

Picking and Choosing: The Simulation of Sequential Mate Selection Process

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Abstract

Among marriage research, the “process” of how people find their partners in marriage market is still vague due to the difficulty of collecting empirical data. Most of mate selection research, therefore, is actually the hindsight of individuals' mate searching behavior. In order to overcome this difficulty, I suggest an idea of "sequential mate selection process" and propose five types of mate-selection principles--“choosing for the best only” principle, “well-rounded” principle, “differential preference” principle, “compensatory” principle and “immediate matching” principle--to theorize agent-based spouse searching behavior. Using computer simulation technique to test these principles, I find “compensatory” principle is the most advantageous mate-selection strategy due to its property of very high chance of successful matching and low searching cost. Moreover, I also find that “choosing for the best only” principle is not a wise way of choosing spouse because it exposes mate-seekers to risks of losing all chances of getting married.

Background

The Transition of Mate Selection System

How do people choose their spouses? How can we know “who is more likely to marry whom”? From the institutional perspective on mate selection, the way by which people decide their spouses has changed dramatically in recent decades. In many societies, such as Eastern societies, parentally arranged marriage was the main stream in the past; however, people now have more freedom to choose their spouses thanks to the institutional change and attitudinal change of people. To sum up, parents’ domination in the decision-making of marriages has diminished and autonomous mate selection system, based on romantic love criteria, becomes the main stream (Bulcroft, 2000; Lancer, 2000; Thornton and Fricke, 1987; Whyte and Xiaohe, 1990).

Marriage Market≠ Free Market: A limited Candidate Pool

Choosing spouses freely doesn’t mean that people are free to pick whomever they like or they are matched randomly. The marriage market those potential grooms and brides face is a highly segregated market, rather than a free market (Frey and Eichenberger, 1996). Generally speaking, “who would marry whom” depends partly on individuals’ preferences and partly on the structure of marriage market (Mare, 1991). Sociological researchers has accumulated plenty of researches on status homogamy or assortative marriage, which means mating of individuals having more characteristics in common, especially focusing on the dimensions of race, age, parental status, educational attainment, occupations, and so on (Brein, 1997; Kalmijn, 1991; Mare, 1991; Qian and Preston, 1993; Qian, 1998). The

cross-cultural evidence of prevalent assortative mating, homogamy and endogamy around the world not only reflect the segregation exactly but also the stratification phenomenon in the marriage market (Bulcroft, 2000; Surra, 1990).

Besides, from the agent-based perspective on mate selection, much research has discussed about the individual preferences about mate selection, such as preferences similarity, age, education level, ethnics, external features, values, social economic status, networks and so on (Bulcroft, 2000; Surra, 1990).

Moreover, according to social exchange theory, mate-selection is a process involving the exchange of resources between both sides. People tend to deliberate and weight in order to choose an ideal spouse who can maximize their benefits. As a result, people pick their spouses within a limited eligibility pool, instead of a totally free marriage market.

Sequential Mate Selection Process

The commonly used agent-based approaches of studying mate selection in economics include match models and search models, the two types of rational-actor models (Pollak, 2000). Match models, which is based on “assigning at most one man to every woman and at most woman to every man” in the marriage market (Pollak, 2000), are questionable and unrealistic compared with actual mate-selection process. When we draw an analogy between mate selection and matchmaking game, it seems there is a ballroom where a given group of grooms and brides has been over there looking for dancing partners. Eventually, everyone is bound to find a partner. What these economists usually do is concentrate on calculating the optimal matching combinations among this group of people by way of maximizing the sum total of marital output. However, the real mate searching process

rarely has something to do with matchmaking. Therefore, it seems the searching models, which focus on search, is more practical to be used to analyze the mate-selection process. In researching models, when individuals meet potential partners, they have to decide whether to marry or to continue searching. In this research, I adopt the searching model and suggest a sequential “picking and choosing” process, which means filtering potential partners one by one until making a final decision, is fit in with actuality better.

All in all, I suggest that mate selection is a **sequential search process**, in which people evaluate each potential partner one by one, and then come to sift an ideal partner out of the marriage market according to their specific preferences. The purpose of this study is to explore the mate-selecting strategies and searching results by using techniques of computer simulation. As for the actual operation of my research, I refer to Todd’s “searching for the next best mate” model (1997), and create a more realistic framework based on five principles of mate selection preferences people have. I propose five types of mate-selection principles in this research: “choosing for the best only” principle, “well-rounded” principle, “differential preference” principle, “compensatory” principle and “immediate matching” principle. By observing the results of simulation of each mate-searching principle, I will be able to evaluate which principle is more “efficient and frugal” as well as which one may not be a wise strategy of matching desirable partners.

Sequential Mate Selection Process: Literature Review and the Preliminary Concept of Simulation Model

Mate Selection in Modern Society

The approach of regarding mate selection as a sequential process conforms to people's actual mate searching experience in modern times. From about 1900 to World War II, a relatively fixed sequence of courtship emerged in the U.S. People "play the field" (casual dating) first, dating exclusively ("going steady"), and finally, getting engaged and married (Lancer, 2000).

Besides, owing to the extension of schooling years, women's growing economic independence, prevalence of cohabitation and other reasons, one of the most significant features of mate choosing in these decades has been individuals' postponement of the decision to wed. Whether in Western or Oriental societies, both men's and women's age at marriage has risen quickly according to numerous research findings (Bumpass, 1990; Lancer, 2000; Lee and Stone, 1980; Oppenheimer, 1994; Surra, 1990). Since delayed marriage becomes an overwhelming trend, have individuals abandoned the value of pursuing marriage and forming family? Is cohabitation a substitute for marriage? Oppenheimer suggested we would rather say that the rise of cohabitating is an adaptation to the delayed marriage as a result of the growing uncertainties associated with young men's declining economic situation or with young women's extensive career aspirations than say cohabitating has become a substitute for marriage (Oppenheimer, 1998). Hence, even though cohabitation has been more and more prevalent in these decades, we still

cannot affirm that individuals have rejected marriage. Instead, people just prolong their sequential mate-searching period.

Marriage market is not a completely open market not only because individuals, as we have mentioned above, always pick their partners within a bounded candidate pool but also because also because information about those potential partners is not available for participators. Whom we will meet in the marriage market and who is the best partner are unknowable. Hence, the secured and reasonable way to choose a partner is to prolong the searching period in order to obtain more information about those potential mates and then choose an optimal partner among them (Oppenheimer, 1998).

The Simulation of Sequential Mate Selection Process: Todd's Model

In accordance with the idea of sequential mate searching process, Todd (1997) contributed an agent-based model to simulating individuals' mate-selection process and outcome. In Todd's model, each individual filters potential partners one by one in the marriage market until this person has searched out a partner who can fit his or her preference. At this moment, the mate searching process ceases. Since we have to assign individuals some preference, what is a suitable one? Following the classic probability question "choosing the largest dowry", proposed by Mosteller (1987), Todd continued using "the largest dowry" as a criterion. He firstly assigned each potential "bride" certain amount of dowry and let potential "groom" to search one by one until the bride with the largest dowry was found. Moreover, Todd also modified the framework slightly in order to make it more realistic. Instead of using "the largest dowry" as the only preference, he allowed grooms to lower their searching level, say, the top 10 or the first one quarter (Todd,

1997).

From Single-factored Model to Multiple-factored Model

Todd's model indeed improves our understanding about the "process" of mate selection. However, using single indicator, say, dowry, to simulate individuals' mate selection process still diverges from the actual mate selection behavior. Mate selection, which involves the pondering over each potential partner's quality (or status) from various aspects, such as, income, social-economic status, education level, occupation status, parental status, and so on, must be a complex decision making behavior and should not be condensed into a single dimension, such as dowry or bride price. For example, the so-called "three high desirable conditions"—included high educational background, high income, and high standing height (tallness)—have become unmarried women's well-known mate-searching criteria in Japanese modern society although it is not clear how important this media portrayal of women's preferences really is/was. "Three high desirable conditions", which lead to women's late marriage or staying single, has been regarded as a trendy explanation for the gap between Japanese women's desire for marriage and the actual decline of their marriage rate since 1980s (Ueno, 1998). Although there has not been any empirical support to prove the significance of "three high desirable conditions", these three conditions illustrate the multiple-faced characteristic of our decision making in the mate-selection process.

For this reason, I suggest that researcher use multiple criteria to conduct our simulation in order to capture the real picture of mate selection. Since I have modified Todd's model from a single-factored one to a multi-factored one, the relationship among

these different aspects must be taken into account. Individuals belong to several status groups at the same time, and these social differences are not necessarily correlated (Kalmijn, 1991). Following Weber's view, Lenski's theory about status crystallization claimed that the uni-dimensional view toward people's statuses is insufficient to describe the complexities of group structure (Lenski, 1954). Instead, the structure of human positions "normally involves the coexistence of numerous parallel vertical hierarchies which usually are imperfectly correlated with one another". Furthermore, several statuses may interrelate each other in different patterns, namely, different degree of consistency among them. Lenski called the situation in which every dimension of status consists with each other "status crystallization", a synonym of "status consistency" (Lenski, 1954).

Due to the possible "status inconsistency" of our potential candidates in the marriage market, once we introduce a perspective of "multiple criteria" to conduct our simulation, the strength of association between different criteria must be taken into account. People who use multiple criteria with different strength of association are bound to have distinct mate selection experiences and different searching outcomes.

To sum up, in this study, people's mate selection process, previously analyzed with single dimension in the simulation literature about mate-selection, is now examined with multiple criteria. I suggests that individual, who intents to find a mate in a candidate pool characterized by different degree of crystallization, would go through a sequential "picking and choosing" process with multiple spouse-choosing criteria, and find a spouse finally.

Research Design and Simulation Model

Main Idea of the Simulation Model

As stated above, in this study people's mate selection process is now examined with multiple criteria. I suggest that individual who intends to find a mate in a candidate pool would go through a sequential "picking and choosing" process with multiple spouse-choosing criteria, and find a spouse finally. Based on this main idea, an agent-based model is presented to simulate individuals' mate searching process

Assumption

Firstly, this model includes five assumptions:

1) **Mate selection behavior is regarded as a rational choice behavior.**

According to rational choice theory, humans are purposive and goal-oriented to achieve maximum self-interest. Humans have sets of hierarchically ordered preferences, or utilities. In terms of the situation of mate selection, individuals would search partners according to the logic of rational choice, which means they will rank their preferences and their ranking must fulfill at least two rational-choice principles: connectivity and transitivity. Connectivity means the ability to compare outcomes and evaluate them coherently. For example, if two comparable things are given: A and B, there are only three kinds of outcomes of their comparison: $A > B$, $A < B$ or $A = B$. As for transitivity, it means the consistency when we compare three things: if $A > B$ and $B > C$, then $A > C$. This assumption is likely to be violated in the real world when people

actually do not know how to prioritize their preference as well as when their evaluations toward potential partners are not accurate. More, specifically, mate-seekers may be uncertain of which criteria, such as candidates' income, age, personality, occupational prestige, educational level and so on, are more important than others. In addition, even though individuals can really rank their preferences and evaluate potential partners according to these preferences, people's evaluations are not necessarily accurate because these evaluations are usually very subjective. Summing up, the actor in my simulation is still very mechanical and there is no bias or error in their evaluation or calculation toward potential partners.

- 2) **There is no competition among two or more persons for the same potential partner.** In other words, each person's searching is an individual event and independent of other people's search. I assume the size of the candidate pool for every individual is static. This assumption does not conform to the actual mate-searching situation. The major impact of the violation of this assumption on my model might be the shrinking of candidate pool—individuals should have fewer and fewer options as time passes, because more and more potential partners are married off. However, restrained by immature simulating technique, I cannot help but do so.
- 3) As mentioned above, marriage market is not a completely open market because information about those potential partners is not available for partner-searchers. Whom we will meet in the marriage market and who is the best partner are unknown. In terms of statistical terminology, **these potential**

partners appear “randomly”. This assumption obviously violates the actual mate choosing process because the feature of segmented marriage market cannot be captured in this model.

- 4) Just like the assumption in Todd’s model, **mate selection is viewed as a one-way behavior in our simulation model**. Once a person finds a suitable potential mate, this mate agrees to marry him/her. Similarly, this assumption also departs from the actual mate selection behavior because “mutual selection” is, for the most part, essential to marriage union—it is relatively rare that a bride (or groom) has no choice but as a subject to be chosen. This assumption of asymmetric choosing is a major constraint of this research.
- 5) This model assume people who enter the marriage market have desire of getting married; however, it does not ensure that people will certainly find out desirable partners in the mate-searching process because it depends on the preference, criteria, or baseline set by individuals. Therefore, unmarried people are treated as those who are in the process of searching partners but have not met the desirable partners at present, or as those who have experienced a searching process but failed to find out any potential candidates fulfilling their requirements.

The Framework of Five Principles of Mate Selection Preference

The purpose of this study is to explore the mate-selecting strategies and searching results by using techniques of computer simulation, based on five principles of mate selection preferences people have. Each principle can be regarded as a distinct “script”

designed for certain type of mate-searching story. The five principles are:

1) The immediate matching principle

Based on the main idea of this research, individuals are bound to pick and choose sequentially in order to find a partner who can maximize the benefit. However, according to the finding of some empirical research, surprisingly there are still many people choosing the “first” potential partner they meet in the marriage market directly as their lifetime mate for the sake of saving time or searching cost (Frey and Eichenberger, 1996). Hence, besides the sequential searching mode, we need to set up an alternative type, that is, the immediate matching type. The immediate matching type is defined as a mate searching principle by which people tend to choose the first potential partner they meet as their partners.

2) The choosing for the best only principle

Although picking the best partner in the marriage market may be time-consuming and requiring strenuous effort, many people still do so at all costs. For this reason, my model includes this mate searching principle which indicates that people will keep searching until they find the top 1 in the marriage market.

3) The well-rounded principle

When mate searching standard is regarded as multi-faced criteria, the so-called “top 1” in the marriage market is exactly the one who performs best in all respects. However, the cost of finding the best potential partners may be too high. Therefore, it is necessary to create alternative other searching principles, which are more economical and efficient. Based on Todd’s model, our model allows individuals to lower their searching level, say, the top 10, the first one-quarter, or

first half. Since individual holds multiple criteria, the “combination” or ranking of each criterion should be taken into account: which criterion is more important than the others? Education level? Personality? Wealth? Does every criterion have equal importance? When an individual is in a dilemma of ranking these different preferences, the ideal solution is to pursue a “balance” among these criteria. The well-rounded type is defined as a mate searching principle which suggests that individuals tend to deliberate upon every criterion and seek a balance among them because each criterion has equal importance for them. Once a potential partner cannot satisfy the minimum requirement of one criterion, he or she is not qualified.

4) The differential preference principle

Although some people deliberate or hesitate about which criterion is more important, certainly, there are others who know whether some criterion, such as wealth, outweighs the others, such as appearances.

The evolutionary perspective of mate searching behavior gives us insight into differential preference between men and women. According to Buss, men and women have developed different mate searching strategies; women needed a mate with adequate resources, and the generosity to share them. Women grew to prefer men who were industrious and ambitious, intelligent, dependable, stable, physically powerful, healthy, and faithful. In short, women seek men who will make outstanding partners in the task of raising children.

However, men’s evolutionary mating strategies are radically different. Men's preference for young, attractive women has evolved from their ability to identify

healthy, reproductively viable mates who can provide them with robust and healthy offspring (Buss, 1994). The evolutionary view provides an explanation of differential preference in terms of the distinctive strategies between men and women.

To sum up, the differential preference type is defined as a mate searching principle which suggests that people can differentiate and rank every criterion and then find out a qualified partner in the marriage market.

5) The compensatory principle

People who hold this type of principle allow their potential partners to draw on the strength of one aspect to offset the weakness on the other dimension. For example, although somebody has a poor educational background, this person still has the chance to be picked as a partner because of his or her respectable moral quality. In other words, the high moral quality supplements this person's deficiency of educational level. This type of mate selection principle is called the compensatory type. Each potential partner's performance is regarded as a whole "package" and his/her qualification is evaluated in a summarized way, rather than being judged specifically according to certain baseline on particular dimension.

This principle is especially applicable when there is "uncertainty" in the searching process—seekers cannot decide which criterion is more important than another; in other words, they do not know how to rank or prioritize each criterion (and this is exactly differences between "compensatory" principle and "differential preference" principle since people hold "differential preference" principle know the priority of certain criterion). Therefore, the alternative is "packaging all

criteria up” as a strategy to evaluate candidates. For example, if women use income, educational level and standing height as three criteria of choosing desirable husbands and follow the “compensatory” principle, a candidate without outstanding educational background could be chosen as a spouse because his remarkable income and physical appearance offset his disadvantage on educational background.

The focuses of result analysis are twofold. Firstly, it looks into the probability of finding a mate successfully by people with different preference principles. Secondly, this study tries to find out the number of “candidates” sifted out before people can make final decisions. Combining and comparing both the results about odds (the probability of finding a mate successfully) and searching cost (the number of “candidates” sifted out) obtained from the simulation results of every searching principle, I will be able to evaluate which mate-searching principle is more “efficient and frugal” as well as which principle may not be a wise strategy for finding out desirable partners.

Method and Simulation Structure

I use SAS to conduct the computer simulation process. Firstly, an agent-based scenario of mate-selection is created; assuming a person who proposes to pick a spouse from marriage market is facing a potential candidate pool (in this paper, suppose the number of potential candidates in the pool is 100. In other words, each agent chooses a spouse among 100 candidates). Following the property of sequential searching process, one by one the candidates appear and the agent evaluates them sequentially until he searches out the suitable partner according to multiple criteria as well as one of principles

including “choosing for the best only” principle, “well-rounded” principle, “differential preference” principle and “compensatory” principle.

Each of the criteria is assumed evaluative and measurable; therefore, when an agent meets a candidate in the marriage market, he/she must evaluate this candidate with multiple criteria based on a principle he/she possesses and decide if this candidate is qualified. If this candidate conforms to the criteria; that is, the both sides match successfully, the searching process stops. Otherwise the agent must continue searching the following candidates one after another until the desirable one shows up. This model assumes every agent entering the mate searching process has the desire of getting married, but does not ensure that the person is sure to find a spouse. The opportunity of picking a spouse successfully depends on the “bottom-line” a person sets. The higher the bottom-line a person sets when choosing a spouse, the higher the risk of losing all candidates and remaining single he/she has to face. If a person sticks certain unattainable standard, he/she could go through the whole mate searching process but end up with nothing.

There is also the fifth type of principle in the searching model—the “immediate matching” principle. An agent possessing this principle is certainly to find a spouse. However, specifically speaking, this kind of person does not experience a sequential searching process because the first candidate he/she meets in the marriage market must be picked as his/her spouse.

Suppose that each agent possesses two criteria¹--criterion 1 and criterion 2--by which he/she chooses spouses in the searching model. Technically, each of these two criteria is

¹ To be limited to my operational ability, in this research, the agent is assumed to use dual criteria, rather than triple or more criteria, to choose the spouse.

regarded as interval variable and the range of variation is 1 to 100². These criteria can be age, income, education level, physical appearances, or other characteristics.

The first step of simulating model is to create a data set with 100 cases, which represents the 100 candidates an agent will meet in the searching process. I create a 100×2 matrix using random numbers and set up five levels of strength of association between values of these two columns: $r=0$, $r=.3$, $r=.5$, $r=.8$, $r=1$. Therefore, we can obtain a data set of 100 cases with values on v1 and v2 respectively, ranging from 1 to 100 and the Person correlation for these two set of values equals 0 (or .3, .5, .8, 1). This data set represents 100 candidates' performance on criterion 1(v1) and criterion 2(v2). The following is an example of the first 10 cases in a data set of 100 cases (with $r=0$, that is, there is no association between two the criteria) I created:

v1	v2
95	16
86	34
51	42
60	24
29	45
27	4
22	92
11	36
97	53
37	46

The values in the first row: [95,16] represent candidate 1's performance on V1 and V2 respectively. Similarly, the second row: [86,34] represents candidate 2's performance on

² Although the operationalization of confining the variation of variables to values of 1 to 100 may diverge from the actual mate-searching process, the specific value on criterion 1 or criterion 2 is not the focus in this paper. The scale of 1 to 100 is no more than a tool to help us understand how people conducting comparison when they evaluate the potential candidates in the marriage market.

V1 and V2 respectively and so on. A complete data set consists of 100 rows of values.

In order to pick a desirable partner, an agent who holds certain criteria starts to meet candidate 1 and compares his/her own “bottom-line” on v1 and v2 with this candidate’s performance on these two characteristics. If this candidate fulfills all requirements, these two persons match successfully. If candidate 1 is unqualified, then the searching process continues. The agent will meet candidate 2 and so on, until the appearance of a desirable partner.

Once a “cycle” of mate searching process can be created successfully, we can set up a loop (create data set 1→ conduct the searching process→ collect the results→ create a new data set 2→ conduct the searching process→ collect the results...) and execute the loop repeatedly, say, 10,000 times, to analyze how the results of each searching type differ.

The focuses of the result analysis are twofold. For each of the principles, firstly, I look into the probability of successfully finding a mate among 10000 cycles of searching. Moreover, for different kind of searching principle, the number of “candidates” which have to been sifted out before people can make a final decision must be different.

For every cycle of searching process, the values of v1 and v2 ([v1, v2]) of the chosen candidate are collected. By collecting outcome from 10000 cycles, we can create another 2×10000 matrix to represent the results. In addition, the order of this chosen candidate (the order of his/her appearance among this candidate pool, or, in other words, the number of candidates the agent has met before he/she chooses a spouse) in every cycle is also collected, which can form the other $1 \times 10,000$ matrix.

The modeling of five principles

1) “Choosing for the best only” principle

Take the type of “**choosing for the best only**” as an example. For people who desire to choose the best and optimal partner in the marriage market, the top 1 candidate ($v_1=100$ and $v_2=100$) must be the only choice. We use a data set (with $r=.8$ that is, there is high association between two criteria) and execute 10 times of searching for an example. The following are the matrices of results:

RESULTS		STEP
.	.	100
.	.	100
.	.	100
.	.	100
.	.	100
.	.	100
.	.	100
.	.	100
.	.	100
.	.	100

If an agent can choose a partner successfully among 100 candidates, which means picking the one with $v_1=100$ and $v_2=100$ in this model, the matrix of RESULTS (10×2 matrix) should list something. The missing data in RESULTS means the agent in each cycle fails to choose the best candidate. In addition, the matrix of STEP (10×1 matrix) shows the number of candidates an agent has met before he/she picks the suitable spouse. The value of 100 in each row means that the agent in every cycle of searching cannot find any suitable partner successfully.

It is understandable that the “choosing for the best only” principle is not a wise strategy for choosing suitable spouses because the risk of losing all chances is very high. I create loops and simulate the searching repeatedly for 10,000 times to see how high the probability of failure is. (Please refer to Appendix for the complete program)

2) “**Well-rounded**” principle

This type is defined as a mate searching principle which indicates that individuals deliberate over both criteria and seek a balance between them because each criterion weighs equally. For this person, once a potential partner cannot satisfy the minimum requirement of one criterion, he or she is not qualified. Suppose now we want to pick a “top 10” candidate as our spouse, the candidates whose performance on both criteria (v1 and v2) ranks top 10 can be the acceptable partners³.

We create a data set (with $r=.5$, that is, there is medium association between two criteria) and execute 10 times of searching as an example. Both the following matrices of RESULTS and STEP show the results of our searching:

RESULTS	STEP	
95	98	21
92	91	71
97	91	6
96	97	22
96	100	50
92	97	17
92	94	28
98	99	15
98	95	37
98	93	4

³ Technically, this means both v1 and v2 must be greater than 90.

The first row of the matrix for RESULTS: [95,98] shows the chosen candidate's performance on v1 and v2. The first row of the matrix of STEP: [21] means this candidate is the 21st candidate the agent meets in the candidate pool. Since there is no missing data in the matrix of RESULTS, obviously this principle of searching spouses significantly lowers the risk of losing all chances in the searching process. Similarly, using “loops” can create the results of 10000 times of simulation.

Obviously the steps of modeling of “well-rounded” principle are very similar to the previous “choosing the best only” principle. The only difference here is the setting of condition. The condition here will be “ $v1 > 90$ and $v2 > 90$ ”. If we want to loosen the baseline, say, making all candidates whose performance on both criteria rank “first one quarter” or “first half” in the pool to be qualified candidates, then the condition will be “ $v1 > 75$ and $v2 > 75$ ” or “ $v1 > 50$ and $v2 > 50$ ”.

3) “**Differential preference**” principle

Very similarly, the setting of this principle is just changing the condition of programming command. For example, if we want the seekers to find out candidates whose performance on one criterion is the best and rank top 10 on the other, the condition will be “ $v1 = 100$ and $v2 > 90$ (or vice versa)”. Therefore, the agent in the searching model will start to filter candidates one by one until he/she meets a candidate whose performance fulfill the requirement of “ $v1 = 100$ and $v2 > 90$ (or vice versa)”. Once it happens, this round of search stops.

4) “**Compensatory**” principle

Again, the setting of this principle is just changing the condition in command. In this case, we use the way of “summation” to create the searching baseline. If we want to find

out top 10 candidates, the command will be “ $v_1 + v_2 > 180$ ”.

5) **Immediate matching** principle

People who use this type of principle to choose spouses do not experience the sequential selection process. What they do is just choose the first candidate they meet in the marriage market as a partner. Therefore, I use “loops” to create the data set of 100 candidates 10,000 times repeatedly, which means 10,000 “cycles”, and then collect the data from the “first” candidate in every cycle, which stands for the behavior of picking the first one we meet in the marriage market as a partner.

Findings

The focuses of result analysis are twofold. Firstly, I look into the probability of finding a mate successfully by people with different preference principles. Secondly, this study tries to find out the number of “candidates” sifted out before people can make a final decision. Combining and comparing both the results about odds (the probability of finding a mate successfully) and searching cost (the numbers of “candidates” we have to sifted out) obtained from the simulation results of every searching principle, I will be able to evaluate which mate-searching principle is more “efficient and frugal” as well as which principle may not be a wise strategy of matching desirable partners.

“Choosing for the best only” principle

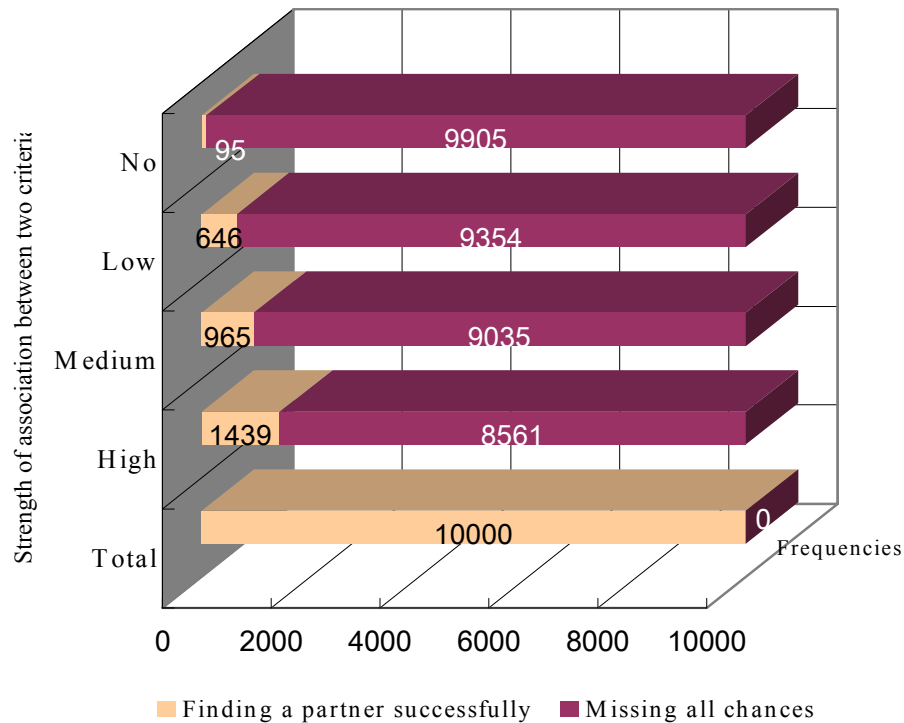
For people who desire to choose the best and optimal partner in the marriage market, the top 1 candidate must be the only choice. The distribution of the times of finding a partner successfully and losing all chances is shown respectively in figure 1. According to the outcome above, the probability of successfully finding the “best” partner in the searching process is extremely low⁴.

In order to reduce the risk of losing all chances, lowering the criteria of searching

⁴ If the two criteria people use are perfectly associated with each other, the “best” partner is certainly can be found in every searching process. However, this situation is unrealistic so it is regarded as an “ideal type” in this research.

spouses would be much more efficient and frugal in that “choosing for the best only” type is not a wise way of choosing spouses, although picking the best partner can maximize

Figure 1. Distribution of frequencies of Successful and Losing Searching for People with "Choosing the Best Only" Principle



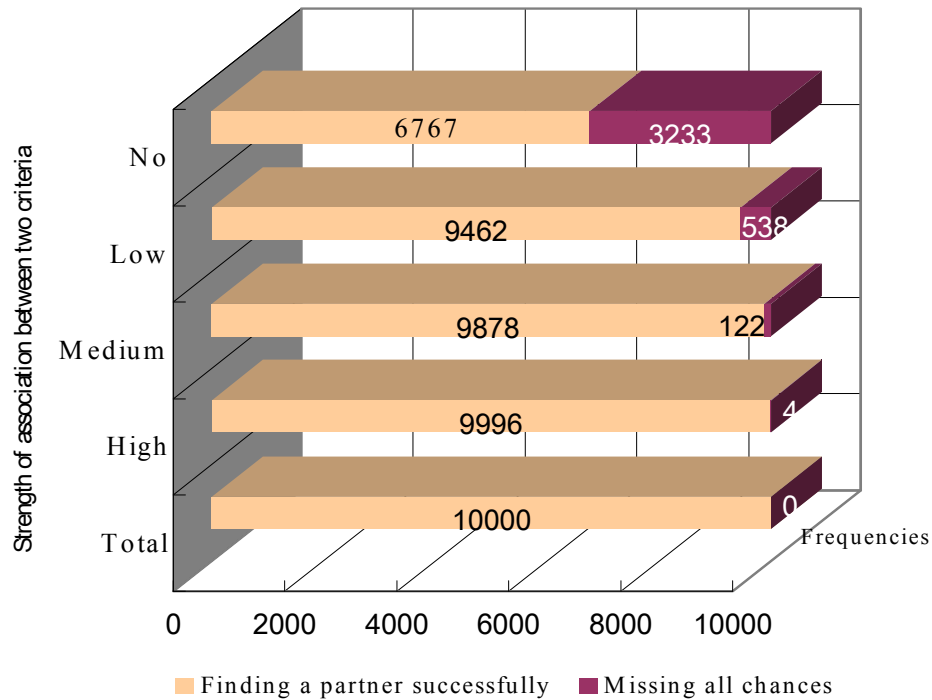
our benefits out of marriage, it is usually an unattainable goal. According to the principle of rational choice, this type of mate-selection cannot fulfill the “expected utility” because the probability of successfully choosing a spouse is too low, although that spouse will be the one who brings us maximum utility.

“Well-rounded” principle

Since people have slim hopes to pick out the best partner in the marriage market, how

about lower the bottom-line and pick an acceptable, but not the best or ideal, partner? For this reason, I propose the other principles of choosing spouses, for they are time-saving and

Figure 2. Distribution of Frequencies of Successful and Losing Searching for People with "Well-rounded" Principle

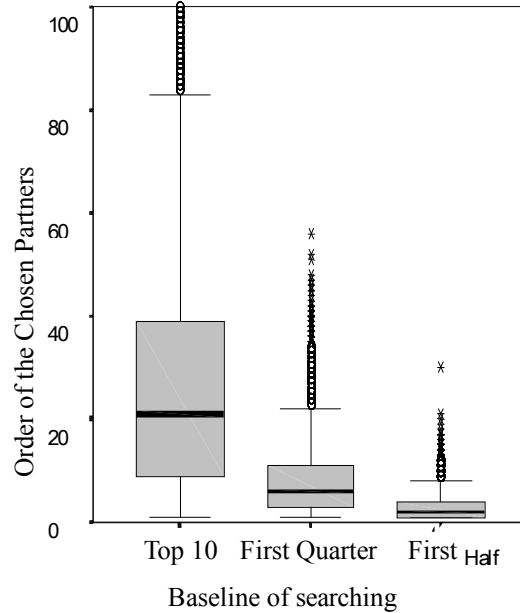


helpful in finding the admirable spouses, such as candidates who are in top 10, first quarter or first half. Figure 2 shows the result of 10000 times of simulation. For a person who holds the “well-rounded type” principle, the opportunity of finding a “top 10” partner is almost 100% unless the two criteria he/she uses are totally unrelated to each other.

Except focusing on the probability of successful searching, the other highlight of this paper is to collect the information about the number of candidates the agent would meet before he/she picks a spouse successfully. A frugal and efficient way of choosing spouses

should not only ensure picking of an acceptable spouse, but also help find he/she as soon

Figure 3. Distribution of the Order of the chosen Partners for People with "Well-rounded" Principle (under the baseline of "top 10", "first one quarter" and "first half" on both criteria)



as possible.

Figure 3 shows the distribution of the order of the chosen partners when people use “well-rounded” principle as their mate-selection principle. The left box-plot in the graph tells us that if I use “well-rounded” principle to choose spouses in the marriage market under the baseline of picking the “top 10” candidates, the qualified can be found after around one-fifth candidates are screened in the pool in general.

Now I try to lower the bottom-line of picking spouses again—from picking “top 10” to “first one quarter” and “first half” to see how loosening the standard can change the result of mate-selection. According to the right box-plot in the graph, it seems that it is not

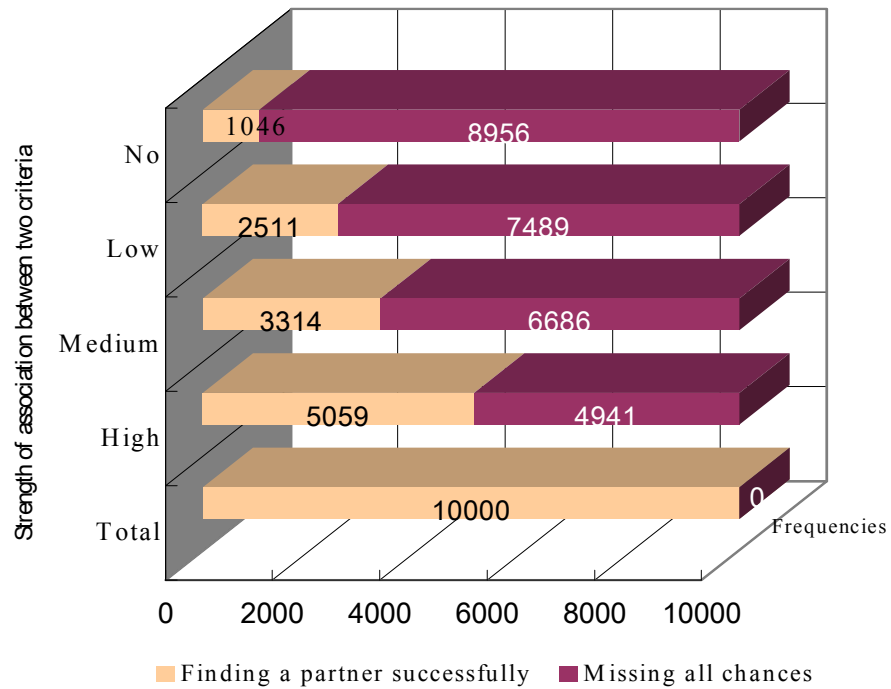
very hard to find an “average” person in the marriage market. As long as we screen 5 to 6 people in the candidate pool in advance, we can meet a potential partner with average characteristics.

“Differential Preference” Principle

The “well-rounded principle” is a way of choosing spouses which indicates that each criterion has equal importance for mate seekers. Take the Japanese women’s “three high desires” as an instance. If these three criteria—high educational level, high income and high standing height—have the same significance for women, short men with high educational level and income may be less desirable due to their weakness on one of three dimensions. Therefore, even though these women had a strong desire for marriage, they could not find a partner in the marriage market unless they compromised on these conditions.

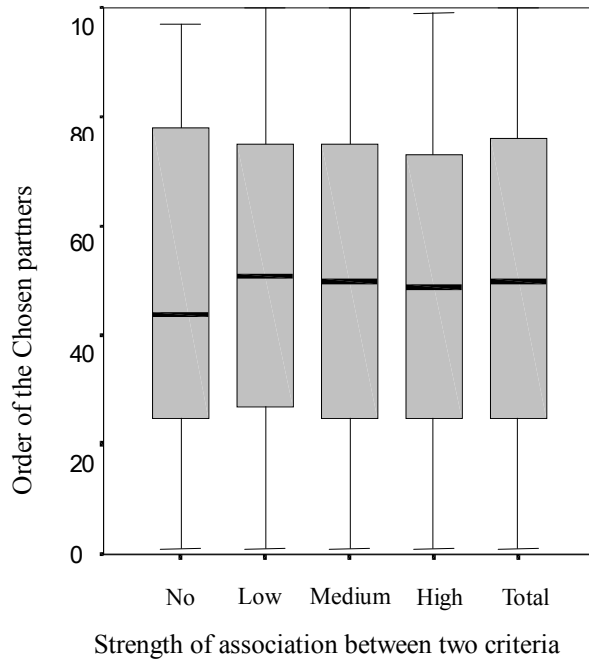
In addition, it is also reasonable to consider the situation of “differential preference”, which is defined as a mate searching way with which individuals can differentiate and prioritize their criterion and then find a qualified partner in the marriage market. For example, for women with differential preference among “three high desires”, say, prioritizing income and having lower standard on the other two dimensions, the affluent candidates can be chosen as a partner as long as their income fulfills the requirements, although they perform worse on educational level and standing height.

Figure 4. Distribution of frequencies of Successful and Losing Searching for People with "Differential Preference" Principle (under the baseline of "the best on one criterion and top 10 on the other")



I use the simulation model to present agents' searching results with "differential preference type" principle. Suppose agents have higher standard on one criterion than the others, candidates can be chosen as a spouse only when they perform best on one

Figure 5. Distribution of the Order of the chosen Partners for People with "Differential Preference" Principle (under the baseline of "the best on one criterion and top 10 on the other")



dimension and top 10 on the other. According to figure 4, people's probability of finding qualified partners successfully is about 25%, 33% and 50% respectively when two criteria have low, medium, and high association. Moreover, for those who can find out qualified partners, according to figure 5, the qualified usually appears when people have filtered out around half of all candidates in the marriage market, no matter how strong the association between the two criteria they use.

"Compensatory" Principle

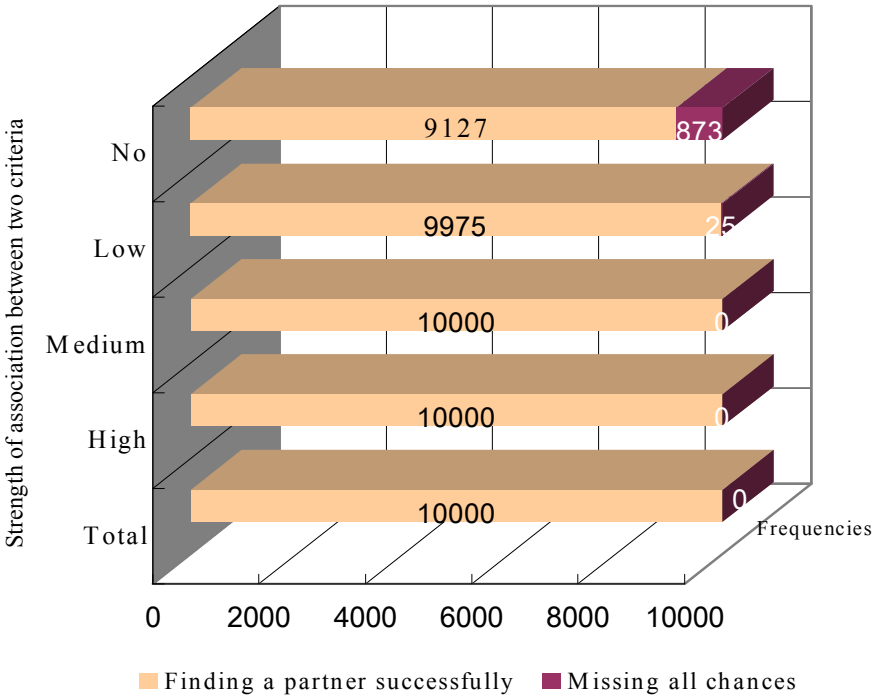
People who hold this type of principle allow their potential partners to draw on the strength of one aspect to offset the weakness on the other dimension. Each potential partner's performance is regarded as a whole "package" and his/her qualification is

evaluated in a summarized way, rather than being judged specifically according to certain baseline on particular dimension.

According to the simulation results shown in figure 6, the opportunity of successful searching with compensatory principle is very high, almost reaching 100% (under the baseline which requires the “whole package” of the performance of candidates should be top 10).

Since “compensatory” principle ensures the “luck” of finding out a desirable partner, how many candidates do we need to filter out in order to search out the qualified one? Simulated results tell us it will not be a long search. If seekers’ baseline is looking for the top 10 candidates in the marriage market, they can find qualified ones after they screen around 15% to 20% of candidates in the pool in general when two criteria have low to high association. If seekers’ baseline is lower, say, looking for the candidates who rank first one quarter in the marriage market, the qualified ones usually show up after seekers

Figure 6. Distribution of Frequencies of Successful and Losing Searching for People with "Compensatory" Principle

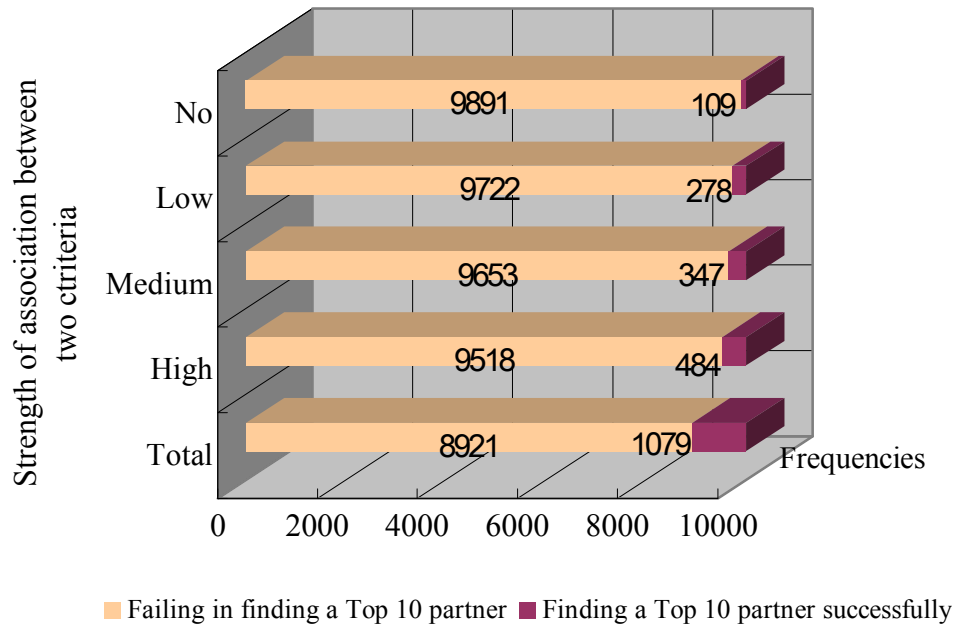


have screened around 10% of candidates in the pool in general. If searchers have much lower bottom-line—candidates whose performance is above average are acceptable to be spouses—filtering out less than 5% of candidates is enough for picking a qualified potential partner(graph not shown here).

“Immediate Matching” Principle

According to the definition of the “immediate matching” principle, people who possess this principle do not experience sequential searching processes because the first candidates they meet in the marriage market must be picked as their spouses. Although

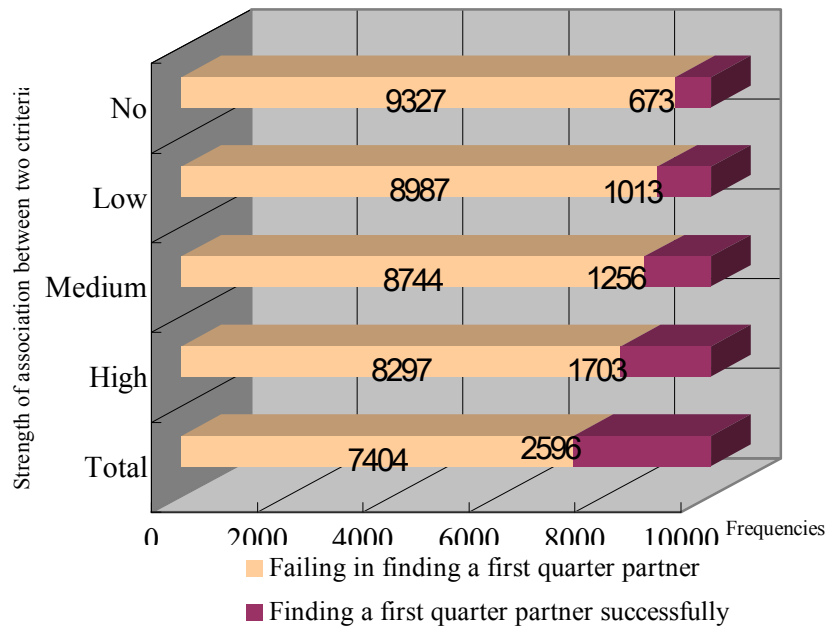
Figure 7. Distribution of Frequencies of Successful and Losing Searching out Top 10 Partners (on two dimensions) for People with "Immediate Matching" Principle



keeping on searching more may help people find out better potential partners, they favor immediate matching with the first candidates they meet over sequential searching due to the consideration of searching cost of time and physical efforts. Now we can ask some questions: is “immediate matching” a wise strategy? What is the opportunity of finding out satisfactory partners if we just pick the first candidates we meet in the marriage market? The simulation results are the following.

Figure 7 shows the results of successful and losing searching of finding top 10 partners (on two dimensions) when people adopt “immediate matching” principle. According to the result in the figure, the low frequencies of successful searching imply that if people prefer choosing the first candidates they meet as partners, the probability of meeting “premium” partners must be very low (1% to 10%). In addition, if we always

Figure 8. Distribution of Frequencies of Successful and Losing Searching out First Quarter Partners for People with "Immediate Matching" Principle

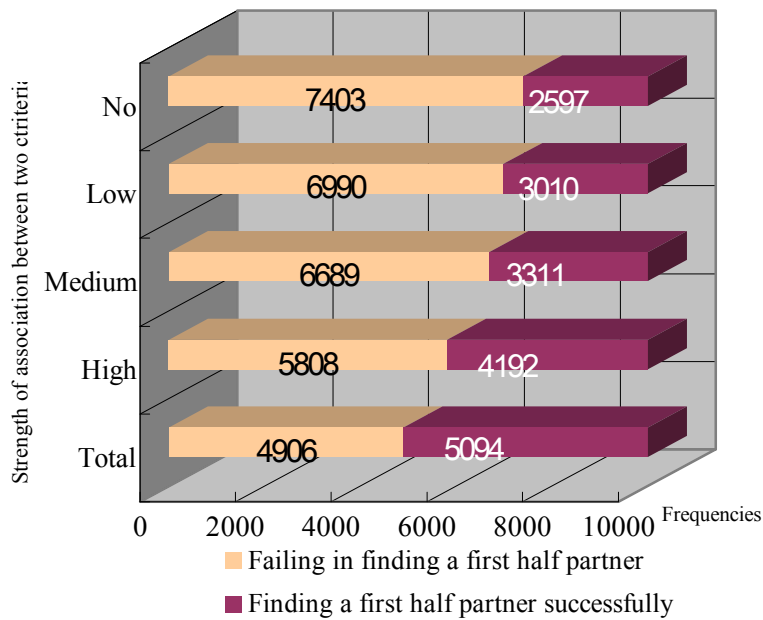


choose the first ones we meet in the marriage market as spouses, what is the probability of meeting partners who rank first quarter or first half on both dimensions? According to figure 8 and 9, the probability is higher, but still not very high (probability of 7% to 25% of searching out first-quarter-ranked partners and 25% to 50% for searching out first-half-ranked partners).

Previous study tells us there are many people using “immediate matching” principle indeed; in other words, choosing the “first” potential partner they meet in the marriage market directly as their lifetime mate (Frey and Eichenberger, 1996). This principle suggests forgoing of the sequential searching, a way of prolonging searching process in order to find better spouses. Although picking the first candidate in the marriage market seems able to save searching cost, time and efforts; however, according to the simulation

results, people using the principle have to assume the risks of finding out disappointing candidates since the opportunity of meeting ideal candidates immediately is very low. In other words, “immediate matching” principle does seem not a wise strategy.

Figure 9. Distribution of Frequencies of Successful and Losing Searching out First Half Partners for People with "Immediate Matching" Principle



Conclusion and Limitation

How do people choose their spouses? —This is the first question proposed from the beginning. After reviewing the research about marriage and mate selection we find that the image about the “process” in mate selection is still vague probably due to the difficulty of tracing and collecting empirical data (Bulcroft, 2000). Constrained by this difficulty, most of the mate-selection research is usually the hindsight of individuals’ mate searching behavior. Moreover, I also discover that the economic approach, such as matching model, diverges from the actual mate selection situation. For this reason, I suggest an idea of sequential mate selection process to catch the reality in the marriage market. I propose five types of mate-selection principles in this research: “choosing for the best only” principle, “well-rounded” principle, “differential preference” principle, “compensatory” principle and “immediate matching” principle. The first four principles are typical sequential mate-searching strategies deriving from individuals’ distinct preferences. According to the results about odds (the probability of finding a mate successfully) and searching cost (the numbers of “candidates” we have to shifted out) obtained from the simulation results of every searching principle, obviously “choosing for the best only” principle is not a wise way of choosing spouses because the odds will be against the mate-seekers, although persisting in this principle can maximize people’s benefits from marriage in terms of choosing the best spouses in the marriage market. This principle exposes mate-seekers to risks of losing all chances of getting married.

Using simulation technique to study mate selection is beneficial because it captures the aspect of “process” in the mate searching behavior. In order to fit in with the actual

decision-making process better, I refer to Todd's model and create a more realistic framework involving not only individuals' multi-factored criteria but also different types of mate-selection preference principles. This would be the greatest contribution of this research. Therefore, I propose the other principles which are expected to be more "realistic, efficient and frugal". Although "well-rounded" principle, "differential preference" principle and "compensatory" principle do not ensure that mate-seekers find the "best and ideal" partners in the marriage market, these three more economical strategies significantly raise the chance of successful matching and save the searching cost in terms of the number of candidates people have to sift out before they find the desirable partners. In addition, the "compensatory" principle seems to be the most advantageous mate-selection strategy due to its property of very high chance of successful matching and low searching cost. According to my simulation results, they also show that using the last principle—the "immediate matching" principle—to choose spouses is nearly like gambling in that the quality of the chosen partner is unknown and the consequence is usually unsatisfactory.

However, several problems remain to be solved in this model. The lack of concerning mutual selection may be a serious drawback. The one-sided nature of my models is certainly problematic as marriage is the outcome of mutual selection in general. Moreover, the one-sided models are also unable to take into consideration the variation in mate-seekers. The disregard of the heterogeneity among mate-seekers makes these models incapable of dealing with the issue about "homogamy" and "assortative marriage" more sophisticatedly because generally individuals' decision-making of choosing spouses should be subject to the comparison between the characteristics of individuals themselves and their potential partner. One suggestion for future study is to assign variation on

mate-seekers and set the baseline which is not only subject to particular preference principle but also mate-seekers' own personal characteristics. To sum up, future study can also design more complex searching models in order to probe the odds and searching cost of homogamy, hypergamy and hypogamy in different scenario of principles. Another related limitation in this research is its assumption of a non-competitive search environment—the candidate pool seems to be fixed and just over there.

In addition, similar to the drawback of other simulation research, the human behavior we simulate is still mechanized and simple. Finally, we still cannot afford to take into account the dimension of time. This deficiency makes me hard to think over whether people's preference would change as time goes by because the searching cost is sure to increase as people prolong their searching period. It is impractical to assume that individuals would keep the same preferences from beginning to end.

There is another important issue we should pay attention to in the end of this paper. Although this paper aims to find out the fundamental principles by which people choose their desirable spouses, picking desirable spouses is just the overture of marriage. Even the best partners do not necessarily assure happy and stable marriage or better marriage quality. Just like Oppenheimer said, the post-marriage socialization is exactly the key of stable and happy match (Oppenheimer, 1998).

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Appendix

The program of “choosing the best only” principle

```
PROC IML;
n=100;
CYCLES=10000;
RESULTS=J(CYCLES,2,.);
STEP=J(CYCLES,1,.);
DO CYCLE=1 TO CYCLES;
r=0;
a=j(2,2,1);
a[1,2] = r; a[2,1]= r ;
x=uniform(j(n,2,0));
x=rank(x[,1]) || rank(x[,2]);
x=x*root(a);
x=rank(x[,1]) || rank(x[,2]);
DO SEARCH=1 TO n UNTIL (x[SEARCH,1]+x[SEARCH,2]=200);
IF x[SEARCH,1]+x[SEARCH,2]=200 THEN
RESULTS[CYCLE,]=x[SEARCH,];
STEP[CYCLE,]=NROW(x[1:SEARCH]);
END;
END;
print x RESULTS STEP;
```