Effects of Synesthesia on Learning Chinese: A Personal Reflection

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Introduction

I remember going to math every day as an elementary school student and starting class with a timed ten-by-ten sheet of math problems. I always dreaded the exercise, and when time was up, my paper’s large amount of unfinished problems was a fairly accurate reflection of my poor math skills at the time. Although the idea that seven times seven equaled forty-nine was difficult for me to remember, I did remember that yellow times yellow equaled orange-pink. I remembered that green plus green equaled orange, and that white times any number was the other number. My initials were green, purple and yellow, and I always knew that my mother had to go to work on brown and pink days of the week. I would later learn in high school that the colors I saw were not random, and not learned, but indications of a neurological condition called grapheme-color synesthesia.

Around the time I first learned about synesthesia, I had already been studying the Chinese language for two years. From that point on, I began to reflect on my synesthesia in regards to how I learn, and discovered that the Chinese characters I had been studying also had colors of their own. Since then, I have been studying the effects of grapheme-color synesthesia on my learning, specifically in regards to Chinese characters. While studying the language, I asked myself what rules my color associations followed, and took note of my color perceptions as I learned more and more Chinese characters. The purpose of this paper is to share my findings on
the effects of grapheme-color synesthesia on Chinese characters as an L2 speaker of the Chinese language.

**What is Grapheme-Color Synesthesia?**

As explained by Cytowic and Eagleman (2009), one of the many types of synesthesia is grapheme-color synesthesia, in which one perceives letters or numbers with color. For example, a grapheme-color synesthete could perceive the number 7 as green or the letter ג as purple. In my case, I see colors in numbers, letters, days of the week and months of the year. The colors each synesthete sees is unique to the individual. Allison, Baron-Cohen and Johnson (2013) mention in their chapter in the *Oxford Handbook of Synesthesia* on the constancy of synesthetes’ cross-sensory associations that, “genuine synesthesia does not arise voluntarily, nor is it learned through training, acquired through drug use or induced (solely) by any neurological pathology” (p. 3-4). Allison et al. go on to explain that the genuineness of a synesthete is generally measured by consistency of color perception over a period of time. If a synesthete’s letter ç is blue, it will tend to be blue throughout the synesthete’s life (Allison et al., 2013, p. 5-6).

**Methodology**

Before my freshman year of college, my understanding of my synesthesia and its effects on my perception of the Chinese language was limited. Since then, I have researched neuroscientists and linguists who have studied and explored this intriguing condition. In order to better reflect on and analyze my perception of Chinese characters, I systematically reviewed each character of the of the Hànyǔ Shuǐpíng Kāoshì (HSK) exams level one through three, taking notes on the colors I saw, or did not see, for each character. I rated each character on a scale of one to three, one being a weak perception of color and three being a strong perception of color. I also took notes on consistencies and inconsistencies in the colors that characters had. Using these
gathered data along with my general understanding of my synesthesia, I was able to find interesting occurrences and factors that contribute to my perception of color with Chinese characters.

**English Alphabet Colors vs Pinyin Alphabet Colors**

As I have come to learn from discussions with other synesthetes, perceived synesthetic colors are unique to the individual. For clarification, it is necessary to add a detailed account of my personal synesthetic color associations. *Table I* provides a detailed account of the letters in the English alphabet and how I perceive each one. I have attempted to color each letter as closely as I can to match my own perception.

<table>
<thead>
<tr>
<th>Letter</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>red</td>
<td>brown</td>
<td>light green</td>
<td>brown</td>
<td>black</td>
<td>pink</td>
<td>light green</td>
<td>brown</td>
<td>white</td>
<td>purple</td>
<td>brown</td>
<td>green</td>
<td>yellow</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Letter</th>
<th>N</th>
<th>O</th>
<th>P</th>
<th>Q</th>
<th>R</th>
<th>S</th>
<th>T</th>
<th>U</th>
<th>V</th>
<th>W</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>yellow</td>
<td>white</td>
<td>purple</td>
<td>cyan</td>
<td>pink</td>
<td>blue</td>
<td>purple</td>
<td>pink</td>
<td>gray</td>
<td>white</td>
<td>black</td>
<td>white</td>
<td>gray</td>
</tr>
</tbody>
</table>

The colors I see in letters used in the English alphabet transpose to the Pinyin Romanization of Chinese characters. The colors of letters in the English alphabet match their Pinyin counterparts almost exactly, except for the case of the letters *q* and *x*. I have found that differences in pronunciation between the English and Pinyin writing systems result in a change of color. The first letter that produces this change in color is *x*. The pronunciation of the letter *x* is normally a *ks* sound in English. The Pinyin system, however, utilizes *x* to represent a phoneme similar in sound to the English letter *s*. Because the letter *x* is black and the letter *s* is blue, the letter *x* as used in the Pinyin system is dark blue, a combination of the color blue with a dark shading. The same phenomenon appears to occur with the letter *q*. The letter *q* is used to represent phoneme similar in sound to the English letter(s) *ch*. Because the letter *q* is cyan and
the letter c is green, the letter q as used in the Pinyin system is a light green color, a sort of combination of the two. This finding shows that differences in pronunciation for the same letter as used in English and as used in Chinese can cause a “blending” of colors. Table II provides a detailed account of colors I perceive in the English alphabet compared to the colors I perceive in the Pinyin alphabet.

<table>
<thead>
<tr>
<th>English Alphabet Colors vs Pinyin Alphabet Colors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>English</strong></td>
</tr>
<tr>
<td>Pinyin</td>
</tr>
<tr>
<td>English</td>
</tr>
<tr>
<td>Pinyin</td>
</tr>
</tbody>
</table>

*The only major differences in color between the two alphabets are shown in the letters q and x, which are light green and dark blue, respectively.

**Factors That Affect My Perception of Color with Chinese Characters**

**Degree of Familiarity**

From notes taken on characters from HSK levels one through three and from general observations made while studying characters, I have noticed that the longer I study a character, the stronger its color association becomes. HSK level one had significantly more strongly colored characters than HSK level two, and HSK level three the fewest amount of strongly colored characters. This relationship shows that degree of familiarity is directly related to the strength of colors I perceive with characters. Simple and frequently used characters that I have studied since I first began learning Chinese such as 你 (you), 好 (good) and 是 (to be), have much more prominent colors than characters I have only known and studied for a few months, such as 省 (province) and 鼠 (mouse), which have fainter colors. I have noticed that with time the colors of characters that were originally weakly or faintly colored appear strongly or boldly colored after only a few months of studying, in general.
Coloring Based on Pronunciation

My perception of colors with Chinese characters is largely based on the letters used in the Pinyin Romanization system. Predominately, the colors of the letters that compose each one syllable character create the colors that I see with Chinese characters. For example, my letter n is yellow. Characters that are written with an n in the Pinyin system are also yellow (e.g. 你 appears yellow because it is spelled nǐ). Letter placement in the context of the syllable also plays a role in my color perception. Characters usually have one dominant color, which is normally assigned by the initial letter, whether it is a consonant or a vowel. For example, the character for cuisine (菜 cài) is composed of three letters, c which is green, a which is red and i which is white. Although this character is written with three different letters, the green c is the component that colors the character because it is the initial letter and therefore has dominance. The same goes for a character that begins with a vowel, such as the word for love (爱 ài) which I perceive as the color red due to its red letter a. One inconsistency to this phenomenon occurs when final letters include brightly colored letters. Specifically, the letter n, which is yellow, has much more a role in coloring a character when it is in the final position. I assume that this phenomenon is due to the high level of brightness of the color yellow. Whereas a character such as 不 (bù) is not colored by the final u, which is a dull pink color and is almost completely dominated by the initial brown letter b, a character such as 点 (diǎn) is colored more so by its initial letter and final letter together due to the brightness and consequent prominence of n.

Coloring Based on Radicals and Components

Radicals and components also play a certain role in how my synesthesia colors the Chinese characters I see. If I have never learned the pronunciation of a character, I do not know the Pinyin and the subsequent color to associate the character with. The only exception to this
case is when a character I do not know composes a radical or component that I do know. The color of that radical or component is therefore transferred to the entire character, regardless of its actual spelling and pronunciation. For example, if I do not recognize the character 霉, I may recognize one or both of the two components, 雨 and 每. If, for example, I recognize the 每 component, which is yellow, the unknown 霉 character is automatically colored yellow. In the case when I recognize both radicals or components, I perceive both colors; however, the dispersion of multiple colors from radicals or components is not always even. Components that change form when used as radicals tend not to transpose their original colors. For example, the 刀 radical, which is normally brown, sometimes changes its form to 刂 when used as a component of a character. Although 刀 is brown, characters such as 刚 (gāng) or 別 (bié) do not appear brown due to the altered 刂 form. One interesting miscellaneous finding is that the 口 (kǒu) radical, which is normally brown in color, changes its color to white when used as a radical component. For example, the character 哪 (nǎ) appears yellow and red due to the letters n and a, but also appears white due to the 口 radical. It seems that the 口 radical appears white when used as radical component because it resembles the letter o, which is white. When 口 appears next to other components, as in the case of 哪, I subconsciously perceive the radical as the letter o as if it were written out as a word in English.

Color Based on Similarly Shaped Characters

Characters that are shaped similarly are usually colored by the character that I learn first. Similar to the case of radicals, the first form I learn is the one that is dominant. For example, the character 日 (rì) is pink due to the spelling’s pink letter r. 日 appears similar in shape to the character 曰 (yuē). Because I learned the character and therefore color of 日 first, 日 appears the
color of 日. Despite 日’s actual Pinyin spelling, the character is overridden by 日’s color. This phenomenon can create some confusion when trying to learn new characters that are similar in shape to characters I have already learned. I will frequently accidently read 日 with 日’s pronunciation because both appear pink.

**Coloring from Word Definition**

There are some instances in which characters are colored by neither Pinyin spelling nor radicals or components. In these instances, colors that I strongly associate with the definitions of characters override the normal letter or radical coloring. For example, the character for rice (米) appears white because I visualize rice as white. The same occurs with the characters for hot (热) and fire (火), which appear both red and orange. Because I strongly associate certain characteristics and colors with certain words, some characters are overridden by these connections. So far, I have not been able to find any consistency to explain why certain characters are colored by their meaning, and why others are not. It may be the case that more basic or elementary-level nouns tend to show this pattern. Words for simple nouns tend to be affected by this type of character-coloring association, rather than more abstract nouns or verbs.

**Color Words**

Similar to coloring from word definitions, characters for color appear as the colors they describe. Most of my color words such as *red*, *green* and *purple*, take on the colors they describe despite their spellings. The character for red (红) is red, the character for orange (橙) is orange, the character for yellow (黄) is yellow, and so on. In regards to basic “crayon box colors,” the only exception to this pattern is the character for blue (蓝), which appears green. Lesser used colors such as silver, gold and gray are not affected by this phenomenon.
Coloring from Numerals

Chinese numeral colors represent their own case in color association. In my synesthesia, Arabic numerals one through nine have their own distinct colors separate from their spellings. The perceived colors of my Arabic numerals then transpose into characters for numerals in Chinese. It is interesting that Chinese numerals one through five take on the colors of my Arabic numerals, but numbers six through nine take on the colors of their Pinyin spellings. *Table III* compares my Arabic numeral colors with my Chinese numeral colors.

<table>
<thead>
<tr>
<th>Arabic Numerals</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese Numerals</td>
<td>一</td>
<td>二</td>
<td>三</td>
<td>四</td>
<td>五</td>
<td>六</td>
<td>七</td>
<td>八</td>
<td>九</td>
<td>〇</td>
</tr>
</tbody>
</table>

Note. 六, 七, 八 and 九 are colored due to their spellings lìù, qī, bā and jiǔ. See *Table II* for corresponding color associations.

**Effects of Synesthesia On My Learning**

Grapheme-color synesthesia has helped me to study and memorize Chinese characters. The condition allows me to remember pronunciations for characters based on their colors, which manifest the more I study. Perceiving Chinese characters with colors has greatly helped me to learn and memorize pronunciations. At times, I forget the pronunciation of a character, but still see its color, which helps me to remember the pronunciation. Say, for example, I forget how to pronounce the character 变 (biàn). Although I have forgotten the character’s pronunciation, I have learned in the past that 变 is brown, red and yellow, which can give me a hint as to its pronunciation. However, with advantages come certain disadvantages. This color association does, at times, hinder my ability to learn new characters. Radicals sometimes create new colors...
for characters I have not learned yet. This can lead to confusion when learning new characters and their pronunciations. For example, the character 野 (yě) contains the 里 (lǐ) radical, which is green due to the letter l. Despite 野’s real spelling, this character is colored green due to its radical component. Consequently, I sometimes pronounce this character incorrectly as li rather than ye. Similarly colored letters can also lead to confusion. For example, in my synesthesia the letters m and n are both yellow. I find myself sometimes pronouncing characters with m initials as n initials and vice versa. The same confusion occurs in the letters w and y, which are both white.

I am proud to have this perspective on Chinese characters. Although it can sometimes prove to be an inconvenience, hard work through studying allows me to overcome these boundaries sometimes created by the condition. Studying is ever critical for me to learn the Chinese language. In all, synesthesia has given me a unique perspective on the Chinese language. Many scientists have researched synesthesia and its effects, but at the same time the number of studies on synesthesia in L2 Chinese speakers is relatively small, and require more research to help discover and understand the potential of this fascinating condition.

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References
