

Original Paper

Metaphoric and Metonymic Operations for the *Iron* Expressions

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Abstract

This study uses the word iron as an example to analyze the phenomena of meaning extensions and function shifts from a cognitive semantic perspective. The analysis shows that the meaning extensions of iron, which are systematic and motivated, are present at three word class levels: nouns, adjectives and verbs. The nominal extensions are systematically connected to the parent noun by the metonymy of THE MATERIAL CONSTITUTING AN OBJECT FOR THE OBJECT. The adjectival extensions are motivated by the metonymy of CATEGORY FOR PROPERTY. The verbal extensions are mainly stemmed from the noun extensions and motivated by the metonymy chains of THE MATERIAL CONSTITUTING AN OBJECT FOR THE OBJECT and INSTRUMENT FOR ACTION. The extensions for the phrasal verb iron out are motivated by both the metonymy chains mentioned above and the metaphors of DIFFERENCES ARE WRINKLES, DIFFICULTIES ARE WRINKLES, and PLANS ARE WRINKLES.

Keywords

cognitive, meaning extensions, shifts, iron, metaphor, metonymy

1. Introduction

The element of iron forms much of Earth's outer and inner core, and it also plays an essential role in the biological functions of human beings. *Iron* has been variously employed for tools, implements, machinery, constructions, and many other applications. Lakoff (1987) claims that "meaning is characterized in terms of embodiment, i.e., in terms of our collective biological capacities and our physical and social experiences as beings functioning in our environment" (p. 266).

The physical properties and functions of *iron* provide the experiential foundation for the meaning extensions of *iron* in English expressions. In the expressions like *iron will*, *iron man*, *iron curtain*, and *iron law* and so on, the extended meanings of *iron* are different but they are related to the physical properties and functions of *iron*.

The recent studies of *iron* expressions apply the metaphorical usages of *iron* to some specific fields, which take *iron* metaphors as examples for the interpretation of some specific purposes. Gold and Segal (2017) analyzed the

metaphor of *iron will* in which the abstract concept or target (*will*) is compared with the base concept (*iron*). The mutual semantic characteristic of firmness leads to a new understanding of the target (*will*). Mashal and Kasirer (2014) used the metaphor of *iron fist* to compare the brain activities when participants processed the inaccessible meaning of novel metaphoric expressions (such as *imagination caves*) to its activity when processing accessible meanings of familiar metaphor (*iron fist*). Schutz (2010) used the *iron band* metaphor to analyze the metaphor of *space* in educational theories. The *iron band* holds men so tightly together and leads to the ultimate destruction of *space*. *Iron* has different meanings in English expressions, but the relationships between the different meanings and the cognitive motivations for these extensions are still waiting to be analyzed.

All kinds of dictionaries and reference books show that *iron* also has function shifts, and that it can function as nouns, adjectives and verbs. For example, in example (1), *iron* is a noun but the contextual meaning is different from the meaning of *iron* as a metal term. In example (2), *iron* functions as an adjective to denote relentlessness. In example (3), *iron* is used as a verb to describe the action of putting *iron* chains or shackles on people. In these examples, the form of *iron* is the same to the noun form but the functions are changed.

(1) Not speeches and resolutions but blood and iron would solve the problems. (OED2ⁱ)

(2) He will need an iron determination, for it will be a long tussle. (BNCⁱⁱ)

(3) Iron him then, let the rest go free. (OED2)

As to the function shifts of *iron* to verbs, Clark and Clark (1979) classified *iron* into “instrumental verbs, in which instrument nouns are used as verbs to refer to the action with the instruments” (p. 777). Kövecses (2010) regarded the noun-to-verb shift as “a metonymical mapping of Action ICMs, in which the instruments are entities in the actions and can create natural links to the action with the instruments” (p. 258). The shifts of *iron* as a noun to *iron* as an adjective and a verb are complicated. The relationships between the different shifts and the cognitive motivations for them should be analyzed. The previous studies of *iron* expressions didn’t give a principled analysis of the meaning extensions and function shifts of *iron*. This study attempts to carry out a systematic analysis of *iron* expressions from the cognitive semantic perspective. The main purpose is to find the relationships between the extensions and shifts and the cognitive motivations for them. The purpose will be achieved by answering the following research questions:

- (4) a. What are the relationships between the meaning extensions of *iron*?
b. What are the relationships between the different functions of *iron*?
c. What are the cognitive motivations for the meaning extensions and function shifts of *iron*?

2. Theoretical Framework

It is now accepted that both metaphor and metonymy are conceptual (Lakoff & Johnson, 1980, p. 3; Kövecses, 2010, p. 4, p. 173). “Metaphor is mapping across knowledge structures (i.e., domains or ICMs); metonymy is mapping within the same domain or domain matrix” (Lakoff & Turner, 1989; Croft, 1993; Kövecses & Radden, 1998).

A cognitive semantic analysis of the meaning extensions of *iron* can show the relationships between the different meanings and the cognitive motivations for them. These meaning extensions are the polysemies of the word *iron*, because they are related to the basic meaning of *iron*. Lakoff (1987) mentioned that “polysemy occurs when a single word has more than one meaning and when those meanings are systematically related” (p. 316). The systematic relationships between the different meanings, as Lakoff (1987) stated, are “systematic relationships between different cognitive models and between the elements of the same model” (p. 13). As to the cognitive motivations for the meaning extensions, Kövecses (2010) said that “the meaning extension often takes place on the basis of conceptual metaphor and metonymy. Metaphor and metonymy serve as cognitive links between two or more distinct senses of a word” (p. 254). These theories and ideas of polysemies provide the framework for the analysis of the relationships of the different meanings of *iron* and the cognitive motivations for its extensions.

The function shifts of *iron* fall into two types: noun-to-adjective shift and noun-to-verb shift. The function shift is the conversion of the word category. Martsa (2013) defined conversion as “a morphologically unmarked category-shifting word-formation process motivated by metonymic and/or metaphoric mappings” (p. 131). These ideas lay the theoretical foundation and general direction for the analysis of the function shifts of *iron*. But the types of mappings are not all the same for all the shifts of *iron* and they will be analyzed in the different contexts of *iron*.

3. Methodology

In this paper, the contexts of *iron* are extracted from both the dictionary and the corpus, which equip this research with abundant linguistic resources for the analysis of the meaning extensions and function shifts of *iron*.

3.1 Data Collection

The contexts of *iron* are collected from two sources: The Oxford English Dictionary (second edition) (OED2) and British National Corpus (BNC). The Oxford English Dictionary (second edition) (OED2) is widely regarded as the accepted authority on the English language. It is an unsurpassed guide to the meaning changes of English words. Due to the restrictions of time and space, some new meanings cannot be included promptly, so the authoritative corpus of BNC, which covers the current samples of written and spoken language from a wide range of sources, will be a good complement to OED2. The two sources of data can complement each other and provide reliable corpus for this study.

The entries (including meaning and word classes) and examples of *iron* are collected from OED2 (CD-ROM version) which will provide references for the meaning extensions and shifts of word classes of *iron* in the contexts from BNC. OED2 (CD-ROM version) provides 582 examples of *iron* expressions and the word classes of *iron* fall into three categories: Noun, Adjective and Verb. With *iron* as the keyword, this research gets 4609 hits of *iron* contexts from BNC.

3.2 Data Processing

After data collection, this research attempts to find answers to the research questions in the following steps. First, the data from BNC and OED2 are stored in excel files respectively. Contexts of *iron* from BNC are stored in the

file and all the hits are retrievable to the original texts. Entries of *iron* (including senses, word class, and examples) from OED2 are stored in the file. Second, the root senses and word classes of *iron* are defined based on the analysis of the entries of *iron* in OED2 and the encyclopedia knowledge of *iron*. After careful observation and comparison, this research gets the base sense of *iron* as follows.

(5) Iron: noun. A metal, the most abundant and useful of those used in the metallic state; very variously employed for tools, implements, machinery, constructions, and in many other applications...

Goatly (1997) stated that “when language maps experience in the most straightforward way, nouns represent things, adjectives the properties of things, verbs realize states and processes” (p. 79). In OED2, the entries of *iron* fall into three classes: noun, adjective and verb. According to the rules of English sentence constituents, the different constituents of subject, predicate, object, attributive, adverbial, and complement and so on characterize the different word classes. Generally speaking, nouns act as subject, object, attributive and complement while adjectives act as attributive and complement and adverbial. Verbs mainly act as predicate which has form changes in terms of number, person and tense. Therefore, the constituent analysis of the *iron* contexts can help to identify the word classes of *iron*.

Then, at the third step, under the guidance of sentence constituent rules and with the reference to the senses and word classes of *iron* in OED2, we tagged the contexts of *iron* from BNC for the classes, senses, and collocations of *iron*, as illustrated below.

(6) They may be repelled with cold iron or an opened Bible. (OED2) (Noun—weapon-cold iron)

(7) He brought it under control with his iron will. (BNC) (Adjective—unyielding-iron will)

(8) I'll teach him to iron his shirts. (BNC) (Verb—to press clothes with heated iron—iron clothes)

The word classes, senses and collocations are tagged in three columns respectively and they will be used for the classification of word classes and senses in the following steps. First, the examples are grouped into different word class groups and sense groups through the sequencing function of excel. Second, the sense groups are compared both within each word class group and among the word class groups. The purpose of this step is to find the relationships between different senses and word classes and to draw a map for meaning extensions and word class shifts. Third, the meaning extensions and word class shifts are analyzed within the framework of cognitive semantics (especially the theory of metaphor and metonymy).

4. Results and Discussions

The results from the data processing will be discussed in this section to explore the relationships between the different extensions and shifts. The motivations for these extensions and shifts will also be analyzed from the perspective of cognitive semantics.

4.1 Results

The results from data processing shows that *iron* has different kinds of meaning extensions in different word classes and the extensions are related to the parent noun directly or indirectly. This is in accordance to some traditional ideas. Lakoff and Johnson (1999) hold that “polysemy is the norm. Most words have a number of

systematically related meanings” (p. 499). The analysis of *iron* shows the systematically related meanings of *iron*. Deignan (2005) mentioned that “it is common for literal and metaphorical meanings of a word to be of different word classes” (p. 152). Sinclair (1991) believed that “there is a close correlation between the different senses of a word and the structures in which it occurs” (p. 53). As to the relationships between form and meaning, Sinclair (1991) hold that “there are correspondences between form and meaning such that different meanings of a word very often take different grammatical patterns, if not at the level of part of speech, then at a more detailed syntactic level” (p. 65).

The analysis of *iron* shows that the meaning extensions of *iron* can take place at the level of noun-to-noun, noun-to-adjective and noun-to-verb. The extensions and shifts are closely connected. Shifts may lead to extension and extension may happen within the same word class.

S			
NV	Vt. + CN / Vt. + Adv(out)+ CN/Vi	Vt. + Adv(out) + AN	
NA	CP (color, material...)	AP (cruelty, firmness...)	
NN	CN (Object, instrument ...)	CN /AN +of +Iron	
PN	Concrete	Abstract	E

Figure 1. Shifts and Extensions of Ironⁱⁱⁱ

The systematic relationships between the different meaning extensions and the different shifts will be analyzed in the following part, while the motivations for them will also be explored.

4.2 Noun-to-Noun Extensions

The data analysis shows that the parent noun may also refer to many things that are related to the root meaning of *iron*, such as the objects made of *iron*, the instrument made of *iron* and *iron* used for properties. When the parent noun is extended to objects and instruments, the motivation for the extensions of the parent noun is metonymy. When the parent noun is extended to the abstract properties, the motivation is a combination of metonymy and metaphor.

Kövecses (2010) defined metonymy as “a cognitive process in which one conceptual entity, the vehicle, provides mental access to another conceptual entity, the target, within the same domain, or Idealized Cognitive Model (ICM)” (p. 173). The motivations for the extensions to objects and instruments are Constitution ICM. According to Kövecses (2010), in Constitution ICM, substances may be conceived of as parts that constitute or make up things, in particular, physical objects. The Constitution ICM gives rise to the metonymic variant of *THE MATERIAL CONSTITUTING AN OBJECT FOR THE OBJECT*” (p.180). Within the Constitution ICM, the parent noun *iron* offers mental access to the objects and instruments made of or related to *iron*. The extensions are

related to the parent noun directly or indirectly and can be listed (from N^1 to N^{11}) in Figure 2 and exemplified as follows.

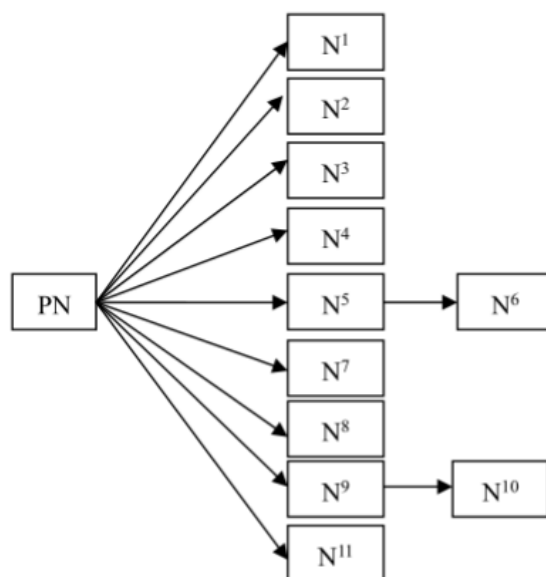


Figure 2. Noun-to-Noun Extension

- (9) N^1 . An appliance with a flat metal bottom, used when heated by electricity, to press or smooth clothes, linens etc.
- An iron that is too hot will melt the fabric. (BNC)
 - The electric iron is not much use without an electricity supply. (OED2)
- (10) N^2 . Iron shackles or fetters; of a person having the feet or hands fettered.
- When the Earl reached the Castle his legs were put in irons. (OED2)
 - The Jailors clapped irons on our feet, and manacles on our hands. (OED2)
- (11) N^3 . Plates or sheets made of iron for furnishing or roofing.
- Building paper should be used under the iron above the shearing board. (BNC)
 - The door was built of ancient oak, heavily reinforced with iron. (OED2)
- (12) N^4 . An iron instrument used for branding or cauterizing; a brand-iron.
- I have not marked them with the iron of the images. (BNC)
 - His throat felt as if it had been cauterized with a hot iron. (OED2)
- (13) N^5 . Engraved iron stamps or models used for impressing a design or figure on something, as in coining money, striking a medal, or embossing paper.
- John was a graver of the coining irons of gold and silver within England and Calais. (OED2)
 - Clerk of the Irons is an officer who had charge of the manufacture and use of the dies. (OED2)

(14) N⁶. Money

- a. He was earning a bit of iron. (BNC)
- b. The iron you're going to give me. (OED2)

(15) N⁷. A golf-club having an iron head which is more or less laid back in order to loft the ball.

- a. There are heavy irons and light irons, driving irons, lofting irons, and sand irons. (BNC)
- b. His opponent used the iron well and played a very good short game. (OED2)

(16) N⁸. Whaling, etc. A harpoon. (=harping-iron.)

- a. One of our Shallops comes too near the other fish before they threw out their irons. (OED2)
- b. Both irons are buried in the whale. (OED2)

(17) N⁹. Weapon (swords or pistols)

- a. Put down your irons, or we'll drop you where you stand. (OED2)
- b. Once again, our shooting irons spoke, adding still another quota to the bag. (BNC)

(18) N¹⁰. Warfare or slaughter

- a. To make way through fields of iron, and streams of blood, to that imperial dignity. (OED2)
- b. Charge Troy's children afield and fell them grimly with iron. (OED2)

(19) N¹¹. The abstract properties, something hard, strong, rigid, or unyielding.

- a. He felt a grip of iron round his wrist. (BNC)
- b. The three girls are like her father, with a will of iron. (BNC)
- c. She ruled their lives with a rod of iron. (BNC)
- d. Others of iron resolution, having announced their determination to climb Ingle borough. (BNC)

The parent noun is mainly extended to the concrete *iron* instruments for different purposes. The motivation for these extensions is the metonymy of *THE MATERIAL CONSTITUTING AN OBJECT FOR THE OBJECT*. These instruments are made of *iron* and they are used in different fields. In (9a) and (9b), N¹ is for smoothing clothes. In (10a) and (10b), N² is for fettering people. In (11a) and (11b), N³ refers to *iron* objects (plates or sheets) for furnishing or roofing. In (12a) and (12b), N⁴ is for branding or cauterizing. In (13a) and (13b), N⁵ is for striking coins. In (15a) and (15b), N⁷ is for playing golf. In (16a) and (16b), N⁸ is for killing whales. In (17a) and (17b), N⁹ is for hurting or killing people.

In (14a) and (14b), N⁶ is extended from N⁵ in that N⁵ is the instrument for striking or producing coins while coins are one form of money. The extension from the parent noun to N⁶ involves three metonymies: *THE MATERIAL CONSTITUTING AN OBJECT FOR THE OBJECT*, *INSTRUMENT FOR PRODUCT* and *MEMBER OF A CATEGORY FOR THE CATEGORY*. The dies or the models for striking coins are made of *iron*, so the material of *iron* offers mental access to the dies for coin-making. The *iron* dies are instruments for coin-making, so the instruments are used as mental access to the products (coins). Coins from these instruments are one form of money, so the products offer mental access to the category of money in general.

In (18a) and (18b), N¹⁰ is extended from N⁹ in that *iron* weapons are instruments used in warfare or slaughter, and the motivation for this extension is the metonymy *INSTRUMENT FOR ACTION*. The *iron* instruments or the

weapons offer mental access to the action or event of warfare or slaughters.

N¹¹ in (19) is the abstract extensions of the parent noun. The motivation for this is a combination of metonymy and metaphor. Within the category for Property ICM, the category *iron* offers mental access to some of the abstract properties related to *iron*, such as the properties of being firm, strong, rigid, unyielding, or unimpressionable. These abstract properties are realized metaphorically in the structure of *noun + of + iron*, in which these properties of *iron* are mapped onto the nouns. In (19a), the hardness of *iron* is mapped onto the firmness of grip. In (19b), the strength of *iron* is mapped on to the strength of willpower. In (19c), a rod is a kind of instrument or weapon to rule people and it offers mental access to the action of controlling. In *a rod of iron*, the strength and hardness of *iron* are mapped on to the rigidity of control. In (19d), the hardness and inflexibility of *iron* is mapped onto the unyielding property of resolution.

4.3 Noun-to-Adjective Extensions and Shifts

The data analysis shows that, when *iron* is collocated with other nouns, it tends to function as premodifiers and the word of *iron* has been appropriated as an adjective denoting strength (*iron will*), robustness (*iron constitution*), relentlessness (*iron determination*), firmness (*iron grip*), and so on. In these compounds, the word of *iron* tends to function as adjective in that in these compounds, the noun of *iron* lost its referential senses and the properties of the metal turn to be highlighted. The analysis of the extensions shows that the adjective senses of *iron* are extended from the parent noun directly or indirectly and can be listed (from A¹ to A⁹) in Figure 3 and exemplified as follows.

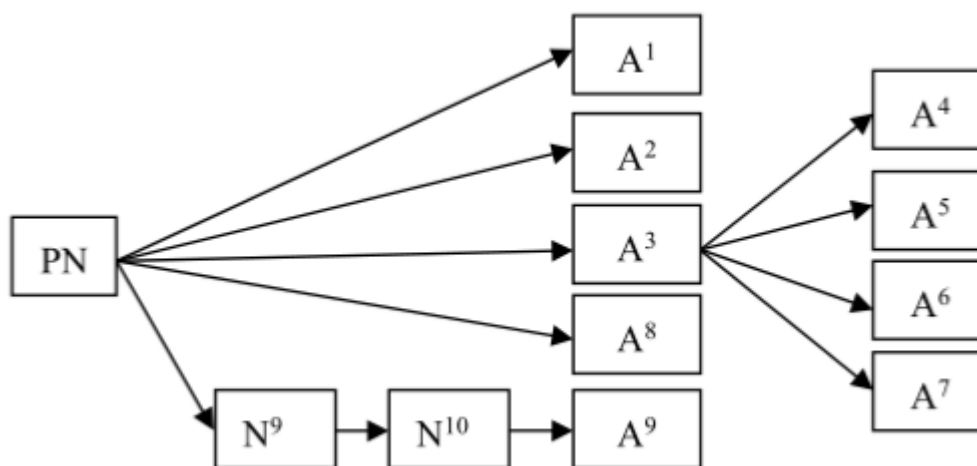


Figure 3. Noun-to-Adjective Shift and Extension

(20) A¹. Of iron; consisting or formed of iron.

- a. Most iron ore had to be imported from Spain. (BNC)
- b. The room is furnished with two iron beds, a shaky table and a stone stool. (OED2)

(21) A². Having the appearance of iron; of the color of iron (or iron-rust).

- a. Some of them are of an iron red, and very bright. (OED2)

- b. The Sun, in iron clouds, concealed the Public Light. (BNC)
- (22) A³. Extremely hard or strong (physically).
- a. The compact and iron nature of the ground is good for construction. (OED2)
- b. We have now that iron frontier. (OED2)
- (23) A⁴. Resembling, or figured as resembling, iron in some characteristic quality, esp. hardness or strength.
- a. Marriage to a snorer requires iron nerves. (OED2)
- b. His father is a man of iron will. (BNC)
- (24) A⁵. Extremely robust; healthy or capable of great endurance.
- a. He is a man of an iron body and mind. (OED2)
- b. Though aged, he was so iron of limb. Few of our youth could cope with him. (OED2)
- (25) A⁶. Inflexible, unchangeable, unrelenting or unyielding.
- a. He will need an iron determination, for it will be a long tussle. (BNC)
- b. There is no iron law of politics that says the Conservatives always win elections. (BNC)
- (26) A⁷. holding or binding strongly or tightly.
- a. She felt the iron grip of an arm clasped round her throat. (BNC)
- b. The hard-line Communist Party still held the country in an iron grip. (OED2)
- (27) A⁸. Of metallic tone, harsh, unmusical.
- a. With his high iron voice causing sickness, he is playing you out with delight. (OED2)
- b. "Enough" Ratha said at some point, her iron voice cutting through the arguments. (OED2)
- (28) A⁹. Harsh, cruel, merciless; stern, severe or unimpressionable.
- a. There is no country so barbarous, or of so iron and hard a disposition. (OED2)
- b. The first Republic in the World is under her iron yoke. (BNC)

As demonstrated in the examples above, A¹, A², A³ and A⁸ are directly extended from the parent noun. *Iron* has many properties, and in A¹, A², A³ and A⁸, the physical features of material, color, hardness and sound produced by *iron* are highlighted respectively. In (20a), *iron* ore contains the metallic element of *iron*, while in (20b) the two beds are made of *iron*. In (21a), the red color of ferric oxide is used to understand the red color, while in (21b) the gray color of *iron* is used to describe the color of the cloud. In (22a) and (22b), the physical hardness of *iron* is used to describe the hardness, firmness or strength of ground and frontier. When stricken, *iron* will produce some kind of harsh noise, and this property is used to understand the harsh unmusical voice of people. In (27a) and (27b), the sound of *iron* is mapped onto the harsh voice of people. The metaphor behind them is *HARSH VOICE AS IRON SOUND*.

A⁴, A⁵, A⁶ and A⁷ are metaphorical extensions of A³. The concrete and physical hardness of *iron* is mapped onto the abstract properties of strength, robustness, inflexibility and tightness. In (23a) and (23b), the hardness of *iron* is mapped onto the strength of willpower and nerves. The metaphor behind them is *STRONG WILLPOWER OR NERVES AS IRON*. In (24a) and (24b), the physical hardness of *iron* is mapped onto the robustness and endurance of human beings. The metaphors behind them are *ROBUST OR HEALTHY BODY AS IRON* and *GREAT*

ENDURANCE AS IRON. In (25a) and (25b), the hardness of *iron* is mapped onto the inflexibility of determination and laws. The metaphors behind them are *INFLEXIBLE DETERMINATION AS IRON* and *INFLEXIBLE RULES AS IRON*. In (26a) and (26b), the hardness of *iron* is mapped onto the tightness of grip and control. The metaphors behind them are *TIGHT GRIP AS IRON* and *TIGHT CONTROL AS IRON*.

In (28a) and (28b), the adjective extension comes from the notion of warfare and slaughter, which are considered to be harsh, cruel and merciless. The extensions from PN to A⁹ involve a chain of metonymy: *THE MATERIAL CONSTITUTING AN OBJECT FOR THE OBJECT*, *INSTRUMENT FOR ACTION* and *CATEGORY FOR PROPERTY*. The category of warfare and slaughter are related to merciless killing, so the category of warfare can offer mental access to the properties of this category.

4.4 Noun-to-Verb Extensions and Shifts

The classifications of the examples from OED2 and BNC show that *iron* can function as transitive verb (Iron^{Vt}), intransitive verb (Iron^{Vi}) and transitive phrasal verb (Iron^{PVt}). The analysis of the senses of the verbs of *iron* shows that Iron^{Vt} is related to three extensions of the parent noun: N¹, N² and N³. Iron^{Vi} and Iron^{PVt} are related to Vt¹. The specific shifts and extensions will be demonstrated in Figure 4 analyzed respectively in the subsections of this part.

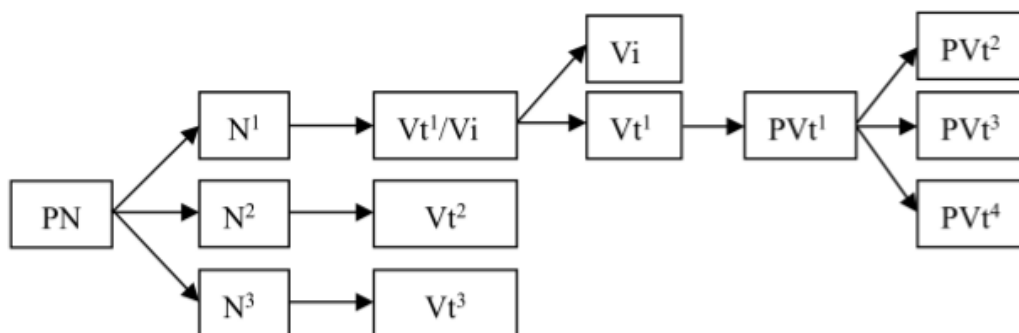


Figure 4. Noun-to-Verb Shift and Extension

The verbal senses of *iron* are related to the noun senses of *iron* as objects or instruments. The shift from the parent noun to the verbs of *iron* involves a chain of metonymy from Constitution ICM and Action ICM, as demonstrated in Figure 5.

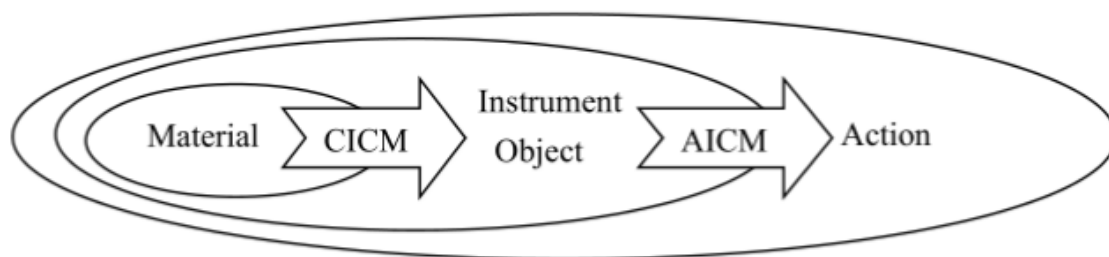


Figure 5. Metonymic Chains in Noun-to-Verb Shift

In Constitution ICM, the parent noun of *iron* gets the sense extension through the metonymy relationship of *THE MATERIAL CONSTITUTING AN OBJECT FOR THE OBJECT*. The parent noun of *iron* as the material offers mental access to the objects made of *iron*.

Kövecses (2010) stated that “in Action ICM, there are specific relationships such as between an INSTRUMENT and the ACTION, an OBJECT INVOLVED in an action and the ACTION, the DESTINATION of a motion and the MOTION, all of which are parts of the Action ICM” (p. 180). The metonymy relationships of *INSTRUMENT FOR ACTION* and *OBJECT INVOLVED IN ACTION FOR ACTION* provide the cognitive motivation for the noun-to-verb shift of *iron*. The instruments and objects provide mental access to the actions in which these instruments are used or objects are involved.

4.4.1 Iron as Transitive Verb

In Constitution ICM, the parent noun of *iron* is extended to N^1 , N^2 and N^3 . The material of *iron* provides mental access to the different objects made of *iron*. In Action ICM, N^1 , N^2 and N^3 are shifted to Vt^1 , Vt^2 , and Vt^3 . N^1 and N^2 are used as instruments in actions (Vt^1 and Vt^2), while N^3 is an object involved in the action of Vt^3 . Vt^1 , Vt^2 , and Vt^3 inherit the senses of N^1 , N^2 and N^3 respectively. The shifts and extensions will be analyzed and exemplified in the following.

The sense of Vt^1 is related to N^1 : *iron* as the instrument for smoothing clothes or linens. The material of *iron* offers mental access to the special instruments made of *iron*. The function shift is motivated by the Action ICM in which the metonymy relationship of *INSTRUMENT FOR ACTION* works. The *iron* instrument provides mental access to the action of smoothing or pressing clothes or linens with a heated iron. As exemplified in (29a) and (29b), *iron* functions as transitive verbs and can directly take shirts or linen as its object.

(29) Vt^1 . To smooth or press clothes or linens with a heated iron.

- a. Draw the scene, and discover her maid ironing her linen. (BNC)
- b. Diana was so chummy with him she even used to iron his shirts. (BNC)

The sense of Vt^2 is related to N^2 : *iron* as *iron* chains, shackles or fetters. The material of *iron* offers mental access to the shackles or fetters made of *iron*. The function shifts from shackles or fetters to the action of putting *iron* shackles or fetters on people is motivated by the Action ICM in which the metonymy relationship of

INSTRUMENT FOR ACTION works. In (30a) and (30b), *iron* gets its verbal sense from the instruments of shackles or fetters which are used to bound peoples' hands or feet.

(30) Vt^2 . To shackle or fetter with irons; to put in irons.

a. Mark Smeton, who had confessed his guilt, was ironed. (BNC)

b. Iron him then, let the rest go free. (OED2)

The sense of Vt^3 is related to N^3 : *iron* as *iron* plates or sheets. The material of *iron* offers mental access to the plates or sheets made of *iron*. The function shifts from iron plates to the action of furnishing the plough or gate with *iron* plates is motivated by the Action ICM in which the metonymy relationship of OBJECT INVOLVED IN AN ACTION FOR THE ACTION. As exemplified in (31a) and (31b), *iron* plates or sheets are only simple objects for the furnishing of the gate and the plough, and it is different from the complicated instruments for smoothing clothes in Vt^1 or *iron* shackles in Vt^2 . In Vt^1 and Vt^2 , the *iron* objects are used conventionally as instruments for specific purposes, while the *iron* plates, sheets, slips or clouts have not received the status as instruments because they are used as material for general purposes, rather than for specific purposes.

(31) Vt^3 . To fit, furnish, cover, or arm with iron.

a. Let him not neglect a day, but iron his plough with clouts in all the wearing places. (OED2)

b. The gate was ironed within and without. (OED2)

4.4.2 Iron as Intransitive Verb

When *iron* is used as verb to refer to the action of pressing clothes with a heated iron, it can also be used as an intransitive verb. $Iron^{Vi}$ inherits the cognitive motivations and sense of Vt^1 but there still exists slight differences between them because of the perspectivization of metonymy.

Taylor (1995) analyzed the perspectivization of metonymy and stated that "different uses of a word whose semantic structure is rather complex tend to highlight different components of frame-based knowledge" (p. 90). Within the frame-based knowledge of ironing, different components can be perspectivized and highlighted, such as the object, the process or the result.

(32) Vi . Of a garment, material: to respond to ironing, to undergo smoothing or pressing with an iron.

a. The servants are all ironing. (BNC)

b. Washing in the morning, and if it was a nice bright day,
she'd iron in the afternoon. (BNC)

In example (32a) and example (32b), $iron^{Vi}$ has the same cognitive motivation with Vt^1 , but $iron^{Vi}$ cannot take any objects after it. When *iron* functions as intransitive verb, the general process of ironing is perspectivized and highlighted while in Vt^1 , the objects are perspectivized and highlighted.

4.4.3 Iron as Transitive Phrasal Verb

The combination of $iron^{Vi}$ with the adverb *out* produces the transitive phrasal verb of *iron out*. In *iron out*, *iron* has the same motivation and sense with Vt^1 while the adverb *out* has the sense of removing something from a place or an object (for example, Get out, Out of sight, out of mind). The transitive phrasal verb inherits the senses of Vt^1 and the adverb and refers to the action of removing the wrinkles or creases from the clothes or linens by pressing

them with a heated *iron*.

Iron^{PVt} shares cognitive motivations with *Vt*¹ but they have different perspectivizations and highlights. In *iron*^{PVt}, the result of ironing is perspectivized and highlighted, that is, getting wrinkles or creases out of the clothes or linens, while *Vt*¹ highlights the objects: clothes or linens. In addition, *iron*^{PVt} highlights the more specific parts (the wrinkles) which are to be removed by ironing, while *Vt*¹ highlights the clothes to be smoothed. As exemplified in (33a) and (33b), *PVt*¹ highlights the result, to get wrinkles or creases out of the clothes by pressing them with a heated iron while her dress and my slacks function as the background.

(33) *PVt*¹. to remove (wrinkles or creases) in clothes by pressing with a heated iron.

a. He offered to iron out the wrinkles in her dress. (BNC)

b. Please iron out the crease in my slacks, I like them flat in the front. (BNC)

The analysis of the examples of *iron out* in BNC shows that *iron*^{PVt} can also take abstract notions after it, such as differences, details, problems and plans and so on. When *iron out* is followed by abstract notions, *PVt*¹ gets metaphorical extensions as shown in *PVt*², *PVt*³ and *PVt*⁴.

In *PVt*¹, the concrete wrinkles or creases in clothes are to be removed by pressing them with a heated *iron*. In *PVt*², *PVt*³ and *PVt*⁴, the abstract notions are reified through the following metaphors: *DIFFERENCES ARE WRINKLES*, *DIFFICULTIES ARE WRINKLES*, and *PLANS ARE WRINKLES*. *Iron*^{PVt} means now to get rid of the differences or problems as if removing the wrinkles by pressing them by a heated *iron*. The concrete wrinkles are mapped onto the abstract differences or difficulties.

Wrinkles are uneven and different from the smooth and even part of the clothes which are preferable. In (34a) and (34b), the concrete feature of being uneven and different is adapted in the conceptualization of the abstract differences or inconsistencies (disagreement). The abstract differences or inconsistencies are removed as if removing the wrinkles by pressing them with a heated *iron*.

(34) *PVt*². to get rid of, to clear up or to eliminate (differences or disagreements)

a. The two chambers are trying to iron out differences on the annual spending bill. (BNC)

b. A tendency might develop to iron out inconsistencies regarded as minor or marginal. (BNC)

Smooth and even clothes are preferable, while wrinkles are uneven and regarded as problems to the overall beauty of clothes. Wrinkles are hard to remove unless being pressed by a heated *iron*. In (35a) and (35b), the abstract notions of problems and difficulties are conceptualized through the features of wrinkles (problems in clothes and difficult to remove). Problems and difficulties are removed as if removing the wrinkles by pressing them with a heated *iron*.

(35) *PVt*³. to get rid of, solve or settle (Problems or difficulties) so that progress becomes easier.

a. Effective preparation helped iron out many problems. (BNC)

b. The manager will give the Celtic directors breathing space to iron out their difficulties. (BNC)

When wrinkles are removed by a heated *iron*, the surface of clothes becomes smooth and even. When differences are removed between different parties, they get the same opinions and agreements. The features of being even and smooth are adapted to understand the identical or similar opinions for plans or contracts. In (36a) and (36b),

compromises are achieved through discussion as if achieving the smoothness of the clothes by removing the wrinkles by a heated *iron*. The concrete feature of smoothness is mapped onto the identical feature of opinions on the contracts or plans.

(36) PVt⁴. To settle through discussion or compromise, work out (plan, agreement or contract).

a. Come by our room at some point so we can iron out the plan for this weekend. (BNC)

b. It only took a day to iron out the contract. (BNC)

5. Conclusion

The systematic analysis of the meaning extensions and function shifts shows that the word of *iron* is polysemic and poly-functional. The extensions are present at three word classes: nouns, adjectives and verbs. By analyzing the polysemic and poly-functional features of the English word *iron*, this study drew up the semantic networks between the extensions and shifts, as shown in Figure 6.

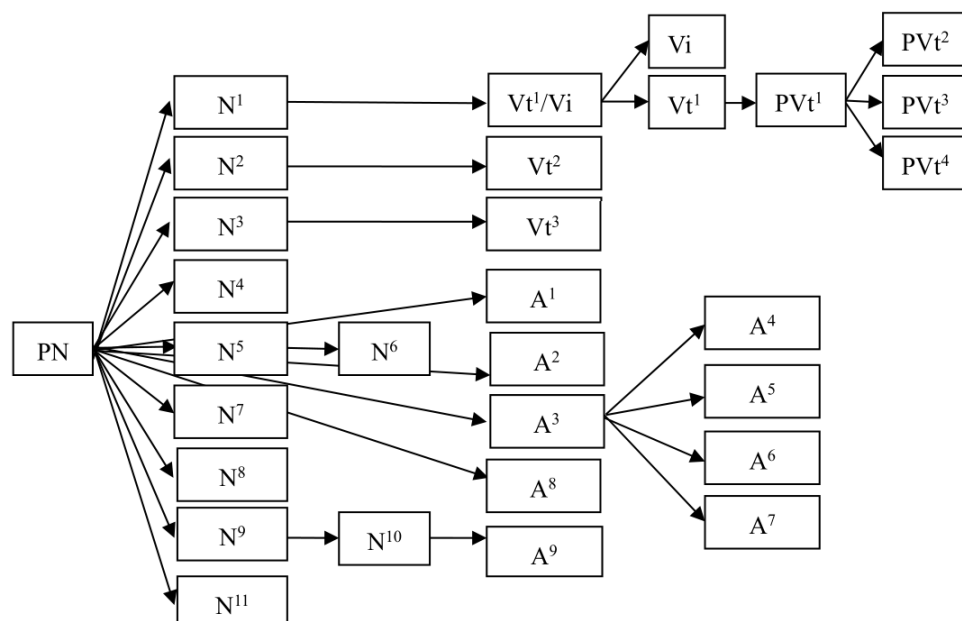


Figure 6. Network of Extensions and Shifts of Iron

From this figure, it can be seen that most of the extensions within the word class of noun are directed from the parent noun, and only N6 and N10 are stemmed from the existing extensions of N5 and N9. The motivations for the extensions at noun level are mainly metonymy (N1 to N10) and metaphors (N11).

The shifts from nouns to adjectives involve the metonymy of CATEGORY FOR PROPERTY. During the shifts, the noun lost its referential senses and took abstract descriptive senses of the properties of iron. Half of the extensions (A1, A2, A3 and A8) are directly stemmed from the parent noun which covers some of the properties of iron, such as material, color, hardness and sound. The other half comes from the existing extension of hardness (A4, A5, A6 and A7). The motivation for this is a combination of metonymy and metaphor. A9 is stemmed from the noun extension of warfare and slaughter which is considered to be cruel and harsh.

The verbal extensions of iron are mainly stemmed from the N1, N2 and N3. The shifts from noun to verbs mainly involve metonymy chains such as: THE MATERIAL CONSTITUTING AN OBJECT FOR THE OBJECT, INSTRUMENT FOR ACTION and OBJECT INVOLVED IN ACTION FOR ACTION. In some cases as PVt2, PVt3 and PVt4, metaphors also exist, in which the concrete wrinkles or creases are mapped onto the abstract differences or difficulties.

This study analyzed the polysemic and poly-functional features of the English word iron, and drew up the semantic networks between the extensions and shifts. The motivations for these extensions and shifts are also analyzed from the perspective of cognitive linguistics, which will be of some value to the study of English polysemy.

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Notes

Note 1. One of the important sources of this study is the Oxford English Dictionary (second edition) (OED2), which is widely regarded as the accepted authority on the English language. It provides an unsurpassed guide to the meaning, history, and pronunciation of 600,000 words and 3 million quotations, from classic literature and specialist periodicals to film scripts and cookery books. The examples in this study are selected from the CD-ROM version of OED2, which attributes the portability and powerful search capabilities to the OED2.

Note 2. Another important source of this study is British National Corpus (BNC), which is a 100 million word collection of samples of written and spoken language from a wide range of sources, designed to represent a wide cross-section of British English from the later part of the 20th century, both spoken and written. BNC is an online corpus accessible at <http://www.natcorp.ox.ac.uk/>.

Note 3. In this figure, PN refers to Parent Noun, that is, the base noun from which the other senses are derived. NN refers to the sense extensions within the word class of noun. NA refers to the word class shift from noun to adjective. NV refers to the word class shift from noun to verb. S stands for Shifts while E stands for Extensions. CN refers to Concrete Noun while AN refers to Abstract Noun. AP refers to Abstract Property and CP refers to Concrete Property. Vt refers to transitive verb, and Vi stands for intransitive verb. Adv stands for Adverb. The part for NN on the S axis is blank, because there is no word class shift in NN. A dotted line is used to divide the sense extensions between the concrete and the abstract extremes, because the division between the concrete and the abstract is not completely clear cut.