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中文單字語意類別判斷作業、遮蔽作業、促發作業與受試者的因應策略（三）

Subject's strategy on character semantic categorization, backward masking, and priming tasks

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中文單字語意類別判斷作業、遮蔽作業、促發作業與受試者的因應策略（三）

對 Perfetti 與 Tan 形音義激發時間歷程模型的反駁

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摘　　要

在上一年度的研究報告裡，本計畫研究者闡明 Perfetti & Zhang (1991)的實驗四是無法被有效重複驗證的, 因此質疑 Perfetti 根據這樣的資料提出 1992 年及 1995 年的普遍語音原則。報告尚未交出時又發現了 Perfetti 與 Tan(1998)剛出爐的新發表，該論文以 Perfetti & Zhang (1991) 的實驗四作為基礎更進一步擴充，也是採用促發唸字作業，操弄極短時間的 SOA，探討漢字辨識過程裡的形、音、義時間激發歷程，當 SOA 長到超過 100 毫秒後，得到了令人讚嘆的漂亮結果，而且，與 Perfetti & Zhang (1991) 的實驗四之結果形成了非常一貫而一致的連結。這是大大令本計畫研究者驚訝的，因此，無論如何是要檢驗 Perfetti & Tan (1998)的形音義激發時間歷程模型了，雖然極短 SOA 的操作在技術上是相當困難的。研究者比 Perfetti 等的研究做了更周延的考量，可以完全涵蓋他們的情況，分述如下：一、同時採用了促發唸字及促發辨識作業。二、比 Perfetti 等多操弄了目標字字頻。三、將 Perfetti 等作為受試間便項的 SOA 改採受試內設計。這是遠比其設計更為複雜的設計。結果發現 Perfetti & Tan (1998) 的發表是不真實而虛假的。這些結果顯示，過去被用來支持漢字辨識語音必要性看法的促發實驗是有很大問題的。

關鍵字：唸字作業、語義促發、形似促發、同音促發。

Subject's strategy on character semantic categorization, backward masking, and priming tasks:

On the time course activations of graphic, phonological, and semantic information in Perfetti & Tan (1998)

Abstract

The present study tried to replicate Perfetti & Tan (1998). The researcher adopted a within-trials priming procedure and manipulated character frequency and stimulus onset asynchrony to evaluate the effects of homophonic, semantic, and graphic priming on character recognition and naming. It was found that neither for recognition nor for naming there existed any effect of homophonic priming or semantic priming on the processing of high-frequency character. When target character was of low frequency, facilitation effect of semantic priming was stably obtained both for recognition and for naming, while facilitation effect of homophonic priming was repeatedly found only in naming task. Also, an inhibitory effect of graphic priming was found for both tasks. The results agreed with that previously found by the author and colleagues. It is noted that in lexical decision task there existed no stable homophonic priming facilitation effect obtained, despite that character frequency effect and semantic priming effect on processing low-frequency character were both vivid. In no any situation the facilitation effect of homophonic priming can be greater than that of semantic priming. The result in company with those from previous studies repeatedly contradicted the conclusion from a series of Chinese studies by Perfetti etc (1991, 1997, 1998).

Keywords: lexical access, character recognition, character naming, frequency effect, character frequency, pre-lexical phonology, neighborhood frequency effect.

In this decade, researchers concerning the orthographic depth hypothesis suggested that the word recognition process is different for different orthographies (e.g., Frost, 1994; Frost & Bentin, 1992; Frost, Katz, & Bentin, 1987; Katz & Feldman, 1983; Katz & Frost, 1992). They stated that the processes of pre-lexical analysis of phonology will be more functional in reading shallow orthographies like Serbo-Croatian, while reading deep orthographies like Hebrew or Chinese will rely more on graphically based direct route for addressing mental lexicon. The typical research paradigm is to evaluate the relative magnitude of frequency effect and semantic priming effect on lexical decision and naming task, among different orthographies. If words with high frequency are responded to faster than those with low frequency, and if semantic priming facilitates the response, then it is inferred that the lexical identification process should be involved in the task. If naming task engages with lexical identification, then it is reasonable to conclude that there is less or without necessity for lexical identification to engage phonology process. Though there existed opposite evidence that supported direct route in lexical access for shallow languages (e.g., Baluch & Besner, 1991; Sebastian-Galles, 1991; Tabossi & Laghi, 1992), it is without doubt that word naming of deep orthographies always engage with lexical identification.

Chinese orthography is a logograph without any stable orthography-to-phonology correspondence. There is no way to pronounce a character with certainty before it is recognized. For instance, with an identical stem, 也 (pronounced as /ye3/), there are many different characters with different pronunciations, 地 (/di4/), 池 (/chi2/), and 他 (/ta1/), etc.. It is then possible for Chinese to demonstrate a clear picture of single route of direct lexical access. Some empirical evidence from studies of comparing frequency effect on lexical decision and naming (Liu, Wu, & Chou, 1996; Wu, Chou, & Liu, 1994), and experiment falsifying the implication of pre-lexical phonology in character naming (Wu & Liu, 1997), were thus provided. These results were consistent with those from studies of the orthographic depth hypothesis.

Nevertheless, there still exists researchers who claimed that phonological activation is an automatic process pre-lexically or at-lexically in Chinese character recognition (Cheng, 1992; Cheng & Shih, 1988; Perfetti & Zhang, 1991, 1995, 1996; Perfetti, Zhang, & Berent, 1992). The most important evidence for them to assure the automaticity of phonology in character recognition came from the studies of homophonic priming effect on lexical decision and naming tasks. Cheng (1992) showed a significant homophonic priming facilitation effect on lexical decision task to support his pre-lexical phonology viewpoint of Chinese character recognition. Perfetti with colleagues (Perfetti and Zhang, 1991; Perfetti & Tan, 1998) found that homophonic prime, compared to semantic prime, showed greater facilitation effect on the response of naming target characters. These studies provided important evidence to support their claim that character identification is accompanied with phonological activation automatically and pre-semantically (Perfetti & Zhang, 1996).

Presented at the Second International Symposium of Chinese Psychologists held on Hong Kong and to be published in the Chinese Journal of Psychology, the author with colleagues systematically re-evaluated the priming effects of different prime types on the tasks of lexical decision and naming (Chen & Wu, 1997; Wu & Chen, 2000) . They found that homophonic priming effect could not be stably replicated on lexical decision task, despite that semantic priming always facilitated the recognition on low-frequency characters. With respect to character naming task, homophonic prime could only facilitate the response to low-frequency characters. Moreover, whenever homophonic priming was effective, a semantic priming effect with greater magnitude was always obtained. These results contradicted those from Perfetti and Zhang (1991) and Cheng (1992). Following their reasoning, Wu and colleagues demonstrated a condition of character identification with semantic activation while without phonological activation. Thus, there exists no reliable convincing evidence for the argument that automatic phonology accompanies character recognition. Moreover, while neither Cheng (1992) nor Perfetti and Zhang (1991) found any observable effect of graphic priming, Wu & Chen (1997, 2000) obtained a substantial effect of inhibition from graphic priming either on lexical decision or on naming. Due to the inhibition effect of graphic priming and the larger facilitation effect easily obtained by semantic priming, inferring the existence of pre-lexical or pre-semantic phonology through the facilitation effect of homophonic priming may be unwarranted.

In a study to compare the time course of activation among graphic, phonological, and semantic information, Perfetti & Tan (1998) manipulated SOA in a manner with very 'small' discrepancies among different levels. There are at least three pitfalls listed as follows. Firstly, unlike lexical decision, naming as adopted by Perfetti with colleagues (e.g., Perfetti & Tan, 1998; Perfetti & Zhang, 1991; Tan & Perfetti, 1997) demands subjects to pronounce. The inference of lexical access concerning phonology will be inevitably confounded by task. Secondly, they did not consider the factor of target character frequency while it plays the most important role in lexical access. It has been well known that the responses pattern on target characters of high frequency was very different from that on low frequency character targets (e.g., Liu, Wu, & Chou, 1996; Hue, 1992; Seidenberg, 1985). And lastly, their manipulation of SOA was practically not valid and might be confounded. The SOA levels they reported were 43, 57, and 85 ms, indicating 3, 4, or 6 frame refresh cycles in English text mode for screen display. In displaying Chinese characters as they described in their experiment, the refresh time of 14 ms is not correct. Moreover, the SOA was designed as a between subjects variable. The inference concerned would be inevitably confounded with sampling subject differences among different groups, especially when the discrepancies among different SOA conditions were not distinguishable.

In an attempt to solve the above-mentioned questions simultaneously, This experiment adopted the same procedure of priming as experiment 1. The factors manipulated were also the same as experiment 1 except that SOA was designed as a within subject variable instead. Furthermore, the levels of SOA were selected as 50, 85, and 120 ms. When displaying Chinese characters in DOS graphic mode, this corresponds to 3, 5, and 7 cycles of frame refresh time, respectively.

Method

Design and stimuli. Subjects were randomly assigned into one of two groups receiving different tasks (lexical decision vs. naming). Each group of subjects received the same 2 x 2 within-subjects factorially arranged materials according to the manipulation of two factors of target character frequency (high vs. low), and prime type (homophonic, graphically similar, semantically related, vs. control). Also, another within-subjects factor, SOA (50, 85, vs. 120 ms), was orthogonally included to form a 2 x 3 x 2 x 4 four-way factorial design.

The stimulus materials was the same as experiment 1. For naming task, all target characters were received by each subject. The assignment of each target character into the different prime type and SOA combinations was orthogonally counter-balanced between subjects. Each target character appeared just once and was preceded by only one of four different types of prime. With respect to the lexical decision task, additional 240 trials each with pseudo character target were constructed and together into 480 trials in total. A total of 20 additional characters (half of them substituted by pseudo-characters for lexical decision) were also selected for practice trials.

Apparatus and procedure. The Apparatus and procedure was the same as experiment 1 except that a more complicated modified block randomization strategy was designed to minimize the possibilities for consecutive trials with the same prime type, the same target frequency, the same key press (in lexical decision), and the same level of SOA.

All the trials were evenly and randomly divided into many block search composed of 24 trials from different target frequency x prime x SOA conditions for naming, and additional 24 pseudo-character target trials for lexical decision. An on-line random assignment shuffling procedure similar as experiment 1 was performed individually so that each subject received an idiosyncratic random sequence of block-arranged stimuli.

Subjects. The subjects were recruited from the same subject pool as experiment 1 at National Taiwan University. They were randomly assigned into one of two task groups each with 36 subjects. All were fluent readers of Mandarin with normal or corrected-to-normal vision.

Results and discussion

In calculating the mean RT of correct responses for each condition within each subject, those trials with RTs less than 200 ms (indicating prompt responses with possible anticipation) or 2.5 standard deviations more than the mean of the condition to which the trials belonged were treated as outliers. The re-computed mean correct RTs and mean percentages of errors across subjects under different conditions of target frequency x prime type for each group of particular SOA x task combination are shown in Table 1.

Insert Table 1 about here

Inspecting table 1 shows that it took slightly longer to response for naming than for lexical decision. Furthermore, it also took longer to respond to the target characters with low frequency than those with high frequency both on naming and lexical decision. This again confirmed with experiment 1 and with the common sense from the literature. The statistical significance of these effects was also assessed by analyses of variance (ANOVAs) across subjects, F1, and across stimulus items, F2.

Mean RT data obtained for all subjects in Experiment 1 were submitted to a four-way ANOVA with factors of task (lexical decision, naming), SOA (50, 85, 120 ms), target character frequen cy (high, low), and prime type (homophonic, graphically similar, semantically related, unrelated control). Lexical decision was in general slightly faster than naming to be responded across items, $F2(1,238) = 57.31$, $p < .0001$. There were also many other factors significantly interacted with task: task x target character frequency, $F1(1,70) = 11.00$, $p < .001$, $F2(1,238) = 31.06$, $p < .0001$, task x target character frequency x SOA across items, $F2(1,1428) = 2.13$, $p < .05$. The higher order interaction effects involved with task suggested that the whole picture is complicated and different result patterns will be obtained from different tasks. Two three-way ANOVAs were then performed sep arately on the RT data for lexical decision and naming .

The three-way ANOVA with factors of target character frequency, prime type, and SOA, performed on lexical decision, showed the result pattern as follows. The significant sources of variation were target character frequency, $F1(1,35) = 167.30$, $p < .0001$, $F2(1,238) = 278.74$, $p<.0001$, prime type, $F1(3,105) = 13.96$, $p < .0001$, $F2(3,714) = 13.93$, $p<.0001$, and target character frequency x prime type, $F1(3,105) = 18.38$, $p < .0001$; $F2(3,714) = 13.86$, $p<.0001$. Other effects were all insignificant.

A further analysis showed that when target character frequency is high the simple simple main effect of prime type was significant under all SOA conditions: for 50 ms, $F1(3,630) = 5.79$, $p < .001$, $F2(3,2142) = 6.34$, $p < .001$, for 85 ms, $F1(3,630) = 7.37$, $p < .001$, $F2(3,2142) = 8.48$, $p < .0001$, and for 120 ms, $F1(3,630) = 4.99$, $p < .01$, $F2(3,2142) = 4.08$, $p < .01$. Also when target character frequency is low the simple simple main effect of prime type was significant under all SOA conditions: for 50 ms, $F1(3,630) = 7.40$, $p < .001$, $F2(3,2142) = 10.37$, $p < .0001$, for 85 ms, $F1(3,630) = 5.00$, $p < .01$, $F2(3,2142) = 4.19$, $p < .01$, and for 120 ms, $F1(3,630) = 3.83$, $p < .01$, $F2(3,2142) = 3.31$, $p < .05$.

Using Dunnett′s method as post hoc comparisons it showed the following significant differences between unrelated control with other primes. When target character frequency is low, semantically related prime reliably facilitated target process under different SOA conditions. For SOA was 50 ms, 85 ms, and 120 ms, it took less time of 83 ms, 55 ms, and 58 ms, respectively, than unrelated control condition to process target character. Homophonic prime also facilitated target process under some SOA conditions. For SOA was 50, or 120 ms, it benefited RT of 46 ms, or 37 ms, r espectively. The response pattern resulted by graphically similar prime was similar as that of homophonic prime. It was noted that when target character frequency is low the facilitation effect of homophonic prime did not exceed that of semantic prime in any SOA condition. On the contrary, when target character frequency is high, Graphically similar prime reliably exerted inhibitory effect on the lexical decision of target. For SOA was 50 ms, 85 ms, and 120 ms, it took more time of 52 ms, 68 ms, and 50 ms, respectively, than unrelated control condition to process target character. There was no significant effect of semantic priming and homophonic priming.

With respect to the three-way ANOVA with factors of target character frequency, prime type, and SOA, performed on naming, it showed the result pattern as follows. The significant sou rces of variation were target character frequency, $F1(1,35) = 77.09$, $p < .0001$, $F2(1,238) = 266.36$, $p<.0001$, prime type, $F1(3,105) = 22.51$, $p < .0001$, $F2(3,714) = 9.27$, $p<.0001$, SOA, $F1(2,35) = 4.05$, $p < .05$, and target character frequency x prime type across items, $F2(3,714) = 3.42$, $p < .05$. Other else sources of variation were all insignificant.

A further analysis showed that when target character frequency is high the simple simple main effect of prime type was significant under all SOA conditions: for 50 ms, $F1(3,630) = 5.42$, $p < .001$, $F2(3,2142) = 3.50$, $p < .001$, for 85 ms, $F1(3,630) = 3.17$, $p < .05$, and for 120 ms, $F1(3,630) = 4.99$, $p < .01$, $F2(3,2142) = 3.80$, $p < .05$. Also when target character frequency is low the simple simple main effect of prime type was significant under all SOA conditions: for 50 ms, $F1(3,630) = 2.78$, $p < .05$, for 85 ms, $F1(3,630) = 5.17$, $p < .01$, $F2(3,2142) = 3.46$, $p < .05$, and for 120 ms, $F1(3,630) = 5.18$, $p < .01$, $F2(3,2142) = 3.78$, $p < .05$.

Using Dunnett′s method as post hoc comparisons it showed the following significant differences between unrelated control with other primes. When target character frequency is low, semantically related prime reliably facilitated target process under different SOA conditions. For SOA was 50 ms, and 120 ms, it took less time of 60 ms, and 72 ms, respectively, than unrelated control condition to process target character. Homophonic prime also facilitated target process under some SOA conditions. For SOA was 85, or 120 ms, it benefited RT with 54 ms, or 31 ms, respectively. Graphically similar prime inhibited target process for 51 ms under SOA condition of 50 ms. It was noted again that when target character frequency is low the facilitation effect of homophonic prime did not exceed that of semantic prime in any SOA condition. On the contrary, when target character frequency is high, graphically similar prime reliably exerted inhibitory effect on the naming of target. For SOA was 50 ms, 85 ms, or 120 ms, it took more time of 68 ms, 40 ms, or 54 ms, respectively, than unrelated control condition to process target character. There was no significant effect of semantic priming and homophonic priming.

To sum up, the target character frequency was the most effective factor irrespective of task and SOA. When target character was of high frequency, the results showed no effect of semantic priming and homophonic priming while exhibited reliable inhibitory effect of graphic priming, irrespective of task and SOA. When target character was of low frequency, upon target lexical decision there existed significant effects of homophonic priming and semantic priming under all SOA conditions, while upon target naming there existed significant effect of semantic priming and weak homophonic priming under all SOA conditions. In no case the effect of homophonic priming would exceed that of semantic priming. Obviously, either for lexical decision or for naming, the observed results agreed with that of experiment 1 and contradicted again with those reported by Perfetti with colleagues (Perfetti & Zhang, 1991;

Perfetti & Tan, 1998; Tan & Perfetti, 1997).

Concluding remark

In the above two experiments using a new sample of materials with a larger scope of frequency domain different than other replication studies (Wu & Chen, 2000; Chen & Wu, 1997), it was found that they all agreed with the same conclusion which contradicted with Cheng (1992) and a series of studies on Chinese character naming by Perfetti with colleagues (Perfetti & Zhang, 1991; Perfetti & Tan, 1998; Tan & Perfetti, 1997). In spite of reliable inhibitory effect of graphemic prime repeatedly found indicating possible logic problems of inference about phonology in character recognition from the facilitation of homophonic priming, even though the rationale makes sense the evidence provided by Perfetti with colleagues is questioned. From our studies it is obvious that it was not so reliable for homophonic priming effect to infer the role of phonology in Chinese lexical access, not only from primed lexical decision adopted by Cheng but also from primed naming by Perfetti with colleagues. It was then concluded that phonological activation is not obligatorily engaged pre-lexically or pre-semantically in Chinese character recognition.

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Table 1

Mean correct latencies in milliseconds as a function of target frequency, prime type, SOA, and task

Task	SOA	High Freq. target				Low Freq. target			
		HP	GP	SP	CP	HP	GP	SP	CP
lexical decision	50 ms	452	516	452	464	589	584	552	635
		(1.4)	(8.3)	(3.1)	(4.2)	(10.3)	(8.9)	(7.5)	(13.6)
	85 ms	450	522	458	454	606	594	545	600
		(1.1)	(8.6)	(1.9)	(3.6)	(7.8)	(9.2)	(7.5)	(12.8)
	120 ms	442	504	450	454	578	576	557	615
		(1.4)	(5.8)	(2.2)	(2.5)	(9.2)	(11.9)	(6.1)	(12.2)
naming	50 ms	470	537	465	469	684	737	696	686
		(1.9)	(6.1)	(2.2)	(5.0)	(16.1)	(24.2)	(17.8)	(21.9)
	85 ms	460	521	474	481	646	703	640	700
		(1.4)	(4.4)	(1.4)	(3.6)	(17.8)	(17.2)	(19.4)	(20.8)
	120 ms	455	524	454	470	666	688	621	697
		(3.9)	(6.7)	(4.4)	(3.9)	(16.9)	(20.8)	(18.1)	(23.6)

Note: Percentages of errors are given in parentheses. SOA = Stimulus Onset Asynchrony, HP = Homophonic Prime, GP = Graphic Prime, SP = Semantic Prime, CP = Control Prime.

Appendix

Characters used in experiment 1 and experiment 2
(with high frequency character target)

Target	Prime Type				Target	Prime Type				Target	Prime Type			
	HP	GP	SP	CP		HP	GP	SP	CP		HP	GP	SP	CP
私	絲	弘	自	訂	許	栩	杵	准	澗	瑞	銳	湍	祥	掩
奶	迺	扔	乳	職	級	輯	圾	層	肝	訴	素	拆	說	樓
初	出	叨	始	肌	刺	次	刷	戳	代	深	申	探	遠	歧
計	紀	什	算	婷	掉	釣	綽	落	暖	眼	演	狠	目	蚊
取	曲	奴	拿	臟	飯	犯	皈	食	診	限	獻	恨	底	仁
即	寂	卻	就	酸	妙	廟	紗	佳	餵	般	頒	股	類	於
院	願	烷	庭	俠	類	淚	頻	區	朗	投	頭	役	丟	艘
減	揀	喊	少	陝	項	像	碩	脖	裕	優	幽	擾	勝	割
睡	稅	唾	眠	雄	煩	帆	頗	躁	則	博	帛	縛	精	傢
迎	螢	仰	來	騷	顧	固	顛	看	赫	校	酵	咬	學	棺
故	僱	改	舊	北	頓	鈍	頑	停	鈣	核	荷	孩	心	碗
攻	宮	玫	打	汁	預	域	頃	先	杭	陽	烊	腸	日	鋸
敗	拜	散	輸	隆	頂	鼎	頊	頭	楷	場	昶	湯	地	防
趕	敢	悍	追	帽	牌	排	碑	玩	煌	揚	羊	暢	舉	紡
便	辨	梗	利	測	純	淳	鈍	清	循	路	轆	骼	徑	款
硬	映	哽	剛	喃	找	沼	伐	尋	偶	略	掠	烙	粗	峰
約	曰	灼	契	稀	槍	腔	滄	炮	邦	證	鄭	蹬	明	娟
如	孺	知	像	誌	棒	蚌	捧	桿	鈉	鐘	忠	僮	錶	膀
加	佳	扣	增	誡	鼓	股	肢	脹	紛	險	顯	臉	危	歸
社	射	杜	團	杖	技	繼	吱	藝	謂	隱	蚓	穩	藏	報
好	郝	籽	優	忙	所	鎖	析	址	諾	禮	裡	體	儀	批
封	蜂	討	圍	換	斯	思	斬	此	貓	辭	磁	亂	詞	耗
耐	奈	肘	久	喧	折	輒	祈	斷	偵	鮮	暹	詳	新	班
仙	掀	汕	神	敷	損	筍	隕	失	郭	洋	瘍	群	海	措
紅	洪	扛	赤	韌	旅	履	族	遊	諒	律	氯	津	令	踢
練	戀	揀	習	肚	朋	彭	明	伴	輛	到	稻	致	達	服
孫	飧	係	兒	矽	歌	擱	歐	唱	物	釋	仕	譯	放	件
消	宵	稍	耗	港	飲	引	軟	喝	猶	觀	官	勸	看	汪
娘	孃	浪	媽	渡	師	失	帥	教	俱	權	詮	罐	勢	糕
配	珮	記	匹	偏	婦	復	掃	嫁	棋	快	檜	決	速	棵

流	榴	梳	通	拜	秋	蚯	伙	涼	版	獨	牘	濁	孤	牧
階	揭	楷	梯	概	借	界	惜	貸	扶	擔	丹	瞻	挑	邱
親	侵	硯	近	衫	鎮	震	滇	鄉	須	除	雛	徐	去	慌
現	縣	視	露	海	靜	勁	睜	寂	額	脫	托	銳	卸	磁
徒	途	陡	空	球	終	忠	咚	末	脾	晚	碗	浼	遲	猿
連	簾	陣	接	討	塊	劊	魂	團	淑	語	宇	悟	言	訊
野	冶	舒	荒	提	功	公	巧	效	部	船	傳	鉛	舶	凱
理	禮	埋	道	竭	唯	違	准	僅	修	講	蔣	溝	述	值
玩	丸	阮	嬉	挨	精	經	猜	巧	嫌	驗	燕	撿	查	腔
松	嵩	蚣	柏	誘	法	髮	怯	規	嫂	保	飽	娛	護	隸

Note: HP = Homophonic Prime, GP = Graphic Prime,
SP = Semantic Prime, CP = Control Prime.

Appendix

Characters used in experiment 1 and experiment 2

(with low frequency character target)

Target	Prime Type				Target	Prime Type				Target	Prime Type			
	HP	GP	SP	CP		HP	GP	SP	CP		HP	GP	SP	CP
沐	牧	休	浴	睹	旌	競	旋	旗	碟	穫	貨	護	收	襪
蜓	沿	誕	彎	餚	倏	漱	條	快	副	咽	業	姻	喉	償
胝	織	抵	胼	冷	垠	淫	很	邊	狗	畦	曦	鮭	田	拓
坎	檻	吹	坷	齡	靼	達	袒	番	映	蛙	挖	桂	蝌	酥
祉	紙	扯	福	統	沬	漠	味	泡	妮	侈	恥	移	奢	備
耿	哽	狄	直	珊	褶	輒	熠	疊	距	橙	城	瞪	橘	戰
隘	愛	溢	狹	槓	懦	諾	儒	懼	捷	憧	充	瞳	影	僑
腊	辣	醋	醃	陛	儕	豺	擠	輩	鍋	粥	周	弼	飯	鄰
惕	悌	賜	警	瑪	呱	挖	孤	哭	綠	鑲	箱	釀	嵌	郊
耽	單	枕	遲	搞	鉗	錢	柑	夾	佈	恃	逝	待	靠	跡
吠	肺	伏	叫	融	佃	電	細	租	彿	峙	制	特	對	恍
咀	矩	姐	嚼	捨	釉	誘	迪	彩	秘	橡	向	豫	膠	曉
棟	洞	陳	柱	採	歿	墨	段	滅	糟	潰	愧	遺	退	鄭
踝	淮	課	腳	睬	漬	字	積	髒	驟	賄	會	侑	錢	操
餤	堰	談	火	帳	嘖	澤	債	奇	嶼	孅	先	懺	細	爐
蛀	助	往	蝕	勒	鑠	朔	礫	亮	濱	栩	許	翎	真	瞞
咋	柵	昨	驚	泡	紳	身	坤	尊	跟	弭	米	洱	消	曦
貶	扁	泛	低	畔	珀	破	拍	琥	政	饞	蟬	纔	吃	翰
猙	楨	淨	醜	務	睦	牧	陸	和	犯	袂	媚	訣	袖	眺
堵	篤	緒	塞	軀	覬	寄	凱	窺	標	恬	闐	括	靜	拱
絀	觸	咄	廢	幔	憚	但	禪	怕	際	騁	逞	聘	跑	例
朕	振	送	尊	雖	蟬	潺	彈	鳴	擱	鐲	啄	觸	環	刊
餽	潰	醜	送	稚	犢	獨	續	牛	濟	贍	扇	膽	養	洶
椎	追	維	刺	帖	贖	叔	讀	買	僵	棧	佔	殘	住	復
帷	微	雜	幕	胡	謫	哲	滴	逐	瀋	蛻	退	說	變	譜
倩	歉	清	美	啄	羶	衫	壇	腥	弧	殮	鏈	儉	棺	緝
粘	年	站	貼	執	僥	餃	燒	倖	姓	蠅	營	繩	蚊	銘
飴	姨	胎	樂	縷	驍	臬	饒	勇	佣	竣	菌	梭	畢	瞧

殆	代	怡	危	演	饌	賺	選	餚	袖	肋	垃	幼	骨	潘
駒	居	鉤	馬	檸	噱	薛	擄	驚	礦	叱	赤	牝	罵	潦
齣	出	夠	戲	擦	詮	泉	栓	釋	濾	諭	域	偷	令	哈
襤	攔	鑑	破	佑	划	滑	列	搖	敵	悖	輩	脖	逆	詬
檻	侃	艦	門	飼	穗	歲	繐	麥	伸	弛	匙	她	鬆	澄
蝠	浮	逼	蝙	糾	撕	司	撒	裂	障	訖	泣	屹	終	潑
泅	球	泗	涉	駛	戟	脊	幹	槍	境	悚	聳	辣	懼	臨
佚	抑	秩	遺	尉	揖	依	輯	禮	漁	豹	報	酌	獅	榻
沱	馱	蛇	滂	磚	詭	軌	脆	詐	滷	灶	造	牡	爐	胰
啜	綽	綴	哭	慷	恪	剋	絡	守	稷	侮	午	梅	辱	瓶
濯	拙	耀	洗	膝	餉	想	晌	薪	擺	蛹	永	桶	雛	餅
秤	稱	坪	量	疑	幡	翻	播	旗	膠	虹	鴻	缸	彩	墳

Note: HP = Homophonic Prime, GP = Graphic Prime,
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