-making may lead to systematic bias. They summarized three kinds of heuristics commonly used by humans in judgment, which are representativeness, availability heuristic, as well as adjustment and anchoring [5]. This review article mainly focuses on the availability heuristic, which is a cognitive shortcut and a way of thinking that is ubiquitous in human judgment. Tversky and Kahneman were the first to introduce and define the

availability heuristic through a series of experiments in their pioneering research, in which people estimate the frequency or the probability by assessing how easily instances come to mind [6]. In real life, the more frequent events occur, the easier they are to be remembered and extracted by individuals [5]. Therefore, the availability heuristic has also been emphasized by scholars as an ecologically effective decision-making strategy [6]. However, due to the influence of various factors unrelated to the frequency of events, decisions using the availability heuristic are not always reasonable and effective. The availability heuristic is regarded as a cognitive decision-making shortcut with both advantages and disadvantages, which is commonly applied in the judgment of events and decision-making.

The availability heuristic and its applications in real life have been attracting considerable interest since it was defined. One study that is often cited in research on availability heuristics is that of Ross and Sicoly [7], who found the egocentric perception of availability plays an important role in judging the contributions of joint products. Some studies illustrate how the availability heuristic affects the behaviors of financial investors [8-10]. Some studies highlight the impact of availability heuristics on risk perception and on the assessment of precaution [11-13]. In addition, the availability heuristic has an influence on consumers, such as consumer's shopping choices and impressions of product prices [14, 15].

Although the availability heuristic has received a lot of attention, there is still a lack of systematic study on the mechanisms of the availability heuristic and its applicants in real daily life. This paper aims to provide a more detailed explanation of the availability heuristic, systematically review the published empirical research on the availability heuristic and summarize the mechanisms and influencing factors of the availability heuristic. Then three applications of the availability heuristic in real life are illustrated to help better understand the bias triggered by availability as well as make more scientific use of the availability heuristic.

2. Origin and Development of Availability Heuristic

Early demonstrations of the availability heuristic were provided by the research of Tversky and Kahneman. Individuals would estimate the number of a category or the likelihood of an event by assessing how easily the relevant mental operation can be retrieved, constructed, or associated [6]. The availability heuristic shows that when people assess the frequency and probability, they tend to rely on the instances or associations that could recall from memory easily and fluently, rather than trying to collect more statistical information. If the retrieval is more readily, the probability of the event will be judged to be larger. Tversky and Kahneman were the first to define the availability heuristic as “people assess the frequency of a class or the probability of an event by the ease with which instances or occurrences can be brought to mind” [5]. For instance, in a well-known experiment conducted by Tversky and Kahneman [6], subjects were asked to listen to two categories of names, one of which listed 19 famous names of men and 20 less famous names of women, and the other listed 19 famous names of women and 20 less famous names of men. The experiment found that subjects perceived more males than females in the first category, while in the second category, subjects perceived more females than males. In contrast, the factual results were the opposite. The experiment showed that celebrity names were more available than unknown names, which led to an overestimation of the probability of the event.

However, the underlying mechanism of availability heuristics that people use to judge probability is ambiguous [16]. Schwarz et al. explained that there are two factors that affect people's recall of events by using the availability heuristic [17]. One is the number of events that people can recall, that is, the sample of recalled events. The other is people's subjective experience in the process of recalling, that is, how easy or difficult it is for people to recall events. Hertwig et al. defined the two different mechanisms of availability heuristic as the “availability by recall” mechanism and the “fluency”

mechanism; the former refers to people making probabilistic predictions based on the number of cases they actually recall, while the latter refers to the subjective ease with which people recall and judge based on expectations or past experiences [18]. Schwarz and Vaughn summarized that the judgment strategies of individuals depend on their motivation for the decision task [16]. If the task is more self-relevant and participatory, people are more likely to adopt systematic processing strategies that focus on the specific content of the recall that comes to mind. In contrast, if the decision task is less individually relevant and less participatory, people will tend to rely on the ease with which recalling events is presented in their minds.

In addition to the availability heuristic associated with memory tasks, the availability heuristic also exists in tasks where probabilities are judged by association as well as imagination based on known information [6]. Carroll connected the availability heuristic with the imagination of the hypothetical results of a future event in real life, and argued that deliberate imagination of the outcomes of an event would stimulate the availability heuristic when people evaluate the probability of such events. In the experiment of Carroll [19], subjects were asked to imagine that they had watched the results of the 1976 presidential election on television. Half of the subjects were asked to imagine that Ford won most of the states by an irreversible margin, while the other half were asked to imagine that Carter won most of the states by an inexorable margin. Both groups were also asked to imagine the speech of the winner of the presidential election after his victory, and the situation of the loser after his defeat. Then, the subjects were asked to judge the outcome of the 1976 presidential election, and the results showed that those who imagined Ford winning expected Ford to win, while those who imagined Carter winning were more likely to expect Carter to win. The deliberate imagination of the outcomes of an event induces an availability heuristic in evaluating probabilities [19]. Nevertheless, if it is difficult for decision makers to imagine an event or the outcome of an event to be extremely negative, the effort of imagination will reduce people's expectations about its possibilities [20].

3. Determinants of Availability Heuristic

The determinants of availability include concepts such as stimulus salience, selective attention, specific training and associative activation as well as priming [21]. Tversky and Kahneman noted that familiarity and salience would affect the extractability of the cases, which has an impact on the availability heuristic [5]. People may more easily recall salient events that caught their attention, such as a politician's sex scandal or a Hollywood star's divorce, and under the influence of the availability heuristic, people tend to exaggerate the frequency of such events [3]. Vividness also affects the availability heuristic, because vivid information could make events visualized and concrete, which is easier to recall and would leave a deep impression on individuals [22]. Keller et al. identified that participants who viewed vivid images of real flood-affected houses rated the risk of flooding higher than those who viewed neutral images [11].

Moreover, recent occurrences are more available than previous experiences, and people are more likely to use the recently obtained information to make judgments under uncertainty [5]. Curt and Zechmeister discussed the primacy effect and recency effect have an influence on evaluating the availability of information on the frequency of judging categories [23]. Since the previous information is gradually blurred in the memory, the recent information is more prominent, so the recent information is easier to be extracted and used by the individual and will be given a higher weight in the decision-making. For instance, Pan et al. demonstrated that the primacy-recency effect of the information presented on the hotel booking page would influence the customer's choice of a hotel [24]. In addition, presenting positive or negative reviews as the initial information that customers see when browsing reviews is also considered a manifestation of controlling for recency and influencing the availability heuristic. Although early researchers also believed that the availability heuristic would be affected by individual emotion [25], there is a lack of subsequent research

demonstration. Future research can explore the influencing factors of the availability heuristic at the cognitive level.

As previously stated, these factors would enhance the accessibility of events by impacting the ease of understanding during the information gathering process. On the other hand, the research on the above influencing factors can clarify what kind of information characteristics will affect the availability heuristic and cause systematic biases, which is conducive to timely discovering possible decision-making errors and taking measures to deal with them. Next, how the biases induced by the availability heuristic works and the variety of applications in the real world will be discussed.

4. Applications in Different Fields

Section 4.1 indicates the application of availability heuristic in cooperative relationship. Section 4.2 describes the availability heuristic applied in financial markets, and Section 4.3 illustrates the process that how availability heuristic influences consumer behavior.

4.1. Application in Cooperative Relationship

Owing to the influences of the availability heuristic, people are more inclined to extract their own contributions when recalling the information in a cooperative relationship with others. The enhancement of availability in memory of personal inputs to joint efforts generally could be explained by four processes, which are selective encoding and storage, selective retrieval of information, differences in information, and motivations [7].

Ross and Sicoly conducted research on the occurrence of egocentric bias in availability and investigated the relationship between availability heuristics and attribution of responsibility [7]. Their experiment involved 37 married couples, and the questionnaire included 20 activities related to married couples' family lives. Subjects were required to estimate the extent of their responsibility for each of 20 activities and then to answer questions about how much they or their spouses contributed to those activities by giving examples. The experiment showed that the sum of contributions assessed by the subjects is beyond 100%, which means at least one of the couples was overestimating his or her responsibility for one activity. When subjects were required to record examples of their own contributions and their spouses' contributions to each activity, the results reported subjects gave more examples of their own contributions rather than of their spouses' contributions. In addition, it is worth noting that overestimation of the contributions of the couples occurred on the negative items, for example, causing arguments in the relationship. It means that the availability heuristic of people in partnerships is not always selfish. Couples would also attribute negative things to themselves, although the proportion is smaller.

Similarly, an experiment was performed by Brawley to examine whether the availability heuristic and attributions of responsibility would cause egocentric judgements in sports teams [26]. They used questionnaires for 12 men's doubles tennis teams, asking subjects to recall significant events or breaking points in tennis contests. The results showed that respondents only mentioned the turning points of their own team and personal events. It's easier for athletes to get self-centered information due to the selective retrieval of information than it is for opponents or team members. Moreover, players attributed the results of matches more to their team's commitment than to their opponents playing tennis. In a cooperative group, it is important for people to be aware of the availability bias in judgement. Guiding people to consider the contributions of cooperators would reduce the conflicts in cooperative relationships to some extent [3].

4.2. Application in Financial Markets

Ritter pointed out that human beings are affected by cognitive illusion in the process of making judgements in the investment, which refers to the systematic mistakes people make in the way of thinking [27]. The availability heuristic is one of the influential factors; for example, investors tend to be too focused on recent experiences when making decisions. Kahneman and Tversky identified the availability bias caused by the extractability of examples, both familiarity and salience affect the retrieval of instances [5]. Furthermore, they suggested that recent events are likely to be easier to recall than previous events, so people tend to give more weight to current information when evaluating probabilities. In financial markets, information that is easily accessible, salient and more vivid will attract more attention from investors, which will affect resource allocation decisions [9].

Grullon et al. demonstrated that the more a firm advertises in its markets, the larger its shareholder base and the significantly higher the liquidity of its common stock [28]. Simple and public messages conveyed by marketing advertisements affect investors' decisions. Advertisements of a company could increase the investors' familiarity with the company, which affects the retrieval of occurrences when investors buy stocks. While advertising boosts sales of a company's products, it may also affect demand for its stock.

In addition to advertising, abnormal events such as experiencing high abnormal trading volumes also attract investors' attention. Barber and Odean argued that investors would be more likely to consider those stocks that have recently caught their attention when they are selecting which stocks to own [29]. They analyzed data on the buying and selling of common stock by individual and institutional investors from discount brokerages, retail brokerages, and a consulting firm that serves institutional investors. The results suggested that when buying stocks, individual investors have a variety of stocks to choose from, which would increase the difficulty of searching for information due to availability bias and other cognitive limitations. Therefore, in order to simplify the process of selecting and buying stocks, the attention of individual investors will be affected by news reports, abnormal trading volume and stocks with extreme 1-day returns, which they choose to buy stocks that attract more attention. Professional institutional investors spend more time and energy looking for stock investments than individual investors, and they could use computers to narrow their searches, which reduces the need for attention and the impact of availability bias.

Furthermore, Kliger and Kudryavtsev examined the outcome and risk availability effect based on the investigation of investor reactions to stock analyst recommendation revisions [8]. Stock investors make decisions under uncertain conditions, estimating the probability of losses as well as gain outcomes associated with stocks before buying, holding and selling them. On the one hand, it is noted that when the stock market index returns are positive, analyst recommendation rating upgrades have a stronger positive reaction to stock prices, which makes positive investment outcomes more accessible. In other words, investors are more likely to imagine scenarios that could bring benefits, making the information about analysts recommendation upgrades more salient and leading to an amplified stock price response. When accompanied by negative returns in the stock market index, analyst recommending downgrades have a stronger negative reaction to stock prices, which makes negative investment outcomes more available, meaning that investors are more likely to imagine the scene of loss, causing the information about analyst recommendation downgrades to be perceived more obviously. Kliger and Kudryavtsev described the above phenomenon as the "outcome availability effect" [8]. When the risk scenario is more easily recalled by the investors, they are more cautious about the uncertainty component of any recommended revisions by stock analysts, which results in a decrease in stock returns before and after the revisions. The findings indicated that on days of high stock market volatility, the positive price response to an analyst recommendation

upgrade is reduced, and the negative price reactions on the analyst downgrades will be magnified, which is defined as the “risk availability effect” [8].

4.3. Application in Consumer Behavior

For online retailers and marketers, the availability heuristic is of great practical value in web-related customer decisions. Simple purchasing decisions are mainly influenced by System 1, making people vulnerable to systematic bias [3]. Customers rely on heuristics, a habitual mental shortcut that simplifies the process of judging probabilities and estimating values [3]. One of these heuristics is the availability heuristic, in which consumers rely on information that is easily brought to mind [30].

Nazlan et al. studied how the availability cues in online restaurant reviews affected the behavioral intentions, evaluations, expectations, and menu choices of consumers [15]. They stated that salience, vividness and negativity of information, as well as primacy and recency factor would make information more easily recalled. There are different information clues such as total score, star rating, numerical rating and text description in review websites, and in general, specific information will be more vivid. For instance, some online reviewers would post photos, which enhance visual stimulation, vividness and salience of information, and have a greater influence on consumer decision-making than online reviews in texts [31]. In terms of negativity, negative information “evokes strong and rapid physiological, cognitive, and emotional responses” [15, 32]. Individuals attach more weight to negative information, since negative information would recall readily in decision-making. Regarding primacy and recency factors, primacy effects occur when people easily recall the information initially presented to them and are most susceptible to being influenced by it [23]. On the contrary, the recency effect refers to the final rendering information being more prominent, the greater the impact on the results [23]. When consumers read online reviews, they would scroll down to check other information, and at this time, the information availability of consumers will be affected by the primary-recency. Analysis by Nazlan et al. revealed that consumers generate higher visit intent and expectations if they see text-plus-rating online restaurant reviews, and costumers are more likely to select menu options with picture information when the restaurants adopt numerical and star ratings [15].

Moreover, the availability heuristic indicates that people judge store prices based on sample prices that recall readily [6]. The process of retrieving commodities at low prices or expensive products influences the price perception of stores, and consumer perceptions of retailer prices are important, which could affect store preferences [14]. Ofir et al. investigated the process of 99 supermarket consumers recalling the sale of products with lower prices in the store, and found that consumers that have more knowledge tend to judge the overall price image of the store by the number of recalled low-priced items [14]. However, less knowledgeable customers prefer to make judgments about the store price with the ease of items at low prices being recalled, i.e., the availability heuristic. Thus, if these consumers recall a smaller number of products with low prices, their recall task will be easier, and their price perception of the store will be lower.

5. Conclusion

The availability heuristic describes a phenomenon in which people estimate the frequency or probability by assessing how easy it is for instances to recall. Because of the differences in the selective encoding and storage of information, the difference in the selective retrieval of information, the difference in information and the difference in motivation, people will have the egocentric bias caused by the availability heuristic in cooperative relationships. In the financial markets, investors will pay more attention to recent information, easily available, salient and vivid information, which will influence investors' stock trading decisions. As regards consumer behavior, availability heuristics would have an impact on consumers' choices and price perception. The availability heuristic plays an

important role in decision-making, and some systematic biases may be mitigated with more understanding of its applications in different fields.

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