LT2204 Language and Mind

Semester-End Written Project: Word Association and Word Games

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Word count: 2706

Introduction

Words are central to every language. The basic thing to learn a foreign language well is to learn its vocabulary. Without learning enough amount of words, it is not possible for us to communicate in a foreign language effectively to express a wide variety of language (McCarthy, 1990). One of the basic ways to learn vocabulary is through word association. Word association is one of the major studies in linguistics, psychology and psycholinguistics field (İSTİFÇİ, 2010).

Aims of the experiment

This experiment aims at discovering how factors such as cultural background, age, era, and syntactic categories (i.e. Noun, verb and adjective) affect people's word association.

Methods of the experiment

60 people aged 18-30 with tertiary educational background were interviewed. 30 of them are native HongKongers and 30 of them come from mainland China.

- The 15 words we have chosen to be the primes:
    - Noun: Dog, Residence, Police, Army, Knife
    - Verb: Die, Eat, Obey, Communicate, Like
    - Adjective: Silent, Unusual, Toxic, Persistent, Yellow

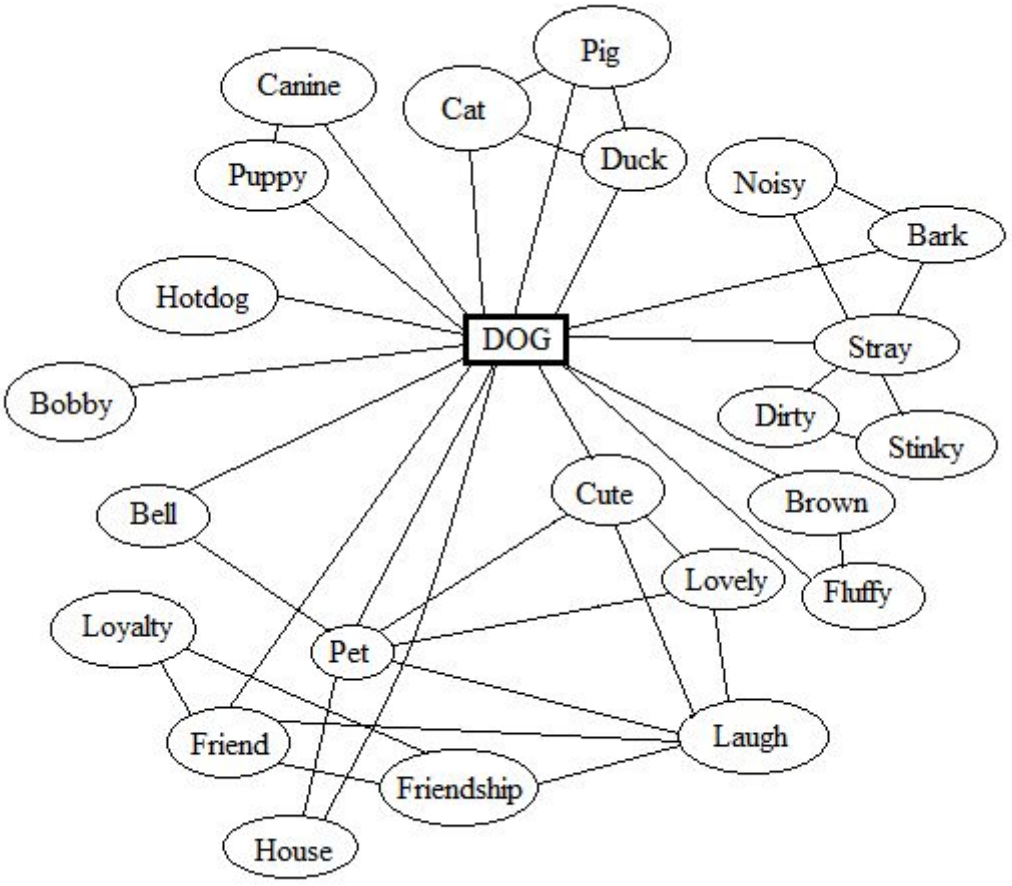
All the 15 words were randomly arranged into a order without any relationship between the successive words (1. dog, 2. silent, 3. die, 4. residence, 5. police, 6. eat, 7. obey, 8. communicate, 9. unusual, 10. toxic, 11. army, 12. persistent, 13. yellow, 14. knife, 15. like'), and participants were asked to give the first English word that popped into their mind immediately when they listened to each of the 15 words. According to Andor, Hollósy, Laczkó & Pelyvás (2008), Radden stated that "some of the conceptual background evoked serves as the basis for characterizing a category. " and "a word may evoke different culture-specific domains." (p.394). Thus, an attempt to prove what the researcher asserted will be made in this experiment. There are six words chosen to be assumed to have differences towards one side, three of them towards HongKonger, which are 'yellow', 'police', and 'residence', three of them towards mainlanders, which are 'dog', 'toxic' and 'army' so that it would be fair for both sides. The assumptions and the results will be further discussed.

Also, some words being chosen including 'knife', 'silent', 'unusual', persistent' and 'obey' generally have an emotional connection which can be positive, neutral or negative. "Knife" can be connotated positively (e.g. the joy of eating) or negatively (e.g. kill). "Silent" can be connotated positively (e.g. peace) or negatively (e.g.angry.). "Unusual" can be connotated positively (e.g. special) or negatively (e.g. strange). "Persistent" can be connotated positively (e.g. persevering) or negatively (e.g. stubborn). "Obey" can be connotated positively (e.g. well-behaved) or negatively (e.g.suppression). It is worth investigating our participants' emotion. Thus, an attempt to choose some neutral words as our primes, which could possibly reflect participants' mindset were made for this purpose.

Results and Discussion of the experiment

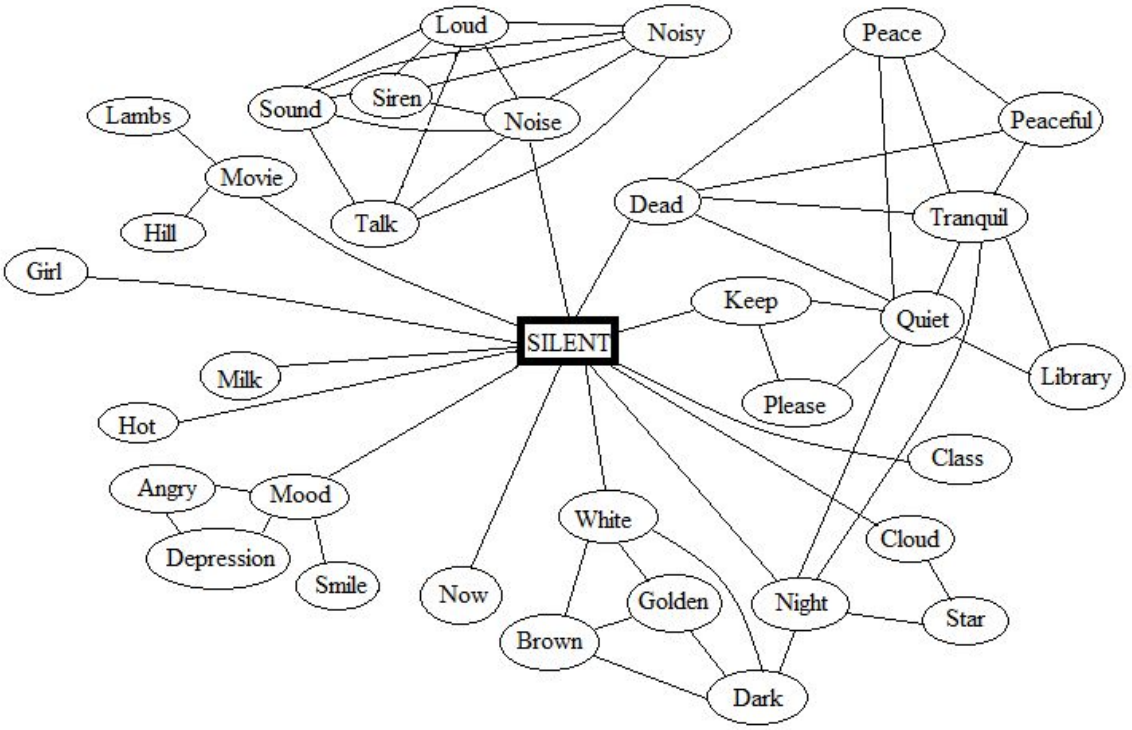
Results (please refer to appendix I at the same time)

1.Dog (noun)



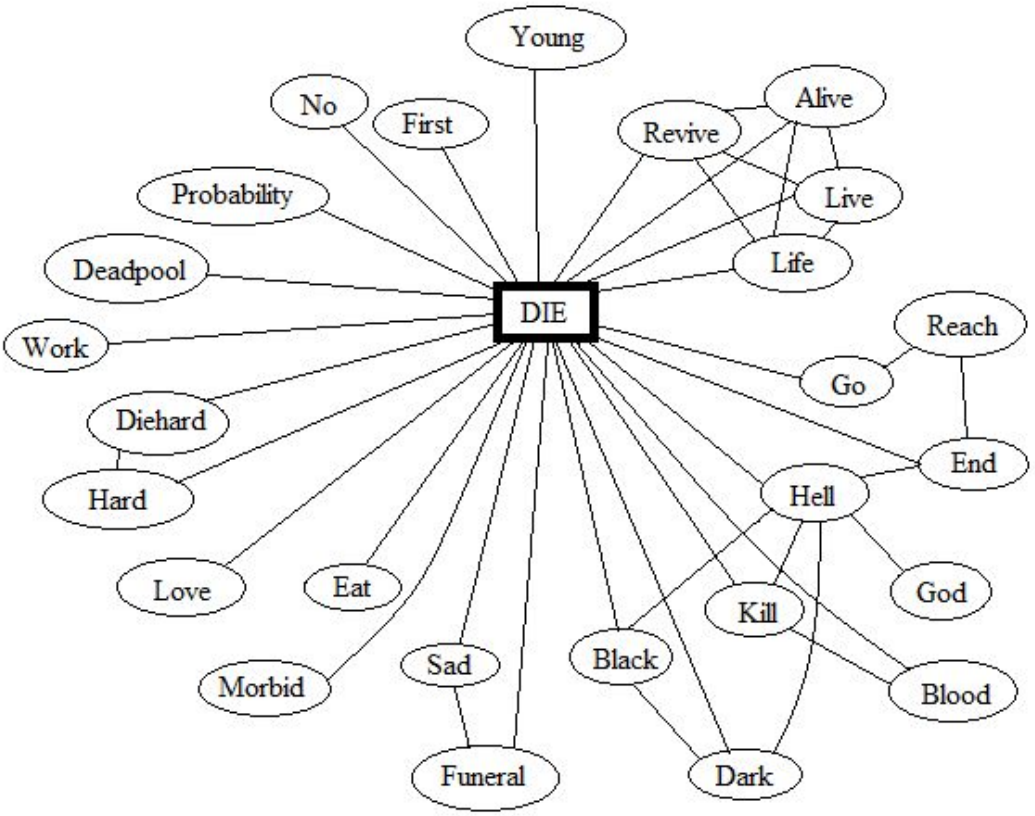
DOG	Frequency	Ranking of frequency
Synonym	1	6
Antonym	0	
Collocation	10	3
Attributive	14	2
Functional	0	
Part-whole	0	
Taxonomic: coordinate	**28**	**1**
Taxonomic: superordinate of the prime	4	4
Taxonomic: subordinate of the prime	0	
Others (Lemma)	0	
Others (Lexeme)	0	
Others (Indirect relation)	2	5
Others (Similar/reverse spelling)	1	6
Total	60	

2. Silent (adjective)



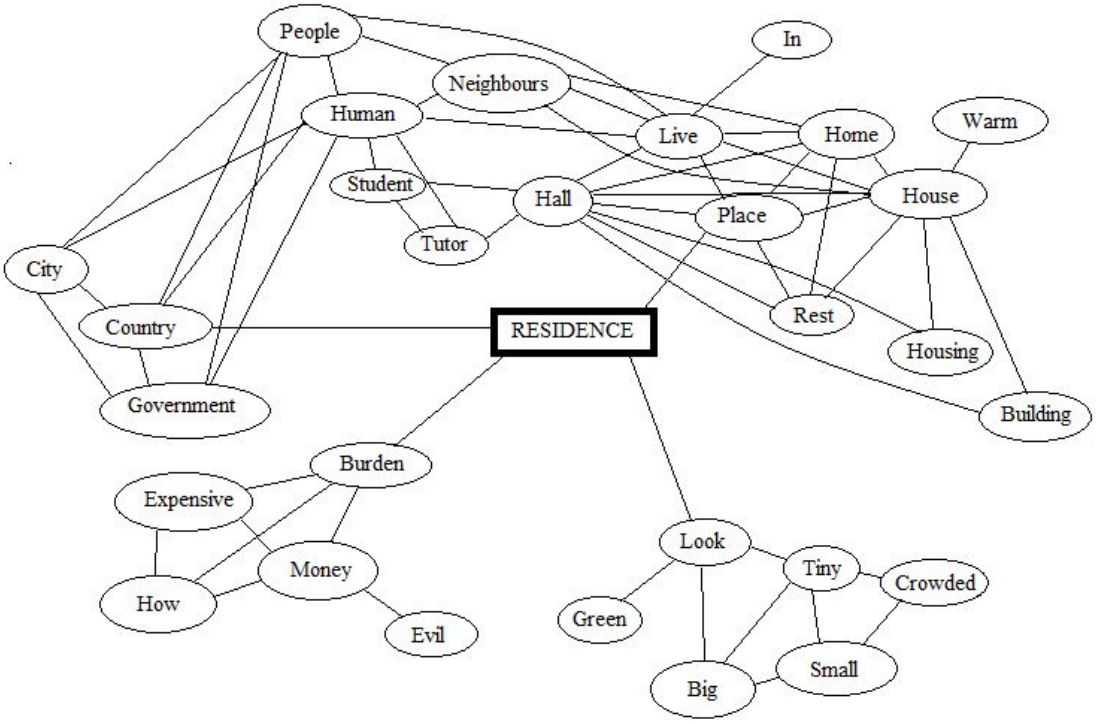
SILENT	Frequency	Ranking of frequency
Synonym	15	2
Antonym	9	3
Collocation	**29**	**1**
Attributive	4	4
Functional	0	
Part-whole	0	
Taxonomic: coordinate	0	
Taxonomic: superordinate of the prime	0	
Taxonomic: subordinate of the prime	0	
Others (Lemma)	2	5
Others (Lexeme)	0	
Others (Indirect relation)	1	6
Others (Similar/reverse spelling)	0	
Total	60	

3. Die (verb)



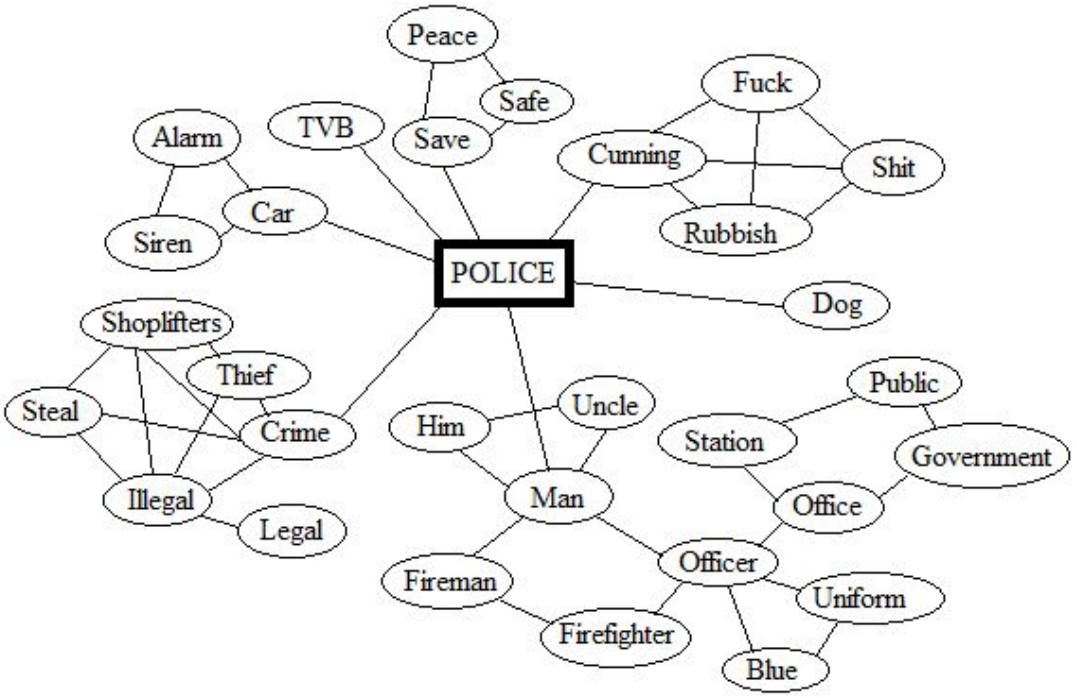
DIE	Frequency	Ranking of frequency
Synonym	0	
Antonym	6	3
Collocation	**40**	**1**
Attributive	0	
Functional	0	
Part-whole	0	
Taxonomic: coordinate	0	
Taxonomic: superordinate of the prime	0	
Taxonomic: subordinate of the prime	0	
Others (Lemma)	13	2
Others (Lexeme)	1	4
Others (Indirect relation)	0	
Others (Similar/reverse spelling)	0	
Total	60	

4. Residence (noun)



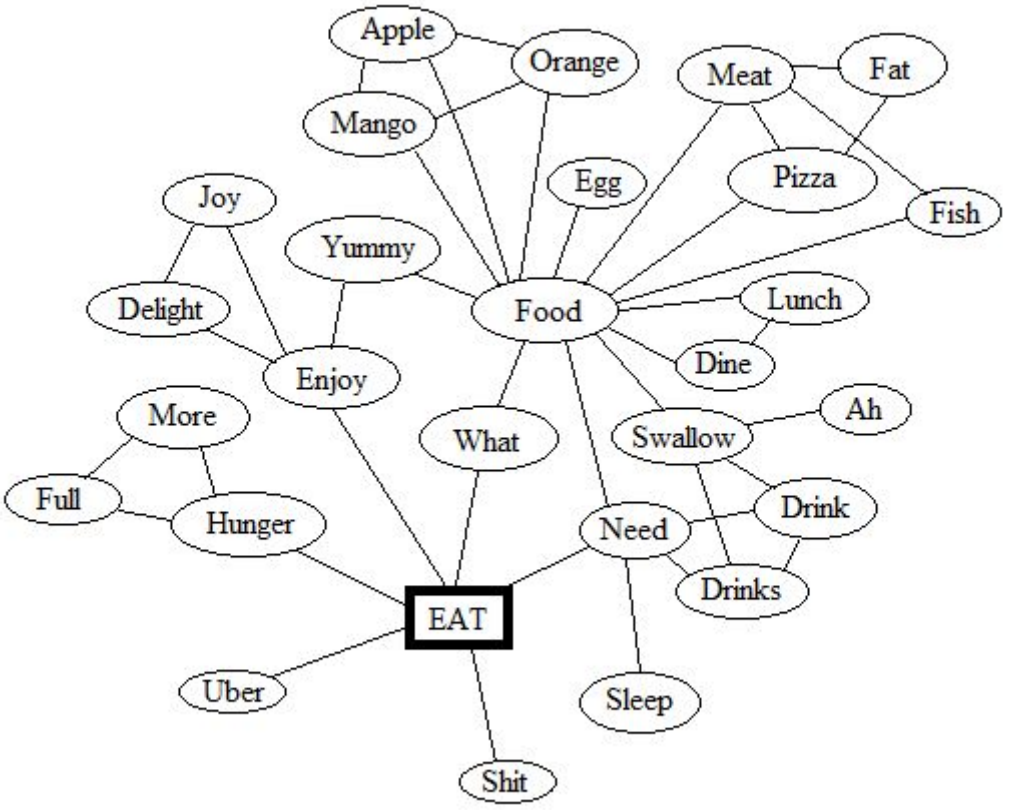
RESIDENCE	Frequency	Ranking of frequency
Synonym	16	2
Antonym	0	
Collocation	**23**	**1**
Attributive	7	3
Functional	3	4
Part-whole	0	
Taxonomic: coordinate	0	
Taxonomic: superordinate of the prime	1	6
Taxonomic: subordinate of the prime	0	
Others (Lemma)	7	3
Others (Lexeme)	2	5
Others (Indirect relation)	0	
Others (Similar/reverse spelling)	1	6
Total	60	

5. Police(noun)



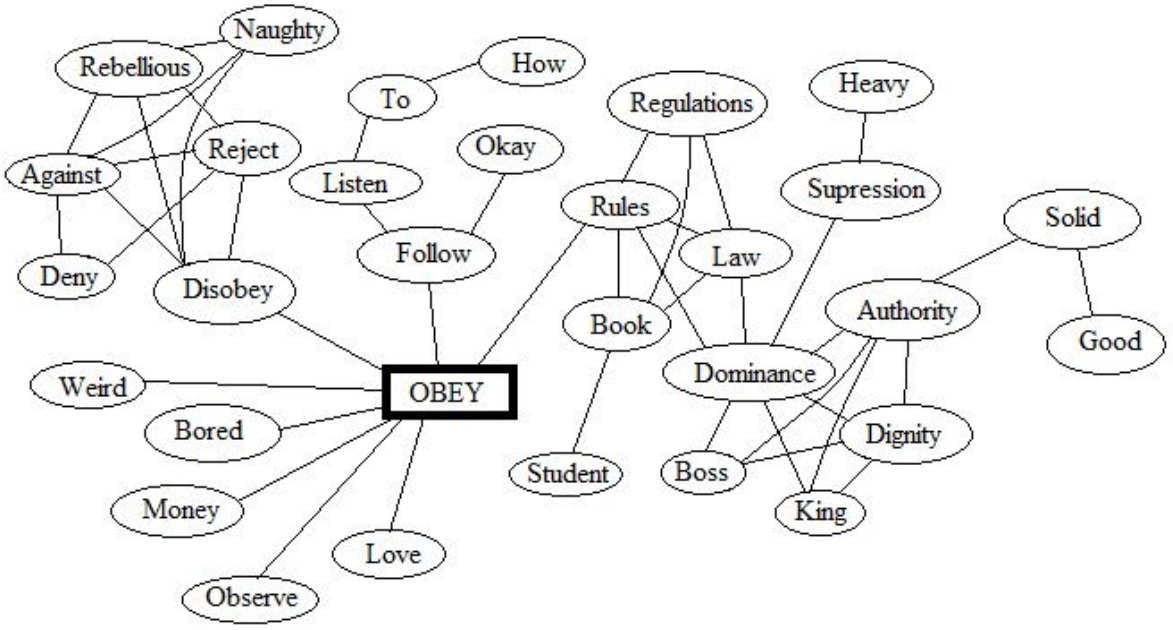
POLICE	Frequency	Ranking of frequency
Synonym	0	
Antonym	0	
Collocation	**46**	**1**
Attributive	2	4
Functional	0	
Part-whole	0	
Taxonomic: coordinate	5	2
Taxonomic: superordinate of the prime	0	
Taxonomic: subordinate of the prime	0	
Others (Lemma)	1	5
Others (Lexeme)	3	3
Others (Indirect relation)	0	
Others (Similar/reverse spelling)	3	3
Total	60	

6. Eat (verb)



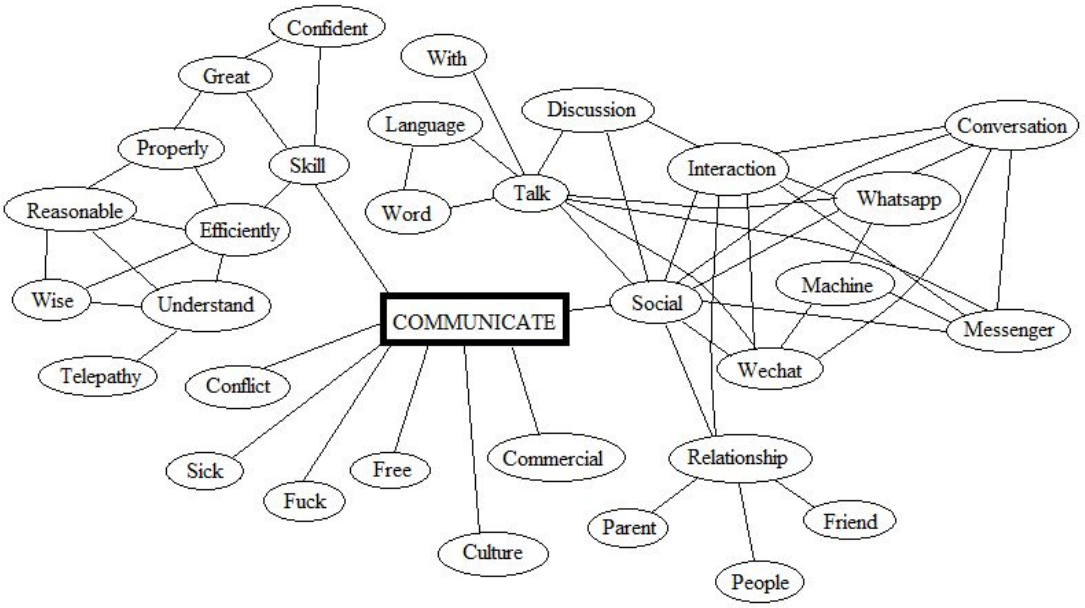
EAT	Frequency	Ranking of frequency
Synonym	1	4
Antonym	0	
Collocation	**44**	**1**
Attributive	0	
Functional	0	
Part-whole	0	
Taxonomic: coordinate	11	2
Taxonomic: superordinate of the prime	0	
Taxonomic: subordinate of the prime	0	
Others (Lemma)	3	3
Others (Lexeme)	0	
Others (Indirect relation)	1	4
Others (Similar/reverse spelling)	0	
Total	60	

7. Obey (verb)



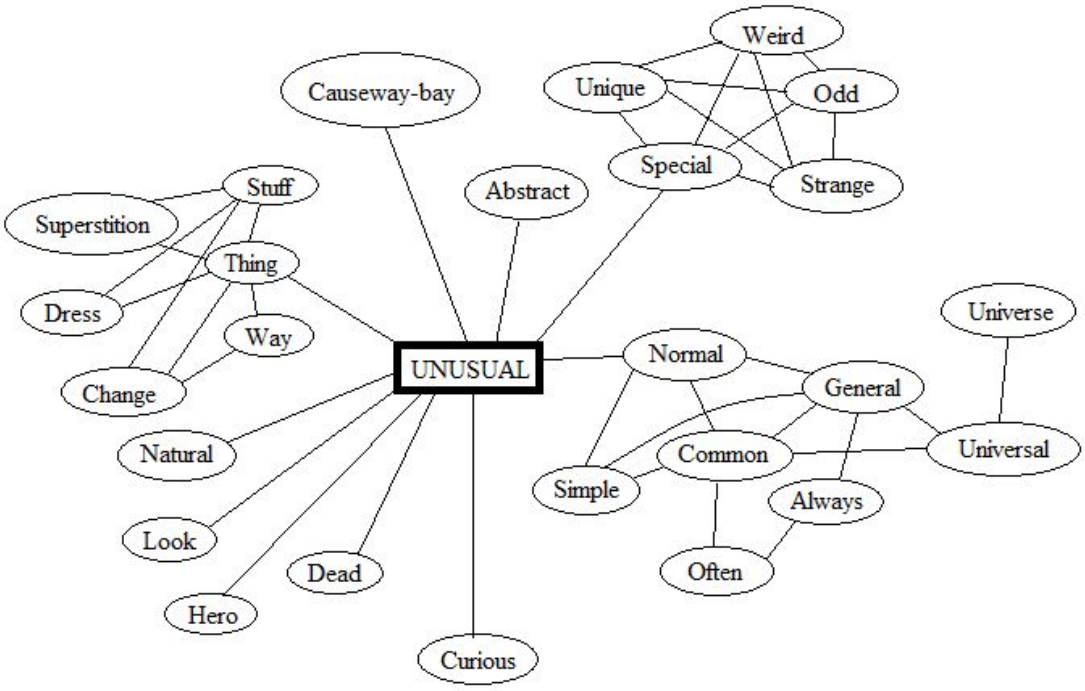
OBEY	Frequency	Ranking of frequency
Synonym	2	4
Antonym	4	3
Collocation	**42**	**1**
Attributive	0	
Functional	0	
Part-whole	0	
Taxonomic: coordinate	0	
Taxonomic: superordinate of the prime	0	
Taxonomic: subordinate of the prime	0	
Others (Lemma)	6	2
Others (Lexeme)	4	3
Others (Indirect relation)	2	4
Others (Similar/reverse spelling)	0	
Total	60	

8. Communicate (verb)



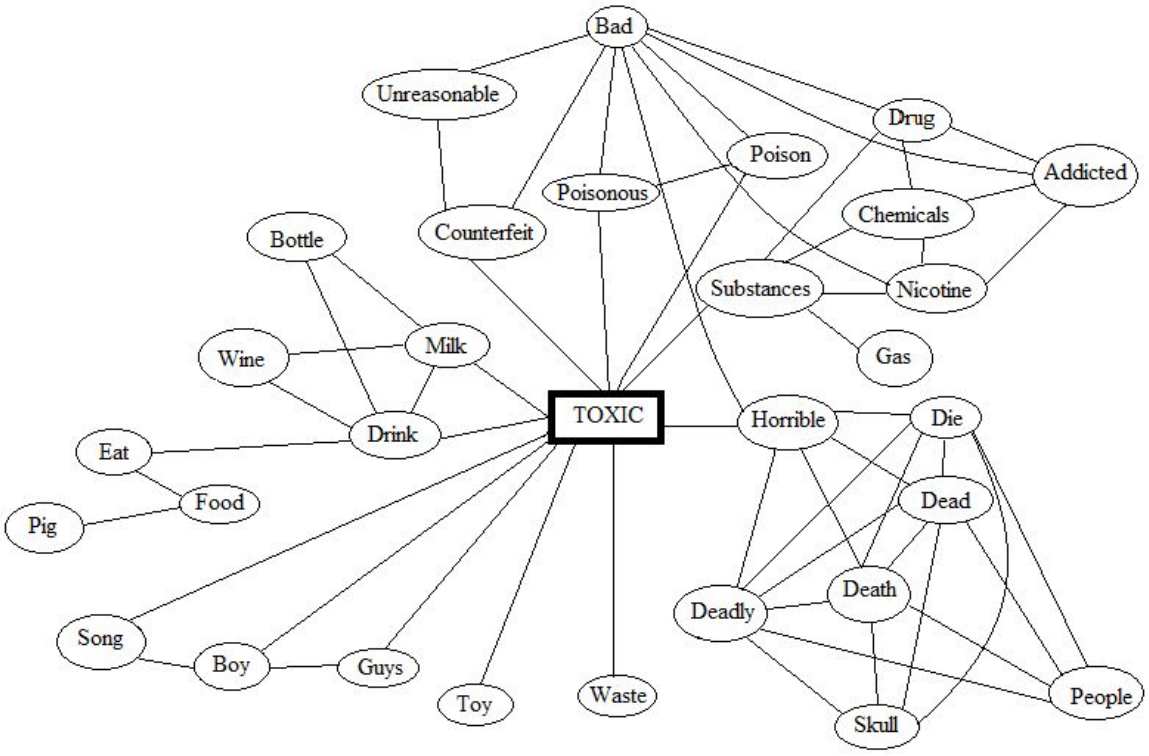
COMMUNICATE	Frequency	Ranking of frequency
Synonym	16	2
Antonym	0	
Collocation	**27**	**1**
Attributive	0	
Functional	11	3
Part-whole	0	
Taxonomic: coordinate	0	
Taxonomic: superordinate of the prime	0	
Taxonomic: subordinate of the prime	0	
Others (Lemma)	6	4
Others (Lexeme)	0	
Others (Indirect relation)	0	
Others (Similar/reverse spelling)	0	
Total	60	

9. Unusual (adjective)



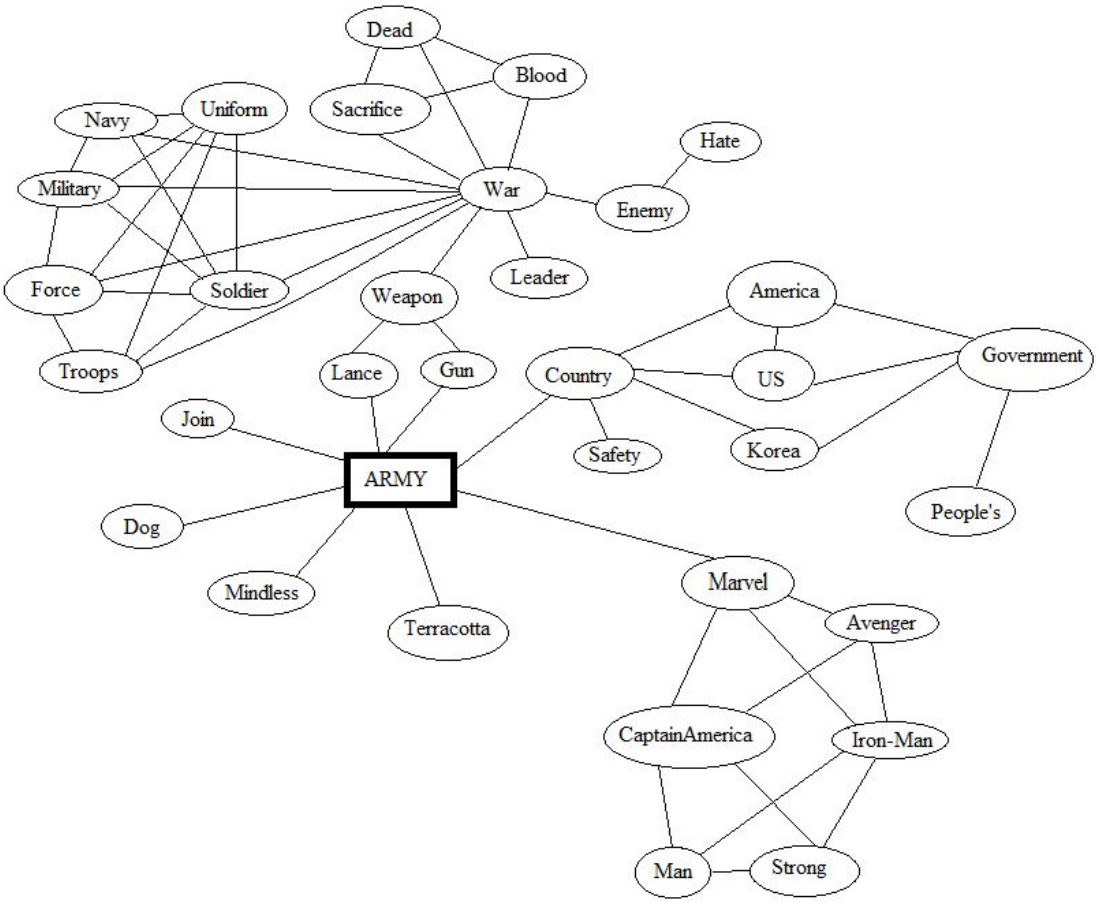
UNUSUAL	Frequency	Ranking of frequency
Synonym	16	2
Antonym	8	4
Collocation	6	5
Attributive	11	3
Functional	0	
Part-whole	0	
Taxonomic: coordinate	0	
Taxonomic: superordinate of the prime	0	
Taxonomic: subordinate of the prime	0	
Others (Lemma)	**18**	**1**
Others (Lexeme)	1	6
Others (Indirect relation)	0	
Others (Similar/reverse spelling)	0	
Total	60	

10. Toxic (adjective)



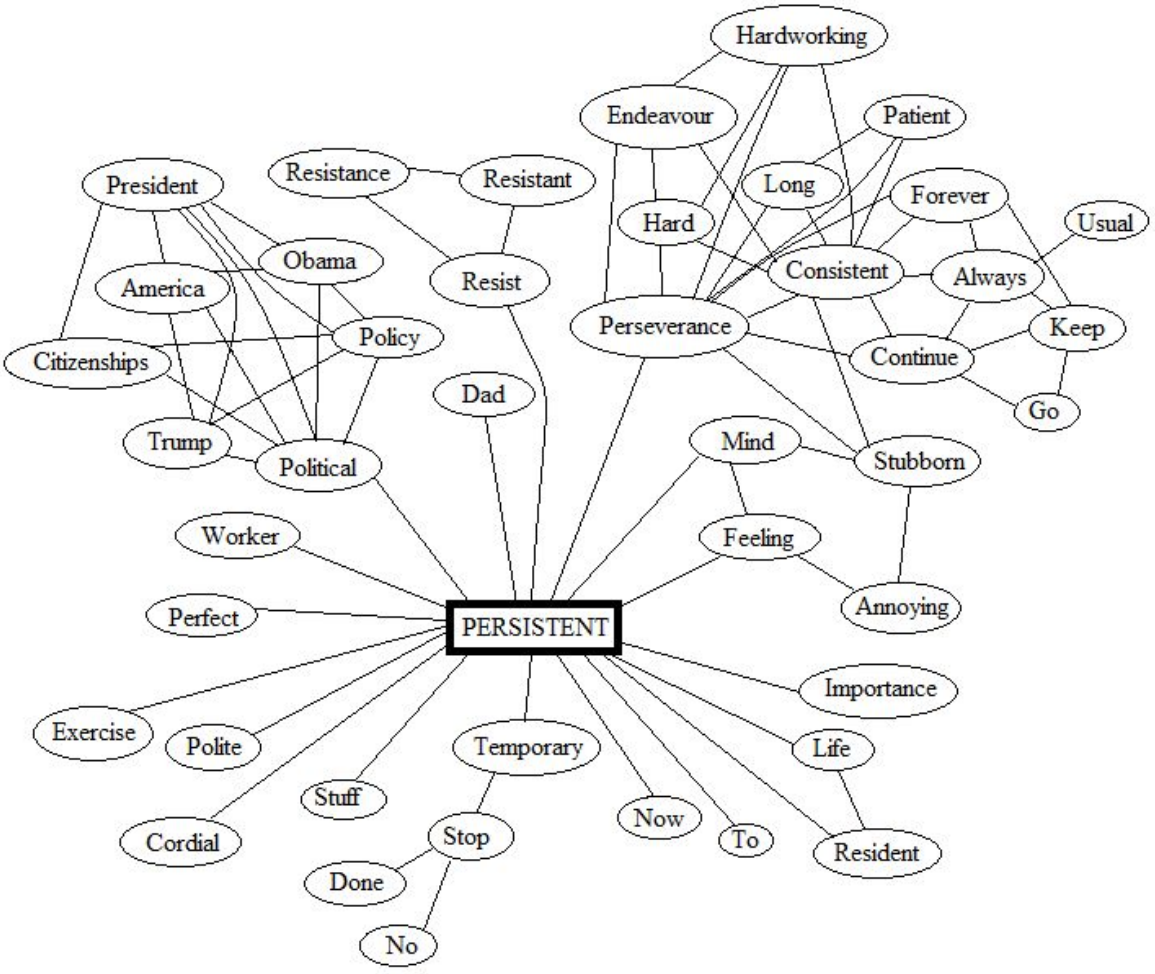
TOXIC	Frequency	Ranking of frequency
Synonym	9	3
Antonym	0	
Collocation	18	2
Attributive	**26**	**1**
Functional	0	
Part-whole	0	
Taxonomic: coordinate	0	
Taxonomic: superordinate of the prime	0	
Taxonomic: subordinate of the prime	0	
Others (Lemma)	0	
Others (Lexeme)	2	5
Others (Indirect relation)	0	
Others (Similar/reverse spelling)	5	4
Total	60	

11. Army (noun)



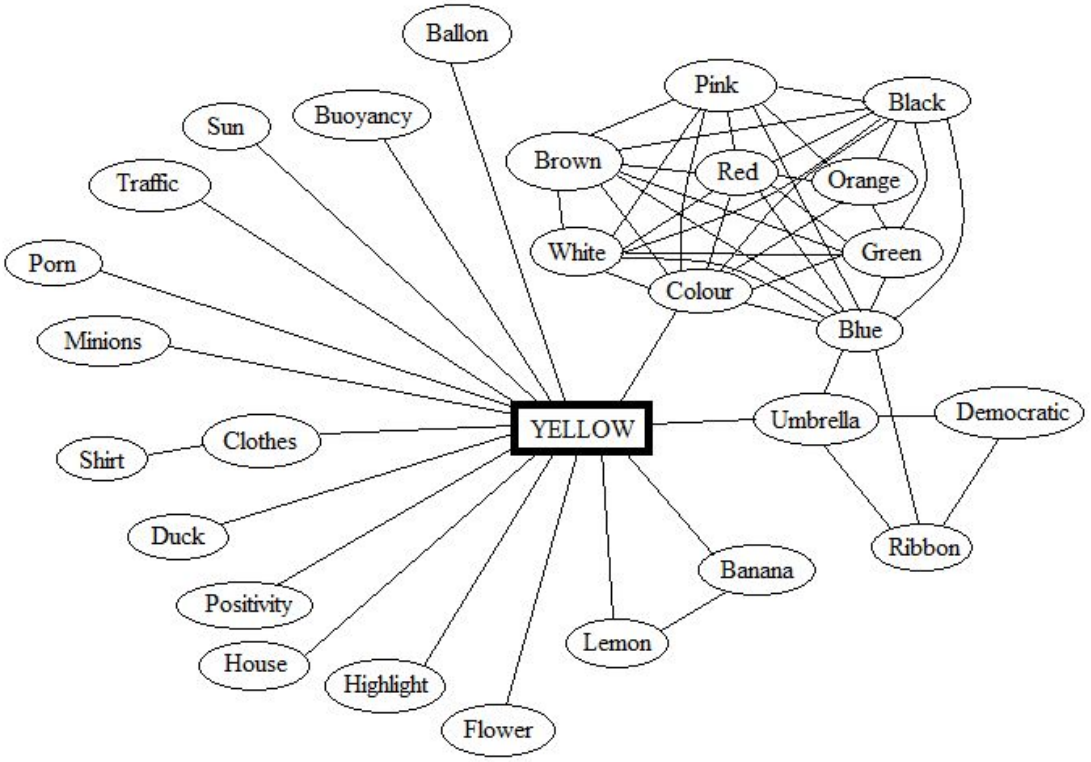
ARMY	Frequency	Ranking of frequency
Synonym	5	3
Antonym	0	
Collocation	**36**	**1**
Attributive	2	6
Functional	0	
Part-whole	9	2
Taxonomic: coordinate	3	5
Taxonomic: superordinate of the prime	0	
Taxonomic: subordinate of the prime	0	
Others (Lemma)	0	
Others (Lexeme)	4	4
Others (Indirect relation)	0	
Others (Similar/reverse spelling)	1	7
Total	60	

12. Persistent (adjective)



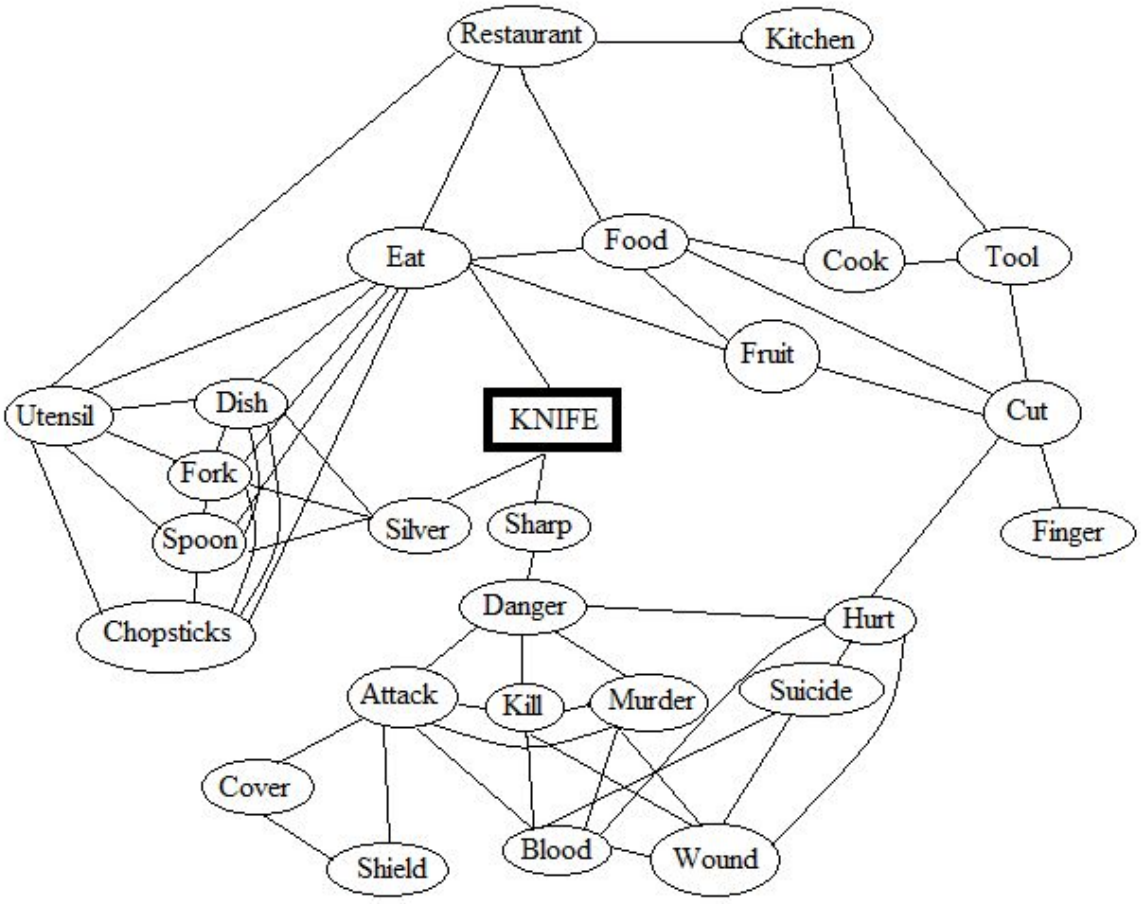
PERSISTENT	Frequency	Ranking of frequency
Synonym	13	2
Antonym	2	5
Collocation	**35**	**1**
Attributive	6	3
Functional	0	
Part-whole	0	
Taxonomic: coordinate	0	
Taxonomic: superordinate of the prime	0	
Taxonomic: subordinate of the prime	0	
Others (Lemma)	3	4
Others (Lexeme)	0	
Others (Indirect relation)	0	
Others (Similar/reverse spelling)	1	6
Total	60	

13. Yellow (adjective)



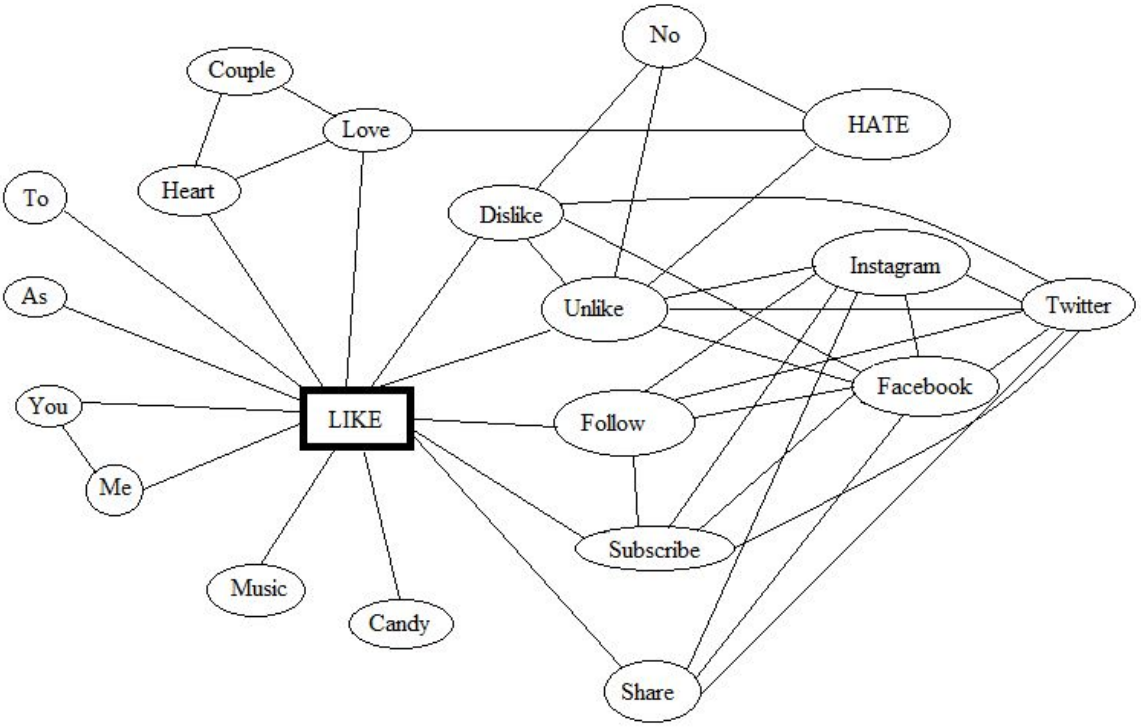
YELLOW	Frequency	Ranking of frequency
Synonym	0	
Antonym	0	
Collocation	17	2
Attributive	15	3
Functional	0	
Part-whole	0	
Taxonomic: coordinate	**20**	**1**
Taxonomic: superordinate of the prime	6	4
Taxonomic: subordinate of the prime	0	
Others (Lemma)	0	
Others (Lexeme)	1	5
Others (Indirect relation)	1	5
Others (Similar/reverse spelling)	0	
Total	60	

14. Knife (noun)



KNIFE	Frequency	Ranking of frequency
Synonym	0	
Antonym	0	
Collocation	**29**	**1**
Attributive	4	4
Functional	3	5
Part-whole	1	7
Taxonomic: coordinate	14	2
Taxonomic: superordinate of the prime	2	6
Taxonomic: subordinate of the prime	0	
Others (Lemma)	0	
Others (Lexeme)	7	3
Others (Indirect relation)	0	
Others (Similar/reverse spelling)	0	
Total	60	

15. Like (verb)



LIKE	Frequency	Ranking of frequency
Synonym	16	2
Antonym	5	4
Collocation	**27**	**1**
Attributive	0	
Functional	0	
Part-whole	0	
Taxonomic: coordinate	0	
Taxonomic: superordinate of the prime	0	
Taxonomic: subordinate of the prime	0	
Others (Lemma)	11	3
Others (Lexeme)	1	5
Others (Indirect relation)	0	
Others (Similar/reverse spelling)	0	
Total	60	

Discussion

Syntactic category Comparison (Noun, Verb, Adjective):

Noun	Frequency	Ranking of frequency
Synonym	22	4
Antonym	0	
Collocation	**144**	**1**
Attributive	29	3
Functional	6	9
Part-whole	10	6
Taxonomic: coordinate	50	2
Taxonomic: superordinate of the prime	7	8
Taxonomic: subordinate of the prime	0	
Others (Lemma)	8	7
Others (Lexeme)	16	5
Others (Indirect relation)	2	10
Others (Similar/reverse spelling)	6	9
Total	300	

Verb	Frequency	Ranking of frequency
Synonym	35	3
Antonym	15	4
Collocation	**180**	**1**
Attributive	0	
Functional	11	5
Part-whole	0	
Taxonomic: coordinate	11	5
Taxonomic: superordinate of the prime	0	
Taxonomic: subordinate of the prime	0	
Others (Lemma)	39	2
Others (Lexeme)	6	6
Others (Indirect relation)	3	7
Others (Similar/reverse spelling)	0	
Total	300	

Adjective	Frequency	Ranking of frequency
Synonym	53	3
Antonym	19	6
Collocation	**105**	**1**
Attributive	62	2
Functional	0	
Part-whole	0	
Taxonomic: coordinate	20	5
Taxonomic: superordinate of the prime	6	7
Taxonomic: subordinate of the prime	0	
Others (Lemma)	23	4
Others (Lexeme)	4	8
Others (Indirect relation)	2	9
Others (Similar/reverse spelling)	6	7
Total	300	

According to a research, second language learners in word association experiment were mainly based on purely phonological, rather than semantic, links with the stimulus words. (İSTİFÇİ, 2010). It, however, largely contradicted to our result. Word association in this experiment is mainly triggered semantically by participants. The following are our explanations for such big difference. From a very general sense, words are used to express ideas and so it is very natural for them to associate the primes semantically. Moreover, the

primes we chose are high-frequency words and they should have known the meaning of the primes very well. Furthermore, some primes are even daily concrete objects or animates (e.g. dog) and thus the concrete things might immediately present in their brain visually and triggered other concrete objects in the 'picture'. Additionally, unlike listening to sentences, participants did not need to be mentally prepared to focus on syntactic knowledge. It is also worth doing an experiment to see whether people will relate functional words (e.g. determiners) or difficult words semantically in the future.

The reason why collocation appeared the most in verbs among nouns, verbs, and adjectives can be explained by the property of English verbs. As collocation can mean two words co-occuring in a sentence or the concepts of two words usually being linked together in the brain. Verbs can be collocated by people in these two ways. Nouns and adjectives can of course be collocated with meaning easily but it is less likely for them to be collocated by people with word-occurence effect. To express meaning accurately, sometimes it is a must for both verbs and prepositions co-occuring in a sentence and missing a preposition can sometimes largely change the intended meaning. Therefore, people may be particularly aware of using phrasal verbs and prepositional verbs correctly. Especially for people who learn English as a second language, many of them must have experienced putting a lot of effort to memorize a variety of phrasal verbs and prepositional verbs. Thus, they might naturally and subconsciously associate the primes with prepositions. The above mentioned are the reasons why collocation appeared the most in verbs than the other two categories.

Two reasons why taxonomic relation appeared more frequently in nouns than verbs and adjectives are proposed. Firstly, for English, nouns in general have more common terms for taxonomic relations known to people. It is undoubtedly possible for some verbs and adjectives to have taxonomic relation but deliberate attempt should be made. For example, it

is possible to deliberately categorize the prime “communicate” with “words that refer to speech” but such attempt is not natural and thus it is not very likely to be the first word popping into most people’s mind. Worse still, participants were required to give one word, but not a phrase. Yet, if they said ‘verb’, that would be regarded as lemma relation, instead of taxonomic relation. However, in this experiment, participants were required to give one word, but not a phrase.

It is worth making an attempt to explain the fact that nearly half of the participants thought of the word 'Cat' immediately after they heard the prime 'dog'. Firstly, Dog and Cat are undoubtedly the most common pets people own in the world. Even for people who have not owned any dog or cat, it is also very common for them to see these animals in daily life. Also, the idiom 'it's raining cats and dogs' might trigger participants to think of 'cat'.

Although the frequency of taxonomic relation in adjective is higher than in that in verbs, it is not advisable to assert that taxonomic relation is more common in adjectives than in verbs in general. It is worth noting that the 26 taxonomic relations in adjective all appeared in the prime ‘Yellow’. It is probably because of the fact that yellow belongs to ‘colour’ category whereas many other adjectives such as ‘persistent’, ‘silent’, ‘unusual’ and ‘toxic’ do not belong to any explicit term category. As a result, only yellow consists of many taxonomic relations but all other adjectives mainly have attributive, synonym and antonym relations without taxonomic relations.

Among half of the collocation with the prime ‘like’ are related to social media. It implied to us that a particular word may trigger different sense relations in different times. It is worth thinking that whether the most frequent relation of the prime ‘like’ would be collocation if the experiment was done 20 years ago. This experiment also reminded us that the issue of why particular sense relation appeared more frequently in particular word

category cannot be always explained by nature of word categories (i.e. noun, verb, and adjective). Era and choice of primes also constituted particular phenomenon in the distribution of sense relation. Therefore, to make generalization more accurately, more primes should be investigated in an experiment in the future. The influence of cultural differences and the age factor on the associated words of 'like' will be discussed in the next section.

Influence of cultural differences and the age factor

There are six words chosen to be assumed to have biased differences towards one side, three of them have biased differences towards mainlanders, which are 'dog', 'toxic' and 'army'.

It was assumed that mainlanders might associate the word 'dog' with 'food', 'cuisine' or 'meat' as mainland has the culture of eating dog meat; they may associate the word 'toxic' with 'food', 'milk', 'eat', 'counterfeit', 'fake', 'drink(s)' or Chinese product since the issue of toxic food and counterfeit food and drinks, as well as toxic products are prevalent and notorious in mainland China; they may associate the word 'army' with 'liberation', 'central', 'government', 'people's', as there are 'people's liberation army' in mainland China but not in Hong Kong.

The result found generally supports our assumptions but surprisingly young mainlanders did not associate 'dog' with 'food', 'cuisine' or 'meat' anymore. However, it is noticeable that they tend to think of negative words when they see 'dog', e.g. 'stinky', 'noisy', 'dirty' and 'stray', whereas Hongkongers tend to think of positive words when they see 'dog', e.g. 'friendship', 'loyalty', 'lovely' and 'cute'. It is probably because of the fact

that mainlanders tend to treat dog as a wild animal instead of a pet.

(Hongkongers) Prime: Dog **Frequency of words VS associated words**	**(Mainlanders) Prime: Dog** **Frequency of words VS associated words**
14 Cat 3 Pet 2 Nine 2 Bark 1 Loyalty 1 Lovely 1 God 1 Friendship 1 Friend 1 Cute 1 Canine 1 Bobby 1 Bell	12 Cat 4 Bark 2 Stray 2 Hotdog 1 Stinky 1 Puppy 1 Pig 1 Noisy 1 Laugh 1 House 1 Fluffy 1 Duck 1 Dirty 1 Brown

For the assumption towards ‘toxic’ and ‘army’, the result appeared to support the assumptions:

(Hongkongers) Prime: Toxic Frequency of words VS associated words	
4	Poison
3	Die
2	Taxi
2	Substances
2	Gas
2	Chemicals
2	Boy
1	Waste
1	Unreasonable
1	Song
1	Skull
1	Poisonous
1	Poisoning
1	Pig
1	People
1	Guys
1	Drug
1	Deadly
1	Bottle
1	Bad

(Mainlanders) Prime: Toxic Frequency of words VS associated words	
3	Taxi
3	Poison
2	Topic
2	Substances
2	Milk
2	Food
2	Drink
2	Die
2	Counterfeit
1	Wine
1	Toy
1	Nicotine
1	Horrible
1	Gas
1	Eat
1	Drug
1	Death
1	Dead
1	Addicted

(Hongkongers) Prime: Army Frequency of words VS associated words	
5	Soldier
4	Gun
2	Enemy
1	War
1	Troops
1	Sacrifice
1	Navy
1	Mindless
1	Military
1	Marvel
1	Leader
1	Korean
1	Iron-Man
1	Hate
1	Force
1	Dead
1	Country
1	Captain-America
1	Blood
1	Avenger
1	Amy
1	America

(Mainlanders) Prime: Army Frequency of words VS associated words	
4	Arm
4	Soldier
3	Government
2	People's
2	Weapon
2	Navy
2	Force
1	War
1	US
1	Terracotta
1	Strong
1	Safety
1	Man
1	Lance
1	Join
1	Dog
1	Uniform
1	America

Other three words that were assumed to have biased differences towards Hongkongers are ‘residence’, ‘police’ and ‘yellow’. It was predicted that Hongkongers might associate the word ‘residence’ with ‘small’, ‘expensive’ ‘burden’ or negative words since it is well-known that Hong Kong’s property price is so expensive that many Hongkongers cannot afford to buy a residence and many of their homes are so small; they may associate the word ‘police’ with some negative adjectives such as ‘cruel’, ‘injustice’, ‘bad’ since the relation between policemen and Hong Kong citizens are getting worse in recent years; they may associate ‘yellow’ with ‘umbrella’, ‘ribbon’, ‘revolution’, ‘blue’ due to the umbrella revolution happened in 2014 and at that time yellow ribbon and umbrella represented the strivers of democracy while blue ribbon represented the support towards policemen or the government. For the assumption towards these three words, the result also appeared to support the assumptions:

(Hongkongers) Prime: Residence Frequency of words VS associated words		(Mainlanders) Prime: Residence Frequency of words VS associated words	
4	Home	6	Resident
3	House	3	People
2	Neighbours	3	House
2	Live	2	Tutor
1	Tiny	2	Home
1	Small	1	Warm
1	Rest	1	Student
1	Residual	1	Rest
1	Resident	1	Resisting
1	People	1	President
1	Money	1	Place
1	Human	1	Look
1	How	1	Live
1	Housing	1	In
1	Hall	1	Hall
1	Green	1	Government
1	Government	1	Evil
1	Expensive	1	Country
1	Evil	1	Big
1	Crowded		
1	City		
1	Burden		
1	Building		

(Hongkongers) Prime: Police Frequency of words VS associated words		(Mainlanders) Prime: Police Frequency of words VS associated words	
3	Station	4	Station
3	Man	4	Man
3	Fireman	3	Please
2	Shit	2	Office
2	Polite	1	Illegal
2	Officer	1	Uniform
1	Thief	1	Uncle
1	TVB	1	Thief
1	Steal	1	Save
1	Siren	1	Public
1	Shoplifters	1	Polite
1	Safe	1	Policeman
1	Rubbish	1	Officer
1	Peace	1	Legal
1	Fuck	1	Him
1	Firefighter	1	Government
1	Dog	1	Fireman
1	Cunning	1	Dog
1	Crime	1	Crime
1	Car	1	Car
1	Blue	1	Alarm

(Hongkongers) Prime: Yellow Frequency of words VS associated words	(Mainlanders) Prime: Yellow Frequency of words VS associated words
7 Blue	6 Green
4 Red	3 Red
3 Umbrella	3 Colour
3 Colour	3 Banana
2 Porn	2 Lemon
1 White	2 Black
1 Traffic	1 Yell
1 Sun	1 White
1 Shirt	1 Pink
1 Ribbon	1 Orange
1 Positivity	1 Huang
1 Minions	1 House
1 Highlight	1 Flower
1 Duck	1 Duck
1 Democratic	1 Clothes
1 Buoyancy	1 Brown
	1 Balloon

From the result, we can see that cultural background indeed exerted an influence over word association. There is a hongkonger associating ‘yellow’ with ‘porn’ and ‘dog’ with ‘nine’, it also shows his cultural knowledge as in Cantonese ‘yellow’ implies ‘porn’, and the pronunciation of ‘nine’ in Cantonese is the same as ‘dog’ in Cantonese.

Another surprisingly found result is that in the associated word of ‘like’, we found that quite a number of Hongkongers thought of ‘Facebook’ or ‘Instagram’ or 'Twitter' or ‘share’, but none of mainlanders did so. It also revealed the cultural difference in that Hongkongers use Facebook, Instagram and Twitter in the daily life which has the ‘like’, ‘share’ and ‘subscribe’ functions, and people press the ‘like’ button frequently to express likeness towards others’ posts in Facebook, Instagram and Twitter. However, mainlanders generally do not use Facebook, Instagram nor Twitter and therefore they lack the concept of liking others on these platforms.

(Hongkongers) Prime: Like Frequency of words VS associated words	(Mainlanders) Prime: Like Frequency of words VS associated words
7 Love 4 Facebook 4 Dislike 3 Share 2 Instagram 2 Hate 1 You 1 Unlike 1 Follow 1 Subscribe 1 Likelihood 1 Twitter 1 Heart 1 Couple	9 Love 4 You 3 Hate 3 Dislike 2 To 2 Me 1 Verb 1 No 1 Music 1 Nike 1 Likely 1 Candy 1 As

Yet, since all the interviewees are of young age, it is common for them to use messaging applications to communicate. Therefore, when they saw the word ‘communicate’, many of them thought of messaging applications. For Hongkongers, many thought of ‘WhatsApp’, while for mainlanders, many thought of ‘WeChat’. This also showed the differences between Hong Kong and mainland in terms of the common devices being used.

(Hongkongers) Prime: Communicate Frequency of words VS associated words		(Mainlanders) Prime: Communicate Frequency of words VS associated words	
6	Talk	8	Talk
3	WhatsApp	4	With
3	Language	3	WeChat
3	Communication	3	Communication
1	Understand	1	Word
1	Telepathy	1	Wise
1	Social	1	Properly
1	Skill	1	People
1	Sick	1	Machine
1	Relationship	1	Great
1	Reasonable	1	Friend
1	People	1	Free
1	Parent	1	Discussion
1	Messenger	1	Culture
1	Interaction	1	Conversation
1	Fuck	1	Commercial
1	Efficiently		
1	Conflict		
1	Confident		

Moreover, we also found that movies might also affect interviewees' association of words, e.g. 'Captain-America', 'Avenger' , 'Iron-Man' and 'Marvel' for 'army','Deadpool' for 'die', 'lambs' and 'hill' for 'silent' due to the movie 'The silence of the lambs' and 'Silent hill', and 'Minions' for 'yellow'.

Emotional connotation for some neutral primes

Although 'knife' is a neutral word, 35.8% of the participants connotated it negatively (e.g. Blood, Murder, Danger, etc…), and 64.2% of the participants connotated it positively or neutrally. We included all neutral connotations and positive connotations for 'knife' since it has no clear cut between the two in this prime's association (i.e. it is difficult to judge whether 'food' is with positive connotation or not). But for the other neutral primes, there are clearer cut between positive and neutral connotations, so we can count only the negative and the positive connotations for them. 'Silent', 'unusual', 'persistent' and 'obey' are all neutral words with both positive and negative connotations. For fairness and accuracy, we only counted the obvious words for all these neutral primes that possibly reflected participants'

mindset. The percentage of positive connotation for ‘silent’, ‘unusual’, ‘persistent’ and ‘obey’ are 60%, 76.9%, 56% and 52.6% respectively, which showed that normal people without mental illness tend to think positively and connect primes with positive words. It is believed that people’s mental condition may also affect word association.

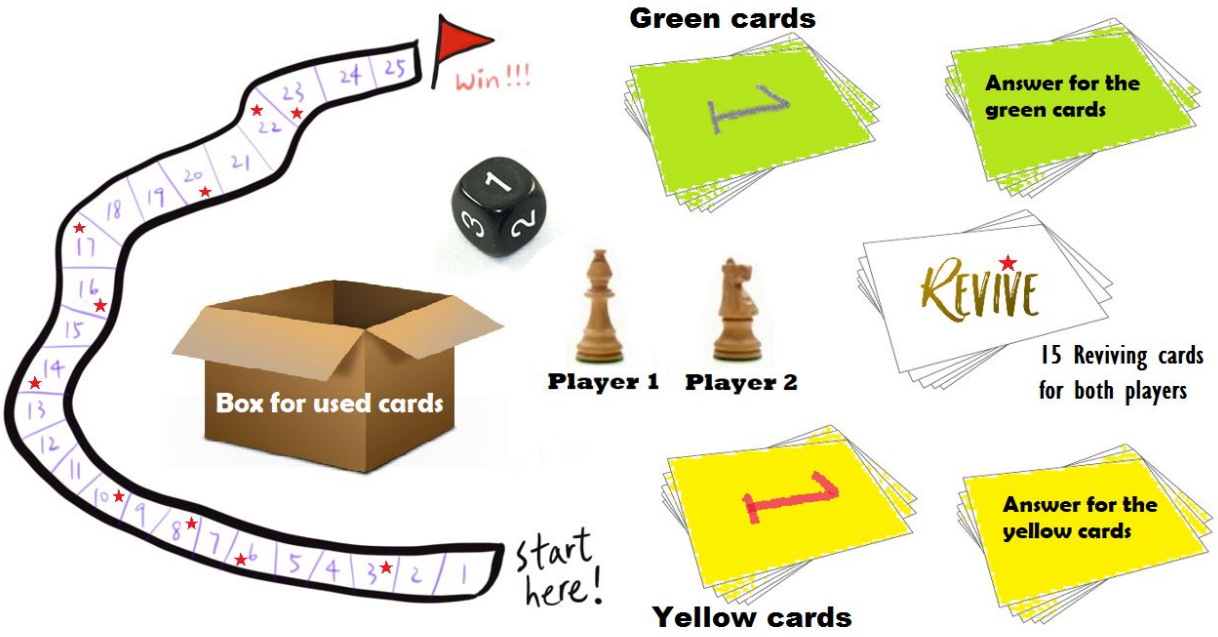
Limitation of this project

A research explored the relationship between age and word association and found that participants with younger age tended to make personal attributions in their responses(e.g. death-my grandfather, home-my family...etc). However, we found the choice of methodology may also affect the result and create limitation. In our experiment, participants were only allowed to speak out the first word popping into their mind while the experiment by this scholar allowed more flexibility(i.e. participants could speak out a phrase). In our experiment, some participants responded ‘Neighbours’ after they heard the prime ‘Residence’ and it was difficult for us to determine whether they had made personal attributions. It could be the cases where they thought of their own neighbours or they just thought of neighbours in general.

Creation of Word Games

With the data collected from the experiment, two word games were created.

Word Association Board Game



1. Target player: Students of secondary school or above

2. Number of players: 2

3. The thought behind designning the game:

The first feature of our game is memorization. Players are required to memorize some associated words of the given prime in a specific second. They are encouraged to use different memory skills to memorize words such as creating stories using these words, and using chunking skills for better memory space. This will strengthen their strategies for handling short term memory. The second feature is that they will learn the ways to categorize words for using different sense relations. Thirdly, the design of punishment cards is thoughtful. It aims at training players' attention and concentration skills because players are required to count from 15 to 1 orally and reciting words at the same time. Fourthly, to encourage better memorization and understanding, summary questions are provided after three primes. Fifthly, the format that requires players to guess words based on some spellings

of words can also strengthen their sensitivity towards words in terms of syntactic and semantic level.

4. Game instructions and material: please refer to appendix II

Word Association Response Game

1. Target player: Students of secondary school or above

2. Number of players: 2-10 (or even more people)

3.The thought behind designing the game:

It is hoped that players would raise their interest and motivation in memorizing the associated words with each prime through this interesting game. The number of players is rather flexible in this game, so that players can base on their desire (to see whether they hope to play with more people to increase excitement or just a few or even two people) to play the game. The more the players participate the game, the more exciting and competitive the game is since this game is testing on people's response. The one who reacts the fastest will be the winner. It can also encourage players to learn vocabulary together with their peers and have fun through learning words. This game also helps to reinforce the players' ability in relating the associated words to the prime.

4. Game instruction and game material: please refer to appendix III

Game demonstration video:

https://www.youtube.com/watch?v=JHuff9D_5Ds&feature=youtu.be

Conclusion

This project has made an attempt to explore how age. era, culture, and syntactic categories of primes affect word association and to enrich students' vocabulary by creating funny games so that their memory of words can last longer.

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Appendices

Appendix I: result for the associated word and the sense relations

1. Dog

26 Cat-Taxonomic relation: coordinate
6 Bark-Attributive
3 Pet-Taxonomic relation: superordinate of 'dog'
2 Stray-Collocation
2 Nine-Indirect relation (lexeme: the sound of nine in Cantonese is identical with the sound of dog in Cantonese)
2 Hotdog-Collocation
1 Stinky-Attributive
1 Puppy-Synonym

1 Pig-Taxonomic relation: coordinate
1 Noisy-Attributive
1 Loyalty-Attributive
1 Lovely-Attributive
1 Laugh-Collocation
1 House-Collocation
1 God-Others: reverse spelling of ‘dog’
1 Friendship-Collocation
1 Friend-Collocation
1 Fluffy-Attributive
1 Duck-Taxonomic relation: coordinate
1 Dirty-Attributive
1 Cute-Attributive
1 Canine-Taxonomic relation: superordinate of ‘dog’
1 Brown-Attributive
1 Bobby-Collocation
1 Bell-Collocation

2. Silent

11 Quiet-Synonym
4 Noisy-Antonym
3 Smile-Collocation
3 Noise-Antonym
3 Night-Attributive
3 Hill-Collocation (due to a movie‘Silent hill’)
2 Silence-Lemma level (noun form of ‘silent’)
2 Please-Collocation
2 Peaceful-Synonym
2 Loud-Antonym
2 Cloud-Collocation
1 White-Collocation
1 Tranquil-Synonym
1 Talk-Collocation
1 Star-Collocation
1 Sound-Collocation
1 Siren- Indirect relation (siren make noise and is noisy, which is the antonym of silent)
1 Peace-Synonym
1 Now-Collocation
1 Movie-Collocation
1 Mood-Collocation
1 Milk-Collocation
1 Library-Attributive

1 Lambs-Collocation (due to a movie ‘The silence of the Lambs’)
1 Keep-Collocation
1 Hot-Collocation
1 Golden-Collocation (due to a Cantonese song ‘silence is gold’)
1 Girl-Collocation
1 Depression-Collocation
1 Dead-Collocation
1 Dark-Collocation
1 Class-Collocation
1 Brown-Collocation
1 Angry-Collocation

- 10 word counted
- 6 positive (60%)
- 4 negative (40%)

3. Die

11 Death-Lemma level (noun form of ‘die’)
5 Life-Collocation
5 Go-Collocation
3 Live-Antonym
3 Hell-Collocation
3 End-Collocation
3 Black-Collocation
2 Sad-Collocation
2 Deadpool-Collocation (due to movie’s influence)
2 Dead-Lemma level (adjective form of ‘die’)
2 Blood-Collocation
2 Alive-Antonym
1 Young-Collocation
1 Work-Collocation
1 Revive-Antonym
1 Reach-Collocation
1 Probability-Collocation
1 No-Collocation
1 Morbid-Collocation
1 Love-Collocation
1 Lie-Lexeme level (/laɪ/ ‘Lie’: similar pronunciation as /daɪ/ ‘Die’)
1 Kill-Collocation
1 Hard-Collocation
1 God-Collocation
1 Funeral-Collocation
1 First-Collocation

1 Eat-Collocation
1 Diehard-Collocation
1 Dark-Collocation

4. Residence

7 Resident-Lemma level (adjective or noun with slightly different meaning of 'residence')
6 House-Synonym
6 Home-Synonym
4 People-Collocation
3 Live-Functional
2 Tutor-Collocation
2 Rest-Collocation
2 Neighbours-Collocation
2 Hall-Synonym
2 Government-Collocation
2 Evil-Collocation
1 Warm-Attributive
1 Tiny-Attributive
1 Student-Collocation
1 Small-Attributive
1 Resisting-Others: Similar spelling
1 Residual-Lexeme level (/rɪˈzɪdʒ.u.əl/ 'Residual' similar pronunciation as /ˈrez.ɪ.dəns/ 'Residence') & morphological similarity
1 President-Lexeme level (/ˈprez.ɪ.dənt/ 'President' similar pronunciation as /ˈrez.ɪ.dəns/ 'Residence')
1 Place-Taxonomic relation:superordinate of 'Residence'
1 Money-Collocation
1 Look-Collocation
1 In-Collocation
1 Human-Collocation
1 How-Collocation
1 Housing-Synonym
1 Green-Attributive
1 Expensive-Attributive
1 Crowded-Attributive
1 Country-Collocation
1 City-Collocation
1 Burden-Collocation
1 Building-Synonym
1 Big-Attributive

5. Police

7 Station-Collocation
7 Man-Collocation
4 Fireman-Taxonomic relation: coordinate
3 Polite-Similar spelling
3 Please-Lexeme level (/pliːz/ ‘Please’: similar pronuciation as /pəˈliːs/ ‘Police’)
3 Officer-Collocation
2 Thief-Collocation
2 Shit-Collocation
2 Office-Collocation
2 Dog-Collocation
2 Crime-Collocation
2 Car-Collocation
1 Illegal-Collocation
1 Uniform-Collocation
1 Uncle-Collocation
1 TVB-Collocation
1 Steal-Collocation
1 Siren-Collocation
1 Shoplifters-Collocation
1 Save-Collocation
1 Safe-Collocation
1 Rubbish-Attributive
1 Public-Collocation
1 Policeman-Lemma level (adding the suffix ‘-man’ meaning people who are ‘police’)
1 Peace-Collocation
1 Legal-Collocation
1 Him-Collocation
1 Government-Collocation
1 Fuck-Collocation
1 Firefighter-Taxonomic relation: coordinate
1 Cunning-Attributive
1 Blue-Collocation
1 Alarm-Collocation

6. Eat

14 Food-Collocation
11 Drink-Taxonomic relation: coordinate
3 Full-Collocation
3 Fat-Collocation
3 Ate-Lemma level (past tense form of ‘eat’)
2 Sleep-Collocation

2 More-Collocation
2 Lunch-Collocation
1 Yummy-Collocation
1 What-Collocation
1 Uber-Collocation
1 Swallow-Collocation
1 Shit-Collocation
1 Pizza-Collocation
1 Orange-Collocation
1 Need-Collocation
1 Meat-Collocation
1 Mango-Collocation
1 Joy-Collocation
1 Hunger-Collocation
1 Fish-Collocation
1 Enjoy-Collocation
1 Egg-Collocation
1 Drinks-Collocation
1 Dine-Synonym
1 Delight-Collocation
1 Ah-Indirect relation (when we feed someone, we may open our mouth and make the sound 'Ah')
1 Apple-Collocation

7. Obey

13 Rules-Collocation
5 Law-Collocation
3 Disobey-Lemma level (adding prefix dis- (the negation morpheme) to make it negative)
2 eBay-Lexeme level (/iːbeɪ/ 'eBay': similar pronunciation as /əʊˈbeɪ/ 'Obey')
2 Okay-Collocation
2 Obedient-Lemma level
2 Love-Collocation
2 Student-Collocation
1 Weird-Collocation
1 To-Collocation
1 Supression-Collocation
1 Solid-Collocation
1 Shopping-Indirect relation (due to lexeme level: obey→eBay)
1 Shop-Indirect relation (due to lexeme level: obey→eBay)
1 Reject-Antonym
1 Regulations-Collocation
1 Rebellious-Antonym

1 Observe-Collocation
1 Obesity-Lexeme level (/əʊˈbiːs/ ‘obese’: similar pronunciation as /əʊˈbeɪ/ ‘Obey’, and then think of ‘obesity’)
1 Obedience-Lemma level
1 Naughty-Collocation
1 Money-Collocation
1 Listen- Synonym
1 King-Collocation
1 How-Collocation
1 Heavy-Collocation
1 Good-Collocation
1 Follow-Synonym
1 Dominance-Collocation
1 Dignity-Collocation
1 Deny-Antonym
1 Boss- Collocation
1 Bored- Collocation
1 Book-Collocation
1 Bay-Lexeme level
1 Authority-Collocation
1 Against-Antonym

- 19 words counted
- 10 words positive
- 9 words negative

8. Communicate

14 Talk-Synonym
6 Communication-Lemma level (Noun of ‘Communicate’)
4 With-Collocation
3 Whatsapp-Functional relation
3 Wechat-Functional relation
3 Language-Functional relation
2 People-Collocation
1 Word-Functional relation
1 Wise-Collocation
1 Understand-Collocation
1 Telepathy-Collocation
1 Social- Collocation
1 Skill-Collocation
1 Sick-Collocation
1 Relationship-Collocation
1 Reasonable- Collocation

1 Properly-Collocation
1 Parent-Collocation
1 Messenger-Functional relation
1 Machine-Collocation
1 Interaction-Collocation
1 Great-Collocation
1 Fuck-Collocation
1 Friend-Collocation
1 Free-Collocation
1 Efficiently-Collocation
1 Discussion-Synonym
1 Culture- collocation
1 Conversation-Synonym
1 Conflict-Collocation
1 Confident-Collocation
1 Commercial- Collocation

9. Unusual

16 Usual-Lemma level [-un(the negation morpheme) of 'unususal]
9 Special-Synonym
3 Strange-Synonym
3 Normal-Antonym
2 Usually-Lemma level [-un(the negation morpheme) -un, +ly: adv of 'ususal']
2 Unique-Synonym
2 Thing-Attributive
2 Stuff-Attributive
2 Common-Antonym
1 Weird-Synonym
1 Way-Attributive
1 Universe -Attributive
1 Universal-Lexeme level (spelling similarity)
1 Superstition-Attributive
1 Simple-Collocation
1 Often-Antonym
1 Odd-Synonym
1 Natural-Collocation
1 Look-Attributive
1 Hero-Attributive
1 General-Antonym

1 Dress-Attributive
1 Dead-Collocation
1 Curious-Collocation
1 Change-Attributive
1 Causeway-bay-Collocation
1 Always-Antonym
1 Abstract-Collocation

- 26 words counted
- 20 positive (76.9%)
- 6 negative (23.1%)

10. Toxic

7 Poison-Synonym
5 Taxi-Others: Similar spelling
5 Die -Collocation
4 Substances-Attributive
3 Gas-Attributive
2 Topic-Lexeme level (/ˈtɒp.ɪk/ 'Topic': similar pronunciation as /tɒk.sɪk/ 'Toxic')
2 Milk-Attributive
2 Food-Attributive
2 Drug-Attributive
2 Drink-Attributive
2 Counterfeit-Collocation
2 Chemicals-Attributive
2 Boy-Attributive
1 Wine-Attributive
1 Waste-Collocation
1 Unreasonable-Collocation
1 Toy-Attributive
1 Song-Collocation ('Toxic' is a song recorded by American singer Britney Spears for her fourth studio album In the Zone (2003))
1 Skull-Collocation
1 Poisonous-Synonym
1 Poisoning-Synonym
1 Pig-Attributive
1 People-Attributive
1 Nicotine-Attributive
1 Horrible-Collocation
1 Guys-Attributive (special meaning of toxic: having a very unpleasant personality, especially in the way they like to control and influence other people in a dishonest way)
1 Eat-Collocation

1 Death-Collocation
1 Deadly-Collocation
1 Dead-Collocation
1 Bottle-Attributive
1 Bad- Collocation
1 Addicted - Collocation

11. Army

9 Soldier- Part-whole
4 Gun-Collocation
4 Arm-Lexeme level (/ɑːm/ 'Arm': similar pronuciation as /ˈɑː.mi/ 'Army')
3 Navy-Taxonmic relation: coordinates
3 Government-Collocation
3 Force-Synonym
2 Weapon-Collocation
2 War-Collocation
2 People's-Collocation
2 Enemy-Collocation
2 America-Collocation
1 US-Collocation
1 Troops-Synonym
1 Terracotta-Collocation
1 Strong-Attributive
1 Safety-Collocation
1 Sacrifice-Collocation
1 Mindless-Attributive
1 Military-Synonym
1 Marvel-Collocation
1 Man-Collocation
1 Leader-Collocation
1 Lance-Collocation
1 Korean-Collocation
1 Join-Collocation
1 Iron-Man-Collocation
1 Hate-Collocation
1 Dog-Collocation
1 Dead-Collocation
1 Country-Collocation
1 Captain-America-Collocation
1 Blood-Collocation
1 Avenger-Collocation
1 Uniform-Collocation

1 Amy-Others: Similar spelling

12. Persistent

4 Consistent-Synonym
3 President-Attributive
3 Mind-Collocation
2 Resist-Collocation
2 Persistence-Lemma level (noun of 'persistent')
2 Perseverance-Synonym
2 Permanent-Synonym
2 Hard-Collocation
2 Resistant-Collocation
1 Worker-Attributive
1 Usual-Collocation
1 Trump-Collocation
1 To-Collocation
1 Temporary-Antonym
1 Stuff-Collocation
1 Stubborn-Synonym
1 Stop-Antonym
1 Resistance-Collocation
1 Resident-Attributive
1 Present-Similar spelling
1 Political-Collocation
1 Polite-Collocation
1 Policy-Collocation
1 Persist-Lemma level (verb of 'persistent')
1 Perfect-Collocation
1 Patient-Collocation
1 Obama-Collocation
1 Now-Collocation
1 No-Collocation
1 Long-Synonym
1 Life-Collocation
1 Keep-Collocation
1 Importance-Collocation
1 Hardworking-Collocation
1 Go-Collocation
1 Forever-Synonym
1 Feeling-Collocation
1 Exercise-Collocation
1 Endeavour-Collocation

1 Done-Collocation
1 Dad-Attributive
1 Cordial-Collocation
1 Continue-Synonym
1 Citizenships-Collocation
1 Annoying-Collocation
1 America-Collocation
1 Always-Synonym

- 23 words counted
- 13 positive (56%)
- 10 negative (43%)

13. Yellow

7 Red-Taxonomic relation: coordinate
7 Blue-Collocation (because of 2014 umbrella revolution)
6 Green-Taxonomic relation: coordinate
6 Colour-Taxonomic relation: Colour is superordinate of 'yellow'
3 Umbrella-Collocation (because of 2014 umbrella revolution)
3 Banana-Attributive
2 White-Taxonomic relation: coordinate
2 Porn-Collocation (due to a colloquial meaning of Canotonese 'yellow')
2 Lemon-Attributive
2 Duck-Attributive
2 Black-Taxonomic relation: coordinate
1 Yell-Lexeme level (/jel/ 'Yell': similar pronuciation as /ˈjel.əʊ/ 'Yellow')
1 Traffic-Collocation
1 Sun-Attributive
1 Shirt- Attributive
1 Ribbon-Collocation (because of 2014 umbrella revolution)
1 Positivity-Collocation
1 Pink-Taxonomic relation: coordinate
1 Orange-Taxonomic relation: coordinate
1 Minions-Attributive
1 Huang- Indirect relation ('yellow' in Chinese can be a surname and Huang is the Putonghua pinyin (a kind of lexeme) of that Chinese character)
1 House-Attributive
1 Highlight-Collocation
1 Flower-Attributive
1 Democratic-Collocation (because of 2014 umbrella revolution)
1 Clothes-Attributive
1 Buoyancy-Attributive
1 Brown-Taxonomic relation: coordinate

1 Ballon-Attributive

14. Knife

12 Fork-Taxonmic relation:coordinate
6 Blood-Collocation
4 Kill-Collocation
3 Wife-Lexeme level (/waɪf/ 'Wife': similar pronunciation as/naɪf/ 'Knife')
3 Sharp-Attributive relation
3 Cut-Funcitonal relation
2 Murder-Collocation
2 Life-Lexeme level (/laɪf/ 'Life': similar pronunciation as /naɪf/ 'Knife')
2 Kitchen-Collocation
2 Hurt-Collocation
2 Fruit-Collocation
1 Wound-Collocation
1 Utensil-Taxonmic relation: superordinate of 'knife'
1 Tool-Taxonmic relation: superordinate of 'knife'
1 Suicide- Collocation
1 Spoon-Taxonmic relation:coordinate
1 Silver-Attributive relation
1 Shield-Collocation
1 Restaurant- Collocation
1 Night-Lexeme level (/naɪt/ 'Night' similar pronuciation as /naɪf/ 'Knife')
1 Food-Collocation
1 Finger-Collocation
1 Eat-Collocation
1 Dish -Collocation
1 Danger-Collocation
1 Cook-Collocation
1 Attack-Collocation
1 Cover-Collocation
1 Chopsticks-Taxonmic relation:coordinate
1 Nice-Lexeme level (/naɪs/ 'Nice': similar pronunciation as /naɪf/ 'Knife')

- 53 words counted
- 34 neutral or positive (64.2%)
- 19 negative (35.8%)

15. Like

16 Love-Synonym
7 Dislike-Lemma (the prefix dis- (the negation morpheme) to make it negative)
5 You-Collocation
5 Hate-Antonym

4 Facebook-Collocation
3 Share-Collocation (e.g.Youtuber, Facebook: please like and share)
2 To-Collocation
2 Me-Collocation
2 Instagram-Collocation
1 Follow-Collocation (e.g.Instagramr: please like and follow)
1 Verb-Lemma level (‘verb’ is the syntactic category of ‘like’)
1 Unlike-Antonym
1 Subscribe-Collocation (e.g. Youtuber: please like and subscribe)
1 No-Collocation
1 Music-Collocation
1 Nike-Lexeme level (Cantonese speakers tend to pronounce ‘Like’ as /laɪ.ki/, and therefore /ˈnaɪ.ki/ ‘Nike’ has similar pronunciation as ‘Like’)
1 Likely-Lemma level(+ly: Adverb)
1 Likelihood-Lemma level (adding suffix ‘-ly’ to be an adjective and then add ‘-hood’ to be a noun)
1 Twitter-Collocation
1 Heart-Collocation
1 Couple-Collocation
1 Candy-Collocation
1 As- Collocation

Appendix II (Word Association Board Game):

Game instruction:

A dice with only number of 1 to 3 are given, i.e. the maximum number being rolled is 6. Each round each player rolls the dice once, and then follows the number he/she rolled and move their own game piece accordingly on the board. There are fix sets of card, two sets of question cards, two sets of answer cards, and one set of punishment cards. Among the two

sets of question cards each consists of 25 cards for each step, with number indicated. Each time when the player reached a step, he/she need to check for the availability of green card of that step number first, if the green card of that number is used, then he/she need to get the yellow card. For example, when player 1 rolled 3, he/she needs to move to the third step of the board and get the 'third' card of the green card and answer the question. After that, player 2 need to help check the answer of player 1. If the green card for that step number is used, he/she need to get the yellow card of the same step number and answer the question (if answer correctly, he/she can stay, else, he/she will be punished for moving back for 3 steps), if both cards are used, the player simply stay that step for next round of rolling dice.
If player 1 answered wrongly, he/she will be given a punishment of moving back for 3 steps and let player 2 take turn to roll the dice.

When the turn is back to player 1, if he/she has not answered for the question of that step before, he/she need to answer it, if he/she answer that question correctly, he/she can keep in that step and let player 2 take the turn and then when the turn is back to player 1, he/she can roll the dice for the next step; if player 1 answer that question wrongly, he/she will be punished for moving back for 3 steps again and wait for his/her next round of rolling dice.
In the punishment of moving back for 3 steps, if the player reached the step with star sign, he/she can decide to get a reviving card and if the player can fulfill the requirement of the reviving card, he/she can be back to the original place and then let player 2 take the turn, and later when the turn is back to player 1 again, he/she can roll the dice for the next step.

The difficulty level of the reviving cards differs and are randomly arranged. 15 reviving chances in total are given for both players. If all reviving cards are used, no more reviving chances will be given. The one who arrive at the end point and reach the flag first will be the winner.

Word Association Board Game materials: green question cards x25, green answer cards x 25, yellow question cards x25, yellow answer cards x25, reviving cards x15:

Green 1st (Section1)
Which of the following word has the loosest relation with the prime "Dog"?
A)Loyalty
B)Pet
C)Friendship
D)White
Green 1st (Section2)
You have 30 seconds to recite all these 8 words. 30 seconds later, try your best to recall and speak aloud all the 8 words:
Nine,Noisy,Pet,Cat,Cute, Dirty,Duck, Brown

Green 2nd (Section1)
Which of the following word relates the most to the prime "Silent"?
A)Noisy
B)Cloud
C)Brown
D)Smile
Green 2nd (Section2)
You have 30 seconds to recite all these 8 words. 30 seconds later, try your best to recall and speak aloud all the 8 words:
Star,Girl,Movie,Night,Silence, Lambs,Please,Quiet

Green 3rd (Section1)
Below are the associated words of the prime "Die". Please fill in the blank.
K_ _l (1syllable)
B_ _ _d(1syllable)
S_d(1syllable)
D_ _ _h(1syllable)
D_ _d(1syllable)
Green 3rd (Section2)
You have 30 seconds to recite all these 8 words. 30 seconds later, try your best to recall and speak aloud all the 8 words:
First,Go,Revive,Sad,Kill,No, Dead,Black

Green 4th (Summary of 1st-3rd)
Which of the following matching is correct?
A)Synonym:
Dog-Puppy;Silent-Quiet;
Die-Hell
B)Antonym:
Dog-Loud;Silent-Noisy;
Die-Live
C)Collocation:
Dog-Hotdog;Silent-Library;
Die-Hell
D)Attributive:
Dog-Bark;Silent-Now;
Die-Alive

Green 5th (Section1)
Below are the associated words of the prime "Residence". Please fill in the blank.
W_ _m(1 syllable)
S_ _ _l(1syllable)
T_ _y(1 syllable)
L_ _e(1 syllable)
H _ _ _ n (1syllable)
Green 5th (Section2)
You have 30 seconds to recite all these 8 words. 30 seconds later, try your best to recall and speak aloud all the 8 words:
Government,Housing,House, Place,Expensive,Residual, Warm,Evil

Green 6th (Section1)
Which of the following word relates the most to the prompt "Police"?
A)Please
B)in
C)me
D)yet
Green 6th (Section2)
You have 30 seconds to recite all these 8 words. 30 seconds later, try your best to recall and speak aloud all the 8 words:
Crime,Uncle,Shit,Fuck, Uniform,Dog,Man,Fireman

Green 7th (Section1)
What is the relation between 'ate' and the prime 'Eat'?
A)Synonym
B)Lemma
C)A& B
D)None of the above
Green 7th (Section2)
You have 30 seconds to recite all these 8 words. 30 seconds later, try your best to recall and speak aloud all the 8 words:
Full,Lunch,Meat,Dine,Food, Yummy,Mango,Uber

Green 8th (Summary of 5th-7th)
Which of the following matching is/are correct?
A)Collocation
Residence-Money;
Police-Station;Eat-Food
B)Attributive
Residence-tiny;
Police-rubbish;Eat-pizza
C)Synonym
Residence-housing;
Police-officer;Eat-food
D)None of the above matching is correct

Green 9th (Section1)
Below are the associated words of the prime "Obey". Please fill in the blank.
R_ _e(1syllable)
Re_ _ _t(2syllables)
B_ _s(1syllable)
K_ _g (1syllable)
Au_ _ _ _ity(4syllables)
Green 9th (Section2)
You have 30 seconds to recite all these 8 words. 30 seconds later, try your best to recall and speak aloud all the 8 words:
Supression,Heavy,Bay,Law, Shopping,Dominance,Okay, Deny

Green Card 1st Answer: D	Green Card 2nd Answer: A	Green Card 3rd Answer: Kill, Blood, Sad, Death, Dead
Green Card 4th Answer: C	Green Card 5th Answer: Warm, Small, Tiny, Live, Human	Green Card 6th Answer: A
Green Card 7th Answer: B	Green Card 8th Answer: A	Green Card 9th Answer: Rule, Reject, Boss, King, Authority

Green 10th (Section1)
Whatsapp, Wechat, Language, Word have the same sense relation with the prime "Communicate".
A)Functional Relation
B)Synonym
C)Coordinate
D)All of the above
Green 10th (Section2)
You have 30 seconds to recite all these 8 words. 30 seconds later, try your best to recall and speak aloud all the 8 words:
Word,Interaction,Friend, Commercial,Efficiently, Machine,Talk,Skill

Green 11st (Section1)
Below are the associated words of the prime "Unusual". Please fill in the blank.
O_ _(1syllable)
No_ _ _ l(2syllables)
St_ _ _ _e(1syllable)
C_ m _ _n(2syllables)
T_ _ _g(1syllable)
Green 11st (Section2)
You have 30 seconds to recite all these 8 words. 30 seconds later, try your best to recall and speak aloud all the 8 words:
Unique,Thing,Hero,Odd,Look, Simple,Odd,Superstition

Green 12th (Summary of 9th-11st)
Which of the following(s) must be incorrect?
A)Collocation
Obey-Law;
Communicate-With;
Unusual-Look
B)Synonym
Obey-Follow;
Communicate-Talk;
Unusual-Weird
C)Antonym
Obey-Disobey;
Communicate-Wechat;
Unusual-Usual
D)Collocation
Obey-Law;
Communicate-Communication;
Unusual-Look

Green 13th (Section1)
Below are the associated words of the prime "Toxic". Please fill in the blank.
F_ _d(1syllable)
M_ _k(1syllable)
P_ _ s o n(2syllable)
G_ s(1syllable)
D _ _ g(1syllable)
Green 13th (Section2)
You have 30 seconds to recite all these 8 words. 30 seconds later, try your best to recall and speak aloud all the 8 words:
Die,Substances,Food,Horrible, Poison,Poisonous,Topic,Boy

Green 14th (Section1)
Which word has the loosest relation with the prime "Army"?
A)Soldier
B)Weapon
C)Navy
D)You
Green14th (Section2)
You have 30 seconds to recite all these 8 words. 30 seconds later, try your best to recall and speak aloud all the 8 words:
Gun,Government,US,Navy, Sacrifice,Mindless, Terracotta,Lance

Green 15th (Section1)
Below are the associated words of the prime "Persistent". Please fill in the blank.
Stu_ _ _ _n(2syllables)
W_ _ _ e r(2syllables)
L _ _ g(1syllable)
Pe _ _ _ _t(2syllables)
End _ _ _ _ur(2syllables)
Green 15th (Section2)
You have 30 seconds to recite all these 8 words. 30 seconds later, try your best to recall and speak aloud all the 8 words:
Go,Annoying,Political,Persist, Dad,Endeavour,President, Continue

Green 16th
(Summary of 13th-15th)
Which of the following matching(s) is/are correct?
A)Synonym
Toxic-Poisonous;
Army-Force;
Persistent-Consistent
B)Collocation
Toxic-Counterfeit;
Army-CaptainAmerica;
Persistent-Policy
C)Attributive
Toxic-Wine;
Army-Strong;
Persistent-Dad
D)None of the above

Green 17th (Section1)
Below are the associated words of the prime "Yellow". Please fill in the blank.
P _ _n(1 syllable)
Gr _ _n(1syllable)
Or _ _ _e(2syllables)
Sh _ _t(1syllable)
Tra_ _ _c(2syllables)
Green 17th (Section2)
You have 30 seconds to recite all these 8 words. 30 seconds later, try your best to recall and speak aloud all the 8 words:
Flower,Buoyancy,Balloon, Blue,Millions,Sun,Red,Green

Green 18th (Section1)
Which of the following word has the closest relation with the prime "Knife"?
A)Life
B)Cute
C)Ballon
D)Amy
Green 18th (Section2)
You have 30 seconds to recite all these 8 words. 30 seconds later, try your best to recall and speak aloud all the 8 words:
Utensil,Attack,Night,Shield, Spoon,Suicide,Kitchen,Danger

Green Card 10th
Answer: A

Green Card 11st
Answer:
Odd, Normal, Strange,
Common ,Thing

Green Card 12th
Answer:C & D

Green Card 13th
Answer:
Food, Milk, Poison,
Gas, Drug

Green Card 14th
Answer D

Green Card 15th
Answer:
Hard, Mind, Perseverance,
Permanent, Patient

Green Card 16th
Answer: D

Green Card 17th
Answer:
Porn, Green, Orange,
Shirt, Traffic

Green Card 18th
Answer: A

Green 19th (Section1)
Below are the associated words of the prime "Like". Please fill in the blank.
F_ _ _b_ _ k(2syllables)
L_ _e (1syllable)
Dis _ _ _e(2syllables)
Y_u (1syllable)
Sub_ _ _ _ _e(2syllables)

Green 19th (Section2)
You have 30 seconds to recite all these 8 words. 30 seconds later, try your best to recall and speak aloud all the 8 words:
Nike,Music,Instagram, Follow,Verb,You,Facebook, Unlike

Green 20th
(Summary of 17th-19th)
Which of the following(s) is/are correct?
A)Collocation
Yellow-Umbrella;
Knife-Danger;
Like-Instagram
B)Functional
Yellow-Red;
Knife-Cut; Like-Facebook
C)Coordinate
Yellow-Blue;Knife-Fork;
Like-Subscribe
D)Attributive
Yellow-Banana;
Knife-Sharp;Like-You

Green 21st
Here are the associated words of a particular prime.
Guess what the prime is!

Ribbon,Banana,Lemon,Duck

Green 22nd
The following are the associated words with the prime "Yellow". One of the associated words are triggered mainly because of cultural background. What is it?
A)Umbrella
B)White
C)Orange
D)Color

Green 23rd
Here are the associated words of a particular prime. Guess what the prime is!

Kitchen,Utensil,Kill,Blood

Green 24th (Section1)
Here are the associated words of a particular prime. Guess what the prime is!

Hell,Sad,Kill,End
(Hints: Verb)

Green 25th
Which prime(s) is/are neutral and is/are possible to be connotated positively by some people and negatively by some people.
A)Dog
B)Unusal
C)Police
D)All of the above

Green Card 19th
Answer: Facebook, Like, Dislike, You, Subscribe

Green Card 20th
Answer: A

Green Card 21st
Answer:
Yellow

Green Card 22nd
Answer: A

Green Card 23rd
Answer:
Knife

Green Card 24th
Answer:
Die

Green Card 25th
Answer: D

Yellow 1st (Section1)
Which of the following word has the loosest relation with the prime "DOG"?
A)Bark
B)In
C)Bobby
D)Animal
Yellow 1st (section2)
You have 15 seconds to recite all these 8 words. 15 seconds later, try your best to recall and speak aloud all the 8 words:
Nine,Noisy,Pet,Cat,Cute, Dirty,Duck,Brown

Yellow 2nd (Section1)
Which of the following word has the loosest relation with the prime "Silent"?
A)Quiet
B)Please
C)Loud
D)Hot
Yellow 2nd (Section2)
You have 15 seconds to recite all these 8 words. 15 seconds later, try your best to recall and speak aloud all the 8 words:
Star,Girl,Movie,Night, Silence,Lambs,Please,Quiet

Yellow 3rd (Section1)
Below are the associated words of the prime "Die". Please fill in the blank.
A_ _ _e(2syllables)
Fun_ _ _l(3syllables)
D_ _k(1syllable)
l_ _e(1syllable)
E_ d(1syllable)
Yellow 3rd (Section2)
You have 15 seconds to recite all these 8 words. 15 seconds later, try your best to recall and speak aloud all the 8 words:
First,Go,Revive,Sad,Kill,No, Dead,Black

Yellow 4th (Summary of 1st-3rd)
Which of the following matching is/are wrong?
A)Synonym:
Dog-Bobby;Silent-Quiet;
Die-Hell
B)Antonym:
Dog-God;Silent-Loud;
Die-Revive
C)Attributive:
Dog-Stinky;
Silent-Library;Die-Young
D)All of the above

Yellow 5th (Section1)
Below are the associated words of the prime "Residence". Please fill in the blank.
H_ _e(1syllable)
P_ _ _ _e (2syllables)
Nei_ _ _ _ _r(2syllables)
Re_ _ _ _ _t (3syllables)
Ex_ _ _ _ _ _e(3syllables)
Yellow 5th (Section2)
You have 15 seconds to recite all these 8 words. 15 seconds later, try your best to recall and speak aloud all the 8 words:
Government,Housing,House, Place,Expensive,Residual, Warm,Evil

Yellow 6th (Section1)
What is/are the sense relation(s) between "Police" and "Safe"?
A)Collocation
B)Attributive
C)Taxonmic relation
D)A& B
Yellow 6th (Section2)
You have 15 seconds to recite all these 8 words. 15 seconds later, try your best to recall and speak aloud all the 8 words:
Crime,Uncle,Shit,Fuck, Uniform,Dog,Man,Fireman

Yellow 7th (Section1)
Pizza, Mango, and Meat have the same sense relation with the prime 'Eat'. What is the relation?
A)Collocation
B)Part-whole
C)Coordinate
D)Functional relation
Yellow 7th (Section2)
You have 15 seconds to recite all these 8 words. 15 seconds later, try your best to recall and speak aloud all the 8 words:
Full,Lunch,Meat,Dine,Food, Yummy,Mango,Uber

Yellow 8th (Summary of 5th-7th)
Which of the following matching is/are correct?
A)Collocation
Residence-Student;
Police-Thief;Eat-Pizza
B)Attributive
Residence-Crowded;
Police-Cunning;Eat-Joy
C)Coordinate
Residence-Building;
Police-Thief;Eat-Drink
D)None of the above matching is correct

Yellow 9th (Section1)
Below are the associated words of the prime "Obey". Please fill in the blank.
L_w(1syllable)
Re_ _ _ _ _ous(4syllables)
Re_ _ _ _ _ion(4syllables)
L_ _ _en(2syllables)
Na_ _ _ty(2syllables)
Yellow 9th (Section2)
You have 15 seconds to recite all these 8 words. 15 seconds later, try your best to recall and speak aloud all the 8 words:
Supression,Heavy,Bay,Law, Shopping,Dominance,Okay, Deny

Yellow Card 1st
Answer: B

Yellow Card 2nd
Answer: D

Yellow Card 3rd
Answer:
Alive , Funeral, Dark, Life, End

Yellow Card 4th
Answer: D

Yellow Card 5th
Answer:
Home, People, Neighbours, Resident, Expensive

Yellow Card 6th
Answer: A

Yellow Card 7th
Answer: A

Yellow Card 8th
Answer: A

Yellow Card 9th
Answer:
Law, Rebellious, Regulation, Listen, Naughty

Yellow 10th (Section1)
Which pair(s) of words have the same relation with the prime "Communicate" respectively?
A){ Talk, Conversation, Discussion}
B){ People, Whatsapp, Sick}
C){Talk, People, Telegraphy}
D){Reasonable, with }
Yellow 10th (Section2)
You have 15 seconds to recite all these 8 words. 15 seconds later, try your best to recall and speak aloud all the 8 words:
Word,Interaction,Friend, Commercial,Efficiently, Machine,Talk,Skill

Yellow 11st (Section1)
Below are the associated words of the prime "Unusual". Please fill in the blank.
C _ _ _ ge(1syllable)
No _ _ _ l (2syllables)
Un _ _ _e(2syllables)
S _ m _ _e(2syllables)
Us _ _ l(2syllables)
Yellow 11st (Section2)
You have 15 seconds to recite all these 8 words. 15 seconds later, try your best to recall and speak aloud all the 8 words:
Unique,Thing,Hero,Odd,Look, Simple,Odd,Superstition

Yellow 12th
(Summary of 9th-11st)
Which of the following(s) is/are correct?
A)Lexeme
Obey-Ebay;
Communicate-Obesity;
Unusual-Usually
B)Antonym
Obey-Reject;
Communicate-Understand;
Unusual-Common
C)Synonym
Obey-Listen;
Communicate-Talk;
Unusual-Special
D)None of the above

Yellow 13th (Section1)
Below are the associated words of the prime "Toxic". Please fill in the blank.
Sub_ _ _ _ce(2syllables)
Dr _ _ _(1syllable)
W_ _e(1syllable)
D_ _ _h(1syllable)
Add_ _ _ed(3syllables)
Yellow 13th (Section2)
You have 15 seconds to recite all these 8 words. 15 seconds later, try your best to recall and speak aloud all the 8 words:
Die,Substances,Food,Horrible, Poison,Poisonous,Topic,Boy

Yellow 14th (Section1)
What is the sense relation between the prime "Army" and "Gun"?
A)Collocation
B)Functional Relation
C)Part-whole
D)Coordinate
Yellow 14th (Section2)
You have 15 seconds to recite all these 8 words. 15 seconds later, try your best to recall and speak aloud all the 8 words:
Gun,Government,US,Navy, Sacrifice,Mindless,Terracotta, Lance

Yellow 15th (Section1)
Below are the associated words of the prime "Persistent". Please fill in the blank.
H _ _ d(1syllable)
M _ _ d(1syllable)
Per _ _ _ _ _ _ _ ce(3syllables)
Per _ _ n _ _ t (3syllables)
Pa _ _ _ _ t(2syllables)
Yellow 15th (Section2)
You have 15 seconds to recite all these 8 words. 15 seconds later, try your best to recall and speak aloud all the 8 words:
Go,Annoying,Political,Persist, Dad,Endeavour,President, Continue

Yellow 16th
(Summary of 13th-15th)
Which of the following matching(s) is/are correct?
A)Collocation
Toxic-Die;Army-War;
Persistent-Political
B)Synonym
Toxic-Poisoning;
Army-Troops;
Persistent-Stubborn
C)Attributive
Toxic-Milk;Army-Mindless;
Persistent-Worker
D)None of the above

Yellow 17th (Section1)
Below are the associated words of the prime "Yellow". Please fill in the blank.
Ba _ _ _ a(2syllables)
B _ _ e(1syllable)
R _ d(1syllable)
Co _ _ _ r(2syllables)
Hi _ _ l i _ht(2syllables)
Yellow 17th (Section2)
You have 15 seconds to recite all these 8 words. 15 seconds later, try your best to recall and speak aloud all the 8 words:
Flower,Buoyancy,Balloon,Blue ,Millions,Sun,Red,Green

Yellow 18th (Section1)
Which of the following word has/have the Attributive relation of "knife"?
A)Silver
B)Blood
C)Cut
D)Sharp
Anser: A & D
Yellow 18th (Section2)
You have 15 seconds to recite all these 8 words. 15 seconds later, try your best to recall and speak aloud all the 8 words:
Utensil,Attack,Night,Shield, Spoon,Suicide,Kitchen,Danger

Yellow Card 10th
Answer: A & D

Yellow Card 11st
Answer:
Change, Normal, Unique, Simple, Usual

Yellow Card 12th
Answer: C

Yellow Card 13th
Answer:
Substance, Drink, Wine, Death, Addicted

Yellow Card 14th
Answer : A

Yellow Card 15th
Answer:
Hard, Mind, Perseverance, Permanent , Patient

Yellow Card 16th
Answer: D

Yellow Card 17th
Answer:
Banana, Blue, Red, Colour, Highlight

Yellow Card 18th
Answer: A & D

Yellow 19th (Section1)
Below are the associated words of the prime "Like". Please fill in the blank.
L_ _ _ _y (2syllables)
Co_ _ _e(2syllables)
Un _ _ _e(2syllables)
H_ _e(1syllable)
Ca _ _ y(2syllables)

Yellow 19th (Section2)
You have 15 seconds to recite all these 8 words. 15 seconds later, try your best to recall and speak aloud all the 8 words:
Nike,Music,Instagram,Follow, Verb,You,Facebook,Unlike

Yellow 20th
(Summary of 17th-19th)
Which of the following(s) is/are correct?
A)Collocation
Yellow-Ribbon;Knife-Blood; Like-Share
B)Functional
Yellow-Democratic; Knife-Kill;Like-Facebook
C)Coordinate
Yellow-Red;Knife-Spoon; Like-As
D)Attributive
Yellow-House; Knife-Silver;Like-Likelihood

Yellow 21st
Here are the associated words of a particular prime. Guess what the prime is!

Bobby,Bark,Loyalty, Friendship

Yellow 22nd
Which prime(s) is/are neutral and is/are possible to be connotated positively by some people and negatively by some people.
A)Knife
B)Persistent
C)Die
D)A& B

Yellow 23rd
Here are the associated words of a particular prime. Guess what the prime is!

Expensive,Small,Crowded, Money

Yellow 24th
Here are the associated words of a particular prime. Guess what the prime is!

Burden,Money,Expensive, Tiny,Crowded
(Hint: Noun)

Yellow 25th
"Some people said my dad was very stubborn while some people appreciated his consistent endeavour towards policy. He said it was hard and it was a long journey."
Read the above paragraph and fill in the blank.

His dad is a ___ person.
(Hint: Adjective)

Yellow Card 19th
Answer:
Likely, Couple, Unlike,
Hate , Candy,

Yellow Card 20th
Answer: A

Yellow Card 21st
Answer: Dog

Yellow Card 22nd
Answer: D

Yellow Card 23rd
Answer:
Residence (Other answers are possible as long as it has the meaning of "residence")

Yellow Card 24th
Answer:
Residence

Yellow Card 25th
Answer:
Persistent

Reviving card 1 (dog)
You have **15 seconds** to recite all these 10 words. 15 seconds later, you are required to count down from 15 to 0 orally. Then, try your best to recall and speak aloud all the 10 words.

Lovely, Loyalty, Nine, Noisy, Pet, Bell, Bobby, Brown, Canine

Reviving card 2 (Silent)
You have **35 seconds** to recite all these 10 words. 35 seconds later, you are required to count down from 15 to 0 orally. Then, try your best to recall and speak aloud all the 10 words.

Depression, Girl, Golden, Hill, Hot, Keep, Lambs, Movie, Night, Noise

Reviving card3 (Die)
You have **15 seconds** to recite all these 10 words. 15 seconds later, you are required to count down from 15 to 0 orally. Then, try your best to recall and speak aloud all the 10 words.

Deadpool, Death, Diehard, Eat, End, Love, Morbid, No, Probability, Reach

Reviving card 4 (Residence)
You have **30 seconds** to recite all these 10 words. 30 seconds later, you are required to count down from 15 to 0 orally. Then, try your best to recall and speak aloud all the 10 words.

Building, Burden, City, Country, Crowded, Evil, Expensive, Residual, Resisting, Rest

Reviving card 5 (Police)
You have **35 seconds** to recite all these 10 words. 35 seconds later, you are required to count down from 15 to 0 orally. Then, try your best to recall and speak aloud all the 10 words.

Crime, Cunning, Dog, Firefighter, Shoplifters, Siren, Station, Steal, TVB, Thief

Reviving card 6 (Eat)
You have **25 seconds** to recite all these 10 words. 25 seconds later, you are required to count down from 15 to 0 orally. Then, try your best to recall and speak aloud all the 10 words.

Drinks, Egg, Enjoy, Fat, Fish, Need, Orange, Pizza, Shit, Sleep

Reviving card 7 (Obey)
You have **35 seconds** to recite all these 10 words. 35 seconds later, you are required to count down from 15 to 0 orally. Then, try your best to recall and speak aloud all the 10 words.

How, King, Law, Listen, Love, Student, Supression, To, Weird, eBay

Reviving card 8 (Communicate)
You have **15 seconds** to recite all these 10 words associated with 'dog'. 15 seconds later, you are required to count down from 15 to 0 orally. Then, try your best to recall and speak aloud all the 10 words.

Commercial, Communication, Confident, Conflict, Conversation, Culture, Discussion, Free, Friend, Fuck

Reviving card 9 (Unusual)
You have **20 seconds** to recite all these 10 words. 20 seconds later, you are required to count down from 15 to 0 orally. Then, try your best to recall and speak aloud all the 10 words.

Dress, General, Hero, Look, Natural, Normal, Odd, Often, Simple, Special

Reviving card 10 (Toxic) You have **25 seconds** to recite all these 10 words. 25 seconds later, you are required to count down from 15 to 0 orally. Then, try your best to recall and speak aloud all the 10 words. *Nicotine, People, Pig, Poison, Poisoning, Poisonous, Skull, Song, Substances, Chemicals*	**Reviving card 11 (Army)** You have **20 seconds** to recite all these 10 words. 20 seconds later, you are required to count down from 15 to 0 orally. Then, try your best to recall and speak aloud all the 10 words. *America, Amy, Uniform, Arm, Avenger, Blood, Lance, Leader, Man, Marvel*	**Reviving card 12 (Persistent)** You have **30 seconds** to recite all these 10 words. 30 seconds later, you are required to count down from 15 to 0 orally. Then, try your best to recall and speak aloud all the 10 words. *Endeavour, Exercise, Feeling, Forever, Go, Hard, Hardworking, Importance, Keep, Life*
Reviving card 13 (Yellow) You have **25 seconds** to recite all these 10 words. 25 seconds later, you are required to count down from 15 to 0 orally. Then, try your best to recall and speak aloud all the 10 words. *Highlight, House, Huang, Lemon, Millions, Porn, Positivity, Red, Ribbon, Shirt*	**Reviving card 14 (Knife)** You have **30 seconds** to recite all these 10 words. 30 seconds later, you are required to count down from 15 to 0 orally. Then, try your best to recall and speak aloud all the 10 words. *Eat, Finger, Food, Fork, Fruit, Suicide, Kill, Sharp, Shield, Silver*	**Reviving card 15 (Like)** You have **20 seconds** to recite all these 10 words. 20 seconds later, you are required to count down from 15 to 0 orally. Then, try your best to recall and speak aloud all the 10 words. *As, Candy, Couple, Nike, Unlike, Verb, Twitter, Likely, Love, Me*

Appendix III (Word Association Response Game):

Game instruction:

There are all together 408 cards with all associated words of 15 primes collected from the experiment without repetition, one associated word for each card (originally the number of all unrepeated associated word of each prime is total 478 with 70 associated words repeated among the primes). After shuffling, the cards are evenly distributed among players

and are held upside down in the hands of each player. Each round there is a prime theme. Before each round, the players have 5 minute to memorize all the related words of that prime.

When that round's theme is 'dog', each player has to know the related words of the word 'dog' in advance and memorize them. When the game start, one by one, they need to turn a card and show the card on the table, calling that prime, i.e. 'dog'. When the card being turned is related to the prime, they need to place a hand on the card as soon as possible. The one who place his/her hand most quickly will be the winner of that round and earn one point for each time while the one who mistakenly place his/her hand on the word that has no relation to the prime will get one point deducted for each time. If the waiting time is more than 3 seconds, one point will also be deducted.

The checking procedure is simplified by running the Java programme we designed in the computer (as attached below), or the players can simply check with the lists with all unrepeated associated word of each prime (appendix IV) themselves. The number of rounds being played may vary and the one who has won for the highest number of time will be the ultimate winner. The same prime can be played for more than 1 round for deeper memorization.

This game helps to reinforce the players' ability in relating the associated words to the prime and their responses towards word association can also be trained in an interesting way.

Word Association Response Game materials: The JAVA source code for checking whether the result of each round in the Word Association Response Game:

```
import java.io.*;

class checking {
public static String [] word1 =
"Bark,Bell,Bobby,Brown,Canine,Cat,Cute,Dirty,Duck,Fluffy,Friend,Friendship,God,Hotdog,House,Laugh,Lovely,L
oyalty,Nine,Noisy,Pet,Pig,Puppy,Stinky,Stray".toLowerCase().split(",");
public static String [] word2 =
"Angry,Brown,Class,Cloud,Dark,Dead,Depression,Girl,Golden,Hill,Hot,Keep,Lambs,Library,Loud,Milk,Mood,Mov
```

```
ie,Night,Noise,Noisy,Now,Peace,Peaceful,Please,Quiet,Silence,Siren,Smile,Sound,Star,Talk,Tranquil,White".toLowerCase().split(",");
public static String []word3 =
"Alive,Black,Blood,Dark,Dead,Deadpool,Death,Diehard,Eat,End,First,Funeral,Go,God,Hard,Hell,Kill,Lie,Life,Live,Love,Morbid,No,Probability,Reach,Revive,Sad,Work,Young".toLowerCase().split(",");
public static String []word4
="Big,Building,Burden,City,Country,Crowded,Evil,Expensive,Government,Green,Hall,Home,House,Housing,How,Human,In,Live,Look,Money,Neighbours,People,Place,President,Resident,Residual,Resisting,Rest,Small,Student,Tiny,Tutor,Warm".toLowerCase().split(",");
public static String [] word5=
"Alarm,Blue,Car,Crime,Cunning,Dog,Firefighter,Fireman,Fuck,Government,Him,Illegal,Legal,Man,Office,Officer,Peace,Please,Policeman,Polite,Public,Rubbish,Safe,Save,Shit,Shoplifters,Siren,Station,Steal,TVB,Thief,Uncle,Uniform".toLowerCase().split(",");
public static String []word6=
"Ah,Apple,Ate,Delight,Dine,Drink,Drinks,Egg,Enjoy,Fat,Fish,Food,Full,Hunger,Joy,Lunch,Mango,Meat,More,Need,Orange,Pizza,Shit,Sleep,Swallow,Uber,What,Yummy".toLowerCase().split(",");
public static String []word7=
"Against,Authority,Bay,Book,Bored,Boss,Deny,Dignity,Disobey,Dominance,Follow,Good,Heavy,How,King
,Law,Listen,Love,Money,Naughty,Obedience,Obedient,Obesity,Observe,Okay,Rebellious,Regulations,Reject,Rules,Shop,Shopping,Solid,Student,Supression,To,Weird,eBay".toLowerCase().split(",");
public static String []word8=
"Commercial,Communication,Confident,Conflict,Conversation,Culture,Discussion,Efficiently,Free,Friend,Fuck,Great
,Interaction,Language,Machine,Messenger,Parent,People,Properly,Reasonable,Relationship,Sick,Skill,Social,Talk,Telepathy,Understand,Wechat,Whatsapp,Wise,With,Word".toLowerCase().split(",");
public static String [] word9 =
"Abstract,Always,Causeway-bay,Change,Common,Curious,Dead,Dress,General,Hero,Look,Natural,Normal,Odd,Often,Simple,Special,Strange,Stuff,Superstition,Thing,Unique,Universal,Universe,Usual,Usually,Way,Weird".toLowerCase().split(",");
public static String []word10 ="Addicted,Bad,Bottle,Boy,Boy
,Chemicals,Counterfeit,Dead,Deadly,Death,Die,Drink,Drug,Eat,Food,Gas,Guys,Horrible,Milk,Nicotine,People,Pig,Poison,Poisoning,Poisonous,Skull,Song,Substances,Taxi,Topic,Toy,Unreasonable,Waste,Wine".toLowerCase().split(",");
public static String [] word11= "America,Amy,Uniform,Arm,Avenger,Blood,Captain－America,Country,Dead,Dog,Enemy,Force,Government,Gun,Hate,Iron,Join,Korean,Lance,Leader,Man
,Marvel,Military,Mindless,Navy,People's,Sacrifice,Safety,Soldier,Strong,Terracotta,Troops,US,War,Weapon".toLowerCase().split(",");
public static String []word12=
"Always,America,Annoying,Citizenships,Consistent,Continue,Cordial,Dad,Done,Endeavour,Exercise,Feeling,Forever,Go,Hard,Hardworking,Importance,Keep,Life,Long,Mind,No,Now,Obama,Patient,Perfect,Permanent,Perseverance
,Persist,Prolonged,Persistence,Policy,Polite,Political,Present,President,Resident,Resist,Resistance,Resistant,Stop,Stubborn,Stuff,Temporary,To,Trump,Usual,Worker".toLowerCase().split(",");
public static String []word13=
"Balloon,Banana,Black,Blue,Brown,Buoyancy,Clothes,Colour,Democratic,Duck,Flower,Green,Highlight,House,Huang,Lemon,Millions,Orange,Pink,Porn,Positivity,Red,Ribbon,Shirt,Sun,Traffic
,Umbrella,White,Yell".toLowerCase().split(",");
public static String [] word14=
"Attack,Blood,Cook,Cut,Danger,Dish,Eat,Finger,Food,Fork,Fruit,Hurt,Kill,Kitchen,Knite,Chopsticks,Cover,Life,Murder,Night,Restaurant,Sharp,Shield,Silver,Spoon,Suicide,Tool,Utensil,Wife,Wound".toLowerCase().split(",");
public static String [] word15=
"As,Candy,Couple,Dislike,Facebook,Hate,Heart,Instagram,Twitter,Likelihood,Likely,Love,Me,Music,No,Share,Subscribe,To,Unlike,Verb,Follow,You,Nike".toLowerCase().split(",");

        public static int displayMenu() throws IOException{

                BufferedReader br = new BufferedReader(new InputStreamReader(System.in));
```

```
            System.out.print("1)Dog \r\n" +"2)Silent\r\n" +"3)Die \r\n" +"4)Residence \r\n"+ "5)Police
            \r\n" + "6)Eat \r\n"+ "7)Obey \r\n"+
      "8)Communicate \r\n"+ "9)Unusual \r\n" + "10)Toxic       \r\n"+  "11)Army \r\n"+  "12)Persistent \r\n"
+  "13)Yellow \r\n"+
                  "14)Knife \r\n"+  "15)Like \r\n" + "\r\n*****What prime do you want to search for? Enter
                  1-15!*******\r\n");

            String choice = br.readLine();
            int k;
            if(choice==null){
                  k= -2; return k;
            }
            else if(choice.equals("")){
                  k=-1; return k;
            }
            else{
                  for(int i=0; i<choice.length(); i++){
                        if(isNumber(choice.charAt(i))){
                              continue;
                        }
                        else{
                              k= -1;  return k;
                        }
                  }
            }
            k=Integer.parseInt(choice.trim());
            return k;
}

public static boolean isNumber(char input){

            int t = Character.getType(input);
            return (t==9);
}

public static String GetInput(int getChoice, String UserInput){

            String keys = ""; //only an empty string as its initial
            switch(getChoice){
            case 1: keys= checkAnswer(word1,UserInput); break;
            case 2: keys= checkAnswer(word2,UserInput); break;
            case 3: keys= checkAnswer(word3,UserInput); break;
            case 4: keys= checkAnswer(word4,UserInput); break;
            case 5: keys= checkAnswer(word5,UserInput); break;
            case 6: keys= checkAnswer(word6,UserInput); break;
            case 7: keys= checkAnswer(word7,UserInput); break;
            case 8: keys= checkAnswer(word8,UserInput); break;
            case 9: keys= checkAnswer(word9,UserInput); break;
            case 10: keys= checkAnswer(word10,UserInput); break;
            case 11: keys= checkAnswer(word11,UserInput); break;
            case 12: keys= checkAnswer(word12,UserInput); break;
            case 13: keys= checkAnswer(word13,UserInput); break;
            case 14: keys= checkAnswer(word14,UserInput); break;
            case 15: keys= checkAnswer(word15,UserInput); break;
            }
return keys;
}
```

```
public static String checkAnswer(String[]Associated,String UserInput){
        String result="";
        for(int x=0; x<Associated.length; x++){
                if(Associated[x].equals(UserInput)){
                        result = "\r\n\r\n" +"Yes! "+  "\"" + UserInput+  "\"" + " is the associated word of
                        this prime!\r\n\r\n" ;
                        return result;

                }
                else {
                        continue;
                }
        }
        result = "Wrong! "+ "\"" + UserInput+ "\""+ " is NOT the associated word of this prime!\r\n\r\n" ;
        return    result;
        }

public static void main (String [] args) throws IOException{
        BufferedReader br = new BufferedReader(new InputStreamReader(System.in));
        int getUserDecision= 0;
        while (true){
                String message="";
                int choice = displayMenu();
                if(choice>=1 && choice<=15){
                    System.out.println("\r\n" + "\r\n"  + "\r\n" +"Enter a word to see whether it is the
                associated word of the prime you have just entered!"
                                                        +"\r\n(Use only lowercase letter!)");

                        String input = br.readLine();
                                if (input== null){
                                        break;
                                }
                                else{
                                        message = GetInput(choice, input);
                                        System.out.println(message);
                                        getUserDecision= Decision();
                                        if(getUserDecision==2){
                                        System.out.println("End of program");         break;
                                        }
                                        else if(getUserDecision==1){
                                                continue;
                                        }

                                }

                }
                else if(choice==-1 || choice>15){
                  System.out.println("Invalid input, try again!");  continue;
                }

                else {
                        break;
                }
        }
        br.close();
}
```

```
	public static int Decision()throws IOException {
		BufferedReader br = new BufferedReader(new InputStreamReader(System.in));
		int decisionChoice;
		while(true){
			System.out.println("*****Do you want to search for another?******\r\n" +
								"INPUT 1 if you still have others to check
								!\r\n" +
								"Otherwise, INPUT 2 to end the program " +
								"\r\nWhat is your decision? 1 or 2?");
			String Userchoice = br.readLine();
			if(Userchoice==null){
				System.exit(0);
			}
			else{
				decisionChoice= Integer.parseInt(Userchoice.trim());

				if(decisionChoice==1 || decisionChoice==2){
					break;
				}
				else{
				System.out.print("Invalid choice! Try again!");
				continue;
				}
			}
		}
		return decisionChoice;
	}
}
```

Appendix IV: Lists with all unrepeated associated word of each prime:

Dog	Silent	Die	Residence	Police
26 Cat	10 Quiet	11 Death	7 Resident	7 Station
6 Bark	4 Noisy	5 Life	6 House	7 Man
3 Pet	3 Smile	5 Go	6 Home	4 Fireman
2 Stray	3 Noise	3 Live	4 People	3 Polite
2 Nine	3 Night	3 Hell	3 Live	3 Please
2 Hotdog	3 Hill	3 End	2 Tutor	3 Officer
1 Stinky	2 Silence	3 Black	2 Rest	2 Thief
1 Puppy	2 Please	2 Sad	2 Neighbours	2 Shit
1 Pig	2 Peaceful	2 Deadpool	2 Hall	2 Office
1 Noisy	2 Loud	2 Dead	2 Government	2 Dog
1 Loyalty	2 Cloud	2 Blood	2 Evil	2 Crime
1 Lovely	1 White	2 Alive	1 Warm	2 Car

1 Laugh	1 Tranquil	1 Young	1 Tiny	1 Illegal
1 House	1 Talk	1 Work	1 Student	1 Uniform
1 God	1 Star	1 Revive	1 Small	1 Uncle
1 Friendship	1 Sound	1 Reach	1 Resisting	1 TVB
1 Friend	1 Siren	1 Probability	1 Residual	1 Steal
1 Fluffy	1 Quite	1 No	1 President	1 Siren
1 Duck	1 Peace	1 Morbid	1 Place	1 Shoplifters
1 Dirty	1 Now	1 Love	1 Money	1 Save
1 Cute	1 Movie	1 Lie	1 Look	1 Safe
1 Canine	1 Mood	1 Kill	1 In	1 Rubbish
1 Brown	1 Milk	1 Hard	1 Human	1 Public
1 Bobby	1 Library	1 God	1 How	1 Policeman
1 Bell	1 Lambs	1 Funeral	1 Housing	1 Peace
	1 Keep	1 First	1 Green	1 Legal
	1 Hot	1 Eat	1 Expensive	1 Him
	1 Golden	1 Diehard	1 Crowded	1 Government
	1 Girl	1 Dark	1 Country	1 Fuck
	1 Depression		1 City	1 Firefighter
	1 Dead		1 Burden	1 Cunning
	1 Dark		1 Building	1 Blue
	1 Class		1 Big	1 Alarm
	1 Brown			
	1 Angry			

Eat	Obey	Communicate	Unusual	Toxic
14 Food	13 Rules	14 Talk	16 Usual	7 Poison
11 Drink	5 Law	6 Communication	9 Special	5 Taxi
3 Full	3 Disobey	4 With	3 Strange	5 Die
3 Fat	2 eBay	3 Whatsapp	3 Normal	4 Substances
3 Ate	2 Okay	3 Wechat	2 Usually	3 Gas
2 Sleep	2 Obedient	3 Language	2 Unique	2 Topic
2 More	2 Student	2 People	2 Thing	2 Milk
2 Lunch	2 Love	1 Word	2 Stuff	2 Food
1 Yummy	1 Weird	1 Wise	2 Common	2 Drug

1 What	1 To	1 Understand	1 Weird	2 Drink
1 Uber	1 Supression	1 Telepathy	1 Way	2 Counterfeit
1 Swallow	1 Solid	1 Social	1 Universe	2 Chemicals
1 Shit	1 Shopping	1 Skill	1 Universal	2 Boy
1 Pizza	1 Shop	1 Sick	1 Superstition	1 Wine
1 Orange	1 Reject	1 Relationship	1 Simple	1 Waste
1 Need	1 Regulations	1 Reasonable	1 Often	1 Unreasonable
1 Meat	1 Rebellious	1 Properly	1 Odd	1 Toy
1 Mango	1 Observe	1 Parent	1 Natural	1 Song
1 Joy	1 Obesity	1 Messenger	1 Look	1 Skull
1 Hunger	1 Obedience	1 Machine	1 Hero	1 Poisonous
1 Fish	1 Naughty	1 Interaction	1 General	1 Poisoning
1 Enjoy	1 Money	1 Great	1 Dress	1 Pig
1 Egg	1 Listen	1 Fuck	1 Dead	1 People
1 Drinks	1 King	1 Friend	1 Curious	1 Nicotine
1 Dine	1 How	1 Free	1 Change	1 Horrible
1 Delight	1 Heavy	1 Efficiently	1 Causeway-bay	1 Guys
1 Are	1 Good	1 Discussion	1 Always	1 Eat
1 Apple	1 Follow	1 Culture	1 Abstract	1 Death
	1 Dominance	1 Conversation		1 Deadly
	1 Dignity	1 Conflict		1 Dead
	1 Deny	1 Confident		1 Bottle
	1 Boss	1 Commercial		1 Bad
	1 Bored			1 Addicted
	1 Book			
	1 Bay			
	1 Authority			
	1 Against			

Army	Persistent	Yellow	Knife	Like
7 Soldier	4 Consistent	7 Red	12 Fork	16 Love
4 Gun	3 President	7 Blue	6 Blood	7 Dislike
4 Arm	3 Mind	6 Green	4 Kill	5 You
3 Navy	2 Resist	6 Colour	3 Wife	5 Hate

3 Force	2 Persistence	3 Umbrella	3 Sharp	4 Facebook
2 Weapon	2 Perseverance	3 Banana	3 Cut	3 Share
2 War	2 Permanent	2 White	2 Murder	2 To
2 People's	2 Hard	2 Porn	2 Life	2 Me
2 Government	2 Resistant	2 Lemon	2 Kitchen	2 Instagram
2 Enemy	1 Worker	2 Duck	2 Hurt	1 Verb
2 America	1 Usual	2 Black	2 Fruit	1 Unlike
1 soldier	1 Trump	1 Yell	1 Wound	1 Subscribe
1 US	1 To	1 Traffic	1 Utensil	1 No
1 Troops	1 Temporary	1 Sun	1 Tool	1 Music
1 Terracotta	1 Stuff	1 Shirt	1 Suicide	1 Nike
1 Strong	1 Stubborn	1 Ribbon	1 Spoon	1 Likely
1 Solider	1 Stop	1 Positivity	1 Silver	1 Likelihood
1 Safety	1 Resistance	1 Pink	1 Shield	1 Twitter
1 Sacrifice	1 Resident	1 Orange	1 Restaurant	1 Heart
1 Mindless	1 Present	1 Millions	1 Night	1 Couple
1 Military	1 Political	1 Huang	1 Chopsticks	1 Candy
1 Marvel	1 Polite	1 House	1 Cover	1 As
1 Man	1 Policy	1 Highlight	1 Knite	1 Follow
1 Leader	1 Persist	1 Flower	1 Food	
1 Lance	1 Perfect	1 Democratic	1 Finger	
1 Korean	1 Patient	1 Clothes	1 Eat	
1 Join	1 Obama	1 Buoyancy	1 Dish	
1 Iron	1 Now	1 Brown	1 Danger	
1 Hate	1 No	1 Ballon	1 Cook	
1 Dog	1 Long		1 Attack	
1 Dead	1 Life			
1 Country	1 Keep			
1 Blood	1 Importance			
1 Avenger	1 Hardworking			
1 Uniform	1 Go			
1 Amy	1 Forever			
	1 Feeling			
	1 Exercise			

	1 Endeavour			
	1 Done			
	1 Dad			
	1 Cordial			
	1 Continue			
	1 Citizenships			
	1 Annoying			
	1 America			
	1 Always			

--This is the end--