

Goodbye Paper Resumes!

Reforming the Parental Matchmaking Market in China

Donghyun Brian Lee

Department of Economics, Stanford University
Stanford, CA 94305
dgbrian@stanford.edu

Sally Wang

Department of Economics, Stanford University
Stanford, CA 94305
sallyw02@stanford.edu

Abstract

In many Chinese urban cities, parents and young adults have different expectations of a marriage partner. While parents care more about material elements in hopes of setting their children away from financial difficulties, young adults tend to lean into emotions, current intimacy, and personal compatibility. Parents have shown and continue to show the desire to remain engaged in their children’s marriage, and many Chinese young adults value their insight and recommendations. There are in-person marriage markets, including Beijing, Shanghai, and Chongqing, where parents become their children’s “agents.” These markets receive “paper resumes” of the young adults and hang them up on lines of strings in the market for parents to screen through and find candidates for their children. We argue that the existing implementation leads to a low success rate and is not scalable. In its place, we propose a model that combines a point-based preference derivation and the Gale-Shapley algorithm. We demonstrate that our model is a more effective matching mechanism that adequately responds to the demand for parental involvement in the Chinese matchmaking scene.

1 Introduction

For many young people in China, marriage is not only a union between them and their partner—it is an extensive process that sees two families with different backgrounds, customs, and expectations come together. As a result, the preferences of parents are encoded in a marriage directly or indirectly. This phenomenon is not something new. Like in other East Asian societies, many older Chinese parents significantly impact their children’s marriage decisions due to the Confucian principle of “孝” (*xiao*), or filial piety, which emphasizes respect and obedience to parents (Verot, 2023). Historically, elderly parents

depended on their children and their children's spouses for support during their retirement years. When the children become adults, they are expected to care for, respect, and financially support their aging parents (Wong, 2014). In many cases, the parents intervene directly in their children's search for a partner. This is known as “白发相亲” (*Bai Fa Xiang Qin*), a form of matchmaking where parents act as the primary agents making recommendations for individuals navigating dating and marriage.

Due to urbanization and the spread of Western ideals in the 20th century, youth in China began to value personal choice and romantic love over strict adherence to parental preferences and finding a socially appropriate match. There was a shift away from binding arranged marriages, and the rise of the internet and mobile technology led to online dating platforms becoming more popular (Verot, 2023). According to Verot (2023), leading platforms like TanTan, Jiayuan, and Baihe use advanced algorithms to match individuals “based on personal preferences, interests, and behavioral patterns,” and they offer “a more private and convenient way” for young professionals to date in a way that tries to overcome geographical and social barriers. However, “Bai Fa Xiang Qin” has persisted. There is no lack of demand from both parents and children. Many parents still feel responsible for their children even in adulthood, and the bestowing of material endowments such as property may make them more compelled to have a say in their children's dating and marriage. For some children, their parents act as a valuable source of information as they have more practical experience and social connections. For others, conforming to their parents' preferences to keep familial harmony continues to be necessary. According to an online survey by China Youth Daily, of 21,727 respondents, 52 percent will need parental approval when choosing a boyfriend or girlfriend (“Chinese parents,” 2015).

This paper will examine “Bai Fa Xiang Qin”—the parental matchmaking market—in China. We argue that in an age where technology giants compete to develop increasingly sophisticated dating apps that cater to young people, the market of parental matchmaking has to catch up if it wants to maintain its competitive edge. We see that while there is an apparent demand for parental input in dating, there is yet a systematic effort to organize a market targeting it. This paper aims to address this gap between demand

and existing implementation by proposing an algorithm adapted from Gale-Shapley’s model of Deferred Acceptance.

The rest of the paper is as follows. In Section 2, we describe the existing parental matchmaking market in major cities in China and highlight the shortcomings present. In Section 3, we propose our adaptation of the Gale-Shapley algorithm that includes a point-based derivation of preferences and show how it addresses the problems in the earlier section. Furthermore, we walk through a demonstration of a hypothetical scenario by implementing the model to a hypothetical dataset. We explain our assumptions and consider potential limitations. We conclude with Section 4, in which we discuss the broader extension of our work.

2 Current Market

“Bai Fa Xiang Qin,” or parent matchmaking, occupies an interesting position in contemporary China. By continuing to exist, it represents an actual demand from young people and their parents for parental involvement in dating and marriage. But at the same time, it has to compete in an age of advanced technology companies offering increasingly sophisticated and personalizable services.

The first parent-organized matchmaking market began in Beijing’s Longtan Park in 2004 (Gui, 2017, p. 1924). The market was first organized by retirees who came to the park to do their morning exercises; through chatting, they found that many of their adult children in their late twenties were still unmarried. Since then, similar matchmaking events have become common in major cities like Beijing, Shanghai, Hangzhou, Shenzhen, and Tianjin (Gui, 2017, p. 1925).

In this market, parents display sheets of paper outlining their child’s suitability as a potential spouse and the desired attributes of a prospective in-law. These “posters” are typically affixed to umbrellas, which function as impromptu stands (“China’s Marriage Markets,” 2019). They present various characteristics of single adult children, including “gender, age, ethnicity, educational level, occupation, income level, hometown,... and so on” (Gui, 2017, p. 1932). Parents visit the different stands and engage in discussions with one another to organize blind dates for their children, aspiring that these

meetings will result in successful matches (“China’s Marriage Markets,” 2019). Because young people are seldom present themselves, parents in the matchmaking corners effectively become “gatekeepers” for their children’s choice of spouse.

However, while these marketplaces have cemented their place in many urban parents’ routines, their current implementation is flawed. One primary weakness is that relying on paper resumes and physically visiting different stands is cumbersome and time-consuming. It does not meet the growing demand of parents and requires parents to be in person, which is an unrealistic expectation consistently. In Chongqing, hundreds of parents flock to People’s Park every weekend, with a modest area of 1.2 hectares; the number has only grown after the easing of COVID-19 restrictions (Ong, 2023). Another potential weakness is the inability of parents to verify the truthfulness of the posted information, which could incentivize them to exaggerate their children’s merits or falsely report their preferences for their children’s partners. According to Ong (2023), parents “would go on the phone or WeChat for as long as half a month to find out everything they could about the other party” and that “arrangements for the meeting between the young people can only happen after satisfactory verification.” As a result, the rate of successful matches—only considering the setting up of a date, not what happens following it—is low, estimated by some parents at less than 10% (Ong, 2023). Furthermore, the dynamics of these markets can become competitive and unsavory. However, desperate parents still go back to these markets weekend after weekend. One parent said, “This is the only way to help my son and our only chance, so I must try my best” (Ong, 2023). In our proposed model, we try to correct these limitations and come up with a way to meet these demands while guaranteeing the stability of matches and preventing the market’s derailment into a “hypermarket” where parents feel like they have to resort to untruthful tactics to outmaneuver one another.

3 Model & Applied Demonstration

I. Model High-Level Overview

In our adapted Gale-Shapley algorithm model for the parental matchmaking market in China, we begin by identifying and structuring preferences essential for effective matchmaking. Combining cultural insights and research, we identified categories that parents tend to focus heavily on when evaluating their child's potential partner. Broadly, these factors were Age, Profession, Education, Financial Preparation, and Future Plans & Values. We further refined these into narrower subcategories: Age, Profession, Degree Level, School, Family Background, Home Ownership, Car Ownership, Savings & Investments, Income Level, Child Planning, Location, Political Alignment, Lifestyle, and Work-Life Balance. The subsequent sections will further dive into the data collection, preference derivation, scoring mechanism, ranking and tie-breaking mechanisms along with a hypothetical demonstration with 10 participants (5 Men and 5 Women).

II. Data & Information Collection

Data Collection

While we did not directly collect real-life data, we tested our model with 10 hypothetical participants' data that we generated. In our hypothetical world, all participants would complete an authenticated survey with their parents, in which participants provide their *own-profile information* and their *ideal preferences* in a partner for each of the 14 specified categories. In this survey, each participant also indicates their top 5 most important categories in order of importance along with their own-profile information and ideal preferences.

Categories of Preferences with Two Degrees of Differentiation

We categorized 5 broad areas most important to Chinese parents in their matchmaking process, which are Age, Career, Education, Financial Preparation, Future Plans & Values. We broke each of these categories down into 14 narrower subcategories. Certain subcategories in our model required a more nuanced approach, leading us to implement a two-degree preference system for 5 of the 14 narrow

subcategories. In total, our model collects two sets of 19 choices, one for own-profile information and another for their ideal preferences.

In the figure below, you can see a comprehensive overview of our 14 categories (Age, Profession, Degree Level, School, Family Background, Home Ownership, Car Ownership, Savings & Investments, Income Level, Child Planning, Location, Political Alignment, Lifestyle, and Work-Life Balance) and their 1st and 2nd-degree differentiation.

Categories	Own-Profile (1st)	Own-Profile (2nd)	Preferences (1st)	Preferences (2nd)
<i>Age</i>	Age		Relative Difference	
<i>Profession</i>	Field of Profession	Job Title	Field of Profession	Job Title
<i>Degree Level</i>	Degree Level	Degree Specialization	Degree Level	Degree Specialization
<i>School</i>	School's Reputation	School System	School's Reputation	School System
<i>Family Background</i>	Family Wealth Percentile Brackets		Relative Difference	
<i>Home Ownership</i>	Ownership Status		Ownership Status	
<i>Car Ownership</i>	Ownership Status		Ownership Status	
<i>Savings & Investments</i>	Asset Percentile Brackets		Relative Difference	
<i>Income Level</i>	Income Percentile Brackets		Relative Difference	
<i>Child Planning</i>	Want/No Children	# of Children	Want/No Children	# of Children
<i>Desired Location</i>	Region/Province	City	Region/Province	City
<i>Political Alignment</i>	Ideological Alignment		Ideological Alignment	
<i>Lifestyle</i>	Urban/Surburban/Rural		Urban/Surburban/Rural	
<i>Work-Life Balance</i>	Family vs Career vs Balance		Family vs Career vs Balance	

Figure 1, Own-Profile & Preference Reporting Template From Participants

Here is a list of all subcategories that have two degrees of differentiation:

- ❖ For Profession, we have the “field of profession” as the 1st-degree category (i.e. "Art, Entertainment & Sports") and the “job title” (i.e. "Musician") as the 2nd-degree category.
- ❖ For Degree Level, we have the “degree level” as the 1st-degree category (i.e. “Bachelor’s”, "Advanced Degrees") and the degree specialization (i.e. “STEM”, "MBA") as the 2nd-degree category. For Bachelor’s, we do not delve into specific majors but rather categorize them between “Humanities” and “STEM” according to the Chinese standard categorization.
- ❖ For School (college), we have the “school’s reputation” as the 1st-degree category (i.e. "Elite", "Low") and “school system” (i.e. "US", “UK”, “China”) as the 2nd-degree category.

- ❖ For Child Planning, we have ‘the desire to have children’ as the 1st-degree category (i.e. "Want", "No Children") and the number of children (i.e. "3 Children", "No Children") as the 2nd-degree category. The maximum desired number of children is 3 as China allows married couples to have up to 3 children.
- ❖ For Location, we have the “region/province” as the 1st-degree category (i.e. "US West Coast") and then the “city” (i.e. "San Francisco") as the 2nd-degree category. For a direct-administered municipality like Shanghai that does not belong to a province, both the 1st-degree and 2nd-degree categorization would be “Shanghai.”

The rationale behind this two-degree system is to capture the detailed preferences that are particularly significant to parents. In this system, second-degree preferences are only relevant if the associated first-degree preference is met. For instance, a participant named Woman 1 might prefer a partner with an Advanced Degree, specifically a Ph.D. If the candidate has an Advanced Degree, they receive a +1 point; if they also have a Ph.D., they receive an additional +1 point. However, if Woman 1 is indifferent about the second-degree preference, it is treated as a positive match, awarding the point as if the condition were met. This approach allows for a detailed and flexible representation of preferences. There can be a logical edge case for the School category, in which the 2nd-degree category of “school system” is a positive match while the 1st-degree category of “school reputation” is not. In this case, we still apply the same principle and reward 0 points in total because the 1st-degree condition has not been met for the 2nd-degree condition to matter. This is culturally consistent with China's societal emphasis on academic prestige, which we argue will trump the value of the school system’s positive match.

Assumptions About Data

1. Absolute choices indicate strict preferences.

An important assumption in our model is that each participant’s choice indicates a strict preference over other choices within that category. This means that if Woman 1 prefers someone who attended a school with a "Medium" reputation, we interpret this as a strict preference for a "Medium" reputation school over a "Low" or "High" reputation school. This assumption of strict

preferences applies across all categories, ensuring clarity in the matching process. This presents a potential limitation discussed later on in the paper.

2. *Relative choices will be processed automatically and indicate strict preferences.*

For some categories, the ideal preference reporting is in relative terms, such as “higher”, “similar”, or “lower”. The subcategories that have this format are: “Age”, “Family Background”, “Savings & Investments”, and “Income Level”.

Age preference is categorized under 5 brackets (“Older within 10 years”, “Older within 5 years”, “Similar within 1 year”, “Younger within 5 years”, and “Younger within 10 years”). The age difference is calculated automatically and if the age difference meets the preference condition for age, then there is a positive match for the subcategory of Age.

For the other three subcategories that relate to financial preparation, we assume the own-profile data is processed internally to place them in one of 5 percentile brackets comparing to the national average (“>90th”, “90-70th Percentile”, “70-50th Percentile”, “50-30th Percentile”, “<30th Percentile”). Instead of the participants specifying the bracket for their ideal preferences, they are only able to select “higher”, “similar”, or “lower”. We assume that those in the same brackets for any of these subcategories are “similar” and there is no option to select “above” or “below” a specific level that is not their own. As with assumption #1, we assume that the choice that they make indicates a strict preference over the other relative options.

3. *Participants can choose indifference.*

Another important assumption is that participants are able to indicate their indifference by submitting preferences that are marked “N/A” for any of the categories. For example, if Woman 1 is indifferent about what reputation their partner’s school has, she would mark it “N/A”. We interpret this indifference to mean that Woman 1 equally prefers all suitors regardless of their own-profile information for the school reputation category. This process ensures comprehensive data collection, allowing us to understand the preferences and priorities of each participant.

Considerations Hypothetical Profiles

In our profile generation process for the simulation demo, we wanted to ensure that our profiles fully captured three important factors:

1. Historical and cultural nuances of gender within marriage in China.

We wanted to account for the different expectations between genders for marriage in China when creating hypothetical profiles and preferences. Therefore, we assume that in general, the ideal preferences of the two genders will be different regarding traditionally stereotyped expectations such as age difference, financial status, and work-life balance.

2. Diverse representation & differentiation of participants' profiles in China.

We wanted to see that our model can handle a diversity of profiles and were intentional to create profiles that are differentiated and represent various archetypes of Chinese singles who would participate in such a market.

3. Varying levels of importance across categories and personalities.

Recognizing individual differences across the participants, we wanted to capture the different weights that each person puts on each of the subcategories. So, we allow each individual to rank the 5 most important categories and weigh them accordingly in our calculation later on. We also created a profile (Woman 4 in the demo) who can be characterized as “mostly indifferent”, having no specific preference for most of the categories provided to stress-test the model and see that it handles the reality of some singles who are not as “picky” by having many specific expectations for their partners.

III. Preference “Fitness” Scoring System

Raw Scores

Once all participants' information and preferences are collected, we begin the scoring process. Each participant is scored based on how well their own-profile information matches the reference point's ideal preferences, and we call this measure “fitness”. For illustration, see Figure #2 below to walk through how Woman 1 from our demo scored against Man 1's ideal preferences in our demo.

Man 1 - Stanford Grad in Silicon Valley						Woman 1 - highly educated banker from well-off family			
Categories	Own-Profile (1st)	Own-Profile (2nd)	Preferences (1st)	Preferences (2nd)	Rank	Woman 1st	Woman 2nd	Raw	Scaled
Age	25.00		Similar (Within 1 year)			28.00		0.00	0.00
Profession	Business & Finance	Business Consultant	Business & Finance	N/A	2.67	Business & Finance	Business Consultant	2.00	5.33
Degree Level	Bachelor's	STEM	Bachelor's	N/A		Master's	STEM	0.00	0.00
School	Elite	US	High	US	1.33	Elite	US	0.00	0.00
Family Background	70-50 Percentile		Similar Family Income Level			90-70 Percentile		0.00	0.00
Home Ownership	Renting		N/A			Owns Multiple Properties		1.00	1.00
Car Ownership	No Car		N/A			Owns a Car		1.00	1.00
Savings & Investments	<30th Percentile		Similar			90-70 Percentile		0.00	0.00
Income Level	>90th Percentile		Lower			90-70 Percentile		1.00	1.00
Child Planning	Want Children	3 Children	Want Children	3 Children	2.33	Want Children	2 Children	1.00	2.33
Desired Location	US West Coast	San Francisco	US West Coast	N/A		Shanghai	Shanghai	0.00	0.00
Political Alignment	Liberal		N/A			Conservative		1.00	1.00
Lifestyle	Suburban Living		Suburban Living		2.00	Urban Living		0.00	0.00
Work-Life Balance	Prioritizes Family		Prioritizes Family		1.67	Prioritizes Career		0.00	0.00
								7.00	11.67

Figure #2, Woman 1's Raw and Scaled Scores Measured Against Man 1's Rubric of Ideal Preferences.

In Figure #2, we see that the raw scores for Woman 1 are derived by simply adding +1 each time there is a positive match. We also follow our principle laid out in the two-degree differentiation setup to ensure that positive matches in 2nd-degree subcategories are only awarded with a point if and only if its associated 1st-degree subcategory is a positive match. We follow assumption #3 and award +1 point to Woman 1 for subcategories that Man 1 is indifferent about as if they were a positive match.

Score Scaling Factors

Once all subcategories have been checked and scored to result in a raw score, we then apply our scaling factors to account for the varying degrees of importance that an individual puts on each subcategory. Each individual has indicated their top 5 most important subcategories during the initial survey, and we use this rank to scale the raw scores correspondingly.

Category Rank	Factor Weight
1st	2.67
2nd	2.33
3rd	2.00
4th	1.67
5th	1.33

Figure #3, Table of Scaling Factors For Each n^{th} Most Important Subcategory.

Returning to our example from the demo in Figure #2, we see that Man 1 ranks Profession, Child Planning, Lifestyle, Work-Life Balance, and Family Background as his top 5 most important subcategories in order of decreasing importance. So for each of those 5 categories, we multiply the

corresponding factor weight by multiplication. After each of the category scores is scaled corresponding to our table, we arrive at the scaled total score that Woman 1 receives when evaluated against Man 1's ideal preferences. A profound result is that this scaling mechanism mathematically allows for improved distinction between candidates than comparing their raw scores; this is consistent with our intention to add depth and dimension by considering individual differences in each category's importance.

IV. Preference Ranking & Tie-Breaking Mechanism

Preference Ranking Derivation

After scaling all raw scores to calculate the scaled scores of each candidate against the reference point, we are now able to deduce the order in which the reference point individual ranks his or her potential suitors. In the example illustrated in Figure #2, we saw that the raw score of 7 has been scaled to 11.67 for Woman 1. After repeating the scaling process for all 5 women in our demo, we are left with 5 different scaled scores, which we can rank in descending order. This results in Man 1's order of preference being $W4 (12.33) > W1 (11.67) > W5 (11.33) > W2 (10.67) > W3 (7.00)$. We repeat this process for all participants and ultimately deduce a ranking order of preferences of the opposite sex for each participant in the model.

Tie-Breaking Mechanism

Considering that our demonstration includes a relatively small sample size of 10 participants, we wanted to come up with a mechanism that handles ties that are very likely to occur with a large sample size. Our tie-breaking mechanism involves comparing the top 5 categories chosen in order of importance until a clear preference emerges. If no clear preference emerges, then we flip a coin (or choose randomly if more than two candidates are tied). For illustration, we draw on two examples from our demo that required tie-breaking.

Woman 2 - paralegal from middle-income family						Man 1 - Stanford Grad in Silicon Valley			Man 2 - UK Educated Professor in Shanghai			Man 3 - Chinese Actor Rising to Fame			Man 4 - English Teacher in Beijing			Man 5 - Politician from Middle Class Family (China)		
Categories	Owo-Profile (1st)	Owo-Profile (2nd)	Preferences (1st)	Preferences (2nd)	Rank	Man 1st	Man 2nd	Scaled	Man 1st	Man 2nd	Scaled	Man 1st	Man 2nd	Scaled	Man 1st	Man 2nd	Scaled	Man 1st	Man 2nd	Scaled
Age	30.00		Similar			25.00		0.00	32.00		0.00	29.00		1.00	40.00		0.00	40.00		0.00
Profession	Legal	Paralegal	Academia	N/A		Business & Finance	Business Consultant	0.00	Academia	Professor	2.00	Art, Entertainment & S	Actor/Actress	0.00	Academia	Teacher	2.00	Government & Public	Politician	0.00
Degree Level	Bachelor's	Humanities	Advanced Degree	Ph.D.	1.67	Bachelor's	STEM	0.00	Advanced Degree	Ph.D.	3.33	Associate's Degree	Community College	0.00	Bachelor's	Humanities	0.00	Master's	Humanities	0.00
School	High	China	High	China	2.67	Elite	US	0.00	Elite	UK	0.00	Medium	China	0.00	High	US	0.00	High	China	5.33
Family Background	70-50 Percentile		Similar			70-50 Percentile		1.00	90-70 Percentile		0.00	<30th Percentile		0.00	>90th Percentile		0.00	70-50 Percentile		1.00
Home Ownership	Renting		Owens Single Property		2.33	Renting		0.00	Owens a Single Property		2.33	Living with Parents		0.00	Owens Multiple Properties		0.00	Owens Single Property		2.33
Car Ownership	No Car but Plans to Buy		Owens a Car			No Car		0.00	Owens a Car		1.00	Owens a Car		1.00	Owens a Car		1.00	Owens a Car		1.00
Savings & Investments	70-50 Percentile		Higher			<30th Percentile		0.00	50-50 Percentile		0.00	>90th Percentile		0.00	>90th Percentile		0.00	70-50 Percentile		1.00
Income Level	70-50 Percentile		Higher			>90th Percentile		1.00	70-50 Percentile		0.00	>90th Percentile		1.00	70-50 Percentile		0.00	70-50 Percentile		0.00
Child Planning	Want Children	1 Child	Want Children	1 Child	2.00	Want Children	2 Children	2.00	Want Children	2 Children	2.00	No Children	No Children	0.00	Want Children	2 Children	2.00	Want Children	2.00	2.00
Location	Beijing	Beijing	Beijing	Beijing		US West Coast	San Francisco	0.00	Shanghai	Shanghai	0.00	Shanghai	Shanghai	0.00	Beijing	Beijing	0.00	Guangdong	Shenzhen	0.00
Political Alignment	Apolitical		N/A			Liberal		1.00	Liberal		0.00	Apolitical		1.00	Conservative		1.00	Conservative		1.00
Lifestyle	Urban Living		Urban Living			Suburban Living		0.00	Urban Living		1.00	Urban Living		1.00	Urban Living		1.00	Urban Living		1.00
Work-Life Balance	Prioritizes Career		Balanced Approach		1.33	Prioritizes Family		0.00	Balanced Approach		1.33	Prioritizes Career		0.00	Prioritizes Family		0.00	Balanced Approach		1.33
						5.00			13.00			5.00			10.00			16.00		

Figure #4, Scaled Scores of All Men for Woman 2

The first example illustrated in Figure #4 is the preference ranking derivation of the five men for Woman 2. After calculating the scaled scores, Man 1 and Man 3 have the same scores when evaluated against Woman 2's ideal preferences. So, we compare their "fitness" in Woman 2's most important category (School) and see that both score 0. Because both have equal amounts of points, we move to the second most important category (Income Level) and see that both score 0 again. Moving onto the 3rd most important category of Child Planning, we see that the tie breaks. According to the tie-breaking mechanism, Man 1 is preferred over Man 3 because Man 3 does not want any children while Man 1 wants children, which matches Woman 1's 1st-degree preference for Child Planning. As we can see, the tie-breaking mechanism works its intended purpose to distinguish between tied candidates and leave each candidate with a strict preference.

Woman 4 - travelling musician in the countryside						Man 1 - Stanford Grad in Silicon Valley			Man 2 - UK Educated Professor in Shanghai			Man 3 - Chinese Actor Rising to Fame			Man 4 - English Teacher in Beijing			Man 5 - Politician from Middle Class Family (China)		
Categories	Owo-Profile (1st)	Owo-Profile (2nd)	Preferences (1st)	Preferences (2nd)	Rank	Man 1st	Man 2nd	Scaled	Man 1st	Man 2nd	Scaled	Man 1st	Man 2nd	Scaled	Man 1st	Man 2nd	Scaled	Man 1st	Man 2nd	Scaled
Age	24.00		N/A			25.00		1.00	32.00		1.00	29.00		1.00	40.00		1.00	40.00		1.00
Profession	Art, Entertainment & Musician		N/A			Business & Finance	Business Consultant	2.00	Academia	Professor	2.00	Art, Entertainment & S	Actor/Actress	2.00	Academia	Teacher	2.00	Government & Public	Politician	2.00
Degree Level	High School		N/A			Bachelor's	STEM	2.00	Advanced Degree	Ph.D.	2.00	Associate's Degree	Community College	2.00	Bachelor's	Humanities	2.00	Master's	Humanities	2.00
School	Low	China	N/A			Elite	US	2.00	Elite	UK	2.00	Medium	China	2.00	Medium	US	2.00	High	China	2.00
Family Background	<30th Percentile		Higher		1.67	70-50 Percentile		1.67	90-70 Percentile		1.67	<30th Percentile		0.00	>90th Percentile		1.67	70-50 Percentile		1.67
Home Ownership	Living with Parents		Renting			Renting		1.00	Owens a Single Property		0.00	Living with Parents		0.00	Owens Multiple Properties		0.00	Owens Single Property		0.00
Car Ownership	No Car		N/A			No Car		1.00	Owens a Car		1.00	Owens a Car		1.00	Owens a Car		1.00	Owens a Car		1.00
Savings & Investments	<30th Percentile		Higher		1.33	<30th Percentile		1.33	50-50 Percentile		1.33	<30th Percentile		0.00	>90th Percentile		1.33	70-50 Percentile		1.33
Income Level	<30th Percentile		Higher		2.00	>90th Percentile		2.00	70-50 Percentile		2.00	>90th Percentile		2.00	70-50 Percentile		2.00	70-50 Percentile		2.00
Child Planning	Want Children	3.00	Want Children	N/A	2.33	Want Children	3 Children	4.67	Want Children	2 Children	4.67	No Children	No Children	0.00	Want Children	2 Children	4.67	Want Children	2.00	4.67
Location	Jilin	Changchun	N/A			US West Coast	San Francisco	2.00	Shanghai	Shanghai	2.00	Shanghai	Shanghai	2.00	Beijing	Beijing	2.00	Guangdong	Shenzhen	2.00
Political Alignment	Apolitical		N/A			Liberal		1.00	Liberal		1.00	Apolitical		1.00	Conservative		1.00	Conservative		1.00
Lifestyle	Rural Living		N/A			Suburban Living		1.00	Urban Living		1.00	Urban Living		1.00	Urban Living		1.00	Urban Living		1.00
Work-Life Balance	Prioritizes Family		Prioritizes Family		2.67	Prioritizes Family		2.67	Balanced Approach		0.00	Prioritizes Career		0.00	Prioritizes Family		2.67	Balanced Approach		0.00
						25.33			21.67			14.00			24.33			21.67		

Figure #5, Scaled Scores of All Men for Woman 4

The second example illustrated in Figure #5 is the preference ranking derivation of the five men for Woman 4. In this example, Man 2 and Man 5 are tied with the same scaled scores. However, our tie-breaking mechanism does not deduce a clear preference for either man after going through the 5 most important categories that Woman 4 had selected. Reaching this point with two candidates at a tie, we flip

a coin and declare Man 2 is preferred over Man 5. In cases with more than two candidates in an unresolved tie, we would randomly choose between the tied candidates with equal probability.

VI. Gale-Shapley Algorithm Implementation & Demonstration Results

Implementation

These are the summarized preferences for all 10 participants :

Man 1: W4 > W1 > W5 > W2 > W3

Woman 1: M1 > **M2** > M3 > M4 > M5

Man 2: W1 > W2 > W4 > W5 > W3

Woman 2: M5 > M2 > **M4** > M1 > M3

Man 3: W3 > W1 > W4 > W2 > W5

Woman 3: M4 > **M3** > M5 > M2 > M1

Man 4: W2 > W5 > W1 > W4 > W3

Woman 4: **M1** > M4 > M2 > M5 > M3

Man 5: W1 > **W5** > W2 > W4 > W3

Woman 5: **M5** > M4 > M2 > M1 > M3

Figure #6, Summarized Preferences of Men & Women with Final Matches Bolded

Gale-Shapley (DAA) Matching Results

Man-Proposing DAA Matching Results (2 Rounds)	Woman-Proposing DAA Matching Results (4 Rounds)
Man 1: Woman 4	Woman 1: Man 2
Man 2: Woman 1	Woman 2: Man 4
Man 3: Woman 3	Woman 3: Man 3
Man 4: Woman 2	Woman 4: Man 1
Man 5: Woman 5	Woman 5: Man 5

Figure #7, DAA Matching Results for Men-Proposing and Woman-Proposing Methods

Demonstration Results & Significance

With the preference rankings established for each participant, we implemented the Gale-Shapley Deferred Acceptance Algorithm (DAA) with both the man-proposing method and the woman-proposing method. This algorithm utilized the strict preferences derived from our scoring system to create stable matches between participants. We see that DAA ensured that the matching process was efficient and

stable, meaning no participant could improve their match by altering their preferences. A significant observation is that everyone participating had a match at the end of the entire process and that the results of the man-proposing and woman-proposing methods both yield the same matching outcomes.

V. Model Limitations

While our adapted Gale-Shapley model achieves the desired objectives by matching every participant with a stable outcome, there are limitations to this model and its application. We will explore some limitations presented by our assumptions as well as a few weaknesses in our mechanism itself.

Assumptions

1. Assumption #1 is not always reflective of the real world.

In our model, we limit the participants from indicating choices that are vague and force them to make a clear-cut specific choice. With the example of school reputation, it is entirely possible that a participant just wants their partner to have gone to a school with a “medium or higher” reputation, but our model limits their choice to either specifying High, Medium, Low or leaving the category “N/A”. None of these options perfectly capture the nuance above.

2. Ranged brackets and relative terms can lead to ambiguity in preference score calculations.

In our model, some categories relating to Financial Preparedness use percentile brackets for own-profile information reporting and relative terms like Higher, Similar, or Lower for their preferences. This can lead to inaccuracies stemming from ambiguity. For example, if Man 1 is in the 70-50th income percentile bracket and has a preference for Women who are in the “lower” income category. In reality, Man 1 could be in the 60th percentile, which leaves any woman who is between the 60th-50th percentile to be a negative match for this category even though they do indeed have a lower income than Man 1. Furthermore, the reporting of preferences in relative terms also fails to account for certain nuanced scenarios in real life. It is entirely possible that Man 1 prefers the Women with “lower” income but with a condition that they are above the 30th percentile. This added condition cannot be reflected in our current model, and any Woman under the 50th Percentile receives the same amount of points for being in the “lower” income bracket.

3. *All subcategories that are not the top 5 most important choices are given the same weight.*

While we applied factor multipliers to the top 5 most important categories selected, we did not apply a multiplier to all other categories. This mathematically means that all categories not selected in the top 5 weigh equally as the other, simultaneously implying that the individual values all other categories to be of equal importance. This implication may not be true in real life.

Mechanism

1. *The sample size used in our model is quite small.*

The expansion of the sample size will likely lead to an increased number of ties, and there will be a need for an improved differentiation mechanism in our preference score calculation in addition to an improved tie-breaking mechanism. This could be achieved by directly increasing the number of categories considered or by extending our scaling method to be applied to an increased number of categories rather than just to the top 5 most important categories.

2. *Allowing indifference to be considered can lead to difficulty in distinguishing candidates.*

When a participant is indifferent about too many categories, differentiating between candidates becomes more difficult and can lead to more complicated ties. We see this play out in our demo for Woman 4, who is indifferent about 13 of her 19 total submittable preferences. As a result, the scaled scores of the five men for Woman 4 are very close to one another. While this reflects real life intuition that those with less specific preferences will find more candidates suitable, this presents a potential issue of indiscernibility. Considering that the Gale-Shapley algorithm requires strict ranking of preferences, this is a potential vulnerability to the model. But this can be mitigated by creating a minimum number of preferences required for submission.

4 Conclusion

This paper analyzes the parental matchmaking market in China and finds a crucial gap between demand and implementation of a system that effectively facilitates this unique type of matchmaking. To

address this gap, we propose a model that combines the Gale-Shapley algorithm and a point system from which the preferences of men and women are derived.

Though we focus our analysis on the Chinese parental matchmaking market, our results can apply to other East Asian countries, such as Korea and Japan, where many parents are also heavily involved in their children's dating and marriage decisions ("Role of Family," 2023; Lau and Fukutome, 2023). While the model will require adjustments dependent on the context of the specific country, our model has demonstrated its value as a good framework to build on.

To further enhance our model, we would tackle the previously identified limitations, such as only being able to rank 5 categories and limited specificity. With more time and resources, we would refine our point system to accommodate the diversity of preferences across different Chinese parents and simulate how the model handles a large sample size. In addition to reviewing existing literature from scholars on characteristics the average Chinese parent considers when finding a match for their children, we can conduct field surveys to learn about how these characteristics may vary from rural cities to urban cities and from older to newer generations, which would make our model more appealing to a broader range of users. We can also allow parents to rank all categories instead of only choosing the top five they consider most important, which may lead to a more sophisticated weighting of points that more closely match their true preferences. Another element to consider is how to prevent parents on the proposing side from misleading or exaggerating their preferences. While the model theoretically ensures that truthful reporting is optimal for the proposing side, actual behavior may depend on the participant's understanding of the algorithm and its truthful property.

References

- China matchmaking market: How does that work? - marketing China.* (2023, October 27).
<https://marketingtochina.com/china-matchmaking-market/>
- China's marriage markets.* (2019, February 21). Cheng & Tsui.
<https://www.cheng-tsui.com/blog/chinas-marriage-markets>
- Do Chinese parents still call the shots in their children's marriages? - People's Daily Online.* (n.d.).
 Retrieved June 4, 2024, from
<http://en.people.cn/n/2015/0116/c98649-8837165.html#:~:text=According%20to%20an%20on%2Dline,cornered%20by%20their%20parents%27%20opinion>
- Fukutome, C. L., Junko. (2023, September 2). *In Japan, the young find dating so hard their parents are doing it for them.* CNN.
<https://www.cnn.com/2023/09/02/asia/japan-speed-dating-parents-low-fertility-intl-hnk/index.html>
- Gui, T. (2017). “Devalued” daughters versus “appreciated” sons: Gender inequality in China’s parent-organized matchmaking markets. *Journal of Family Issues*, 38(13), 1923–1948.
<https://doi.org/10.1177/0192513X16680012>
- Ong, E. (n.d.). *Desperate parents gather in China's latest matchmaking park for the sake of their kids.* ThinkChina - Big Reads, Opinion & Columns on China. Retrieved June 4, 2024, from
<https://www.thinkchina.sg/society/desperate-parents-gather-chinas-latest-matchmaking-park-sake-their-kids>
- The role of family and tradition in Korean relationships.* (2023, April 18). Seoulbox.
<https://myseoulbox.com/blogs/seoul-blog/the-role-of-family-and-tradition-in-korean-relationships>
- Wong, W. M. (2014). Finding “love” in China: An overview of Chinese marriage markets(Baifaxiangqin). *Inquiries Journal*, 6(12).

<http://www.inquiriesjournal.com/articles/946/finding-love-in-china-an-overview-of-chinese-marriage-markets-baifaxiangqin>