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Math Project 115R

My major at NKU is Japanese, therefore I had to be precise on where I found math in my major. They say to become fluent in Japanese, one must master at least 2,000 Kanji characters. Although I have only made a dent in that number, some Kanji are easier to read due to their simplicity. My math project is based on the reflectional symmetry of Kanji while also including the concepts of counting the stroke order of each Kanji. One must follow the exact stroke order to be correct. They say that if you are to be fluent in Japanese, you must be able to realize if a stroke order is performed correctly or out of order.

Characters that I have found reflectional symmetry in are the following Kanji Characters: **One (Ichi), Two (Ni), Three (San), Ten (Jyuu), Tree (Ki), Sun (Hi), Middle (Naka), Ta (Rice field) Exit (Deguchi) and Book (Hon).** These are 11 everyday Kanji that have reflectional symmetry. **I will demonstrate writing them on the board for you all, this way you can see that I must count each stroke.** Once completed, you will see that each of these eleven Kanji have reflectional symmetry. I am going to demonstrate that with reflectional symmetry and counting using each stroke order, it can be easy and fun to learn a few of Japan's everyday writing systems.

Kanji (漢字) are logographic Chinese characters, adapted from Chinese script, used in the writing of Japanese. They were made a major part of the Japanese writing system during the time of Old Japanese and are still used, along with the subsequently-derived syllabic scripts of *hiragana* and *katakana*. Kanji was invented to make the writing system much more easy for those who are native or learning to read. Hiragana consists of 46 characters and Katakana consists of 46 characteres. Each character has a specific stroke order which you must use in order to write and learn it properly. I will give an example as to why Kanji is helpful.

If I were to write this sentence…

きょう、すしをたべにいきますか？(Kyou, Sushi wo tabemasu ka?)

This means “ Would you like to eat sushi today?” and…

今日きょう、 寿司すしを 食たべに 行いきますか？ (Kyou, Sushi wo tabemasu ka?)

This also means “ Would you like to eat sushi today?”

The first sentence is very difficult to read for those learning. There is nothing separating the words and characters from each other. In Japanese, there are no spaces between words, so kanji helps break words apart, making it easy to read.

Long sentences would get even more difficult to read, and when you don't know where one word begins and another one ends, reading errors can occur. This is why Kanji is extremely important, even if there are over 2,000 to learn to be considered fluent.

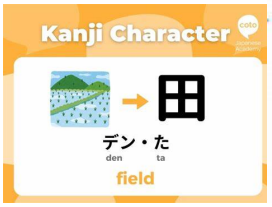
When beginning to learn Kanji, it can be overwhelming. This is why Kanji that have reflectional symmetry can be a breath of fresh air. Instead of learning a Kanji with 84 strokes like "Taito" or "appearance of a dragon in flight" (See bottom of essay for this Kanji) these characters are rather simple to remember due to each of their strokes being symmetrical and exactly the same. Although the eleven Kanji I've demonstrated drawing all have reflectional symmetry, they do not have rotational symmetry or any other type of symmetry that I am able to see. However, they are still rather simple due to having one type of symmetry and since I have over 2,000 to learn, I'll take any help I can get!

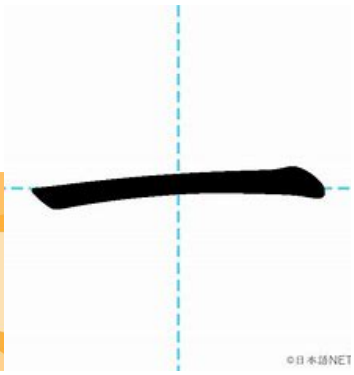
一 This is the Kanji for one, and as you can see since it is a straight line, if you put a mirror up to half of it, it would reflect the same. 二 This is the kanji for two & this 三 is the kanji for kanji for three. Simple right? Unfortunately, four 四 breaks the cycle of simplicity. I'm sure that other Kanji exist with reflectional symmetry but once you begin learning the more complex Kanji, it gets rather difficult for anything to be symmetrical due to its complex amount of strokes. An example of Kanji that looks like it has reflectional symmetry but doesnt is the Kanji 山 (Yama) This means mountian. It looks like like if you were to put the mirror on the middle line it would reflect the same on the opposite side however, if you look very closely you can see that on the right hand side at the very bottom of the character, the furthest right stroke goes slightly past the edge, making it unable to have reflectional symmetry.

Kanji also exists in Yang Hui's Triangle, the numbers of one, two, and three, can be seen throughout the triangle. It was fascinating to see that even inside the original triangle with counting numbers, triangle numbers, binary number and the sum of the previous two numbers, the triangle still had other aspects of math inside it. The kanji used needed a meticulous and exact amount of strokes to write the correct Kanji. Reflectional symmetry in the kanji numbers were also shown in the numbers 1,2 and 3.

This math course has shown me that truly math exists everywhere and although I won't be a math major anytime soon, it has made me understand and appreciate the fact that math has been a part of everything since the beginning of time. We wouldn't be the civilization we are today without math.

□ Taito or “appearance of Dragon in flight”





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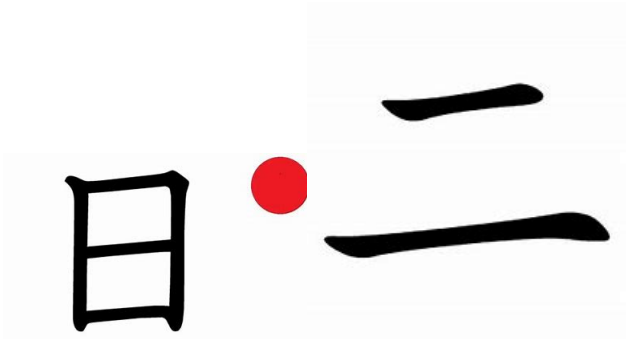

二三

土

ド / ト / つち

dirt / earth / soil

木

モク、ボク

き

tree, wood

で ぐち

出口

de guchi

exit