The Algorithm of Semi-Automatic Thai Spoonerism Words for Bi-Syllable

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Abstract—The purposes of this research are to study and develop the algorithm of Thai spoonerism words by semi-automatic computer programs, that is to say, in part of data input, syllables are already separated and in part of spoonerism, the developed algorithm is utilized, which can establish rules and mechanisms in Thai spoonerism words for bi-syllables by utilizing analysis in elements of the syllables, namely cluster consonant, vowel, intonation mark and final consonant. From the study, it is found that bi-syllable Thai spoonerism has 1 case of spoonerism mechanism, namely transposition in value of vowel, intonation mark and consonant of both 2 syllables but keeping consonant value and cluster word (if any).

From the study, the rules and mechanisms in Thai spoonerism word were applied to develop as Thai spoonerism word software, utilizing PHP program. the software was brought to conduct a performance test on software execution; it is found that the program performs bi-syllable Thai spoonerism correctly or 99% of all words used in the test and found faults on the program at 1% as the words obtained from spoonerism may not be spelling in conformity with Thai grammar and the answer in Thai spoonerism could be more than 1 answer.

Keywords—Algorithm, Spoonerism, Computational Linguistics.

I. INTRODUCTION

HUMANKIND uses language as the tool for communication in different forms corresponding to events or experience happened in daily life for negotiation, talking in several matters by verbal language or non-verbal language in order to express meaning for understanding correspondingly; therefore, language is an important factor for expressing meaning "what speaker wants to say" to listener for understanding correspondingly; moreover, nowadays, the evolution in language is changing according to social and cultural age, greatly affecting in language usage either in any form [4], [6].

Culture of Language could, therefore, be regarded as one kind of art affecting in communication [7]. The researcher perceived the beauty of pun in language usage; therefore, a design was conducted to demonstrate spoonerism by utilizing linguistic rules to support in spoonerism for creating knowledge, including functions and rules in spoonerism to obtain concrete and certain method in spoonerism as spoonerism is the art of word play having twisting between

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transposition of sound or syllables; this indicates that Thai language is always shifting and changing constantly, all of which are the trait of Thai people as the purpose of spoonerism is to use for playing for enjoyment and compete linguistic intelligence being regarded as a demonstration of linguistic ability [3].

The researcher envisioned the importance in Thai spoonerism play; thus, the study of Thai spoonerism was conducted by analyzing elements of syllables in each syllable, namely consonant, vowel, intonation mark and final consonant in order to find probability of spoonerism and establish rule and mechanism in Thai spoonerism for bi-syllable and store the knowledge related to Thai spoonerism in order to have the certain form. For the study of algorithm in spoonerism, the researcher collected the obtained knowledge from the study for conducting a computer-language algorithm structure by utilizing PHP language programing and word processing as the interested persons could bring it to study and develop in several fields further.

II. OBJECTIVE

The aim is to study a Thai spoonerism algorithm and establish rules or mechanisms in Semi-automatic Thai spoonerism for Bi-syllable.

III. HYPOTHESIS OF SPECIAL SUBJECTS

Rules and algorithm in developed method are able to conduct automatic Thai spoonerism correctly at 95%.

IV. EXPECTED OUTCOMES

A. *To Obtain More Computational Linguistics Knowledge* and be able to bring such obtained knowledge to develop further in order to increase a performance in the program further.

B. *To Obtain Forms of Rules and Mechanisms in Spoonerism* in order to be guidelines for applying with related subjects to be new guidelines in the study.

C. *To Obtain System of the Linguistic Program for Application* from several subjects which is collected and analyzed until it generates new knowledge.

D. *Can be Used to Analyze the Sentiment Analysis* in the future, which are needed in Thai language because of the spoonerism is a factor or effect the opinion of messages.

V. LITERATURE REVIEW

A. Definition of Spoonerism

The Royal Institute of Thailand (B.E.2546) gave the

definition of "spoonerism" as "a reversible word such as "Tok-Tee-It" ("ตก-ที่-อิฐ", Falling bricks) to be "Tit-Tee-Ok" ("ติด-ที่-อก", Breast stuck) as spoonerism words.

B. Element of Thai Syllable

Syllable in Thai language has 3 important elements, including initial consonant + vowel sound+ intonation tone.

Initial consonant sound is such as a consonant which is pronounced before the other consonant; initial consonant can be single initial consonant or initial cluster consonant, for example Pāt and Prāt [1].

Vowel sound is such as a sound pronounced along with consonant swiftly, making initial consonant pronounced clearly; vowel can be short-sound single vowel, long-sound single vowel or diphthong mixed with any one of sound.

Intonation tone is such as high-pitch or low-pitch sound pronounced with vowel [5].

Elements of syllable have 3 important parts, namely initial consonant, vowel, intonation mark (having or not having a letter representing sound). PrayaUpakitSilapasarn (B.E.2533) explained the elements of syllable that it is created by compounding letter having 4 forms which could be summarized as follows [2], [8]:

1) Compounding 3 parts of letters, such as syllable generated from compounding of initial consonant + vowel + intonation mark, for example **มี**(Mī = Have), **นา** (Na = Field), **ห้า**(Ha = Five) , **ไร่** (Rai = Farm)etc.
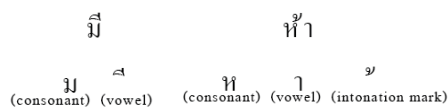

Fig. 1 Compounding 3 parts of letters

2) Compounding 4 general parts of letters, such as syllable generated from compounding of initial consonant + vowel + final consonant + intonation mark, for example **พลาย** (Phla = Elephant) and **งาม** (ngām = Beautiful) etc.

Fig. 2 Compounding 4 general parts of letters

3) Compounding 4 special parts, such as syllable generated from compounding of initial consonant + vowel + intonation mark + mute intonation mark, for example **เล่ห์**(Lē= Trick) , **สีห์** (Sī = Lion), **เบียร์** (Beer = Beer) etc.

TABLE I
THAI SYLLABLE

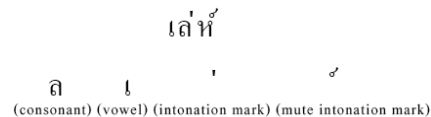| Thai	English	Syllable
ไร่	Farm	*Rai (Syllable)*
ชาวไร่	Farmer	*Chāo-Rai (2-Syllables)*
สหกรณ์	Cooperative	*Sa-ha-kon (3-Syllables)*
โรงพยาบาล	Hospital	*Rōng-pha-yā-bān(4-Syllables)*
นักศึกษาผู้ใหญ่	Adult Students	*Nak-seuk-sā-phū-yai(5-Syllables)*
สหกรณ์การเกษตร	Agricultural cooperative	Sa-ha-kon-kan-ka-sēt *(6-Syllables)*

Fig. 3 Compounding 4 special parts

4) Compounding 5 parts, such as syllable generated from compounding of initial consonant + vowel + final consonant + intonation mark + mute intonation mark, for example **ลักษณ์**(Lak = Image) ,**ขันธ์**(Khan = Group) and **จันทร์**(Jan = Moon) and etc.
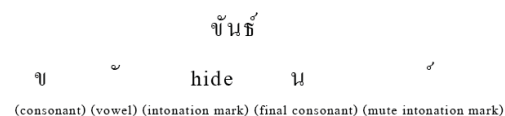

Fig. 4 Compounding 5 parts

From the Table I, it demonstrates that syllable is the sound pronounced one time, whether having meaning or not; if it is pronounced 1 time, that means 1 syllable; if it is pronounced 2 times, that means 2 syllables according to Thai grammar.

VI. METHOD AND RESULT

A. Rules of Bi-Syllable Spoonerism

Probability of answers based on the theory of mathematical probability is bi-syllable word generating the probability as 2!= 2*1 =2; therefore, the answer of the spoonerism can't generate results not more than 2 answers.

1) As for spoonerism of bi-syllables, the first syllable and second syllable must not have the same initial-sound consonant. If there are same initial-sound consonant, the spoonerism can't be conducted as the results will be only word transposition, for example**กาง-เกง** (Kāng-kēng), **โพ**ง-**พ**าง(Phøng-phāng), **แสง-สี**(Sangsi) and etc.

2) For spoonerism of bi-syllable, the vowel form and final consonant must be the same sound, namely for example **รา-ชา**(Rā-chā), **ชม-รม** (Chom-rom)

3) Bi-syllable that when being pronounced as 3 syllables or compound word must use the rules of spoonerism for tri-syllable, and the data must be enter as reading word only because, if the rules of spoonerism for bi-syllables is used

in encoding, the spoonerism could not be conduct correctly and compound-word sound in the middle of words will be omitted, for example the word เท-ศ-กาล"thēt-sa-kān". If the word "thēt-sa-kān" is conducted spoonerism based on bi-syllables basis, the results will be "than-la-kēt"; however, if "thēt-sa-kān" is conducted spoonerism based on tri-syllable basis by entering data as reading word "Thēt-Sa-Kān", the result will be "Thān-Sa-Kēt".

4) Vowel and final consonant which should be avoided to use in spoonerism as it will be resulted in impoliteness, such as syllable consisted of vowel "з" having "ด" as final consonant; syllable consisted of vowel "ะ" having "ด" as final consonant; syllable consisted of "au" having "ย"as final consonant; syllable consisted of "i"; syllable consisted of "ว"; syllable consisted of "um"; syllable consisted of "ai" (ไ and ใ).

5) Bi-syllable spoonerism functions by utilizing linguistic rules, from the study and data research relevant to spoonerism words, we brought above-mentioned rules of bi-syllables spoonerism converting it into functions by utilizing linguistic theory for supporting in analysis by connecting them with elements of structure in syllable. Therefore, the variables in spoonerism is obtained as Table II.

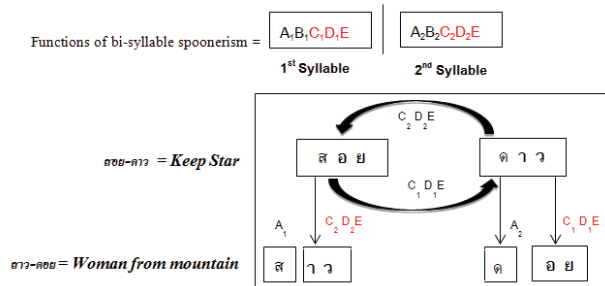### B. Conceptual Bi-Syllable Spoonerism

Fig. 4 Usage of Rules of Bi-syllables Spoonerism

Form the Fig. 4, the explanations are as follow: the formula usage of bi-syllable spoonerism uses cross-encryption, that is to say, the value of initial consonant (A) and cluster word (B) is preserved; only vowel, intonation mark and final consonant will be conducted cross-encryption. From the above examples, the word, such as สอย-ดาว"Søi-dao", when encrypting in Bi-syllable spoonerism, the answer will, for example, be สาว-ดอย"Sao-døi".

TABLE II
ASSIGNING VARIABLES

Var	Description	Values
A	"A" letter as initial consonant identified as Thai consonants, total: 44 consonants, namely	กขฃคฅฆงจฉชซฌญฎฏฐฑฒณด ตถทธนบปผฝพฟภมยรลวศษสห ฬอฮ
B	letter as cluster words and lead letters	ร, ล,ว หง,หญ,หน, หม,หย, หร, หล, อย, กร, ขร, คร,ตร, ปร, พร, กล, ขล, คล, ปล, ผล, พล, กว, ขว, คว, จร, ศร, สร, ทร
C	letter as vowel sound identified as vowel sound, total: 32 vowels	*For Example:* ◌ะ; ◌ัวะ; เ◌ะ; เ◌อะ; เ◌าะ; เ◌ียะ; เ◌ือะ; แ◌ะ; โ◌ะ, ◌ำ ไ◌า, เ◌า etc.
D	letter as final consonant by identifying as 9 systems of final consonants	*For Example:* Kok system pronounced as "Kor" (final consonant), using consonants: ก, ข, ค, ฆas final consonants
E	letter as 5 intonations by identifying as 4 forms of intonation, namely low tone, falling tone, high tone, rising tone	*For Example:*

Phonemic	Gloss
/nā□/	*paddy field*
/nà:/	*(a nickname)*
/nâ:/	*face*
/ná:/	*maternal aunt or uncle younger than one's mother*
/nǎ:/	*thick*

C. Function in Bi-Syllable Spoonerism

An analysis of elements of syllables are conducted according to letters in elements of each syllable, which can analyzed into 2 cases, that is, the first letter of each syllable can be both initial consonant and vowel. From the preliminary analysis of the syllable, probability could be used for searching the second letter of each syllable in order to conduct function analysis in spoonerism as Table III.

In case the first syllable and second syllable have the first letter as consonant, the second consonant as vowel, all of which could be analyzed according to probability and create functions in spoonerism as อา-กี "ākī" (no meaning in Thai language) to beอี-กา "īkā" (crow in Thai language) substituting the formula of spoonerism as follows:

S_1 = อา "ā"
S_2 = กี "kī"
S_1 = ch_1(Cons.) + ch_2(Vow.) + $ch1_n$
S_2 = ch_1(Cons.) + ch_2(Vow.) + $ch2_n$
$Sp = S_1(ch_1(Cons.)) + S_2(ch_2(Vow.)$
$+ ch2_n) + S_2(ch_1(Cons.)) + S_1(ch_2(Vow.) + ch1_n)$
Sp = อีกา"īkā"

TABLE III
VARIABLES IN BI-SYLLABLE SPOONERISM FUNCTION

Var	Description
Sp	Obtained Spoonerism Word
S_1	First Syllable
S_2	Second Syllable
ch_1	First Letter
ch_2	Second Letter
ch_3	Third Letter
$ch1_n$	Other Letter of First Syllable
$ch2_n$	Other Letter of Second Syllable
Cons.	Consonant
Clus.	Cluster Words
Itone.	Intonation Marks
Vow.	Vowel
+	Character Connector
n	Other Number of Character

D. The Semi-Automatic Thai Spoonerism Algorithm in Computer Language

For functions and algorithm in semi-automatic Thai spoonerism, the research has developed the program by PHP language utilizing algorithm structure in order to analyze the elements of syllables; moreover, the principle of probability was brought to establish rules and mechanisms in spoonerism which could specify conditions as follows:

```
$DATA1 = str_split($_GET['Data1']);
$DATA2 = str_split($_GET['Data2']);
$Consonant = array("ก","ข","ค","ฆ","ง","จ","ฉ",
"ช","ซ","ฌ","ญ","ฎ","ฏ","ฐ","ฑ","ฒ","ณ","ด","ต","ถ","ท","ธ","น",
"บ","ป","ผ","ฝ","พ","ฟ","ภ","ม","ย","ร","ล","ว","ศ","ษ","ส","ห","ฬ","อ","ฮ",
"ย","ญ","ห","ร","ล","ว");
$Diphthongs= array("ร","ล","ว");
$Vowel= array("ะ","ั","า","ิ","ี","ึ","ื","ุ","ู","เ",
"แ","โ","ำ","ไ","ใ","ฤ","ฦ","็","อ","ย");
$Itone_marks=array("่","้","๊","๋","์");
$Syllable1= $DATA1[0].$DATA1[1].
$DATA1[2].$DATA1[3].$DATA1[4].
$DATA1[5].$DATA1[6];
$Syllable2= $DATA2[0].$DATA2[1].
$DATA2[2].$DATA2[3].$DATA2[4].
$DATA2[5].$DATA2[6];
$A1 = $DATA1[0];
$B1 = $DATA1[1];
$C1 = $DATA1[2];
$D1 = $DATA1[3];
$E1 = $DATA1[4];
$F1 = $DATA1[5];
$G1 = $DATA1[6];
$A2 = $DATA2[0];
$B2 = $DATA2[1];
$C2 = $DATA2[2];
$D2 = $DATA2[3];
$E2 = $DATA2[4];
$F2 = $DATA2[5];
$G2 = $DATA2[6];
$arr1 = $B1.$C1.$D1.$E1.$F1.$G1;
$arr2 = $B2.$C2.$D2.$E2.$F2.$G2;
$arr3 = $C1.$D1.$E1.$F1.$G1;
$arr4 = $C2.$D2.$E2.$F2.$G2;
$arr5 = $D1.$E1.$F1.$G1;
$arr6 = $D2.$E2.$F2.$G2;
```

Fig. 5 Examples of Variables Declaration of Spoonerism

Fig. 5 represents a specification of variables of bi-syllable, namely variables of consonant, cluster word, vowel and intonation mark, then, input value from keyboard which used by users for entering words into blanks is received and kept in Array and a conditional variables of elements of first syllable and second syllable are created according to probability of the

syllables. This algorithm of functions will keep the value of each syllable which users have entered in the form of one Array per letter for applying in rules of bi-syllable spoonerism, further.

```
foreach(array($DATA1[0]) as $a1){
foreach($Consonant as $b1){
if($a1 == $b1){
foreach(array($DATA2[0]) as $a2){
foreach($Consonant as $b2){
if($a2 == $b2){
foreach(array($DATA1[1]) as $c1){
foreach($Vowel as $d1){
foreach(array($DATA2[1]) as $c2){
foreach($Vowel as $d2){
if($c2 == $d2){ // if the second letter is vowel
if($c1 == $d1){
echo" Case 1 : 1st Syllable และ 2nd Syllable ,
The 1st Letter is Consonant and 2nd Letter is Vowel "."<br>";{
echo"1st Syllable is ".$Syllable1."<br>"; {
echo"2nd Syllable ".$Syllable2."<br>";  {
echo" spoonerism is".$A1.$arr2.$A2.$arr1."<br>";
}}}}} }}}}
```

Fig. 6 Code of Instance in Bi-syllable Spoonerism

From Fig. 6, Code of instance in bi-syllable spoonerism: first syllable and second syllable, first letter is consonant, second letter is vowel, having algorithm and functions as the program will examine the value of letter at first field [0] of first syllable and second syllable that the value are in conformity with specified conditions, after that the program will examine the value of second letter [1] of first syllable and second syllable that the value are in conformity with specified conditions. If the conditions of examined letter is true the program will display the value for notifying users that the spoonerism word that was conducted spoonerism are in conformity with which case of the program and display the value of first syllable and second syllable which was entered by users preliminary and the program will display spoonerism words that was conducted spoonerism according to the rules specified conditions in each case as each of such case is different in code for specifying different conditions.

VII. CONCLUSION

The test of bi-syllable Thai spoonerism demonstrates that in bi-syllable Thai spoonerism, initial consonant and cluster word (if any) are stable; however, vowel, intonation mark and final consonant of first syllable and second syllable will be transposed. From the above performance test (200 Records of Thai spoonerism dataset), it is found that syllable having cluster word (second letter is ร,ลandว) could be enter words in 2 cases, but the result of spoonerism words is only one answer. Accuracy in Thai bi-syllable could be analyzed at 99%.

The development of semi-automatic Thai spoonerism has a working principle of program, that is, an examination of first letter, if the first letter is consonant, second letter will be examined. If the second letter is cluster word, the system will examine third letter of syllable whether such syllable is vowel, intonation mark and final consonant or not. If the third letter is vowel, intonation mark and final consonant, the program will transpose one of the elements of syllable to other syllable, then display an output at monitor. If the second letter is not cluster word (second letter is the elements, namely vowel,

intonation mark and final consonant), the program will transpose the value of the elements at the position of second letter to be transposed with other syllable, then display an output at monitor. Correctness of spoonerism word could be examined by inverting word needed to conduct spoonerism in order to obtain the answers in spoonerism with effectiveness and select a correct answer for application, further.

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