



A SEMANTIC ANALYSIS OF THE *FIRE* RADICAL IN CHINESE UMA ANÁLISE SEMÂNTICA DO RADICAL FOGO EM CHINÊS¹

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ABSTRACT

Fire has played an essential role in human civilization. FIRE as such is not only a basic but also a crucial concept in human language, including Chinese. In Chinese, FIRE *huǒ*火 acts as an independent character that is often used as a radical in many composite characters. Considering the fact that Chinese radicals are typically regarded as the semantic components within the composite characters to indicate broader concepts and categories of the characters, the FIRE radical is expected to determine the lexical meaning of composite characters one way or another. Since the independent use of the FIRE character precedes its function as a radical, we hypothesize that the semantic development of the FIRE radical will be influenced by those of the FIRE character. Therefore, we first carried out a semantic analysis of the FIRE character in previous research. The present paper studies the semantic structure of the global extensions of the FIRE radical, i.e. the original senses of the composite characters of the FIRE radical that are expected to have developed from the senses of the FIRE character. This analysis shows that, like the FIRE character, the semantic structure of the FIRE radical is still a radial network with prototypical features. However, the FIRE radical showcases semantic developments that occur independently of the FIRE character.

KEYWORDS: Chinese character; *fire* radical; global extension; prototype; radial network

RESUMO

O fogo tem desempenhado um papel essencial na civilização humana. FOGO, como tal, não é somente um conceito básico como também crucial nas línguas humanas, incluindo o chinês. Em chinês, FOGO *huǒ*火 atua como um caractere independente que é frequentemente usado como um radical em muitos caracteres compostos. Considerando o fato de que os radicais chineses são tipicamente considerados como os componentes semânticos dentro de caracteres compostos para indicar conceitos e categorias mais amplos dos caracteres, espera-se que o radical FOGO determine o significado lexical de caracteres compostos de uma forma ou de outra. Uma vez que o uso independente do caractere FOGO precede a sua função como um radical, hipotetizamos que o desenvolvimento semântico do radical FOGO será influenciado pelos desenvolvimentos do caractere FOGO. Portanto, primeiramente efetuamos uma análise semântica do caractere FOGO em estudos anteriores. O presente artigo investiga a estrutura semântica das extensões globais do radical FOGO, isto é, os sentidos originais dos caracteres compostos do radical FOGO que esperamos ter se desenvolvido dos sentidos do caractere FOGO. Esta análise mostra que, como o caractere FOGO, a estrutura semântica do radical FOGO é ainda assim uma rede radial com características prototípicas. No entanto, o radical FOGO coloca em evidência desenvolvimentos semânticos que ocorrem independentemente do caractere FOGO.

PALAVRAS-CHAVE: Caracter Chinês; Radical Fogo; Extensão Global; Protótipo; Rede Radial.

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1. Introduction

As a product of nature, fire can be considered as one of the earliest phenomena humans experienced. Ever since people learned how to start fire by themselves, fire has played an important role in human lives. Naturally, FIRE has been one of the most basic and important concepts in human language, including the Chinese language. In Chinese, FIRE *huǒ* 火 is one of the earliest pictographic characters that developed from oracle bones inscriptions (甲骨文 *jiǎ-gǔ-wén*). In *Shuo Wen Jie Zi*, the authoritative dictionary from the Han dynasty (1st century CE) which is the first dictionary to analyze the structure of Chinese characters and the motivation of character formation based on the categorization of radicals, FIRE *huǒ* 火 is defined as in example (1) provided by HUANG, *et al.* (forthcoming).

(1). 物体燃烧时产生的光和焰。‘firelight and flames produced by burning’ (XU, 1988; LUO, 1991)

火，燬也。南方之行，炎而上。象形。凡火之属皆从火。

‘Fire, is burning things down. It refers to south. In the process of burning, light, heat and flames are released. Fire is an pictographic character and all semantically ‘fire’-related characters contain FIRE as the radical.’

(*Shuo Wen Jie Zi*, ‘An Analysis and Explanation of Characters’)

Since FIRE is an independent pictographic character (independent characters 独体字 *dú-tǐ-zì*), it can also be used to form composite characters (合体字 *hé-tǐ-zì*)⁵ where it functions as a semantic or phonetic indicator (e.g. see HUANG, *et al.* forthcoming; WANG, 2016, p. 97; YEH, *et al.*, 2017). More specifically, when the FIRE character is used as a semantic indicator in a composite character, it is usually referred to as the FIRE radical. Radicals in the Chinese writing system indicate that the overall lexical meaning of a composite character is somehow linked to a broader semantic category (see CHEN, 2012). For instance, the character 炊 *chuī* ‘to cook’, which takes the FIRE radical (火) on the left is obviously linked to FIRE since the burning fire was the obvious tool for preparing food throughout most of human history. When the FIRE character functions as a phonetic indicator in a composite character, the overall phonetic sound of the composite character typically rhymes with the phonetic sound of the FIRE character. For example, the phonetic sound of the character 伙 *huǒ* ‘partner; mate; companion’ is the same as the phonetic sound of the FIRE character *huǒ*.

If the FIRE radical determines the lexical meaning of composite characters to a certain extent, the question arises as to how the semantic developments of FIRE as an independent character and FIRE as a radical compare. Given that the FIRE character appeared earlier than

⁵ In terms of the internal structure, characters can be divided into independent characters and composite characters (see QIU, 1988, p. 10). The main criteria to distinguish between the two types of characters is whether the characters can be decomposed into smaller meaningful components. If a character is formed at least by two individual components, then it is a composite character. If not, the character is usually formed directly by strokes, which is considered as an independent character. (see YANG, 2017, p. 436).

the FIRE radical, it is hypothesized that the semantic developments of the FIRE character may somehow influence those of the FIRE radical. Therefore, it is crucial to first investigate the historical semantic change of the FIRE character before turning to the semantic development of the FIRE radical in composite characters. The diachronic analysis of the FIRE character was the object of a first study investigating the semantic structure of the FIRE character (HUANG, *et al.* forthcoming). The study reveals that the internal semantic structure of the FIRE character “radiates from the inner circle to the outer area, with senses developing from the core to the periphery” (HUANG, *et al.* forthcoming) and “the diachronic development of the FIRE character has characteristics of prototype-based networks” (HUANG, *et al.* forthcoming; also see e.g. GEERAERTS, 1989, 1997, 2006, 2007). In particular, the core circle of the semantic structure refers to the prototypical FIRE as well as the features of the prototypical FIRE, i.e. to fire in the most literal, material sense, and to the phenomena that can be used to describe the burning process, for example BURNING, ENERGY, FLAMES, HEAT, LIGHT, and RED. Figurative senses that developed from the core circle typically appear in the peripheral area, with metaphor and metonymy as the main underlying mechanism of semantic extensions. Specifically, most extensions are linked to the core circle through one of the facets just mentioned, like flames or color. (HUANG, *et al.* forthcoming).

The analysis of the FIRE character in HUANG, *et al.* (forthcoming) suggests that the semantic network of the FIRE radical is a radial network with prototype characteristics since all the senses of the composite characters should be linked one way or another to the senses of the FIRE character. In terms of the different semantic mechanisms, metaphor, metonymy, generalization and specialization are expected to be the main driving forces for semantic change. We hypothesize that the senses of the composite characters featuring the FIRE radical develop from two types of extension: the global extensions and the local extensions. On the one hand, the FIRE radical may go through semasiological changes. That is to say, the original or prototypical senses of all the composite characters containing the FIRE radical are expected to have developed from the senses of the FIRE character, which we will refer to as *global extensions*. Given that the global extensions are linked to FIRE, we expect the senses of the global extension to overlap with the senses of the FIRE character. That is to say, these senses develop in the same semantic fields of the FIRE character. On the other hand, composite characters can go through internal semantic change individually, which we will refer to as the *local extensions*. Local extensions may come about through two different mechanisms. On the one hand, local extensions may develop from global extensions, so that these local extensions are indirectly linked to FIRE. For example, the metonymic sense ‘to ignite fire’ of the composite character 烽 *fēng* develops from its original sense ‘beacon fire or signal fire’. Obviously, such figurative extensions are still linked to FIRE through different mechanisms such as metonymy. On the other hand, local extensions may also occur when composite characters go through an independent semantic change. For example, a local extension ‘the final exclamation particles’ of

the composite character 然 *rán* ‘to burn’ came into being through grammaticalization, which we will illustrate in Section 2.2.1 in detail. In such local extensions the link to FIRE is nonexistent. Hence, it is possible that composite characters also develop senses that are different from those of the FIRE character. Many factors influence this type of local extensions, which we intend to explore in details in the coming case studies.

To test these hypotheses and assumptions, the present study takes the first step. That is, describing the semantic structure of global extensions of the composite characters featuring the FIRE radical. The local extensions of the composite characters featuring the FIRE radical will be dealt with in the follow-up studies. We illustrate the method and analysis in Section 2 and Section 3 respectively. The study concludes in Section 4 with discussion.

2. Method

2.1. Data processing

The data stem from *The Great Chinese Dictionary of Characters* (GCDC, 《汉语大字典》) (XU, 1988), which is the largest dictionary of Chinese characters with a wide coverage of characters and materials. As for many dictionaries, the first senses listed in the GCDC are what the dictionary considers the original sense. This ‘original sense’ of characters is the sense that carries the original motivation of character formation. More specifically, in the case of composite characters, the original sense shows the rationale behind how a composite character was formed, including why a certain radical or phonetic indicator was used to form the character. Applied to the present analysis, the original sense listed in the dictionary reveals why the FIRE radical was used to form the composite characters. Therefore, we collected the first senses of all the composite characters of the FIRE radical from the GCDC and built a semantic structure based on the semantic relations that hold between the senses. After collecting the first senses, we cleaned the data before analysis.

1. The following types of senses were excluded from the data:
 - a. Senses that are irrelevant to FIRE, such as place names or family names.
 - b. Senses that are indicated by compound words rather than an independent character. For example, the sense ‘smoke’ among the senses of the composite character 爇 *ài* is denoted by a two-character compound (viz. 爇 *liè*-爇 *ài*) that is formed by 爇 *ài*. So the sense ‘smoke’ is not a direct sense of the composite character 爇 *ài*. Therefore, such senses were not used in the data.
 - c. Senses for which there is no semantic information in the dictionary. For example, the

character 燿 is listed in the dictionary as one of the composite characters of the FIRE radical. However, the dictionary does not provide semantic and phonetic information for this character.

d. Senses that emerged through phonetic loaning. Jiang (1989, p. 196–202) categorized two types of phonetic loan characters. One refers to “the colloquial words with no corresponding characters that borrow the graphemic forms from homonyms that already had graphemic forms” (HUANG, *et al.* forthcoming), which is referred to as 假借字 *jiǎ-jìè-zì*. The other type refers to 通假字 *tōng-jǐǎ-zì* where “a lexical item borrows written forms from homonyms while having its own graphemic character” (HUANG, *et al.* forthcoming). In short, senses that developed through phonetic borrowing are to a certain extent synonymous homonyms linked through phonetic similarity. Hence, there is no motivation between the graphemic representation and the radical regarding the phonetic loaning senses, which is beyond the scope of the present study.

2. Some characters are recognized as polyphonic and polysemous characters (多音多义字 *duō-yīn-duō-yì-zì*) in the GCDC. In these cases, we followed the dictionary instructions and collected the first sense of the separate pronunciation as the original sense of a different lexical item. For example, the composite character 焦 is a polyphonic and polysemous character. When it is pronounced as *jiāo*, it refers to ‘burned’ whereas when it is pronounced as *qiáo*, it refers to a place. To distinguish the two lexical items, the two senses were both recognized as independent senses and marked as 焦 *jiāo* ‘burned’ and 焦 *qiáo* ‘a place name’ respectively.

3. Some characters may be listed in their traditional written form as well as their simplified written form⁶, such as the graphemic character 灯 *dēng*, which is recognized as the simplified written form of the traditional written form 燈 *dēng*, which means ‘illumination tools’. In such cases, both forms are merged as one lexical item in the data, viz. 灯(燈) *dēng* ‘illumination tools’. However, one issue stated by Jiang (2015, p. 24) is that different traditional characters with different lexical meanings have been graphemically merged as the same simplified written form. That is to say, the simplified characters may have senses originating from different lexical items. Therefore, simplified characters were checked individually before being merged with their traditional written equivalent. For example, the simplified character 灯 *dēng* is also used to refer to the lexical item ‘fire’, which is articulated as *dīng*. In this case, the graphemic character 灯 which expresses ‘fire’ and articulates *dīng* cannot be seen as the simplified character of the traditional written form

6 Simplified characters (简体字 *jiǎn-tǐ-zì*) refer to the standard Chinese characters mainly used in mainland China after 1950s, which are simplified in strokes and overall structure. Also see (https://en.wikipedia.org/wiki/Simplified_Chinese_characters) for more details.

燈 *dēng* ‘illumination tools’. Hence, 灯 *dīng* ‘fire’ was considered as a separate sense or lexical item. In cases like these, the phonetic information given by the dictionary is used to differentiate lexical items.

4. Some senses listed in the GCDC can be represented by several variant written forms. The variant graphemic forms of certain sense are typically listed as “同某” ‘same as X’, “后作某” ‘later as X’, and “也作某” ‘also as X’ in the dictionary. That is to say, multiple graphemic characters are used to refer to the same sense. For example, the variant characters 焦 *jiāo* and 隹 *jiāo* both refer to the meaning ‘burned’. They are graphemically similar in that the first 焦 *jiāo* takes the variant FIRE radical (灬, four dots)⁷ in the bottom whereas the second 隹 *jiāo* takes the original FIRE radical in the bottom. Such characters are referred to as variant characters (异体字 *yì-tǐ-zì*) representing an identical meaning. In a broad sense, variant characters are different writing styles for the same character due to chronological, geographical or dialectal factors (see JIANG, 1989, 190–192; QIU, 1988, p. 205–208). In other words, regarding the synonymous sense, variant characters are graphemically interchangeable (see ZHANG, 2017, p. 34). In this case, we merged all graphemic representations of the shared sense as one lexical item in the data. For example, the variant characters 焦 *jiāo* ‘burned’ and 隹 *jiāo* ‘burned’ were merged as 焦 (隹) *jiāo* ‘burned’. However, not all variant characters share the same radical. For example, the sense ‘chimney of the stove which is made for making bricks and tiles; also, a mud-made oven for temporary use’ is shared by the variant characters 焠 *yì* with the FIRE radical and 埆 *yì* with the EARTH radical. It is clear why both radicals are involved: FIRE and EARTH are two related concepts of the same lexical item ‘chimney of the stove or a mud-made oven’. However, whether the two concepts are competing with each other or one of the radical dies out is beyond the scope of the present study, which can be an interesting topic in the future research. Since the FIRE radical is still involved in one of the variant characters, we still merged such variant characters as for example 焠 (埆) *yì* ‘chimney of the stove which is made for making bricks and tiles. It also refers to a mud-made oven for temporary use.’ Although variant characters are graphemically equivalent to each other regarding the sense they share, they are not necessarily equivalent to each other regarding their other senses (ZHANG, 2017, p. 34). Therefore, the graphemic forms of the variant characters should only be merged for the sense they share. For example, the character 焦 is articulated as *jiāo*, which it refers to ‘burned; wounded’ and has variant counterparts 隹, 隹, 隹 and 隹. However, when 焦 is pronounced as *qiáo*, it is the name of historical place. Hence, 隹, 隹, 隹 and 隹 can only be merged with 焦 *jiāo* as variant characters of the meaning ‘burned; wounded’, i.e. 焦 (隹, 隹, 隹, 隹) *jiāo*, but not 焦 *qiáo* ‘a place name’.

⁷ In order to save writing space when it comes to structurally complicated written forms, many radicals are portrayed in a variant form, such as the variant FIRE radical (灬, four dots), which represents the burning fire in the characters (see WANG, 2016, p. 102).

2.2. Cases that were not displayed in the analysis

Some of the cases that were gathered during the data collection process were not included in the analysis. The senses that were excluded were categorized into three main types as well as a number of sub-types as follows:

1. Senses that are not semantically linked to the FIRE radical
 - a) graphemic misinterpretations
 - b) phonetic indicators
 - c) phonetic borrowing
 - d) function words
2. Senses with unclear graphemic history
3. Senses that are possibly linked to local extensions

2.2.1. Senses that are not semantically linked to the FIRE radical

The first type of cases consists of senses where the link between FIRE and the lexical meaning is non-existent. These can be further subdivided into a number of subtypes. The first subtype involves the composite characters where part of the graphemic representation may be mistaken for the FIRE radical. For example, we found that some senses of the composite characters containing the FIRE radical describe animals, such as 𩺰(魚) *yú* ‘fish’, 熊 *xióng* ‘bear’ and 燕 *yàn* ‘swallow’ (see XU, 1963). Typically, we found that for these pictographic characters denoting animals, the part that represents the animal’s tail, feet or head tends to be recognized as the FIRE radical due to their graphemic similarity. For example, the bottom part of the composite character 𩺰(魚) *yú* ‘fish’ attempts to depict the dendritic shape of the fish’s tail. Coincidentally, the graphemic representation of the fish’s tail and the FIRE radical on the right side of Figure 1 ended up looking the same over the course of their graphemic development. As a result, the fish’s tail was reinterpreted as the FIRE radical although there is no semantic link whatsoever with the radical.

(1). 水蟲也。象形。魚尾與燕尾相似。

‘(Fish) is an aquatic animal. It is a pictographic character. The tail of the fish tail is similar to the tail of the swallow.’

(*Shuo Wen Jie Zi*, ‘An analysis and explanation of characters’)

Figure 1. The characters of ‘fish’ (left) and ‘fire’ (right) in *Shuo Wen Jie Zi*



Since there is no apparent semantic link with the FIRE radical, some of these composite characters later changed their graphemic representation so as to no longer include the radical. For example, the more recent graphemic representation of ‘fish’ features a horizontal stroke at the bottom instead of the radical (魚). Other composite characters, however, have kept the radical, which raises the question as to whether the FIRE radical influences the semantic development of these characters. This is a question we intend to pursue in follow-up research.

The second subtype includes composite characters where the FIRE character is used as part of the phonetic indicator in the composite character rather than the radical. For example, FIRE is part of the character 粦 *lín* that is used as the phonetic element in the character 鄰 (鄰) *lín* ‘clear; crystalline’ to indicate that the overall sound of both characters rhyme with one another (see example 2). As a phonetic indicator, it is not surprising that FIRE does not contribute to the overall lexical meaning of those characters.

(2). 水生厓石間粦粦也。从火。粦聲。

‘Between the rocks are there where the clear water flows. (The character) takes 火⁸ as its radical whereas it rhymes with the character 粦 *lín*.’

(*Shuo Wen Jie Zi*, ‘An analysis and explanation of characters’)

The third subtype consists of senses that are shared by variant characters, which may be seen as instances of phonetic borrowing in other reference works. As discussed in Section 2.1, phonetic borrowing refers to the process whereby a sense is typically a synonymous homonym that is linked to another sense or character through phonetic similarity. Naturally, in such senses, the radical does not contribute to the overall lexical meaning of the composite character. For example, the composite character 焦 *qiáo* featuring the FIRE radical is recognized as the variant character that shares the sense ‘wan and sallow’ with another variant character 憔 *qiáo* featuring the HEART radical in the GCDC. Given that the semantic motivation between the sense ‘wan and sallow’ and FIRE is not transparent and the sense ‘wan and sallow’ of the composite character 焦 *qiáo* featuring the FIRE radical is considered a phonetically borrowed sense of the character 憔 *qiáo* (which features the HEART radical in other dictionaries), the sense ‘wan and sallow’ is probably not motivated by the FIRE radical, so it is not included in the analysis.

8 火 *kuài* refers to ‘the sound of water flowing’.

Finally, senses that are used as function words are also not shown in the analysis. One reason for the functional use of composite characters is grammaticalization (see WANG, 2010, p. 554–555). Grammaticalization of the content words occurred when they were put in an unusual syntactic position, e.g. at the end of the sentence. This happened to 然 *rán*, which originally refers to ‘burn’. In order to make the sentence coherent and understandable, the lexical meaning of such characters bleached to a certain extent, which is why such senses are not relevant to FIRE and therefore they will not be covered in the analysis.

2.2.2. Senses with unclear graphemic history

The second type features senses or characters where the motivation between the FIRE radical and lexical meaning of the overall characters is not clear. The semantic motivation of the FIRE radical is not clear due to the lack of information in the dictionaries. This typically happens when the graphemic character already used in old Chinese and the materials concerning the motivation behind the character formation are difficult to get, for example the character 𤇀.

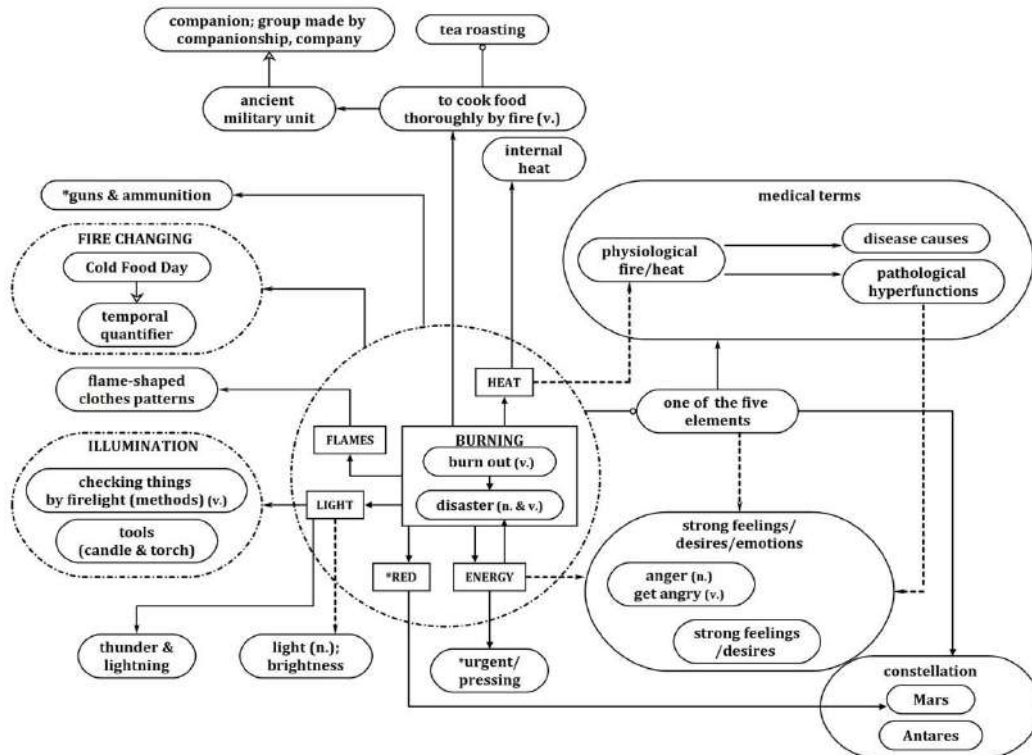
2.2.3. Senses that are possibly linked to local extensions

This type concerns the senses that may have developed from the local extensions of the composite characters containing the FIRE radical instead of the global extensions. For example, the composite character 烈 *jiǔ* ‘imposing lighter sentences’ may be seen as the extension of the local extension ‘FIRE as one of the punishments’.

3. Semantic structure of the global extensions

After cleaning the data and identifying the cases that will not be included in the analysis, we collected 497 senses for the analysis of the semantic structure of the global extensions. Using this dataset, we analyzed the potential mechanisms that underlie the global extensions. Based on the semantic relations that hold between the global extensions, we illustrate the semantic structure of the FIRE radical in Figure 2. The semantic structure of the FIRE radical mostly confirms our hypotheses. Firstly, it shows that the semantic structure of the global extensions is a radial network as we expected. That is, it is a semantic structure where all the senses develop from the core to the periphery. Secondly, the semantic structure of the FIRE radical and the FIRE character overlap with respect to the core circle as well as the semantic fields COOKING, ILLUMINATION and ‘fire as one of the five elements’. This is also in line with our hypothesis that global extensions are likely to fall into the same semantic fields as those present in the semantic structure of the FIRE character since the FIRE radical functions as a semantic indicator of FIRE in composite characters. Surprisingly, other semantic fields in Figure 2 are independent semantic extensions of the FIRE radical. For practical reasons, only one or a few representative senses were used to illustrate each global extension. For each example we provide a direct translation.

Figure 3. The semantic structure of the FIRE character



The legend used in all figures in this text includes as follows:

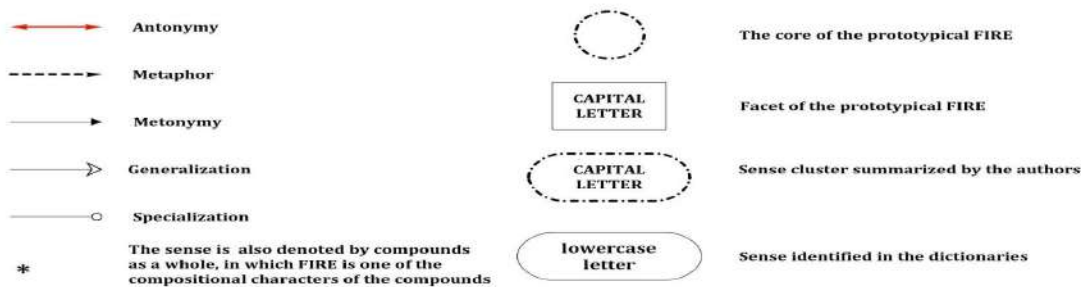
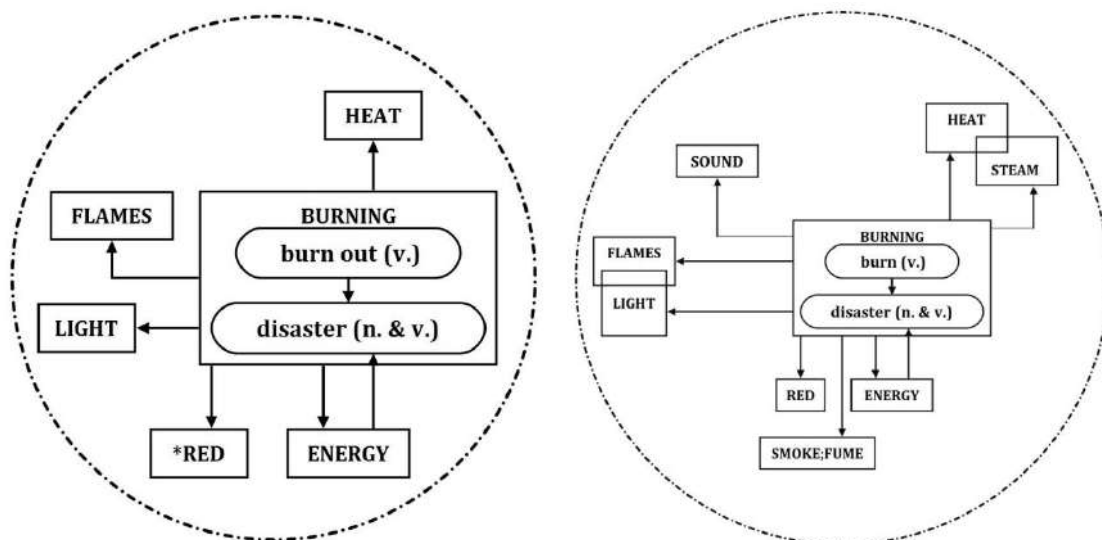


Figure 4. The core circles of the semantic structures of the FIRE character (left) and the FIRE radical (right)



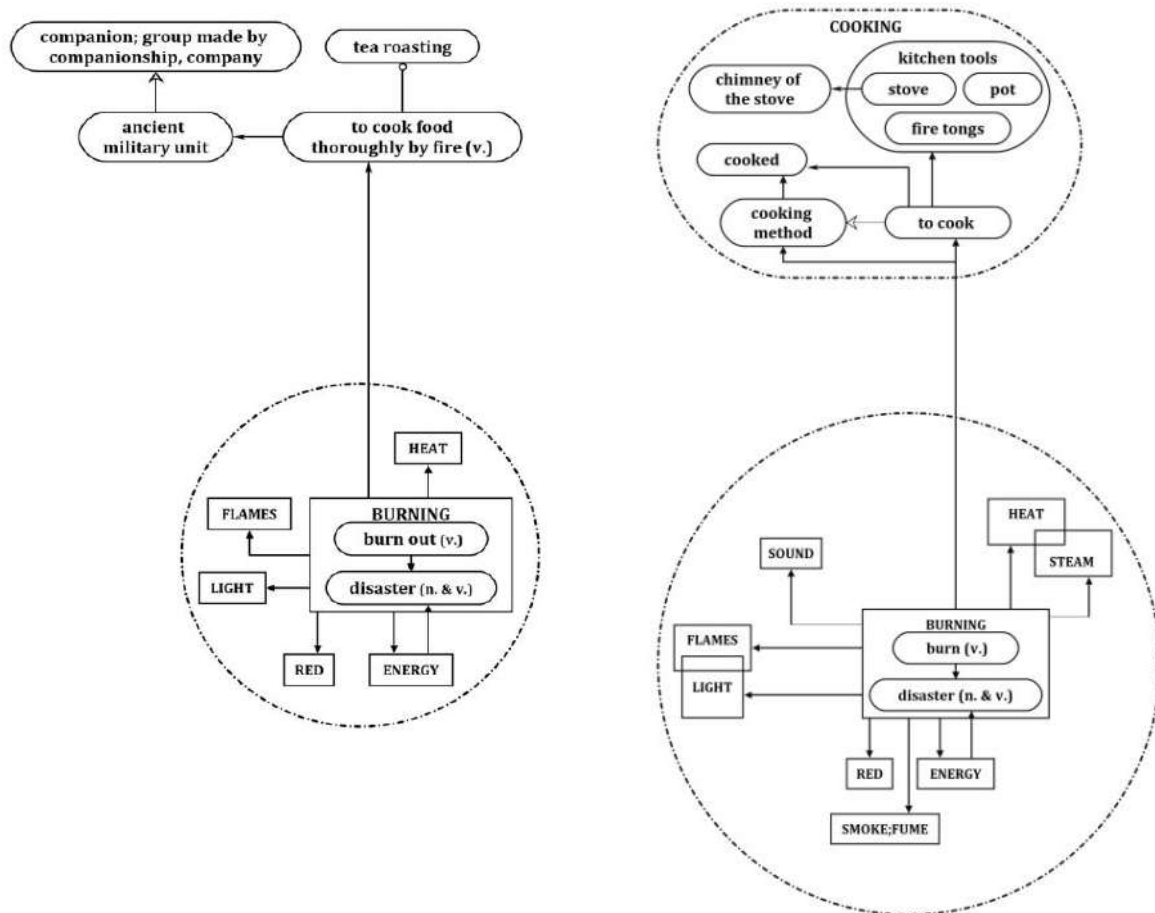
To begin with, the prototypical and the core circle of the semantic structures of both the FIRE character and the FIRE radical is the literal FIRE with its defining features such as LIGHT, HEAT, FLAMES, etc. The core circle of the FIRE character and the FIRE radical are juxtaposed in Figure 4. Figure 4 show that BURNING is the center in both semantic structures. Additionally, BURNING has two similar nuances in both structures, i.e. ‘burn out’; ‘burn’ and ‘fire as a natural disaster’. Both nuances ‘burn out’ and ‘burn’ can metonymically extend to the nuance ‘fire as a natural disaster’. Regarding the other facets that describe the literal FIRE, they all appear to be metonymically linked to BURNING given that they are present during the burning process in both prototypical circles. However, there are some new facets that appear in the semantic structure of the FIRE radical in addition to the prototypical facets BURNING, HEAT, FLAMES, LIGHT, RED and ENERGY, namely SOUND, STEAM and SMOKE; FUME. Additionally, some facets overlap with each other in the semantic structure of the FIRE radical. Specifically, FLAMES overlaps with LIGHT and HEAT overlaps with STEAM. For example, composite characters such as 料 *liào* and 映 *yǐng* both refer to 火光 *huǒ-guāng*: literally means the ‘firelight of the flames’. Similarly, the composite character 物 *xù* describes the gaseous products of burning, such as heat or steam. Such cases cannot easily be categorized in one single facet. Moreover, the prototypical facet RED is different in the two semantic structures. In the analysis of the FIRE character, we found that

...the FIRE character either refers to the color red directly by itself or it is used in its literal sense as a compositional part in compounds describing the ‘reddish’ sense as a whole. For instance, the notion RED is expressed by the FIRE character directly in the compound 火旗 *huǒ-qí* ‘red flag’ in quotation (19). In compounds such as 火红 *huǒ-hóng* ‘red (fiery-red)’, which as a whole is denoted ‘as red as fire’, the FIRE character may act as a redundant intensifier to express its literal meaning.”(HUANG, *et al.* forthcoming)

However, in the current analysis, the notion of red is directly denoted by the composite characters rather than compounds formed by the composite characters.

Now if we move on to the extended readings (the outer of circle the semantic structure), the question arises as to what extent the semantic structure of the composite characters (i.e. the FIRE radical) is different from the semantic structure of the FIRE character? It seems that the difference is substantial given that only three of the semantic fields of the FIRE character are kept in the semantic structure of the composite characters of the FIRE radical, namely COOKING, ILLUMINATION and ‘fire as one of the five elements’.

Figure 5. The COOKING extensions of the semantic structures of the FIRE character (left) and the global extensions of the FIRE radical (right)



In the semantic structure of the FIRE character, FIRE takes its literal sense and is used as a direct tool ‘to cook’, which further extends to senses ‘tea roasting’, ‘ancient military unit’ and ‘companion’ (for details, see HUANG, *et al.* forthcoming). In contrast, the semantic field COOKING in the composite character network is a bit more complicated. On the one hand, if you think of the notion of ‘to cook’ as the action to make food well-cooked, the notion of ‘to cook’ involves two nuances: i) the literal FIRE is used as the direct tool to cook the food as in the FIRE character network as in example (3), and ii) the literal fire is used as part of the tool to cook the food, which is typically referred as ‘a cooking method’ in the dictionary, as in example (4).

(3). 炙 (爇, 爇) *zhì*

烧烤,把去毛的兽肉串起来在火上薰烤。‘to broil or roast raw meat over the fire’

(4). 炖 (燉, 炖) *dùn*

把食物煨煮熟烂。‘to stew food until it is fully cooked and tender’

(5). 炒 (炒, 炒, 炒, 炒, 炒, 炒, 炒, 炒, 炒, 炒) *chǎo*

一种烹调方法。把食物或其他东西放在锅里加热翻动使熟或使干。

‘It is a kind of cooking method: to stir-fry food or things in the pan to make them well-cooked or dried.’

Whereas there is more or less direct exposure to the flames in the first case, the fire is merely the source of heat in the second case. In this regard, both nuances ‘to cook directly through fire’ and ‘to cook through methods in which fire is used as part of the tool’ are metonymic extensions of the literal FIRE. On the other hand, if we think of the second nuance as ‘a cooking method’ as defined in the dictionary, the second nuance may also be seen as a generalization of the first nuance ‘to cook directly through fire’. More specifically, if you think of modern cooking, the literal FIRE may not be used as part of the tool to cook, such as to steam or fry things on the induction cooker in which there is no burning fire involved. Moreover, if nuances i) and ii) are considered as the action ‘to cook’, i.e. to make food well-cooked, the third extension ‘cooked; cooked food’ may be seen as a metonymic extension from both nuances of the notion ‘to cook’. The next extension in the semantic field COOKING is ‘kitchen tools’, exemplified in (6)–(8).

(6). 焗 (燻) *wēi* and 焗 *chén*

古代一种可移动的火炉。‘a kind of portable stove in the ancient times’

(7). 焗 *chán*

钳。‘fire-tongs’

(8). 爐 (炉) *lú*

供做饭、烧水、取暖、冶炼等用的盛火器具或装置。

‘containers or devices of fire that are used for cooking, boiling water, heating, smelting, etc.’

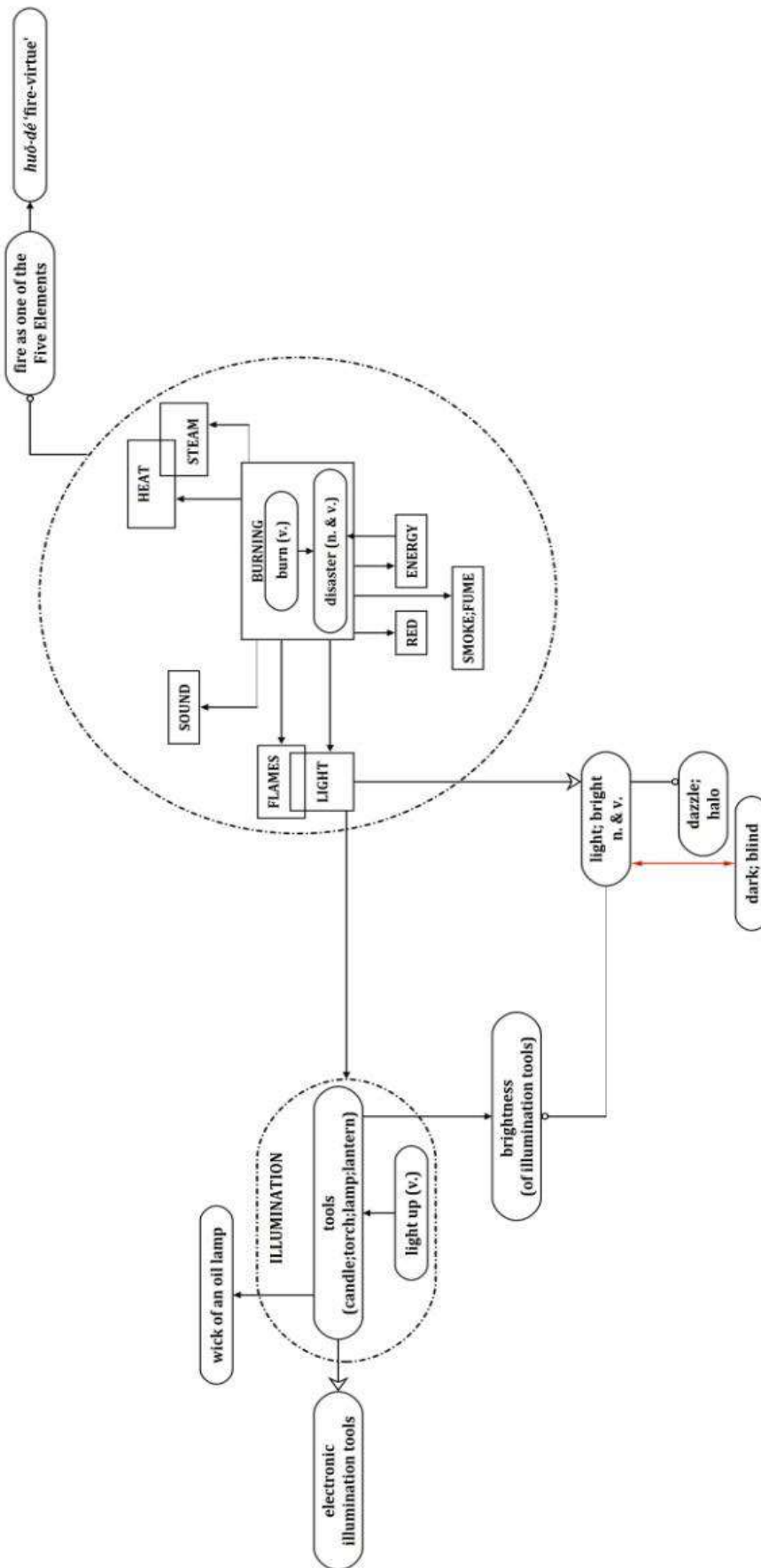
(9). 焗 (埝) *yì*

陶烟囱，砖瓦窑的烟囱。也指用土坯临时搭成的灶。

‘It refers to the chimney of the stove which is made for making bricks and tiles. It also refers to a mud-made oven for temporary use.’

There are again two ways in which FIRE is linked to ‘kitchen tools’. Take sense (8) for example, 爐 (炉) *lú* refers to ‘containers or devices of fire (typically stove, oven, furnace etc.)’, in which FIRE is still used in its literal sense so it can be seen as a metonymic extension of the literal FIRE. On the other hand, the function of such ‘containers or devices of fire’ is for cooking, boiling water and so on, which may also be seen as a metonymy of ‘to cook’. ‘Chimney’, as an assistive facility to ventilate the kitchen, during cooking, in example (9) may be seen as a metonymy of the kitchen tools such as ‘stove’.

Figure 6. The extensions 'fire as one of the five elements' and ILLUMINATION



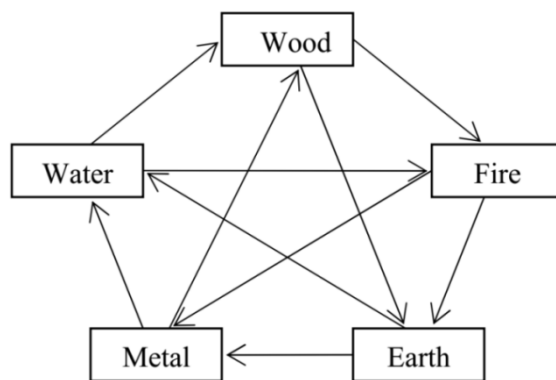
The semantic fields ‘fire as one of the five elements’ and ILLUMINATION remain more or less the same in the semantic structure of the composite characters compared to that of the FIRE character. Example (10) is the only metonymic extension regarding the semantic field ‘fire as one of the five elements’, which is a specialization of the literal FIRE. The five elements theory is a classic Daoism doctrine that is used to describe the dynamic balance of the universe. That is, each of the five elements develops from one another but also restrains each other as portrayed in Figure 7. More precisely, the outer arrowheads and inner arrowheads in Figure 7 reveal how the five elements develop from and restrain one another respectively (see YU, 2009, p. 106). Applied to example (10), 火德 *huǒ-dé* ‘fire-virtue’ comes from an ancient belief that the fate and destiny of a dynasty follows the rule of mutually promoting and restraining relations among the five elements. That is to say, the five elements represent five virtues. When a new virtue (i.e. one of the five elements) starts to generate from another, a new dynasty is expected to begin. The dynasties that start at the time when the element FIRE begins to generate are referred to as those with 火德 *huǒ-dé* ‘fire-virtue’.

(10). 焯 *zhōu*

火行。指犹火德，谓于五行中属火。

‘*Huǒ-xíng* refers to *huǒ-dé* ‘fire-virtue’, which belongs to FIRE of the five elements.’

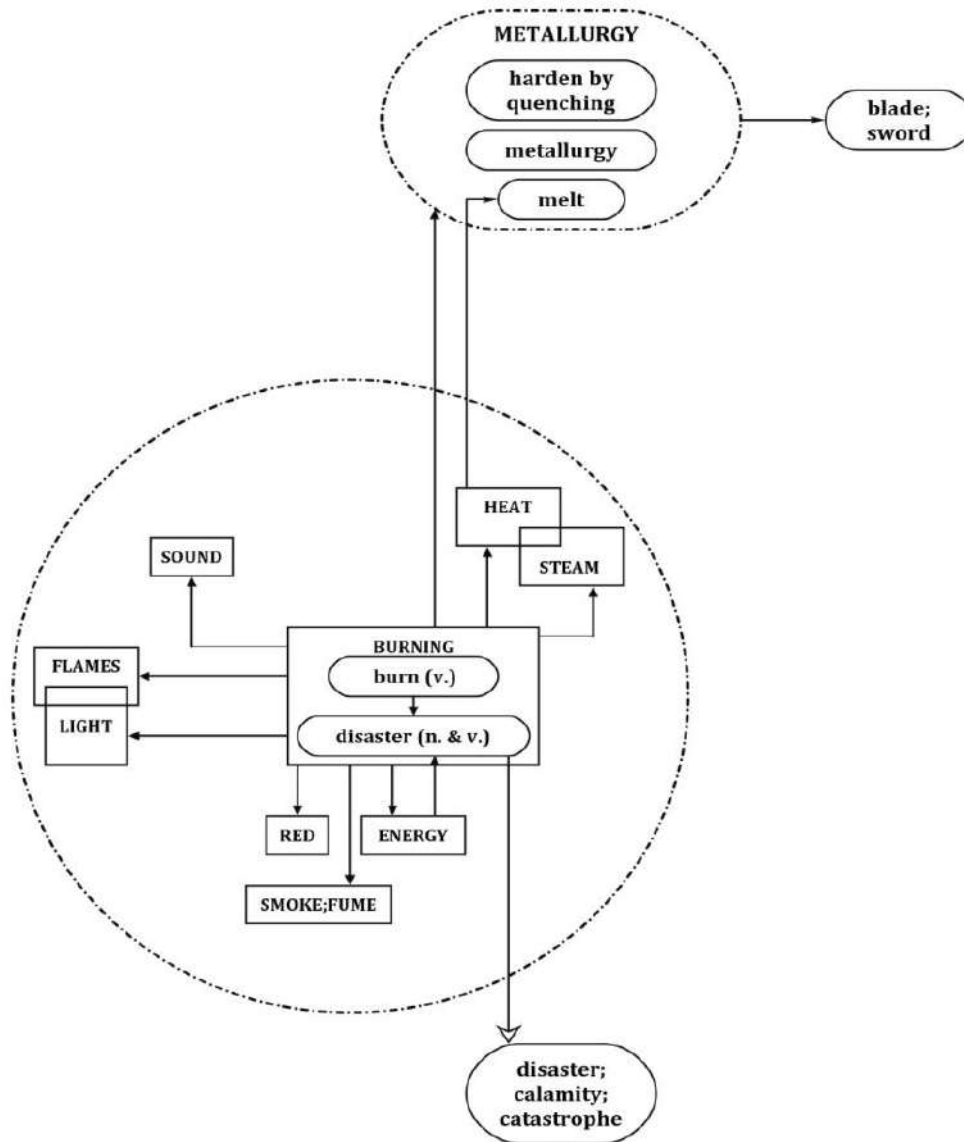
Figure 7. Relation of mutual promotion and restraint among the five elements (from CHEN,1989, p. 1000, translated by YU, 2009, p. 106, also see HUANG, *et al.* forthcoming)



Under the label ILLUMINATION, we grouped composite characters with the FIRE radical that refer to ‘illuminations tools such as candles, torches, etc.’, and those that describe the action of ‘lighting up’ such tools. Although such metonymies are also present in the FIRE character, there are some extensions within the scope of the FIRE radical that are not present in the FIRE character. The radical is present in characters with the meaning ‘wick of an oil lamp’ and ‘brightness’, but also in a number of characters referring to illumination tools that do not involve fire in its literal sense, but that work on electricity or other more modern energy sources. For example, the character 灯 *dēng* as an ‘illumination tool’ can refer to ‘modern lamp

of electricity’, in which the literal FIRE is not involved anymore. In addition, the LIGHT of the burning fire develops a generalization ‘light; bright’ that is not seen in the FIRE character. Moreover, ‘brightness (of illumination tools)’ and ‘dazzle; halo’ as a special type of light are seen as specializations that developed from ‘light; bright’. Interestingly, composite characters of the FIRE radical also generate antonymic meaning ‘dark; blind’ as opposed to ‘light; bright’.

Figure 8. The extensions of ‘disaster’ and METALLURGY



Except for the shared semantic fields discussed above, most semantic fields of the global extensions of the FIRE radical are not present in the FIRE character. Since all the extensions radiate from the core to the periphery through different semantic mechanisms, the different semantic fields will be introduced starting from the prototypical facet they originate from. Since BURNING is still the central facet of the core circle in Figure 4, the analysis starts with the extensions that develop from BURNING. First, the composite characters of the FIRE radical

with the meaning ‘fire as a natural disaster’ can also refer to ‘disaster; calamity; catastrophe’ in a broad sense in the semantic structure of the composite characters (see example 11).

(11). 災 (狄, 灾, 裁, 裁, 熯, 叇, 灾) *zāi*

原指自然发生的火灾。后泛指个人自然或人为的灾祸。

‘It refers to fire as a natural disaster, which gets further generalized to refer to disaster in general.’

A second cluster of extensions developing from the facet BURNING that is proper to the FIRE radical is related to METALLURGY. In general, the composite characters that are used to refer to senses exemplified in (12)–(16) describe a process where the literal FIRE is used to shape objects and elements such as metal. The literal FIRE can either be a direct tool or it can be used as part of a tool that ‘melts solid matter to liquid form’ in (12) thanks to its heating properties. Both senses are metonymically linked to the core circle through the facet BURNING. However, if FIRE is mostly used for its heating properties to melt solid matter, especially in the modern sense where it forms only part of a tool, then ‘melt’ can also be seen as a metonymy of the facet HEAT. This leads us to the sense ‘blade or sword’ (see example 16), which is the product of the melting process and can therefore be seen as a metonymy of METALLURGY.

(12). 煬(煬) *yáng*

熔化金属。‘to melt metal’

(13). 熔 *róng*

以高温使固体物质转变为液态。如：熔铁。

‘to use high temperature to melt solid matter to liquid form, such as to melt iron’

(14). 燹 *jiǎn*

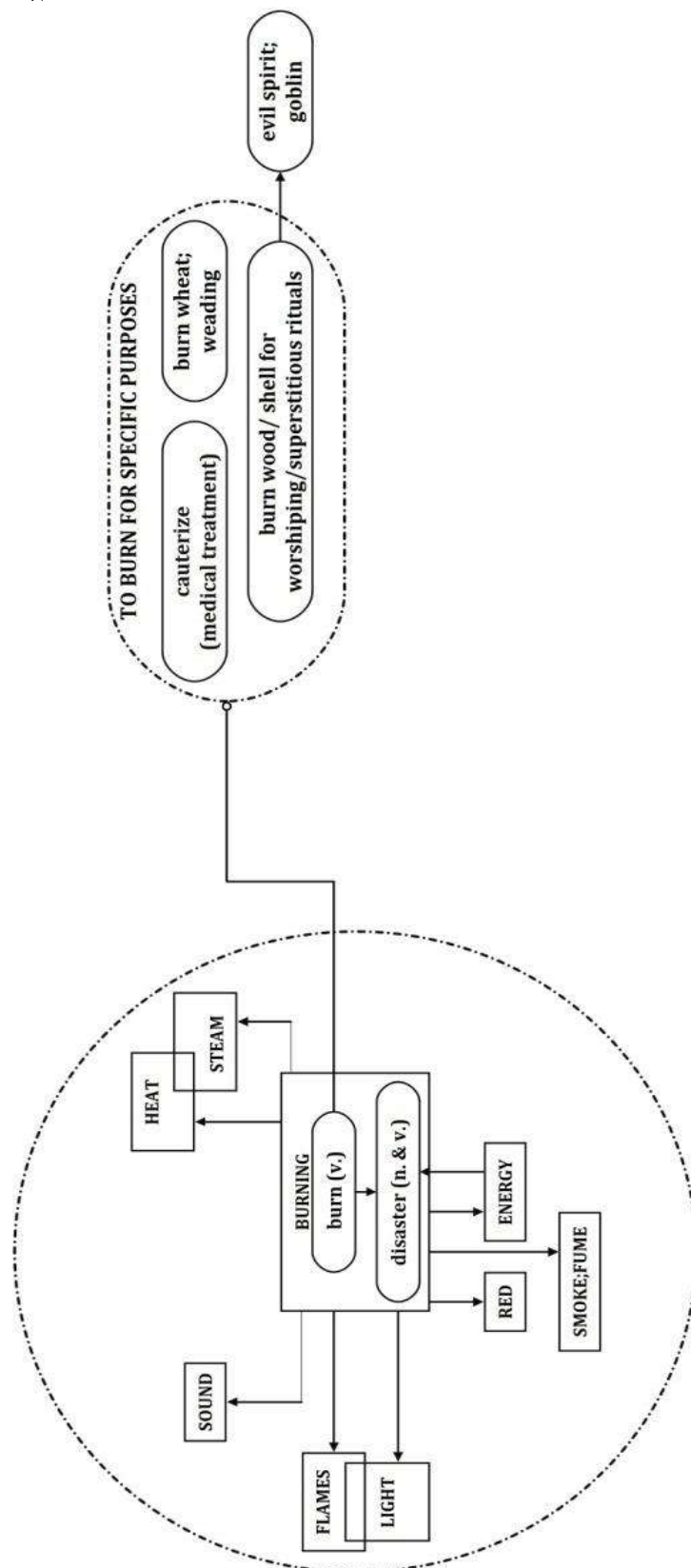
把烧红的铁浸入水中淬火，今称‘蘸火’。

‘to quench the red-hot iron by dipping it into the water, which is referred to as *harden by quenching*’

(15). 刃 *gàng*

刃。‘blade or sword’

Figure 9. The extensions of TO BURN FOR SPECIFIC PURPOSES



Another semantic field that is connected to BURNING incorporates the senses where burning is used for a specific purpose (Figure 9), which includes ‘to cauterize as a medical treatment’, e.g. moxibustion treatment as in example (16); ‘to burn wheat’ for fertilizing the

earth or ‘to burn grass’ for weeding the earth, such as sense (17); and ‘to burn wood or shell for worshipping or superstitious rituals’, such as sense (18). Moreover, ‘to burn wood or shell for worshipping or superstitious rituals’ further extends to senses that are related to superstitious beliefs, for example ‘evil spirit; goblin’ as exhibited in (19).

(16). 灸 *jiǔ*

烧, 中医的一种医疗方法。用艾叶等制成艾炷或艾卷, 烧灼或熏烤人身的穴位。

‘It is a medical treatment of the Traditional Chinese Medicine (TCM): to burn or cauterize the acupuncture points of the body with moxa.’

(17). 烧 *xiǎo*

火烧杂草。‘weeding’

(18). 烧 *dì*,

古代烧荆枝更递灼龟, 以占卜吉凶。

‘It is a ritual in ancient times: to burn the turtle shells to foretell good or ill luck.’

(19). 煞 *shà*

迷信的人指凶神。‘evil spirit; goblin’

Figure 10. The extensions of PRODUCTS OF THE BURNING PROCESS

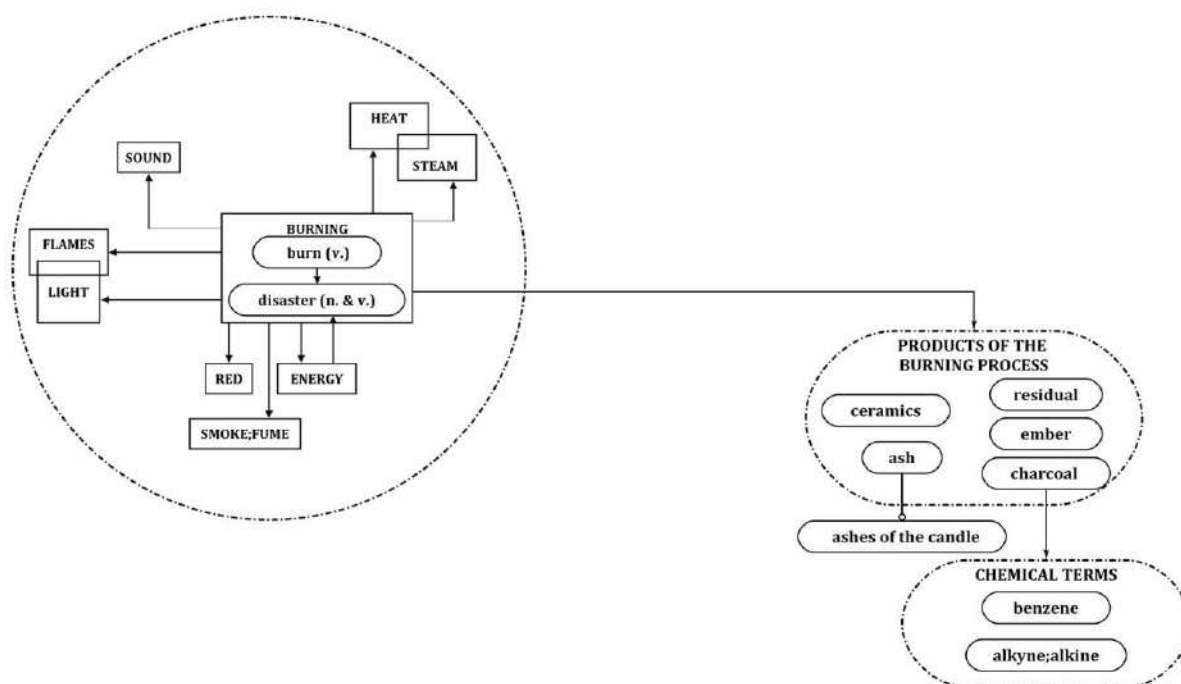


Figure 10 presents the semantic extensions of the semantic field PRODUCTS OF THE BURNING PROCESS, which includes the things produced after the burning process. The senses of this semantic field can be categorized in two types, namely the natural materials left after burning and the manufactured goods produced through burning. The first group typically includes ‘ash’, ‘residual’, ‘ember’ and ‘charcoal’ as in examples (20)–(25). A specialization of ash in the cluster is ‘ashes of the candle’ as in example (23). ‘Charcoal’ gives rise to the chemical terms ‘alkyne; alkine’ and ‘benzene’ through metonymy as in example (24). The semantic link between ‘charcoal’ and the chemical terms lies in the fact the chemicals are formed by carbon-bonds. Therefore, the FIRE radical is used to indicate the concept of “carbon” produced through “burning” in those chemical terms. Other senses in this semantic field include manufactured goods that are produced in a fire oven, such as ‘ceramics’ (example 25).

(20). 灰 (爇) *huī*

物质燃烧后剩下的粉末状的东西。

‘the ashes of burning things’

(21). 烬 *jìn*

焰余。‘embers’

(22). 炭 *tàn*

木炭。‘charcoal’

(23). 炷 (炷, 爇) *xiè*

灯烛余烬。‘the ashes or embers of the candle’

(24). 炷 *quē*

化学名词。指一类有机化合物，其中含有碳-碳叁键结构而具有很不饱和性。

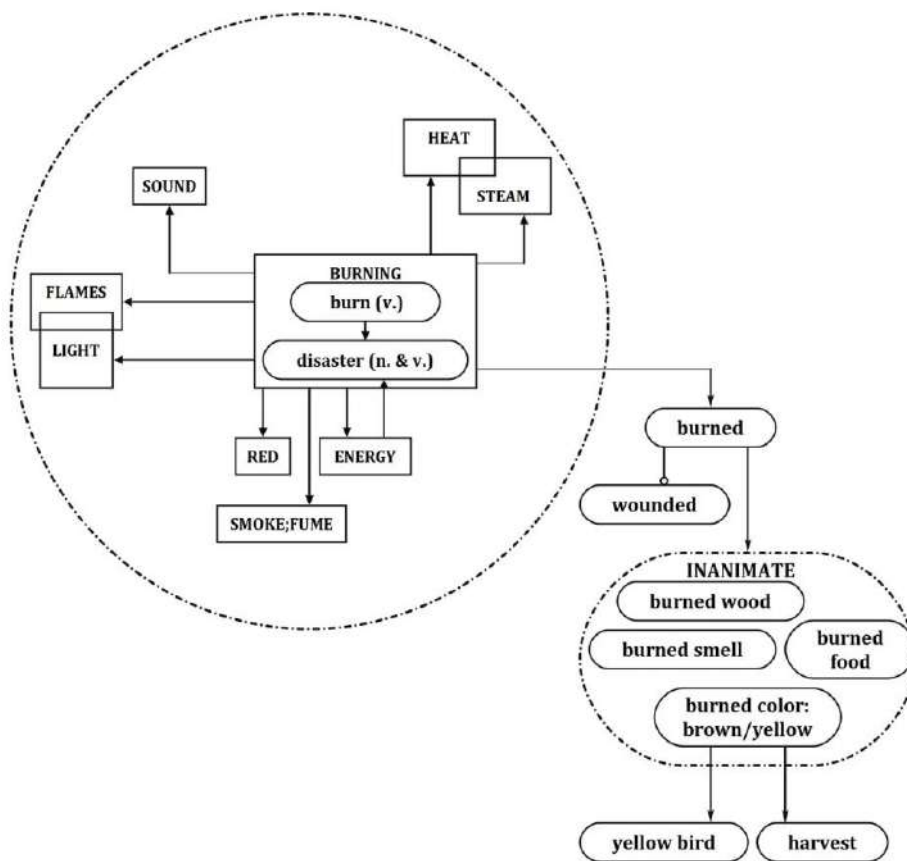
‘It is the chemical term of alkyne or alkine, which refers to a kind of organic compound that is very unsaturated because it contains the structure of the carbon-to-carbon triple bond.’

(25). 炷 *shí*

炷器，一种介于陶器和瓷器之间的制品，如水缸等，质地致密坚硬。

‘It refers to Ceramics of which the texture is something between pottery and porcelain.’

Figure 11. The extensions of being BURNED



The state of being BURNED (see 26) constitutes a further metonymic extension of BURNING, as shown in Figure 11. Not only inanimate things but also human or animals can get burned. When it comes to human or animals, the senses of the composite characters typically describe the status of ‘being wounded by fire or the heat of fire’ (see example 27) which is a specialization of the general ‘being burned’. When it comes to inanimate things, the senses of the composite characters typically describe the things incorporating the feature of ‘being burned’ rather than the ‘burned’ status itself. For example, these senses are typically (28) ‘burned color (yellow or brown)’, (29) ‘burned food or clothes’, (30) ‘burned smell’ and (31) ‘burned wood’. Since the color yellow is a feature of a kind of bird named 焉 *yān*, the ‘burn color’ may further metonymize as (32) ‘yellow bird’. In addition, since the golden color of the grains is reminiscent of the color of something that has been burned through fire, another metonymy that developed from the ‘burned color’ occur in example (33) ‘grain crop are ready for harvest’.

(26). 爇 (斃) *biē*

烧焦。‘burned’

(27). 燙 (燙) *tàng*

被火或高温灼痛或灼伤。‘burned or wounded by fire or heat’

(28). 爍 *lán*

焦黄色。‘the burned color brown’

(29). 糊 *hú*

食品经火变焦发黑;衣物等经火变黄、变黑。

‘burned food or clothes that turn into brown and black’

(30). 撕 *sī*

烧焦的气味。‘burned smell’

(31). 糟 (爍) *zāo*

烧焦的木头。‘burned wood’

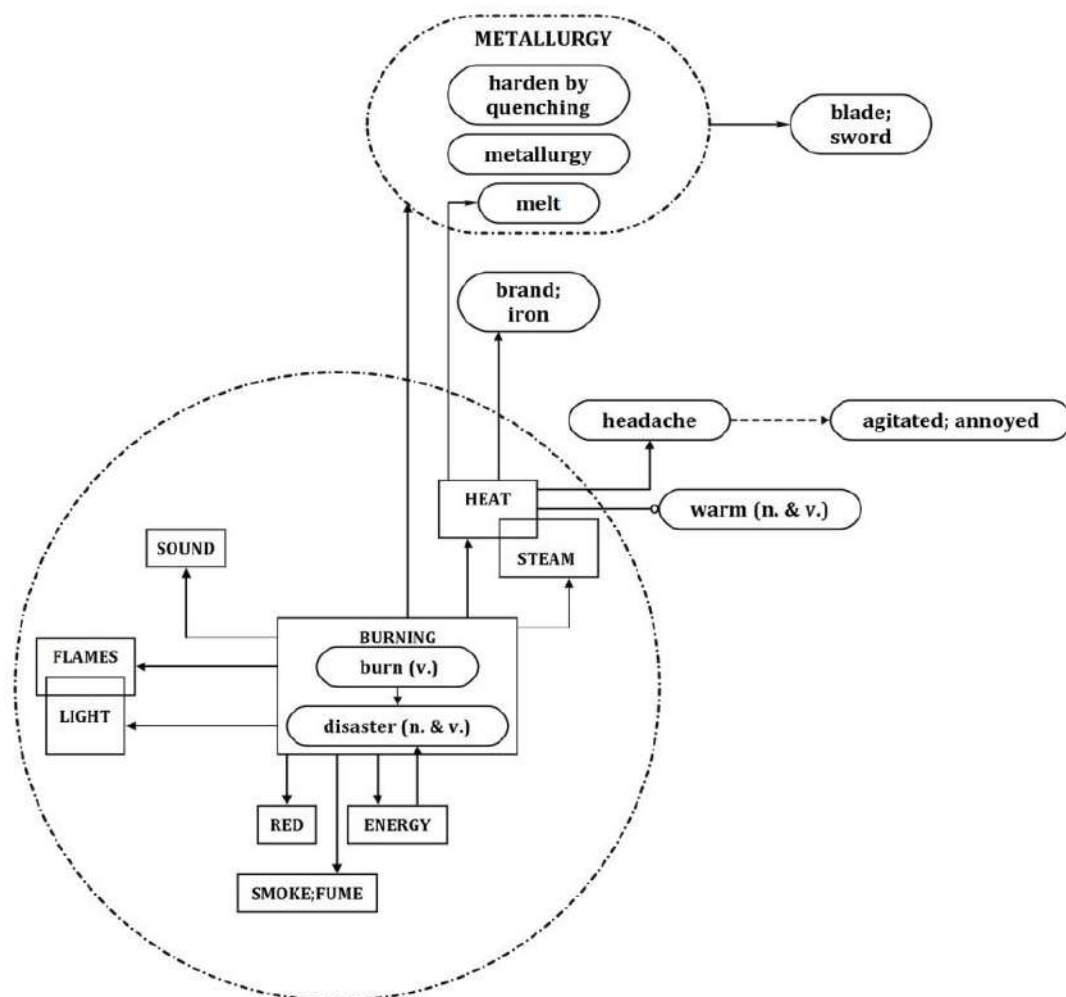
(32). 焉 (焉) *yān*

鸟名 (黄色的鸟) 。‘It refers to a kind of yellow bird.’

(33). 秋 (黍) *qiū*

秋, 禾谷孰也。‘It refers to grain crop are ready for harvest.’

Figure 12. The extensions of the facet HEAT



Now let us have a closer look at the extensions of the FIRE radical regarding the facet HEAT in Figure 12. As the analysis of METALLURGY has shown, ‘melt’ may be a metonymy of HEAT. Example 34 shows that the literal FIRE can be used as an indirect tool to heat up the temperature to ‘brand or iron’ things. The composite character in example (35) describes the type of ‘headache caused by physiological heat’. According to the traditional Chinese medicine belief, cold can be divided into 风热感冒 *fēng-rè-gǎn-mào* ‘common cold with wind-heat syndrome’ and 风寒感冒 *fēng-hán-gǎn-mào* ‘common cold with wind-cold syndrome’, which cause different types of headaches. The wind-heat type of cold and its corresponding headache are typically caused due to too much unbalanced internal heat within the human body. Therefore, the meaning ‘headache’ in (35) can be considered as a metonymic extension based on physiological experience. Since having a headache is generally uncomfortable, the feeling of being ‘agitated or annoyed’ may further extend from ‘headache’. ‘Warm’ in (36) can be seen as a specialization describing the milder degree of the more general type of heat associated with a burning fire.

(34). 烙 *lào*

用烧热的铁器烫，熨，使衣物平整或在物体上留下标志。

‘to use red-hot ironware to iron the clothes or to brand things’

(35). 烦(烦) *fán*

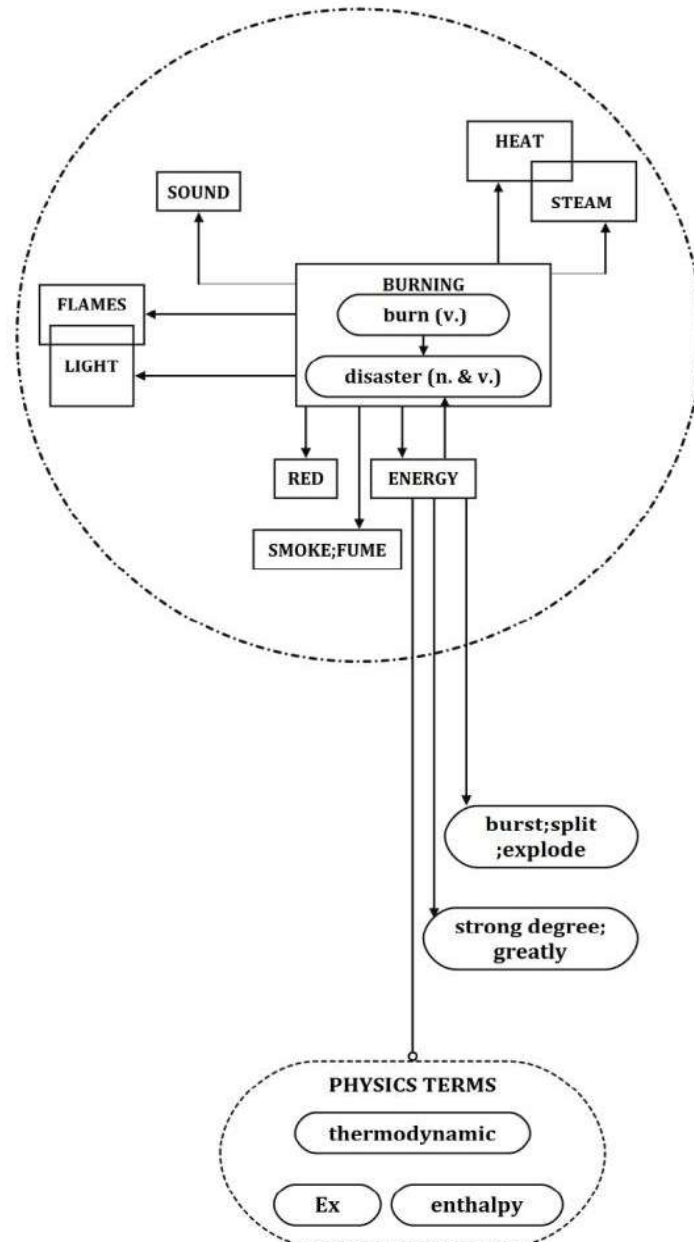
热头痛。引申为烦躁，烦闷。

‘It refers to the headache caused by physiological heat, which can be extended to describe agitation or annoyance.’

(36). 灵 *líng*

微温，温度不高。‘It refers to warm or, the temperature is not high.’

Figure 13. The extensions of ENERGY



The next facet of the prototypical FIRE is ENERGY. In the case study of the semantic structure of the FIRE character (HUANG, *et al.* forthcoming), the facet ENERGY did not develop many extensions except for its mutual metonymic relation with ‘disaster’. By comparison, the facet ENERGY of the composite characters with the FIRE radical exhibit a number of additional extensions. Some extensions relate to terms in physics, more specifically to terms that describe the phenomena related to ‘energy changes or thermodynamics’. Hence, the FIRE radical is used in these terms to indicate a type of strong energy (see example 37). If the ENERGY is so strong that it is out of control, things may suddenly ‘burst; split; explode’ as in (38). Following this line of development, composite characters that convey sense (39) ‘strong degree; greatly’ may also be a metonymy of strong ENERGY.

(37). 熵 *shāng*

物理学上指热能除以温度所得的商，标志热量转化为功的程度。

‘In physics, it refers to entropy or thermal charge that is used to measure the changes between work and energy in the thermodynamics.’

(38). 炸 *zhà*

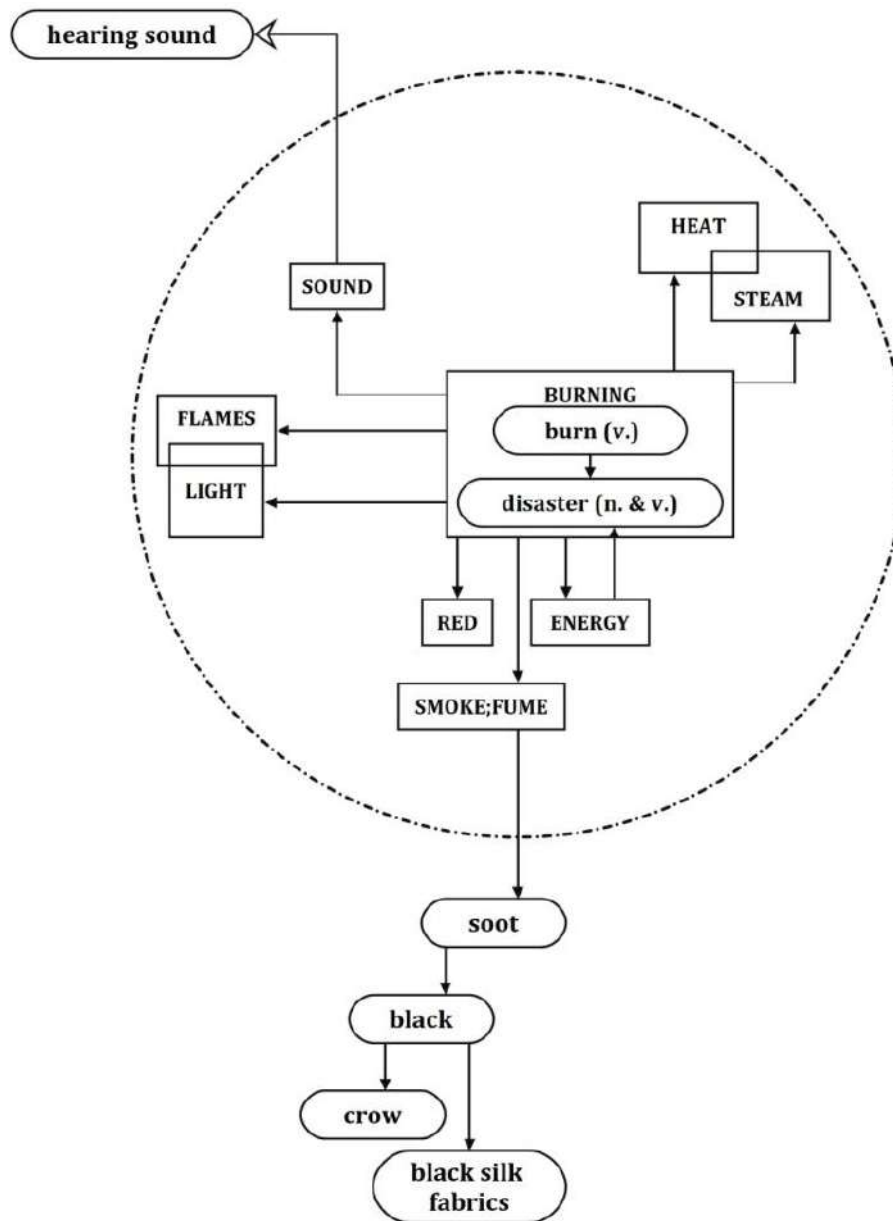
指物体突然破裂。

‘It refers to the sudden bursting or splitting or exploding of things.’

(39). 焯 *tuī*

盛 (程度深)。‘strong degree; greatly’

Figure 14. The extensions of SMOKE;FUME



As mentioned briefly in the description of Figure 4, the facets SOUND, STEAM and SMOKE; FUME are facets that do not appear in the prototypical circle of the semantic structure of the FIRE character. The facets SOUND and STEAM seem not to be as productive as the facet SMOKE; FUME. That is, SOUND is further generalized from ‘the sound of burning fire’ to ‘hearing sound in general’ (see example 40–46) whereas no semantic extensions are found to develop from STEAM. However, several extensions develop from the facet SMOKE; FUME. Since ‘soot’ refer to black ashes of the smoke, ‘black’ may be seen as a metonymy of ‘soot’. Also, due to the feature ‘black’, senses such as (44) ‘crow’ and (46) ‘black silk fabrics’ can also be indirectly linked to the literal FIRE and the FIRE radical through metonymy.

(40). 夙 *huǒ*

火发声。‘fire sound’

(41). 猷 *qiú*

耳中声。‘hearing sound’

(42). 煙 (烟, 𤇀, 𤇁) *yān*

物质燃烧时所产生的气壮物。

‘the gaseous substance produced by burning things’

(42). 𤇂 (炘, 燿, 𤇃, 𤇄, 𤇅) *tái*

烟尘。烟气凝积而成的黑灰。俗称烟子。

‘It refers to the dust of the smoke or black ashes that is accumulated from smoke or fume of burning, which is also called soot.’

(43). 烏 *wū*

鸟名，乌鸦。‘crow’

(44). 𤇆(黑) *hēi*

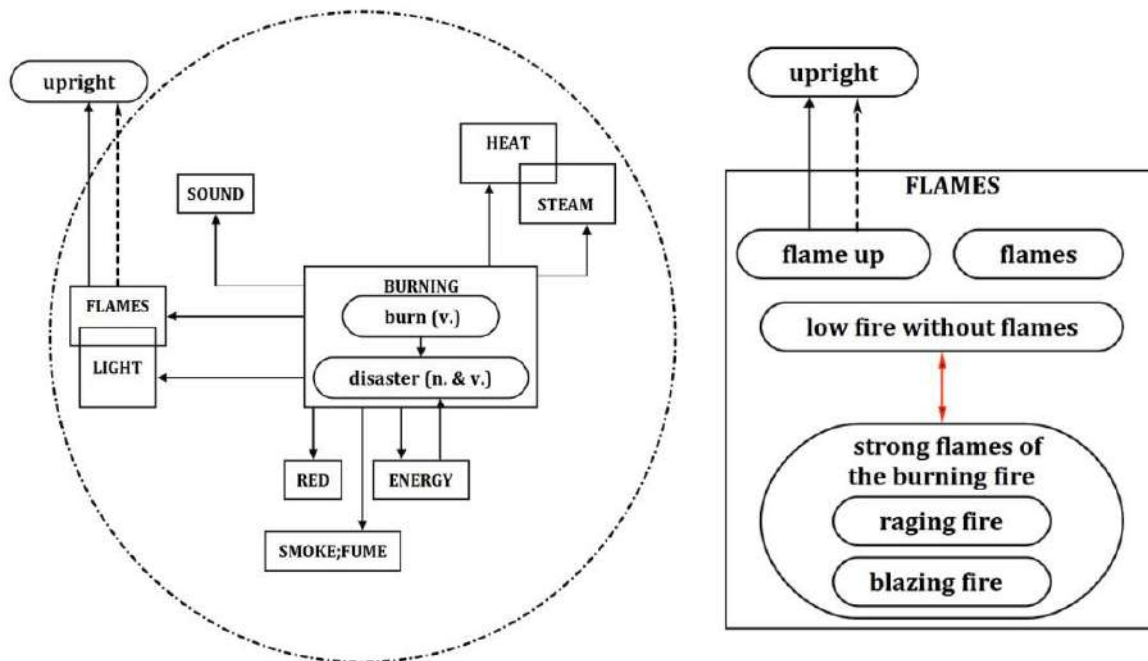
火所熏之色也。

‘It refers to color black that is the color of smoked things.’

(45). 𤇇 *tān*

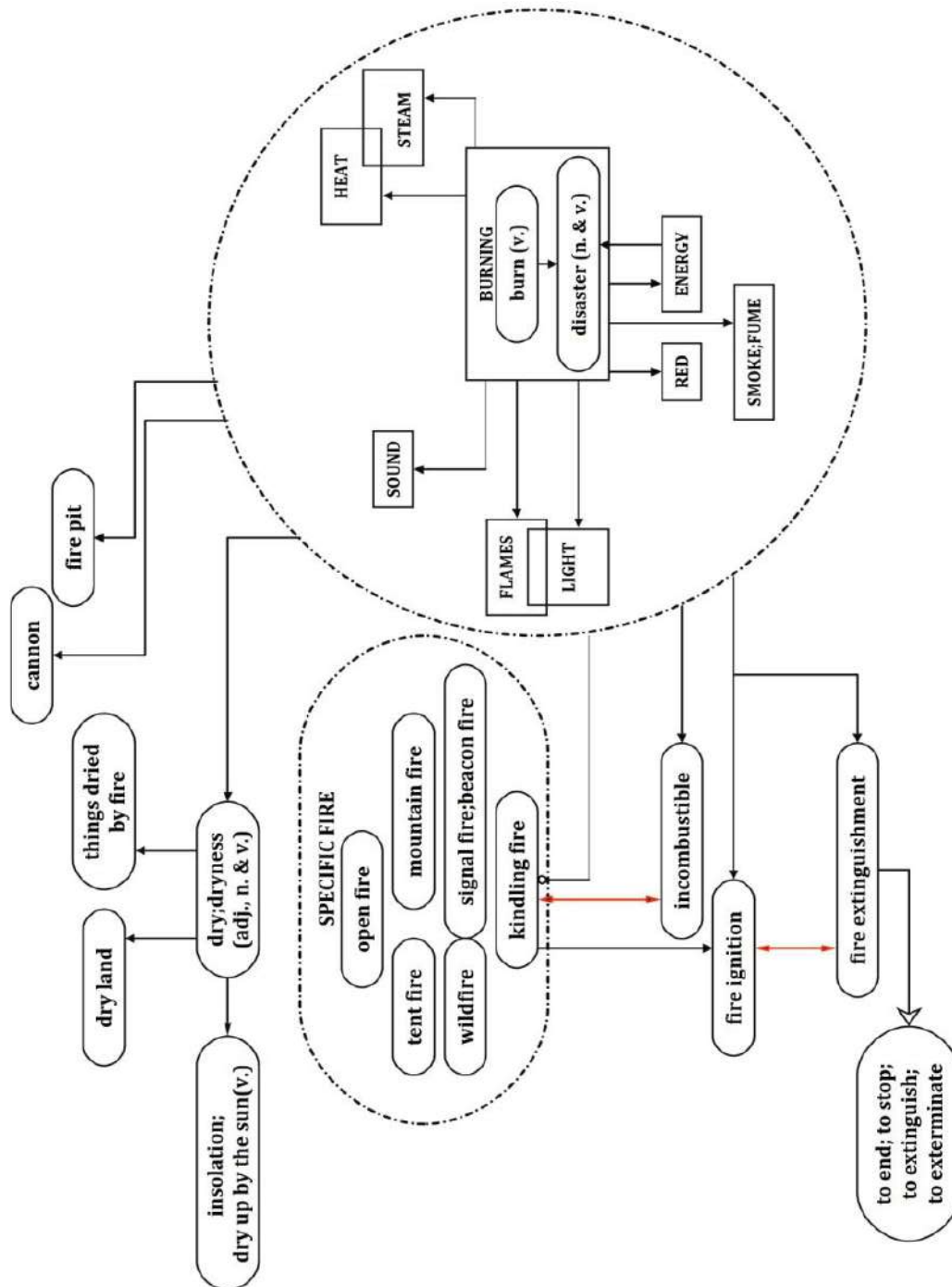
青黑色的丝织品。‘black silk fabrics’

Figure 15. The overview (left) and close-up (right) of the extensions of FLAMES



Since the facet LIGHT has already been discussed under Figure 6 and since the facet RED has no extensions, only the facet FLAMES remains, which is displayed in Figure 15. The extensions in this semantic field mainly convey the following meanings: i) ‘flames’, ii) ‘strong flames of the burning fire’ and iii) ‘flame up by wind’. First, it is not difficult to understand that some composite characters may express ‘flames’ and ‘firelight’ at the same time since FLAMES is a part of the burning fire. For instance, the characters 爍 *liào* and 映 *yǎng* mentioned in Figure 4 express 火光 *huǒ-guāng* ‘firelight of the flames’. Second, since the intensity of the ‘flames’ can give an indication of the intensity of the burning fire, ‘strong flames of the burning fire’ incorporates two sub-notions in the form of the composite characters such as 焮 *mù* (火焮 *huǒ-chì* ‘fire-blaze’); 焜 *tōng* (火盛 *huǒ-shèng* ‘fire-magnificent’) and 焮 (焮) *pū* (火烈 *huǒ-liè* ‘fire-violent’). The senses of the composite characters 焮 *mù* and 焜 *tōng* typically describe the ‘burning fire’ as being ‘strong in intensity with flaming or blazing’. The sense of the composite character 焮 (焮) *pū* also describes the ‘burning fire’ but with flames that are strong and raging so that the fire is so violent, rampant and possibly out of control’. Interestingly, the composite characters can also convey the opposite sense ‘low fire without flames’, whereby flames are again used to gauge the intensity of the fire. This is reminiscent of the sense ‘dark; blind’ of the facet LIGHT, which shows that the FIRE radical may work in antonymic ways. The third extension of FLAMES is ‘flame up’ whereby the flames rise upwards due to external factors such as the wind. In this sense, ‘upright’ may be considered as a metonymy or a visual metaphor of FLAMES due to the upwards momentum of the burning flames.

Figure 16. The extensions of the literal FIRE



Besides the extensions of the facets, some extensions develop from the literal FIRE itself. These include metonyms, such as ‘fire pit’, ‘cannon’, and ‘dry or dryness (by fire)’, in which FIRE takes its literal sense. There are three more metonyms that developed from the extension ‘dry; dryness (by fire)’, namely ‘dried things (by fire)’, ‘dry land’ and ‘insolation; dry up by the sun’. Other metonyms of the literal FIRE are ‘fire ignition’, ‘fire extinguishment’ and ‘incombustible’ since a fire can be started or stopped. Interestingly, ‘fire ignition’ and ‘fire extinguishment’ are once again two antonymic extensions. Through a generalization, senses such as ‘to end; to stop; to extinguish; to exterminate’

to extinguish; to exterminate' developed from the sense 'fire extinguishment'. Furthermore, the senses subsumed under the semantic field SPECIFIC FIRE refer to types of fire that are found in a specific place (e.g. mountain fire) or used for a certain purpose (e.g. signal fire). 'Kindling fire' may generate the metonymic links with 'fire ignition' and 'incombustible' since 'kindling fire' is 'flammable'. Again, 'kindling fire' and 'incombustible' constitute antonyms.

4. Discussion

This study serves as the first step in the investigation of the semantic structure of the composite characters featuring the FIRE radical. By analyzing the semantic scope of the FIRE radical, we seek to discover what role the FIRE radical plays in the semantics of the composite characters it forms. More concretely, the study focuses on the global extensions, i.e. the extensions that develop from the senses of the FIRE character, as opposed to the local extensions, which result from internal semantic change of the composite characters. The present case study on the FIRE radical specifically is taken to be a case study of the way in which radicals as a whole undergo semantic change.

Although a thorough investigation of the local extensions is needed to offer a comprehensive account of the function of the FIRE radical, the global extensions offer us some valuable insights. Firstly, the analysis confirmed our hypothesis that the semantic structure of the global extensions of the FIRE radical is a radial network with prototype characteristics. The network therefore consists of a core circle and a peripheral area, with the structure radiating from the inner circle to the outer area. The core circle can also be referred to as the prototypical circle, which consists of FIRE in its most literal sense and the facets that can be used to describe the literal FIRE, namely BURNING, ENERGY, FLAMES, HEAT, LIGHT, SMOKE; FUME, SOUND, STEAM and RED. The peripheral area consists of the figurative senses of the composite characters that extended from the literal FIRE. Semantically, all extensions in the radial network are linked to one another through different mechanisms, which again develop from the core to the periphery.

The radial network of the FIRE radical shows features of prototype-based networks. To begin with, the radial network takes the shape of a semantic structure of family resemblance: "a family resemblance relationship takes form AB, BC, CD, DE. That is, each item has at least one, and probably several, elements in common with one or more items, but no, or few, elements are common to all items" (ROSCH & MERVIS, 1975, p. 574–575). More specifically, "the semantic structure of family resemblance is typically with clusters of meanings and overlapping readings in a radial network" (GEERAERTS, p. 1997:11). Applied to the present case study, family resemblance causes a definitional problem (see GEERAERTS, 1997, p. 21–22, 2007) with regard to the prototypical facets of the literal FIRE. More concretely, FIRE is complex process that may elicit different experiences in different people, which makes it difficult to capture all characteristic facets of FIRE in a single set of criteria. This definitional problem explains why the FIRE radical incorporates some facets that have no equivalent in the network of the FIRE character, namely SOUND, STEAM and SMOKE; FUME. This does not necessarily mean that the core circle of the FIRE radical and the FIRE character are different. Rather, SOUND,

STEAM and SMOKE; FUME may simply be less salient or less central facets of FIRE when it comes to the dictionary definition of FIRE compared to the other facets such as BURNING, HEAT, FLAMES, LIGHT and RED. It is possible that when the FIRE radical was used to create composite characters to enlarge the vocabulary, the pervasive sensory experience of hearing the crackling sound of fire, feeling or seeing steam, smoke and fume in the community as a whole may have driven the emergence of the composite characters featuring the FIRE radical that convey SOUND, STEAM and SMOKE; FUME as well as their extensions:

有火必有煙，煙最初是一種自然現象。人類學會用火以後，煙也可以人為地產生，有時利用煙來派上各種用場，如‘烽煙/狼煙’，。。。 [Where there is fire, there is smoke. Smoke originally is a natural phenomenon. Since mankind have learned how to use fire, smoke can also be made and used for various purposes, such as smoke of the beacon fire or burning wolf feces...](WANG, 2018, p. 384)

In addition, family resemblance effects also appear in the form of semantic clusters of extensions and overlapping readings of the senses. Likewise, all the global extensions of the FIRE radical that are linked through mechanisms such as metaphor, metonymy, generalization and specialization tend to cluster in groups. Extensions such as ‘fire ignition’ is linked to three different semantic fields, viz. the literal FIRE, ‘kindling fire’ and ‘fire extinguishment’ in Figure 16, which may be seen as a sense cluster of overlapping readings.

Another prototypical characteristic of the radial network of the FIRE radical is that the senses appear to be blurry at the edges, especially the facets. In the present case study, two pairs of facets overlap semantically. That is, FLAMES overlaps with LIGHT whereas HEAT overlaps with STEAM, from which composite characters that refer to ‘firelight of the flames’ and ‘heat and steam’ developed respectively. The reason for the blurred edges between senses is two-fold. For one, the demarcation of the facets is blurry because of the definitional problem (see GEERAERTS, 2007), viz. there is no single set of criteria to describe FIRE in its literal sense. Secondly, since FIRE is a complicated phenomenon where all facets occur simultaneously, it is natural that it is difficult to untangle the different facets of FIRE, and by extension, some senses cannot easily be categorized into a single facet.

The second finding about the FIRE radical and radicals as a whole is that radicals are semantically not the same as the character from which they derive; they have an independent semantic status. Although we expected that the global extensions of the FIRE radical share the same semantic fields as those of the FIRE character, the present study shows that except for COOKING, ILLUMINATION and ‘fire as one of the five elements’, most global extensions are not linked to the extensions of the FIRE character other than its literal sense. Hence, most global extensions are independent extensions of the FIRE radical.

Finally, regarding the different semantic mechanisms, metonymy appears to be the main driving force behind most global extensions, in which the FIRE radical refers to its most literal meaning, i.e. the burning fire, whereas metaphor, generalization and specialization produce fewer extensions in our data. So if the FIRE radical is mostly used to refer to the literal FIRE in

the composite characters and if the original meanings of the composite characters are extensions of the literal FIRE, the question arises as to whether the FIRE radical only contributes the literal sense of burning fire in the composite characters. Since burning fire was an important part of daily life in the past, it comes as no surprise that the global extensions, i.e. the original senses of all the composite characters featuring the FIRE radical, convey the meaning of burning fire through metonymy since they were introduced to accommodate the pervasive use of FIRE in different aspects of life. However, fire is no longer as central in modern society, which gave rise to an interesting phenomenon where the burning fire is no longer involved in the meanings of composite characters anymore. For example, if we think about ‘to cook’ in a modern sense: ‘to cook’ in the oven or on the induction cooker, where the literal FIRE is not used at all. The immediate question is to what extent this type of extension or semantic change happens and to what extent do the FIRE radical and the composite characters interact semantically.

The semantic structure of the global extensions partially reveals the semantic functions of the FIRE radical as well as radicals as a whole. To see the whole picture, we need to move on to the next case study of the semantic structure of the local extensions of the composite characters featuring the FIRE radical. Only then can we fully understand what role the radicals as a whole play in lexical change.

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