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Primary Metaphors across Languages: Difficulty as Weight and Solidity

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ABSTRACT

This is a linguistic study of two primary metaphors with the same target concept, "DIFFICULTY IS WEIGHT" and "DIFFICULTY IS SOLIDITY," in English and Chinese. The study employs both lexical and corpus-based approaches in order to gain insights into their manifestation in the two languages. In an attempt to show how the two primary metaphors manifest themselves at the linguistic level, the study lays out the linguistic patterns that reflect the underlying conceptual associations across the metaphorical domains, and analyzes the differences as well as similarities between English and Chinese. It is argued that primary metaphors may manifest themselves at different levels of specificity within and across different languages. The findings support the views that conceptual associations of primary metaphors may or may not lead to productive linguistic patterns in a language, and that speakers' linguistic experience may play an important role in shaping their metaphorical conceptualizations, in conjunction and interaction with their bodily and cultural experience. The study, therefore, sheds light on the mutuality between language and thought.

Introduction

As a subclass of conceptual metaphors, primary metaphors are metaphorical patterns motivated by tight correlations between fundamental dimensions of human experience (Grady, 1997a, 1997b). They function as the "core" and "backbone" of conceptual network of metaphors (Stickles, David, Dodge, & Hong, 2016, p. 194), and therefore have a pivotal role to play in constituting "the foundation of much of our complex cognition" (Grady, 1997b, p. 288).

As an important contribution to conceptual metaphor theory (e.g., Gibbs, 1994, 2017; Lakoff, 1993; Lakoff & Johnson, 1980, 1999), the theoretical construct of primary metaphor has attracted considerable attention within Cognitive Linguistics and beyond in the past 20 years. In particular, the year 2017 saw a renewed interest in primary metaphor research (e.g., Grady & Ascoli, 2017; Winter & Matlock, 2017; Yu, Yu, & Lee, 2017). Grady and Ascoli (2017) is an overview of primary metaphor theory in light of some new developments in the past 20 years. Winter and Matlock (2017) show how multimodal representations of primary metaphors in communication enhance and support their underlying conceptual associations as a way of cultural reinforcement. Some other chapters in Hampe (2017) also apply the construct of primary metaphor in their studies. Yu et al. (2017) carry out a linguistic study in English and Chinese of two primary metaphors sharing the same target concept, "IMPORTANCE IS SIZE" and "IMPORTANCE IS WEIGHT." This study is intended to be a follow-up on Yu et al. (2017).

Based on the schematic knowledge about physical objects, Yu et al. (2017) hypothesized a conceptual mapping scheme for some primary metaphors rooted in the OBJECT image schema, which is at the highest,
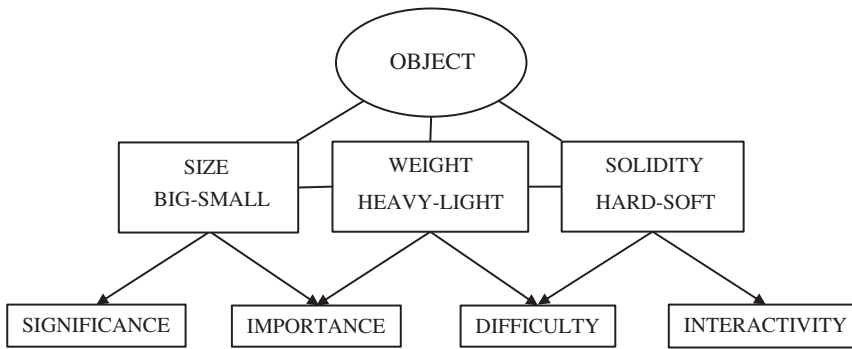

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Figure 1. A hypothetical mapping scheme for some primary metaphors based on the OBJECT image schema (Yu et al., 2017, p. 245).

most schematic level of metaphor analysis (Kövecses, 2017). This scheme is shown in Figure 1. There, the source domain OBJECT, as an image schematic domain, is mapped onto the target concepts through one of its three interrelated, basic properties, or dimensions, as actual source concepts. These source concepts each have two possible opposing values as their parametric valences: BIG and SMALL for SIZE, HEAVY, and LIGHT for WEIGHT, and HARD and SOFT for SOLIDITY. In that study, Yu et al. (2017) limited themselves to two source concepts, SIZE and WEIGHT, which share the same target, IMPORTANCE, namely "IMPORTANCE IS SIZE" and "IMPORTANCE IS WEIGHT." The study found that both primary metaphors are manifested in English and Chinese although there are graded metaphorical strengths with particular lexical items as language-internal specifics and characteristics.

As a follow-up study, this article focuses on another pair of primary metaphors sharing the same target as shown in Figure 1: "DIFFICULTY IS WEIGHT" and "DIFFICULTY IS SOLIDITY." Both of them link two distinct dimensions of our recurring embodied experiences in specific situations: subjective experience and judgment of difficulty and sensorimotor experience of weight and solidity (i.e., degree of hardness and toughness). In both cases, the motivations for the primary metaphors lie in the experiential correlations between perceiving weight or solidity of physical objects and experiencing difficulty as we try to lift or manipulate them (Grady, 1997a). That is, it is the source that causes the target: the heaviness or hardness of physical objects is the reason for effortful interactions with them (Grady, 2005; Kövecses, 2013).

As defined above, the two primary metaphors sharing DIFFICULTY as the target, along with their two parametric versions are provided in Table 1. In what follows, we evaluate how these two primary metaphors hold in English and Chinese in sections 2 and 3. We employ mixed methods using both lexical and corpus-based approaches to describe and analyze linguistic data at both supraindividual and individual levels, with regard to types and tokens of linguistic instantiations (Kövecses, 2015). In section 4, we show how languages may differ in the manifestation of primary metaphors, and propose a general Human-Object Interaction frame analysis that can account for such differences with parametric variables. We draw conclusions in section 5.

Difficulty as weight and solidity in English

In this section, we look at English for possible linguistic instantiations of "DIFFICULTY IS WEIGHT" and "DIFFICULTY IS SOLIDITY." With the lexical approach, we use three authoritative

Table 1. Two primary metaphors for DIFFICULTY under study with possible parametric versions.

Primary metaphors	"DIFFICULTY IS WEIGHT"	"DIFFICULTY IS SOLIDITY"
Parametric version 1	"DIFFICULT IS HEAVY"	"DIFFICULT IS HARD/TOUGH"
Parametric version 2	"EASY IS LIGHT"	"EASY IS SOFT"

online dictionaries, *Merriam-Webster, Oxford*, and *Longman*, to see if keywords from the source domains, WEIGHT and SOLIDITY, have lexicalized target-domain senses listed in them. We then turn to a major English corpus, the Corpus of Contemporary American English (COCA, Brigham Young University), to see if and how the mappings between source and target are instantiated in real-life discourse, and to detect the degrees of entrenchment of the two primary metaphors in the language (Newman, 2011).

For "DIFFICULTY IS WEIGHT" we looked at three weight adjectives: *weighty, heavy*, and *light*. While the first two are synonyms in the sense of "having great weight," only *heavy* has developed the metaphorical sense "difficult," along with its antonym *light* meaning "easy" (see Table 2). *Heavy* instantiates both "DIFFICULTY IS WEIGHT" and "IMPORTANCE IS WEIGHT," but *weighty* instantiates the latter only (Yu et al., 2017).

The idiomatic expressions in which *heavy* and *light* respectively mean "difficult" and "easy" are listed in Table 3, where their frequencies in COCA vary considerably. Note that, although *heavy lifting* is idiomatic with a metaphorical meaning "hard or difficult work," it can still be used in a literal sense: e.g., *He has back and shoulder injuries from heavy-lifting jobs* (COCA). Also, *make heavy weather*, marked as a British English idiom, is defined in *Merriam-Webster* as "to treat (something) in a way that makes it seem more *important* or *difficult* than it really is" (italics added). That is, *heavy* here can mean both "important" and "difficult."

Other than the idiomatic usages like those in Table 3, however, whether *heavy* or *light* means "difficult" or "easy" depends on the context because both are highly polysemous with various distinct but related senses. The COCA examples in (1) are likely to instantiate "DIFFICULT IS HEAVY" and "EASY IS LIGHT."

(1) a. It's **heavy** work, but using the right sequence and tools makes the job easier.
     b. I went through some **heavy** things in childhood.
     c. Being an academic is a really **heavy** job.
     d. Many hands make **light** work.

We checked *heavy work* (1a) and *light work* (1d) in COCA, and their respective frequencies are 115 and 37, with irrelevant tokens (e.g., *heavy work schedule*, where *heavy* modifies *schedule* rather than *work*) removed. We found 8 out of 115 (6.96%) and 15 out of 37 (40.5%) in which *heavy* and *light* unambiguously mean "difficult" and "easy", respectively.

In order to assess the proximate extent to which *heavy* means "difficult," we made a preliminary quantification of the percentages of what *heavy* may mean in COCA, utilizing two different sets of data: (i) 200 tokens randomly selected by the corpus, and (ii) the first 200 tokens found in the

Table 2. Relevant senses of "weight" and "difficulty" with *heavy* and *light*.

Word	Webster	Oxford	Longman
heavy	1. having great weight	1. of great weight	1. weighing a lot OPP light
	2. **difficult**; requiring considerable physical or mental effort	2. **difficult** to deal with	2. **not easy**; needing a lot of physical or mental effort
light	1. having little weight	1. of little weight	1. not heavy
	2. involving **minimal difficulty** or effort; **easy**	2. **easily done; easy**	2. (work) **not hard**

Table 3. English lexical items in which *heavy* and *light* mean "difficult" and "easy", respectively, and their COCA frequencies.

Idiom	Relevant meaning	Frequency
heavy lifting	hard or difficult work	473
heavy going	difficult to do or finish	16
make heavy weather	(British) have unnecessary difficulty in dealing with (a task or problem)	2
make heavy work	do with difficulty	0
make light work	deal with quickly or easily	11

corpus. The percentages for the "difficult" sense of *heavy* are equally low, 3 out of 200 at 1.5% in both sample sets. In contrast, the largest percentages seem to characterize something great in amount, density, degree, or effect, such as *heavy rains, heavy smokers, heavy fines, heavy traffic, heavy emphasis, heavy music*, etc.

At this point, we turn to "DIFFICULTY IS SOLIDITY." In English, this primary metaphor seems to manifest mainly via three adjectives: *hard* and *soft* as a pair of antonyms characterizing the scalar properties of solid entities; *tough*, a near synonym of *hard* in some senses, referring to solid entities' resilience to external pressure or force. We checked them in the dictionaries and found that all three have lexicalized senses relating to difficulty, as in Table 4.

Our next step was to get a sense of the extent to which these three adjectives each instantiate "DIFFICULTY IS SOLIDITY" in the real-life discourse, utilizing COCA. We looked particularly for collocations in Adjective-Noun constructions, where the adjective represents the source and the head noun the target. Sullivan (2013) calls such collocations "predicating modifier constructions," where the modifying adjective is dependent and the head noun autonomous in conceptual relation. Some examples from our corpus searches are provided in Table 5.

Table 5 provides the most frequent collocations in which the adjectival modifiers *hard* and *tough* can be interpreted as meaning "difficult," and *soft* as meaning "easy." For *hard* and *tough*, we only listed the top 10. As can be seen, half (5) of the two top 10 lists share the same head nouns: *time(s), thing(s), question(s), choice(s)* and *decision(s)*. We actually looked into COCA's "context" and, if necessary, "context+" function of the 20 collocations, and found that the likelihood of *hard* or *tough* meaning "difficult" approaches 100%. We only found irrelevant tokens in three collocations: 11 in 42 tokens of *hard parts*, 5 in 575 of *hard thing*, and 9 in 137 of *hard things* (with an average of 3.3%). In those tokens *hard* refers to the literal hardness of physical things. We subtracted these numbers from the frequencies in Table 5.

What is salient in Table 5 is the asymmetry in *hard* and *tough* vs. *soft* in terms of types and frequencies of tokens. The only collocation that has relatively high frequency is *soft target(s)* at 166, in contrast to *hard target(s)* at 71, which did not make it to the top 10. A "soft target" refers to a target that can be attacked easily, namely, an "easy target" for the attacker. We looked into the tokens of *soft schedule* and found that they all refer to sports teams' schedules being easy, on which they do not play "tough" opponents. The search for *soft way* yielded 15 tokens, but only in 3 of them *soft* means "easy." The COCA examples in (2) show how *hard, tough*, and *soft* instantiate "DIFFICULTY IS SOLIDITY" in natural discourse.

(2)   a. And despite years of living off Sonny's death benefits from the Navy, she had fallen on **hard** times and was working as a cleaning lady at this motel.
       b. But if you don't want to make **hard** choices, don't get involved in politics!

Table 4. Relevant "solidity" and "difficulty" senses of *hard, tough*, and *soft*.

Word	Webster	Oxford	Longman
hard	1. not easily penetrated, not easily yielding to pressure 2. **difficult** to bear or endure; **difficult** to accomplish or resolve; **difficult** to comprehend or explain	1. solid, firm, and rigid; not easily broken, bent, or pierced 2. **difficult** to bear; difficult to understand or solve	1. firm, stiff, and difficult to press down, break, or cut (OPP soft) 2. **difficult** to do or understand (SYN **difficult** OPP **easy**)
tough	1. strong or firm in texture but flexible and not brittle; not easily chewed 2. **difficult** to accomplish, resolve, endure, or deal with; very **hard** to influence	1. (of a substance or object) strong enough to withstand adverse conditions or rough handling 2. **difficult** and requiring determination or effort	1. (strong material) not easily broken or made weaker; (food) difficult to cut or eat (OPP tender) 2. **difficult** to do or deal with
soft	1. yielding to physical pressure; lacking relatively or comparatively in hardness 2. demanding **little work** or **effort; EASY**	1. easy to mold, cut, compress, or fold; not hard or firm to the touch 2. (of a job or way of life) requiring **little effort**	1. not hard, firm, or stiff, but easy to press (OPP hard) 2. (too **easy**) a soft job, life etc. is too **easy** and does not involve much work or **hard** physical work

Table 5. Examples of predicating modifier constructions involving the three solidity adjectives and their frequencies in COCA.

Adjective	Collocation	Frequency
hard	hard time(s)	6903
	hard way	1307
	hard part(s)	823
	hard thing(s)	698
	hard question(s)	634
	hard choice(s)	503
	hard decision(s)	356
	hard life	257
	hard lesson(s)	234
	hard job(s)	181
tough	tough time(s)	2140
	tough question(s)	1184
	tough decision(s)	858
	tough job(s)	469
	tough choice(s)	467
	tough call(s)	317
	tough situation(s)	314
	tough thing(s)	310
	tough issue(s)	302
	tough day(s)	256
soft	soft target(s)	166
	soft life	13
	soft schedule	13
	soft job(s)	10
	soft way	3

    c. The president raised some very **tough** questions that he said the country is facing.
    d. Having a trusted board of advisors to guide you through the **tough** decisions is priceless.
    e. I guess I'm not learning it the **soft** way because, if it could have been learned more comfortably, I wouldn't be sitting in this kind of emotional pain.

We would like to point out that an idiomatic expression, *hard/rough nut(s)*, instantiates "DIFFICULTY IS SOLIDITY" but is not included in Table 5. This idiom, with its singular and plural variants, often collocates with the transitive verb *crack*, as exemplified below:

(3)   a. She knew this problem was going to be a **hard nut** to crack.
     b. It was a **tough nut** to crack because of the difficulty of interpreting the relationship between cops and crime.
     c. And Gorbachev sounded upbeat saying that while "we have a few more **tough nuts** to crack, we have very good teeth and we'll crack them."

This collocation differs from those in Table 5 in that its adjectival modifier (*hard/tough*) and nominal head (*nut*) are both from the source domain, with its target inferable from the context. The frequencies for them in COCA are 38 for *hard nut(s)* and 65 for *tough nut(s)*.

As shown above, "DIFFICULTY IS WEIGHT" and "DIFFICULTY IS SOLIDITY" are indeed conventionalized metaphors in English, instantiated by the adjectives *heavy, light, hard, tough*, and *soft*. All of them have lexicalized senses of difficulty listed in the dictionaries. The result was further supported by the COCA data. We found that "DIFFICULTY IS SOLIDITY" is instantiated with more lexical types and higher token frequencies than "DIFFICULTY IS WEIGHT." What is of special interest is the asymmetry between *hard* and *tough* representing one pole of the scalar opposition and *soft* representing the other pole. Not only do we have two adjectives (*hard* and *tough*) versus one (*soft*), but we also see a huge gap between the opposite poles in the numbers of types and tokens. These are linguistic specifics deserving more attention.

Difficulty as weight and solidity in Chinese

For the study of "DIFFICULTY IS WEIGHT" and "DIFFICULTY IS SOLIDITY" in Chinese, we consulted three authoritative dictionaries: (a) the online *Hànyǔ Dà Cídiǎn* "Grand Dictionary of Chinese Language" (HYDCD), (b) the 6th edition of *Xiàndài Hànyǔ Cídiǎn* "Contemporary Chinese Dictionary" (XDHYCD, 2012), (c) *Xīn Shídài Hàn-Yīng Dà Cídiǎn* "New Age Chinese-English Dictionary" (XSDHYDCD, 2004). To evaluate the extent to which the two primary metaphors are manifested in Chinese, we utilized a major Chinese corpus, the Corpus at Center for Chinese Linguistics (CCL, Peking University).

For "DIFFICULTY IS WEIGHT," we looked at the pair of weight antonyms: 重 *zhòng* "heavy" and 轻 *qīng* "light." We noted that none of the three dictionaries lists lexicalized "difficult" senses of the two weight adjectives. Instead, they have other conventionalized senses listed, which are evidence for other metaphor instantiations, such as "IMPORTANT IS HEAVY" and "ᴜɴIMPORTANT IS LIGHT" (Yu et al., 2017). While the two weight adjectives do not have lexicalized "difficulty" senses listed in the dictionaries, it does not mean that "DIFFICULTY IS WEIGHT" is not applicable in Chinese. Instead, we found that this primary metaphor is instantiated at a more specific level by certain Chinese compounds and idioms that have the two weight adjectives as their components. Table 6 lists these lexical items and their frequencies in CCL. There are other possible expressions whose meaning needs to be interpreted on a case-by-case basis. For instance, Chinese has the compounds in (4) which have close equivalents in English. Depending on the contexts, (4a) and (4b) can refer to either some physically heavy work or burden, or some difficult task ("DIFFICULT IS HEAVY"), and (4c) and (4d) can refer to both important and difficult responsibilities/tasks ("IMPORTANT IS HEAVY" and "DIFFICULT IS HEAVY").

(4)   a. 重活 *zhònghuó* (heavy-work) "heavy work"
      b. 重负 *zhòngfù* (heavy-load) "heavy load; crushing burden"
      c. 重荷 *zhònghè* (heavy-burden) "heavy burden; grave responsibility"
      d. 重担 *zhòngdàn* (heavy-load) "heavy burden; difficult task; great responsibility"

In Table 6, *zhòng* "heavy" occurs in three expressions, and *qīng* "light" in seven. In terms of frequency, it is 155 for the former vs. 7071 for the latter. That is, within the scope of the table, there is an asymmetry between "DIFFICULT IS HEAVY" and "EASY IS LIGHT" in variety and frequency of expressions that instantiate them. More realize the latter than the former, which was unexpected. In (5) are CCL examples showing how some expressions in Table 6 instantiate the pair of primary metaphors.

Table 6. Examples of Chinese compounds and idioms instantiating "DIFFICULTY IS WEIGHT."

Expression	Gloss	Chinese definition and English translation	Frequency
负重致远 *fùzhòng zhìyuǎn*	carry-heavy reach-far	比喻能够负担艰巨任务 walk a long way carrying a heavy burden – be able to shoulder heavy responsibilities or **arduous** tasks	5
举重若轻 *jǔzhòng ruòqīng*	lift-heavy as if-light	比喻能力强，能够轻松地胜任繁重的工作或处理困难的问题 very capable of accomplishing heavy work and handling **difficult** problems with **ease**	137
拈轻怕重 *niānqīng pàzhòng*	pick-light fear-heavy	接受工作时挑拣轻易的，害怕繁重的 prefer the light to the heavy – pick **easy** jobs and shirk **hard** ones	13
轻车熟路 *qīngchē shúlù*	light-carriage familiar-road	比喻对情况熟悉，做起来容易 (do) sth. one knows well enough to manage with **ease**; as **easy** as traveling along a familiar road in a light carriage	121
驾轻就熟 *jià-qīng jiù-shú*	drive-light go-familiar	比喻对某事有经验，很熟悉，做起来容易 handle a job with **ease** due to previous experience; do a familiar job with **ease**	191
轻易 *qīngyì*	light-easy	简单容易 **easy**; simple	5268
轻而易举 *qīng'ér yìjǔ*	light so easy-lift	形容事情容易做，不费力气 be **easy** to do; come **easy** (to sb.)	1305
说得轻巧 *shuō de qīngqiǎo*	talk as if light-adept	说起来很简单容易 sound as if sth. is simple and **easy**; **easier** said than done	36

(5)   a. 正因为有难度，而能克服、攻破，并且做到**举重若轻**，才更有价值。
    It is just because there are difficulties, which are overcome and conquered **with ease** (lit. **in a manner of lifting the heavy as if it was light**), that there are even more values.
  b. 有些人干工作**拈轻怕重**，艰苦的地方不愿去，困难的工作不愿干 ……
    Some people **pick easy jobs and shirk hard ones** (lit. **pick the light and fear the heavy**), unwilling to go to tough places or to do difficult work …
  c. 当了多年刊物的记者，自以为办刊物是**轻车熟路**。
    Having worked as a journalist for a magazine for years, he thought it would be **easy and simple** (lit. **driving in a light carriage on a familiar road**) for him to run a magazine.
  d. 申请到国外的著名大学读MBA虽然不是一件**轻而易举**的事儿，但是也不是难不可攀。
    Applying for admissions to an MBA program at a top university abroad may not be a very **easy** (lit. **light so as to be easy to lift**) thing, but it's not too difficult to overcome (lit. to climb) either.

For "DIFFICULTY IS SOLIDITY," we focused on three adjectives: 硬 *yìng* "hard" and 软 *ruǎn* "soft," which form a pair of antonyms, as most commonly used solidity adjectives for physical objects, and 坚 *jiān* "solid," which is a near synonym of 硬 *yìng*. None of the three adjectives has lexicalized senses of difficulty or easiness listed in the three dictionaries. This is in stark contrast with English. In Chinese, "DIFFICULTY IS SOLIDITY" manifests itself again at a specific level of mapping that evokes concrete images and rich frames. Our screening spotted only five compounds listed in Table 7 along with their frequencies in CCL. The English translations of the definitions from HYDCD and XDHYCD (2012) are our own, rendered literally on purpose. The English definitions from XSDHYDCD (2004) are original from that Chinese-English dictionary.

In Table 7, the first compound, literally "hard threshold," figuratively means "difficulty that is not easy to overcome." This compound was found only in HYDCD. The second one, literally "hard bone," can mean figuratively both a "strong and unbending person" (HYDCD; XDHYCD, 2012) and a "problem extremely difficult to solve" (XDHYCD, 2012). In XSDHYDCD (2004), these two senses are rendered as "person of indomitable will" and "hard nut; difficult task." Of these two compounds for "difficulty," the first one is rare,

Table 7. Five compounds instantiating "DIFFICULT IS HARD."

Compound	Gloss	HYDCD	XDHYCD	XSDHYDCD	Freq.
硬门槛子 yìng ménkǎnzi	hard-threshold	比喻不易克服的困难 *fig.* **difficulty not easy** to overcome			0
硬骨头 yìng gǔtou	hard-bone	比喻坚强不屈的人 *fig.* **strong and unbending person**	1. 指坚强不屈的人 referring to a strong and unbending person 2. 比喻极难解决的问题 *fig.* problem extremely **difficult** to solve	1. person of indomitable will 2. **hard** nut; **difficult** task	300 299
硬仗 yìngzhàng	hard-battle	1. 硬拼硬打的战斗 hard-fought, tough battle 2. 艰难的工作或任务 **hard/difficult** job or task	正面硬拼的战斗；艰苦激烈的战斗 arduous, fierce battle	1. tough battle 2. **formidable** task	74 798
攻坚 gōngjiān	attack-solid	攻打敌人的坚固防御工事 attack enemy's solid fortifications	1. 攻打敌人的坚固防御工事 attack enemy's solid fortifications 2. 比喻努力解决某项任务中最困难的问题 *fig.* try to solve the most **difficult** problem of a task	1. storm fortifications; assault fortified positions 2. tackle a **thorny** problem	175 4152
坚苦 jiānkǔ	solid-bitter	坚忍刻苦 persevering and painstaking	坚忍刻苦 persevering and painstaking	**arduous; difficult; hard; tough**	37 1

but the second is common, as confirmed by our CCL searches yielding 0 and 545 returns, respectively. Some of 545 contain more than one token, so the total is 605. Of these *yìng gǔtou* (hard-bone) means "person of indomitable will" in 300 (49.59%), "difficult task" in 299 (49.42%), and literal "hard bone(s)" in 6 (0.99%).

The relevant metaphorical sense (sense 2) of the third compound, 硬仗*yìngzhàng* (lit. hard-battle), is listed only in HYDCD and XSDHYDCD (2004). It refers to a military battle in sense 1, which is further extended to sense 2 "difficult task." Our CCL search for 硬仗*yìngzhàng* (hard-battle) yielded a total of 872 tokens (850 + 22 multiple tokens). We checked them all and found that 74 (8.5%) carry the primary military meaning "tough battle" while 798 (91.5%) mean "difficult task." That is, this compound is used in its metaphorical nonmilitary sense much more frequently than in its original military sense in natural discourse. This makes sense since "tough battles" constitute only one of many possible kinds of "difficult tasks" in life. The examples in (6) are among the tokens that contain the second and third compounds.

(6) a. 这是一起因交通肇事引发的"民告官"案，是一桩已拖了两年多的"**硬骨头**"案。
This is a case of "civil lawsuit against the governmental offices" caused by a traffic accident, a "**hard bone**" (i.e., **difficult**) case dragging on for over two years.

b. 因为技术要求高，国内几个厂家都不敢**啃**这块**硬骨头**。
Because this requires high-quality technology, several domestic manufacturers do not dare to **gnaw** on this piece of **hard bone** (i.e., to take on this **difficult task**).

c. 尹克升要求与会人员要树立**打硬仗、啃硬骨头**的决心 ……
Yin Kesheng asked that the meeting attendees forge the determination to **fight tough battles** and to **gnaw on hard bones** (i.e., **take on formidable tasks** and **deal with difficult cases**) …

In (6a), if the legal case is a "hard bone" one, it is difficult to settle, and therefore has been "dragging on" for over two years. In (6b), 啃 *kěn* "gnaw (on)" is the verb that specially collocates with the "hard bone" compound. Example (6e) involves both "hard battle" and "hard bone," which both mean metaphorically "formidable or difficult task."

While the first three compounds in Table 7 contain 硬 *yìng* "hard," the fourth and fifth contain 坚 *jiān* "solid." The fourth one, 攻坚 *gōngjiān* (lit. attack-solid), is a Verb-Object compound in which the object is a noun converted from an adjective via metonymy "PROPERTY FOR THING." Thus, "solid" means "solid thing." The compound carries a primary military sense "assault enemy's fortified positions." Just like "tough battle," this word has developed a nonmilitary sense through semantic expansion, i.e., "try to solve the most difficult problem of a task," listed only in two of the three dictionaries. As shown in Table 7, 攻坚 *gōngjiān* (lit. attack-solid) has by far the highest CCL frequency among the compounds in this group. The total is 4327 (4240 listed + 87 multiple). We went over them and found that it is used in its original military sense for only 175 times (4%), and in its metaphorical sense "solve the most difficult problem of a task" for 4152 times (96%). For instance, the collocation 扶贫攻坚 *fúpín gōngjiān* (lit. support-poor attack-solid), which refers to the tough social campaign in China to "support the poor and lift them out of poverty," occurs as many as 1614 times. Besides, a large number of tokens are concerned with reform in China. The two examples in (7) are from CCL.

(7) a. 云南是全国扶贫**攻坚**的主战场……
Yunnan Province is the major battlefield for the **tough campaign** (lit. **attack-solid**) against poverty (lit. to support the poor) …

b. ……一些**攻坚碰硬**的改革步履维艰……
… some of the reforms to **tackle difficult problems and address hard issues** (lit. **attack-solid bump-hard**) are taking difficult steps…

Example (7a) contains an extended military metaphor, with "battlefield" and "attack enemy's solid fortifications" highlighting the toughness of the campaign against poverty. Example (7b) suggests that the reform "steps" being taken are difficult and shaky because they are "tackling difficult

problems and addressing hard issues." In this example, *gōngjiān* (lit. attack-solid) is coordinated with *pèngyìng* (lit. bump-hard) to form a collocation literally meaning "attack the solid and bump the hard." Both objects of the transitive verbs are originally adjectives meaning "solid" and "hard", respectively, converted into nouns through the "PROPERTY FOR THING/PERSON" metonymy. Interestingly, *pèngyìng* (lit. bump-hard) is a newly-added word in the 6th edition of XDHYCD (2012). Its meaning is close to "crack hard nuts" in English.

In Table 7, the first three compounds are nominal, the fourth one is verbal, but the fifth is adjectival. The literal meaning of the last compound is "solid-bitter," with two morphemes juxtaposed appealing to both tactile and gustatory senses. It is defined as "persevering and painstaking" in HYDCD and XDHYCD (2012), describing people who possess these qualities so that they can survive or succeed in a tough situation. In the Chinese-English dictionary XSDHYDCD (2004), however, it is defined with all the "difficult" adjectives: "arduous; difficult; hard; tough." A sentential example is provided in there: 翻译是坚苦的工作 "Translation is an **arduous** (lit. **solid-bitter**) task." The "difficult" sense of this compound is not used often, though. We searched for it in CCL; 38 tokens were retrieved, but only in one the adjective means "difficult," regarding the contents of a book, as in (8).

(8)　……因而此著虽论专深之学，却以其明畅而不使人觉其**坚苦**。
　　… therefore, this book, although on the specialized and profound knowledge of learning, does not make its readers find it **difficult** (lit. **solid and bitter**) with its clarity and coherence.

In sum, the linguistic manifestation of "DIFFICULTY IS WEIGHT" and "DIFFICULTY IS SOLIDITY" in Chinese displays some features quite different from those in English. First, the English weight and solidity adjectives have largely developed lexicalized "difficult" sense, *weighty* being an exception (see Tables 2 and 4). The same is not true of their Chinese counterparts, which have no lexicalized "difficult" sense listed in the dictionaries, where the "difficult" meaning was found with some conventionalized expressions as idioms and compounds (see Tables 6 and 7). This finding contrasts with that of Yu et al. (2017), which is a linguistic study of "IMPORTANCE IS SIZE" and "IMPORTANCE IS WEIGHT" in English and Chinese. There, it was found, size and weight adjectives have developed lexicalized "important" sense in Chinese as well as in English.

Another difference is that, in English, "DIFFICULTY IS SOLIDITY" exhibits a much richer (types) and stronger (frequencies) linguistic pattern than does "DIFFICULTY IS WEIGHT" (see Tables 3 and 5); in Chinese, the reverse seems to be true (see Tables 6 and 7). The five Chinese compounds in Table 7, which we believe to play a major role in instantiating "DIFFICULTY IS SOLIDITY," vary greatly in frequency in CCL (0, 1, 299, 798, and 4152).

As observed in the cognitive linguistic literature, pairs of antonymous adjectives do not appear equally in the linguistic instantiations of conceptual metaphors (e.g., Deignan, 2005; Stefanowitsch, 2006). We also observed this phenomenon in our study. In English, for instance, collocations containing *hard* and *tough* abound in the formation of a productive linguistic pattern for "DIFFICULT IS HARD," but *soft* appears by far less frequently for "EASY IS SOFT" (see Table 5). In Chinese, the "hard" adjectives (*yìng* and *jiān*) were found in five frozen collocations, with relatively low or no frequencies in CCL. Notably, the "soft" adjective (*ruǎn*) does not seem to appear in any linguistic expression of "EASY IS SOFT." In other words, this parametric version may not manifest in Chinese.[1] Also, the Chinese "light" adjective (*qīng*) has a stronger showing, in terms of both type and token, for "EASY IS LIGHT" than does its antonym (*zhòng*) for "DIFFICULT IS HEAVY" (see Table 6). On the other hand, the reverse is true of the English counterparts *heavy* and

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[1]In Chinese 软柿子 *ruǎn shìzi* "soft persimmon" can refer idiomatically and metaphorically to someone who is *weak* and therefore *easy* to be bullied by others. To us, the expression instantiates "INTERACTIVITY IS SOLIDITY" rather than "DIFFICULTY IS SOLIDITY" (see Figure 1). Here *ruǎn* "soft" means "weak," but "weak" is closely related to "easy." In the eyes of a bully, a "weak target" is also an "easy target."

light, as expected (see Table 3). The differences and asymmetries observed seem to constitute some idiosyncratic behaviors in the linguistic manifestations of the primary metaphors within and across the language boundaries.

Further analysis and discussion

In this section, we take a closer look at one similarity and one difference between English and Chinese in the linguistic realization of "DIFFICULTY IS WEIGHT" and "DIFFICULTY IS SOLIDITY." Regarding the first primary metaphor, we noticed that both English and Chinese use two actions in evocation of imagery for difficulty or ease. The first is lifting, i.e., raising something from a lower to a higher position; the second is going, i.e., moving on a course in a vehicle or not. Thus, English *heavy lifting* means "hard or difficult work" (*Oxford*) or "a burdensome or laborious duty" (*Webster*). In Chinese, being able to do something difficult with ease is "lifting something heavy as if it were light," and something easy to do is "light and therefore easy to lift" (see Table 6 and Example 5). Also, *heavy going* in English means "difficult to do or finish" (*Webster*) or "difficult to understand or deal with" (*Longman*). In Chinese, those who are capable of undertaking difficult tasks are able to "walk a long way while carrying a heavy burden," and those who are doing familiar things with ease are "driving a carriage with a light load on a familiar road" (see Table 6 and Example 5).

As can be seen, both actions involve motion through space, one vertical and upward, and the other horizontal and forward. Being heavy, either the object to lift or the load to carry on one's shoulder or in a vehicle, means "impediment to motion" ("DIFFICULTY IS IMPEDIMENT TO MOTION"). With both actions, lifting and going forward, the amount of weight we lift or carry typically correlates with the level of difficulty we experience in the actions. This experiential correlation, motivating the primary metaphor, is a fundamental aspect of human experience that does not vary from culture to culture. It would be of interest to see if similar imagery is evoked in other languages and cultures for "DIFFICULTY IS WEIGHT."

With regard to the second primary metaphor "DIFFICULTY IS SOLIDITY," we found a striking difference between English and Chinese regarding the extent to which this metaphor manifests itself in these two languages. It is manifested extensively in English, but very limitedly in Chinese. In the remainder of this section, we discuss how and why these two languages differ in this respect.

In section 2, we observed an asymmetry in English between the two poles of the scalar opposition, represented by the tactile adjectives, *hard* and *tough* on the one hand, and *soft* on the other. This is true in Chinese as well, but on a much smaller scale. Having studied the linguistic patterns for "DIFFICULTY IS SOLIDITY" in English and Chinese, we found a related difference between these two languages in the extent to which this primary metaphor is manifested linguistically. English seems to have a much more productive linguistic pattern for it than Chinese. This difference can be
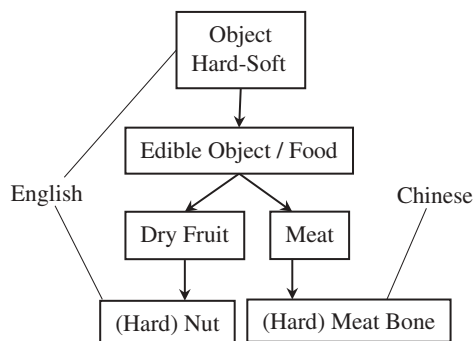

Figure 2. Difference between English and Chinese in the source domain of "DIFFICULTY IS SOLIDITY."

illustrated by Figure 2. We believe that this primary metaphor is based on the OBJECT image schema. It has been suggested that conceptual metaphors derive from and elaborate on image schemas (Johnson, 1987), and image schemas exist at the highest level of metaphor analysis (Kövecses, 2017). One of the core elements of the schematic frame of Object is Solidity, alongside the other two, Size and Weight (see Figure 1). The dimension of Solidity is represented by the scalar opposition between two poles: HARD and SOFT. Physical Object as a category in our folk taxonomy forms a hierarchy with different levels of schematicity and specificity. Each lower-level subcategory inherits the structure of its higher-level category while adding some new, more specific structure to it, as its subcase. As such, Object has a subcategory, Edible Object, i.e., Food, which in turn has two subcategories, Dry Fruit and Meat, among others. Under Dry Fruit one subcategory is Nut, which has a hard shell, like a walnut, for instance. It is usually "hard" for us to crack open the shell of a "hard nut" before we can eat the seed inside. Under Meat, there is bone-in meat or Meat Bone as a type of meat available in the supermarket. By "meat bone" we refer to a lump of bone with some meat attached to it. Bones vary in hardness, and what we refer to here are "hard bones" with irregular shapes on which it is "hard" to nibble the meat.

As shown in Figure 2, both English and Chinese utilize concrete images at the lowest, specific level to think and talk metaphorically about working on a "difficult task." Such an image is "(to crack) a hard/tough nut" in English, but "(to gnaw on) a hard bone" in Chinese. The major difference between English and Chinese is that English also deploys, to a vast extent, the very skeletal or schematic image, i.e., the OBJECT image schema, at the very top of the hierarchical structure in Figure 2, for the conceptualization of something difficult. Due to its schematic nature, the source domain does not specify the kind of object, but just outlines a generic object that has the basic property in solidity, i.e., being hard, tough, or soft.

Thus, the differences between English and Chinese relating to "DIFFICULTY IS SOLIDITY" can be illustrated by Figure 3, where the bold font type indicates primary metaphors. As this figure shows, Chinese has mappings at the specific level only, but English has mappings at both specific and schematic levels, and the large numbers of linguistic expressions instantiate the primary metaphor at the schematic level. At this level, English maps Physical Object onto Abstract State (i.e., state or attribute of an abstract entity or "being"), leading to a very productive linguistic pattern, as illustrated by the collocations in Table 5. In those collocations, for instance, *hard question, tough choice*, and *soft job*, the head noun represents the target while the modifying adjective denotes the source. It is at this schematic level that "DIFFICULTY IS SOLIDITY" manifests itself extensively in English, applying to a wide variety of target concepts. In contrast, the linguistic manifestation of this primary metaphor at this highly schematic level is largely missing in Chinese.
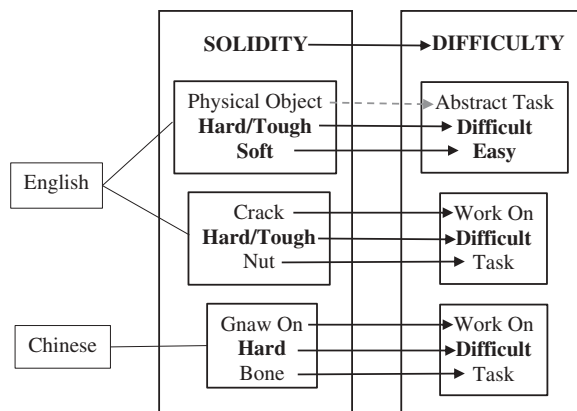

Figure 3. Differences between English and Chinese in the mappings of "DIFFICULTY IS SOLIDITY."

At this point, we would like to ask a question regarding the differences observed above between English and Chinese. Is it because SOLIDITY, with scalar properties of hardness, toughness, and softness, is not a salient source-domain concept for metaphorical mappings in Chinese? To answer this question, let us first go back to the Chinese compound *yìng gŭtou* (hard-bone). As shown in Table 7, its primary meaning refers figuratively to a "strong and unbending person" (HYDCD; XDHYCD, 2012) or a "person of indomitable will" (XSDHYDCD, 2004); its secondary meaning "problem extremely difficult to solve" (XDHYCD, 2012) or "hard nut; difficult task" (XSDHYDCD, 2004) is not even listed in HYDCD. That is, as a metaphorical expression, the "hard bone" refers primarily to a "hard" person, and only secondarily to a "hard" task.

Now, we would like to ask a further question: If "DIFFICULTY IS SOLIDITY" is manifested only to a limited extent in Chinese, is it because the "hard" and "soft" words in Chinese are less metaphorically extended into other domains? The answer is "No." In fact, the "hard" and "soft" words in Chinese are also quite polysemous, with different but related senses radiating in different directions from their central or prototypical meaning of solidity. Table 8 displays the polysemy of Chinese "hard" and "soft" words in XDHYCD (2012). The English translations are cited, where possible, from the Chinese-English edition of XDHYCD (2002), which, based on an earlier edition of XDHYCD, translates all the Chinese definitions and examples into English.

It is beyond the scope of our study to provide a deep semantic analysis of all the metaphoric and metonymic meaning extensions of the Chinese "hard" and "soft" words in Table 8. We just want to point out that most of such meaning extensions apply to the properties associated with "person" rather than "thing," with a total ratio of 10:4 (separately, 3.5:1.5 for *yìng* "hard"; 1:1 for *jiān* "solid; hard"; 5.5:1.5 for *ruăn* "soft"). As seen in Table 8, people can be "hard" or "soft" in character, will, attitude or ability, or in a manner of talking or doing, or dealing with other people. On the other hand, physical entities (e.g., goods) can be "hard" or "soft" in quality, and abstract entities (e.g., tasks) can be "hard" or "soft" in requirement. Interestingly, what is literally "hard task" in Chinese does not mean "difficult task," but "exacting task," i.e., a task that must be carried out to the letter. As shown in Table 8, the Chinese "hard" and "soft" words have developed numerous lexicalized metaphorical senses even though "difficult" and "easy" are not included in there.

Finally, we propose a general Human-Object Interaction frame, with essential elements and relations, as the source domain for "hard" and "soft" metaphors in Figure 4. We believe this general frame can serve as a foundation for the analysis of "hard" and "soft" metaphors, both within one language and for comparative purposes across languages. In this figure, the cross-frame solid arrow lines denote metaphorical mappings, with Object mapped onto the target with Abstract Entity, State or Process, or Person as possible variables, and with Hard or Soft mapped onto their Abstract Properties. In the left frame, which constitutes the structure of the source domain, the smaller boxes represent elements and the lines with stealth arrowheads indicate relations between them. Specifically, Human interacts with (manipulates, utilizes, touches, etc.) Object, which Human knows as either Hard or Soft. Object's property of being Hard or Soft results in Human's experience or judgment X, which represents a few parametric settings: More or Less Effort, Impact, Strength, or Flexibility. Of these four, associated with Object, the first two refer to Object's influence on another entity whereas the last two refer to the condition of Object itself. Though distinct values, they are nonetheless interrelated, serving as possible "main meaning focuses" (Kövecses, 2010) of "hard" and "soft" metaphors (indicated by the dotted line), which can then be elaborated and extended in various directions in the target domain. Note that the four scalar values are intrinsically neutral; they become positive or negative with specific metaphorical mappings in specific cultural contexts. In English, for instance, a "hard problem" that takes more effort to resolve is negative, but a "hard worker" that makes more effort at work is positive. Also, a "hard head" can describe positively a sober person (with much mental strength) or negatively a stubborn person (with little mental flexibility), although a "soft head" can only refer negatively to a person with a weak mind.

As in Figure 4, "hard" and "soft" metaphors are motivated by our sensorimotor experiences interacting with physical objects (cf. Slepian, Rule, & Ambady, 2012). It is well known, however, that

Table 8. Polysemy of Chinese "hard" and "soft" words (XDHYCD, 2012).

| Word	XDHYCD	English translation of definitions and examples
硬 *yìng*	1. (形)物体内部的组织紧密, 受外力作用后不容易改变形状(跟"软"相对)	1. (adj.) hard; stiff to the touch; (of an object) not easily yielding to the pressure of an external force because of its tight texture (as opposed to "soft"): 硬木 "hardwood"
	2. (形)(性格)刚强; (意志)坚定	2. (adj.) (of character) unyielding; (of will) firm: 硬汉子 "strong (lit. **hard/tough**) man"; 话说得很硬 "express oneself in strong (lit. very **hard**) terms"
	3. (副)坚决或执拗地(做某事)	3. (adv.) (do something) resolutely and obstinately: 不让他去, 他硬要去 "Although he was not allowed, he obstinately (lit. **hard**) wanted to go"
	4. (副)勉强地(做某事)	4. (adv.) ([manage to] do something) with difficulty/effort: 硬撑 "force oneself to go on doing sth. (lit. prop oneself up **hard**)"; 他一发狠, 硬爬上去了 "He made a determined effort and finally (lit. **hard**) climbed up"
	5. (形)(能力)强; (质量)好	5. (adj.) (of ability) strong; (of quality) good: 硬手 "skilled (lit. **hard**) hand"; 货色硬 "goods of high quality (lit. goods **hard**)"; 功夫硬 "be skilled (lit. skills **hard**)"
	6. (形)硬性的	6. (adj.) of inflexible, unchangeable (lit. **hard**) nature: 硬指标 "mandatory (lit. **hard**) quota; inflexible (lit. **hard**) target with strict, definite requirements"; 硬任务 "non-negotiable, non-alterable (lit. **hard**) task that has definite requirements on time, amount, quality, etc."
坚 *jiān*	1. 硬、坚固	1. solid; hard; firm; strong: 坚冰 "solid/hard ice"
	2. 坚固的东西或阵地	2. solid thing or fortification; stronghold: 攻坚 "storm a fortified position"
	3. 坚定、坚决	3. firmly; steadfastly: 坚信 "firmly (lit. **hard**) believe"
软 *ruǎn*	1. (形)物体内部的组织疏松, 受外力作用后容易改变形状(跟"硬"相对)	1. (adj.) (of an object or material) soft; loose-textured and easy to change shape under an outside force (as opposed to 硬 "hard"): 软木 "softwood"
	2. (形)柔和	2. (adj.) gentle: 软语 "**soft** voice"; 话说得很软 "speak in a **soft** voice"
	3. (形)身体无力	3. (adj.) (one's body) feeling weak: 爬到半山腰, 两腿就开始发软 "Having just climbed halfway up the mountain, he started feeling weak (lit. **soft**) in his legs"
	4. (形)软弱	4. (adj.) weak: 欺软怕硬 "bully the weak (lit. **soft**) and fear the strong (lit. **hard**)"; 人软被人欺 "people who are weak (lit. **soft**) will be bullied by others"
	5. (形)能力弱, 质量差	5. (adj.) incompetent; inferior: 功夫软 "half-baked skill (lit. skills **soft**)"; 货色软 "shabby goods (lit. goods **soft**)"
	6. (形)容易被感动或动摇	6. (adj.) easily moved or influenced: 心软 "tender-hearted (lit. heart **soft**)"; 耳朵软 "credulous (lit. ears **soft**)"
	7. (动)使不坚定; 软化	7. (v.) make (sb.) irresolute; soften: 别想拿眼泪软我的心 "don't ever intend to **soften** my heart with your tears"
	8. (形)没有硬性规定的; 有伸缩余地的	8. (adj.) with no hard rules; flexible: 软任务 "negotiable, alterable (lit. **soft**) task that has no definite requirements on time, amount, quality, etc."; 软指标 "non-mandatory (lit. **soft**) quota; flexible (lit. **soft**) target without strict, definite requirements"
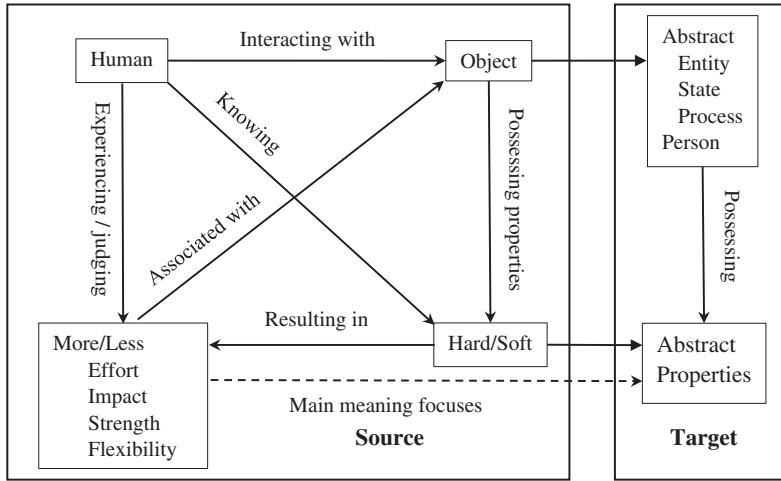
Figure 4. General human-object interaction frame as a source for "hard" and "soft" metaphors.

embodied motivation can only explain why a particular metaphor exists, but cannot predict which metaphor should or will exist in a particular language. This is because metaphors emerge in the interaction between bodily and cultural experiences (Yu, 2008). That is why, for instance, both "hard head" and "hard heart" can mean stubborn in Thai, but in English only "hard head" can mean stubborn whereas "hard heart" means cold or insensitive, thus suggesting a contrast between monism and dualism in two distinct cultures (Slepian et al., 2012). In addition, the linguistic experience itself, with salient variations in linguistic pattern and frequency, also has the potential to strengthen or weaken conceptual patterns (e.g., Casasanto, 2016, 2017a, 2017b; Yu, 2017; Yu & Jia, 2016). In COCA, for example, the imbalance in frequency between "hard decision(s)" (= 356) and "soft decisions" (= 1) may suggest an asymmetry in strength between "DIFFICULT IS HARD" and "EASY IS SOFT," the bipolar subversions of "DIFFICULTY IS SOLIDITY" (see also Table 5 and related discussions). This, as a hypothesis, needs to be confirmed by experimental research.

Conclusion

With this cross-linguistic study, we have come up with some findings regarding the status of two primary metaphors, "DIFFICULTY IS WEIGHT" and "DIFFICULTY IS SOLIDITY," through both qualitative and quantitative evaluations of their linguistic manifestations in English and Chinese. While the linguistic findings do support the validity and applicability of the two primary metaphors in both languages, their linguistic manifestations, however, vary considerably in degree across and within language boundaries.

Grady and Ascoli (2017, p. 27) argue that primary metaphors "form the basis for widely shared if not universal patterns of language and conceptualization." As they point out, primary metaphors involve multiple levels of phenomena from motivation to manifestation. Correlations in fundamental aspects of human experience lead to natural cognitive associations, which they call "pre-metaphors." Cognitive associations "then may or may not be established as conventional patterns of conceptual and linguistic associations, depending on the presence or absence of reinforcement from the surrounding linguistic and cultural environment" (Grady & Ascoli, 2017, p. 35; see also Winter & Matlock, 2017). In other words, the universality of a set of motivations for primary metaphors does not imply that lexical patterns themselves must be universal. There are a number of intervening factors between experience, for instance, and linguistic conventionalization, including cultural

mediation, so that even a conceptual association that is well motivated may not end up leading to a productive pattern of semantic extension. (Grady & Ascoli, 2017, p. 35)

The findings of our linguistic study in English and Chinese indeed support this view, as well as the claim about graded metaphorical strength and conventionality with specific lexical items in their ability to instantiate a particular primary metaphor (Svanlund, 2007).

In talking about the complex relationship between metaphorical language and thought, Gibbs (2017, p. 145) argues that the reality of human experience suggests that "metaphorical cognition and communication are tightly coupled," and that we should not neglect "the guiding force of metaphorical language" in metaphorical thought or "the mutuality between thought and language" in general. Indeed, there has been growing attention to the possibility of conventional conceptual patterns being inherited, from generation to generation, through the inheritance of conventionalized linguistic patterns, as well as the role of speakers' linguistic experience, in conjunction and interaction with their bodily and cultural experience, in metaphorical conceptualization and human cognition (e.g., Casasanto, 2016, 2017a, 2017b; Yu, 2017; Yu & Jia, 2016). The present study adds more weight to that end.

Disclosure statement

No potential conflict of interest was reported by the authors.

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