

A Study on the Influence of Light Social Drinking on Writing by Chinese in Hong Kong

Yau-Sang Patrick Cheng and Yee-Mei Amy Leung

Questioned Documents Section, Forensic Science Division, Government Laboratory, Hong Kong, 88 Chung Hau Street, Homantin, Hong Kong

A study was conducted on the effect of light social drinking on handwriting involving the writing of Chinese, English, Arabic numerals, and some geometric shapes. All of the 151 participants were ethnically Hong Kong Chinese and ranged from occasional drinkers to habitual drinkers of alcoholic beverages. The results of this study confirmed observations made in previous studies of the effects on handwriting due to alcohol consumption. In general, the forensic document examiner can expect to find the effects to include an increase in size of the writing, wider word spacing, and increased pen pressure along with possible writing mistakes. The other aspects of handwriting such as the quality of writing, writing characteristics including writing movements, alignment, and slant would largely be retained. The writing of geometric shapes after light drinking agreed with that of text writing with some exceptions.

Introduction

The individual characteristics of an adult's handwriting are considered to be habitual. One would expect a person's handwriting to remain fairly consistent. However, there are situations that exist that often do affect a person's writing. Examples of these situations include writing on unaccustomed surfaces, illness, old age, hurried writing, and writing under the influence of alcohol or drugs. It is known that alcohol consumed in excessive amounts often causes deterioration in muscular coordination, even though the manifested effects depend on an individual's tolerance (Ellen 1989, Hilton 1982). Studies on the handwriting of people under the influence of alcohol have been widely published by various authors. The effects of consumption of a moderate amount of alcohol have been described by Inderjit Singh and P.K. Chattopadhyay (1996). Jan Beck has made a study of handwriting of alcoholics (1985) discussing the problems in the evaluation of their writing. The studies thus far appear to refer mainly to the Western world and concern English handwriting. No studies were found reporting the effect of alcohol on Arabic numeral writing or the drawing

of geometric shapes. Therefore, the authors of this study believed that it would be significant and useful to conduct such a study with particular reference to ethnic Chinese handwriting in the local situation in Hong Kong involving the effects of light social drinking on the writing of Chinese, English, Arabic numerals, and some geometric structures.

Methods and Materials

The present study is limited to light social drinking. The collection of handwriting samples was made during a study of alcohol pharmacokinetics (Mok and Tam, 2004) of local Chinese in Hong Kong conducted by the Toxicology Section of the Forensic Science Division of the Government Laboratory, Hong Kong. Altogether, 151 people participated in the study comprising laboratory staff and police officers between the ages of 20 and 55. As declared, the participants were either occasional or habitual drinkers.

Prior to consuming alcohol beverages, the participants were requested to initially give writing in English, followed by Chinese, then Arabic numerals, and finally geometric shapes

(Appendix 1). After the first set of samples was obtained, the participants were offered a choice of alcoholic drinks: 2 cans of beer containing 5 percent v/v of ethanol, 2 glasses of 150 milliliters of red wine containing 13 percent v/v of ethanol, or 120 ml of spirit (brandy or whisky) containing 40 percent v/v of ethanol. If they chose, snacks were made available along with the drinks. The participants were instructed to finish drinking within one hour. It was believed that the blood alcohol level reached its peak 15 to 30 minutes after consumption; therefore, after 15 to 30 minutes the participants were asked to repeat the same set of handwriting as indicated above. Both

sets of handwriting were then compared according to the features listed below. The quality of a particular parameter as specified after drinking was to be compared with that same parameter before drinking (Table 1). The different features of the samples before and after drinking were examined and evaluated visually and in detail under the Zeiss Stemi 2000 stereomicroscope.

Results

The results are illustrated in the following charts:

Description	Parameters
English, Chinese and Arabic Numerals	
Speed	similar, slower, or faster
Writing pressure	similar, lighter, or heavier
Size	similar, smaller, or bigger
Spacing	similar, smaller, or bigger
Line length	similar, decreased, or increased
Line spacing	similar, decreased, or increased
Change in writing slant	no or yes
Margin changes	no, closer, or away
Quality of writing	similar, worse, or better
Abbreviation(s)	no or yes
Connecting Strokes	no or yes
Change in alignment	no or yes
Writing characteristics	comparable, partially comparable, noncomparable
Writing mistake(s)	no or yes
Horizontal line, Curved line, Vertical Line	
Quality	similar, worse, or better
Resembling the length of the model line	similar, worse, or better
Writing pressure	similar, decreased, increased
Circle, Triangle	
Size	similar, smaller, or bigger
Shape	similar, worse, or better
Pressure	similar, decreased, or increased
Parallel Zigzag Lines	
Size	similar, smaller, or bigger
Shape	similar, worse, or better
Pressure	similar, decreased, or increased
Spacing between lines	similar, decreased, or increased
Circle, Triangle	
Size	similar, smaller, or bigger
Shape	similar, worse, or better
Pressure	similar, decreased, or increased

Table 1. Writing features and parameters used in the analysis of the writing after the participants drank alcoholic beverages.

Discussion

The speed of writing of English, Chinese, and Arabic numerals for 81% of the participants remained unaffected after drinking, while 19% of the writing was written at a faster speed. It was interesting to note that none of the after drinking writings were written at a slower speed. These results echo Hilton's findings (1969) that no apparent change in speed could be observed for the before or after drinking samples.

Regarding pressure, 71% of the writings had similar writing pressure before and after drinking. Of the after drinking writings, 13% were found to have been written heavier than before drinking and 16% were found to have been written lighter. These findings show that some people do write with a lighter pressure after drinking even though the majority of people write with similar pressure or heavier pressure after drinking.

Of the English and Chinese writings, 59% were found to have been written larger after drinking. This is in agreement with what has been reported (Ellen, 1989; Hilton, 1982; Singh and Chattopadhyay, 1996) in the literature. Only 7% of the writers were found to have written smaller after drinking. As to the numeral writings after drinking, 53% remained similar in size, 42% were written larger, and 5% smaller. These findings show that some writers had a tendency to write larger numerals after the consumption of alcohol. This may be attributed to the simplicity in form of the numerals and the easiness in their execution.

Of the Chinese and English handwriting, 65% were found to have been written with larger spacing after drinking, as compared with 48% in the writing of Arabic numerals. Again, the simplicity of the numerals might be the reason. In the Chinese and English handwriting, 72% had increased line length after drinking. However, for the Arabic numerals, only 50% had increased in line length after drinking. A moderate increase in line spacing of 51% was observed for the Chinese and English handwriting after drinking. For the Arabic numerals, only 33% showed an increase in line spacing after drinking. Virtually no change in the writing slant was observed for the Chinese, English, or Arabic numeral writings after drinking.

With the English, Chinese, or Arabic numerals of the after drinking writings, 48% showed similarity in the distance from the left margin. Al-

though 40% of the after drinking writings were closer to the margin, only 12% of the after drinking writings were away from the margin. These findings show that there is a less tendency towards writing away from the margin.

Regarding the quality of writing, 90% of the writings of English, Chinese, or Arabic numerals were similar before and after drinking, with 10% of the writings in poorer writing quality after drinking. These findings indicate that for light drinking, the quality of writing is largely unaffected, contrary to moderate to heavy drinking (Singh and Chattopadhyay 1996, Beck 1985, Galbraith 1986, Foley 1979).

Of the English and Arabic writings, 99% showed no change in abbreviation after drinking. Chinese handwriting showed relatively more abbreviation, namely 10%, as compared to 1% in English and Arabic numerals. Chinese is written stroke by stroke, and thus has a greater potential to be abbreviated (Leung, Tsui, Cheung, and Chung 1985).

The after drinking writings of 91% of the participants did not show any extra connecting strokes, and 90% of the after drinking writings showed no change in the alignment. Virtually all of the after drinking writings showed comparable characteristics. These findings indicate that for light drinking, the deterioration or distortion in writing characteristics is expected to be minimal.

Writing mistakes were found in 13% of the English writings and 9% of the Chinese writings after drinking. Even for light drinking, mistakes in writing could occur. None of the Arabic numeral writings showed any writing mistakes. Regarding the writing of the horizontal line, curved line, and vertical line, 58% of the samples exhibited similar quality of execution after drinking. Some 12% of the samples were written better and 30% were written poorer after drinking. It appears that for simple geometric structures like lines, people would pay less attention to quality after drinking, resulting in a greater percentage of lines in poorer condition as compared with the percentage of handwriting of English, Chinese, or Arabic numerals of poorer quality. Similarities to the model lines in length and shape showed on 55% of the after drinking samples, while 35% showed poorer resemblance to the model lines after drinking.

Line structures in 27% of the samples showed increased pressure after drinking. This percentage is more than double the 13% increase in pressure in the writing of Chinese, English, or

Arabic numerals after drinking. The tendency of increasing pressure is greater for simple lines than with writing, probably because more freedom is allowed.

Regarding the writing of the circle and triangle, 54% of the samples showed an increase in size after drinking, which is virtually the same percentage as for Chinese, English, and Arabic numeral writings. In addition, 71% of the circle and triangle samples contained similarities in the shape before and after drinking, as compared to only 58% of the lines showing similar quality after drinking. Individuals may give more attention to geometric figures than simple lines. Also, 76% showed similar pressure before and after drinking. Increase in pressure after drinking was found on 16% of the circle and triangle writings, which was similar to 13% in the writing of English, Chinese, or Arabic numerals.

Regarding the writings of the parallel zigzag lines, 52% of the samples showed an increase in size after drinking, which was similar to 54% increase in size of the circle and triangle. In addition, 48% of the parallel zigzag lines showed similarities in shape after drinking, which was much less than the 71% similarities in shape in the circle and triangle. These findings show that people tend to pay less attention to lines than figures in their execution. These same parallel zigzag lines showed an increase in pressure after drinking on 28% of the writings. This compared well with the 27% of line samples with an increase in pressure. Also, 40% of the writings of the parallel zigzag lines showed an increase in spacing after drinking, which was similar to 45% percent of samples of English, Chinese, or Arabic numerals with increase in line spacing.

Conclusions

For light alcohol drinking, it could be seen from the results that writings before and after light drinking are highly comparable and they maintain close similarities in the writing characteristics, slant, alignment, quality of writing, abbreviation, and connecting strokes.

The findings of this study also indicate that after light drinking there is the tendency for individuals to write larger as indicated in the literature (Ellen 1989, Hilton 1982, Hilton 1969). However, Arabic numeral writings after drinking show smaller differences in the increase in size, word spacing and line length compared to Chinese and English handwriting. This may be

attributed to the simplicity and size of individual numerals. Another point of interest was that even with light drinking, 11% of the participants made mistakes in their writing of Chinese and English.

For all of the geometric figures, the quality and shape after drinking was by comparison inferior to that of the writing of English, Chinese, or Arabic numerals after drinking. This may be attributed to the lack of attention from individuals when writing simple geometric structures. The increase in size for triangles, circles, and parallel zigzag lines after drinking paralleled that for writing of English, Chinese, and Arabic numerals after drinking. While the percentage of circle and triangle samples showing an increase in writing pressure after drinking paralleled that of writing of English, Chinese, or Arabic numerals after drinking, the percentage of samples of the line structures with an increase in pressure after drinking was higher than that of the writing of English, Chinese, or Arabic numerals. This might be due to the easiness and freedom of execution of lines and therefore a tendency toward increase in pressure.

In conclusion, the present study has supported the literature in some respects and added some new insight as to the influence of light social drinking on handwriting. The effect of alcohol, whether writing Chinese or English, is similar to what has been reported in the literature. New insights have been shown regarding the effect of drinking alcohol on the writings of Arabic numerals and simple geometric figures.

Acknowledgement

The authors would like to thank all those participants who provided us handwriting samples. We also have to record here our gratitude to Chief Chemist, Dr. Y. S. Wong for his proof-reading of the paper, Assistant Government Chemist, Mr. S. C. Leung, and Government Chemist, Dr. D. G. Clarke for their support and encouragement.

References

- Beck, Jan (1985). Handwriting of the Alcoholic. *Forensic Science International*, Vol. 28, pp. 19-26.
- Ellen, David (1989). *The Scientific Examination of Documents*. Ellis Horwood, England, pp. 36-37.
- Foley, Robert G.; Miller, A. Lamar (1979). The Effects of Marijuana and Alcohol Usage on Handwriting. *Forensic Science International*, Vol. 14, pp. 159-164.
- Galbraith, Nanette (1986). Alcohol: Its Effect on Handwriting. *Journal of Forensic Sciences*, Vol. 31, No.2, April 1986, pp.580-588.
- Hilton, Ordway. (1982). *Scientific Examination of Questioned Documents*. Elsevier North Holland, Inc., pp. 178-180.
- Hilton, Ordway (1969). A Study of the Influence of Alcohol on Handwriting. *Journal of Forensic Sciences*, Vol. 14, pp. 309- 316.
- Leung, S.C.; Tsui, C.K.; Cheung, W.L.; Chung, M.W.L. (1985) A Comparative Approach to the Examination of Chinese Handwriting – the Chinese Character. *Journal of the Forensic Science Society*, Vol. 25, pp. 255-267.
- Mok, V. and Tam.T. (2004) A study of Alcohol Pharmacokinetics of Local Chinese in Hong Kong Part I: Blood Alcohol Concentration (BAC): Time Profile and Time to Peak BAC. In application for publication.
- Singh & Chattopadhyay (1996). Effect of Alcohol on Handwriting. *Proceedings of the 14th IAFS*, pp. 390-396
- Stinson, Marie D. (1997). A Validation Study of the Influence of Alcohol on Handwriting. *Journal of Forensic Science*, Vol. 42(3), pp. 411-416.

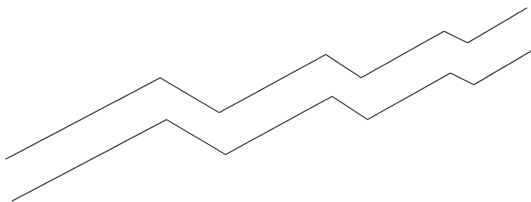
Appendix 1a.

Reference No. _____ Please perform the following tasks before you start your drinking (在酒精測試前，請供給以下書寫樣本。) Mississippi River in the USA Procrastination is the thief of time. 7328 5176 \$940.00 1. Please write the above sentences and numerals twice (請在以下空間寫以上句子，數目字兩次) 嚴厲打擊罪行 是我們的首要任務 2. Please write the above sentences twice (請在以下空間寫以上句子兩次)	3. Please draw the following lines twice (請畫以下線條兩次) a. Horizontal line (水平線)  b. Curved line (波浪線)  c. Vertical line (垂直線) 
--	---

4. Please draw a circle twice (請畫一個圓形兩次)

5. Please draw a triangle with 3 equal sides twice (請畫等邊三角形兩次)

6. Please draw the following parallel lines twice (請畫以下平行線兩次)



Thank you. 謝謝。

Appendix 1b.

Reference No. _____

Please perform the following tasks **after** you have finished drinking and when you have reached your alcohol “peak” level [as when you are informed](當你被通知已經到達自己酒精含量最高時，請供給以下書寫樣本。)

Mississippi River in the USA

Procrastination is the thief of time.

7328 5176

\$940.00

1. Please write the above sentences and numerals twice
(請在以下空間寫以上句子，數目字兩次)

嚴厲打擊罪行
是我們的首要任務

2. Please write the above sentences twice
(請在以下空間寫以上句子兩次)

3. Please draw the following lines twice (請畫以下線條兩次)

a. Horizontal line (水平線)

b. Curved line (波浪線)

c. Vertical line (垂直線)

4. Please draw a circle twice (請畫一個圓形兩次)

5. Please draw a triangle with 3 equal sides twice (請畫等邊三角形兩次)

6. Please draw the following parallel lines twice (請畫以下平行線兩次)

Thank you. 謝謝。

Appendix 2.

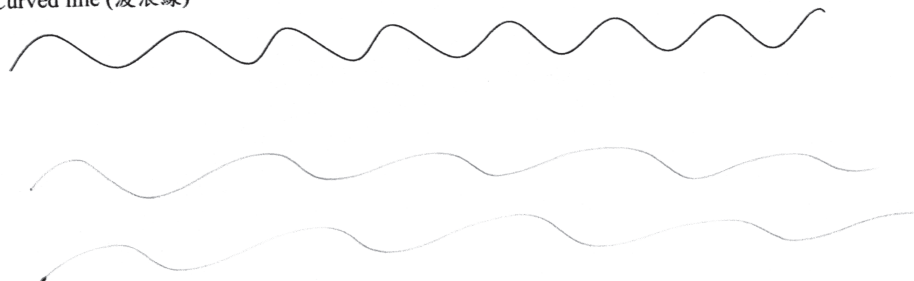
001

Increase in writing pressure after drinking

Curved

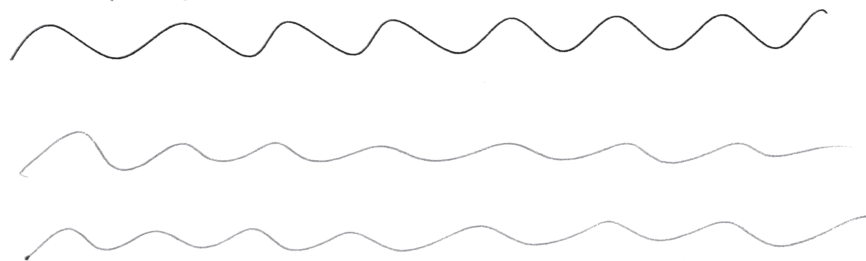
Before drinking

b. Curved line (波浪線)



After drinking

b. Curved line (波浪線)



068

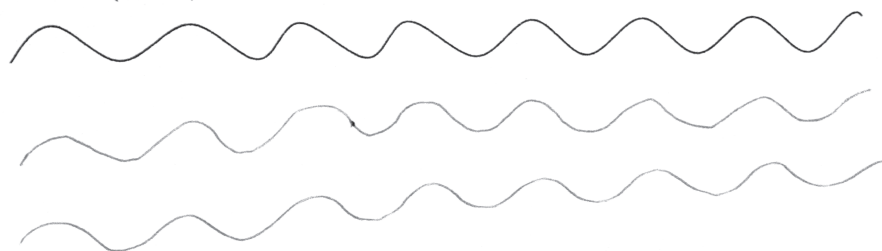
1. Similar pressure before and after drinking

2. Similar quality before and after drinking

Curved

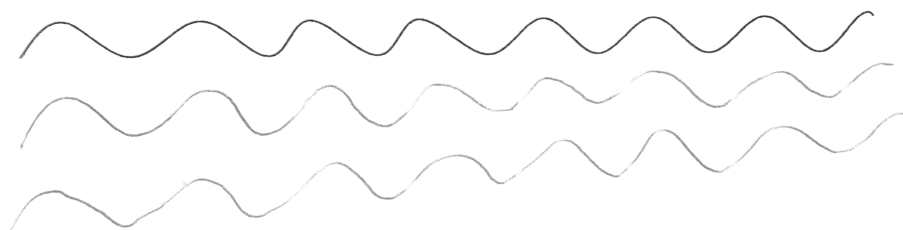
Before drinking

b. Curved line (波浪線)



After drinking

b. Curved line (波浪線)



Appendix 2.

065

Increase in size after drinking

Triangle

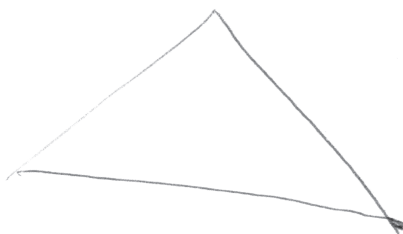
Before drinking

5. Please draw a triangle with 3 equal sides twice (請畫等邊三角形兩次)



After drinking

5. Please draw a triangle with 3 equal sides twice (請畫等邊三角形兩次)



Appendix 2.

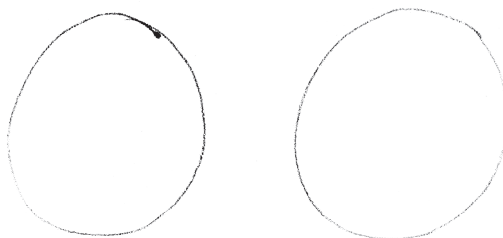
060

Similar size of the circles before and after drinking

Circle

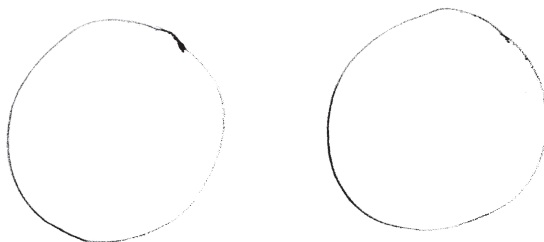
Before drinking

4. Please draw a circle twice (請畫一個圓形兩次)



After drinking

4. Please draw a circle twice (請畫一個圓形兩次)



Appendix 2.

069

1. Increase in size after drinking

2. Increase in line length after drinking

Chinese

Before drinking

嚴厲打擊罪行
是我們的首要任務

嚴厲打擊罪行
是我們的首要任務

After drinking

嚴厲打擊罪行。
是我們的首要任務

嚴厲打擊罪行。
是我們的首要任務

010

1. Increase in writing speed after drinking

2. Increase in size after drinking

3. Increase in word spacing after drinking

4. Increase in line length after drinking

Chinese

Before drinking

嚴厲打擊罪行
是我們的首要任務

嚴厲打擊罪行
是我們的首要任務

After drinking

嚴厲打擊罪行。
是我們的首要任務
嚴厲打擊罪行。
是我們的首要任務

Appendix 2.

069

1. Increase in size after drinking

2. Increase in line length after drinking

Chinese

Before drinking

嚴厲打擊罪行
是我們的首要任務

嚴厲打擊罪行
是我們的首要任務

After drinking

嚴厲打擊罪行。
是我們的首要任務

嚴厲打擊罪行。
是我們的首要任務

010

1. Increase in writing speed after drinking

2. Increase in size after drinking

3. Increase in word spacing after drinking

4. Increase in line length after drinking

Chinese

Before drinking

嚴厲打擊罪行
是我們的首要任務

嚴厲打擊罪行
是我們的首要任務

After drinking

嚴厲打擊罪行。
是我們的首要任務
嚴厲打擊罪行。
是我們的首要任務

Appendix 2.

067

Distance of writing closer to page margin after drinking

English

Before drinking

Mississippi River in the USA
Procrastination is the thief of time.

7328 5176

\$ 940.00

Mississippi River in the USA

Procrastination is the thief of time

7328 5176

\$ 940.00

After drinking

Mississippi River in the USA

Procrastination is the thief of time

7328 5176

\$ 940.00

Mississippi River in the USA

Procrastination is the thief of time

7328 5176

\$ 940.00

001

1. Presence of English writing mistakes after drinking

2. Distance of writing closer to page margin after drinking

English

Before drinking

Mississippi River in the USA

Mississippi River in the USA

Procrastination is the thief of time

Procrastination is the thief of time

7328 5176

7328 5176

\$ 940.00

\$ 940.00

After drinking

Mississippi River in the USA

Mississippi River in the USA

Procrastination is the thief of time

Procrastination is the thief of time

7328 5176

7328 5176

\$ 940.00

\$ 940.00