

# Acquisition-Side Uncertainty in Relative Rationality Theory: Emotional Adjusted Expected Cost

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## Abstract

This paper develops the acquisition-side uncertainty framework of Relative Rationality Theory (RRT) by extending Emotional Adjusted Cost (EAC) from certain acquisition to uncertain acquisition. Standard demand theory, search-cost theory, and behavioural consumer research provide important treatments of non-price attributes, search, time, waiting, stock-outs, and consumer experience. The contribution developed here is more specific: within RRT, economic costs, economic revenues, emotional costs, and emotional revenues are represented on a common cash-equivalent scale and incorporated into an acquisition-side uncertainty architecture. This paper introduces Emotional Adjusted Expected Cost (EAEC) as the RRT demand-side uncertainty extension of EAC. It distinguishes one-shot Expected Emotional Adjusted Cost (EEAC), where the decision-maker makes a single uncertain acquisition attempt, from repeated-search Emotional Adjusted Expected Cost (EAEC), where the decision-maker continues searching until successful acquisition.

The central claim is that uncertain acquisition should not be evaluated only through nominal price or expected monetary expenditure. Failed acquisition attempts may generate travel costs, wasted time, frustration, disappointment, search fatigue, delay, anxiety, and loss of trust, while successful acquisition may generate emotional revenues such as certainty, relief, convenience, confidence, and satisfaction. EAEC translates these economic and emotional consequences into a cash-equivalent acquisition-cost structure. The relatively rational choice is therefore not necessarily the cheapest option, but the option or acquisition path with the lowest Expected Emotional Adjusted Cost. By formalising one-shot uncertainty, repeated search, stock-out risk, online versus in-store acquisition, bundle acquisition, and EAEC-based utility mapping through Decision-EAW, the paper extends the RRT acquisition-side framework from certain acquisition to emotional-economic acquisition paths under uncertainty.

**Keywords:** Relative Rationality Theory; Emotional Adjusted Cost; Emotional Adjusted Expected Cost; Expected Emotional Adjusted Cost; Emotional Adjusted Wealth; Decision-EAW; acquisition uncertainty; demand-side uncertainty; search costs; stock-out risk; repeated search; consumer behaviour; behavioural economics; emotional valuation; cash-equivalent valuation; acquisition cost; online acquisition; store choice; uncertainty; decision theory.

## 1. Introduction

Many demand-side decisions are not simple acts of purchase in which a good is immediately available at a known price. In real acquisition environments, consumers frequently face uncertainty about whether the desired option can actually be obtained, how many attempts will be required, whether delivery will succeed, whether the item will be in stock, whether the search process will be tiring, and whether failed acquisition will generate frustration, delay, wasted time,

or disappointment. These factors show that acquisition is not only a price problem. It is also a problem of availability, search, waiting, failed attempts, delivery uncertainty, and emotional-economic cost.

Standard economic theory has long recognised that information and search are costly. Stigler's economics of information showed that buyers may incur search costs when identifying sellers and prices, so that market choice cannot always be reduced to the posted price alone (Stigler, 1961). Later consumer and retail research also showed that stock-outs affect consumer satisfaction, choice difficulty, substitution, and store-switching behaviour (Fitzsimons, 2000; Campo, Gijsbrechts and Nisol, 2000). Service and marketing research further demonstrates that waiting, delay, and the management of the waiting experience can influence consumers' affective and evaluative responses (Taylor, 1994; Hui and Tse, 1996; Dellaert and Kahn, 1999). More recent customer-experience research has emphasised that consumer evaluation is shaped across the whole customer journey, not only at the moment of payment (Lemon and Verhoef, 2016).

These literatures provide an important foundation for the analysis developed here. The contribution of RRT is more specific: it represents economic costs, economic revenues, emotional revenues, and emotional costs on a common cash-equivalent scale and incorporates them into an acquisition-side uncertainty architecture. Standard models can incorporate search costs, waiting costs, transaction costs, and stock-out probabilities. Behavioural and marketing models can also analyse frustration, satisfaction, loyalty, trust, and the experience of waiting. The contribution of Relative Rationality Theory is different: it seeks to express these economic and emotional components within a single cash-equivalent acquisition-side construct. In this framework, Emotional Adjusted Cost extends the earlier Emotional Adjusted Value model by applying emotional-economic valuation to the acquisition side of decision-making (Di Toro, 2022, 2026).

This paper introduces Emotional Adjusted Expected Cost (EAEC) as the demand-side uncertainty extension of Emotional Adjusted Cost (EAC). It distinguishes between one-shot Expected Emotional Adjusted Cost and repeated-search Emotional Adjusted Expected Cost as two acquisition-side extensions of Emotional Adjusted Cost under uncertainty. EAC measures the emotional-economic cost of obtaining an option by combining economic costs, emotional costs, emotional revenues, and economic revenues. Formally, Emotional Adjusted Cost is defined as:

$$EAC = \text{Economic Costs} - \text{Economic Revenues} + \text{Emotional Costs} - \text{Emotional Revenues}.$$

Under uncertain acquisition, however, the decision-maker does not simply face the EAC of a successfully obtained good.

Each determinant should enter the EAC structure only once; economically monetised costs, including opportunity costs where applicable, should therefore be distinguished from emotional costs to avoid double counting.

The acquisition process may include successful and unsuccessful branches, failed search attempts, stock-out events, delays, substitute purchases, repeated visits, online delivery risk, or the emotional cost of returning without the desired option. EAEC is introduced to represent the expected Emotional Adjusted Cost of this uncertain acquisition process.

The central claim of this paper is that uncertain acquisition should not be analysed only through expected monetary expenditure or nominal price. A nominally cheaper option may generate a higher expected emotional-economic cost if it is unreliable, difficult to find, associated with repeated failed attempts, or emotionally frustrating. Conversely, a nominally more expensive option may be relatively rational if it reduces uncertainty, waiting, travel strain, search fatigue, disappointment, or the risk of failed acquisition. The relevant demand-side criterion is therefore not the lowest posted price, but the lowest Expected Emotional Adjusted Cost.

The paper distinguishes two main forms of acquisition uncertainty. The first is one-shot acquisition uncertainty, where the decision-maker makes a single attempt and the outcome is either successful or unsuccessful. In this case, EEAC is represented as the probability-weighted Expected Emotional Adjusted Cost across mutually exclusive acquisition states. The second is repeated-search acquisition uncertainty, where the decision-maker continues searching until acquisition succeeds. In this case, EAEC becomes the expected cumulative Emotional Adjusted Cost of the search process leading to eventual acquisition. This distinction is important because failed attempts are not zero-cost events. They may generate economic costs, such as travel, fuel, delivery fees, or wasted time, and emotional costs, such as frustration, disappointment, anxiety, inconvenience, loss of trust, or search fatigue.

For clarity, the acquisition-side uncertainty framework distinguishes three decision environments. Under certain acquisition, the decision-maker compares options by Emotional Adjusted Cost (EAC). Under one-shot uncertainty, the relevant object is Expected Emotional Adjusted Cost (EEAC), which probability-weights mutually exclusive acquisition states within a single attempt. Under repeated-search uncertainty, the relevant object is Emotional Adjusted Expected Cost (EAEC), which measures the expected cumulative Emotional Adjusted Cost of the acquisition path until success. The relatively rational choice is therefore the option with the lowest EAC under certainty, the lowest EEAC under one-shot uncertainty, and the lowest EAEC under repeated-search uncertainty.

By formalising these structures, the paper extends Relative Rationality Theory from certain acquisition to uncertain acquisition, and from price-centred demand analysis to emotional-economic acquisition paths under uncertainty. It shows how availability, stock-out risk, failed search, delivery uncertainty, waiting, travel inconvenience, and emotional experience can be incorporated into a single demand-side framework. In doing so, EAEC provides the acquisition-side counterpart to the offer-side uncertainty tools of RRT: where Emotional Adjusted Expected Utility evaluates uncertainty over what may be received, Emotional Adjusted Expected Cost evaluates uncertainty over what must be incurred in order to obtain an option.

## 2. Standard Demand Theory, Search Costs, and Behavioural Acquisition

Standard demand theory usually represents consumer choice as the selection of one option from a feasible set, subject to preferences, prices, income, and constraints. In its simplest form, the consumer is assumed to choose the alternative that maximises utility within the relevant budget set. Price is therefore a central determinant of demand, but it is not the only determinant.

Product characteristics, transaction costs, search costs, time constraints, risk, waiting, availability, and other non-price factors may also affect the effective attractiveness of an option.

For this reason, the contribution of Relative Rationality Theory is not that standard economics ignores all non-price determinants of choice. Standard economic theory can incorporate search costs, waiting costs, transaction costs, uncertainty, and product attributes either through the constraint structure, the utility function, or the preference relation. Stigler's economics of information, for example, showed that consumers may incur costs when searching for prices, sellers, and product information. Once search is costly, acquisition cannot be reduced to the posted price of the good alone, because the process of finding and obtaining the good also affects the consumer's decision.

A similar point arises in consumer and retail research. Product availability, stock-out risk, and unsuccessful acquisition attempts may influence consumer behaviour even when the consumer's underlying preference for the good remains unchanged. If a desired product is unavailable, the consumer may postpone the purchase, substitute another product, switch store, experience dissatisfaction, or revise future purchasing behaviour. Stock-outs therefore show that demand-side choice depends not only on the desirability and price of a product, but also on whether the preferred option can actually be obtained in the relevant acquisition environment.

Service and marketing research further shows that waiting, delay, and uncertainty affect evaluation. A consumer does not experience acquisition only at the moment of payment. The wider customer journey may include travelling, searching, waiting, communicating with sellers, dealing with uncertainty, receiving delivery, returning goods, or reacting to service failure. These elements may influence satisfaction, trust, perceived reliability, and future choice. Online acquisition makes this especially clear: it may reduce travel and search effort, but it may also introduce delivery uncertainty, return inconvenience, delayed possession, and anxiety about product quality.

Behavioural consumer research adds an additional psychological layer. Consumers may evaluate acquisition through convenience, familiarity, trust, frustration, disappointment, symbolic meaning, service quality, confidence, and emotional reassurance. A trusted local shop may be preferred despite a higher price because it reduces uncertainty and generates familiarity. A cheaper seller may be avoided because repeated stock-outs, poor service, or unreliable delivery increase the emotional cost of acquisition. In such cases, the observed choice may appear inconsistent if judged only by nominal price, but it becomes more intelligible once the emotional and experiential structure of acquisition is taken into account.

These existing approaches provide an important foundation for the analysis developed in this paper. The contribution developed within RRT is more specific: economic and emotional acquisition consequences are decomposed and represented on a common cash-equivalent scale before acquisition uncertainty is incorporated. Search-cost theory identifies the cost of obtaining information or locating goods. Expected-cost reasoning can probability-weight uncertain monetary costs. Behavioural consumer research identifies frustration, trust, waiting, satisfaction, and stock-out reactions as relevant determinants of choice. Relative Rationality Theory builds on these insights by translating both economic and emotional acquisition consequences into a common cash-equivalent structure.

This is the role of Emotional Adjusted Cost and its uncertainty extension, Emotional Adjusted Expected Cost. Under certainty, Emotional Adjusted Cost measures the emotional-economic cost of acquiring an option by combining economic costs, emotional costs, emotional revenues, and economic revenues.. Under uncertainty, EEAC extends this structure to one-shot acquisition states, while EAEC extends it to repeated-search acquisition paths. The relevant object is therefore not only the price of the good, nor only the expected monetary expenditure, but the expected Emotional Adjusted Cost of the acquisition path.

This distinction is important because failed acquisition is not a neutral event. If a consumer travels to a store and the desired product is unavailable, no purchase occurs, but the consumer may still incur petrol costs, time loss, frustration, fatigue, disappointment, inconvenience, or loss of trust. Conversely, successful acquisition may generate emotional revenues such as relief, certainty, convenience, confidence, satisfaction, or symbolic reassurance. EAEC allows these components to enter the same expected-cost structure instead of leaving them as informal psychological explanations outside the formal model.

The distinctive contribution of RRT is therefore to move from price-centred demand analysis to emotional-economic acquisition analysis. A nominally cheaper option may generate a higher EAEC if it is unreliable, difficult to obtain, associated with repeated failed attempts, or emotionally frustrating. Conversely, a nominally more expensive option may generate a lower EAEC if it reduces uncertainty, travel strain, waiting, search fatigue, disappointment, or the risk of unsuccessful acquisition. The relatively rational acquisition option is therefore not necessarily the option with the lowest nominal price, but the option or acquisition path with the lowest Expected Emotional Adjusted Cost.

### 3. One-Shot State-Based Expected Cost

In the most general one-shot case, let option  $j$  have possible mutually exclusive states  $s = 1, \dots, S$ , each occurring with probability  $p_{js}$ , where  $\sum_{s=1}^S p_{js} = 1$

Let  $EAC_{js}$  denote the Emotional Adjusted Cost associated with option  $j$  if state  $s$  occurs. The general one-shot Expected Emotional Adjusted Cost (EEAC) is then:

$$EEAC_j = \sum_{s=1}^S p_{js} EAC_{js}$$

The decision rule is to select the option with the lower  $EEAC_j$ , because it generates the lower expected Emotional Adjusted Cost of acquisition.

The EEAC and EAEC formulations apply where probabilities are objectively known or can be specified subjectively by the decision-maker.

A practically important two-state version arises when the good may either be found or not found in a single visit. Let  $P_j$  denote the probability that the desired good is found in option  $j$ , and let  $1 - P_j$  denote the probability that it is not found. Let  $EAC_{\text{found},j}$  denote the Emotional

Adjusted Cost of successful acquisition, and let  $EAC_{\text{not found},j}^{(\text{one-shot})}$  denote the Emotional Adjusted Cost of the one-shot unsuccessful outcome. Then:

$$EEAC_{\text{one-shot},j} = P_j EAC_{\text{found},j} + (1 - P_j) EAC_{\text{not found},j}^{(\text{one-shot})}$$

This is the one-shot expected-cost representation. If the consumer makes one trip and the decision problem ends after either success or failure, the expected emotional-adjusted cost is the probability-weighted average of those two mutually exclusive acquisition states.

The one-shot formula evaluates the expected cost of a single uncertain attempt, whereas the repeated-search formula evaluates the expected total Emotional Adjusted Cost of the entire acquisition process leading to eventual success.

### **Illustrative Example: Garden Tool Purchase under One-Shot Demand-Side Uncertainty**

Consider a consumer who needs to buy a garden tool and must choose between two stores. Store A is close to home, but has a low probability of having the tool in stock. Store B is farther away, has a much higher probability of availability, but also involves a higher price and a greater travel emotional cost.

Let the relevant probabilities and Emotional Adjusted Costs be as follows. For Store A, let the probability of finding the tool be  $P_A = 0.10$ . Let the Emotional Adjusted Cost if the tool is found be

$$EAC_{(\text{found},A)} = 15$$

This amount aggregates the market price, for example 10, together with local travel cost and time, and the net emotional component of success, including the effort of the trip and the satisfaction of obtaining the tool. Let the Emotional Adjusted Cost if the tool is not found in the one-shot sense be

$$EAC_{(\text{not found},A)}^{(\text{one-shot})} = 40$$

This higher value reflects wasted time and petrol, the emotional cost of not finding the good, and the Emotional Adjusted Cost of the unsuccessful visit when the decision ends after that attempt.

For Store B, let the probability of finding the tool be  $P_B = 0.95$ . Let the Emotional Adjusted Cost if the tool is found be

$$EAC_{(\text{found},B)} = 35,$$

for example because the price is higher, say 30, and the one-hour drive in traffic is tiring, though partly offset by the satisfaction of having obtained the tool. Let the one-shot Emotional Adjusted Cost if the tool is not found be

$$EAC_{(\text{not found},B)}^{(\text{one-shot})} = 45$$

reflecting the wasted long trip, frustration, and the emotional cost of returning without the good.

In a one-shot decision, the consumer visits exactly one store once and then stops, regardless of whether the tool is found. Under this interpretation, Relative Rationality Theory evaluates each store  $j$  by:

$$EEAC_j = P_j EAC_{(found,j)} + (1 - P_j) EAC_{(not\ found,j)}^{(one-shot)}$$

For Store A, this gives

$$EEAC_A = 0.10 \times 15 + 0.90 \times 40 = 1.5 + 36 = 37.5$$

For Store B, it gives

$$EEAC_B = 0.95 \times 35 + 0.05 \times 45 = 33.25 + 2.25 = 35.5$$

Even though Store B is farther away and charges a higher price, its high availability keeps the expected Emotional Adjusted Cost lower than that of Store A:

$$EEAC_B = 35.5 < 37.5 = EEAC_A$$

From the perspective of Relative Rationality Theory, the relatively rational choice in this calibration is therefore to go to the more distant but more reliable Store B. The higher monetary price and travel cost of Store B are offset by the much lower probability of an unsuccessful visit and by the lower expected Emotional Adjusted Cost associated with possible failure.

This example also illustrates a more general feature of the one-shot expected-cost formulation. The expression

$$EEAC_j = P_j EAC_{(found,j)} + (1 - P_j) EAC_{(not\ found,j)}^{(one-shot)}$$

does not mechanically guarantee that expected cost decreases whenever  $P_j$  increases. If, in a particular subjective context, the decision-maker codes the found state as more emotionally costly than the not-found state, for example because success would require purchasing an extremely expensive tool that generates guilt or stress, then raising  $P_j$  may genuinely increase expected cost. In Relative Rationality Theory, this is not a defect of the model. A change in  $P_j$  does not have a fixed positive or negative effect by itself. Its effect depends on whether the more likely outcome contains emotional revenues, emotional costs, or economic costs. Monotonicity is therefore determined by the option's EAC structure.

In this illustrative example,  $EAC_{not\ found,j}^{one-shot} > EAC_{found,j}$  for each acquisition option."  $EAC_{(not\ found,j)}^{(one-shot)} > EAC_{(found,j)}$

In this setting, an increase in availability lowers  $EEAC_j$ , and Relative Rationality Theory predicts the intuitive preference for the more reliable store once the emotional and economic cost of unsuccessful search is fully incorporated.

The example also shows that the ranking is not fixed independently of context. If the distant store carries substantially higher emotional or travel-related costs, the expected Emotional

Adjusted Cost of the high-probability store may exceed that of the nearby, low-probability store. This variation shows that availability probabilities and sticker prices are not sufficient by themselves to determine demand-side rationality; the relevant criterion is the total Expected Emotional Adjusted Cost of the acquisition path.

In demand-side applications of Relative Rationality Theory, it is essential to distinguish between one-shot uncertainty and repeated-search uncertainty, because the object being evaluated differs in each case. The distinction is not merely notational. It concerns the acquisition environment to which probability is being applied. If the consumer tries once and then stops,  $EEAC_{\text{one-shot},j}$  is the correct representation. If the consumer continues searching until successful acquisition, the repeated-search representation developed below is required. The formal expressions should therefore be read as applying to two different acquisition environments, rather than as alternative notations for the same problem.

## 4. Repeated Search with Constant Success Probability and Attempt-Specific Failure Costs

A different structure arises when the consumer is expected to continue searching until the desired good is found. In that case, the relevant object is no longer the expected Emotional Adjusted Cost of one visit, but the expected total Emotional Adjusted Cost required to secure one eventual acquisition.

To obtain the good, the consumer expects to incur the Emotional Adjusted Cost of successful acquisition once together with the Emotional Adjusted Cost of some number of failed attempts before that acquisition occurs. For this reason, repeated-search expected cost is not interpreted as a simple one-shot average of success and failure states, but as the expected cumulative Emotional Adjusted Cost of the acquisition path leading to eventual acquisition.

Suppose that, for option  $j$ , the conditional probability of success on each reached attempt is constant at  $P_j$ , with  $0 < P_j \leq 1$ , while the Emotional Adjusted Cost of a failed attempt may vary across attempts. Let  $EAC_{\text{fail},j}^{(m)}$  denote the Emotional Adjusted Cost of the  $m$ -th failed attempt, and let  $EAC_{\text{found},j}$  denote the Emotional Adjusted Cost of the eventual successful acquisition. Then the repeated-search formula under constant success probability is the Emotional Adjusted Expected Cost (EAEC):

$$EAEC_{\text{search},j} = \sum_{n=0}^{\infty} P_j (1 - P_j)^n \left( EAC_{\text{found},j} + \sum_{m=1}^n EAC_{\text{fail},j}^{(m)} \right)$$

Here,  $n$  denotes the number of failed attempts that occur before successful acquisition. If  $n = 0$ , the good is found immediately and no failed-attempt EAC is incurred. If  $n = 1$ , the consumer fails once and succeeds on the second attempt. More generally, if success occurs only after  $n$  failures, the total Emotional Adjusted Cost consists of the EAC of successful acquisition once plus the cumulative EAC of the first  $n$  failed attempts. This total is then weighted by the probability of exactly  $n$  failures followed by success, namely  $P_j(1 - P_j)^n$ . The formula is

therefore more general than the compact reciprocal expression, because it allows the failed-attempt EAC to vary across attempts even when the per-attempt probability of success remains constant.

### Equivalent Decomposition under Constant Success Probability

The repeated-search expression above may be rewritten in a cleaner decomposition when the success probability remains constant across attempts and the Emotional Adjusted Cost of successful acquisition is the same whenever success occurs. In that case:

$$EAC_{\text{search},j} = EAC_{\text{found},j} + \sum_{n=1}^{\infty} (1 - P_j)^n EAC_{\text{fail},j}^{(n)}$$

In this decomposed expression,  $EAC_{\text{found},j}$  does not disappear from the probability structure. Rather, its probability weights have been summed out. Because the model assumes that each attempt has a positive probability of success, eventual acquisition occurs with probability one in the repeated-search-until-success case. The probability weights over all possible success paths therefore sum to 1, so the expected successful-acquisition EAC is simply  $EAC_{\text{found},j}$  because the successful acquisition occurs with certainty. The probability weights remain attached only to the failed-attempt costs, because the number of failed attempts before success is uncertain.

The successful-acquisition EAC appears once because, under eventual success, it is incurred once. The cost of the first failed attempt is weighted by the probability that the first attempt fails; the cost of the second failed attempt is weighted by the probability that the first two attempts fail; and so on.

Hence availability still matters, but its effect is carried by the geometric weights  $(1 - P_j)^n$  attached to each attempt-specific failed-search EAC.

Accordingly, if the failed-attempt terms are positive net EAC components, an increase in  $P_j$  lowers repeated-search expected cost because it reduces the weight attached to every future failed attempt. This decomposition is exact when eventual success occurs with probability one; in the constant- $P_j$  case, that condition is satisfied whenever  $P_j > 0$ .

## 5. Stationary Same-Store Special Case

In this subsection, “stationary” means that the relevant search conditions remain stable across repeated attempts. The consumer checks the same store repeatedly, and the probability of finding the good, the Emotional Adjusted Cost of a failed attempt, and the Emotional Adjusted Cost of successful acquisition do not change from one attempt to the next.

In that stationary case, the probability of success is constant across attempts at  $P_j$ , the Emotional Adjusted Cost of one failed attempt,  $EAC_{\text{fail},j}$ , is constant across attempts, and the Emotional Adjusted Cost of successful acquisition,  $EAC_{\text{found},j}$ , is also stable. Let  $m = 1, 2, \dots$  index the successive acquisition attempts.

Formally, if

$$P_j^{(m)} = P_j \text{ for all } m,$$

$$EAC_{\text{fail},j}^{(m)} = EAC_{\text{fail},j} \text{ for all } m$$

and

$$EAC_{\text{found},j}^{(m)} = EAC_{\text{found},j} \text{ for all } m$$

then the repeated-search expression with constant success probability and constant attempt-specific EACs collapses to the compact formula:

$$EAC_{\text{search},j} = EAC_{\text{found},j} + \frac{1 - P_j}{P_j} EAC_{\text{fail},j}$$

The term  $\frac{1-P_j}{P_j}$  is the expected number of failed attempts before one successful acquisition when the probability of success is constant at  $P_j$ . Thus, the compact formula adds the EAC of successful acquisition once, plus the expected number of failed attempts multiplied by the EAC of one failed attempt.

The Emotional Adjusted Cost of successful acquisition is counted once, while the Emotional Adjusted Cost of failed search is scaled by the expected number of failures before success. Higher  $EAC_{\text{found},j}$  increases repeated-search expected cost. Higher  $EAC_{\text{fail},j}$  also increases repeated-search expected cost. Provided failed attempts generate a positive net EAC, a higher  $P_j$  lowers repeated-search expected cost because it reduces the expected number of failures before success.

This special case should be understood as a simplification rather than as the general acquisition-search structure. It applies only when search conditions remain approximately stable across repeated attempts. In many realistic acquisition problems, consumers move across different shops, routes, or search conditions, so the more general repeated-search expressions remain primary.

### **Illustrative Example: Choosing Between Two Stationary Same-Store Strategies**

In the stationary single-store case, the consumer repeatedly checks the same store under roughly unchanged acquisition conditions. Travel costs, emotional costs, and the probability of finding the good are assumed to remain stable across attempts. Suppose a consumer wishes to buy a specific product and must choose between two store strategies, A and B. Store A is nearer, while Store B is farther away. The stores differ in travel cost, price, and availability.

For Store A, let travel cost be 5, product price 100, emotional revenues 10, probability of success  $P_A = 0.9$ , and failed-attempt emotional cost 5. Then the found-state Emotional Adjusted Cost is:

$$EAC_{(\text{found},A)} = 100 + 5 - 10 = 95$$

The failed-attempt Emotional Adjusted Cost is:

$$EAC_{(fail,A)} = 5 + 5 = 10$$

For Store B, let travel cost be 10, product price 95, emotional revenues again 10, probability of success  $P_B = 0.5$ , and failed-attempt emotional cost 5. Then:

$$EAC_{(found,B)} = 95 + 10 - 10 = 95$$

and

$$EAC_{(fail,B)} = 10 + 5 = 15$$

The two stores have the same found-state Emotional Adjusted Cost.

Store B's lower sticker price is exactly offset by its higher travel-related acquisition cost.

Since this is a stationary special case, the repeated-search expected-cost formula simplifies to:

$$EAEC_{(search,j)} = EAC_{(found,j)} + \frac{1 - P_j}{P_j} EAC_{(fail,j)}$$

Applying this gives:

$$EAEC_{(search,A)} = 95 + \frac{1 - 0.9}{0.9} \cdot 10 = 95 + \frac{0.1}{0.9} \cdot 10 \approx 96.11$$

and

$$EAEC_{(search,B)} = 95 + \frac{1 - 0.5}{0.5} \cdot 15 = 95 + \frac{0.5}{0.5} \cdot 15 = 110$$

Although Store B offers the lower nominal product price, its lower availability and higher failed-attempt Emotional Adjusted Cost make its repeated-search expected Emotional Adjusted Cost higher than that of Store A. Hence,

$$EAEC_{(search,A)} < EAEC_{(search,B)}$$

and Store A is the relatively rational choice.

The example shows that a store with a lower nominal price may nevertheless generate a higher repeated-search EAEC when lower availability and higher failed-attempt costs are incorporated. Relative Rationality Theory therefore evaluates store choice through the expected emotional-economic cost of the acquisition process, rather than through sticker price alone.

## 6. Repeated Search with Non-Constant Success Probabilities Across Attempts

The previous repeated-search expression assumes that the probability of finding the good is constant across attempts. In many realistic acquisition problems, however, this assumption is too restrictive. Success probabilities may differ from one attempt to the next. Once this happens, the geometric term  $P_j(1 - P_j)^n$  is no longer adequate, because the probability that

success occurs only after  $n$  prior failures must reflect the specific sequence of attempt-by-attempt failure and success probabilities.

In repeated search with non-constant success probabilities across attempts, each attempt may carry its own Emotional Adjusted Cost. If the consumer changes shop, route, seller, or search channel from one attempt to the next, both the probability of success and the Emotional Adjusted Cost of the attempt may change. The model therefore allows  $EAC_{\text{fail},j}^{(m)}$  and, where relevant,  $EAC_{\text{found},j}^{(m)}$  to vary across attempts.

Let  $P_j^{(m)}$  denote the conditional probability of success on attempt  $m$  for acquisition path  $j$ , given that all preceding attempts have failed, where  $j$  identifies the acquisition path and  $m$  identifies the attempt number. Let  $n$  denote the number of failed attempts before success occurs, so that success occurs on attempt  $n + 1$ . Let  $EAC_{\text{fail},j}^{(m)}$  denote the Emotional Adjusted Cost of failing on attempt  $m$ , and let  $EAC_{\text{found},j}^{(n+1)}$  denote the Emotional Adjusted Cost of succeeding on attempt  $n + 1$ . The repeated-search expression then becomes:

$$EAE C_{\text{search},j} = \sum_{n=0}^{\infty} \left[ \left( \prod_{m=1}^n (1 - P_j^{(m)}) \right) P_j^{(n+1)} \left( EAC_{\text{found},j}^{(n+1)} + \sum_{m=1}^n EAC_{\text{fail},j}^{(m)} \right) \right]$$

This is the general repeated-search formula for an acquisition path in which both the probability of success and the Emotional Adjusted Cost of each attempt may vary across attempts.

The infinite-horizon repeated-search-until-success formulation assumes eventual acquisition with probability one and a finite expected cumulative EAC.

The product term,

$$\prod_{m=1}^n (1 - P_j^{(m)})$$

means that the failure probabilities of the first  $n$  attempts are multiplied together. Therefore,

$$\left( \prod_{m=1}^n (1 - P_j^{(m)}) \right) P_j^{(n+1)}$$

is the probability that the first  $n$  attempts fail and the  $(n+1)$ -th attempt succeeds. If success occurs on attempt  $n + 1$ , the total Emotional Adjusted Cost for that search path is the EAC of successful acquisition on attempt  $n + 1$ , plus the cumulative EAC of the  $n$  failed attempts that occurred before it.

This is the appropriate representation when repeated search takes place across changing acquisition environments, for example, a nearby shop on the first attempt, a more distant shop on the second attempt, and an online order on the third attempt. The product of the preceding failure probabilities captures the fact that the  $(n+1)$ -th attempt is reached only if all earlier

attempts fail. The current success probability then determines the probability that the acquisition process ends at that point. Repeated-search Emotional Adjusted Expected Cost is therefore obtained by weighting each state-contingent cumulative Emotional Adjusted Cost by the probability of the exact search history through which it arises.

This repeated-search structure differs conceptually from the one-shot case. In the one-shot formulation, probabilities are attached to mutually exclusive outcomes of a single visit and therefore sum to one within that single attempt. In the repeated-search formulation, by contrast, probabilities are attached to the stage at which eventual success occurs along the search path. The object being evaluated is therefore not the Emotional Adjusted Cost of one uncertain visit, but the expected cumulative Emotional Adjusted Cost of a sequential acquisition process.

For this reason, repeated-search Emotional Adjusted Expected Cost should be interpreted as a search-process expectation rather than as a simple one-shot probability-weighted average. The general repeated-search formulation is therefore appropriate when acquisition attempts differ across stages, so that both success probabilities and attempt-specific EACs may change over the search path. It captures a realistic search environment in which each failed attempt, and each possible successful acquisition, may carry a different emotional-economic cost.

A further clarification concerns travel-related economic costs. In acquisition problems under uncertainty, costs such as petrol, parking, tolls, and vehicle wear are typically incurred on each realised visit, whether or not the good is ultimately found. For this reason, such costs should be treated as attempt-level EAC components within the relevant Emotional Adjusted Cost of each branch, rather than as costs that disappear merely because the probability of success is high.

When eventual success occurs with probability one, successful acquisition is certain to occur exactly once somewhere along the search path, though not necessarily immediately. This does not eliminate failed-attempt costs, because eventual success need not occur on the first attempt. The consumer may still experience one or more failed attempts before success is reached, and those failed-attempt EACs must be counted according to the probability that each failed attempt is actually reached.

If eventual success occurs with probability one and the Emotional Adjusted Cost of successful acquisition is the same whenever success occurs, this expression may also be written as:

$$EAE C_{\text{search},j} = EAC_{\text{found},j} + \sum_{n=1}^{\infty} \left( \prod_{m=1}^n (1 - P_j^{(m)}) \right) EAC_{\text{fail},j}^{(n)}$$

This decomposition makes the comparative-static logic clearer. Each failed-attempt cost is weighted by the probability that the failed attempt is actually reached. Hence, provided the failed-attempt EAC is positive in net terms, an increase in the probability of success at any stage reduces the expected failed-search EAC and therefore lowers repeated-search Emotional Adjusted Expected Cost.

## 7. Bundle Acquisition under Uncertainty

The preceding formulas treat acquisition as focused on a single target good. The same logic can be extended to a bundle of goods, but bundle acquisition requires special care because common search costs, such as travel, waiting, or search-related frustration, may otherwise be counted more than once.

Bundle acquisition requires two distinctions. The first distinction concerns the acquisition process: the basket may be evaluated in a single one-visit uncertainty problem, or it may be evaluated over repeated search. The second distinction concerns the structure of the basket: the goods may need to be evaluated jointly as one bundle, or they may be separable goods that can be evaluated item by item.

When the basket is evaluated as a whole in a single visit, the bundle-state formula is appropriate:

$$EEAC_{\text{bundle},j} = \sum_{s=1}^S p_{js} EAC_{\text{bundle},js}$$

Here,  $j$  identifies the bundle-acquisition option or acquisition plan,  $s$  identifies the joint state of the bundle, and  $EAC_{\text{bundle},js}$  denotes the Emotional Adjusted Cost of the whole bundle under state  $s$  for acquisition option  $j$ , not merely the EAC of the item that is found.

This bundle-state formulation is the more general representation because, in many real acquisition problems, the emotional and economic meaning of the basket depends on the joint outcome. Finding all goods, finding only some goods, or finding none may generate different levels of frustration, relief, wasted time, inconvenience, disappointment, or satisfaction. For this reason, when the basket is experienced as a whole, the model should assign one probability and one bundle-level EAC to each possible joint state rather than mechanically adding item-level EACs.

When the basket is evaluated as a whole over repeated search, the same logic applies, but the relevant states are no longer one-visit states. They are basket-level search histories. In this case, the appropriate representation is the general repeated-search basket-history formula:

$$EAC_{\text{search},j}^{\text{basket}} = \sum_{h=1}^H p_{jh} EAC_{\text{basket},jh}$$

This formula is different from the separable item-by-item formula. It does not add the repeated-search EAEC of bread, milk, or other goods separately. Instead, it assigns one probability and one bundle-level EAC to each possible search history of the whole basket.

Here,  $h$  identifies a possible basket-level search history under acquisition plan  $j$ . A search history is the full sequence of outcomes that occurs over repeated attempts, such as finding the whole basket on the first attempt, finding only part of the basket and continuing the search, failing several times before success, or abandoning the search after repeated failure.  $EAC_{\text{basket},jh}$  denotes the bundle-level Emotional Adjusted Cost of that entire history. This

formulation is appropriate when the basket remains a joint object across repeated attempts, for example when partial success, repeated failure, or staged acquisition changes the emotional or economic cost of the basket as a whole.

Only when the goods are separable and shared acquisition costs are not counted more than once may the basket-level repeated-search cost be written as:

$$EAE C_{\text{search},j}^{\text{basket}} = \sum_{g=1}^G EAE C_{\text{search},j}^g$$

This is not the joint basket-state or basket-history representation. It applies only when each good can be treated as a separable component of the basket and shared acquisition costs are not duplicated. The term  $EAE C_{\text{search},j}^g$  denotes the repeated-search Emotional Adjusted Expected Cost of acquiring good  $g$  under acquisition plan  $j$ .

The probabilities do not appear separately in the basket summation because they are already embedded inside each item-specific term  $EAE C_{\text{search},j}^g$ . For each good  $g$ , this term is computed using the repeated-search formula developed above, including the probability of finding that good, the EAC of successful acquisition, and the expected EAC of failed attempts. Thus, each  $EAE C_{\text{search},j}^g$  is already a probability-adjusted acquisition-cost term.

The additive expression is therefore valid only as a separable repeated-search case. If travel, waiting, or general visit-related frustration are included separately in the EAEC of bread and again in the EAEC of milk, the formula would double-count those shared EAC components. Moreover, if frustration or disappointment depends on the joint outcome of the basket, for example finding only one good rather than both, the separable formula may be too simple. In that case, the more precise approach is to define joint basket states or search histories directly and assign the relevant bundle-level EAC to each one.

In summary, the first two formulas evaluate the basket as a whole: once for one-visit uncertainty and once for repeated-search histories. The last formula is only the separable case, where each good is evaluated separately and then combined. The main issue is therefore not only whether acquisition is one-visit or repeated-search, but also whether the basket is joint or separable.

This framework allows a store with slightly higher prices but greater availability to have a lower basket-level EAEC than a nominally cheaper store with frequent stock-outs. If basket components are not separable, or if the emotional-economic meaning of finding one item depends on whether another item is also found, the more precise approach is to define uncertainty directly over joint basket states or repeated-search histories rather than adding product-specific terms.

## 8. Store Choice, Stock-Out Risk, and Sequential Search under RRT

Building on the EAEC framework developed above, this section applies the logic to store choice, stock-out risk, sequential search, and online versus in-store acquisition.

Consumers frequently face uncertainty about product availability when deciding where and how to buy. A preferred local store may not always have the item in stock, forcing repeated visits. A discount retailer may offer lower prices but be unreliable in terms of availability. Online channels may appear more certain in stock terms, yet introduce delivery risk, return complications, waiting time, and a different emotional profile altogether.

The distinction developed in the previous sections remains central. If the consumer makes only one purchase attempt, the relevant metric is one-shot Expected Emotional Adjusted Cost,  $EEAC_{\text{one-shot},j}$ . If the consumer continues searching until successful acquisition, the relevant metric is repeated-search Emotional Adjusted Expected Cost,  $EAE C_{\text{search},j}$ , where  $j$  denotes an acquisition path or search plan. The difference is not merely notational. In the one-shot case, probability weights the possible outcomes of a single acquisition attempt. In the repeated-search case, probability determines how many failed attempts may occur before successful acquisition.

This logic also applies to sequential search. A consumer may begin with a preferred local store, then switch to a discount retailer, then order online if earlier attempts fail. Each step in the sequence has its own availability probability and its own EAC profile. A failed visit is not neutral: it may involve travel costs, wasted time, frustration, fatigue, or the emotional cost of returning without the good. RRT captures these elements by treating each acquisition path as a sequence of possible EAC outcomes rather than as a simple comparison of prices.

The online versus in-store distinction is a natural application. Online channels may have high availability and remove travel costs, but they may introduce waiting time, delivery uncertainty, return inconvenience, anxiety about product quality, or the loss of the ability to inspect the product directly before purchase. Physical stores may involve travel and stock-out risk, but they may also provide immediate possession, direct inspection, familiarity with staff, and emotional satisfaction from the purchasing experience. RRT does not assume in advance that one channel is superior. It asks which channel generates the lower expected Emotional Adjusted Cost for the specific consumer in the specific acquisition context.

Consider a simple example. Anna wants to buy a specific printer. She faces two options. For Store  $A$ , the local store, the printer costs 120, the probability of availability is  $P_A = 0.6$ , travel cost is 10 per visit, and she receives a small emotional revenue of 5 from interacting with familiar staff. If the printer is available, the Emotional Adjusted Cost of successful acquisition is:

$$EAC_{\text{found},A} = 120 + 10 - 5 = 125$$

If the printer is not available, Anna still incurs travel costs, time costs, and frustration from the stock-out. Suppose the Emotional Adjusted Cost of one failed attempt is:

$$EAC_{\text{fail},A} = 20$$

If repeated checking of Store A is treated as a stationary same-store search, then:

$$EAE C_{\text{search},A} = 125 + \frac{1 - 0.6}{0.6} \cdot 20 = 125 + \frac{0.4}{0.6} \cdot 20 \approx 138.3$$

For the online store, suppose the printer costs 130, availability is effectively certain for present purposes, and there is no travel cost. However, Anna experiences an emotional cost of 3 from delivery anxiety, minor delivery risk, and possible return inconvenience. The Emotional Adjusted Cost of successful acquisition is therefore:

$$EAC_{\text{found, online}} = 130 + 3 = 133$$

If availability is treated as effectively certain, then there are no expected failed stock-out attempts, so:

$$EAE C_{\text{search, online}} \approx 133$$

Nominally, Store A is cheaper. However, once availability and emotional factors are incorporated, the online channel generates the lower repeated-search Emotional Adjusted Expected Cost. Anna's choice of the online option is therefore relatively rational in RRT terms, even though a model focusing on nominal price alone would omit the emotional-economic components represented in the RRT specification.

These comparative effects identify acquisition flip points: combinations of price, availability, travel cost, emotional revenue, and emotional cost at which the relatively rational acquisition path changes. For retailers, such thresholds help explain why small changes in reliability, convenience, or service quality may alter consumer behaviour. For online goods, this implies that availability, reliable delivery, transparent tracking, and simple return procedures can reduce the Emotional Adjusted Cost of acquisition. A platform may therefore become more attractive not only by lowering prices, but by reducing uncertainty, delay, frustration, and the perceived risk of a failed purchase.

In this way, store choice, stock-out risk, sequential search, and online versus in-store acquisition become natural applications of the broader RRT framework. They show how economic, emotional, and probabilistic factors can be analysed together without reducing consumer behaviour to nominal price alone.

## 9. Emotional Adjusted Expected Cost Utility (EAECU)

Once Emotional Adjusted Expected Cost has been constructed in money-metric terms, it may, if desired, be mapped into utility space through Emotional Adjusted Wealth. On the demand side under uncertainty, Relative Rationality Theory first constructs a cash-equivalent measure of the expected emotional-economic acquisition cost, denoted by  $EAE C_{\text{search},j}$ . Utility is then applied, not to the nominal price alone, but to the resulting Decision-EAW.

In the main RRT representation, uncertainty is incorporated once at the cash-equivalent cost stage through  $EAEC_{search,j}$ . Once this probability-adjusted Emotional Adjusted Cost has been constructed, utility is applied directly to the resulting Decision-EAW:

$$\text{Decision-EAW}_j = EAW_{\text{before}} - EAEC_{\text{search},j}$$

Therefore,

$$EAECU_j = u(\text{Decision-EAW}_j) = u(EAW_{\text{before}} - EAEC_{\text{search},j})$$

Probabilities should not be applied again to this expression, because they have already entered the construction of  $EAEC_{search,j}$ . EAEC is therefore the final probability-adjusted Emotional Adjusted Cost used in the main two-step RRT representation. The sequence is:

$$EAC \rightarrow EAEC \rightarrow \text{Decision-EAW} \rightarrow EAECU$$

When there is no uncertainty, this structure reduces to the ordinary demand-side utility evaluation of Emotional Adjusted Cost:

$$\text{Decision-EAW}_j = EAW_{\text{before}} - EAC_j$$

and therefore

$$U_j = u(EAW_{\text{before}} - EAC_j)$$

EAECU provides the demand-side utility mapping of a probability-adjusted acquisition-cost measure within RRT. Probabilities are not applied again at the utility stage because they have already entered the construction of EAEC. On the offer side, uncertain emotionally adjusted values are evaluated through Emotional Adjusted Expected Utility:

$$EAV \rightarrow EAEU$$

On the demand side, EAC under uncertainty is first represented as  $EAEC_{search,j}$ , and, where utility mapping is required, this probability-adjusted acquisition cost is then evaluated through  $EAECU_j$ :

$$EAC \text{ under uncertainty} \rightarrow EAEC_{\text{search},j} \rightarrow EAECU_j$$

This architectural parallel shows that RRT can analyse uncertainty on both sides of choice. On the offer side, uncertainty concerns the emotionally adjusted value of what may be received, and this is evaluated through EAEU. On the acquisition side, uncertainty concerns the emotionally adjusted cost of obtaining the good, and this is evaluated first through EAEC and, where utility analysis is required, through EAECU.

EAECU therefore has a different role from EAEU. EAEU concerns uncertain gains, offers, or lottery-like outcomes. EAECU concerns uncertain acquisition processes, such as whether the good will be found, whether the purchase will succeed, whether there will be delay, or whether further search will be required. For this reason, EAECU does not replace EAEC. EAEC first expresses the uncertain acquisition process as a probability-adjusted Emotional Adjusted Cost. EAECU then shows how that cost affects Decision-EAW and, where required, utility.

## 10. Theoretical Contribution and Comparison with Existing Approaches

The theoretical contribution of Expected Emotional Adjusted Cost is best understood in relation to three existing approaches: standard expected-cost reasoning, search-cost theory, and behavioural consumer choice. Each of these approaches captures an important part of acquisition behaviour under uncertainty. Standard expected-cost reasoning shows that uncertain costs can be probability-weighted. Search-cost theory shows that information, time, and effort matter in acquisition. Behavioural consumer research shows that stock-outs, waiting, delay, service experience, trust, and frustration influence consumer behaviour. Relative Rationality Theory builds on these insights but reformulates them within a unified emotional-economic acquisition-cost structure.

In standard demand theory, consumer choice is commonly represented through preferences, prices, income, and constraints. In a simple discrete-choice setting with mutually exclusive alternatives, if one alternative is preferred and both remain feasible, the preferred alternative will ordinarily be selected, holding other relevant conditions constant. Standard models can also incorporate product attributes, search costs, waiting costs, transaction costs, risk, and psychological considerations by placing them in the utility function, the preference relation, or the constraint structure. The characteristics approach likewise models goods through the attributes they embody (Lancaster, 1966), while discrete-choice models provide a formal framework for incorporating attributes into choice and for recovering monetary trade-offs between attributes where the relevant conditions are satisfied (McFadden, 1974; Train, 2009). Related valuation approaches also establish monetary trade-offs for non-market or non-monetary consequences, including willingness-to-pay and willingness-to-accept measures (Hanemann, 1991). The claim of Relative Rationality Theory is therefore not that standard economics is unable to represent non-monetary considerations at all. Its contribution is more specific: it provides an explicit money-metric acquisition-side operator through which emotional determinants alter the effective cost of obtaining the good.

Under this approach, emotional determinants are understood in the broad analytical sense. They include affective, symbolic, cultural, moral, cognitive, unconscious, sociological, contextual, identity-related, and psychologically relevant influences that enter choice as emotional revenues or emotional costs. This allows behaviours that may appear inconsistent under a purely price-centred interpretation to be reinterpreted as coherent once the emotional-economic acquisition cost represented within the model is taken into account. Standard preference or utility theory may rationalise such behaviours by assigning sufficiently high disutility to the relevant option, or by representing guilt, symbolic dissatisfaction, stress, or emotional discomfort within the preference relation. The distinctive contribution of RRT lies in representing the relevant determinants explicitly as cash-equivalent emotional revenues or emotional costs within the EAC, EEAC, and EAEC structures.

This distinction is important. Refusing a tempting dessert because of guilt, avoiding a cheaper product because of symbolic dissatisfaction, choosing a trusted local shop despite a higher price, or abandoning a previously preferred good because acquisition has become stressful are not treated as mere anomalies. They become intelligible responses to the total Emotional Adjusted Cost of acquisition as experienced by the decision-maker. RRT does not reject standard choice theory. Within the RRT architecture, nominal price or expenditure is incorporated into a

broader money-metric acquisition-cost measure that also includes the relevant emotional determinants.

Compared with standard expected-cost reasoning, EAEC changes the object being expected. A conventional expected-cost model can weight possible monetary costs by their probabilities. For example, it may calculate the expected travel cost, expected delivery cost, or expected search expenditure associated with an acquisition path. EAEC preserves this probability-weighted logic but expands the cost term itself. The expected object is not merely monetary expenditure. It is Emotional Adjusted Cost: economic costs plus emotional costs, minus emotional revenues and economic revenues. The result is an expected acquisition-cost measure that can include price, petrol, delivery fees, time costs, frustration, waiting, disappointment, trust, convenience, relief, and symbolic value within one cash-equivalent structure. The economic value and allocation of time also have established theoretical treatments, including models in which time enters choice as a scarce resource and can carry an implicit monetary value (Becker, 1965; DeSerpa, 1971).

This makes EAEC more general than expected monetary cost. A nominally cheaper option may have a higher EAEC if it has low availability, repeated stock-outs, stressful travel, unreliable delivery, or a high emotional cost of failed acquisition. Conversely, a nominally more expensive option may have a lower EAEC if it provides certainty, convenience, trust, immediate possession, reduced anxiety, or lower search fatigue. The relatively rational acquisition path is therefore not necessarily the option with the lowest price, nor even the lowest expected monetary expenditure. It is the option with the lowest Expected Emotional Adjusted Cost once the emotional-economic structure of acquisition is incorporated.

Compared with search-cost theory, EAEC also makes a specific contribution. Search-cost theory, beginning from the economics of information, correctly recognises that consumers may incur costs in finding sellers, prices, products, and information (Stigler, 1961). This insight is essential because it shows that markets are not always frictionless and that acquisition may require effort before purchase occurs. The subsequent consumer-search literature has developed this approach extensively, examining both the determinants of search and its implications for consumer and market behaviour (Ratchford, 2009). RRT recognises this established insight, while developing its treatment of search independently within the theory's own acquisition-side architecture. A failed search attempt may involve not only economic expenditure but also frustration, fatigue, disappointment, inconvenience, urgency, loss of trust, anxiety, or the emotional cost of returning without the desired good. These components are not treated as informal additions to the analysis. They enter directly into the Emotional Adjusted Cost of the failed attempt.

EAEC extends the RRT representation of search by incorporating cash-equivalent emotional consequences alongside the economic consequences of failed acquisition. In one-shot acquisition uncertainty, the relevant object is the probability-weighted Expected Emotional Adjusted Cost across mutually exclusive acquisition states, such as finding or not finding the good. In repeated-search acquisition uncertainty, the relevant object is the expected cumulative Emotional Adjusted Cost of the search process leading to eventual acquisition. This distinction matters because a failed attempt is not a zero-cost event. Even when no purchase occurs, the decision-maker may incur economic costs, emotional costs, and sometimes offsetting emotional or economic revenues.

Compared with behavioural consumer choice research, EAEC provides a formal money-metric operator for factors that are often discussed descriptively. Consumer research has shown that

stock-outs may affect satisfaction, substitution, store switching, and future purchase behaviour (Fitzsimons, 2000; Campo, Gijsbrechts and Nisol, 2000). Service and marketing research has also shown that waiting, delay, and the management of waiting experiences affect consumer evaluation and affective response (Taylor, 1994; Hui and Tse, 1996; Dellaert and Kahn, 1999). Customer-experience research further emphasises that evaluation unfolds across the whole customer journey, not only at the moment of payment (Lemon and Verhoef, 2016). RRT is consistent with these findings, but it adds a formal valuation layer: these experiential and emotional components are translated into emotional revenues and emotional costs and then incorporated into EAC, EEAC, or EAEC, as appropriate.

This provides an operational advantage. In many behavioural and marketing models, trust, frustration, convenience, symbolic attachment, loyalty, disappointment, or anxiety may be discussed as explanatory variables. RRT allows these factors to be represented as cash-equivalent emotional revenues or emotional costs. Emotional revenues reduce Emotional Adjusted Cost; emotional costs increase Emotional Adjusted Cost. This makes it possible to compare heterogeneous acquisition paths within a common money-metric framework. A local shop, a discount retailer, an online platform, and a sequential search strategy can therefore be compared not only by price, but by total expected Emotional Adjusted Cost.

A good may carry emotional revenues such as comfort, pride, safety, identity confirmation, trust, relief, familiarity, or symbolic meaning. It may also carry emotional costs such as stress, guilt, inconvenience, shame, fear, moral unease, symbolic discomfort, uncertainty aversion, or anticipated regret. EAC captures these elements when acquisition is certain; EEAC extends the logic to one-shot acquisition uncertainty, while EAEC extends it to repeated-search acquisition uncertainty.

The proposed contribution lies in the RRT-specific decomposition of acquisition consequences into economic costs, economic revenues, emotional costs, and emotional revenues on a common cash-equivalent scale, and in extending that structure to one-shot and repeated-search acquisition uncertainty through the probability-weighted EEAC and EAEC formulations and their integration with Decision-EAW. This architecture makes explicit how the identified emotional-economic components and their associated probabilities enter the acquisition-cost measure and how changes in those components or probabilities may alter the ranking of acquisition alternatives.

The architectural innovation is that EAC and EAEC are not isolated corrections to standard cost analysis. They are integrated into the broader structure of Relative Rationality Theory through Emotional Adjusted Wealth, Decision-EAW, and the utility function defined over emotionally adjusted wealth. Under certain acquisition, the relevant demand-side object is Emotional Adjusted Cost:

$$\text{Decision-EAW}_j = \text{EAW}_{\text{before}} - \text{EAC}_j$$

Under uncertain acquisition, the relevant object becomes Emotional Adjusted Expected Cost:

$$\text{Decision-EAW}_j = \text{EAW}_{\text{before}} - \text{EAEC}_j$$

Here,  $\text{EAEC}_j$  is used in the general sense of the probability-adjusted Emotional Adjusted Cost relevant to the acquisition environment; it corresponds to  $\text{EEAC}_j$  under one-shot uncertainty and to  $\text{EAEC}_{\text{search},j}$  under repeated-search uncertainty.

Where utility mapping is required, utility is then applied to the resulting Decision-EAW, that is, to the Emotional Adjusted Wealth position generated by the acquisition choice. EAECU does not replace EAEC. It expresses the utility implication of the probability-adjusted acquisition cost already constructed in money-metric terms. For repeated-search acquisition, the demand-side sequence can therefore be stated as

$$\text{EAC} \rightarrow \text{EAEC} \rightarrow \text{Decision-EAW} \rightarrow \text{EAECU}.$$

The practical contribution of the EAEC–EAECU sequence is also significant. It makes it possible to analyse acquisition decisions in environments where repeated failure, stock uncertainty, delay, inconvenience, travel strain, frustration, and emotionally meaningful search experiences materially affect behaviour. This opens applications in retail choice, online versus in-store comparison, delivery and waiting decisions, health-related acquisition under uncertainty, and other domains in which the process of obtaining the good is itself part of the Emotional Adjusted Cost. Within RRT, EAECU extends the acquisition-side framework from certain acquisition to utility evaluation of probability-adjusted acquisition costs.

This sequence clarifies the relation between money-metric evaluation and utility evaluation. RRT does not move directly from price to utility. It first constructs the emotionally adjusted acquisition cost, then incorporates uncertainty where relevant, then maps the resulting acquisition cost into Decision-EAW, and only then applies utility if utility analysis is required. The same architecture makes it possible to bring ordinary acquisition and consumption choices into a wealth-based utility framework once wealth is understood as Emotional Adjusted Wealth rather than merely as remaining money.

The comparison with existing approaches can therefore be summarised as follows. Standard expected-cost reasoning provides a probability-weighted cost structure and may be applied to monetary as well as other specified cost components, including time costs, generalised costs, and opportunity costs. Search-cost theory identifies acquisition frictions, but often treats them primarily as information, time, or effort costs. Behavioural consumer research identifies stock-outs, waiting, frustration, loyalty, trust, and customer experience as behaviourally relevant, but often leaves their valuation implicit or context-specific. EAEC combines these insights by representing uncertain acquisition as a probability-weighted emotional-economic cost structure.

The resulting decision rule is simple. Under certain acquisition, the relatively rational choice is the option with the lower Emotional Adjusted Cost, not necessarily the lower nominal price. Under one-shot uncertain acquisition, the relatively rational choice is the option with the lower Expected Emotional Adjusted Cost across mutually exclusive acquisition states. Under repeated-search acquisition, the relatively rational choice is the acquisition path with the lower Emotional Adjusted Expected Cost of the search process. In each case, RRT preserves the discipline of economic reasoning while expanding the meaning of acquisition cost to include the emotional, symbolic, contextual, psychological, and experiential determinants that may shape real demand.

In this way, EAEC extends the RRT acquisition-side framework from certain acquisition to emotional-economic acquisition under uncertainty. It does not deny the relevance of price, search costs, or expected monetary expenditure. Instead, it embeds them within a broader acquisition-side operator designed to represent experienced acquisition consequences arising from the process of obtaining goods and services.

## 11. Conclusion

This paper has developed the acquisition-side uncertainty framework of Relative Rationality Theory by distinguishing Expected Emotional Adjusted Cost (EEAC) for one-shot uncertainty from Emotional Adjusted Expected Cost (EAEC) for repeated-search acquisition. Its central purpose has been to extend Emotional Adjusted Cost from acquisition under certainty to acquisition under uncertainty, and to develop within RRT a formal representation of emotional-economic acquisition paths under uncertainty.

Relative Rationality Theory therefore treats uncertain acquisition as a structured demand-side process. In the one-shot case, the relevant object is the probability-weighted Expected Emotional Adjusted Cost across mutually exclusive acquisition states, such as finding or not finding the good. In repeated-search cases, the relevant object is the expected cumulative Emotional Adjusted Cost of the whole search process leading to eventual acquisition. This distinction is important because a failed attempt is not a zero-cost event. Even where no purchase occurs, the decision-maker may incur economic costs, emotional costs, and sometimes offsetting emotional or economic revenues.

Within RRT, EAEC represents demand-side uncertainty through both its economic and its emotional-economic consequences, including contextual, experiential, and symbolic determinants where relevant. A nominally cheaper option may generate a higher expected acquisition cost if it is unreliable, difficult to find, emotionally frustrating, time-consuming, or associated with repeated failed attempts. Conversely, a nominally more expensive option may be relatively rational if it reduces uncertainty, search fatigue, delay, anxiety, travel costs, or the emotional cost of unsuccessful acquisition.

This framework also clarifies the relation between acquisition uncertainty and utility. EAEC first constructs a money-metric measure of the expected emotional-economic cost of acquisition. Where utility analysis is required, this probability-adjusted cost is then mapped into Decision-EAW through Emotional Adjusted Wealth. For repeated-search acquisition, the sequence is therefore EAC to EAEC, EAEC to Decision-EAW, and Decision-EAW to EAECU. This preserves the cash-equivalent discipline of RRT while allowing uncertain acquisition to be evaluated in utility space when necessary.

The theoretical significance of EAEC is that it completes the demand-side uncertainty architecture of RRT. Offer-side uncertainty concerns the emotionally adjusted value of outcomes that may be received. Acquisition-side uncertainty concerns the emotionally adjusted cost of obtaining an option. EAEC therefore provides the acquisition-side uncertainty component of the RRT architecture, alongside offer-side uncertainty operators such as Emotional Adjusted Expected Utility, by showing how uncertain costs, failed attempts, availability, and search paths can be formally incorporated into the same emotional-economic decision architecture.

In this way, EAEC extends the RRT acquisition-side framework from certain acquisition to uncertain acquisition paths. It provides a formal structure for analysing not only the good to be acquired, but also the emotional-economic consequences of the process through which acquisition occurs. By integrating availability, search, failure, delay, frustration, trust, convenience, and symbolic meaning into a money-metric acquisition criterion, RRT provides a broader formal representation of demand-side decision-making under uncertainty.

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