Effects of conventionality and proficiency in metaphor processing

A response time study

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Abstract

Some researchers that work with metaphor theory claim that metaphors and figurative language are understood and processed just as easily as literal language. However, as this thesis will explore in detail, other research indicates that such is not always the case. That is, if the category of metaphor is further subcategorized into conventional and non-conventional metaphor, the scope will change because of the fact that it is possible to argue that non-conventionalized metaphors require a more conscious path of processing. In order to explain this alternative path, there are two primary approaches to language processing worth introducing: implicit and explicit. These approaches vary in required attention and speed of processing. With regards to conscious effort, these approaches are rather similar to the way in which we process conventionalized and non-conventionalized metaphors. Conventional metaphors are processed more quickly and easily than non-conventional ones. Hence, the claim that all metaphors are similarly processed may not always be true. Furthermore, an individual’s level of proficiency presumably correlates with speed in language processing. However, if non-conventional metaphor requires a more deliberate path of processing, this thesis assumes that the processing of this type of metaphor will be relatively unaffected by proficiency level, thus causing informants to process them in similar manners. In this thesis, 24 non-native speakers (NNS), categorized into intermediate proficient and advanced proficient, and seven native speakers (NS) were tested with an RT-test on subjective metaphor comprehension. Results were compared using mean response times and standard deviations, as well as looking at correlations and coefficient of variation. The results showed a distinct difference in processing speed with conventional metaphors being processed significantly faster. Moreover, the findings indicate that conventional metaphor processing speed seems to be predicted by proficiency, whilst non-conventional processing speed is not. The RT differences remained relatively consistent in both conventional and non-conventional metaphor processing, but when taking correlations, variance and coefficient of variation into consideration, the findings indicate that these other factors help level out the differences in non-conventional metaphor processing in more subtle ways than simply by RT’s.

Keywords

Language processing, Metaphor comprehension, Conventional metaphor, Non-conventional metaphor, Automaticity, Proficiency, Native speaker (NS), Non-native speaker (NNS), Response time (RT).
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1. Introduction

In one form or another, metaphor is essential to the way in which language systems develop over time (Yu, 2011). Figurative language is often viewed as a prevalent tool in people’s everyday linguistic repertoire and it is used so frequently that it provides an insightful basis for linguistic studies. One area in which such studies are relevant is that of metaphor comprehension and metaphor processing. More specifically, this thesis will explore receptive features of metaphor processing, in the form of reading and reacting, and how this varies as a result of conventionality and language proficiency.

1.1 Background

Research within the field of metaphor processing explores several theoretic views which promote various paths of processing (e.g. Grice, 1975; Searle, 1979; Christmann, Wimmer & Groeben, 2011; Yu, 2011). First of all, as suggested by some of the literature on the topic (Glucksberg, 2003; Gibbs, 1984), metaphor comprehension and processing, in some instances, seems every bit as fast and accurate as language processing in general. Secondly, processing speed is assumed to correlate with proficiency which in turn has effects on automaticity, relative speed and, hence, comprehension (Paradis, 2009). In Paradis’ view, experimental behavioral measures can be obtained with the help of testing syntactic constructions and/or morphological forms to determine response times. This thesis will adopt this type of testing and apply it to metaphor-like linguistic stimuli. This may reveal whether performance is not only fast, as in speed of delivery, but also automatic. That type of processing test has also been researched from a neurological perspective where Paradis claims that: “Under brain imaging conditions, one can assess accuracy and fluency and measure inter-individual variation in reaction times, imaging should show heightened activation of the basal ganglia, and Broadmann’s areas 22, 40 and 44, reflecting implicit language processing.” (2009, p. 7), and the fact that “Lack of automaticity would be reflected in longer reaction times and, more importantly, greater variation (…)” (2009, p. 7). According to this line of reasoning, the level of proficiency should correlate with the length of the response times; i.e. the faster the response, the higher level of proficiency the participant should display and vice versa. With a general approach, one can therefore hypothesize that the processing speed of an individual would remain relatively stable over various types of processing tasks, e.g. on word-, sentence- and metaphorical tasks. That is, the differences in processing speed, which are assumed to be affected by proficiency, are likely to remain stable in various types of language processing tests, e.g. word recognition tests, sentence processing tests and general metaphor tests. However, if the category of metaphor is further subcategorized, i.e. into conventionalized metaphor and non-conventionalized metaphor, the scope of metaphor processing will slightly change. One can hypothesize that there will be less of a difference, than with only conventionalized metaphor, across proficiency groups and that participants will process at more similar speeds since proficiency will be of little help as other factors in processing (e.g. increased conscious effort) come into play when processing non-conventionalized metaphors.
In recent work, Thibodeau and Durgin (2011) have identified two primary aspects that might account for the variation in processing fluency, speed and ease: conventionality and aptness. In this thesis, conventionality will be the main focus. In their view, “Conventionality reflects the familiarity of a metaphor whereas aptness reflects the degree to which a metaphor vehicle captures important features of a metaphor topic.” (2011, p. 206). Conventionalized metaphors have been internalized as a part of the mental lexicon and are often processed as categorical assertions. An example of such a metaphor is, according to Thibodeau and Durgin (2011), Memory is a warehouse. In this instance, warehouse would be considered prototypical in terms of members in the category of ‘vast but bounded spaces for storage’, whilst memory would be considered a reasonable example of said category. Differences in processing with such items are dependent on how fast a taxonomic relationship can be established. That is, if memory is already thought of as an example of said category its aptness is considered to be high. As a result, the metaphor is likely to be processed relatively easily. In contrast, even though they might be processed like categorical assertions (as detailed above), non-conventionalized metaphors often rely more on an “(…) intensive comparison-based process like structure mapping” (Thibodeau & Durgin, 2011, p. 207). Consider the following metaphor A fisherman is a spider. The idea is that people must map the relational structure of a spider onto a fisherman. In this instance, a patient spider could be likened with an enduring fisherman, and the spider’s net likened with the net of the fisherman. This process would then generate a mental representation of the sentence as opposed to that of Memory is a warehouse, which people might be able to retrieve from memory directly. Of these aforementioned processes (categorical assertion & comparison-based structure mapping), the intensive comparison-based structure mapping is especially interesting in this particular study.

Thus, the overall purpose of this thesis is to test and compare the relative speed of conventionalized- and non-conventionalized metaphor processing among non-native speakers (henceforth labeled NNS) which display various levels of proficiency. In order to better describe the effects of this phenomenon, a small number of native speakers (henceforth labeled NS) will also be tested as reference.
2. Literature review and framework

This section provides a review on some of the literature relevant to the field of metaphor processing as it constitutes the theoretical framework adopted in this thesis. Here, various theories of metaphor processing and comprehension are presented. It presents literature that spans from the more general levels of sentence processing and more specific levels of metaphor processing, via basic metaphor theory, to automaticity and aspects of conventionality.

2.1 Sentence processing

In sentence processing, or parsing, we structure words and phrases into comprehensible syntactic structures that convey some sort of meaning to us. There are several models that propose different strategies and we will go into general descriptions of two of these. First, there are constraint based models which propose that the parser is “(…) capable of pursuing multiple structural possibilities simultaneously” (Traxler, 2012, p. 152). That is, processing is often parallel: when partial and incomplete information occurs, these parsing models suggest a sequence of multiple partial activations of various syntactic structures. Furthermore, it is suggested that syntactic, semantic and lexical processes are often simultaneous, which implies a one-stage model with parallel activation. Also, constraint based parsers can draw on a wider number of cues (lexical, semantic or syntactic) than e.g. garden path parsers, who rely solely on word category information for its inputs (Traxler, 2012), to decide what structures to actually build on.

If we take into account that these models include semantic and lexical processes as well, one could argue that these models are built on the understanding of the lexical items given that we are aiming for sentence meaning rather than syntactic meaning) within the sentence, i.e. their literal meaning. To understand them in context, the parser has to, as noted by Traxler (2012, p. 166), first activate representations for these words and then rank various structures in relation to how much evidence that is available for each of the inputs. Having done so, the parser then integrates these to form meaning. However, at times, the syntactic process does not integrate with the semantic process: that is, when the meaning(s) of the sentence does not match any contexts or structures previously known to us. At such instances, the parser proceeds to the interpretation of non-literal meaning. The parser then conducts a search for non-literal meaning that somehow does make sense. As suggested by Searle (1979, p. 114), “When an utterance is defective if taken literally, look for an utterance meaning that differs from sentence meaning”. This third step is, as we will see, involved in the comprehension of metaphor.

2.2 Metaphor theory

By arranging words into sentences, e.g. through the models described above (sec. 2.1), we can pair syntax and semantics into an understanding of a particular sentence. One instance in which we cannot pair them, by general rules that is, is for metaphorical expressions. So, how should we explain the way in which we arrive at appropriate understandings of sentences such as ‘My lawyer is a shark’?
Traditionally, metaphor processing has been contrasted and presented in two primary approaches; indirect access models and direct access models (Lai, Curran & Menn, 2009). Indirect access models suggest that metaphorical meanings are deviant in comparison to literal meanings. This deviancy causes metaphorical meaning to not be computed until any literal meaning can be refuted by context. Direct access models suggest little, or no, deviancy which in turn allows metaphors to be as readily available as literal meaning. A model which has long held sway is the standard pragmatic model of metaphor (Grice, 1975; Searle, 1979), henceforth labeled SPMM. The SPMM claims that a three-stage model is what largely determines our comprehension of metaphors and processing of meaning. Basically, this theory promotes a view where the first step is to derive the literal meaning of the sentence. This would then yield a nonsensical interpretation in which a shark is a predator and a marine creature. Secondly, we assess this interpretation against the context of the utterance. Since my lawyer is not likely to be a vicious marine creature, this brings little meaning to the sentence as a whole. Therefore, and lastly, we search for a non-literal meaning that makes sense. By Grice’s and Searle’s notions, defective meaning is an important aspect. Defective meaning, in their view, is a false categorical assertion, which leads to inaccurate interpretations of sentence meaning, which must be rejected in favor of other non-literal interpretations (Glucksberg, 2003, p. 92). The model generates a few psycholinguistic issues, as criticized by Glucksberg (2003). Among them, the SPMM poses that the process of literal meaning has unconditional priority and, therefore, that it should be easier to understand than figurative language since the latter process is only triggered if the former process fails. This issue of the SPMM fails at a moment’s reflection. If it were to be always true, figurative processing would take much longer than literal processing. However, Glucksberg exemplifies the opposite with the idiom kick the bucket which is hardly ever used literally but rather recognized metaphorically, in an instant, as to die. This leads Glucksberg to claim that: “Like any kind of language comprehension, metaphor comprehension, is non-optional. Instead, it is mandatory and automatic (2003, p. 93).”

Furthermore, the SPMM is often contrasted with a psycholinguistic direct access model (Gibbs, 1984). That particular model supports the claim that metaphors are automated and relatively easily processed. It claims that figurative utterances are likely to be directly comprehended from the situation or context without even activating the inadequate literal meaning of the utterance. Accordingly, this model, alongside Glucksberg’s criticism of SPMM, indicates that the comprehension of metaphors does not seem to require any additional processing steps. Just as proposed earlier by Glucksberg (2003), the majority of studies promote the direct access view based on the fact of context being available (Lai et al., 2009, p. 146).

2.2.1 The Contemporary Theory of Metaphor (CTM)

Another model of metaphor, the contemporary theory of metaphor (henceforth labeled CTM), proposes that metaphors are understood through cross-domain conceptual mappings. As exemplified by Lai et al. (2009), metaphors such as His idea was half-baked and The teacher spoon-fed them information, are supposedly “(...) surface realizations of an underlying conceptual metaphor IDEAS ARE FOOD, and are
understood via a cross-domain conceptual mapping between IDEAS and FOOD” (Lai et al., 2009, p.145). Certain linguistic expressions enable conceptual mappings so that ideas can be thought of, and reasoned about, in terms of food. The CTM illustrates how various concepts of varying levels of abstractness are organized and interrelated in the human mind. The CTM also acknowledges the distinction of conventionalized metaphors and more novel ones. Conventionalized metaphors, such as ‘ideas are food’, and their patterns and mappings have been made part of our conceptual system of mental representations. According to Lakoff (1993, p. 245), conventionalized metaphors are readily available in terms of processing and retrieving as they are “used with no noticeable effort”.

2.2.2 The Property Attribution Model (PAM)

\( X \text{ is } Y \) is a very common sentence form. It is typically used to communicate relationships of various kinds between two concepts. This can be done in two primary ways: either by asserting the membership of \( X \) in a category exemplified by \( Y \), such as e.g. \( a \text{ trout is a fish} \), or by asserting that \( X \) is similar to \( Y \) (and vice versa) in some ways, e.g. \( a \text{ Coke is like a Pepsi} \) (Glucksberg, McGlone & Manfredi, 1997). Similar to these examples, metaphors are commonly structured in the same way, e.g. \( Birds \text{ are airplanes} \). While metaphors can be paraphrased as similes, as in \( Birds \text{ are like airplanes} \), one cannot say that \( a \text{ Coke is a Pepsi} \). Glucksberg et al. (1997) note that metaphor theorists view this interchangeability of category-inclusion and comparison approach help form people’s perception of metaphors. As mentioned in section 2.2, false categorical assertions are claimed to be one of the first steps in metaphor comprehension (Glucksberg et al., 1997). Once this comparison is activated, theorists believe that metaphors are recognized and interpreted in the same way as items of a literal comparison would be, i.e. “(...) by determining the relevant properties that the compared concepts have in common” (Glucksberg et al., 1997, p. 51). Some models (Ortony, 1979; Gentner, 1983) claim that these common properties are identified via a property-matching strategy. In their view, metaphor comprehension “(...) begins with an initial exhaustive extraction of the properties comprising the representation of the topic and vehicle concepts” (Glucksberg et al., 1997, p. 51). That is, once the topic and vehicle properties have been extracted, they are exhaustively checked against one another, and those that are perceived to match are considered in the comparison. However, metaphorical comparisons that introduce novel properties into someone’s representation of a topic do not seem to be eligible for understanding via simple property matching. Should this occur, it would only mean that the property of one concept is transferred to the other rather than compared (Glucksberg et al., 1997). So, instead of property matching, Glucksberg et al. propose a property attribution model (henceforth labeled PAM) by which people, at a minimum, select one or more suitable candidate properties from either concept to apply to the other. Some research proposes that only the most salient properties are considered, or at least most likely to be so. Moreover, Silvia and Beaty (2012) argue that the PAM is to be viewed in some ways as a guide to the understanding of the creation of metaphor. Accordingly, the PAM indicates that the creation of metaphor involves “(...) several executive processes” (2012, p. 344). Silvia’s and Beaty’s contributions are very similar but they also point to
the fact that while people e.g. process the topic teaching, they must select what they want to communicate about that topic. For example, if they wish to communicate that it is stressful and rewarding, they must then “(…) scan semantic knowledge for suitable vehicles that exemplify the abstract, higher-order attributive category.” (Silvia & Beaty, 2012, p. 344), and most importantly, that while doing so, people must maintain access to the actual category while in turn inhibiting other kinds of knowledge, e.g.

(... features of the topic and possible vehicles that are irrelevant to the higher-order category; highly accessible but irrelevant semantic knowledge; and many accessible but trite possibilities, such as idioms, clichés, and dead metaphors (2012, p. 344).

Finally, according to Silvia and Beaty (2012), the likely vehicles are evaluated according to abstract criteria (is it conveying desired meaning? is it clever or interesting?), then revised, and then retained or discarded. The extension of the model suggests that the creation of metaphor involves several cognitive abilities which include a number of executive processes that also tells us a bit about the cognitive load that is required when dealing with metaphor, not only in its creation but also in its processing.

2.3 Automaticity in metaphor comprehension

Based on the previous reasoning on metaphor and their level of automaticity in contrast to literal language, it is important to define what is meant by automaticity. As Segalowitz (2010, p. 79) accurately points out, “Often some behavior is labeled automatic without an operational definition of what that is supposed to mean (…)”. As a concept, automaticity, and related concepts, tends to be used generically. Something that has been ‘automated’ implies a change in behavior or response of some sort. This change could hold a number of implications. For example, “(…) the process has become more stable, more resistant to interference, and/or more independent etc., compared to some reference point” (Segalowitz, 2010, p. 79).

Thus, in order to understand automaticity, as adopted in this thesis, we will first review the concept of implicit linguistic competence, as put forth by Paradis (2009). When something is implicit, it is said to be unobservable and inferred. For example, knowledge is represented as implicit when we infer that it exists within an individual’s systematic behavior. Implicit linguistic competence is therefore the “(…) functional system capable of generating sentences, which is inferred from speakers’ systematic verbal behavior” (Paradis, 2009, p. 3). Linguistic competence is a cognitive skill that resides in what is called procedural memory. The computational procedures that are governed by linguistic competence and procedural memory is said to support automatic language comprehension. In turn, procedural memory is the part of implicit memory that sustains skills; e.g. implicit linguistic competence being such a skill. In contrast to implicit competence, Paradis (2009) points to explicit knowledge. Roughly, these concepts reflect acquisition (implicit) and learning (explicit). Acquisition within implicit linguistic competence refers to the generation of novel sentences, also known as propositionizing, by combining and recombining linguistic units into proper sequences. According to Paradis, “The initiation of an utterance is deliberate, but its elaboration is automatic” (2009, p. 4). The ability of automatic elaboration is incidentally acquired:
i.e. it is “the appropriation of information without awareness on the part of the acquirer of what is acquired and stored in implicit memory” (Paradis, 2009). Moreover, learning within explicit metalinguistic knowledge refers to the focusing of deliberate attention towards acquiring and processing new knowledge. Hence, automaticity, in this stance, reflects processing which is fast and largely non-conscious. In short, implicit linguistic competence reflects a parallel processing pattern in which phonology, morphology, syntax and lexical retrieval work together simultaneously. Explicit knowledge however, is processed sequentially with the help from rule-based algorithms. So accordingly, metalinguistic knowledge requires attention, linguistic competence does not (Paradis, 2009). So, to repeat Glucksberg’s claim “Like any kind of language comprehension, metaphor comprehension, is non-optional. Instead, it is mandatory and automatic” (2003, p. 93), could be taken to mean that metaphor comprehension is somewhat governed by some of the principles like the aforementioned, i.e. those accounted for by Paradis (2009). To clarify the relationship between comprehension and processing it is worth noting that the processing always proceed comprehenson, either implicitly or explicitly.

2.3.1 Automaticity does not necessarily reflect comprehension

According to Segalowitz (2010), automaticity is not necessarily a predictor of actual comprehension. This claim is based on findings from a study done in 1983 by Favreau and Segalowitz (as cited in Segalowitz, 2010), where two groups of bilinguals, distinguished by fluency (more fluent/less fluent), were tested using a priming lexical decision task. Findings showed that, even though both groups achieved equal comprehension of a screened text in their L2, the more fluent group read the text significantly faster than the less fluent group. Hence, level of automaticity in a task is by no means an obvious measure of comprehension: “This finding, that speed was less important than automatic processing, has implications for understanding L2 cognitive fluency” (2010, p. 80). That is, rather than comprehension, it is a measure of cognitive fluency and flexibility.

2.3.2 Automaticity as processing stability

In terms of speed in processing, one can accentuate automaticity by distinguishing processing stability from processing speed (Segalowitz, 2010). In other words, this means that we address the question of whether, e.g., RT’s (response times: responses, measured in milliseconds, by the test subjects on linguistic stimuli) that are fast are just speeded up our actually more automatic. As Segalowitz elaborates;

Processing stability could be operationalized in terms of RT variability, the intraindividual standard deviation corrected for mean RT, and that this measure could be used to determine if one set of RT’s reflects greater processing stability than another (2010, p. 86).

2.3.2.1 Coefficient of variation

As suggested by Harrington (2005), response speed is a necessary but insufficient condition for identifying automaticity. Standard deviations in an RT-task would change proportionally to the RT’s if all that happens is that something is speeded up. As Segalowitz (2010) points out, the ratio of standard deviation to RT is likely to remain
constant. This ratio is known as the coefficient of variation (CV). If faster RT’s are followed by proportionally changing standard deviations, the CV will remain relatively unchanged. According to Harrington (2005, p. 3), “In the case of automatization (faster response times, lower RT’s) there must be a decrease in mean RT and a disproportionate decrease in mean standard deviation (…)”. In less automated tasks, the lower CV is often attributed to cognitive components that require resource-demanding processes (Harrington, 2005). Moreover, “The performance at early phases of development is largely due to these effortful processes, and as they change variability decreases” (Harrington, 2005, p. 3). The coefficient of variation is therefore a good indicator of automaticity. That is, if, e.g., two people have similar RT’s, the one with the lower standard deviation is likely more automated. The coefficient of variation therefore, in the words of Segalowitz (2010), reflects processing stability.

### 2.4 Conventionality – conventionalized vs. non-conventionalized

This section focuses on conventionality. However, in order to understand this concept, it is also of importance to relate it to other similar concepts. Researchers sometimes use varying terminology to describe similar or related concepts. Thus, in this section, we will explore saliency, conventionality, familiarity, and quality as adopted in this thesis.

Saliency is a concept that occurs frequently among researchers of metaphor processing. It is the first concept introduced in this section since it is closely related to other concepts or used to describe other concepts (as will be illustrated below).

(...) most words have multiple meanings that vary in their relative salience. When a metaphorical meaning is highly salient, then that meaning will be accessed first and the metaphor will be rapidly understood. When its meaning is relatively low in salience, then it will be understood more slowly (Glucksberg, 2003, p. 94).

This is further emphasized by Christmann et al. (2011) as they describe salient as frequent, familiar and conventional (which also indicates a relationship). According to their view, conventional metaphors are processed with more ease due to the fact that “(...) they are coded in the mental lexicon and hearers can therefore retrieve them automatically” (2011, p. 201). On the other hand, non-conventional metaphors, or non-salient meanings, “(...) are not coded in the mental lexicon but have to be generated on the fly by means of additional inferences” (2011, p. 201).

If explicit language competence, since it is less automated, accounts for an increase in processing speed in general language comprehension, non-conventionalized metaphors might account for similar effects on metaphor processing and comprehension as opposed to those that have been conventionalized i.e. those that have already been acquired and lexicalized through repeated use (Glucksberg, 2003). According to Jones and Estes (2006), conventionality is the strength of association between a metaphor vehicle and its figurative meaning. As exemplified in their research, a term that is frequently used metaphorically, e.g. roller coaster as in marriage is a roller coaster, becomes associated with its figurative meaning, i.e. having highs and lows, thereby conventionalizing its meaning. Less conventional meanings, e.g. rail, have no salient figurative meaning as a consequence of having little or no metaphorical usage. Thus, the
more a term is used in a metaphorical sense, the higher degree of conventionality it achieves (Jones & Estes, 2006).

As described by Schmidt and Seger (2009), familiarity is described as how frequently a specific metaphor might occur and to the degree of which any overlapping semantic features can be distinguished. This concept is explored in more detail in section 2.4.2, but nevertheless mentioned here because of its close connection to these other similar concepts.

On a similar note, Yu (2011) speaks of the quality of metaphors; i.e. there is a crude distinction between poorer and better metaphors where the former ones only supply relevance to a few interpretations, whilst the latter is said to better apply relevance in more contexts. In the context of processing, non-conventional metaphors (or poorer metaphors), by Yu’s view, are extended, elaborated and combined in ways that go “(...) beyond the automatic and unconscious conventional use of metaphor” (2011, p. 1616). This also suggests, at the very least, a more semi-conscious approach to non-conventional metaphor. Thus, the path of processing with such metaphors is likely to be different.

Following this reasoning, and with significance for the assumptions made in this thesis, one can infer that the level of conventionality, and its related concepts, plays a key role in the processing of figurative language. It suggests that non-conventional metaphors require a more conscious path of processing which accounts for increased processing time due to the activation of literal meaning. Also, conventional metaphor is said to convey a single strong implicature as opposed to the several, nevertheless acceptable, weak ones that one will find in non-conventional ones. In conclusion, the level of cognitive effort that is required is thus somewhat dependent on their level of (non-) conventionality.

Hence, with the support of previous research (Christmann et al., 2011; Glucksberg, 2003; Paradis, 2009; & Yu, 2011) it would seem reasonable to claim that non-conventionalized metaphors require more deliberate attention in its processing path, hence making it slower than the rapid and somewhat automated processing of those that have been conventionalized and lexicalized.

2.4.1 On the importance of conventionality in metaphor research

There are ways in which one can demonstrate empirically that certain metaphors, such as non-conventional ones, require more deliberate thought in its processing. Brisard, Frisson and Sandra (2001) outline a number of studies on the processing of what they call unfamiliar metaphors. In these studies researchers used predicative sentence structures to investigate the level of automaticity of metaphors by having participants focusing only on literal meaning. That is, they wanted to see if obvious metaphorical meaning could be refuted by only processing the sentences literally. Participants were asked only to monitor for literal meaning and decide with yes or no if literal meaning was true or false. As it turned out, it was demonstrated that it seemed more difficult for
participants in a speeded task to answer ‘no’ to a conventionalized metaphor like e.g. *All jobs are jails*, with longer RTs and higher error rates, as opposed to a non-conventional metaphor which was blatantly false and containing no metaphorical meaning, e.g. *All jobs are forests* (Brisard et al., 2001, p. 89). This clearly indicates that some metaphors are processed very fast. This type of test cannot fully refute older theories such as literal first since, in theory, these processes could be so fast that they, even if secondary, might interfere with literal processing regardless of status. Nevertheless, it shows a tendency towards rapid processing with familiar or conventionalized metaphors.

With regards to non-conventionalized or unfamiliar metaphors, few studies address this phenomenon. Brisard et al. (2001) question the research on literal and figurative meaning that propose an identical, or at least, similar path of processing;

(...) the methodology that is generally used does not allow us to conclude that this is due to the use of an identical processing routine (a single stage for both types of language use) or, for that matter, to the parallel activation of two different routines (one for literal and one for figurative language) (2001, p. 90).

According to Brisard et al., non-conventionalized metaphors provide the most obvious point of entry for an investigation that explores the creative functions and characteristics of figurative language. Creativity is a good indicator of cognitive flexibility and automaticity in processing (Zabelina & Robinson, 2010), which therefore suggests that non-conventional linguistic stimuli is a fruitful domain for an investigation into language processing and its cognitive components.

2.4.2 Close vs. distant semantic relationships

Schmidt and Seger (2009) accounts for a number of factors that affect metaphor processing. One of these factors is familiarity. One of their more interesting claims is that familiarity can be examined independently of figurativeness. According to their reasoning, an unfamiliar (non-conventional) metaphor is more likely to have a, as opposed to close, distant semantic relationship than those that are more familiar (conventional). There are several reasons for this; first, “Metaphors based on close associates may occur more frequently and therefore be more likely to become familiar over time” (Schmidt & Seger, 2009, p. 376). Secondly there is also the possibility of the fact that associations have formed between the words involved in a particular metaphor because of the speaker’s use and interaction with the particular metaphor over time. For example, as put by Schmidt and Seger, a familiar (conventional) metaphor like ‘Babies are angels’ consists of nouns that share more obvious overlapping semantic features, whereas a metaphor like ‘Dictionaries are microscopes’ contain nouns that share less obvious overlapping semantic features.

Interestingly, on a side note and according to their study, the level of stimulus familiarity was shown to “(...) differentially recruit the right and left hemispheres and to modulate right hemisphere recruitment for metaphor processing” (Schmidt & Seger, 2009, p. 376). Furthermore, modulation of neural activation on a basis of level of conventionality has been examined within metaphor processing. In many cases,
conventional metaphors do not recruit the right hemisphere whereas non-conventional ones do (Schmidt & Seger, 2009). Research up to the date of the publication of Schmidt and Seger (2009) indicate that studies that report right hemisphere activation all used non-conventional metaphors or novel or unfamiliar semantic relationships. Accordingly, right hemisphere use in metaphor comprehension is indicative of non-conventional metaphor comprehension and processing.

2.4.3 Processing related non-conventional metaphors with the help of conventional ones

Thibodeau and Durgin (2008) demonstrate that certain conventional metaphors can facilitate processing of similar but novel metaphorical content as long as the same conceptual vehicle is referred to by both the conventional and novel metaphors. What those findings suggest is that the “(...) original conceptual component of conventional metaphors is not dead and that there might be a psychological reality to the idea of metaphor families” (Thibodeau & Durgin, 2008, p. 522). As pointed out, it proposes an alternative to Lakoff and Johnson’s (as cited in Thibodeau & Durgin, 2008) theory of conceptual need, and instead suggests that it offers “(...) a communicative advantage”. In other words, the conceptual understanding of, e.g. anger, does not depend on a prior understanding of heat and pressure. Alternatively, by describing anger with heat and pressure, it allows a speaker to lean on an existing reference scheme or a conceptual mapping familiar to both speaker and listener. Thus, the formation of metaphor clusters could be indicative of a continued utility where speakers are activating established schemes and then elaborating on them (Thibodeau & Durgin, 2008). Metaphor clusters refer to phenomenon where either a speaker or a writer quite suddenly produces a number of metaphors in rapid succession (Cameron & Stelma, 2004). This possible relationship should be acknowledged since it might actually occur in the data collected for this thesis.

2.5 For selectional purposes – a brief description of aptness

Aptness is a concept that is often mentioned in relation to conventionality. Aptness is the concept by which a metaphor is said to describe the “(...) extent to which the vehicle’s figurative meaning expresses an important feature of the topic” (Jones & Estes, 2006, p.19). Thibodeau and Durgin (2011) exemplifies aptness with the metaphor Memory is a warehouse. In this instance, warehouse would be considered prototypical in terms of members in the category of ‘vast but bounded spaces for storage’, whilst memory would be considered a reasonable example of said category. Variance in processing with such items is dependent on how fast a taxonomic relationship can be established; i.e. if memory is already thought of as an example of said category, its aptness is considered to be high and vice versa. The concept of aptness in this thesis is relevant for selectional purposes because of Jones and Estes’ (2006) use of aptness as a variable in their rating of their results.

2.6 Proficiency

In addition to what was described in section 2.3, Paradis also accounts for the definition of proficiency and its meaning in relation to implicit and explicit processes. According
to Paradis, proficiency is “(...) usually measured in terms of accuracy and fluency” (2009, p. 6). In this particular study, proficiency is defined by the participants’ performance on a vocabulary test. In terms of accuracy and fluency, both items may be present in both automated (implicit) and controlled (explicit) performances of language. That is, a vocabulary test is measured by a score which is based on the amount of correct answers given to a number of questions. What this means, in the respect of explicit and implicit processes, is that it might actually reflect “(...) either access to vocabulary (an implicit function) or the richness of the vocabulary (a measure of explicit knowledge)” (Paradis, 2009, p. 6). Moreover, similar to the metaphor response test carried out in this study, Paradis (2009) points to the way in which experimental behavioral measures can be obtained with the help of testing of syntactic constructions and/or morphological forms to determine response times. This could possibly reveal whether performance is not just fast, as in speed of delivery, but also automatic. On a basis of such testing, sometimes also neurologically examined, Paradis claims that; “Under brain imaging conditions, one can assess accuracy and fluency and measure inter-individual variation in reaction times, Imaging should show heightened activation of the basal ganglia, and Broadmann’s areas 22, 40 and 44, reflecting implicit language processing” (2009, p. 7), and the fact that “Lack of automaticity would be reflected in longer reaction times and, more importantly, greater variation (...)” (2009, p. 7). According to this line of reasoning, level of proficiency should somewhat correlate with the length of response times: i.e. the faster the response, the higher level of proficiency the participant possesses and vice versa. This is relevant to this thesis because of the significance it brings to the assumptions made in this thesis. That is, if proficiency correlates with response times in testing that reflects language processing, then the assumptions of this study will prove an exception to this view. Namely, that regardless of proficiency level, most participants will process at a similar speed because of the fact that non-conventionalized metaphors have not been internalized or automated in the majority of the L2’s lexicon, regardless of their proficiency level. Hence, proficiency gives less of an advantage in such a context than it perhaps could have given in another context (e.g. vocabulary testing) since in such a test, as mentioned earlier in this section, one cannot really determine whether or not one is dealing with an implicit or an explicit process.

Moreover, Roehr (2008b, as cited in Paradis, 2009), has found a strong relationship between L2 proficiency and L2 metalinguistic knowledge; i.e. an L2’s proficient use of L2 structures and vocabulary and their explicit knowledge of these features co-vary strongly and significantly.

2.6.1 The effect of L2 proficiency on the strength of the connections between concepts and words

According to Kotz and Elston-Güttler (2003), an individual’s understanding and usage of a second language coupled with their overall language learning experience is highly likely to affect the way in which L2 words and meanings are accessed, processed, and represented in the mind. Several psycholinguistic studies using various methods have primarily addressed the issue of to what extent L2 proficiency affects the strength of
connections between concepts and words in the L2 mental lexicon. Kotz and Elston-Güttler (2003) addresses this issue by applying the framework within the revised hierarchical model (RHM).

The basic assumption of the RHM states that “(...) word form is represented separately in L1 and L2, while word meaning is represented in a common conceptual system for both languages” (Kotz and Elston-Güttler, 2003, p. 216). In this model, L1 connections are presumed stronger than L2 connections. A developmental approach to this model assumes “(...) that the interaction between the two lexical level representations and between the lexical level representations and the conceptual representation varies as a function of L2 proficiency” (Kotz and Elston-Güttler, 2003, p. 216). That is, during L2 acquisition learners will access L2 words via their L1 lexicon. However, as L2 fluency increases, access via the L1 lexicon will be reduced and there will be possibilities for direct conceptual mapping. According to Kotz and Elston-Güttler, “On the above ‘developmental’ interpretation of the RHM, we would expect L2 word-to-concept connections to be stronger (and therefore native-like) for highly advanced L2 learners than for less advanced learners” (2003, p. 216). Also, by this model, because of a lesser vocabulary, less proficient NNSs may exhibit less efficient or non-native like processing of L2 word associations.

The above aspects contribute to the already adopted reasoning that functions as a basis for the assumptions regarding the hypothesis of this thesis (sec. 3.1.). That is, more proficient NNSs can be presumed to perform better in tasks oriented towards conventionalized metaphor on a basis of the fact that their presumably more advanced L1/L2 conceptual and lexical connections, and their richer vocabulary, might provide an advantage in processing speed.
3. Research issues

To briefly summarize: in contrast to conventionalized metaphors that have been lexicalized and made part of the mental lexicon as well as the automated levels of language processing, non-conventionalized metaphors have to be dealt with in another processing path. That processing path is likely to become increased in processing time in comparison to the processing path of those metaphors that have been conventionalized. On a basis of previous research, it is likely that this difference exists. However, little has been said on this subject in relation to level of proficiency and processing speed. In Paradis’ view (2009), there is an existing correlation of these two elements. So, the issue at hand is to establish whether or not the claim that there is expected to be small differences in processing speed between the various proficiency levels among NNSs, and even NSs, can be said to hold. That is, the relative processing speeds, whether with an NS vs. NNS, NNS advanced vs. NNS intermediate or NS vs. NNS advanced perspective, are likely to level off at roughly the same mean response times. Advanced NNSs should not have any major advantage over intermediate NNSs, who in turn should not have any major advantage over even less proficient NNSs. NNS’s do traditionally process at a more semi-conscious level which is reflected in their processing on a basis of proficiency, but with this approach it will presumably have all NSs and NNS’s processing in a slower and more conscious manner. In turn, that should level the initial differences between categories (NS/NNS intermediate & advanced) thought to be affected, to some extent, by proficiency.

The aim of this thesis is to test the relative speed of conventionalized and non-conventionalized metaphor comprehension and processing speed among a small reference sample of L1’s and L2 speakers that display various levels of proficiency (intermediate & advanced). It is assumed that there will be differences in response times when participants are tested with conventionalized metaphors, primarily thought to be affected by their level of proficiency. On the other hand, with several implausible non-conventionalized metaphors, the response times are expected to be similar regardless of proficiency because of factors in processing that require participants to process in a more conscious manner.

Thus, the assumption is that proficiency is less of a factor when comparing response times regarding non-conventional metaphor processing whilst level of conventionality is more of a factor.

3.1 Research questions

1) *Is there a difference in response times when processing conventional and non-conventional metaphor respectively?*

2) *Is there a correlation between proficiency level and non-conventional metaphor comprehension?* According to previous reasoning, the correlation is expected to be weak or non-existing.
4. Methodology

4.1 Research design

In this thesis, the aim is to measure response times by having 29 informants indicating subjective comprehension on various linguistic stimuli made up of one set of conventionalized metaphors and one set of non-conventionalized metaphors. This is done by posing stimuli on a screen and asking participants to indicate when they subjectively comprehended metaphor meaning or plausibility by pressing a key, thus measuring response time that in some ways reflect processing speed. The main research variable is response time. The independent variables thought to cause effect on the response times are twofold: first, conventionality, and secondly, proficiency level. The questionnaire (see Appendix C) provides controlled variables such as L1, linguistic background, nationality, age etc.

4.2 Validity and reliability

In terms of reliability, it is roughly measured by the extent to which the research is duplicable and whether or not other researchers would get the same results. In this study one can say, with some confidence, that at least one aspect of reliability is relatively high as the response times are measured via computer and not subject to human error.

In terms of validity, it is roughly measured by the extent to which the study is actually telling us what we think it is. The issue is whether or not participants actually respond to the test in a desired way. The construction of the test (the priming condition) alongside the choice of Yes or No should force a response that might reflect the processing speed of an informant.

Moreover, construct validity is a concept that explains how we operationalize our independent variables; i.e., as in the case in this thesis, proficiency in itself cannot be measured quantitatively. One needs to operationalize the concept into something measurable. In this case, proficiency is operationalized by the participants’ test score on a vocabulary size test. The vocabulary size test is a relatively appropriate measure of proficiency since it has been established that this type of test correlates fairly well with overall language abilities (Lemmouh, 2010).

4.2.1 Selection of participants

First of all, to achieve a homogenous group and a relatively high level of validity from that perspective, some 60 entry level undergraduate students took a questionnaire on linguistic background and L2 experience as a basis for selection of participants. 24 students were selected. All of these were of Swedish nationality, spoke Swedish as their L1, and considered it to be their native language. Secondly, by comparing these questionnaires through anonymous codes with the SU English Department’s list of scores on their vocabulary size test, two L2 groups of 12 (simply splitting the group in half based on their score: i.e. the 12 highest scores = advanced, the 12 lowest scores =
intermediate) were selected and categorized into proficiency groups as intermediate proficient and advanced proficient.

4.2.2 Selection of test stimuli

Jones and Estes (2006) examined the role of aptness and conventionality in metaphor comprehension. The experiments were conducted on a large number (130) of linguistic stimuli in metaphor-like structures. Their results were compiled and presented in a table with two columns (Jones & Estes, 2006, p. 30-31) where they were ranked by ratings of conventionality and aptness. As a first step, out of these 130 items, 100 were selected as possible items to be used in this study. Fifty of their items, starting from the back end (seemingly high to medium conventionality), were selected from the high apt rated column and categorized as conventionalized metaphors, and another 50, starting from the front end (seemingly low to medium conventionality), were selected from the low apt rated column and categorized as non-conventionalized metaphors. However, the selection process was not altogether that simple. A number of metaphors were discarded because of being ambiguous, i.e. some were neither purely conventional nor purely non-conventional. Furthermore, a large number of their items that were labeled with a high conventionality rate simply had novel or implausible topics attached to more conventional predicatives (e.g. My organic chemistry course is a joke). Because of this, the conventionalized metaphors were subcategorized into two groups; one with items that displayed common conceptual components of the topic (e.g. memory is a warehouse) and one with conventionalized predicatives (e.g. x is a joke). Furthermore, several of those with low novelty rates seemed to be far too cliché (e.g. love is a journey). In addition, to subcategorize the non-conventionalized metaphors, they were divided by perceived plausibility; plausible and implausible. This was done with native-speaker input from several professional linguists (native speakers of English). This native-speaker input also provided other valuable aspects such as complementary examples (hence, a small number of examples cannot be found in Jones & Estes, 2006) and suggestions of slight phrasal modifications. Thus, the final selection (see Appendix A), with as homogenous categories as possible included 70 metaphors; 40 conventionalized and 30 non-conventionalized.

4.2.3 Test construction

The test measures response times on linguistic stimuli in the form of conventional and non-conventional metaphors. Participants were presented with a computer. By using the mouse’s left and right clicker they could indicate Y or N (yes or no) as a response to various linguistic stimuli, i.e. the metaphors. Indicating Y meant that they found the metaphor reasonable, whilst N meant that they found it unlikely to be a metaphor. The test was constructed so that participants were first presented with a context and then with a metaphor. All contexts were relevant to the following metaphorical expression’s topic or subject, i.e. the purpose of the contexts were to prime the topic of the metaphor, thus activating the neural schematics of the topic and thereby increasing the likeliness of a successful mapping of these schematics onto the target domain introduced in the following metaphorical sentence. The purpose of the contexts is to force a response from the participant; i.e. because of these contexts, and the question of whether the
metaphorical expression is reasonable or not, participants are forced to perform a reaction-like response, hopefully coming close to representing their actual processing speed.

4.3 Threats to validity and reliability

To overcome as many threats and problems with reliability and validity as possible, the test was piloted on a number of random participants not included in the following actual test. Primarily, a number of external variables seemed to cause some difficulties. The main overall threat, as posed in the pilot of this study, seemed to be that participants were in need of overly specific instructions and a number of test runs to perform the test somewhat accurately. There seemed to be confusion with regards to the purpose of the context sentence. Initially, the context was put there to force an instinctive response to the linguistic stimuli, and it was put there to prime the topic or vehicle of the metaphor. However, the participants initially interpreted the pilot instructions in such a way that they were looking for the context to convey the same meaning as the metaphor that was being tested. Moreover, participants tended to stray towards constant conscious effort by spending additional time on evaluating their choice of response (Y/N). This may have led to misleading data, hence the instructions were revised and a number of test runs were applied in order for the participants to perform the test accurately.

4.3.1 Test revision based on pilot test issues

First of all, the issue of the clarity of the instructions was dealt with. Instructions were scripted and put in the RT computer program and then also presented orally prior to each instance of testing. Secondly, the contexts were dealt with in such a way that ambiguous priming conditions were clarified or completely changed, in order to best predict the desired response. Thirdly, the test was revised in a number of important aspects. First, it would seem as if participants were experiencing issues with the contexts and its purpose. In the pilot, the contexts varied in relevance with some of them not priming the metaphor topic at all. Some of the pilots stated that they were looking for the context to convey the same meaning as the metaphor thus proving problematic since pilots therefore seemed to put in too much conscious effort in addition to searching for irrelevant information (i.e. mapping irrelevant contexts onto metaphor structures). Instead, the test was revised so that all contexts provided relevancy in the form of a priming condition where contexts primed the subject or topic of the metaphorical sentence. Secondly, as opposed to the very first version of the test, only one sentence at a time was framed on the computer screen. This meant that participants were only presented with the actual metaphor when RTs were measured. This hopefully narrowed the amount of external variables that could interfere with the comprehension of the metaphor. All of the above applied revisions should help increase validity and reliability.
5. Results

In order to best visualize the primary findings and to provide as concise an overview as possible, the findings are presented in a number of subsections with varying focuses. These subsections include findings presented with mean RT’s (response times) and standard deviations put in relation to conventionality, metaphor type, and proficiency level. Furthermore, there are also subsections that describe correlations of different variables, and coefficient of variation. More formal interpretations on the meaning and importance of the findings are conducted in section 6. The analysis includes a more critical approach where findings are put in contrast to claims made in some of the literature referenced throughout this thesis. At the very end, the findings are presented in a contrastive style where the results of the two NNS categories (intermediate & advanced) are contrasted cross-categorically as well as being contrasted with the small NS reference sample. This is done by comparing mean response times, standard deviations and coefficient of variation.

5.1 Findings in terms of conventionality

![Mean RT's in terms of conventionality](image)

**Figure 1. Mean RT’s (milliseconds) in terms of conventionality.**

Results that were based on the entire group of NNS test participants, without regards to level of proficiency, indicated a distinct difference in processing speed, as represented by mean RT’s, between conventional and non-conventional metaphors. Overall, non-conventional metaphors required roughly 1.2 seconds of additional processing (Figure 1). An unpaired, two-tailed and equal variance t-test found the difference to be significant, i.e. according to a 95% confidence coefficient, with a p-value of 0.003. Amongst the NSs, the non-conventional metaphors also indicated a clear difference in processing speed (1.5 seconds). An unpaired, two-tailed and equal variance t-test found
the difference to be significant, i.e. according to a 95% confidence coefficient, with a p-value of 0.0001 (Figure 1).

Moreover, standard deviations were slightly higher when processing non-conventional metaphors with both NNS and NS (Figure 2).

### 5.2 Findings in terms of proficiency level and metaphor type

Apart from the results being processed on a basis of conventionality and as NS and NNS, they were also subject to analysis based on groupings by proficiency.

Figure 3. NS & NNS mean RT’s (milliseconds) in terms of proficiency level.

There is a noticeable difference in both RT and standard deviations between the two proficiency groups (Figures 3 & 4). RT means regarding conventional metaphors differ
by 0.8 second between NNS intermediates and NNS advanced proficients, whilst non-conventional differ by a full second (Figure 3).

Furthermore, both of the two unpaired, two-tailed and equal variance t-tests found the difference between proficiency groups to be insignificant, i.e. according to a 95% confidence coefficient, with a p-value of 0.12 with regards to differences in the processing of conventional metaphors. Moreover, a second similar t-test indicated a p-value of 0.06 with regards to the processing of non-conventional metaphors, thus indicating an insignificant difference statistically (Figure 3).

![Standard deviations in terms of proficiency level (NNS)](image)

**Figure 4. NS & NNS standard deviations (milliseconds) based on RT's in terms of proficiency level.**

Moreover, the intermediate NNSs display standard deviations well above those of the advanced NNSs: 0.4 second for conventional metaphors and 0.8 second for non-conventional metaphor (Figure 4).
Furthermore, when analysing RT’s in terms of proficiency level and metaphor type, one could see a stair-like effect processing wise amongst all groups with the NSs group being the fastest (Figure 5).

![Mean RT's in terms of proficiency level & metaphor type](image)

**Figure 5. NN & NNS mean RT's (milliseconds) in terms of proficiency level & metaphor type.**

Moreover, the findings do indicate a noticeable difference in standard deviations primarily between NS and NNS intermediates (Figure 6). Differences between NNS advanced proficients and NS were close to identical (Figure 6).

![Standard deviations in terms of proficiency level & metaphor type](image)

**Figure 6. NS & NNS standard deviations (milliseconds) based on RT's in terms of proficiency level & metaphor type.**

The above findings (Figures 5 & 6) have NSs processing metaphors somewhere between roughly 0.8 and 1.1 seconds faster than NNSs. Moreover, standard deviations are noticeably lower amongst NSs than NNS intermediates whereas NNS advanced proficients.
5.3 Correlations

This subsection presents a number of variables that have been subject to tests of correlation with other variables; i.e. what variables seem to be good predictors of certain outcomes in other variables.

Table 1. Correlations between RT and vocabulary test score (NNS).

| Conceptual components        | -0.4 |
| Conventionalized predicatives | -0.6 |
| Non-conventional (plausible) | -0.4 |
| Non-conventional (implausible)| -0.4 |

Correlations between test score and the respective metaphor types are relatively consistent as well as relatively weak. The test scores seem to best predict faster RT’s on conventionalized predicatives, -0.6.

Table 2. Correlations between RT and vocabulary test score (NNS Intermediate).

| Conceptual components        | -0.4 |
| Conventionalized predicatives | -0.6 |
| Non-conventional (plausible) | -0.5 |
| Non-conventional (implausible)| -0.6 |

Amongst the NNS intermediate participants there seem to be slightly stronger correlations. Three of the four types indicate correlations below -0.5.

Table 3. Correlations between RT and vocabulary test score (NNS Advanced).

| Conceptual components        | -0.3 |
| Conventionalized predicatives | -0.6 |
| Non-conventional (plausible) | -0.2 |
| Non-conventional (implausible)| -0.2 |

Once again, the conventionalized predicatives display the strongest correlation. The remaining three indicate more consistent, almost non-existing, correlations.

These correlations are important to the thesis because they provide a good indication of to what extent the respective variables, vocabulary test score and type of metaphor being processed, are affected by each other. Strong correlations are 1 or -1, indicating either a positive or negative relationship. 0 is a non-existing correlation.
5.4 Coefficient of variation

Coefficient of variation indicates the relationship between response time and standard deviation.

![Coefficient of variation: by proficiency group and metaphor type (x100)](image)

Figure 7. Coefficient of variation (multiplied by 100 for easier reading): by proficiency level and metaphor type.

The findings indicate relatively consistent numbers for NNS intermediates while there are quite distinct differences among NSs and NNS advanced proficients.
6. Discussion

Because of the many approaches to the collected data, similarly to section 5, this section will be divided into similar subsections in order to achieve a more coherent presentation of the content.

6.1 On conventionality

Figures 1 and 2 strengthen some of the assumptions in this thesis with regards to how the processing of metaphors is being affected by their level of perceived conventionality. That is, non-conventional metaphors require up to a full second of increased processing time. This difference was found to be statistically significant as the p-value of an unpaired, two-tailed and unequal variance t-test, was 0.003. By also looking at standard deviations regarding the various metaphor types (Figures 2, 4 & 6 primarily), one can see that the range of variation is greater amongst non-conventional metaphors, thus indicating that they are less automated than those that are conventional. According to Schmidt and Seger (2009), an unfamiliar, or non-conventional, metaphor is more likely to have a distant semantic relationship than those that are more familiar or conventional thus making their processing more complex and therefore might account for the higher RT’s. As we have previously learned, metaphors that are based on close associates may occur more frequently and therefore be more likely to become familiar over time (Schmidt & Seger, 2009). Also, there is also the possibility of the fact that associations have formed between these words because of the speakers’ use and interaction with the particular metaphor over time. Furthermore, according to Jones and Estes (2006), conventionality is the strength of association between a metaphor vehicle and its figurative meaning; i.e. a term that is frequently used metaphorically becomes associated with its figurative meaning and thereby conventionalizing its meaning. Less conventional meanings have no salient figurative meaning as a consequence of having little or no metaphorical usage. Thus, the more a term is used in a metaphorical sense, the higher degree of conventionality it achieves and, hence, possibly accounts for differences in RT’s and processing speed. Moreover, the contemporary theory of metaphor (the CTM) and its conceptualization of certain patterns could also account for the RT differences. For example, certain linguistic expressions enable conceptual mappings so that vehicle and target domain can be connected. The CTM illustrates how various concepts of varying levels of abstractness are organized and interrelated in the human mind. More importantly, the CTM is also known for the distinction of conventionalized metaphors and more novel ones. Conventionalized metaphors, such as, e.g., ‘ideas are food’, and their patterns and mappings have been made part of the conceptual system, thus making them more readily available.

6.2 On metaphor types

As expected, among all NNSs (Figure 5), the non-conventional metaphors, categorized as plausible and implausible, display a noticeable difference in RT’s with the implausible ones requiring additional processing time. More interestingly, the subcategories of the conventional metaphors also displayed a noticeable difference of
just over 0.4 seconds with conventionalized predicatives requiring some increased processing time. This difference could be argued to be based on a number of factors in the comprehension process. Namely, as mentioned, the result of *false categorical assertions*, which is claimed to be one of the first steps in metaphor comprehension (Glucksberg et al., 1997), our cognitive abilities implicitly transform these into comparison assertions. Once this comparison is activated, theorists believe that metaphors are recognized and interpreted in the same way as items of a literal comparison would be, i.e. “(...) by determining the relevant properties that the compared concepts have in common” (Glucksberg et al., 1997, p. 51). According to the PAM (property attribution model), metaphor comprehension “(...) begins with an initial exhaustive extraction of the properties comprising the representation of the topic and vehicle concepts” (Glucksberg et al. 1997, p. 51). That is, once the topic and vehicle properties have been extracted, they are exhaustively checked against one another, and those that are perceived to match are considered in the comparison. However, metaphorical comparisons that introduce novel properties into someone’s representation of a topic do not seem to be eligible for understanding via simple property matching. Thus, when dealing what is labeled conventionalized predicatives in this thesis, many of them might not be perceived to possess as traditionally interchangeable properties as one might think. That is, we might be more familiar with the predicative rather than the properties of the topic and vehicle that might actually semantically overlap. Thus, that might account for some increased, and presumably less automatic, processing time as opposed to those metaphors that only share common conceptual components. It seems to be the case that there are similar factors in play in both NS and NNS processing (Figures 5 & 6). At least in terms of metaphors that are conventional. NSs are faster than NNSs, but standard deviations indicate that both NSs and NNSs are relatively automated in conventional metaphor comprehension. However, as indicated by standard deviations with regards to non-conventional metaphors, the bigger range of variation among NNSs, alongside their increased RT’s seem to indicate a significantly less automated approach to non-conventional metaphor than NSs. As pointed out by Paradis; “Lack of automaticity would be reflected in longer reaction times and, more importantly, greater variation (...)” (2009, p. 7).

### 6.3 On proficiency levels

As illustrated by Figures 5 and 6, there is a noticeable difference in both RT’s and standard deviations between the two NNS proficiency groups. RT means by conventionality indicate a 0.8 to 1 second of increased processing time. Moreover, the intermediate NNSs display standard deviations well above those of the advanced NNSs. Once again, it is worth mentioning that lack of automaticity is usually reflected in an increase of response times and also by greater variation (Paradis, 2009). On a viable note in relation to proficiency and processing some theories claim that an individual’s understanding and usage of a second language coupled with their overall language learning experience is highly likely to affect the way in which L2 words and meanings are accessed, processed, and represented in the mind. Moreover, as we learned from the definition of the RHM, “(...) word form is represented separately in L1 and L2, while word meaning is represented in a common conceptual system for both languages” (Kotz
A developmental approach to this model assumes “(...) that the interaction between the two lexical level representations and between the lexical level representations and the conceptual representation varies as a function of L2 proficiency” (Kotz & Elston-Güttler, 2003, p. 216). As L2 fluency increases, access via the L1 lexicon will be reduced and there will be possibilities for direct conceptual mapping. According to Kotz and Elston-Güttler, “On the above ‘developmental’ interpretation of the RHM, we would expect L2 word-to-concept connections to be stronger (and therefore native-like) for highly advanced L2 learners than for less advanced learners.” (2003, p. 216). Also, by this model, because of a lesser vocabulary, as represented in this thesis by the vocabulary test, less proficient NNSs may exhibit less efficient or non-native like processing of L2 word associations. By this reasoning, one can assume the NNSs in this study have developed a fairly strong conceptual connection between L1 and L2 as they perform fairly well in comparison. However, as the above theory proposes, this study also exemplifies the variation that proficiency might cause since one can notice a difference between NNS proficiency groups performances on conventional metaphors.

6.4 On correlations
With regards to correlations, all correlations amongst NNSs indicate a negative correlation. That is, high values on one variable (vocabulary test scores) are associated with low values on the other (low RT’s), and vice versa. Moreover, few were significant and some were almost non-existing.

Amongst the entire NNS group (Table 1), conventionalized predicatives were the best predictor of high vocabulary scores, -0.6. All other metaphor types had a -0.4 correlation, thus correlating very weak. This is roughly in line with one can expect when looking at the entire group. In the NNS intermediate group (Table 2), all four were in the range of -0.4 and -0.6. The rather consistent correlations (-0.4 to -0.6), indicate that there is a tendency towards NNS intermediate proficient to process in a more similar manner altogether as opposed to the more advanced NNSs. The NNS advanced group (Table 3) provided interesting correlations as the non-conventional metaphors did barely correlate at all (-0.2 & -0.2) with the vocabulary test scores, thus indicating that the assumptions of this thesis might be substantiated. All conventionalized predicatives indicated a -0.6 correlation with proficiency, thus weakly indicating that conventional metaphor processing is somewhat correlated to proficiency.

6.5 On the coefficient of variation
As we learned from Segalowitz and Harrington, processing stability could be operationalized in terms of RT variability and be used to determine if one set of RT’s reflects greater processing stability than another. Standard deviations would change proportionally to the RT’s if all that happens is that something is speeded up. As Segalowitz (2010) points out, the ratio of standard deviation to RT is likely to remain constant. The findings (Figure 7) indicate that NNS intermediates are quite consistently processing at an effortful level. As Harrington (2005) pointed out, faster RT’s that are followed by proportionally changing standard deviations will have a relatively
unchanged CV, thus, in this instance, indicating effortful processing. Depending on the where the NNSs are in their L2 development: “The performance at early phases of development is largely due to these effortful processes, and as they change variability decreases” (Harrington, 2005, p. 3). This indicates that the performance in conventional metaphor processing among NSs and NNS advanced proficients is quite automated whereas their increase in CV is indicative of more effortful processing across all proficiency levels. These findings imply that the assumptions about the similar processing patterns of all participants on the non-conventional metaphor RT-task is accurate to some extent.

On another note, it is worth mentioning that level of automaticity in a task is by no means an obvious measure of comprehension: “This finding, that speed was less important than automatic processing, has implications for understanding L2 cognitive fluency” (Segalowitz, 2010, p. 80). That is, rather than comprehension, it is a measure of cognitive fluency and flexibility. Therefore, there is nothing in this study that suggests that the NSs have understood the metaphors better than the NNSs. This study has simply shown that the processing speed and model that participants are using for conventional metaphor processing is not directly transferrable for usage on non-conventional metaphors.

**6.6 Limitations and further research**

In the following subsections, some issues of limitations will be acknowledged and addressed. Moreover, some thoughts on further research will also be presented.

**6.6.1 Test item selection**

First of all, one can assume that the categorization of metaphor by conventionality is likely to be scrutinized if this thesis were to come under critique. However, there is never going to be a distinct line between conventional and non-conventional metaphor because of their cultural, subjective and varying nature. Nor are we trying to establish one either. Therefore, it seemed reasonable to base the test item selection on already existing empirical measures and native speaker input. Thus, one can at least say with certainty, that most items that were used have previously acquired some sort of perceived conventionality.

**6.6.2 Control for accuracy and time spent reading**

In this thesis, there was no control for accuracy in the RT-test. That is, the variable of accuracy was not examined or taken into account in any way. In future research, this could provide additional information that might prove insightful when it comes to the processing of metaphors. Moreover, the RT computer program does calculate the time spent on each frame of the test. Thus, one could obtain time spent reading the contexts among the participants as well. That might prove interesting from a NS/NNS comparative perspective.
6.6.3 Operationalization of proficiency

Due to the fact that the operationalization of the concept of proficiency in this thesis was solely based on a vocabulary size test, one can assume that other, more comprehensive, proficiency tests with more aspects would have been beneficial. The main problem in this thesis was that the test scores were not that varied. It was impossible, as initially was intended in the pilot, to categorize the participants into three groups, hence, in the end, only making it two. Obviously, not having the ideal variation in test scores, could account for some of the weak aspects in the findings. Furthermore, as was mentioned by Paradis (section 2.6), proficiency is “(…) usually measured in terms of accuracy and fluency.” (2009, p. 6). Here, proficiency is defined by the participants’ performance on a vocabulary test. In terms of accuracy and fluency, both items may be present in both automated (implicit) and controlled (explicit) performances of language, hence causing ambiguity. That is, a vocabulary test is measured by a score which is based on the amount of correct answers given to a number of questions. What this means, in the respect of explicit and implicit processes, is that it might actually reflect “(…) either access to vocabulary (an implicit function) or the richness of the vocabulary (a measure of explicit knowledge)” (Paradis, 2009, p. 6). If high test scores are the result of more explicit processes, there might not be a correlation to faster RT’s and processing speed. Thus, using vocabulary scores, even though the size test is reliable and correlates fairly well with overall language abilities (Lemmouh, 2010), as a sole predictor of proficiency is perhaps not ideal, but rather forced because of the time frame and resources needed to compile even more comprehensive measures of proficiency.

6.6.4 A note the processing of related non-conventional metaphors with the help of conventional ones

As was mentioned in section 2.4.3, certain conventional metaphors can sometimes facilitate processing and comprehension of more novel metaphorical content as long as the same conceptual vehicle is referred to by both the conventional and novel metaphors. What those findings suggest is that the “(…) original conceptual component of conventional metaphors is not dead and that there might be a psychological reality to the idea of metaphor families (Thibodeau & Durgin, 2008, p. 522). Therefore, it would be interesting to know to what extent this facilitation is at work. That is, would one have seen even bigger differences if less implausible metaphors would have had similar novel counterparts (e.g. the driveway is an ice rink vs. the front lawn is an ice rink)?

6.6.5 Brain imaging and ERP

Although RT studies are relatively reliable and frequently used within the field of language processing, one would have benefitted from adding the dimension of brain imaging or ERP. As was mentioned, Schmidt et al. found that the level of stimulus familiarity was shown to “(…) differentially recruit the right and left hemispheres and to modulate right hemisphere recruitment for metaphor processing” (2009). The modulation of neural activation in relation to level of conventionality has been examined within metaphor processing. In many cases, conventional metaphors do not recruit the right hemisphere whereas non-conventional ones do. Previous research
indicates that studies that report right hemisphere activation all used non-conventional metaphors or novel or unfamiliar semantic relationships. Thus, this indicates that conventionality is an important factor in determining the role of right hemisphere use in metaphor comprehension. Using ERPs or brain imaging in this thesis could thus have further strengthened the evidence of differences in processing between conventional and non-conventional metaphor.

6.6.6 A note on dual reference in metaphor processing and comprehension

Another important aspect of metaphor comprehension that is important to address is that of dual reference. Dual reference is a communicative strategy that uses prototypical category member names to name non-lexicalized categories which provides an explanation for the major metaphor phenomena (Glucksberg, 2003). In other words, consider the use of ‘shark’ in metaphorical expressions, it could either pose an understanding of the word as referring to ‘shark’ at the subordinate level, i.e. the marine creature, or the superordinate level, i.e. the category of predatory creatures in general. With that said, imagine the importance of context. For example, when saying “He is going at it like a shark!” when referring to a boy swimming like crazy in a pool, which implies property-matching features, i.e. the swimming and bodily movement, as opposed to the sentence “My lawyer is a shark.”, which implies reference to the predatory creature, and thereby suggesting categorical features where the lawyer might be vicious and aggressive in his attempts to win legal disputes. Thus, out of context, one cannot infer which interpretation that an interpreter has in mind. Furthermore, dual reference also accounts for the paraphrasability of metaphors as similes. That is, in its simile form ‘my lawyer is like a shark’ implies the likening of the predatory fish, whilst in metaphor form, ‘my lawyer is a shark’, implies the category of predatory creatures as exemplified by the literal shark (Glucksberg, 2003). Literal form does not possess this feature. Similes tend to become false in categorical form, e.g. ‘Pepsi is like Coke’ vs. ‘Pepsi is Coke’, whilst categorical assertions become anomalous in its comparison form, e.g. ‘salmons are fish’ vs. ‘salmons are like fish’.

These types of context dependent issues might also account for differences in response times, as there might be both explicit and implicit attempts to interpret metaphors by simile form. Furthermore, one could also hypothesize that there is a so called ‘ceiling effect’ in the processing of metaphor form in relation to simile form. That is, the metaphor form will only be processed to a certain extent and then replaced by simile form as it hits the figurative ceiling defined by an unknown number of milliseconds. Thus, that might activate the aforementioned implicit and explicit attempts of interpretation which might account for differences in RT’s.

In order to truly understand the dual reference concept in metaphor comprehension, one should investigate it separately by, e.g., using an RT-test were simile-forms are tested against metaphor-forms.
7. Conclusions

The basic assumption of this thesis was whether proficiency is less of a factor when comparing response times with regards to non-conventional metaphor processing, whilst level of conventionality is more of a factor.

To repeat the research questions;

1) *Is there a difference in response times when processing conventional and non-conventional metaphor respectively?*

There is a distinct difference in how fast we process conventional metaphors in comparison to non-conventional metaphors. The results confirmed, with the help of t-testing, that conventional metaphors are processed significantly faster. Moreover, metaphor types, as adopted in this thesis, were processed with decreasing speed, from metaphors that share common conceptual components, via conventionalized predicatives and plausible non-conventionalized metaphors, to implausible non-conventionalized metaphors.

2) *Is there a correlation between proficiency level and non-conventional metaphor comprehension?* According to previous reasoning, the correlation is expected to be weak or non-existing.

The findings were relatively weak, but still indicating a tendency towards confirming the assumptions made about the outcome. Especially the low correlations between NNS advanced proficients’ test scores and their RT on the non-conventional metaphor task indicated that proficiency is less of a factor when processing non-conventional metaphors. Also, the t-tests carried out on the data in figure 5 indicated that the difference between intermediate and advanced NNSs were bigger and statistically significant on conventional metaphors as opposed to the difference in processing speed with regards to non-conventional metaphors. That finding implies a pan out of differences in a more subtle way than by simply RT.

Moreover, the coefficient of variation (CV) also indicates that non-conventional metaphor processing seems to be governed by more effortful processes. The CV also indicates that NNS intermediates seem to process in this manner relatively consistently for both conventional and non-conventional metaphors whereas NNS advanced proficients and especially NSs seem to process the two categories of metaphor differently where non-conventional metaphors require more conscious effort.

Given the above, it would seem that the data suggests a confirmation of the assumptions made in this thesis. It could be the case that, with a better operationalization of proficiency and with a larger number of participants, one would see definite evidence of either case since these aspects might have contributed to a higher degree of validity. In conclusion, one can say with certainty that conventionality seems to play a key role in
metaphor processing. With conventional metaphors, participants seem to process relatively consistently and with reasonable stability, albeit differentiated by RT.

With non-conventional metaphors, there are still differences in RT, but perhaps more importantly not as much in variation as represented by the CV. Advanced NNSs displayed a close to non-existing correlation to test score whilst intermediate NNSs consistently processed in a conscious manner, thus indicating that proficiency is less of a factor in non-conventional metaphor processing even though RT’s differentiate. This also means that the assumptions unsuccessfully assumed that RT’s would level off in non-conventional metaphor processing. The RT differences remained, but when taking variation (standard deviations) and coefficient of variation into consideration, findings indicate that these other factors help pan out the differences in non-conventional metaphor processing in more subtle ways than simply by RT’s.
References


Appendix A – RT-test: Context & Metaphors

RT test
1. Johnny looks up to his math teacher.
   Respect is a precious gem.
2. We need to discuss this issue.
   Debate can be a lantern.
3. Teaching is only half of the actual teaching job.
   Grading is mountain climbing.
4. The grass looked like a golf green.
   His lawn mower is a boat.
5. Mexican food is spicy.
   Jalapeno peppers are fire.
6. I love sleeping in my own bed.
   That bedroom is a dump.
7. Nathan cried at the funeral.
   Shedding tears can be a magnet.
8. Jane just learned to swim.
   Some swimmers are twigs.
9. Mark works in the IT-business.
   My computer skills course is a joke.
10. Almost everyone sunbathes in the summer.
    Crowded beaches are jungles.
11. My teacher is an expert on syntax.
    Some teachers are encyclopedias.
12. Allison was watching ‘Big Brother’.
    Reality TV can be medicine.
    A library is a museum.
14. Bill was furious with George.
    Hatred is a flower.
15. Jack is extremely inventive.
    Ideas are diamonds.
    Crime is a disease.
17. Mark and Emily are not a couple anymore.
    Some divorces are storms.
18. Do you remember the first Beatles song?
Memory is a warehouse.

19. Sean was really upset when he left the house.
Anger is a wild beast.

20. Oaks are bigger than birches.
A tree is an umbrella.

21. Usain Bolt is a Jamaican sprinter.
Some runners are cheetahs.

22. Aretha Franklin is a fantastic singer.
Some voices are sirens.

23. Bob caught both trout and salmon.
A fisherman is a spider.

24. It is important to deal appropriately with criticism.
Her evaluations were daggers.

25. This year the bug infestation is severe.
Termites are lumberjacks.

26. It was time for the Bush family to cut the grass.
The front lawn is an ice rink.

27. John is in prison for murder.
That criminal’s path is a portrait.

28. John pulled up to the house with his Volvo.
The driveway is an ice rink.

29. Hillary has the chicken pox.
Being sick is feeling under the weather.

30. Joan wanted a Barbie for Christmas.
A wish is a dagger.

31. Mike and Sarah learned that they had won the contest.
The good news was an earthquake.

32. John reads his ‘Sports Illustrated’ every week.
A magazine can be an umbrella.

33. I was hired as a clerk at the hardware store.
Many jobs are prisons.

34. John was studying effortlessly.
Her final exam in Geography was a bear.

35. Mr. Brown led our team to victory.
Some coaches are encyclopedias.
36. The showroom had the longest catwalk ever.\nThat fashion model is a beanpole.\n
37. Psychology is about behavior and thinking.\nThe mind is a machine.\n
38. If you need any help, visit our front desk.\nThat new receptionist is a breath of fresh air.\n
39. We bought fresh green peppers at the market.\nBell peppers are fire.\n
40. Mark was ready for his skydive.\nAdventure is a roller coaster.\n
41. Janet was dreaming.\nThe subconscious is an arena.\n
42. Max was born in 1942 and died in 2009.\nLife is a burden.\n
43. Pluto is a planet further away than Saturn.\nThe planet Earth is a ball.\n
44. The kidney excretes urine for disposal.\nSome bladders are barrels.\n
45. I’ve watched every ‘Seinfeld’-episode.\nSome comedians are sleeping pills.\n
46. There are three species of eagles in Australia.\nBirds are airplanes.\n
47. It was a wild party; beer everywhere!\nAlcohol is a crutch.\n
48. I am in love with John.\nMy boyfriend’s arms are steel.\n
49. Pets are very popular in Sweden.\nMy cat’s fur is silk.\n
50. Mark and Sheila were not James’ biological parents.\NSome adoptions are storms.\n
51. Madison Square Garden seats 18 200 people.\nThe cheering crowd was thunder.\n
52. John is old enough for pre-school.\nHis kindergarten class is a zoo.\n
53. Sam loved to live.\nLife is a rose garden.\n
54. John totally got that wrong.
A misjudged situation is overshooting the green.

55. Mark couldn’t sleep next to Joan. Some snores are sirens.

56. I spend at least one hour reading every day. Books are treasure chests.

57. He woke up with a flash with the sound of a gunshot echoing. A dream is a journey.

58. John won two straight championships. Amazing success is a hole-in-one.

59. Zlatan is a confident individual. Soccer players can be butterflies.

60. LeBron James had a 23-point night. The basketball player was thunder.

61. Janice needed a haircut. Her hairdresser is a mule.

62. John went out to get some milk. Many stores are jungles.

63. It was not a friendly atmosphere. Hostility is a veil.

64. Mark was not always truthful to his girlfriend. Lies are a spider web.

65. The water was nice and still. A pond is nature’s mirror.

66. My teacher is very strict. Discipline is fertilizer.

67. I am half-decent at the fox trot. Dancers can be butterflies.

68. Jon tried to score but the defenseman was really skilled. An opponent is an anchor.

69. Many birds fly south for the winter. A robin is an alarm clock.

70. Exams are tough, let’s hope it is worth it. A college degree is a doorway.
Appendix B – Metaphor types

Metaphor categories (for mapping)
A=Conventionalized metaphors with a common conceptual component of the topic/subject
B=Conventionalized predicatives
C=Non-conventionalized metaphors (plausible)
D=Non-conventionalized metaphors (implausible)

1B. 25C. 49A
2C. 26C. 50D.
3C. 27D. 51A.
4C. 28A. 52B.
5A. 29B. 53B.
6B 30D. 54B.
7C. 31C. 55C.
8C. 32C. 56B.
9B. 33B. 57C.
10C. 34B. 58B.
11A. 35D. 59D.
12D. 36B. 60D.
13A. 37A. 61D.
14D. 38B. 62B.
15B. 39C. 63C.
16A. 40B. 64A.
17A. 41D. 65A.
18A. 42B. 66A.
19A. 43A. 67A.
20A. 44C. 68C.
21B. 45C. 69C.
22A. 46A. 70B.
23C 47B.
24C. 48A.
Appendix C - Questionnaire

MA Thesis Questionnaire
Department of English
MA Essays in English Linguistics
Peter Eriksson

Thank you for taking the time to answer this questionnaire, it is greatly appreciated!

Linguistic background

Name: ____________________________ Sex (M/F): _____ Age: _____
Nationality: __________________________ Native language(s): ________________

1. In addition to the languages listed above, what other languages do you speak and how well do you speak them (roughly beginner, intermediate, advanced)?
   __________________________________________________________________________
   __________________________________________________________________________

2. What language(s) do you speak at home?
   If more than one, please indicate which one is used most frequently:
   __________________________________________________________________________

3. What language(s) did you speak in school?
   If different languages were used at different levels, please indicate when and which (e.g. primary school /secondary school/gymnasium):
   __________________________________________________________________________

4. Have you spent any time in an English speaking country?
   If yes, how long?

5. How would you rate your own English proficiency (beginner, intermediate, advanced, native-like)?

   Thank you for your time!

   All the best,
   Peter