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## **The hidden cost of education fever: Consequences of the Keju-driven education fever in ancient China**

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Education Fever is not a new phenomenon, particularly in Asian countries such as Korea, China, and Vietnam. We see evidence of parents' concerns and enthusiasm about their children's education and government's strong promotion of education throughout history in these countries. As one of the numerous pieces of evidence of such promotion in ancient China, consider the popular "*Urge to Study Poem* 勸學詩" written by Emperor Zhenzong 宋真宗 (986-1022) of the Song dynasty in China about 1,000 years ago (see Guo, 1994):

宋真宗 《勸學詩》

富家不用買良田，書中自有千鐘粟。  
安房不用架高梁，書中自有黃金屋。  
娶妻莫恨無良媒，書中自有顏如玉。  
出門莫恨無隨人，書中車馬多如簇。  
男兒欲遂平生志，六經勤向窗前讀。

*To be wealthy you need not purchase fertile fields,  
Thousands of tons of corn are to be found in the books.*

*To build a house you need not set up high beams,  
Golden mansions are to be found in the books.  
To find a wife you need not worry about not having good matchmakers,  
Maidens as beautiful as jade are to be found in the books.  
To travel you need not worry about not having servants and attendants,  
Large entourages of horses and carriages are to be found in the books.  
When a man wishes to fulfill the ambition of his life,  
He only needs to diligently study the six classics by the window.*

Two particular verses of this not-so-poetic poem: *Golden mansions and beautiful women are to be found through the books* 書中自有黃金屋，書中自有顏如玉， have been frequently quoted by parents, teachers, and officials ever since to urge youngsters to study. They have been taken as a strong piece of evidence that education was highly valued in historical China. There are numerous other indicators of such promotion of and enthusiasm for education throughout history.

Why was there such an education fever? Many would point at the high value placed on learning in Confucian philosophy as a reason for the phenomenon in these countries. The belief that Confucian teaching has led an entire society in a feverish pitch to seek the joy of learning, while romantic, is probably not the complete picture. At least, we have one clear case in history that the manifested education fever was not for the pure joy of learning but for other reasons. The case is that of the 1,300-year old civil service exam/education system of China known as the Keju 科舉 examination system. As we ponder the various issues of education fever, perhaps there are lessons that should be learned from the history of the Keju system.

In the case of the Keju system, the education fever was not for the pure joy of learning, but for the potential economic and social rewards gained through success in examinations; and education was but the necessary preparation for that ultimate examination. Evidence of this can be seen throughout the history of China. The poem by Song Zhenzong cited above did not urge children to study for the joy of learning, to become a better person, to become a scholar or to gain knowledge. Instead, it promised wealth and success as a result of studying. Such success is to be obtained through good performance on the Keju exams. Such admonitions to children to study and learn in order to gain fame and

fortune through the exams can be found in early primers for young children. Below are some popular rhymes found in children's primers during the Ming 明 (1368-1644) and the Qing 清 (1644-1911) dynasties (Guo, 1994):

天子重英豪，文章教爾曹。  
萬般皆下品，唯有讀書高。  
*The emperor values talents;  
Admonishes that essays be taught to all of you.  
All pursuits are of low value;  
Only studying the books is high.*

少小須勤學，文章可立身。  
滿朝朱紫貴，盡是讀書人。  
*When you are young you need to study diligently,  
Knowing how to write essays can establish your future.  
Look at all the powerful and wealthy people in the emperor's court,  
They are all people who have studied the books.*

朝爲田舍郎，暮登天子堂。  
將相本無種，男兒當自強。  
*A common farmer in the morning,  
Ascending the emperor's hall by the evening.  
Prime ministers and commanders are not born so,  
A man should seek to improve himself  
(i.e., to become competitive in the exams).*

白馬紫金鞍，騎出萬人看。  
借問誰家子，讀書人做官。  
*A white horse with indigo/golden saddle,  
The rider is admired by the multitude.  
Please tell me whose son is that?  
He is someone who has studied the books and is now an official.*

學乃身之寶，儒爲席上珍。  
君看爲宰相，必用讀書人。  
*Learning is the precious jewelry on the body,  
Scholarship is the fine delicacy on the table.  
Sir, look at those who have become prime ministers,  
They are all people who have studied the books.*

一舉登科日，雙親未老時。

錦衣歸故里，端的是男兒。

*One day your name appears on the roster of exam passers,  
And both your parents are not yet old.  
You return home in your fine official gown,  
What a man you have become!*

Also, a frequently cited statement throughout Chinese history has been one made by Confucius' student Zi Xia 子夏 in a conversation he had with another student, Zi You 子游. It was recorded in one of the *Four Books* of Confucianism, the *Lunyu* 論語 (*The Analects*), compiled by the Confucian scholar Zhu Xi 朱熹 in 1174. It states: “when one attains excellence in scholarship, one can then become an officer of the court 學而優則仕”. This statement has been frequently cited as direct evidence from the Sage and his disciples that excellence in learning is a pre-requisite to the power and fortune of officialdom. Perhaps more explicit evidence can be found in the popular expression that states: “Once you pass the Dragon Gate, your personal worth is increased 100-fold 一登龍門 身價百倍.” The Dragon Gate in this expression refers to the third and last gate in the ancient examination compounds called Gongyuans 貢院 used for Keju exams.

As further evidence of the fever toward success in examinations but not necessarily education, there have been specialized gods for exams and various foods and artifacts in Chinese history that were believed to bring good-fortune and to help candidates in exams. A few common examples include the worshipping of the gods Kuixing Ye 魁星爺, Wenqu Dijun 文昌帝君, and Wenchang Dijun 文昌帝君; and food items such as the Exam-passing Congee 及第粥 popular in the Guangzhou area, Zhuangyuan (1<sup>st</sup>-ranked examinee) Red Wine 紹興狀元紅 in the Shaoxing area, and Zhuangyuan Cake 秦淮狀元酥 in the Nanjing area.

There is some evidence that such exam-induced education fever took place in historical Korea as well. For example, observe the theme in the popular 18<sup>th</sup> century Korean romantic story of Chunhyang 春香. In this story, wrongs were righted and justice and happiness were brought about, and the young man, Mongryong, was able to save his

lover Chunhyang; -- but only after he studied hard and ranked first in the national exams and thus gained the power to do these things. Again, the moral of the story is not to study in order to become a scholar or to gain knowledge; but in order to do well in exams that will then bring about fame, fortune, and power.

Is there anything wrong with exam-driven education fever? It would appear that whatever is the driving force, if it could manage to induce a desire for education in children, among parents and in society in general, it would be something beneficial to everyone. Unfortunately, the situation is not that simple. The use of exams as the driving force to induce the desire to learn, in fact, introduces extraneous variables that can lead to undesirable outcomes and side effects. In some situations, it might even counter the purpose of encouraging learning.

An examination, in its pure conceptual form, is basically a passive, standardized, and hopefully fair way to measure human knowledge and ability. It is conceptually an innocuous measurement tool and procedure similar in function to the use of the string, the ruler or the scale to measure length or weight. However, when an examination is coupled with a reward system such that much is to be gained by doing well on this examination and much is to be lost when one performs poorly on this exam, the function of the examination has changed. It is no longer a simple innocuous measure, but is an important social tool in the overall reward/punishment system. This reward system, on the one hand, drives education and induces a general enthusiasm toward education; while on the other hand it becomes an active social force that can potentially change the behaviors of the prospective examinees, the parents and society in general. Some of these changes might be intended while others might be unintended. Some of these changes are consistent with the overall goal of society and of education, while others are not. That is, exam-driven education fever may be gained at the expense of many other unintended negative consequences. In this paper, we explore some of the unintended consequences of the Keju exam-driven education fever in ancient China.

## *A brief summary of the Keju exam system of ancient China*

The Keju examination system is commonly regarded as being started around the year 606 and officially ended in 1904; for a total of 1,298 years. During this time, the exams became the central focus of a state-orchestrated system of high-stakes civil service employment tests and test-driven education. At its height, over a million examinees were tested every 3 years. When we think of civil service exams, we think of tests to identify and hire low-level functionaries and workers in a governmental bureaucracy. This was not the case with the Keju system. Through these exams, Chinese emperors identified individuals who would either immediately or eventually serve as prime ministers, ministers of major national departments, imperial secretariats, provincial governors, county magistrates, city mayors, and other key positions of power. These exams were used to select individuals for high-level, high-power positions; along with all the rewards that came with such positions, including financial rewards, prestige, power, and various advantages for the entire extended family and ancestry. The stakes were extremely high.

In its most common and stable form, the exams consisted of three progressive levels. First, a candidate takes the local district/prefectural exams known as the *tongshi* 童試/院試. These exams were given once every two years. A person passing these exams was awarded the title of a *Shengyuan* 生員 or *Xiucai* 秀才 (budding scholar) and was eligible to take the next level of the exams, along with the privilege of being exempted from certain military drafts, public works duties and some taxes. Next level was the provincial exams called *xiangshi* 鄉試, which was given once every three years at the provincial capital. A *Shengyuan* who passed these exams was awarded the title of a *Juren* 舉人 (elevated scholar) and was eligible to take the third set of exams. This third set of exams took place in the national capital and was given the spring after the provincial exams. This third level consisted of two steps: The “joint” exams called *huishi* 會試, to be followed by the palace exams, *dianshi* 殿試. Those who passed the joint exams were given the title of a *Gongsheng* 貢生 (tributary scholars) and those who passed the final step of the palace exams were given the much coveted title and privileges of a *Jinshi* 進

士 (advanced scholars). Jinshi's were eligible for official appointments. Jinshis were divided into three tiers. The top tier consisted of only three jinshi's and these three top jinshis were given special titles (*Zhuangyuan* 狀元, *Bangyan* 榜眼, and *Tanhua* 探花). The privileges and honors that went with these titles were extreme. One could take these exams as many times as desired.

Both the earliest district/prefectural exams and the final palace exams were one-day long – typically from sun up until sun down or until the end of three candles. The provincial exams and the joint exams in between, however, were very harsh experiences. Each of these two sets of exams was nine days and nine nights long. The nine days/nights were divided into three sessions; each three days and three nights long. A candidate checked in the large prison-like examination compound before sun rise (the check-in process started at midnight) on the first day and was assigned a very small cell with no wall on the front side in a long row of about 50-60 such cells that share a common outhouse, water supply and locked gate. There, the candidate would spend the next three days and nights answering questions on paper, sleep, and eat food brought in on the first day. All activities were under the watchful eyes of proctors and guards in guard towers overlooking the exam compound. The candidate was to leave the compound by the end of the third day and to return after a day of rest. The process was repeated two more times.

Candidates were tested on knowledge, which was demonstrated through written essays, of contents of nine classic texts of Confucian philosophy and history called the *four books and five classics* 四書五經. They were also tested on poetry, on the writing of official documents, and on national policy issues. The *four books and five classics* were books compiled by Confucian scholar Zhu Xi 朱熹 in the Song dynasty. The four books included *Great Learning* 大學; *The Doctrine of the Mean* 中庸; *The Analects* 論語; and *Mencius* 孟子. The five classics included the *Book of Changes (I Ching)* 易經; *Book of History* 書經; *Book of Odes* 詩經; *Book of Rites* 禮記; and *Spring & Autumn Annals* 春秋.

The essays on the Confucian classics were to be written in a very restrictive writing style called Baguwen 八股文 (8-legged essays), which is generally considered pedantic and trite by modern-day scholars. The essay consisted of 8 components, each serving a different purpose (opening statements, supporting statements, beginning discussion, abstraction, etc.). Each component had to be written to conform to particular rules, including rules on the number of sentences; format, length and style of each component; and rules for rhyming, symmetry and tonal balance and “couplet” styles. There were also strict limits on the total number of words for the overall essay. There were also general rules regarding the avoidance of certain offensive words and words that might reveal the candidate’s identity or status. Since the essay was supposed to explain the meaning of a quote from Confucian classics by “speaking for the Sage”; words, phraseology and events that occurred after the death of Mencius, the later sage after Confucius, in 298 BCE would not be allowed. This restrictive essay style served no purpose in life except for meeting the requirements of the Keju exams.

The testing of poetry was equally restrictive. By the Qing dynasty, the poems were to be written in a standardized format called *Shitishi* 試帖詩 (*standard exam poems*). This was a very restrictive format that left little room for artistic creativity. The candidates were given a title for a poem with one of the words in the title identified as the “rhyming word.” The candidate was then to write a poem based on that title following these rules: 1) each verse must be 5 words in length; 2) there must be 8 pairs of verses, or a total of 16 verses; 3) except for the first and last pairs, all other pairs of verses must form symmetric ‘couplets’: Symmetric in terms of contents (e.g., yin-yang, people-people, nature-nature) and the words be symmetric in strict adherence to tonal rules; 4) all pairs must rhyme with the assigned rhyming word in accordance with rhyming rules; 5) the contents of the 8 pairs must follow the same set of rules as those for the 8 components in Baguwen; i.e., opening statements, supporting statements, etc.; 6) all the words in the given title must appear within the 20 words in the first 2 pairs. If the title was too long, must have all the essential words of the title within these 2 pairs; 7) the last pair of verses must praise the emperor or praise the peace and prosperity of the time.



The number of candidates passing the exam is based on assigned national quotas. The list of passers was announced 15 days after the end of the exams. The average number of Jinshis conferred after each administration in the Sui & Tang Dynasties (600-960) was about 30. The average number of Jinshis conferred after each administration in the Song, Ming and Qing Dynasty (960-1279, 1368-1644 and 1644-1911) was about 200-300. Based on several sources (Chang, 1955; Ho, 1962; Wainer & Braun, 1988), it can be estimated that the chance of an individual passing the prefectural exams to become a shengyuan is about 0.2 to 0.3%. The chance of a shengyuan advancing to become a juren through the provincial exams is 1 to 2%. Finally, the chance of a juren earning the jinshi title through joint and palace exams is about 5 to 6%. Since previously failed shengyuans and jurens could take the next level exams as many times as possible, the probability of finally becoming a jinshi through these exams is not a simple compounding of these probabilities, but is in fact much lower than the joint probability – a chance of about 1 out of 250,000 to 1 out of a million. In other words, the probability was extremely small.

This system has been commonly praised by historians and psychometricians alike as being valid and sophisticated (e.g., Martin, 1870; Dubois 1964, 1970) and was adopted in different forms by various nations including Korea, Vietnam, England and the United States (Liu, 1996). In the case of Korea, in 936, the Koryo 高麗 dynasty successfully unified the peninsula of Korea. Based on the advice of a scholar in the Koryo imperial Hanlin Academy 元甫翰林學士 named Shuang Yi 雙翼, who was originally from China, Koryo adopted the Keju examination system of China in 958. This continued through the Choson 朝鮮 dynasty (1392-1910) until 1894, when Japan invaded and eventually colonized Korea (Liu, 1996). Because the Korean system was adopted two years before the beginning of the Chinese Song 宋 dynasty (960-1279) and thus before the Keju system stabilized into the system described in this paper under Song emperors, the Korean system was thus slightly different from what is described above. Many Korean scholars in fact went to China to participate in the Chinese Keju exams throughout history.

### *Some unintended consequences*

The function of an exam changes and the nature of education changes as a result of inducing education fever through high-stakes testing; such as the education fever induced by the Keju exams in ancient China. These changes may be due to several fundamental characteristics of exam-driven education in general. Four such educational characteristics that can be observed in the Keju-induced education fever of ancient China include *peripheral counterproductive activities*, the “*baton effect*” of exams, *the limits of exams*, and *unintended effects on the learner*. First, because the stakes were so high and the consequences of doing well on the exams were so important, the fever was no longer on learning and education was no longer an end in itself. Rather, the fever was toward doing well on the exams. Although studying and learning and education fever were the orthodox route to doing well in the exams, it was not the only way. Many *peripheral counterproductive activities* could also lead to good performance on the exams. For instance, the fever toward doing well on the exams could lead to a great deal of effort expended on non-productive or counterproductive activities such as cheating, testing coaching, and teaching toward the very specific contents or style of test questions.

Then, there is the question of education fever toward learning what? Given the importance of the exams, the obvious answer is to teach and to learn what is being tested. It is generally known that high-stakes exams will drive curriculum. Subject matters that are being tested will be taught and students will try to learn them. However, subject matters that are not tested, no matter how valuable, will be ignored or de-emphasized and students will not wish to spend too much time learning them. The effect of the exam is similar to that of the conductor’s baton in a musical symphonic orchestra. Whatever instrument is being pointed at by the conductor’s baton, that section of the orchestra is being emphasized and the rest of the instruments are at best background and are de-emphasized. This *baton effect* occurs not just within the classroom or the education system. The high reward that comes with doing well in the exams also directs the overall society to value skills that are tested and ignore skills that are not tested. Consequently,

subject matters that are tested are not only taught and learned, but are valued by society. All other skills are at best de-valued. That society then produces people skilled in matters tested and would excel in the development of primarily those matters tested. Its development in other subject matters will suffer.

Not everything can be tested. It is often said that we test what is easy to measure, but not necessarily what is important. There are many inherent *limitations to tests and exams*. One apparent limitation is that of time. Given the need to complete an exam within a reasonable amount of time, skills and tasks that take a great deal of time would not be tested. For high-stakes assessment, it is also necessary that the examination procedure and format of the exams and tasks be fair to all examinees. This suggests a need for standardization and uniformity of exam contents and procedures. It is also necessary that exams be designed in such a way that responses can be scored or judged easily, efficiently and with little ambiguity. These limitations impose additional constraints on subject matters tested such that emphases in learning and teaching of the subject matters tested are placed on those aspects and features of these subject matters that can be tested and can meet the specifications and limitations of testing conditions. Additionally, skills suitable for the limitations of the particular format of the test will be emphasized while skills that do not adjust well to the testing procedures and format will be ignored. For example, given the inherent limitation of time, speed would be valued over deliberation. In a multiple-choice exam, ability to discriminate among choices would be valued over depth of understanding.

Finally, a high-stakes exam-driven system is coupled with an award system in such a way that there will be a limited number of awards. In other words, a number, often large, of learners will fail the exams; in spite of the general education fever. In a society where there is a heightened level of education fever and where successes in exams are highly valued, the *effects of failing the exam on the learner* will be devastating.

Liu (1996) has pointed out that the Keju system led to a general enthusiasm toward education in historic China. However, he also cautioned that such a system is in fact a

two-edged sword. While it helps induce education fever on the one hand, it also brings along a number of other effects, many of which may not be that desirable. A high-stakes examination system and exam-driven education system as large and long-lasting as the Keju system has necessarily led to many consequences; including political, social, educational and cultural consequences. For example, the examination is commonly regarded as having provided a stabilizing force in maintaining political tranquility and harmony (e.g., Ho, 1962; Miyazaki, 1976). Unfortunately, the education fever was gained at the expenses of inducing peripheral counterproductive activities, stifled developments due to the baton effect, narrowed focus due to the inherent limitations of exams, and pathological effects on the learners.

### **Peripheral counterproductive activities**

In the case of the Keju system, we know, for example, that starting from the early Ming (1368-1644) dynasty (Chow, in press), successful essays from the exams had been widely published by commercial printing presses. These model essays became very popular instructional materials. Students studied these essays and often memorized them verbatim in hopes that they could imitate such excellent writing styles. Such learning activities had only one objective in mind: Doing well in the exams. The original intended education fever was meant to provoke enthusiasm toward learning Confucius' philosophy regarding morality, society and government. Instead, the effort was expended on learning how previously successful candidates had written their essays. These activities do not serve to advance learning and knowledge. Rather, they helped only to advance the art of writing. They serve to improve testing performance, while taking time away from learning the subject matter.

In addition to these model essays, there were also many books that can best be described as “test-coaching” books. These were books designed to help a student to improve test-taking skills. They taught students “tricks” to writing essays in Baguwen style and poems in Shitieshi style, which are the two standardized styles used in the Keju exams –

and only in the Keju exams. Such knowledge only serves to improve exam performance without improving learning of the Confucian classics. To illustrate, Qi (1999) described a book entitled *Shengyun qimeng* 聲韻啓蒙 (*A Primer of sounds and rhymes*), written by Ju Wanyu 車萬育 during the reign of the Emperor Kangxi 康熙 (1662-1722) that had become a popular textbook for students. The book contains pairs of words, phrases, and even complete sentences that are matches for one another under the rules of Baguwen and Shitieshi and are thus useful when composing matching couplets of sentences needed for Baguwen and Shitieshi. Below are a few examples (Qi, 1999, p. 17):

雲對雨, 雪對風, 晚照對晴空.

來鴻對去燕, 宿鳥對鳴虫.

*“Clouds” matches “rain,” “snow” matches “wind,” “evening twilight” matches “clear sky.”*

*“Arriving geese” matches “departing swallows,” “nestling birds” matches “buzzing insects.”*

Again, the knowledge of these rules and rhymes are useful only for the exams and serves no purpose in learning either the Confucius classics or other general knowledge. Students devoted a great deal of time to these activities in order to do well in the exams.

Perhaps the most destructive of all counterproductive activities were the widespread cheating activities. The Keju system was in fact very structured and highly organized in such a way that it should have minimized cheating. Severe punishments were meted out for people caught cheating, including caning or being placed in stocks for a month. Many measures were taken to prevent cheating, including specially built prison-like exam compounds that could accommodate up to 22,000+ examinees with armed guards and with thorny bushes planted around the outer walls (Chaffee, 1995), very strict search procedures, very strict exam procedures, grouping candidates in small groups responsible for each others' behaviors, watch towers, strict rules and specifications regarding clothing and what could be brought to the exam compound, close constant proctoring, anonymity in scoring through concealed names and the use of copyists, sequestering examiners prior

to exams, and so on and on. There are really too many of these measures to describe in this paper.

Yet, in spite of all these measures, cheating was often rampant and the amount of cheating ebbed and flowed throughout the ages. Exam officials and examinees and people who provided supplies to examinees were in fact engaged in a continuous cat-and-mouse game. On the one hand, the officials added more and more rules and restrictive measures. On the other hand, the candidates and suppliers were continuously attempting to outwit the officials.

For instance, one of the weakest links in the exam system was identification. Without photography, fingerprinting, or other means of authentication available today, examiners relied on verbal descriptions of candidates for identification. Consequently, hiring substitutes to take exams, particularly at the low-level prefectural exams, was quite commonplace. According to one estimate (Chen, 1993), as much as 30-40% of prefectural examinees were illegal hired substitutes during late Qing dynasty.

Other common cheating methods included bringing and using concealed cheat sheets and notes. Cheating notes have been found in pockets, inside linings of clothes, hollowed soles of shoes, baked bread and cakes, handles of pens, hollowed bases of inkslabs, hollowed bases of carrying cases, written on undergarments, and even written on undergarments with invisible ink that shows up when rubbed with dirt. Other cheating methods included communicating with outside confederates by tying sheets to rocks and secretly throwing them over walls of the guarded exam compound, using carrier pigeons to send notes back and forth, and using signal lanterns on long poles or fireworks as signals. Bribing exam officials was yet another popular activity. Officials and exam compound workers were bribed to hide cheat sheets in exam cells ahead of time; proofreading officials were bribed to switch ID numbers of candidates with those obtaining high scores; examiners were bribed to provide high scores to anonymous essays with certain agreed-upon key phrases at agreed-upon points in the essays.

There was a significant underground industry developed to facilitate these cheating activities. For example, Guo (1994, p.137) reported cases in which skillful craftsmen prepared extremely thin gold-leaves about one-thousandth of an inch in thickness and copied in extremely tiny words all 9 Confucian classic texts into about 1,000 such gold sheets. Rich exam candidates would pay dearly for these. They were then rolled up and hidden inside the hollow handle of a brush-pen, which would be taken into the exams as part of a candidate's supplies.

### **Baton effect**

One of the major aspects of exam-driven education fever is that the exam is in control of the system. As a result, the attention of the entire educational system as well as that of the value system of society is directed to those areas being tested. The educational system in specific and society in general become quite strong in the development of those areas tested. Areas not tested, however, are often ignored and developments in those areas consequently suffer. The Keju system tested examinees on writing essays in the format of Baguwen to explain the meaning of Confucius' classic texts and to write poems on given topics. They were also required to write policy essays on current topics but these essays were in fact used to examine whether the candidate was able to apply Confucius' social philosophy to solve current problems. These skills were thus emphasized in the educational system and were valued by society overall. Other skills and areas of knowledge consequently were ignored and did not develop extensively.

It is difficult to speculate as to what could have happened in areas not tested if the Keju exam system were not in place. However, some observable long-term patterns may be suggestive of opportunities lost due to the baton effect of the Keju exams. An area that has almost certainly suffered from neglect at least partly due to the baton effect of the Keju exams is the area of medicine. Medicine as a discipline of learning and investigation has always had a low social status in ancient China. It was often associated with fortunetelling. The elevation of the status of literati over others by the Keju exams, along with the perceived power and wealth of being successful in the exams have at least

contributed to ensuring that medicine maintained a low status. Regardless of the exact reason for the low status of medicine, it is quite clear that the Keju exam system had siphoned talents away from medicine into the areas of civil administration, philosophy, poetry and literature. We can obtain an indirect glimpse of this siphoning effect by examining how the lives of distinguished individuals in the area of medicine differed in the presence and absence of the Keju exams over the ages.

There are about 21 particular individuals throughout Chinese history who are commonly considered the most important historical figures in the development of medicine. They include, in chronological order:

Prior to the Keju exam system: 1. Bian Que 扁鵲 (c. 500 BCE) ; 2. Chun Yuyi 淳于意 (c. 200 BCE); 3. Zhang Zhongjing 張仲景 (c. 100 CE); 4. Hua Tuo 華佗 (c.110-207); 5. Ge Hong 葛洪 (c. 200); 6. Huang Fumi 皇甫謐 (~215-282); 7. Tao Hongjing 陶弘景 (452-536); 8. Chao Yuanfang 巢元方 (550-630)

During early Keju exam system/period of moratorium of exams (Sui through Yuan dynasties): 1. Sun Simiao 孫思邈 (541-682) ; 2. Wang Tao 王燾 (670-755); 3. Qian Yi 錢乙 (c. 1032-1113); 4. Li Dongyuan 李東垣 (1180-1252); 5. Zhu Zhenheng 朱震亨 (1281-1358)

At the height of the Keju exams (Ming and Qing dynasties): 1. Li Shizhen 李時珍 (1518-1593); 2. Wang Kentang 王肯堂 (1549-1613); 3. Wu Youke 吳又可 (1582-1652); 4. Zhang Jingyue 張景岳 (1583-1640); 5. Ye Tianshi 葉天士 (1666-1745); 6. Wu Jutong 吳鞠通 (1758-1836); 7. Wang Qingren 王清任 (1768-1831); 8. Wu Shangxian 吳尚先 (1806-1886)

When we examine the lives of these 21 medical giants across different time periods, a pattern emerges. Of the 8 individuals who lived prior to the establishment of the Keju exam system, 5 started their career in their own area of interest of medicine and practiced medicine the remainder of their lives (See Table 1). Most were repeatedly offered high-level civil administrative posts but all have declined. The remaining 3 individuals accepted offers of administrative posts but continued their medical research/practice simultaneously. None opted for medicine as a last or even second choice. When we look at the lives of the 5 individuals who lived during the early days of the Keju exam system through the period of the exam moratorium in Yuan dynasty (i.e., Sui through Yuan



dynasty), a slightly different pattern emerges. Of these 5 individuals, 4 chose medicine as a career from the start and refused civil administrative posts when offered. The fifth (Zhu Zhenheng), however, chose medicine only as the last resort – after a fortuneteller told him that he was destined to fail the Keju exams. When we examine the lives of the medical figures who lived during the height of the Keju exam system in the Ming and Qing dynasties, however, a very dramatically different pattern emerges. Of the eight medical figures who lived during this period, all but one (Ye Tianshi) chose medicine only as the very last resort. In every case, except for Ye Tianshi, the first choice was to attain a post in civil (or military) administration. Most studied for and participated in the Keju exam system early on in life. They gave up their attempts for the exams and switched to medicine later in life only after either repeated failures or after some traumatic event. Medicine was the last resort in every case. Table 1 provides a summary of the pattern of career choices among these medical giants.

Table 1  
Medicine vs. civil administration as first choice

<b>Prior to Keju exams</b>	
Medicine as 1 <sup>st</sup> choice	1. Bian Que. 2. Hua Tuo. 3. Ge Hong. 4. Huang Fumi. 5. Chao Yuanfang.
Equal interest in civil administration	1. Chun Yuyi. 2. Zhang Zhongjing. 3. Tao Hongjing
Medicine as last resort	(none)
<b>Early Keju/moratorium</b>	
Medicine as 1 <sup>st</sup> choice	1. Sun Simiao. 2. Wang Tao. 3. Qian Yi. 4. Li Dongyuan
Equal interest in civil admin.	(none)
Medicine as last resort	1. Zhu Zhenheng
<b>Height of Keju exams</b>	
Medicine as 1 <sup>st</sup> choice	1. Ye Tianshi
Equal interest in civil administration	(none)
Medicine as last resort	1. Li Shizen. 2. Wang Kentang. 3. Wu Youke. 4. Zhang Jingyue. 5. Wu Jutong. 6. Wang Qingren. 7. Wu Shangxian.

Of course, it is not possible to know what advances in medicine would have occurred had there not been the baton effect of the Keju exams. From the pattern above, however, it is quite reasonable to infer that many would-be-medical-giants have been siphoned off to prepare for and participated in the Keju exams. Many of these potential medical talents would either become successful in these exams to become mediocre administrators or become career examinees. Their natural talents and interests in medicine were never encouraged or cultivated. Therefore, we can infer that the Keju exams have indirectly stifled potential advances in medicine in ancient China.

Another area that is very likely to have suffered due to the indirect baton effect of the Keju exams is the general area of engineering/technological development. I should clarify that, by engineering/technological development, I am not referring to the epistemology of science. China has had a long and continuous developmental history in scientific epistemology; parallel that of what occurred in Europe (cf. Elman, 2002). Instead, I refer to the development of technology and engineering in the form of applications of scientific knowledge to solve everyday problems.

The extent to which the baton effect of the Keju exams has stifled the development of technology in China is rather controversial. It is commonly known that many of the early technological advances in the world had been made or discovered in China. These include such items as the development of the compass, seismic sensors, gun powder, the use of coal, paper, and movable type printing, among others. Most of these developments were made prior to the beginning of the Keju exam system and particularly prior to the widespread educational fever among common citizens, which started in the Song dynasty. Yet, after the implementation of the Keju examination system, there continued to be a number of new developments in technology. These included developments in agricultural technology, particularly irrigation and crop rotation technologies; textile technology, and maritime technology, among others. Thus, while many scholars have argued that technological development in China was impeded or at least decelerated by the implementation of the high-stakes Keju exam system, others have argued that there is

no direct evidence that technological developments have suffered since new developments continued to emerge after the exams were in place.

It is quite likely that direct evidence of the negative impact of Keju exams on technological development will never be obtainable as it is inherently difficult to prove what could have happened in the absence of what has already happened. However, in spite of the continuing development of some new technology in China after the implementation of the Keju exams, logical reasoning dictates that at least some, if not a great deal, of advances in technology have been lost due to the siphoning of talents to study for the exams. The exam system, and thus the educational system, placed a great deal of focus on knowledge of Confucius' social philosophy of government and on poetry. A valued scholar was one who knew the proper way to conduct himself according to Confucian doctrines, was capable of governing in accordance with the Confucian philosophy, and was able to write good essays and poems. In fact, the highest ideal to be attained by literati, according to Confucian teaching, is to become a *jun-ji* 君子 (a virtuous scholarly gentleman). The proper goals in life for a *jun-ji* is to strive to become a virtuous person first, then to establish an orderly and happy family, to help rule the nation in a proper manner and finally to bring peace to all under heaven 修身齊家治國平天下. Thus, the Keju exams inevitably directed all students to focus on the principles and philosophies of morality, proper human conduct and political ideology and systems. Matters of technology and engineering were at best devalued; and were despised as not worthy of the scholar. In fact, one of the often-quoted teachings from the Confucian classic texts states that *Toying with things will lead to a loss of ambitions* 玩物喪志. In general, this quote is taken to suggest that what we consider recreation activities today were discouraged under Confucianism. However, it also suggests that tinkering with things (machine-toys; i.e., engineering) should be avoided. Thus, with the Keju exams directing all students toward the study of Confucian philosophy, technological development had to have suffered from negligence.

Finally, the baton effect did not only apply to broad subject matters of study such as medicine and engineering, but also had an impact on what exactly to focus on within a

single subject matter area. One of these effects can be observed in the development of poetry versus other genres of artistic expression. In the very early days of the Keju system during the Tang dynasty, poetry was not tested. Examinees were required to write policy essays only. In 681, the exam content was changed to composing poems and poetically rhymed prose called *fu* 賦. This change was initiated by imperial decree. In the decree, the emperor complained that candidates in the first 70+ years of the Keju exams had been studying and memorizing by rote old policy essays in preparation for these exams. When required to write these essays, they often regurgitated these model essays verbatim. Subsequently, candidates generally had low levels of literary skill, were unimaginative and were generally not very intelligent (Zhang, 2002, p. 7). It was believed that one could not compose good poetry, or good *fu*, without profound knowledge and understanding of history and philosophy. Additionally, Confucius suggested that poetry was the essential tool through which one demonstrates knowledge, intelligence and ability. Consequently, the writing of poems became and remained a major component of the Keju exams.

With this emphasis on poetry in the exams, and thus widespread study of the art of poetry, both the Tang dynasty and the successive Song dynasty were famous for their excellent poetry. Both dynasties produced numerous famous and prolific poets, and Tang and Song poems are still appreciated, praised and studied today. All these came to an abrupt end when the Song dynasty was replaced by the Yuan dynasty of Khubilai Khan in 1279. Very few poets emerged in the next 100 years or so and poetry was never to regain the quality of the Tang and Song dynasties. What happened? The Keju exams were discontinued for about 100 years under Khubilai Khan and his successors. Without the driving force of the Keju exams, few were interested in composing poems anymore. When the exams were resumed under late Yuan dynasty 100 years later and during the subsequent Ming dynasty, poetry was not tested at all. Poetry was re-instated as an exam subject under Qing rules, but in the changed format of the highly restrictive *shitishi* described earlier, which was almost a mini-version of *baguwen* essays. The writing of poems never quite stopped, but its popularity waned.

Instead, the Yuan dynasty was famous for producing many excellent playwrights, who have written numerous dramas, stage plays, and operas. The genre that is called Peking Opera today was developed during this time. The most famous playwright in Chinese history, Guan Hanqing 關漢卿 (1229-1297), who wrote 63 plays, emerged during this time. Many of the plays, dramas and operas remain popular today (700 years later), in the form of stage plays and movies. Prior to the Yuan dynasty, scholars had ignored stage plays, dramas and operas and little energy had been expended by anyone in the development of these genres of artistic expression.

Why the sudden switch to the popularity of plays, dramas and operas? For the exams during the Tang and Song dynasties, candidates were required to write poems with 12 five-word verses or a total of 60 words for each poem. These were all highly regulated short poems that could be tested and easily evaluated in an exam setting. With the exception of a few lengthy odes, most famous Tang poems written outside of the exam settings were indeed short ones, not too different from the exam poems. The plays, operas and dramas produced during the Yuan dynasty, by contrast, were very long stories; the writing of which could not be tested within the short time frame of an exam setting. As long as the exams were in place and the ability to write short poems were tested, few would incline to develop lengthy and time-consuming genres of artistic expression that were not and could not be tested. Once the driving force for short poems was removed by stopping the exams and the accompanying reward system, alternative forms of artistic expression emerged. The question, of course, is: Would there have been the emergence of these plays, dramas and operas had there not been a discontinuation of the exams? We can surmise that, even if they did emerge, in the competition for the attention of literati, they would have failed against the development of poems. Not only that there was nothing there to foster their growth and development; but by drawing energy and attention toward poetry, their development was in effect discouraged by default. While the exam-driven fever toward learning and composing poetry was in place, we would have no idea what good plays and dramas might have been missing.

After the Keju exams were reinstated in late Yuan dynasty and the subsequent Ming dynasty, poetry was not tested at all. Not surprisingly, Ming dynasty was not known for the poetry of its period. Instead, another genre emerged – lengthy novels. Three of the four Great Novels of ancient China: *Romance of the Three Kingdoms* 三國志演義, *The Water Margin* 水滸傳, and *The Western Journal* 西游記 were all written during the Ming dynasty. The same questions can be raised regarding the emergence of novels as a dominating genre. Why was it that accomplishments in poetry were at their heights when poetry was tested but other lengthier genres such as plays and novels emerged as when poetry was no longer tested? This again is strongly suggestive of the baton effect of the exams, which inadvertently limits the breadth of artistic creativity. For sure, other factors such as the availability of cheap commercial printing presses were contributing factors as well. However, the absence of the competition from poetry made it possible for literati to direct their attention to other genres.

Unfortunately, when an exam-driven education fever is occurring, we seldom can see what is being ignored. In the case of the Keju, we would not have known about the missing plays and dramas and novels had there not been a halt in testing poetry. We would not have known about the missing technological and medical developments had there not been a contrast against what had developed in the meantime in European nations.

### **Limitations of exams**

Exams have many physical limitations. Only certain things can be done during an exam and many things simply cannot be tested easily or efficiently. As illustrated in the previous point regarding poetry, while it is practical to test a person's ability to write short poems within the time limits of an exam, it is almost impossible to test a person's ability to write long plays, dramas and novels in an exam setting with limited time. Consequently, an exam-driven education fever would direct enthusiasm toward learning aspects of things that are practical in exams, but not aspects of things that are difficult to test.

The target of the Keju exam system itself was in fact a compromise on what was practical in testing environments. Prior to the Keju system, the appointments of officers during the Han dynasty were through nominations and lengthy individual observations, oral exams, written exams and interviews. The objective was to identify and appoint men of virtue who would rule the nation in accordance with the moral codes of Confucius, while serving as moral examples for the common people. Those appointed were given titles of *xianliang fangzheng* 賢良方正 (virtuous and upright). Selecting men of virtue and talent remained the official objective of the Keju exams. However, with the increased number of candidates (particularly after the exams were opened to the general public without nomination starting in the Song dynasty), individual observations and interviews were no longer possible. Exams in the form of essays and poems were implemented. While it might be possible to identify virtuous individuals through observation and nominations, it was almost impossible to identify such people through essay exams and poetry. Consequently, the objective of the Keju exams had in practice changed from identifying moral and virtuous men to identifying men who were *knowledgeable* about virtues and moral codes as outlined in the Confucius philosophy. Knowledge of virtue, of course, is not the same thing as the practice of virtue. While the latter was the intended object of education and examination, the former was the result. Consequently, throughout the ages, top jinshi's identified through the Keju exams represented the entire spectrum of moral characters spanning from the royal and upright to the greedy, the corrupt, the cowardly and the cruel. The resulting education fever was not on learning how to be virtuous, but on learning *about what Confucius had said about* being virtuous.

To be fair and efficient, the format of exam questions and responses needed to be standardized. In the early days of the Keju system, there was no fixed format for the essay questions and answers and candidates could elaborate to any extent they wished. Some of the candidates indeed wrote tens of scrolls in response to a single question. As the number of examinees increased, this lack of standardization made it very difficult to evaluate the essays' quality; at least it would be difficult to evaluate the essays by a common standard across examiners. Additionally, it was quite time-consuming to

evaluate these lengthy essays. Starting from the early Song dynasty, attempts to place limits on the essays and to standardize the format of responses were made. As more candidates participated and the time constraint increased, more and more restrictive rules had to be added; eventually resulting in the highly restrictive baguwen format in the Ming dynasty. The baguwen format was so exceedingly restrictive that essays written were generally pedantic and trite. The candidate was preoccupied with rules regarding word limits, rhyming, balance, tone and choice of exact words that there was little room left for creativity and original thought. Consequently, because of the need for standardization and efficiency, the resulting exams no longer tested candidates' knowledge of Confucius philosophy. Instead, it tested candidates' cleverness and wit in coming up with and arranging words that met all the requirements of baguwen.

The same problem occurred with poetry. It was originally believed that the depth of a candidate's knowledge of history and philosophy would be manifested through poetry. However, with the increasingly restrictive rules to facilitate evaluation and scoring, ending with the shitieshi format of the Qing dynasty, writing poems became a process of testing the candidate's cleverness in finding matching and rhyming words that would meet these rules. Much of the education fever was consequently "de-railed" to focusing on learning the art of rhyming and writing couplets, which were not the intended skills or virtues promoted or tested.

Both the all-important provincial exams and the national joint exams were nine-days/nights long, divided into three 3-day/night sessions. During the first three-day/night session, the candidate was to answer questions about Confucianism by providing answers in baguwen style. Additionally, the candidate was to write poems on given topics in the format of shitieshi. The second three-day/night session was devoted to writing various official documents such as legal judgments, reports and so on. The last session was devoted to writing policy essays regarding national or local policy issues. In theory, although baguwen and shitieshi could "de-rail" the purpose of the exams, candidates still needed to demonstrate ability to write official documents and knowledge of and insight



into policy issues of the time. In practice, however, the baguwen and shitieshi proved to be all that was important. The reason is another limitation of the exam setting.

In order to ensure fairness and to prevent cheating, various measures were taken after a candidate submitted his responses written in black ink. First, an officer assigned an ID number to the paper. Next, another officer pasted a piece of paper over the name of the candidate. Next, an official copyist copied verbatim, including the ID number, on another scroll using red ink. Another officer then verified that the copied version was identical to the original version and that the ID numbers were identical. The red copy was then submitted to an associate examiner to be scored and the original black copy was filed away. Each essay was rated by two independent associate examiners. Should there be a disagreement, a third associate examiner was to read the essay to make a judgment and recommendation. In other words, for an exam at any given examination compound with up to 22,000 examinees, the amount of work needed to cover the names and copy the responses and to rate the responses was enormous. By law, the results of the exams were to be posted 15 days after the end of the third session; otherwise the examiners would risk demotion or suffer punishment such as caning. Given this time limit and the enormous task, by the time 15 days were over, the examiners most often had finished scoring only the essays from the first 3-day/night session; i.e., the baguwens and shitieshis (Shang, 1958; Teng, 1967). Most, if not all, of the responses from the second and third sessions were still being covered and copied. To avoid punishment, the examiners would announce the results based on the scores of the first session only. Again, while the intention of the exams was to encourage the development of skills in writing official documents and knowledge of national and local policies; due to the limitations of the exam setting, examinees, and thus candidates studying to prepare for the exams, knew that they only needed to focus on baguwen and shitieshi. The exam-driven education fever, thus, resulted in enthusiasm to learn rhyming and writing couplets and other skills that would help with meeting the restrictive rules of baguwen and shitieshi.

### *Effects on the learner*

Although the aim of the exam-driven system is to promote a general enthusiasm toward education and toward the joy of learning, the ultimate measure of success for the individual is in fact performance on the exam. Since not everyone will pass the exams, there will be a number of individuals who fail. The proportion of people who fail will differ from exam system to exam system. In most cases, the proportion is substantial. In the case of the Keju exam system, extremely few people would achieve the last coveted Jinshi title. The overwhelming vast majority of the examinees would fail. Candidates could take the exams as many times as they wished. Over time, after repeated failures, a large proportion of these candidates would be disillusioned. Instead of producing a nation of scholars interested in learning, the system could very well have produced a nation of disillusioned and cynical individuals. In the case of the Keju exams, we can observe several phenomena among the examinees.

First, given that one could take the exams as many times as possible and further given that the rewards were so high, many people kept trying. As a result, there were many career examinees whose entire occupation of their lives was taking exams. Those whose family could afford it would simply try every three years and kept studying in between exams. Those who could not afford it would try to subsist by some means in between exams. Throughout history, there had been many examinees that took the exams from when they were teenagers until they died, never accomplishing anything in their lives. For example, Chen (1993) reported the case of Gong Chengyi 公乘億 who took the exams 30 times until he died. From record, we know of the case of Lu Yunzong 陸雲從 who took yet again and failed yet again the last exam of his life in 1826 when he was 103 years old. Chinese history is filled with candidates taking these exams until they were well into their 70's and 80's; until they were physically no longer able to participate or until they died. Many of these lives may be considered wasted, as all these individuals ever did was to prepare for the exam and to take the exams repeatedly. This type of individual is not consistent with the lofty goals of education fever.

In the case of the Keju exams, the subject matter tested had little practical value in an agrarian society. The knowledge of Confucian philosophy of government, the ability to write official documents and policy essays might be useful skills had one passed the exams and if one was subsequently appointed an officer of the court. But these skills would not offer much assistance to an individual who failed the exams and was attempting to make a living. What was a failed candidate to do? For the fortunate few, they were able to find jobs as advisers (called Shiye's 師爺) to rich merchants or even officers. Yet a few others were able to make a living as accountants for rich merchants. Some were able to find jobs as tutors to teach the next generation of (failing) candidates. The majority of the failed candidates simply had no means, knowledge, skills, nor ability of making a living. Some of these failed candidates came from wealthy families and would essentially live off their families in between exams. In other words, they became economic parasites without any useful skills. Other less fortunate ones would beg, borrow or do whatever was necessary to subsist.

One of those repeatedly failed candidates from a wealthy family was Wu Jingzi 吳敬梓 (1701-1754). He failed the exams repeatedly and simply lived off the wealth of the family. However, since he did not know how to manage his family business and had no income, he eventually exhausted all his family fortunes. Between 1745 and 1754, he did whatever was necessary to scrape a living around the examination compound in Nanjing. There, he observed many of the lives of many failed candidates and wrote the classic novel entitled *Rulin Waishi* 儒林外史 (*The Other History of the Literati Circle*). In this parody, he chronicled the lives of many failed candidates and other wannabe's, their families and other social climbers. He described the comic lives of the failed candidates, who often had to resort to deceit to make a living. He also ridiculed the pretentiousness and self-importance of often-penniless Jurens, and the comic admiration from the wannabe's. The exam-driven system had produced many social parasites whose abilities consisted of preparation for the exams.

Repeatedly failing the all-important exams, which had been greatly promoted by the state and the general education fever of society, must have taken a severe psychological toll

from the failed candidates. Minimally, there would be serious problems of self-doubt and poor self-esteem. Effects of failure have ranged from mild cases of self-doubt to various psychopathologies and in some cases to suicide or physical violence to others. There have been many recorded cases of psychological problems of delusions and illusions and various forms of insanity. Many of these cases have been described by Chen (1993), Elman (2000), Liu (1996) and Miyazaki (1976). Some of these psychopathological illusions and delusions were the subject of part of the famous 17<sup>th</sup> century novel, written by Pu Songling 蒲松齡, entitled *Liaozhai zhiyi* 聊齋志異 (*The strange stories from a Chinese studio*). In other words, another by-product of the exam-driven education system was the generation of a whole class of exam-induced psychopathology and a large number of mentally ill individuals.

### ***Conclusion***

Education fever may be intrinsically desirable to some. However, we need to examine how the fever toward education has arisen. Dependent on the mechanism that is in place to induce such an education fever, the unintended consequences can be more damaging than the intended educational benefit to society. In the case of the historical Keju-exam induced education fever, there is much to be questioned regarding the price China paid for the education fever it enjoyed in history. Certainly, the use of the exam-driven system did not preclude genuine learning and true intellectual activities. We might even conjecture that there was a genuine fever toward the intended learning of the Confucian philosophy. However, the use of the exams as the driving force did introduce a number of extraneous factors that might have countered the possible benefit of these genuine intellectual activities. In any event, the price paid in terms of energy and resources expended on coaching and cheating, in terms of opportunities lost in neglected subject matters, in terms of misdirected focus on surface exam features due to inherent physical limits of exams, and in terms of the general mental health of society may very well have been too dear.

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