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A Semantic Feature Approach to Compare English-Mandarin Equivalents of CRAWL

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Abstract

Equivalents of two languages may have corresponding senses but there could be some language-specific senses that are not found in one of the languages. Previous research used different ways to present identical and different meanings of equivalents, but seldom provided explanation for how senses could be connected or derived. The present study proposes a semantic feature approach, in which a sense flow chart is used to present how semantic features of an action verb and their specifications may explain the variation among the literal senses as well as the derivation routes of the figurative senses. Two equivalents, Chinese PA2 and English CRAWL, were chosen, and their usages in the corpus and their senses from dictionaries were examined with the specifications of semantic features (some taken from Gao (2001)) of the crawling action.

Results showed that the identified semantic features could be classified into two categories: salient and minor semantic features. Specifications of salient features (e.g., 'human,' 'plant' or 'non-creature' in the [Agent] feature) can adequately explain the differences among literal senses. Specifications of minor features (e.g., 'search' and 'examine' in the [Intention] feature) can suggest necessary clues for the derivation of some figurative senses. It was also found that specifications of semantic features were embedded differently in Chinese PA2 then in English CRAWL. Due to the differences, one specification of a feature may receive different weight of emphasis from the two languages which thus induces the derivation of a language-specific sense (e.g., Flesh—Crawl in English). For pedagogy, our findings imply that an underlying set of semantic features with their specifications could be provided to learners so that they can know what and why a targeted word in L2 differs from its equivalent in their L1.

INTRODUCTION AND LITERATURE REVIEW

Polysemy means that several related senses are realized in one single lexicon. It has been explored with distinct approaches such as the analysis of semantic concepts and prototype analysis, etc. What these approaches employed is thought to be the crucial semantic elements to comprehend each word. Based upon these elements, some studies focused on how synonymous words within one single language differ in semantics (Gao, 2001; Hong et al., 2007; Moravcsik, 1975; Pustejovsky, 1995); while some contrastively examined synonymous words across languages (Hegarty, 2005; Lardiere, 2009; Huang et al., 2003). These contrastive analyses investigated how equivalent words differ in semantics. For example, 呂卓童(民90) presented the results of semantic differences of Chinese PA2 and English CRAWL in a linear pattern. But, as Wikberg (1983) maintained, human brain does not necessarily organize or store information linearly. With this approach, one could hardly see the connections between senses. Alternatively, the sense derivation approach provided by Fillmore and Atkin (2000) linked all senses of English CRAWL and its corresponding French RAMPER through derivation routes. The approached was supported by Verspoor and Lowie (2003), saying that it could result in longer retention in language learning. However, there was no clear and systematic explanation about how these polysemous senses of a word are related and extended.

The present study provides explanation for how senses differ and are derived through the semantic feature and specification system (Gao, 2001). Through this system, Gao distinguished Chinese synonymous verbs of cutting (e.g., 剁, 割), putting (e.g., 擺, 放), and throwing (e.g., 丟, 拋). He referred to the semantic feature as the "semantic component of a word" (p.20) (e.g., the [Instrument] for 剁), and the specification as the "further classification and identification of meanings components" (p. 3) (e.g., the 'size' of the [Instrument]). But unlike Gao's study, we apply the semantic feature and specification to contrastive analysis, investigating two corresponding equivalent action verbs, Chinese PA2 and English CRAWL, because specifications of semantic features could be used to explain the literal sense variation or figurative sense derivation of two equivalents. The following two research questions are postulated:

1. How differently are the specifications of semantic features embedded in PA2 and CRAWL?
2. How well can the specifications of semantic features explain sense variation and derivation of PA2 and CRAWL?

PA2 and CRAWL were chosen because they are claimed to be equivalents in dictionaries and in Taiwanese senior high English textbooks. Results will be illustrated with a sense flow chart, for its possibilities to present what specifications of semantic features might be chosen by a sense and what specifications of semantic features might induce the derivation of senses.

METHODOLOGY

Semantic Features and Specifications Identification of PA2 and CRAWL

To identify how the semantic features and specifications were embedded in Chinese PA2 and English CRAWL, we first extracted the corpus data from Sketch Engine, a platform that contains word usages in contexts of many languages, including English and Chinese (Kilgarriff et al., 2004). The data of PA2 were retrieved from *Chinese GigaWord 2 Corpus: Taiwan*, a corpus containing 382,600,557 Chinese words (455,526,209 tokens). The data of CRAWL were from *British National Corpus*, which contains 96,048,950 English words (112,181,015 tokens). After excluding nominal usages (e.g., *爬蟲類*, *Going on a pub* ***crawl***) in both languages and usages of Classical Chinese (e.g., *爬梳理紛*), 692 instances of PA2 and 1,047 instances of CRAWL remained. Instances of classical Chinese were excluded because they were not used in modern Chinese anymore and the historical evolution of senses was not the immediate interest of this paper.

Next, we used seven semantic features identified in Gao's (2011) research on action verbs (i.e., [Part], [Direction], [Mentation], [Instrument], [Intension], [Effect], and [Speed]) to analyze the corpus data. The semantic features and specifications are presented in Table 1 with examples from Chinese (marked in (C)) and English ((E)) corpus.

Table 1
Semantic Features and Specifications of the Crawling Movement

Feature	Specification		Example(s)
(1) Part	Human	(1.1) Four limbs	(C) *她用**爬**的逃離現場* (E) *Babies **crawling** about in the grass.*
		(1.2) Legs	(C) *與鄰居一同**爬**紫山* (E) *He can hardly **crawl** upstairs to his office!*
		(1.3) A hand	(C) *自由作家**爬**格子賺錢*
		(1.4) A body part	(E) *His hand **crawled** on the rug like a spider.*
		(1.5) Eyes	(C) ***爬**文* (E) *There are MPs who **crawl** over everything we do.*
	(1.6) Animal limbs, belly		(C) *烏龜慢慢地**爬*** (E) *The snake is **crawling** along.*
	(1.7) Insect legs		(C) *蛆**爬**在身上* (E) *A fly **crawled** across the wall.*
	(1.8) Plant tendril, stem, root		(C) *牽牛花兒向上**爬*** (E) *Ivy **crawling** up the stairs.*
	(1.9) Vehicle wheels		(C) *列車**爬**不上坡* (E) *The passing taxi **crawled** to a halt.*
(2) Direction	(2.1) Upward		(C) *跌倒後**爬**起來* (E) *He was very brave, **crawling** up to his feet.*
	(2.2) Forward		(C) ***爬**出路邊求救* (E) *She began to **crawl** hastily away.*
(3) Mentation	(3.1) Down is Bad		(E) *The way you **crawl** to them makes me sick.*
	(3.2) Up is Good		(C) *在社會上往上**爬*** (E) *To **crawl** up the staircase of preferment.*
(4) Instrument	(4.1) Pen		(C) *最常做的事是鎮日**爬**格子*
(5) Intention	(5.1) Search		(C) *去多**爬**一些文來參考看看*
	(5.2) Examine		(E) *There are MPs who **crawl** over everything we do.*
(6) Effect	(6.1) Sensation		(E) *Darkness made his skin **crawl**.*
(7) Speed	(7.1) Slow		(C) *年底利率就開始上**爬*** (E) *Retail sales **crawled** up by 1%.*
(8) Agent	(8.1) Human		(C) *警察**爬**在地上* (E) *The man **crawling** across the roof.*
	(8.2) Animal		(C) *小猿在身上**爬*** (E) *Reptiles **crawled** aggressively towards her.*
	(8.3) Insect		(C) *火蟻快速**爬**來**爬**去* (E) *Cockroaches **crawl** inside machinery.*
	(8.4) Plant		(C) *奇樹溝南溝北**爬**著長* (E) *Yellow jasmine **crawled** over a tree stump.*
	(8.5) Non-creature		(C) *消費支出開始往上**爬*** (E) *A grey fear was **crawling**.*
(9) Medium	Horizontal	(9.1)Solid surface	(C) *用四肢在地上**爬*** (E) *To let a child **crawl** on a dirty floor.*
		(9.2) Water	(C) ***爬**得動就**爬**下去，自由式…* (E) *I **crawled** back to the deep end.*
		(9.3) Paper	(C) *花了一年七個月**爬**格子記錄*
		(9.4) Document	(E) ***Crawling** inside the details of federal grant programmes.*
		(9.5) Human skin	(E) *Taheb's skin **crawled** from the scribe's touch.*
	Vertical	(9.6) Vertical Object	(C) *軍人**爬**竿* (E) *He **crawled** out of the trench.*
		(9.7) Slope	(C) ***爬**三十度的山坡* (E) *He **crawled** up the path.*
		(9.8) Webpage	(C) *多**爬**一下文就會有你要的答案*
(10) Amount	(10.1) Mass		(C) *螞蟻**爬**滿全身* (E) *Brown Insects **crawling** about all over you.*
(11) Formation	(11.1) Instantaneous		(E) *Ants are **crawling** out of the woodwork.*

It should be noted here that the specification(s) under these seven features were established by the researchers of this paper through our examination of the data, because the crawling action studied in the present research enclosed different specification(s) of a feature from the cutting, putting, and throwing actions studied in Gao's research. For instance, the specification of the body [Part] used in cutting is solely 'a hand,' whereas that of crawling may be 'four limbs.' After the analysis, we found that under the first feature, [Part], which refers to the part agents use to move along with, there were nine specifications (see specifications from (1.1) to (1.9) and their respective example(s)). The specifications vary with the [Agent] types; for instance, humans may use two 'legs' to crawl while vehicles crawl on wheels. What also worth mentioning was that two specifications were language-specific; 'a hand', was only found in Chinese, and 'a body part' was only found in English. The second feature, [Direction], was identified with two specifications: 'upward' and 'forward.' 'Upward' simply means moving upward, and 'forward' moving ahead (see examples of (2.1) and (2.2)). The third feature, [Mentation], which refers to the mental state an agent bears while doing the crawling action, contained two specifications. The first one, 'down is bad,' was best exemplified with example of (3.1), in which one feels inferior to grovel for help. The second one, 'down is bad,' can be best illustrated with examples in (3.2), in which one will feel good for the raise of status. The fourth feature, [Instrument], is the external object that an agent makes use of during the movement. Only one specification, 'pen,' the tool used to write (see example of (4.1)), was found. As for the fifth feature, [Intention], which refers to the purpose of doing the action, two specifications, 'search' and 'examine,' were identified. The first one is specific to Chinese PA2, as eyes crawling from an article to another (see example of (5.1)), while the second is specific to English CRAWL, as eyes crawling from a word to another to 'examine' a document (see example of (5.2)). The sixth feature is the [Effect] resulted from the action. 'Sensation' is the only specification found under this feature and is specific to CRAWL only (see example of (6.1)). The seventh feature is the [Speed] at which an agent moves. The typical and sole specification found is 'slow,' which can be realized by various types of non-creature agents, as examples of (7.1) showed.

In addition to the previous seven semantic features adapted from Gao's study, four other semantic features specific to the crawling action were added by authors (i.e., [Agent], [Medium], [Amount] and [Formation]) since these features could be found in instances of PA2 and CRAWL. [Agent] is the eighth semantic feature, which refers to the type of action doer. It contained five specifications, ranging from animate creatures as 'human,' 'animal' and 'insect' to non-animate 'plant' and finally to 'non-creature' (see their respective examples from (8.1) to (8.5)). The ninth feature is [Medium], the type of surface on which the action is taking place. Depending on the directionality, eight specifications of [Medium] were categorized as either horizontal or vertical (see specification from (9.1) to (9.8) and their respective

examples). Four specifications were language-specific; 'paper' and 'webpage' are specific to PA2 while 'document' and 'human skin' to CRAWL. The tenth feature is [Amount], the number of subjects involved in the action. When the number is enormous, its sole specification, 'mass', is formed, which could be illustrated by example of (10.1). The eleventh feature is [Formation], referring to the time taken to form a mass of subjects. A mass sometimes could be formed 'instantaneously,' as example of (11.1) exemplified. This specification was specific to English CRAWL only.

Senses Identification of PA2 and CRAWL

To explore how semantic features and their specifications can explain sense variation and derivation of the two equivalents, we first collected all the possible senses of Chinese PA2 and English CRAWL, and then used the identified specifications of semantic features to reclassify the categorization of senses. Senses of PA2 and CRAWL were first collected from five frequently used Chinese and English dictionaries respectively. For Chinese dictionaries, there were *Renumbering the Ministry of Education Mandarin Dictionary Revised* (C1), *Dictionary of Chinese Characters* (C2), *Mandarin Daily News Dictionary* (C3), *Modern Chinese Dictionary* (C4), and *Chinese Word Net* (C5); for English, *Merriam Webster* (E1), *Cambridge* (E2), *Longman* (E3), *Oxford* (E4), and *Collins* (E5)[1]. After excluding the senses of Classical Chinese, PA2 as collecting (爬羅) and as rearranging (爬梳), thirteen senses of PA2 (from sense a. to m.) and nine CRAWL senses (sense a., b., d., e., and from n. to r.) were identified (see the first column from the left in Table 2). All of them, including four idiomatic usages (sense l., m., n. and q.), were enclosed in the present study regardless of the times they were found in dictionaries since they all showed that PA2 and CRAWL were polysemous.

[1] C1=http://dict.revised.moe.edu.tw/; C5=http://cwn.ling.sinica.edu.tw/; E1=http://www.merriam-webster.com/; E2=http://dictionary. cambridge.org/; E3=http://www.ldoceonline.com/; E4=http:// oxforddictionaries.com/; E5=http://www.collinsdictionary.com/.

Table 2
Comparison of Senses of PA2 and CRAWL[2]

Senses Before Adjustment	Senses After Adjustment	Chinese Dictionary					English Dictionary					Corpus	
		C1	C2	C3	C4	C5	E1	E2	E3	E4	E5	G	B
a. Animate Creature—Crawl	1.1 Human—Crawl											√	√
	1.2 Animal—Crawl	√	√	√	√	√	√	√	√	√	√	√	√
	1.3 Insect—Crawl											√	√
b. Insect—Teeming	1.4 Insect—Teeming	—	—	—	√	√	√	√	√	√	√	√	√
c. Human—Crawl Up	1.5 Human—Climb	√	√	√	√	√	—					√	√
	1.6 Human—Walk											√	√
d. Plant—Crawl	1.7 Plant—Crawl	—	—	—	√	√	√	—	—	—	—	√	√
e. Human—Swim	1.8 Human—Swim	—	—	—	√	—	—	—	—	√	√	√	√
f. Human—Get Up	1.9 Human—Get Up	—	—	—	√	√	—					√	√
g. Human—Move to Higher Position	1.10 Human—Move to Higher Position	—	√	—	—	√	—					√	√
h. Curve—Crawl Up	1.11 Non-Creature—Rise Slowly	—	—	—	√	√	—					√	√
i. Road—Crawl Up		—	—	—	—	√	—					√	√
j. Vehicle—Climb	2.1 Vehicle—Climb	—	—	—	√	√	—					√	—
k. Human—Brace Up	2.2 Human—Brace Up	—	—	—	√	√	—					√	—
l. Human—Write	2.3 Human—Write	—	—	—	√	—	—					√	—
m. Human—Search	2.4 Human—Search	—	—	—	—	√	—					√	—
n. Human—Grovel	3.1 Human—Grovel	—					√	√	√	√	√	—	√
o. Vehicle and Traffic—Crawl	3.2 Vehicle—Crawl	—										—	√
	3.3 Traffic—Crawl			—			√	√	√	√	√	—	√
p. Flesh—Crawl	3.4 Flesh—Crawl	—					√	—	—	√	—	—	√
q. Insect—Appear Suddenly	3.5 Insect—Appear Suddenly	—					√	—	—	√	—	—	√
r. Liquid—Crawl	3.6 Non-creature—Move Slowly	—					√	—	—	√	—	—	√
s. Non-Creature—Crawl		—					—					—	√
t. Human Body Part—Crawl	3.7 Human Body Part—Crawl	—					—					—	√
u. Human—Examine	3.8 Human—Examine	—					—					—	√

Afterwards, all the 692 corpus instances of PA2 and 1047 of CRAWL were categorized by the senses identified in dictionaries. Additional senses were added for instances that could not be categorized into any of the dictionary sense. The categorization process returned exactly the same number of senses (thirteen) for PA2 (see Table 2's second to the right column for senses from the Chinese corpus (G)), but with eight senses added for CRAWL (sense c., f. to i., and s. to u.), so senses of CRAWL increased to seventeen (see the very right column for the English corpus (B)).

Lastly, the previously identified specifications of the crawling action's semantic features (in Table 1) were applied to recategorize some collected senses in the left column in Table 2 into senses in the second to the left column. Concerning the senses shared by both PA2 and CRAWL, the sense a. Animate Creature—Crawl, was divided into three independent senses, sense 1.1 Human—Crawl, sense 1.2 Animal—Crawl, and sense 1.3 Insect—Crawl due to differing in the specifications of [Agent] and [Part]. The sense c. Human—Crawl Up, was organized into two senses, sense 1.5 Human—Climb and sense 1.6 Human—Walk since the specifications of [Part] involved are

[2] A check mark in Table 2 represents that a sense was identified in that dictionary or corpus, while a minus symbol means a sense was not found in that dictionary or corpus. Senses in each group were sequenced in descending order according to the times they were found in dictionaries and corpora.

different, 'four limbs' and two 'legs' respectively. The sense h, Curve—Crawl Up, and the sense i. Road—Crawl Up, were combined into one sense and renamed as 1.11 Non-Creature—Rise Slowly because both senses shared the same specification of [Agent], 'non-creature,' the same specification of [Direction], 'upward,' and the same specification of [Speed], 'slow.' As for the senses specific to CRAWL, the sense o. Vehicle and Traffic—Crawl, was separated into two senses, sense 3.2 Vehicle—Crawl and sense 3.3 Traffic—Crawl to distinguish their difference of [Amount]. The sense r. Liquid—Crawl, and the sense s. Non-Creature—Crawl, were combined into one sense, sense 3.6 Non-creature—Move Slowly because they shared the same specification of [Agent], 'non-creature,' the same specification of [Direction], 'upward,' and the same specification of [Speed], 'slow.' In sum, there were a total of fifteen senses finalized for PA2 and nineteen senses for CRAWL, as presented in the second column from the left in Table 2.

All identified senses of PA2 and CRAWL were manually clustered into three groups, as presented by bold lines in Table 2. The first group included eleven senses (from sense 1.1 to 1.11) shared by both languages. These eleven senses explained why the two words were considered as equivalents. The second group (from sense 2.1 to 2.4) was comprised of four senses specific to Chinese PA2, and the third group (from sense 3.1 to 3.8) contained eight senses solely used in English CRAWL. These language-specific senses demonstrated that the so-called equivalents were only partially overlapped in meanings and usages.

After the finalization of senses, it was found that the choice of different specifications of some semantic features results in different literal senses (i.e., literal action of crawling). We called these salient features ([Agent], [Part], [Medium], and [Direction]). In addition, specifications of some semantic features may act as the base from which figurative senses, the senses without literal crawling action, were derived. These features were named as minor features ([Mentation], [Instrument], [Intention], [Amount], [Formation], [Effect], and [Speed]).

RESULT AND DISSCUSSION

In this section, we will address our first research question, the distribution of each semantic feature's specification in Chinese PA2 and English CRAWL, as summarized in Table 3.

Table 3
Senses Correspond to Semantic Features' Specifications and their Corpus Frequencies

Feature		Specification		Related Senses	Freq. (%) of corpus instances of English CRAWL	Freq. (%) of corpus instances of Chinese PA2
Salient	Agent	Human		1.1, 1.5, 1.6, 1.8, 1.9, 1.10, 2.2, 2.3, 2.4, 3.1, 3.7, 3.8	440 (63.60%)	865 (82.60%)
		Animal		1.2	44 (6.40%)	42 (4.00%)
		Insect		1.3, 1.4, 3.5	111 (16.00%)	63 (6.00%)
		Plant		1.7	3 (0.50%)	4 (0.40%)
		Non-creature		1.11, 2.1, 3.2, 3.3, 3.6	80 (11.50%)	73 (7.00%)
	Part	Human	Four limbs	1.1, 1.5, 1.8, 1.9	404 (58.40%)	430 (41.10%)
			Legs	1.6	12 (1.70%)	241 (23.00%)
			A Hand	2.3	——	5 (0.50%)
			A body part	3.7	1 (0.20%)	——
			Eyes	2.4, 3.8	1 (0.20%)	——
		Animal limbs, belly		1.2	44 (6.40%)	42 (4.00%)
		Insect legs		1.3	71 (10.30%)	21 (2.00%)
		Plant tendril, stem, root		1.7	3 (0.50%)	4 (0.40%)
		Vehicle wheels		2.1, 3.2, 3.3	26 (3.80%)	42 (4.00%)
	Medium	Horizontal	Solid surface	1.1, 1.2, 1.3, 1.7, 3.2, 3.7	530 (76.60%)	193 (18.40%)
			Water	1.8	2 (0.30%)	1 (0.10%)
			Paper	2.3	——	5 (0.50%)
			Document	3.8	1 (0.20%)	——
			Human skin	3.4	14 (2.00%)	——
		Vertical	Vertical Object	1.5	12 (1.80%)	251 (24.00%)
			Slope	1.6, 2.1	14 (2.00%)	283 (27.00%)
			Webpage	2.4	——	——
	Direction	Upward		1.5, 1.6, 1.9, 1.10, 1.11, 2.1, 2.2, 2.4,	33 (4.70%)	806 (77.00%)
		Forward		1.1, 1.2, 1.3, 1.4, 1.7, 1.8, 2.3, 3.1, 3.2, .3.3, 3.6, 3.7, 3.8	641 (92.60%)	241 (23.00%)
Minor	Mentation	Down is Bad		3.1	19 (2.7%)	——
		Up is Good		1.10, 2.2	3 (0.4%)	188 (18.00%)
	Instrument	Pen		2.3	——	5 (0.5%)
	Intention	Search		2.4	——	——
		Examine		3.8	1 (0.20%)	——
	Amount	Mass		1.4, 3.3, 3.5	43 (6.20%)	42 (4.00%)
	Formation	Instantaneous		3.5	5 (0.70%)	——
	Effect	Sensation		3.4	14 (2.00%)	——
	Speed	Slow		1.11, 3.6	53 (7.70%)	31 (3.00%)

Table 3, from the left to right, contains a column for eleven semantic features (in two groups: salient and minor), each semantic feature's specification, senses corresponding to each specification, and then the total corpus frequency and percentage of senses corresponding to each specification. A negative signs mean no instances were found to correspond to the specification in that language. It should be noted here that one instance may be categorized into more than one semantic features (e.g., *He **crawled** out of the trench* and 軍人爬竿 were instances of both 'human' as [Agent] and 'vertical object' as [medium]), so the percentage in the two columns on the right does not added up to 100%.

First of all, for the first salient feature [Agent], 'human' is the most frequent specification in both languages with over 80% in Chinese and 60% in English, because it is embedded in highly frequent senses (e.g., 1.1

Human—Crawl as *Babies **crawling** about in the grass* in English CRAWL and 2.4 Human—Climb as *軍人**爬**竿* in Chinese PA2). What also deserves attention is that 'non-creature' as [Agent] is not uncommon in both PA2 (7%) and CRAWL (11.5%), reflecting how pervasive metaphor is in the use of PA2 and CRAWL. It should be noted that, however, the percentage of 'non-creature' in Chinese PA2 and English is contributed by different senses (i.e., PA2 by the sense 1.11 Non-Creature—Rise Slowly as *年底利率就開始上**爬*** and CRALW by sense 3.6 Non-Creature—Move Slowly as *A grey fear was **crawling***).

For the feature [Part], it is not surprising that the typical specification, 'four limbs,' takes up much of the percentage, around 58% in CRAWL and 41% in PA2 (e.g., *她用**爬**的逃離現場*) and English (e.g., *Babies **crawling** about in the grass*). What should be pointed out here is the languages' discrepancy in the frequency of 'legs,' which is embedded in the sense 1.6 Human—Walk. The specification is up to 23% in Chinese (e.g., *與鄰居一同**爬**柴山*) while there is only 1.7% in English (e.g., *He can hardly **crawl** upstairs to his office*).

Concerning the feature [Medium], it is obvious that PA2 tends to select 'vertical' mediums while CRAWL 'horizontal' ones. The percentage of horizontal 'solid surface' is up to 76% in CRAWL (e.g., *The man **crawling** across the roof*) but is under 20% in PA2 (e.g.,*警察**爬**在地上*). On the other hand, the percentage of vertical 'slope' and 'vertical object,' are fairly high in PA2, 27% and 24% respectively (e.g.,*爬三十度的山坡* and *軍人**爬**竿*) but their percentages in CRAWL are as low as 2% and 1.8% in CRAWL (e.g., *He **crawled** out of the trench* and *He **crawled** up the path*).

Since the directionality of the medium will determine the direction of the movement (e.g., the vertical wall of a trench forces one to crawl upward, as in *He **crawled** out of the trench*), PA2 and CRAWL's preference of medium types leads to a huge discrepancy in the frequency of the specifications of the third salient feature [Direction]. The percentage of 'upward' is up to 77 % in PA2 (e.g., *跌倒後**爬**起來*), while that of 'forward' is more than 92% in English (e.g., *She began to **crawl** hastily away*). The tendency of the direction of a physical movement may influence how speakers of a language perceive the action verb. Since most of the crawling instances in PA2 are 'upward,' which carry a positive connotation, the Chinese may conceptually perceive PA2 as a positive action. This may explain why the specification of first minor feature [Mentation], 'up is good,' realized by the sense 1.10 Human—Move to Higher Position (e.g., *在社會上往上**爬***) is not uncommon in Chinese, up to 16%. In contrast, since more than 95% of the crawling direction in CRAWL is 'forward,' which entails lower body position, CRAWL can be perceive negatively by English speakers. This may account for why the specification, 'down is bad,' realized by the sense 3.1 Human—Grovel (e.g., *The way you **crawl** to them makes me sick*), is specific to CRAWL and its percentage is higher than the percentage of the sense 1.10 Human—Move to Higher Position

(e.g., *To **crawl** up the staircase of preferment*) which realized 'up is good' in CRAWL (2.7% versus 0.4%).

The Sense Flowchart

To answer the second research question, the identified semantic features' specifications were used to explain the variation of literal senses and derivation of figurative senses that were identified for PA2 and CRAWL. The results are presented in the following sense flow chart (Chart 1).

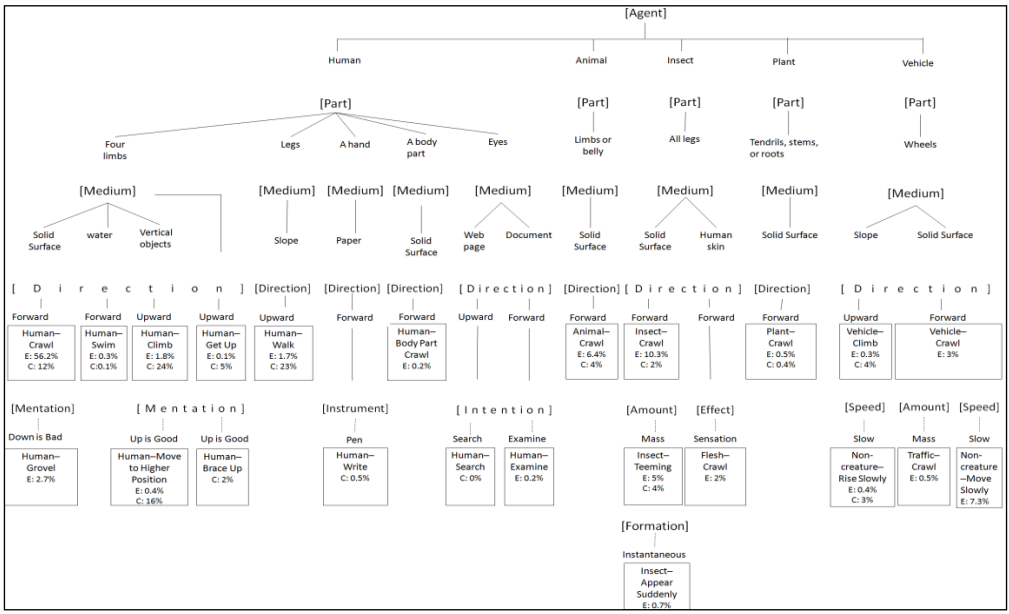

Chart 1. Sense flow chart of PA2 and CRAWL.

The hierarchical structure of the Chart 1 is composed of five levels. The salient feature [Agent] and its specifications were at the first level, and the salient feature [Part] and its specifications at the second. The reason to have [Agent] proceeds [Part] is that a [Agent] type restricts what sort(s) of [Part] can be used to crawl (i.e., 'human' allows 'four limbs', 'legs', 'a hand', 'a body part' and 'eyes'; 'animal' adopts 'limbs or belly'; 'insect' uses 'all legs'; 'plants' with 'tendrils, stems or roots'; 'vehicle' on 'wheels'). The salient feature [Medium] and its specifications are at the third level, and salient feature [Direction] and its specifications at the fourth. The reason to have [Direction] succeeds [Medium] is that the direction of a movement is often determined by the directionality of a medium (i.e., 'solid surface', 'water', 'paper', 'document' and 'human skin' lead to 'forward' movement; 'vertical object', 'slope' and 'web page' result in 'upward' movement). At the bottom of

the fourth level are the squares in which literal senses and their percentage of corpus instances are displayed. In a square, the capital E means a sense exists in English CRAWL; the capital C is used for Chinese PA2 (e.g., the sense Human—Crawl takes up 56.2% instances of CRAWL and 12% of PA2). Note that some literal senses are specific to only one language, so there are squares with only an E or a C. Based on the 'Es' and 'Cs' in Chart 1, PA2 has nine literal senses CRAWL has ten. At the top of fifth level are the minor semantic features and their specifications, from which dotted lines extend to the figurative senses (also shown in squares) that realize those features' specifications. They are presented under the literal senses from which they are derived. For example, the figurative sense Human—Grovel realizes the specification, 'down is bad,' of the minor feature [Mentation], which is the mental state a human may bear while doing literal Human—Crawl action. Summing up the 'Es' and 'Cs' in the squares of these figurative sense, we know that PA2 has eight figurative senses and CRAWL has five.

The salient features' specifications of the fourth level onward are used to differentiate one literal sense from another, while the minor features' specifications of the fourth level downward could explain the derivation of figurative senses. The following two sub-sections respectively discuss the literal sense variation, and the figurative sense derivation postulated in our second research question.

Variation of Literal Senses of PA2 and CRAWL

From the senses in squares under the fourth level of the specification of 'forward' and 'upward' in Chart 1, we can see the variation of senses resulting from different specifications of a semantic feature. To begin with, there are five crawling movement senses (i.e., Human—Crawl, Animal—Crawl, Insect—Crawl, Plant—Crawl, and Vehicle—Crawl). Agents in these senses all use limb-like supports to crawl forward on a solid surface, but the difference in [Agent] types ('human,' 'animal,' 'plant,' and 'non-creature') leads to the formation of these four literal senses.

Similarly, the choice of different specifications of [Part] can arrive at different senses. Taking the instance *Babies **crawling** about in the grass* of Human—Crawl and *His hand **crawled** on the rug like a spider* of Human Body Part—Crawl as an example, though both of them have 'human' as the agent, 'solid surface' as the medium, and 'forward' as the direction, the only difference in [Part] (i.e., 'four limbs' versus 'a body part') leads to their variation.

Likewise, the specifications of [Medium] cause the sense variation, such as the senses in the very left squares in Chart 1 under 'human' as [Agent] and 'four limbs' as [Part]. In Human—Crawl (e.g., *The man **crawling** across the roof* and 警察**爬**在地上) and Human—Swim (e.g., *I **crawled** back to the deep end* and **爬**得動就**爬**下去，自由式…), human agents all use their four limbs to move forward, but the different mediums, 'solid surface' and 'water,' results in two different senses. What should be pointed out is that choosing none of the

specifications of [Medium] can also arrive at another sense, namely Human—Get Up, in which a person gets back to sitting or standing position by pushing a surface with four limbs, as instances of 'upward' (e.g., *He was very brave, **crawling** up to his feet* and *跌倒後**爬**起來*) show.

Different specifications of [Direction] (i.e., 'forward' and 'upward'), influenced by the medium type, can result in different literal senses as well. The instance *列車**爬**不上坡* of the sense Vehicle—Climb and *The passing taxi **crawled** to a halt* of Vehicle—Crawl in the very right squares in Chart 1 demonstrate this sense variation.

Derivation of Figurative Senses of PA2 and CRAWL

In addition to the salient features and their specifications in Chart 1, the namely minor features and their specifications tell us what features of an action prompt the derivation of figurative senses. Their derivation routes are presented by dotted lines in Chart 1. In total, there are six figurative senses of PA2 and nine of CRAWL, which are located in squares on the fifth level. In this sub-section, we will discuss the senses under the minor features from left to right in Chart 1.

[Mentation], the mental state born by the agent while crawling, is a minor feature prompting the derivation of three figurative senses, Human—Grovel, Human—Move to Higher Position, and Human—Brace Up. In terms of the posture of crawling, people's mental state could be negative, because the low body position entails an inferior status, and thus 'down is bad' (Clark, 1973). Through this specification, Human—Crawl induces the derivation of Human—Grove in English. By lowering the body, people show inferiority to those who can grant favors, as the instance of 'down is bad' (e.g., *The way you **crawl** to them makes me sick*) displays. On the contrary, people's mental state when crawling upward can be positive, namely 'up is good' (Clark, 1973). Through this specification, we make analogy of moving up to higher status to climbing up a 'vertical object,' as shown in the instances of 'up is good' (e.g., *To **crawl** up the staircase of preferment* and *在社會上往上**爬***). Thus Human—Move to Higher Position is said to be derived from Human—Climb. Note that although both languages have this figurative sense, Chinese has much more instances (16%). The pervasiveness is related to the fact that, in Chinese, the agent of this sense extends to include 'human communities' like countries or political parties (e.g., *台灣排名往上**爬***). In addition, Chinese also make analogy of rising up from the failure to getting up from the ground, as *從低潮**爬**起來*. Hence, Human Brace Up is said to derive from Human—Get up. Like Human—Move to Higher Position, this sense also contains instances of 'human communities' as agents (e.g., *保守黨**爬**不起來*).

[Instrument] is a minor feature triggering the figurative sense Human—Write in Chinese. Note the minor feature and its specification, 'pen,' will not be able to realize the sense without other specifications of salient features (i.e., 'Human' as [Agent,], 'a hand' as [Part], 'paper' as [Medium] and

'forward' as [Direction]), because in instances of Human—Write, as *作家**爬**格子賺錢*, there must be a writer holding a 'pen' in hand and moving across grids on a piece of paper.

Similarly, the derivation of Human—Search and Human—Examine encloses not only the minor feature [Intention] but also other specifications of 'salient features.' The 'human' agents in both figurative senses make use of the [Part], 'eyes,' to crawl. Eyes may crawl because, according to theory of conceptual metaphor, seeing is touching (Lakoff & Johnson, 1980). The derivation routes of these two senses, nevertheless, are separated when different specifications of [Medium] are embedded in PA2 and CRAWL. In Chinese, the eyesight moves 'upward' from the bottom of a 'webpage' with the [Intention] to 'search' for needed information in posted articles, and thus the sense Human—Search is derived, as the instance *多**爬**一下文就會有你要的答案* of 'webpage' shows. However, instances were only found in dictionary. The reason could be that the usage is fairly new and has not yet been recorded in corpus. In English, the eyesight moves 'forward' on 'document' with the [Intention] to 'examine' its details, and hence the sense Human—Examine is derived, such as the instance of 'document' (e.g., ***Crawling*** *inside the details of programmes*).

There are three minor features that are related to the sense Insect—Crawl. The first one, [Amount], induces the derivation of the figurative sense Insect—Teeming, which simply means many, since 'insects' usually appear in a 'mass,' as instances of 'mass' (e.g., *Insects* ***crawling*** *about all over you* and *螞蟻**爬**滿全身*). Sometimes, the subject could be a place where there is a mass of things, for example, *樹上**爬**滿毛毛蟲* and *Her hair was* ***crawling*** *with insects*. Like Insect—Teeming, the sense Traffic—Crawl could also derived through [Amount] because a large amount of vehicles can also form a 'mass.' The difference is that, in English, a singular noun, *traffic*, is used to replace the subject (e.g., *Rush-hour traffic* ***crawling*** *through London*) since the image schemata emitted by numerous individual vehicles may be perceived as a whole when looking from a distance (Lakoff, 1987). The second minor is [Formation], which is actually extended from [Amount]. Usually, it takes time to form a 'mass,' but if woodwork cracks suddenly, a mass of insects living inside will reveal at once. This particular situation that a 'mass' is formed induces the derivation of the sense Insect—Appear Suddenly in English (e.g., *Ants are* ***crawling*** *out of the woodwork*). The third minor feature, [Effect], is also specific to CRAWL. It prompts the derivation of Flesh—Crawl when joined with 'human skin' as the specification of [Medium], because people feel creepy when being crawled over by 'insects.' Later, the source of the 'sensation' includes everything that can make a person afraid, as the instance of 'sensation' (e.g., *Darkness made his skin* ***crawl***) suggests.

The last minor feature, [Speed] explains how the figurative senses Non-creature—Rise Slowly and Non-creature—Move Slowly are derived from vehicle crawling. Usually, vehicles run much faster than creatures do, unless

they are driven at very low speed, which can be said to crawl. From the specification of 'slow,' the range of agent can extend to enclose any 'non-creature' that is observed to move slowly. Based on their [Direction] of the movement, 'non-creature' agents were categorized to either Non-creature—Rise Slowly or Non-creature—Move Slowly. In Chart 1, Non-creature—Rise Slowly is extended from Vehicle—Climb because agents in both senses move 'upward,' and Non-creature—Move Slowly from Vehicle—Crawl due to the identical specification of [Direction], 'forward.' Within Non-creature—Rise Slowly, there are two sorts of agents: 'road' and 'curve.' For 'road,' we found instances like *鐵路爬至高原* and *the road that* ***crawls*** *around the mountains.* The 'curve' basically are economic indexes like expenditure and interest rate, as *年底利率就開始上爬* and *Retail sales* ***crawled*** *up by 1%.* As for Non-creature—Move Slowly, it is hard for a list of all possible agents to be exhaustive. Some common types are 'liquid,' 'smoke,' and 'time' (e.g. *Sweat crawls under her armpits, Heavy clouds were crawling across the sky*, and *Hours crawled by like years*). It should be noted that Non-creature—Move Slowly is specific to English since Vehicle Crawl, the sense from which it is derived, is also language-specific.

CONCLUSION

The present study presents a set of underlying semantic features that depict the crawling action of Chinese PA2 and English CRAWL on a sense flow chart. In the chart, senses are distinguished from one another more consistently (e.g., Human—Crawl, Animal—Crawl, and Insect—Crawl were separated for differing in specifications of [Agent]), two senses' difference in specification of features is explicitly indicated (e.g., Vehicle—Crawl and Vehicle—Climb differ in the in the specification of [Direction]), and figurative senses are especially noted and their routes of derivation are provided (e.g., Insect—Teeming is derived from Insect—Crawl through the feature [Amount]). With this approach, learners may understand senses more systematically because they would know how various literal senses are originated from different choice of specifications, and how figurative senses are derived through some features.

LIMITATION AND FUTURE WORK

A small empirical translation task was conducted to investigate whether there are English equivalents that are also synonymous to PA2. Participants, Taiwan senior high students, were asked to write down PA2's English equivalents. The result showed that CLIMB was identified as the most frequent equivalent. A future study is suggested to investigate whether CLIMB shares a similar set of specification of semantic features with PA2.

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呂卓童(民 90)。英漢動詞“爬”的認知對比分析。大眾文藝，7，154-155

以語意特徵比較中文與英文的對譯詞 — 以「爬」字為例

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摘要

兩個語言間的對譯詞除了共享一些相似的語意之外，另有一些語意是某一語言獨有的。先前的研究人員曾使用各種不同的方式來呈現對譯詞間相似及相異的語意，但鮮少有研究針對語意之間的差異及語意衍生做出解釋。本研究認為一個動作動詞本身的語意特徵及其細項訊息能用來區別此動詞的各個動作語意，並能用來解釋其他延伸意是如何衍生而來，而這些動作語意間的差異及延伸意的衍生路徑非常適合以語意流程圖來呈現。本研究以中文的「爬」和英文的「CRAWL」為研究目標，從字典及語料庫收集此對對譯詞的各種語意，並加以分析他們的語意特徵及其細項訊息。

分析結果顯示爬的語意特徵可以分為兩大類：顯著特徵和次要特徵。顯著特徵的細項訊息(如：[動作者]這個特徵的‘人類’、‘植物’或‘非生物’等細項訊息)可以合理地解釋各個動作語意之間的差異。次要特徵的細項訊息(如:[意圖]這個特徵的‘尋找’和‘檢驗’等細項訊息)則能說明延伸意是如何衍生而來。本研究同時也發現中文的「爬」和英文的「CRAWL」著重於不同的特徵細項訊息(如：[部位]特徵中的細項訊息‘腳’在中文「爬」字的比率高出英文「CRAWL」字許多)。此外，某些語言獨有的特徵細項訊息解釋了為何某些語意只存在於其中一個語言之中(如: [效果]特徵的細項訊息‘驚悚’只存在於英文當中，故皮肉爬這個語意僅存在於英文「CRAWL」字中)。本研究於教學上的啟發在於鼓勵語言學習者利用語意特徵和其細項訊息去分析並了解外語及母語對譯詞在語意上有何不同。

關鍵詞：對比分析、對譯詞、動作動詞、語意特徵、動作語意與延伸意