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CHINESE COLOR WORD EVOLUTION

A Thesis Presented

by

MARY E. FRANCK

Submitted to the Graduate School of the
University of Massachusetts Amherst in partial fulfillment
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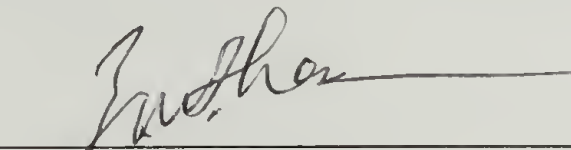Department of Asian Languages and Literatures

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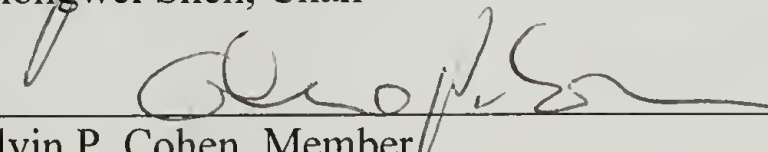
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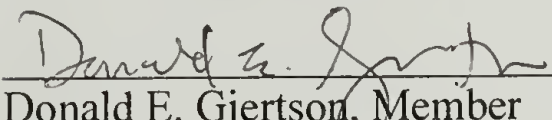
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To my patient and loving husband

Gregory Saulmon

In gratitude to my parents

Frances M. Scholz

Homer L. Franck

In grateful respect for my teachers

Zhongwei Shen

Alvin P. Cohen

Donald E. Gjertson

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INTRODUCTION

The color spectrum is a continuous band of frequencies that is perceived by the human eye as a rainbow of colors. It is universal among all languages to divide the continuous color spectrum into finite categories, and to name those categories. One only has to look as far as a crayon box to see the proliferation of English color words.

This thesis is an in-depth survey of the development of Chinese color words throughout Chinese written history. It discusses the categorical classification of the color spectrum into word groups. In addition, it investigates the patterns of color word development through its various stages—basic color words, similies (names of objects that are characteristically a certain color that later come to specifically indicate that color alone), and the fossilization of color terms. The focus of this thesis is a statistical analysis of the usage patterns of basic color words and their subsequent fossilization. Through this analysis, we can see changes in the usage of color words over a written history of two-thousand years.

Color word development has several stages. First, basic color terms are invented as the need to name each color group arises. The specifics of how basic color terms arise is unknown as they usually occur so early on in the development of a language that it is extremely difficult to deduce where the original word came from. For example, we know that *xuan* 玄 and *huang* 黃 are two of the four color words found on the Oracle Bone Inscriptions[1] of the Shang dynasty (1200-1046

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[1] Oracle Bone Inscriptions (*Jiagu wen* 甲骨文) of the Shang Dynasty (12th to 11th cent. B.C.E.)

1

BCE). *Xuan* (dark) and *huang* (yellow) were used at a point in the language where very little is known about the language as a whole. Therefore, it is difficult, if not impossible, to investigate the origins of the word *huang*. We do know however, that it is the first record of a color term for a range of color covering the modern English brown to yellow. As such, it will be called a basic color term.

Another and very common method of color naming is through similie. (This process may be the source of basic color terms, but it is unproven thus far). Similie occurs when the name of an object that is characteristically a certain color, is divorced from the noun and is used to refer to that color alone. For example, the word *dan* 丹 originally referred to 'cinnabar' or HgS, which has an earthy-red color. Later the word *dan* simple referred to this color. In this way, the newly formed color word can be used to describe objects that are characteristically that color.

Fossilization is the process of a color word becoming fixed in a phrase or proper noun and subsequently losing its original meaning of color. For example, the word *zhu* 朱 is a color word with the gloss of 'vermilion'. In the phrase *zhu niao men* 朱鳥門 'Vermilion Bird Gate', the semantic reference is to a gate. The gate may or may not be vermilion colored. This process does not happen overnight. As will be seen, it takes hundreds of years for color words to occify in this fashion.

In order to fully understand the patterns of usage of the color words found through my statistical analysis of color word frequencies in the Twenty-five

Dynastic Histories, it is essential to discuss previous research on color words. William Baxter has done the most thorough research on Chinese color words and therefore will receive some discussion in this thesis. Baxter has applied the Universal Theory of Color Word Evolution devised by Brent Berlin and Paul Kay to Chinese color words. Through the discussion of their works, I will establish a context for the research I have done to test this theory of color word evolution.

The focus of the thesis is in Chapters Three and Four, in which I present my research and analysis. I determine how Chinese color words change over time. In order to observe and analyze color word development, I found the number of times each color word occurred in each of the Twenty-five Dynastic Histories and the Thirteen Classics. After calculating the relative frequencies of each of these color words, I then further analyzed specific color words based on two factors: 1. the word must have a relatively high frequency and 2. existence of 'older' and 'newer' counterparts. The five words that met this criteria are *xuan* 玄 'black', *hei* 黑 'black', *zhu* 朱 'red', *chi* 赤 'red', and *hong* 紅 'red'. Employing statistics to analyze this vast body of literature, I illustrate the exact proportion color term usages are actually used as color terms. This is the first time this process has been applied to the study of Chinese color words. Through this research I have found that some 'older' color words have become fossilized in proper nouns and phrases, while 'newer' color words remain free and are not limited to the description of certain objects. The replacement of fossilized color words by newer color words demonstrates the process of color word evolution.

CHAPTER 1

UNIVERSAL COLOR WORD EVOLUTION

1.1 Development of Universal Color Word Theory

The study conducted by anthropologists Brent Berlin and Paul Kay in 1969 was pioneering work in the field of semantic universals of color words. Berlin and Kay set out to investigate the pattern of color word acquisition in language. In other words, they wanted to know if languages acquired words for colors in random order or if there was a universal pattern or sequence. At the time, their theory contradicted the popular view that each language encodes experience into words uniquely and are therefore "semantically arbitrary relative to every other language."[2] Despite this prevailing view, Berlin and Kay pursued their investigation and proved that there is indeed a universal sequence of color word acquisition.

In order to investigate their hypothesis of sequential color word acquisition, Berlin and Kay collected data from native-speaker informants in twenty languages. To collect the data, they used 329 color chips. Three hundred and twenty of them were composed of "forty equally spaced hues and eight degrees of brightness, all at maximum saturation, and nine chips of neutral hue (white, black and grays)."[3]

[2] B. Berlin and P. Kay. *Basic Color Terms: Their Universality and Evolution.* Berkeley: University of California Press, 1991. pp. 1-2.
[3] Berlin and Kay. *Basic Color Terms.* p. 5.

The informants were first asked to state the basic color terms of their language. They were then asked to indicate the focal point of maximum density of each color on the color chart and indicate the boundary denoting each term.

This raises the question as to what qualifies as a basic color term. Berlin and Kay had four characteristics for each basic color term:

1) It is monolexemic—its meaning is not predictable from its parts, e.g., blue-green, reddish-orange.

2) Its signification is not named under any other color term. (The color it represents is not implied by any other color term. For example, crimson and scarlet would not count—both are reds)

3) It cannot be restricted to a specific class of objects. For example, blond is applied to hair or furniture.

4) It must be psychologically salient for informants e.g., a) it tends to occur at the beginning of elicited color lists, b) it exhibits stability of reference across informants and across occasions of use, c) it occurs in the ideolects of all informants (e.g., 'the color of rust on my aunt's old Chevrolet' is limited to a single person's ideolect.)[4]

As corollaries to these rules, Berlin and Kay also exclude affixed words (reddish) and colors that share the same name as objects (lemon, lilac, gold). However, Berlin and Kay make an exception for the English word orange (because of its alternate meaning of a kind of fruit) but do not offer any adequate

explanation. Also excluded are recent foreign-loan words and any word that is morphologically too complex, such as blue-green.

Berlin and Kay found that there are eleven basic color words among all of the languages studied: black, white, red, yellow, green, blue, brown, pink, gray, purple, and orange. They also found that not all languages have terms for all of the basic colors. More importantly, they found that there was a certain order to acquisition in the historical development of a language. Although the study conducted by Berlin and Kay was conducted on modern languages, since each language was at a different stage of development, they surmised that the observed data reflected the different historical stages in the development of language. Black and white were always first to appear. Red was next, then yellow or green but not both. Blue followed, and then brown. Pink, gray, purple and orange were the last to appear and they usually entered a language all at once. From this we conclude that a language containing a word for blue, for example, must also already have words for black, white, red, yellow and green.

Since Berlin and Kay's first analysis of color words, much research has been conducted in this field and their results have been revised. New studies conducted by Berlin and Kay, along with C.K. McDaniel, have developed a more precise hypothesis of the seven basic stages of color lexicon development. These new findings provide a more accurate picture of universal color development as well as a far more reliable base from which to launch further, more detailed, investigations of color naming in language.

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[4] Berlin and Kay. *Basic Color Terms.* p.6

This new research project led to the World Color Survey. It was initiated because of five faulty premises in Berlin and Kay's original experiment. First, the twenty languages studied were not numerous enough to allow for universal conclusions. Second, the data were collected at Berkley rather than in native countries. Third, most of the informants also spoke English. Fourth, for most of the languages only three or fewer informants were interviewed. Finally, it was discovered that not all of the informants were native speakers of the language.

The new data were collected in situ for one hundred and ten languages. There were at least twenty-five informants per language and monolingual speakers were used whenever possible. Based on this newer work, Berlin and Kay still maintain that there are eleven basic color words (black, white, red, yellow, green, blue, purple, pink, orange and gray), but they have constructed a new model of how these words developed. The new experiments lead to the following conclusions.

1.2 Universal Color Words: Patterns and Developments

The researchers found that, rather than a language first defining terms for black and white while leaving all other colors unnamed, there are instead two words to cover the entire range of colors. That is, there are two words that describe the entire color spectrum: a word for light colors and a word for dark colors. The light color term refers to white, red and yellow. The dark color term refers to black, blue and green. As the language develops and there is a need for distinctions within

color categories, divisions are made within these two major groups. Thus, the next differentiation is between white and red/yellow. Next a distinction is made between red and yellow. Then the same phenomenon occurs in the dark category. First there is differentiation between black and blue/green, and then between blue and green.

The next new conclusion was that basic color categories can be divided into three types. The first type is the fundamental color words, which are black, white, red, yellow, green, and blue. The second type is composites or fuzzy color that different speakers of the same language will randomly assign to one or another color term. These are colors that blend into one another such as magenta, which is a blend of red and blue. There is a distinction between these and the third type, which are "derived" colors, those that are mixtures of the fundamentals. For example, orange is a derived color from red and yellow. Derived colors are exact intersections of fundamentals rather than blends of color that can lean toward one color or another.

Analysis of these three color categories led to another conclusion: color words develop according to two independent processes. First, colors are divided into the six fundamental color terms. Second, the fundamental colors combine into derived color terms.

With this theory of universal color development, we can better understand color word development in Chinese. One of Berlin and Kay's major contributions to the study of color words is the guidelines they developed using one-hundred and

ten languages, which allow us to sort through the many color words in a language and group them to better understand their developments.

1.3 William Baxter's Application of Berlin and Kay's Basic Color Word Guidelines in Old Chinese

William H. Baxter's article, "A Look at the History of Chinese Color Terminology"[5] uses Berlin and Kay's basic color word guidelines to determine the basic color terms in Chinese in two distinct periods. Baxter examines basic color words in the Shang and Western Zhou Dynasties (1500-771 B.C.E.) and calls this time period the 'earlier' stage. The 'later' stage covers the time from the Eastern Zhou through the Han Dynasty (770 B.C.E.- 220 C.E.). These two periods in Baxter's discussion cover a long span of history and thus it is difficult to pinpoint when a color word changes and to divide the span of time into finite categories. In fact, so much of Baxter's evidence overlaps the two periods that his study should be considered an investigation of early color words from 1500 B.C.E.-220 C.E.

In his reconstruction of basic color terms during the early period, Baxter used three types of evidence: phonological reconstruction, graphic form, and old texts. The texts included in the early period are the Oracle bones, bronze inscriptions, parts of the *Shijing* (Book of Odes) ca. 5th-4th cent. B.C.E, the *Yijing* (Book of Changes) ca. 4th cent. B.C.E, and the *Shujing* (Book of History) ca. 4th to 3rd cent.B.C.E.

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[5] W. Baxter. "A Look at the History of Chinese Color Terminology," Journal of the Chinese Language Teachers Association 19:2 (May 1983): 1-26

Clearly, the dates of these texts are not included in the time period Baxter defines as the 'earlier stage' (1500-771 B.C.E.). The only evidence that is relevant during this period are the inscriptions found on the Oracle Bones and the Bronze inscriptions. The evidence Baxter obtains from the *Shijing, Yijing,* and *Shujing* is useful for the study of the history of color words, but is not relevant in terms of the words' usage in the Shang and Western Zhou Dynasties (1600-771 B.C.E.).

Baxter's analysis is useful for examining the emergence of basic color words, however, the two distinct time periods into which Baxter places color words is dubious. While it is true that the color words in his study did change (e.g. *hong* originally referred to silk of that color and was not a general color term until later), Baxter's evidence does not demonstrate a clear division between the color words of the Shang and Western Zhou Dynasties and those of the Eastern Zhou through the Han Dynasty. Therefore I will discuss Baxter's analysis of the basic color words, but will consider them to be of two distinct time periods.

Baxter argues that there were originally four basic color terms in Chinese: *bai* 白(white), *huang* 黄(yellow), *chi/zhu* 赤/朱(red) and *xuan* 玄(black). Also, he argues that the basic color terms changed to include five terms: *bai* 白(white), *huang* 黄(yellow),[6] chi 赤(red), *qing* 青(grue), and hei 黑(black).

The *Shuowen jiezi* of Xu Shen (ca. 100 C.E.) provides many glosses useful for reconstruction. If a term appears rather frequently in glosses, then Baxter

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[6] The Chinese word *huang* 黄 indicates a range of color covering the modern English terms 'brown' to 'yellow'. For practical reasons, I will refer to the gloss of this term as 'yellow' for the remainder of this thesis, but it should be understood to encompass this range.

regards this as evidence for psychological salience. In addition, when a word occurs in the *Shuowen jiezi* as the gloss for many words (e.g., in English red is used for the gloss for scarlet or crimson), then it could be considered basic. Lastly, the glosses often indicate the domain of the color term. For example, the domain of *hong* 紅 is limited to textiles at the time of the *Shuowen jiezi*.

When Baxter discusses the five basic color terms, he mentions the 'five agents' or *wu xing* 五行. According to the *Hanyu Da Cidian*, the *wu xing* were first mentioned (and applied to color terms) in the *Shu jing* 書經 (4th-3rd cent. B.C.E.), but Baxter applies the concept of the *wu xing* to the entire later period (770 B.C.E. to 220 C.E.). This is a tenuous application. However, the five color words that correspond to the *wu xing* are important to examine. Because of the Chinese tradition of five categories as correlations with the *wu xing*, it is easy to assume that the five colors, *bai, huang, chi, qing* and *hei* were basic color terms. However, due to the tendency to stretch things into five categories (e.g., adding 'middle' to the four directions), we cannot assume that all of these colors were basic, nor can we assume that other basic colors were not excluded. That is to say, it may be the case that not all of these color words are basic; more likely, it is possible that there are other basic color words that are not included in the five agents list. Given that these five words are so commonly found in literature, Baxter instead gives a detailed argument of why there are not other basic color words.

1.4 Baxter's Basic Color Words

The basic color term for 'white' is *bai* 白. It is generally applicable, as can be seen in a poem in Mencius, "*Bai yu zhi bai ye, you bai xue zhi bai; bai xue zhi bai, you bai yu zhi bai yu? Yue, 'Ran.'* (白羽之白也，猶白雪之白；白雪之白，猶白玉之白與？曰 '然'), ("Is the whiteness of a feather like the whiteness of snow; and the whiteness of snow like the whiteness of jade? 'Yes.'")[7] In addition to its general applicability, *bai* 白 can certainly be considered to be one of the earliest basic color terms as it appears in the Oracle Bone inscriptions. It has no other meaning.

The basic color term for 'yellow' is *huang* 黃. *Huang* has no competitors. However, there are many composite characters that mean yellowish and employ the *huang* element in their graphs. Due to a lack of lexical salience, these words are not considered basic. *Huang* 黃 is well established as 'yellow' very early on. It occurs in the Oracle Bone inscriptions and is common in the *Shijing*(ca. 5th-4th cent. B.C.E.). The *Shuowen jiezi* suggests that it is related to *guang* 光 meaning 'light' or 'bright'. Baxter suspects that the relation between *guang* and *huang* indicates that at one time *huang* was not a basic color term. This relationship can be understood in the context of Berlin and Kay's theory that the spectrum is first semantically divided into two color groups: light and dark. Nevertheless, *huang* is the only color

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[7] *Meng Zi* 孟子 "Gao Zi Pian" 《告子篇》 *pian* 11, verse 3, 4th to mid-3rd cent. B.C.E. Transl. by William H. Baxter

word referring to yellow; it does not have alternate meanings and should be considered basic.

Baxter argues that the basic term for red is *chi* 赤. It is used frequently and describes a variety of things. Karlgren indicates that *chi* 赤 occurs in the Oracle Bones[8] and, according to Baxter, it occurs in the Zhou bronzes. *Chi* is in the *Yijing* (ca 4th cent. B.C.E.) and the *Shijing* (ca. 5th-4th cent. B.C.E.). *Chi* has many synonym colors, however, including *zhu* 朱, *dan* 丹, *tong* 彤, and *cheng* 赬. Of these, *zhu* is the only word common enough to be a possible basic color term. Nevertheless, *zhu* is given as the definition of *chi* in the *Shuowen* and not the other way around, possibly indicating that *chi* is more basic than *zhu*. Baxter considers these two words to be synonyms.

In the *Shuowen jiezi*, *qing* 青 is the term that covers the color range of 'blue' and 'green' and 'gray' in English. The modern word for blue, *lan* 蓝, was the name of the indigo plant and is not considered basic. Although the modern word for green, *lü* 綠, existed during Baxter's later period, it only refers to textiles (as indicated by its usage in the *Shijing* (ca. 5th-4th cent. B.C.E.). *Lü*, therefore, is not a basic color term.

Another word for 'grue' was *cang* 蒼. *Qing* and *cang* are often used interchangeably so it is difficult to determine which is more basic. Baxter

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[8] Karlgren, Bernhard. *Grammata Serica Recensa*. Stockholm: Museum of Far Eastern Antiquities, 1964. no. 793a

concludes that *qing* is used more often and therefore is more psychologically salient.

In his discussion of *qing* 青, Baxter argues for the reconstruction of *sr->tsh- in Old Chinese. In accordance with this reconstruction, *qing* is phonetically related to *sheng* 生 (live, bear, be born, produce, fresh), and the graph used for *qing* additionally is related to the graph for *sheng*. It can also be compared to the Tibeto-Burman root *s-rin(g), 'live, alive, green, raw.' Baxter concludes that *qing* and *sheng* were related phonologically, morphologically and semantically. Thus, *qing* covering 'blue' and 'green' is a relatively new word that developed from its original meaning of 'flourishing' or 'verdant'.

In addition, *qing* appears in the bronze inscriptions but does not indicate a color. It doesn't appear in the older parts of the *Yijing* or *Shujing*. It appears in the *Shijing*, but again, its meaning is not necessarily a color. The evidence here leads Baxter to suggest that *qing* was a relatively new color word and in the early occurrences of its use was not considered basic.

Xuan 玄 and *hei* 黑 are words for black. Other words for black include *li* 黎, *lu* 旅, and *zi* 緇. The latter words have many graphic variants and are not nearly common enough to be considered basic. *Xuan* occurs on the Oracle Bone inscriptions and the Bronze inscriptions. *Xuan* also occurs in the *Yijing*, where it is paired with *huang*, (another basic color term). Therefore, it seems likely that *xuan* is also a basic color term.

The term *hei* 黑 came from the initial OC *hm- and is therefore phonetically related to *mo* 墨 'lampblack ink'. In addition, Yu Xingwu (1979) argues that *hei* was used in the Oracle Bones to describe animal hair color and the darkening of the sky. *Hei* does not occur in the *Yijing* nor in the early parts of the *Shujing*. Therefore, Baxter concludes that *hei* was a later addition to the list of basic color words.

1.5 Universal Color Word Evolution as a model to Chinese Color Words

There is a strong correlation between Berlin and Kay's theory of universal color word development and the color lexicon development in Chinese as identified by Baxter. Their model for color development helps us to better understand the Chinese color *qing*. This word covers a broad section of the color spectrum, from blue to green to gray. The model asserts that a word for this color came into the language at a stage where a linguistic distinction was being made between black and blue/green, but not between green and blue.

This model also helps us explain why, as will be discussed below, such color words as *cheng* 橙(orange), *fen hong* 粉红(pink), and *hui* 灰(grey) are used relatively infrequently in the literature of the Twenty-five Dynastic Histories covering 90 B.C.E. to 1927 C.E. and the Thirteen Classics covering 4th-1st cent.B.C.E.—they are later developments and have not yet reached the popularity of the older color words.

The model of universal color word evolution helps us understand the color lexicon development in Chinese. It shows that language *does* systematically encode experience into sound and is therefore not "semantically arbitrary".

CHAPTER 2

CHINESE AND ENGLISH COLOR WORD DEVELOPMENT: SHEDDING LIGHT ON UNIVERSAL PATTERNS

The purpose of this chapter is to compare the etymologies of Chinese color words with those of English color words. This comparison proves to be useful, as it illuminates the patterns for color word formation. In addition, it will serve as a supplement to the pattern of color word evolution in Chinese as explored in this thesis.

For the English etymologies, I have relied on *The Barnhart Dictionary of Etymology* (1988),[9] Funk's *Word Origins and their Romantic Stories* (1978),[10] and McKnight's *English Words and their Background* (1969).[11] The origins of Chinese color words, for the purpose of this comparison, are taken from Baxter's "A look at the History of Chinese Color Terminology" and Huang Lili's "Hanzi yu Secai [Chinese characters and colors]".[12]

I start with the words considered by Berlin and Kay to be basic color words. Those colors are black, white, red, yellow, green, blue, brown, orange, pink, purple and gray. They argue that these words are basic to language, they are most often the first and oldest color words. As a result, it is often difficult or impossible to determine the exact origins of these words. In English, for instance, "Black goes back, it is thought, to an earlier meaning 'burnt', and white goes back possible to

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[9] Barnhart, Robert K. ed. *Barnhart Dictionary of Etymology*, New York: H.W. Wilson, Co., 1988.
[10] Funk, Wilfred J. *Word Origins and their Romantic Stories*, New York: Bell Pub. Co., 1978.
[11] McKnight, George Harley. *English Words and Their Background*, New York: Gordian Press, 1969.

the idea of 'shining'."[13] This is similar to what is speculated by Baxter about the Chinese words for 'black' (*hei*) and 'white' (*bai*). According to the *Shuowen*, 'black' (*hei*) is the color of something smoked by fire. Baxter relates *hei* to *mo* '墨' 'ink'. However, *hei* is not the earliest word for 'black' in Chinese. *Xuan* also means 'black', but we can discover even less about its origins. The graph for *xuan* is found in the Oracle Bone inscriptions.[14] There it is believed to have meant 'dark'. *Bai*, according to Baxter, means 'white' as far back as can be determined. *Bai* was also used in the Oracle Bone inscriptions in the meaning 'white'. So we can see here a hint of the similar pattern of both English and Chinese color words changing from non-color words to color words.

Regarding red, yellow and blue, McKnight discusses similes. Similes, in terms of word origins, are metaphorical shifts in language usually occurring when there is an inadequacy in the vocabulary of that language. For example, if a language has a word for stone, but no word for gray, then eventually stone may shift to the dual meanings of (1) 'stone' and (2) simply the color 'gray'. McKnight writes that red, yellow and blue certainly may have had simile origins, however, they "go back so far in the history of language that one cannot be sure about the derivation."[15] Although McKnight only suspects these colors to have simile origins, there are other colors, to be discussed later, that definitely do.

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[12] Huang Lili, "Hanzi yu Yanse [Chinese Characters and Color Words]." In *Zhongguo Hanzi Wenhua Daguan*, Zhang Meng ed. Beijing: Beijing University, 1995.
[13] McKnight. p. 331
[14] Huang, p. 230
[15] McKnight. p. 230

In Chinese the first known terms for red and yellow occur in the Oracle Bone Inscriptions. The word for 'red' is *chi*, and for 'yellow' is *huang*.[16] The origins of these terms are unknown.

While McKnight finds little on the origins of English 'blue', *The Barnhart Dictionary of Etymology* traces the origins of 'blue' to the Proto-Germanic *blæwaz and "probably cognate with Latin flāvus 'yellow', from Indo-European *bhle-wo-s, and distantly related to Greek phalos 'white', and Sanskrit bhala-m 'luster'." He writes, "the name of one color often shifted to another color in the various Indo-European languages so that different colors (here yellow, white, pale or livid) have related forms from the same base." This gives us some insight into the origins of English blue. According to McKnight, another less common term for a blue color, 'azure', has a more definite origin. Azure is of Persian derivation and dates about 1374 C.E. as the name of a blue dye. Also, the word indigo made its way into the English language about 1600 C.E. It is the name of a blue Indian dye and is related to the word India.

Similarly, the modern Chinese word for 'blue', *lan,* comes from the word for the indigo plant. The *Shuowen* defines *lan* an as 'herb used for dyeing things *qing* 'grue'. *Qing* is another Chinese word for 'blue', or 'grue', and has a more interesting origin. According to Baxter, the word *qing* is related to the word *sheng* or 'live, be born, fresh'. This is a similar origin to the English word 'green' which came from the word 'grow' through the Proto-Germanic *gronja-. Both *qing* and green began with a meaning of 'verdant, alive'. With *qing* and green we find

similarity between color origins of English and Chinese. We find that the adjective 'green' developed from the verb 'live or grow' or the adjective 'fresh, verdant' and became a color word.

In Chinese we also have the later term, *lü*, for green. In the *Shuowen*, *lü* is defined as 'a cloth of *qing*-yellow color'. Baxter also writes that *lü* did not refer just to green in the *Shijing*, but was a loan word for a kind of plant. Here we see with *lü* 'green', and previously with *lan* 'blue', evidence of a true simile. Both adjectives come from nouns, whether they are a plant that yields a dye of that color or a cloth that is characteristically that color.

As we investigate colors in the latter part of Berlin and Kay's series, and thus newer words in language, we find more evidence as to their origins as well as a greater occurrence of similes. For example, the English word brown can be traced from "Proto-Germanic *brūnez-; and to the Indo-European base *bhrū- cognate with Greek phryne toad (originally descriptive of its brown color) and Sanskrit babhru-s reddish-brown (also as a noun meaning beaver or large mongoose.)"[17]

The Chinese word, *he* 褐, refers to 'brown', but also to a kind of tree, animal fur or a type of coarse clothing.[18] As such, it may be considered to be a simile. There is also the word *zong* 棕, which means 'palm' or 'palm fiber'. It is used in compound color words such as *zong*hei (dark brown), *zonghong* (reddish brown), or *zonghuang* (light brown). This is another example of a simile. The modern term for brown, *kafeise* 咖啡色, is a relatively new addition to the Chinese

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[17] Barnhart. p. 121

language; it is a transliteration of the English word 'coffee' and means 'coffee-colored'.

The origin of the English word 'purple' is an interesting one. Funk (1978) writes, "The word purple has descended to us through the Latin term purpura, from the Greek porphyra, which was the name of the purple shell of a fish from which the dye was obtained."[19] The English word for purple is a simile that is easily compared to the Chinese word *qian* 茜 'red' since it also came from the name for a dye source. *Qian* is 'madder', the name of the dye plant that yields the color red. The Chinese word for purple however, originated slightly differently. The Chinese word for purple is *zi* 紫. Huang Lili writes that it originally indicated this color of silk and later came to mean just the color in general.

The color 'orange' in both English and Chinese is also a simile. *Barnhart* lists orange as "the color of an orange. [ca.] 1542, [it came] from the noun (originally an attributive use, as in the orange hue, but by 1620 used as an adjective, as in orange velvet)."[20] The word orange came from the Sanskrit word naranga which means 'orange tree'. Interestingly enough, Barnhart also lists orange as a surname circa 1296 C.E., an example of the fossilization of a color word. The Chinese words *cheng* 橙 and *ju* 橘 have similar origins. Each refers to a fruit and later came to mean simply 'orange' color.

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[18] Huang Lili, p.
[19] Funk, p 308
[20] Barnhart, p. 733

Another simile is the origin of the English color 'pink'. *The Barnhart Dictionary of Etymology* lists 'pink' as a light red color and circa "1573 [it was] a garden plant of various colors of uncertain origin....About 1720 the plant name began to be used attributively in the sense of having the color of the garden pink."[21] We also find this same pattern of color words from flowers with the English words violet, mauve, and lavender.[22] The modern Chinese word for pink, *fenhongse* 粉紅色, comes from the word *hong* 紅 'red', originally the name of a dyed cloth.

This brings us to a new pattern in the formation of color words in Chinese. That is, color words that name parts of a large spectrum that another color already indicates. For example, in English, the word 'lilac' is a subdivision of 'purple'. In Chinese we have *fenhong* 'pink' as a subdivision of 'red', *danzi* 'lilac or light purple' as a subdivision of 'purple', or the previously mentioned *zonghei* 'dark brown' and *zonghong* 'reddish brown' as subdivisions of 'brown'. These examples illustrates how a new color category is named. With the addition of a new word, such as pink, what actually occurs is the division of an already established category. For example, 'red' is a term that covers a sizable part of the color spectrum. In order to specify a color with greater precision, a new color word, such as 'pink', is formed to refer to a small portion of the red category.

We find more and more similes in secondary color words. In English there is quite a variety of origins of secondary color words. For example, 'maroon' originally meant 'chestnut-color' coming from the French for 'chestnut', *marron*.

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[21] Barnhart, p. 796

Similarly, the Chinese word for 'maroon' is *lise* 栗色 which also means 'chestnut-colored'.

'Crimson' comes from the "Arabic term *qirmizi*, a red dye extracted from the scale-like bodies of tiny female insects allied to the cochineal."[23] Here we have another example of a color word coming from its dye source.

Magenta has a unique origin. According to Funk, "The purplish-red dye called magenta was so titled because it was discovered at about the time of the Battle of Magenta in 1859 in which the French and the Sardinians defeated the Austrians, supposedly liberating Italy."[24] I have found no Chinese color words originating from names of historical events.

According to McKnight, "Scarlet and cardinal originate as similes, the first from the name of a cloth, the second from the name of a church dignitary, itself in origin a simile from cardo, 'hinge'."[25] The connection between the name of a church dignitary and 'hinge' is unknown.

McKnight writes of color word formation in English that "it goes through the list of color names from maroon, derived from the name for chestnut, and cerise, from cherry, to taupe (French taupe, Latin talpa, 'mole') and henna (Arabic henna) the name of the Egyptian privet from the leaves of which the dye is made."[26] The English words for derived colors come from various sources. That is, 'crimson', 'scarlet', and 'cardinal' are all within the scope of red. All have specific

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[22] McKnight, 203
[23] Funk. p. 308
[24] Funk. p. 308
[25] McKnight. p. 230

origins. In Chinese, these subgroups within color word categories are formed quite differently. These variations of color words are generally formed with a modifier on the base color word. For example, within red, we have the words crimson *shenhong* 深紅 'deep red', magenta *yanghong* 洋紅 'foreign red', or scarlet *xianhong* 鮮紅 'fresh red'.

We have seen several patterns and parallels between Chinese and English color word origins. First, we find that that basic color words have 'unknown' origins. Next, the overwhelming number of color words in both languages come from similes.

We also find a few cases of the meaning of an adjective changing. For example, in Chinese *huang* changed from 'bright, light' to 'yellow'. Its counterpart, *xuan,* changed from 'dark' to 'black'. We find words changing from verb to adjective as in the English and Chinese words for 'green'. An anomaly in the origins of color words is English 'magenta'. It is the only color word found in English to be named for an historical event. In Chinese, we also find color words deriving from more basic color words such as *shenhong* 深紅 'deep red', which came from *hong* 紅 'red'.

Comparison of the origins of color words in Chinese and English shows that there are indeed numerous similarities in the processes of derivations in both languages and that, in this way, the Chinese language is not unique.

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[26] McKnight, p. 230

CHAPTER 3

CLASSICAL CHINESE TEXTS AND THE STUDY OF CHINESE COLOR WORDS

3.1 Classical Texts and Statistical Analysis

Because of the nature of the Chinese writing system, modern readers can still comprehend the literature of nearly 2000 years ago with relative ease. The Twenty-five Dynastic Histories contain adequate data from which to extrapolate color word trends. In addition, I have examined color words in the Thirteen Classics. The data obtained from the Thirteen Classics are far more problematic due to the nature of the text. Issues regarding dating and revisions of both the Twenty-five Dynastic Histories and the Thirteen Classics will be discussed. The focus of the analysis is on the data of the Twenty-five Histories as this data is more reliable.

The Twenty-five Dynastic Histories provide us with a relatively continuous body of literature spanning approximately 2000 years, thus allowing an examination of the dynamic aspects of historical lexicons. In addition, the collection of the Thirteen Classics offers a relatively static picture of the lexicon of approximately 4th to 1st cent. BCE. With the aide of the online search engine for the text database at Academic Sinica[27] of Taiwan, I have collected the frequencies with which each color word occurs in each of the Twenty-five Histories and the Thirteen Classics.

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[27] Academia Sinica   www.sinica.edu.tw

This is a useful endeavor because once we know the frequencies of each word in each work, we can see how the salience of each word changes over time. Some words lose favor, while others become more popular. By looking at the numbers, this trend is illustrated in a quantitative and tangible manner.

The Twenty-five Histories are chosen because they represent a relatively continuous body of datable literature spanning the greatest length of time (approx. 2000 years). Moreover, the history of each dynasty is written in a relatively consistent style. That is, since the purpose of each book is to record the history of the previous dynasty, the style is more consistent than comparing the *Song Shi* 宋史 to the *Erya* 爾雅.[28] The Twenty-five Dynastic Histories are also written in a formal style. While the formality of style does not dramatically reflect changes in lexicon, due to the tendency to use fixed, formal phrases and the slow rate with which newer words become popular, the Dynastic Histories provide a useful source for comparison over time due to datability and continuity. Additionally, since the language of the Twenty-five Dynastic Histories is a formal written language, it does not reflect the colloquial speech of any time period. Thus the color word trends that will be discussed are a reflection of the formal written language rather than the colloquial spoken language.

Despite the formal and somewhat fixed style of the Histories, the writers of the record of a dynasty simply cannot escape the changes of the language of their

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[28] Indeed, it would be unproductive to compare the *Erya* 爾雅, a dictionary circa 50 BCE with the *Song Shi* 宋史, a history of the Song dynasty written circa 1341-1345 CE; they differ in both date of composition and style.

time. While the frequencies of the occurrence of new color words in a particular History may underestimate the popularity of a particular word in colloquial speech, it nevertheless illustrates a trend.

3.2 Dating Classical Texts

It is essential to discuss the dates of these texts. To accurately date each text, or text component, is an extremely difficult task. Each text underwent changes over extended periods of time. We do not know, and perhaps will never know, the true dates of each component of the texts. Yet, rather than dismiss the value of the texts due to this obstacle, we must acknowledge it and discuss in what way the texts are still of use.

The Thirteen Classics is a difficult body of literature to date. The *Yijing*, for example, is traditionally dated 11th to 4th cent. B.C.E. This is a wide range for one piece of literature. Although, more recent scholarship dates the *Yijing* at about the 4th cent. B.C.E. The Thirteen Classics has also undergone much revision. In addition, the Classics include many genres such as philosophy (*Meng Zi*) and poetry (*Shijing*). Overall, this body of texts can be realistically ascribed to the 4th to 1st centuries B.C.E. The data that the Thirteen Classics yields is crude. Thus, observations are made cautiously.

The Twenty-five Dynastic Histories, absent the commentaries, can be dated quite accurately (within one or two generations). Since the shift of color vocabulary takes place over an extended period of time, the data that can be

gathered from these texts will still reflect a general trend. That is, since the trend spans many different texts, even though some texts were revised, the overall trend is not drastically affected. In this way, the patterns and percentages reflected by the current works today will either underestimate the vocabulary frequencies of color words due to the omissions and revisions, and/or the entire pattern of lexical development will be shifted chronologically, since the formal written language is slow to be influences by spoken colloquial language. Nevertheless, the pattern is apparent and useful.

While it is impossible to know the true date of composition of each section of each book, it is important to be aware of the problems that arise when texts such as these are used for research. Awareness of these problems, allows for more accurate and cautious conclusions.

3.3 General Trends in Color Words

Appendices A and B contain the word counts for each color in each book. In Appendixes C and D is the preliminary data for the relative frequency of color words in each book. These frequencies were obtained by dividing the number of times a given word occurs by the number of times all color words occur in each book. This is preliminary data, however. Due to the arrangement of the Academic Sinica text database, it is impossible to search the original text alone (omitting the commentaries). But it is necessary to obtain data from which the commentaries are eliminated because the commentaries were composed at later and sometimes

uncertain dates. It is necessary to sift this data (as will be done in the following chapter) in order to accurately examine color word trends. The data in Appendix A, therefore, will be called crude data. Thus this data must not be used to draw any conclusions.

In addition to the commentaries, there are other circumstances that do not allow for an accurate picture from using the crude data. The following observations of the crude data should not be considered definitive, they are merely suggestions for further investigations.

We can see there are trends according to the crude data. The frequencies of color words change dramatically over time. One of the first color words, *xuan*, appears in the Oracle Bone Inscriptions and occurs frequently in the early works of the Twenty-five Histories, but is used relatively infrequently by modern times. At the same time, *hei* is an infrequently occurring color word in the early works. However, its frequency rises steadily throughout history.

The case of shifting word frequencies is not always clear. The frequencies of *zhu*, *chi* and *hong* all show steady increases over time. This can be explained by the fossilization of words in phrases and proper names. For example, *zhu* is a common surname and, while the word for 'red' may evolve from *zhu* to *hong*, a surname will not change as it is already divorced from the meaning 'red'.

We see this in the case of *qing* as well. As there is a steady increase in the frequency of *lan* and *lü* over time, *qing* decreases but still maintains a relatively high frequency. *Qing* is a common character in place names such as *qingshan* 青山.

In these cases, *qing* is not considered a color word just as in English we no longer think of the color green or orange when referring to Greenfield or Orange, Massachusetts.

3.4 Comparing Color Word Frequencies

Since the Histories are a more reliable source with which to study lexical changes, they will receive more attention. However, I will briefly discuss the frequency of color word usage in the Thirteen Classics as compared with the earliest two Histories, the *Shiji* 史记(ca. 90 B.C.E.) and the *HanShu* 漢書 (ca. 58-76 C.E.). The Thirteen Classics covers a wide variety of styles from the 4th-1st cent. B.C.E. It is closest chronologically to the *Shiji* and the *Han Shu* of the Twenty-five Dynastic Histories. This allows for a comparison of frequencies within a variety of styles.

Below is a table of the frequencies of color word occurrences in the Thirteen Classics, the *Shiji* and the *Han Shu*.

Table 3.1 The Frequencies of Color Words in the Thirteen Classics, Shiji, and Han Shu

	xuan	hei	qing	hong
Thirteen Classics (ave. freq.) (4th –1st cent. B.C.E.)	0.04	0.07	0.05	0.01
Shiji (90 B.C.E.)	0.14	0.04	0.08	0.01
Han Shu (58-76 C.E.)	0.07	0.04	0.08	0.02

The variance[29] of the color word frequencies of each color word is very low. The variance of *xuan* is 0.003, *hei* is 0.0003, *qing* is 0.0003, and *hong* is 0.02. Color word frequencies do not vary considerably over style.

The continuous body of literature of the Twenty-five Histories (and, to some extent, the Thirteen Classics) provide the opportunity to investigate impressions of how words have changed over time. By quantifying the occurrence of color words and examining the trends in their usages, we have a much clearer picture of how and when color words changed. The following chapter provides a closer, more accurate analysis of the data. The analysis in the next chapter relies on new data. This new data was obtained by sifting the color words into two groups: color word usages and non-color words usages. Below is the methodology for this process.

3.5 Gathering Color Word Data

For my analysis of color word development, I have employed the website search engine of the databases at Academia Sinica of Taiwan. With this search tool, it is possible to obtain character counts relatively quickly. Once the frequency with which each color word occurs in a text is quantified, the data can be used to test initial impressions of color word trends.

Obtaining color word frequencies is a multi-step process. First, I entered each color word character into the search engine for each book of the Twenty-five Histories and the Thirteen Classics and found the total number of occurrences of

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[29] The variance is calculated using the formula $v = \sum (\bar{x}-x)^2/n-1$

each color word used in each book. Then I divided each number of individual word occurrences by the total number of times color words were used within a text to obtain the proportion of usage frequency for a color word within a text.

These numbers offer us a crude view of the general trend of the frequency of occurrence of color words within each text. However, the numbers in this form are not useful for accurate analysis. There are many problems concerning this initial data.

First, due to the limitations of the Academia Sinica data base searches, it is impossible to search each text in its original form without its commentary. Thus the data for each text contains a portion of later language usage which skews the numbers.

Second, not all color words are used to refer only to color. For example, there are many color words that are also surnames, such as *Huang, Bai, Zhu.* In addition, there are many color words that are frequently used in personal names, *qing* or *hei.* There are also many color words used in place names that, while they may have originally been used as a color to describe the place, they have then become fixed names where the color words are no longer semantically relevant.

In order to overcome these problems, it is necessary to examine each color word occurrence individually. Because there are tens of thousands of color word occurrences in the Twenty-five Histories and Thirteen Classics, it is difficult, if not impossible to examine each case.

This is where statistics is a valuable tool. Using a random number chart, I can take random samplings of each color word, examine the individual words, calculate the proportion of times a word appears in the commentary, and then calculate the number of times the word appears in the commentary as a whole. I can also determine the proportion of times a color word is used to denote a proper name. For each color word, I used a sample size minimum of ten percent of the word's occurrence. In some cases, when the population size of a particular color word within a book was very small, a one-hundred percent sample size was used. The minimum ten percent sample size was chosen for practical purposes, as ten percent was the maximum amount that could be examined due to constraints of time and resources. However, the use of the random number chart yields an accurate random sampling of the distribution of the data. The ten percent minimum sample size has proved sufficient, as will be shown in the later discussion of data reliability.

Each individual case of a color word occurrence in the random sample is then marked as used either as a color word or as a non-color word. Non-color word usage includes words used in proper names such as places, people, titles or set phrases where the word does not reflect use as a color term any longer. (The uses of color words in the commentaries were dismissed as they reflect later language usage.)

The following examples illustrate color word versus non-color word usage.

Color Words

1. 三十四年十二月庚申，晦，日忽暗，有青<u>黑</u>紫日影如盤數十相摩，久之千百，飛蕩滿天，向西北而散．[On the 57th day of the day-cycle in the 12th lunar month of the 34th year, on the last day of the lunar month, the sun suddenly darkened. There were grue, **black**, and purple shadows like dozens of platters rubbing together. After a while it looked like hundreds and thousands. It covered almost all of the sky, then dispersed toward the northwest.]

（明史 412）

2. 拜其酋長為都督，制史，給<u>玄</u>金魚以爲符信，又置燕然都護以統之。[He saluted the chief and made him the commander and the prefect. He gave him a **black** and gold fish as a symbol of his status. Also he established Yen Ran as chief protector in order to control them.]（舊唐書，1235）

3. 四年十月丁巳，光山有<u>紅</u>光如電，自西南往東北，聲如鼓，久之入地，化為石，大如斗．[On the 54th day of the day-cycle in the 10th month of the 4th year, on Guang Mountain there was a **red** light ray like lightening. From the southwest toward the northeast, the sound was like a drum. After a while it entered the earth, and changed into a rock as big as a peck.][30] （明史 22）

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[30] *dou* 斗. A *dou* is a unit of measurement by capacity, a Chinese peck.

Non-Color Words

1. 王陵亦至玄孫，坐酎金國除。[Wang Ling also reached **Xuan**[31] Sun, made contributions to the emperor and was appointed to be an official of the state.] （漢書 100）

2. 光化初，朱全忠陷河中，進兵入潼關。[At the beginning of the Guanghua reign period (898 C.E.), **Zhu**[32] Quanzhong conquered [the territory of] Hezhong. He advanced his troops to enter the Tong Pass.] （舊唐書 537）

3. 總督朱燮元彙奏文武將吏功 ... [The Supreme Commander **Zhu**[33] Bianyuan assembled the memorials on the meritorious deeds of the civil and military officers] （明史 683 ）

There are some cases that are not as black and white as these, such as cases where a color word usage is in the process of changing to a proper noun. For the purposes of this investigation, I adhered to a very strict rule for proper nouns versus color words. In cases where a color word is used to describe an object or a place, the first time a particular adjective is used to describe a particular noun, the phrase should not be considered a proper noun. However, since these names (places, animals, etc.) have been committed to writing, I have assumed they have already been accepted in the spoken language as the names of the places, objects, etc. Therefore, in these cases I have considered these to be proper names.

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[31] In this example, *xuan* is used as a surname. Therefore, it is transliterated instead of translated.

For example, the term *chishui* 赤水 'red river', as in 'He lost a black pearl in the Red River' (遺玄珠於赤水. 陳書, 10), the river may have originally been so named due to the red color of its water. However, this has become the name for the river and therefore is considered to be a proper noun.

It should also be noted here that due to limitations of time and resources, it was not feasible to sample every text in the Twenty-five Dynastie Histories. In order to adequately demonstrate the trends, every other book was sampled after they had been ordered chronologically.

Upon examination of the color word counts in the crude data, we see that there are many words with extremely low frequencies. For example, *he* 褐 'brown', *cheng* 橙 'orange', *piao* 縹 'light blue', etc., are infrequently occurring. The frequencies of these words are much too low to conduct accurate statistical analysis of the trends. Therefore, these low frequency words will not be further examined.

I have also excluded words with no competing forms such as *bai* 白 and *huang* 黃. For these reasons, in the in-depth analysis of color word usage, I will focus on two groups; *xuan* and *hei*, and *zhu*, *chi*, and *hong*.

Once the data have been sorted, we are now able to observe reliable patterns and further analyze the trends.

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[32] In this example, *zhu* is a surname. Therefore, it is transliterated instead of translated.
[33] In this example, *zhu* is a surname. Therefore, it is transliterated instead of translated.

CHAPTER 4

OUT WITH THE OLD, IN WITH THE NEW: THE NEXT STEP IN COLOR WORD EVOLUTION

Any scholar of Chinese texts quickly learns the various common color words used in Chinese literature. We have an impression of "older" color words (*xuan, qing, chi, zhu*) and "newer" color words (*hei, lan, lü, hong*). We learn that in modern Chinese older words are more formal, newer words are more colloquial. Through reading Chinese literature, we find that the older color words have been fossilized in place names, surnames and personal names, as well as in technical terms and expressions (e.g., *huang di* 黃帝, *xuan nu* 玄女, Li Bai 李白). At the same time we find that newer color words more often than not are used only as color terms and are not fossilized.

However, this is just an impression. We find anecdotal examples and we use this impression as a general rule of thumb when tackling translations. This impression must be analyzed so we can know just how and when a color word changes. Trends in color word usage is a perfect example for applying quantitative methods to language analysis. It is often difficult to quantify a linguistic phenomenon, but with the help of modern technology this task is not quite so daunting.

4.1 Color Word Data and Statistical Analysis

After examining the color word data on a case by case basis, the relevant data are arranged into a chart to illustrate the color word trends. In this chart the numerators represent the number of times the color word is used to denote a color in the random sample; the denominators indicate the total number of times the word is used either as a color word or non-color word in the random sample.

In the case of *Xuan* and *Hei* we find the following:

Table 4.1   The Frequency of Color Word Usage Versus Total Word Usage for *Xuan* and *Hei.*

		玄		黑	
58-76 CE	漢書 *han shu*	2/14	(0.14)	11/13	(0.85)
285-297	三國志 *san guo zhi*	1/21	(0.05)	6/9	(0.67)
530	南齊書 *nan ji shu*	0/18	(0)	7/9	(0.78)
622-629	陳書 *chen shu*	1/5	(0.2)	3/4	(0.75)
629	北史 *bei shi*	1/41	(0.02)	11/15	(0.73)
636	周書 *zhou shu*	0/7	(0)	5/9	(0.55)
648	晉書 *jin shu*	4/68	(0.06)	9/14	(0.64)
941-945	舊唐書 *jiu tang shu*	7/128	(0.06)	7/16	(0.44)
973-974	舊五代史 *jiu wu dai*	1/8	(0.12)	6/8	(0.75)
1341-1345	宋史 *song shi*	1/28	(0.04)	40/44	(0.909)
1343-1344	金史 *jin shi*	2/12	(0.17)	5/9	(0.55)
1679-1736	明史 *ming shi*	2/19	(0.10)	19/37	(0.51)

(Each ratio represents the number of times a word is used to denote a color word divided by the number of times it occurs in the random sample. The decimal represents this ratio)

The trends are better illustrated in graphic form as follows.

Figure 4.1 Trends of Color Word Usage versus Total Word Usage in Xuan and Hei
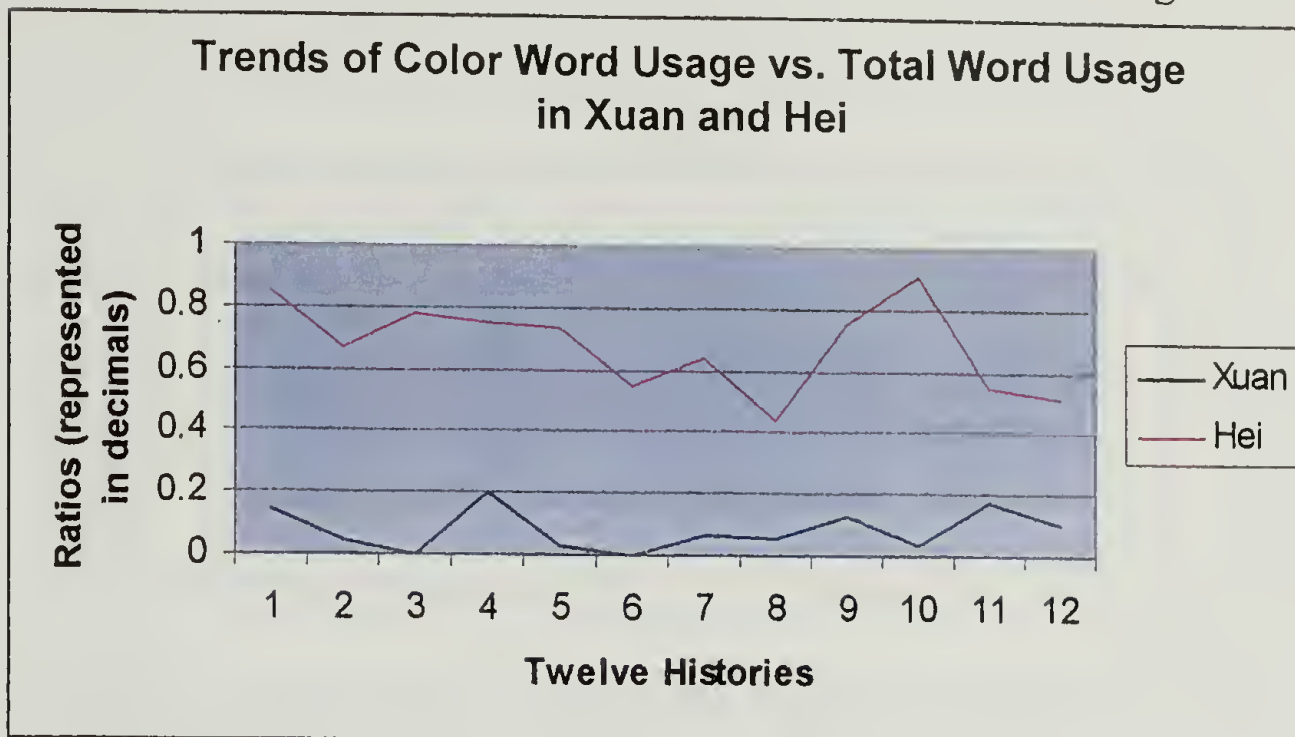
Before discussing the apparent trends, it is essential to discuss the accuracy with which the ratios of the samples reflect the true ratios of all the color words in each text. In order to illustrate this, I will use the concept of confidence interval. That is, I will determine the interval in which we can be sure, with 95% accuracy, the true ratio will fall.

First we must determine the sample mean. The sample mean is the same as the ratio of color word usage to total usage. The sample mean is defined as the sum of the individual items in each sample divided by the total number of items in all samples. Since each data item is qualitative it is necessary to quantify each item. For each item in a sample, a '1' is assigned to those used as a color; a '0' is assigned to those used as a non-color word. For example, in the case of *xuan* in the *Han Shu*, we see there are fourteen items in the sample, two of which are used as color words. In this case, our data would look like this:

Data Sample	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Assigned Number	1	1	0	0	0	0	0	0	0	0	0	0	0	0

In this way, the sum of the assigned numbers equals the number of times the word appears as a color word, in this case, two. This number is divided by the total number of items in all the samples, which in the case of *xuan* yields 0.143. Thus, the mean is exactly the same as the ratio of color words to total usage.

The next information we need for determining the confidence interval is the standard deviation of the items in each sample. To calculate this, we once again employ the '1''s and '0''s. We then use the formula

$$S = \sqrt{\{\sum (\bar{x}-x)^2 / (n-1)\}} \qquad \text{where } \bar{x} = \text{the mean and } x = \text{either 1}$$

or 0.

We find that the standard deviation of the number of the occurrences of *xuan* in the *Han Shu* is 0.363. The formula for calculating the confidence interval is $\bar{x} \pm ts/\sqrt{n}$, where x is the mean, s is the standard deviation, n is the sample size, and t is a set value for the percentage of the distribution that lies outside of the range. It is obtained from a standard t-distribution chart. Here, t=2.18 for a 95% confidence level.[34]

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[34] A. Woods, P. Fletcher and A. Hughes. *Statistics in Language Studies*. Cambridge: Cambridge University Press, 1986. p. 300

We find that the range of the population ratio is –0.069 to 0.355. Since our ratio cannot be a negative number, it is only appropriate to say that the ratio will fall below 0.355 with 95% accuracy. This figure tells us that the ratio of color word usage to overall usage of the word *xuan* in our sample accurately reflects the ratio of all instances of *xuan* in the *Han Shu*, with 95% accuracy.

4.2 *Xuan* versus *Hei*: a comparison

With the accuracy of each ratio established, I will now turn to a discussion of confidence in comparing the *xuan* data set to the *hei* data set. The question here is whether or not the difference in ratios between *xuan* and *hei* are significant. To test this we can apply a non-parametric rank test[35] (Appendix V). From this test we find that the difference is indeed significant since each data sample ratio of *xuan* is far below (at least 0.4) the data sample ratio of *hei*. For example, in the Figure 4.1 for the *Han Shu* we find that the frequency of color usage for *xuan* is 0.143 and the frequency of color usage for *hei* is 0.85. The difference is 0.707. This is a significant difference.

Next we must determine how accurate the results will be from the samples taken from twelve books. This accuracy is dependent upon the differences in frequencies of the data sets. In a probability report[36], we find that with the twelve books and a proportion difference of at least 0.5, there is a power of 0.986. That is,

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[35] Non-parametric rank test conducted by Trina Hosmer of Academic Computing Statistical Services of University of Massachusetts, Amherst.
A non-parametric rank test is used because it is a test which requires no special distributional assumptions.

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we have a 99% accuracy rating. Therefore, we can see from these tests that the conclusions drawn from this data are indeed reliable and accurate.

From this sample, we find that indeed our original impression is true. We find that *hei* is used more often as a color word than as a proper noun. Likewise, we find that *xuan* is used less often as a color word than as a proper noun. This study also finds another startling conclusion. Not only did *xuan* become a fossilized color word (in that it is mainly used in proper nouns), we find that *xuan* became fossilized very early on, as early as the *Han Shu* (58-76CE).

Statistics allows us to analyze specific words in enormous bodies of literature. We can quantify findings and examine semantic changes. This is one example were statistics and linguistics go hand in hand.

4.3 'Red' and *Zhu, Chi* and *Hong*

Now the question arises, do we find similar patterns in other color words? Let us now examine the color words for red: *zhu, chi*, and *hong*. The data from the same bodies of literature for *zhu, chi* and *hong* are as follows:

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[36] Probability test conducted by Trina Hosmer of Academic Computing Statistical Services of University of Massachusetts, Amherst.

Table 4.2   The Frequency of Color Word Usage Versus Total Word Usage for *Zhu*, *Chi* and *Hong*.

		朱	赤	紅
58-76 CE	漢書	3/28 （0.11）	17/23 （0.74）	2/14 （0.14）
285-297	三國志	0/22 （0）	4/12 （0.33）	0/1 （0）
530	南齊書	3/9 （0.33）	9/9 （1）	10/10 (1)
622-629	陳書	1/8 （0.12）	5/9 （0.56）	2/2 （1）
629	北史	1/53 （0.02）	6/16 （0.38）	5/5 （1）
636	周書	1/14 （0.07）	6/7 （0.86）	2/2 （1）
648	晉書	5/31 (0.16)	21/24 (0.88)	4/4 （1）
941-945	舊唐書	6/58 （0.10）	11/26 （0.42）	9/10 （0.90）
973-974	舊五代史	0/37 （0）	3/9 （0.33）	3/3 （1）
1341-1345	宋史	14/105 （0.13）	40/74 （0.54）	17/17 (1)
1343-1344	金史	3/10 （0.30）	4/20 （0.20）	15/15 (1)
1679-1736	明史	1/104 （0.01）	15/50 （0.30）	34/40 (0.85)

Figure 4.2 Trends of Color Word Usage versus Total Word Usage in Zhu, Chi and Hong
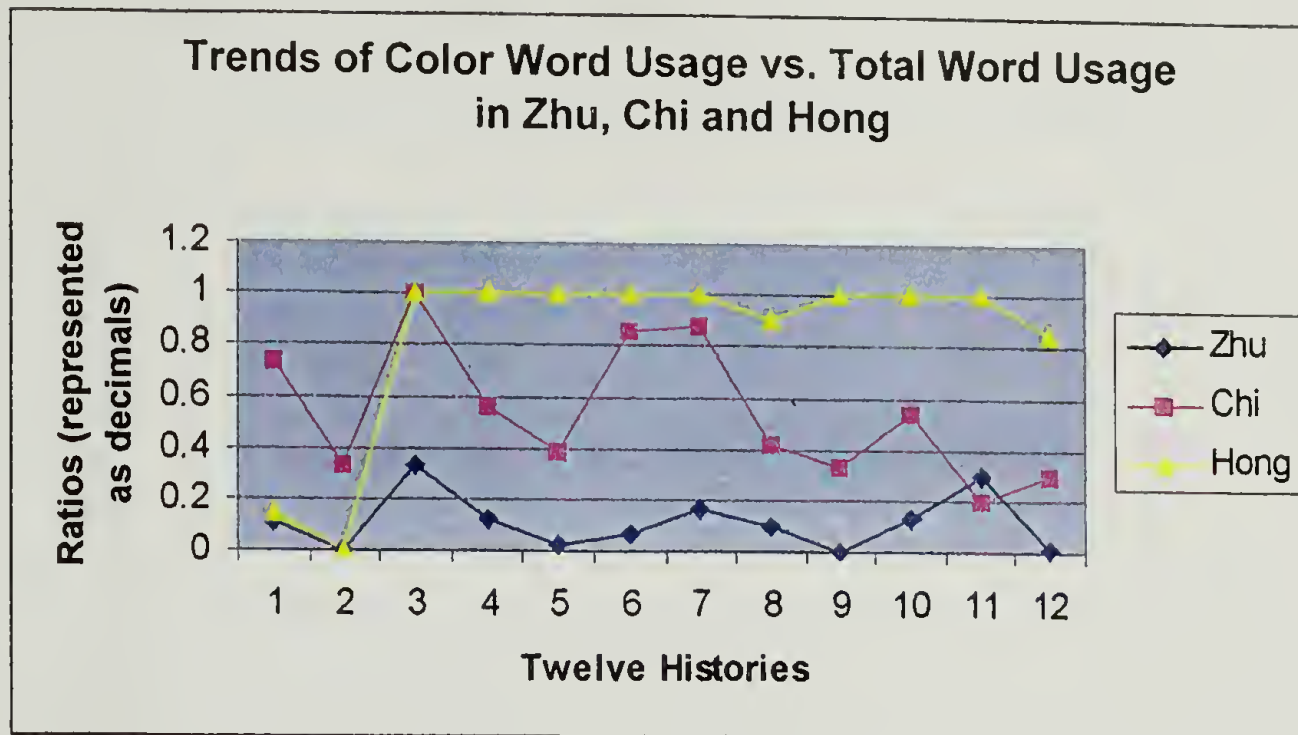
From the evidence in the chart and graph, we see the same pattern in *zhu*

and *hong* as we did in *xuan* and *hei*. *Zhu*, a relatively old color word, became

fossilized early in the language (as early as the *Han Shu* 58-76 CE) and is used

frequently as a non-color word throughout the histories. *Hong*, a relatively new

color word, is used almost exclusively as a color word.

When we compare *zhu* with *chi* we find that *chi* is used more frequently as a

color word than *zhu*. But why are there two competing color words marking

supposedly the same color at the same period in history? Berlin and Kay have

shown that color words develop in a pattern based on need for a particular color

word. If a color word for a particular designation already exists, why would another

word come about? When a language develops a color word for yellow for example,

only one signifier occurs. Due to languages' tendency to eliminate redundancy, it

does not follow to have two competing color words.

Having two color words can only mean that there was a need for each of those words. Could it be that *zhu* and *chi* signify two different colors? Since it is impossible to ask a Chinese person that was alive two-thousand years ago what color each word refers to, we must look at the substances that these words refer to for an answer.

Indeed, upon examination of naturally occurring substances we find that this is the case. The word *zhu* refers to the pigment used for red seal imprints for calligraphy and sealing letters. This pigment can be composed of several types of compounds. It is commonly known to be made of cinnabar or red ochre. Cinnabar is mercuric sulfide (HgS) and is characteristically an earthy color ranging from a brownish red to orange.[37] Red Ochre (Fe_2O_3) characteristically occurs in a range of hues from yellow to red to brown.[38] The color of *zhu* is not a brilliant, bright red, but an earthy brown or orange red. The word *zhu* is closely tied to the actual mineral from which the pigment is derived (as evident in the word *zhusha* 朱砂 'cinnabar' or 'red sand'). In this way, *zhu* never became a true color word because it was so closely tied to the noun that represents the color. In addition, *zhu* never represented a *true* red—another reason for its lack of psychological salience as a color word.

[37] *Pigments through the Ages*. Website: www.webexhibits.org/pigments April 10, 2002
   Web Elements. Website: www.webelements.com, April 10, 2002
   CRC Handbook of Chemistry and Physics. David R. Lide, ed. London: CRC Press, 2001. pp.70
[38] Ibid.

Chi, on the other hand, did represent a true red. *Chi* is cognate with the Tibetan word for blood, *khrag*.[39] Additionally, *chi* is often used to describe blood in Chinese. For example, in the *Han Shu* (58-76 CE), *chi* is used in a similie: 四年夏，有風赤如血。 ("In the summer of the fourth year, the wind was as red (*chi*) like blood.") It is used again in the *Han Shu* in: 甲申，日出赤如血。 ("On the twenty-first day of the day-cycle, the sunrise was as red as blood.") This similie is used throughout the Histories.[40]

Chi is used as a color word (rather than as the name of something characteristically that color) as indicated by its use in similie. In this way, *chi* is a more abstract term than *zhu* and therefore is more readily retained as a color word.

Hong originally indicated silk that was dyed a *hong* color. According to the *Shuo Wen*, the definition of *hong* is "帛赤白色" (silk of a red-white color). In some cases, this is interpreted to indicate that *hong* was originally pink. To say *baichi* 赤白 does not necessarily imply that there are equal parts red and white in the color (which is interpreted to mean 'pink'). It only indicates for certain that the color denoted by *hong* is a lighter red than previously named. Which is to say that it is lighter than the dark, earthy red of *zhu* or the deep blood red of *chi*. *Hong* may indicate a broader range and brighter color red. This is evident in the objects that

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[39] Bodman, Nicholas C. "Proto-Chinese and Sino-Tibetan: Data towards Establishing the Nature of the Relationship." In *Contributions to Historical Linguistics; Issues and Materials*, ed. Frans van Coetsem and Linda R. Waugh. (Cornell Linguistic Contributions, vol. 3.) Leiden: E.J. Brill, 1980. pp.185-186
[40] For example, 《北史》 "先是河水赤如血."
　　《明史》 " 二月乙巳亥，日赤如血。"

hong is used to describe. *Hong* is also used in the *Jiu Tang Shu* (941-945 C.E.) to describe pomegranates.[41] They are of a red color.

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[41] 《舊唐書》 "紅榴白蓮"

CONCLUSION

Through an examination of color word frequencies in the Twenty-five Dynastic Histories and the Thirteen Classics, I have found several trends that further the study of color word evolution in Chinese.

First, I have explained the patterns by which some of the color words are formed. While it is nearly impossible to know the origins of some color words, many color words evolve through similie. The name of an object with a characteristic color becomes a color word that is no longer tied to the noun.

Next, I have demonstrated that the use of twelve of the Twenty-five Dynastic Histories provides an excellent picture of semantic change in Chinese color words. Through this analysis we are able to see the trends in color word evolution.

Finally, I have demonstrated through careful analysis that some "older" color words have become fossilized in proper nouns, while "newer" color words have semantically remained as color words in the majority of cases. Such is the case with *xuan* and *hei* respectively. In addition, through analysis of word origins, I have explained why *zhu* was not a psychologically salient color term and was quick to fall from favor. In contrast, *chi* varies drastically in frequency throughout the Histories (an indication of its competition with *zhu*), and *hong* remains a versatile term for a wider scope of the term red.

Through this analysis of Chinese color words, I have added a new chapter to the study of the formation, semantic evolution and fossilization of color words.

APPENDIX A: COLOR WORD COUNTS IN THE TWENTY-FIVE DYNASTIC HISTORIES

Twenty-five Dynastic Histories

	玄	黑	朱	赤	紅
史記	370	121	148	177	16
漢書	248	139	258	225	59
後漢書	538	144	423	388	19
三國志	199	35	191	117	2
晉書	692	140	285	221	5
宋書	517	91	253	193	7
南齊書	185	52	72	68	13
梁書[42]	7844	3973	9011	6406	2080
陳書	39	5	38	11	2
魏書	354	137	388	166	7
北齊書	48	24	165	38	2
周書	49	9	121	26	2
南史	388	41	275	86	12
北史	412	96	488	146	5
隋書	400	118	271	224	15
舊唐書	1247	155	569	244	32
新唐書	1149	250	641	318	32
舊五代史	83	34	359	72	6
新五代史	26	18	186	36	3
宋史	277	439	1054	733	170
遼史	56	112	22	68	15
金史	72	119	86	183	136
元史	115	270	340	1689	175
明史	186	373	1026	482	384
清史稿	93	1035	1229	455	956

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[42] It is noted here that the numbers of the Liang Shu color word frequencies are extraordinarily high. This is most likely attributed to an error in the Academia Sinica databases. These data should not be relied upon for conclusions.

史記

黃	白	青	綠	藍	素	紫
525	478	221	8	39	152	43
731	685	281	25	31	297	69
990	779	361	31	33	323	104
504	333	205	4	6	263	28
665	673	389	25	18	492	157
564	905	437	16	18	300	149
238	336	174	18	6	137	93
18345	18125	9471	6	4	134	75
110	90	38	1	2	71	40
529	974	491	10	25	260	175
141	109	104	1	5	68	45
106	160	94	8	8	78	69
429	449	220	11	12	445	149
606	588	416	16	38	547	158
505	493	333	45	22	336	145
841	841	698	53	72	743	537
986	1162	471	46	89	696	271
221	325	236	7	9	263	119
151	153	80	3	3	118	18
2199	2598	1328	91	69	909	715
122	213	90	12	1	56	25
427	584	216	31	16	178	142
812	1169	469	75	103	255	227
1930	1507	600	90	201	653	224
3855	2370	1418	357	784	774	549

丹	緇	褐	橙	橘	蒼	縹
135	3	15	5	9	119	1
189	2	12	4	8	93	7
213	16	22	1	7	217	14
139	0	11	0	4	42	3
228	4	30	4	2	95	9
269	6	11	1	7	93	6
99	3	43	0	2	58	1
7390	1	22	0	5	26	1
79	0	34	1	1	8	0
133	16	91	0	2	63	1
32	2	27	0	0	21	0
31	0	23	0	3	21	0
262	2	30	3	8	50	0
153	5	57	0	2	42	2
129	10	41	0	4	108	12
351	6	99	0	6	163	7
364	14	41	4	19	95	3
488	9	24	1	2	19	0
337	0	2	0	0	4	0
1308	10	138	2	10	189	16
207	1	3	0	0	4	0
277	1	30	2	1	14	5
254	5	15	0	2	30	5
342	14	27	1	4	119	9
1248	8	16	4	22	181	7

緋	皁	棕	彤	Total
1	9	0	16	2611
0	10	0	6	3379
1	46	0	36	4706
1	4	0	3	2094
2	37	0	15	4188
1	31	0	5	3880
0	16	0	2	1616
0	14	0	3	82936
0	5	0	4	579
2	1	0	7	3832
2	0	0	1	835
1	2	0	1	812
0	19	0	6	2897
7	15	0	3	3802
11	47	0	9	3278
94	15	0	20	6793
55	4	0	22	6732
28	0	0	3	2308
3	0	0	0	1141
226	34	0	24	12539
12	0	0	0	1019
54	26	0	2	2602
74	2	5	2	6093
28	39	1	10	8250
2	30	9	81	15483

APPENDIX B: COLOR WORD COUNTS IN THE THIRTEEN CLASSICS

The Thirteen Classics

	玄	黑	朱	赤	紅	黃	白	青	綠	藍	素	紫
周易	0	3	15	10	0	61	32	3	1	0	19	0
尚書	4	34	38	22	0	53	84	27	1	0	12	3
毛詩正義	5	131	61	147	11	271	303	108	39	5	122	16
周禮注疏	72	102	69	112	4	156	208	93	15	5	106	9
儀禮	17	38	67	32	2	48	103	26	7	0	96	1
禮記	32	102	106	92	6	190	245	82	28	2	222	13
春秋左傳正義	144	128	124	110	9	187	206	60	9	11	115	6
春秋公羊	11	32	24	66	4	64	76	12	0	0	29	2
春秋穀梁	2	22	19	28	6	31	42	3	3	1	21	1
論語	1	15	29	25	4	16	37	14	5	0	22	9
孝經	16	2	2	4	0	5	15	4	0	2	2	3
爾雅	3	109	26	129	9	135	209	108	18	7	26	61
孟子	1	8	36	15	3	32	39	3	1	0	32	8

丹	緇	褐	橙	橘	蒼	縹
3	1	0	0	1	11	0
22	3	1	0	6	15	0
41	5	6	0	11	69	0
43	25	3	0	4	49	1
11	109	0	0	0	11	0
56	76	2	1	3	60	0
78	26	7	0	2	34	0
15	4	2	0	0	4	0
11	4	3	0	0	4	0
4	9	0	0	0	2	0
1	2	0	0	0	9	0
16	17	0	2	4	37	3
14	1	5	0	0	3	0

緋	皂	棕	彤	Total
0	2	0	0	162
0	1	0	7	333
0	7	0	22	1380
0	10	0	15	1101
1	0	0	6	575
0	1	0	3	1322
1	12	0	29	1298
0	0	0	1	346
0	0	0	2	203
0	2	0	2	196
0	0	0	0	67
0	8	0	6	933
0	0	0	2	203

APPENDIX C: RELATIVE FREQUENCIES OF COLOR WORDS IN THE
TWENTY-FIVE DYNASTIC HISTORIES

Relative Frequency in the Twenty-five Histories

	玄	黑	朱	赤	紅
史記	0.14	0.05	0.06	0.07	0.01
漢書	0.07	0.04	0.08	0.07	0.02
後漢書	0.11	0.03	0.09	0.08	0
三國志	0.1	0.02	0.09	0.06	0
晉書	0.17	0.03	0.07	0.05	0
宋書	0.13	0.02	0.07	0.05	0
南齊書	0.11	0.03	0.04	0.04	0.01
梁書	0.09	0.05	0.1	0.08	0.03
陳書	0.07	0.01	0.07	0.02	0.01
魏書	0.09	0.04	0.1	0.04	0
北齊書	0.06	0.03	0.2	0.04	0
周書	0.06	0.01	0.15	0.03	0
南史	0.13	0.01	0.1	0.03	0
北史	0.12	0.03	0.13	0.04	0
隋書	0.12	0.04	0.08	0.07	0
舊唐書	0.18	0.02	0.08	0.04	0
新唐書	0.17	0.04	0.1	0.05	0
舊五代史	0.04	0.01	0.16	0.03	0
新五代史	0.02	0.02	0.16	0.03	0
宋史	0.02	0.04	0.08	0.06	0.01
遼史	0.05	0.11	0.02	0.07	0.01
金史	0.03	0.05	0.03	0.07	0.05
元史	0.02	0.04	0.06	0.28	0.03
明史	0.02	0.05	0.12	0.06	0.05
清史稿	0.01	0.07	0.08	0.03	0.06

黄	门	青	綠	藍	紫	紫
0.2	0.18	0.08	0	0.1	0.06	0.2
0.2	0.2	0.08	0.01	0.01	0.09	0.02
0.2	0.17	0.08	0.01	0.01	0.07	0.02
0.2	0.16	0.1	0	0	0.13	0.01
0.16	0.16	0.09	0.01	0	0.12	0.04
0.15	0.23	0.11	0	0	0.08	0.04
0.15	0.21	0.11	0.01	0	0.08	0.06
0.22	0.22	0.11	0	0	0	0
0.19	0.16	0.07	0	0	0.12	0.07
0.14	0.26	0.13	0	0.01	0.07	0.05
0.17	0.13	0.12	0	0.01	0.08	0.05
0.13	0.2	0.12	0.01	0.01	0.1	0.08
0.14	0.15	0.08	0	0	0.15	0.05
0.16	0.15	0.11	0	0.01	0.14	0.04
0.15	0.15	0.1	0.01	0.01	0.1	0.04
0.12	0.12	0.1	0.01	0.01	0.11	0.08
0.14	0.17	0.07	0.01	0.01	0.1	0.04
0.1	0.14	0.1	0	0	0.11	0.05
0.13	0.13	0.07	0	0	0.1	0.02
0.18	0.21	0.1	0.01	0.01	0.07	0.06
0.12	0.21	0.09	0.01	0	0.05	0.02
0.16	0.22	0.08	0.01	0.01	0.07	0.05
0.13	0.19	0.08	0.01	0.02	0.04	0.04
0.23	0.18	0.07	0.01	0.02	0.08	0.03
0.25	0.15	0.09	0.02	0.05	0.05	0.04

黄	门	青	綠	藍	紫	紫

丹	緇	褐	橙	橘	蒼
0.05	0	0.01	0	0	0.05
0.06	0	0	0	0	0.03
0.04	0	0	0	0	0.05
0.07	0	0.01	0	0	0.02
0.05	0	0.01	0	0	0.02
0.07	0	0	0	0	0.02
0.06	0	0.03	0	0	0.04
0.09	0	0	0	0	0
0.14	0	0.06	0	0	0.01
0.03	0	0.02	0	0	0.02
0.04	0	0.03	0	0	0.03
0.04	0	0.03	0	0	0.03
0.09	0	0.01	0	0	0.02
0.04	0	0.01	0	0	0.01
0.04	0	0.01	0	0	0.03
0.05	0	0.01	0	0	0.02
0.05	0	0.01	0	0	0.01
0.21	0	0.01	0	0	0.01
0.3	0	0	0	0	0
0.1	0	0.01	0	0	0.02
0.2	0	0.01	0	0	0
0.11	0	0.01	0	0	0.01
0.04	0	0	0	0	0
0.04	0	0	0	0	0.01
0.08	0	0	0	0	0.01

縹	緋	皁	棕	彤
0	0	0	0	0.01
0	0	0	0	0
0	0	0.01	0	0.01
0	0	0	0	0
0	0	0.01	0	0
0	0	0.01	0	0
0	0	0.01	0	0
0	0	0	0	0
0	0	0.01	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0.01	0	0
0	0	0	0	0
0	0	0.01	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0.01	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

縹	緋	皁	棕	彤

APPENDIX D: RELATIVE FREQUENCIES OF COLOR WORDS IN THE THIRTEEN CLASSICS

Relative Frequencies in the Thirteen Classics

	玄	黑	朱	赤	紅	黃	白	青	綠	藍	素	紫
周易	0	0.02	0.09	0.06	0	0.38	0.2	0.02	0.01	0	0.12	0
尚書	0.01	0.1	0.11	0.07	0	0.16	0.25	0.08	0	0	0.4	0.01
毛詩正義	0	0.09	0.04	0.11	0.01	0.02	0.22	0.08	0.03	0	0.09	0.01
周禮注疏	0.07	0.09	0.06	0.1	0	0.14	0.19	0.08	0.01	0	0.1	0.01
儀禮	0.03	0.07	0.12	0.06	0	0.08	0.18	0.04	0.01	0	0.17	0
禮記	0.02	0.08	0.08	0.07	0	0.14	0.19	0.06	0.02	0	0.17	0.01
春秋左傳正義	0.11	0.1	0.1	0.08	0.01	0.14	0.16	0.05	0.01	0.01	0.09	0
春秋公羊	0.03	0.09	0.07	0.19	0.01	0.18	0.22	0.03	0	0	0.08	0.01
春秋穀梁	0.01	0.11	0.09	0.14	0.03	0.15	0.21	0.01	0.01	0	0.1	0
論語	0.01	0.08	0.15	0.13	0.02	0.08	0.19	0.07	0.03	0	0.11	0.05
孝經	0.24	0.03	0.03	0.06	0	0.07	0.22	0.06	0	0.03	0.03	0.04
爾雅	0	0.12	0.03	0.14	0.01	0.14	0.22	0.12	0.02	0.01	0.03	0.07
孟子	0	0.04	0.18	0.07	0.01	0.16	0.19	0.01	0	0	0.16	0.03

丹	緇	褐	橙	橘	蒼
0.02	0.01	0	0	0.01	0.07
0.07	0.01	0	0	0.02	0.05
0.03	0	0	0	0.01	0.05
0.04	0.02	0	0	0	0.04
0.02	0.19	0	0	0	0.02
0.04	0.06	0	0	0	0.05
0.06	0.02	0	0	0	0.03
0.04	0.01	0	0	0	0.01
0.05	0.02	0.01	0	0	0.02
0.02	0.05	0	0	0	0.01
0.02	0.03	0	0	0	0.13
0.02	0.02	0	0	0	0.04
0.07	0	0.02	0	0	0.01

縹	緋	皁	棕	彤
0	0	0.01	0	0
0	0	0	0	0.02
0	0	0.01	0	0.02
0	0	0.1	0	0.01
0	0	0	0	0.01
0	0	0	0	0
0	0	0.01	0	0.02
0	0	0	0	0
0	0	0	0	0.01
0	0	0.01	0	0.01
0	0	0	0	0
0	0	0.01	0	0.01
0	0	0	0	0.01

APPENDIX E: STATISTICAL TESTS

Chi-Square Test

Numeric Report

W ES-Index	Chi-Square	DF	N	Alpha (à)	Beta (á)	Power

---Two Proportions---

Numeric Report

Proportion	Diff0-ë0	Diffa-ëa	N1	N2	Alpha (à)	Beta (á)	Power
0.5000000	0.000000	0.500000	12	12	0.50000	0.013805	0.986195

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
WORD 1	12	9.225E-02	8.702E-02	0.00	0.29
WORD 2	12	0.6267	0.2031	0.25	0.91

Wilcoxon Signed Ranks Test

Ranks

		N	Mean Rank	Sum of Ranks
WORD 2-	Negative Ranks	0^a	0.00	0.00
WORD 1	Positive Ranks	12^b	6.50	78.00
	Ties	0^c		
	Total	12		

a. WORD2<WORD1

b. WORD2>WORD1

c. WORD1=WORD2

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