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# Assessing Claims of Metaphorical Salience Through Corpus Data

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## Abstract

In the linguistic domain, conceptual metaphors have been shown to structure grammar, the lexicon, and abstract reasoning. Much recent research on conceptual metaphor comes from corpus examination, which is increasingly focused on developing quantificational tools to reveal co-occurrence patterns indicative of source and target domain associations. Some mappings between source and target are transparent. However, other metaphors, especially those that structure abstract processes, are more complex because the target domain is lexically divorced from the source. This study introduces new techniques directed at the quantitative evaluation of metaphorical salience when target and source relationships are nonobvious. Constellations of source-domain triggers are identified in the data and shown to disproportionately emerge in topic specific discourse. This measurement can be taken as one indicator of conceptual salience among the target speech community.

**Keywords:** conceptual metaphor; corpus linguistics; political discourse

## Introduction

In the last few decades, cognitive scientists have begun to rigorously investigate the metaphorical models, which organize speakers' comprehension of complex political topics. (Lakoff 2002, 2009; Lakoff and Wehling 2012; Fausey and Matlock, 2011; Matlock, 2012). Increasingly, this research is based on corpus studies of topic specific discourse. Researchers in academia and partner researchers outside reveal how social inequality is embedded in and perpetuated by language use, spanning issues such as sexuality education (Real Reason), women's health and abortion (Real Reason), same-sex marriage (Face Value Project), education reform (Frameworks Institute, Cultural Logic), climate disruption (Skinnemoen 2009; Cultural Logic), crime (Thibodeau and Boroditsky 2011), economic inequality (Shenker-Osorio 2012), and immigration (Charteris-Black 2006; Chilton 2005; Hart 2007, 2010; Lakoff and Fergusson 2006; Lederer 2013). In the case of immigration, for example, migration is understood as a *flow* of water from *outside* the country through *porous* borders. When countries are metaphorically construed as containers and migrants as part of *tides*, *waves*, and *floods*, it makes sense to interpret immigration as a threat, a destructive force from which we need protection. The metaphor, thus, reinforces anti-immigrant sentiment.

A challenge for those working at the intersection of politics and cognitive science rests on the methodological rigor with which data-driven study is conducted. Because

much research in this arena occurs outside the academic publishing sphere, the research methods are often under-described. For the most part, advocacy organizations draw on small samples of data and reach conclusions that are most aptly described as conjecture. The goal of applied cognitive and conceptual metaphor research is admirable – to effect change by promoting models that align with a progressive value system. But that goal begs a fundamental research question. How can conceptual dominance be established through corpus methodology? And, how can naturally occurring language data translate into individual and or collective conceptual mental models? For example, how many times does a particular model need to be evoked in order to establish it as a 'dominant' conceptual model? Can dominance be quantified outside of the psycholinguistic, experimental arena?

## A Case Study: Gender Transition

Collections of naturally occurring language data serve as repositories of metaphor and can be used to investigate lexical patterns indicative of specific source domains. In this paper, I introduce simple corpus linguistic techniques to be considered as quantitative evidence for the conceptual potency of a given metaphorical understanding. The case study I present here is based on an investigation of the metaphors that structure speakers' understandings of gender transition, the process by which individuals change their birth-assigned gender to the gender with which they identify later in life (Lederer 2014). The abstract idea of gender and transition is metaphorical, and, like other politically relevant concepts, it is based on a set of conceptual metaphors (Lakoff and Johnson 1980). Two robust metaphors cover a sizable portion of metaphorical language in this issue area. In the first metaphor, TRANSITION IS A JOURNEY, gender transition is structured by speakers' experience of physical space, location, direction, and movement, as evidenced in terms like *cross-dressing*, *transitioning*, *changing*, *male-to-female*, *coming out*, *intersex*. The language of gender transition is indicative of a dual or binary category model of gender assignment, where male and female are understood as separate bounded regions in space. In this model, humans are assigned a sex at birth, thought of as the origin of the transition. The destination of the transgender traveller maps to the gender with which one identifies as an adolescent and/or adult. The journey's path represents decisions made to reach the desired gender identity. These choices are both steps taken to recognize and accept the gender mismatch and practices that affect one's physical appearance –

clothing and hair choices, hormone therapies, and surgical procedures.

A second model in transgender narrative data is centered on the DIVIDED-SELF metaphor. Transgender individuals sense a mismatch between two genders. This experience leads to unique understandings of a self divided (Talmy 2000; Lakoff 1996), in which the ‘real’ inner self is hidden, a covert gender identity which clashes with the exterior self, one’s public gender presentation. Transition involves harmonizing the two selves.

These two metaphors are conceptually potent in qualitative surveys of transition narrative data. In the subsequent presentation, I explore how qualitative insight can be translated into quantitative evidence. A movement towards quantifiable indicators of metaphorical salience pushes metaphor research of all kinds into the computational arena and will help to shield conceptual metaphor researchers from on-going methodological criticism (Gibbs 2011:533).

### Metaphor and Corpus Data

Since the recent introduction of big data, in the form of sizable, computationally searchable corpora, metaphor analysts in academia have begun to probe questions of quantitative validity (Deignan 2005). Musolff (2006: 24), for instance, proposes that token frequency in an author-generated corpus should be taken as a measure of conceptual potency. He investigates the family based models that structure descriptions of political relations within the European Union by counting the number of times each source domain strain is evoked in his corpus. He maintains that certain discourse communities share specific source domain scenarios through their reliance on common folk models.

Adopting a lexical approach to metaphor identification, Oster (2010) relies on collocation patterns to show which lexical units are most associated with metaphorical description of the emotion fear. Oster uses co-occurrence information – the lexical units that most frequently collocate with *fear* – to find target-specific metaphorical expressions. She draws on this data to build a source-domain ontology. She argues the most “relevant” metaphors are those evoked by the highest number of linked linguistic expressions (p.742). For example FEAR IS SOMETHING INSIDE THE BODY is evoked more frequently than is FEAR IS AN ANTAGONIST. Some metaphors, however, such as FEAR IS FIRE are more creatively produced because they are evoked by a larger set of linguistic expressions. Oster, therefore, combines frequency information with lexical co-occurrence data to produce a source domain’s productivity and creativity index (p. 748) – additional parameters by which she can compare source domains.

One difficulty in this algorithmic approach comes from the nature of conceptual metaphor itself. Most metaphorical data draws from multiple source domains simultaneously. For example, when fear is *attacking from the inside*, fear is

both an entity in the body and an antagonist at the same time. Thus, though useful for attaining certain types of information, Oster’s lexical approach doesn’t provide a complete picture of how fear is understood metaphorically on its own and in relation to other emotions.

In more recent research, investigators working on the MetaNet project at the International Computer Science Institute have engaged in a corpus-driven, lexical approach to researching the alignment between target domain expressions, source domain frames, and the grammatical constructions that blend the two (David, et al. 2014; Stickles et al. 2014). Target and source word pairs, such as *alleviate poverty*, in which the source domain of DISEASE is evoked to understand the target domain POVERTY, are used to quantitatively evaluate the frequency of one source domain in relation to another. Through the same approach, the frequency of activation of individual frames can be compared to other frames within the same source domain. For example, in the British National Corpus, Stickles et al. (2014) show how POVERTY is more frequently discussed as a DISEASE than as a basic HARM. And, when understood as a disease, speakers are more likely to discuss the treatment of the affliction of poverty than the diagnosis of the disease of poverty. Thus, at a macro level, the corpus results lead to the conclusion that AFFLICTION and TREATMENT roles in the source domain are more salient than is the role of DIAGNOSIS (Stickles et al. 2014).

Corpus-based approaches to metaphorical investigation have moved toward increasingly sophisticated quantitative methodology, and the alignment between lexically encoded metaphor and grammar is more researchable than ever. Nonetheless, much metaphorical structure rests beyond obvious, direct lexical investigation. This is the case with metaphorical concepts fundamentally understood as processes not as entities. The ease with which conceptual potency can be exposed has to do with the relationship between source-domain lexical triggers and the structural character of the target domain. When the target domain is cognitively complex and lexically divorced from the source domain, conceptual salience can still be revealed, but the implementation of corpus methodology must be tweaked.

### Beyond Direct Lexical Searches

Unlike the investigation of a lexically encoded metaphorical concept like fear or poverty, a corpus approach directed at an issue like gender transition isn’t straightforward. Because transition is understood as a process, not an abstract entity, a corpus investigation cannot begin with lexeme specific searches as has been done by Oster (2010) and Stickles et al. (2014). That is, searching the topic-specific corpus data for the word *transition* won’t reveal the complex model(s) and/or source domains involved in understanding gender transition as is the case with an emotion like fear or a state like poverty. Ultimately, the investigation of these types of metaphorical models must be carried out through a mixed-method approach in which the corpus is qualitatively

scanned, manually tagged, and as an additional measure, quantitatively assessed.

**The Corpus.** Preliminary data for this case study analysis was drawn from various online sources, resulting in an archive of transition narratives that includes 30 self-published coming-out stories on YouTube™, five published autobiographical works, 10 television interviews from broadcast networks such as ABC and CNN, multiple internet forum postings, and message board commentary. To supplement the archive of narrative data, a transition-specific corpus was constructed by pulling 200 consecutive postings from one specific thread called “I am Transgender” within the *Experience Project* website ([www.experienceproject.com](http://www.experienceproject.com))<sup>1</sup>. The Experience Project is a free, publically accessible website in which members build online communities centered on a wide variety of life experiences.<sup>2</sup>

**Motivating a Quantitative Approach.** Qualitative metaphor research forces researchers to assert rather than show the conceptual dominance of particular metaphorical models. A dearth of quantitative data suggests a quantitative approach to establishing dominance is challenging. The challenge resides in the observations raised above – direct lexical searching is fruitless when a metaphorical model structures an abstract process.

**A New Methodology.** When the target domain isn’t encoded lexically, isn’t encoded directly in the corpus, relevant source domains must be identified manually, by scanning the data line by line. In the case of gender transition, obvious patterns reveal themselves quickly. Data from just a few coming-out narratives indicates speakers rely heavily on journey language and discuss a complex, yet common, understanding of an inner and outer self:

- (1) *I can admit it now, I am a transgender woman and I'm ready to start my **journey!***
- (2) *So September again is a big month for my progression down this transition **road.***
- (3) *The next year, 2010, I went through the next major **step** in my transition.*
- (4) *It's taken 5 years to get **here**, today was a mile stone, soon I will be complete and by 2014 hopefully I can pee and make love like other woman do.*

<sup>1</sup> The ‘I am Transgender’ (IAT) corpus contains 5996 unique word types and 75,505 total tokens.

<sup>2</sup> The thread I accessed is called “I am Transgender (Personal stories, advice, and support)” (IAT). There are 2010 subscribers to this thread. From it, I culled 200 consecutive postings from the years 2012-2014. Each posting ranges from a few sentences to well over 10 paragraphs.

- (5) *I am 17 years old, I am a beautiful young woman **trapped** in a hideous gentleman's **body.***

- (6) *To do that I had to look **inside** of my own self and discover who I am.*

Once the relevant source domains are identified, simple frequency statistics can, in fact, serve as indicators of model salience. If a source domain is actively structuring an abstract idea, language from the source frame should be frequent and robust in topic specific discourse.

The “over-use” of model-evoking lexical units points to conceptual reliance on a holistic domain. Therefore, one way to argue a given model is dominant among a particular group of speakers is to compare the frequency of lexical triggers in and out of the speech community. If a particular model is consistently evoked to address a metaphorical concept, then some of the lexemes associated with that model should appear in topic specific data more frequently than in the language overall.

In order to test this proposition, I compared the frequency of use of the noun *journey* within the IAT corpus to the frequency of occurrence in a sample of American English between the years 2010 and 2012 (taken from the Corpus of Contemporary American English (COCA) (Davies 2008-)). COCA serves as a robust representation of the English language as a whole due to its sheer size and varied register representation<sup>3</sup>. Between the years 2010-2012, there are 1,976 tokens of the noun *journey* in COCA, resulting in a 0.0190% chance of occurrence during this time period. On the other hand, there are 33 tokens of the noun *journey* (specified to the transition process) in the IAT corpus, amounting to a 0.0437% chance of occurrence. In other words, the lexical item *journey* is more than twice as likely to show up in the IAT corpus than it is in COCA. An analogous comparison can be made with the lexical item *self*. In the IAT corpus there are 27 tokens of the noun *self* (used to address the transition process), resulting in a 0.0365% chance of occurrence. This is almost three times the likelihood of occurrence in non-topic-specified discourse in COCA, where it has a 0.0137% chance of occurrence. (And this differential is based on only the uses of *self* used to evoke the DIVIDED-SELF metaphor, not other unrelated uses of the word.)

However, in order to evaluate the robustness or potency of a complete metaphorical model, it is insufficient to probe the frequency of just one lexical item. A better representation of model salience is to establish the comparative frequency of a collection of lexical items all related to the same source domain. But, the evaluation of the constellation of source domain triggers must be carried out with caution. Trigger lexemes used to mine the corpus data are not necessarily lexical items exclusive to the source domain. For example, the word *step* has a high frequency of

<sup>3</sup> At the time of this investigation, COCA was comprised of 464,020,256 tokens.

occurrence in language used to describe gender transition, but it also has a very high frequency in all types of English discourse and is active in many other unrelated target domains that rely on the same source domain. Therefore, direct frequency count comparisons of individual words will not necessarily yield useful information. Trigger lexemes need to be evaluated as a group.

Grouping lexical triggers yields a new kind of quantitative measurement of conceptual salience. For individual lexical items, Ahmad (2005) has developed a simple ‘weirdness’ algorithm to measure genre, topic-specific key words, which appear disproportionately in a restricted corpus compared to a baseline. In Ahmad’s measure, the frequency of the lexical item in the specialized corpus is divided by the frequency of the item in a general corpus. Any item which occurs more frequently in the specialized corpus will measure at a weirdness score greater than 1.0. A measure greater than 1.0 indicates a word is comparatively unique to the restricted corpus.

$$\text{weirdness}(\text{term}) = \frac{F_{\text{special}}/N_{\text{special}}}{F_{\text{general}}/N_{\text{general}}}$$

This measure of ‘weirdness’, which I will term ‘keyness’, allows lexical items to be both ranked by their relative frequency and numerically compared to one another. If a metaphorical model is salient in topic specific discourse, we should expect all, or almost all, lexical triggers to exhibit a score greater than 1.0.

## Results

The results differ for the two metaphors investigated in this paper. The source domain of a JOURNEY in the TRANSITION IS A JOURNEY metaphor exhibits a more diffuse lexical representation. Nevertheless, as shown in Table 1, almost all journey-evoking lexical items measured show a keyness score higher than 1.0, meaning their relative frequency is higher in the IAT than in COCA, and the words *journey*, *path*, *forward*, and *step* show comparatively high keyness scores. This result supports the proposition that certain aspects of the concept of a journey are being addressed more frequently when speakers discuss gender transition than in the language overall. And, it is clear from the qualitative evaluation of the data that the journeys discussed in the IAT corpus are indicative of metaphorical, not literal, travel.

Table 1 – ‘Keyness’ factor for journey-associated lexical items in the IAT compared to the baseline COCA

Lexical Item	IAT %	COCA%	Keyness
Journey	.000437	.000033	13.24
Path	.000159	.000058	2.74
Forward	.000318	.000130	2.45
Step(s)	.000503	.000208	2.42
Direction	.000119	.000075	1.59
Far	.000490	.000336	1.46

Back	.001775	.001221	1.45
Here	.001470	.001023	1.44
Place	.000517	.000472	1.10
Stage(s)	.000119	.000116	1.03
Arrive(d)	.000093	.000093	1.00
Road	.000146	.000170	0.86

This type of frequency ranking comparison also suggests the strength by which an individual lexical item is tied to a source domain. We can hypothesize that the words *journey* and *path*, for example, are robust indicators of the metaphorical model since their relative frequencies are significantly higher in the IAT than in COCA, certainly more so than the words like *place*, *stage*, or *road*.

Demonstrating a more uniform pattern, the set of model-referencing words used to evoke the DIVIDED-SELF metaphor are *all* more frequent in the IAT than in COCA.

Table 2- ‘Keyness’ factor for divided-self-associated lexical items in the IAT compared to the baseline COCA

Lexical Item	IAT %	COCA%	Keyness
Self	.000781	.000037	21.11
Coming out	.000252	.000020	12.60
Inner	.000265	.000032	8.28
Hide	.000172	.000030	5.73
Trapped	.000093	.000017	5.47
True	.000675	.000194	3.48
Body	.000834	.000255	3.27
Hidden	.000093	.000040	2.33
Inside	.000305	.000203	1.50

Each trigger word in Table 2: *body*, *self*, *true*, *coming out*, *inside*, *inner*, *hide*, *hidden*, and *trapped*, appears more frequently in the IAT than in COCA and has a significant keyness score greater than 1.0. However, again there are disparities in how strong a trigger word is associated with the source domain. For example, *self*, *coming out*, *inner*, *hide* and *trapped* (all scoring >5) are much more frequently used in the IAT than in COCA; whereas, *true*, *body*, *hidden* and *inside* are more frequent in the IAT, but not by such a large margin.

## Defining Lexical Density in the Source Domain

The fact that JOURNEY language overall exhibits a lower keyness average (2.57) while DIVIDED-SELF language averages to a higher score (7.09) suggests that the lexical items tied to the DIVIDED-SELF metaphor may function as a tighter constellation of lexemes. That is, the lexical set is comprised of specific expressions that pattern more closely and frequently together. To show this, the corpus can be searched for N-grams (e.g. Carter and McCarthy 2006: 832). For example, *inner self* functions as a formulaic expression. In the IAT, *inner* is the third most frequent collocate one words to the left (1L) of *self*, with a Mutual Information score of 7.58. (An MI score is a statistical measure of lexical attraction in the corpus and an MI greater than 3.0 is

interpreted as significant (Cheng 2012.) When the IAT corpus is probed for N-gram clusters *wrong body* is found 10 times (MI=7.99), and there are four instances of *trapped in a \* body*.

Journey language, on the other hand, is more diffuse. The lexical set used to trigger the source domain is larger, co-occurrence patterns are weaker, and the constellation of model-evoking terms is less directly tied to the metaphor itself. For example, of the other trigger words, only *step(s)* occurs as a collocate of the noun *journey* in the IAT (5L, 5R). Clearly the words *journey*, *path*, *step*, etc. form part of the lexical set that evokes a JOURNEY frame, but they don't appear next to one another in running discourse.

## Discussion

Comparative frequency rankings through the calculation of 'keyness' can be used as a measure of comparative conceptual salience as well. In some cases, multiple complex metaphorical models structure one particular target domain. When two models are in conceptual competition, so to speak, comparative frequency rankings can be used to establish conceptual dominance. However, in the case of gender transition, the difference between the average keyness score across the two models should not be taken as a sign that speakers evoke one model over the other. In fact, many examples from the IAT corpus exemplify how both models are active simultaneously in the same narrative. In (7), the speaker elaborates both the TRANSITION IS A JOURNEY metaphor and the DIVIDED-SELF understanding in her description of gender transition:

- (7) *I became quiet and withdrew into myself. I could see a doorway and I was on one side of an open door, staring through into another room...The **place** I started was my male-centric life. The **place** I crossed into is my female-centric life. During this **I saw myself turn** and stare back through the door in which I just passed. I could see **my old self** standing there, unable to come with me. I looked down at **my new self** and there I was, the woman I am becoming... I know there will be **parts** that I, indeed, do miss, but nothing can compare with **what lies ahead**. After a pause, **I stepped into my future**. I guess, really though, when you've kept a secret as long as I have, when you've had to **hide your inner self**, even from yourself as long as I have when you're finally able to **live as the person you've always known yourself** to be it's hard to control your emotions...*

This dream sequence is representative of many other narratives of gender transition. The exterior self is modified over time to match the interior self –the identified gender. The process is a journey of multiple stages, usually slow and methodical, carried out over a time span of several years. One metaphorical model does not preclude the other,

but rather the two metaphors work in tandem to structure speakers' understanding of change.

When it comes to the metaphorical analysis of other issue areas, it is not uncommon for analysts to speculate on the dominance of one model over another with no real quantitative analysis. An impressionistic assessment of metaphorical salience has its place in applied conceptual metaphor research. However, the availability of computational assessment vis-à-vis corpus analytics is becoming cheaper, easier, and more common in the evaluation of discourse in other applied areas of linguistic research (Cheng 2012). There is a case to be made that metaphor researchers should follow suit and infuse more precision into the dissection of conceptual models.

The use of a 'keyness' measure allows the researcher to put numbers to observations. As executed using the data of gender transition, keyness can be calculated for individual metaphor triggers, and the average of the keyness score across each lexeme can be taken as a numerical indicator of a model's overall lexical salience in the data. This method is not without limitations. For example, there is no way to restrict keyness calculations to only metaphorical senses of the lexical item without manually tagging both the restricted corpus and the baseline corpus. Tagging of this sort runs counter to the purpose of using the statistical measure to optimize the research process.

It is still an open research question as to whether corpus frequency statistics translate into conceptual potency. This proposal rests on the assumption that the model most frequently evoked within a speech community is also the model most conceptually salient in the minds of the speakers. Clearly, moving forward, analysis drawn from the quantification of corpus data needs to be paired with psycholinguistic, experimental research in the lab. It is only when patterns from both research strands align that metaphor analysts can be truly confident in the conceptual dominance of one model over another.

## Conclusion

In this paper, I have used the case study of gender transition to demonstrate how corpus frequency statistics can be used to bolster claims of metaphorical salience. Corpus-driven, statistical data are making their way into the study of conceptual metaphor research (Stefanowitsch 2006). Often however, these analyses are based on metaphorical data that are easy to mine. That is, probing a corpus for metaphorical data in which both source and target domain language is paired and collocated is a straightforward process. But, this method is not possible for many metaphorical concepts due to the nature of how target domains are represented. When a target domain like gender transition is understood as a process, direct lexical searches won't recover pertinent structural information about active source domains. The corpus data must be first qualitatively analyzed for metaphorical structure and then searched based on preliminary findings.

In the case of gender transition, the constellation of source-domain lexical triggers occurs more frequently in the corpus of transition narratives than the same lexical items do in nonspecific English discourse. The methodology presented in this study includes a multistep process in which topic-specific corpus data is collected, manually scanned, and then statistically compared to non-specific, generic discourse. This relative frequency differential is assessed through a 'keyness' score, which is a numerical measure of how frequent, on average, metaphorical triggers occur in the restricted corpus compared to the baseline corpus. The application of this new methodology to other politically relevant issue areas will result in quantifiable observations of metaphorical salience, thus providing metaphor researchers additional strategies to validate impressionistic conclusions of model dominance.

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