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An Eye-Tracking Study:
Combining Metaphor Comprehension Models with
Knowledge Mismatch

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ABSTRACT

Metaphor comprehension models such as that of Giora [19, 17] account for a general view of metaphor processing by attributing a priority to the saliency of the linguistic expressions. The hypothesis is that metaphorical interpretation of a base term is accessed initially if it connotes the salient meaning of that term. In contrast, cognitively taxing models [11, 3] attribute priority to contextual fit from the initial reading processes suggesting that metaphorical interpretation of a base term can be accessed given the sufficient prior discourse context. Typically, models of metaphor comprehension aim to explain how prior linguistic context affects the mapping between the base and the target terms while ignoring the role of perspective taking. Thus, in this thesis, it is aimed to answer whether the processing of a metaphor is different when the addressee is naive to the context of the metaphor use compared to when the addressee knows about the context of the metaphor. Therefore, an eye-tracking experiment, which allows dissociating between early and later processing stages of metaphor comprehension, was conducted to show whether different contextual factors influence the time it takes to process novel metaphors. The analyses of regression path durations suggest that supportive context facilitates processing of the metaphorical expressions but only when the addressee is aware of such context. The results reveal the importance of perspective taking in real-time metaphor comprehension.

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1

INTRODUCTION

1.1 BACKGROUND

Human language is fascinating. It facilitates human communication by allowing an exchange of messages between a speaker and a hearer or a writer and a reader. One of the most powerful yet not straightforward aspects of language is the use of figurative (or non-literal) expressions, which are traditionally defined as artful deviations from normal (or literal) manner of expression [5]. One of the most studied figurative expressions in the psycholinguistic literature is the use of metaphors [16]. A Metaphor violates the conventions of literal language use because it represents a gap between two concepts, thereby encouraging further interpretation between two different literal expressions [9]. For example, in the metaphorical expression "My lawyer is a shark", the literality is violated by the non-conventional use of the concept "a shark", to represent the similar features between a lawyer and a shark, such as "being predatory and vicious". Only the metaphorical properties of "a shark" are attributed to "a lawyer", leaving the literal meaning out. However, despite being extensively studied, it is not clear when and how hearers and readers fill this gap between the two concepts when they encounter metaphorical expressions.

Until the late seventies, metaphors were typically studied within the scope of rhetoric and language as purely literary tropes [42]. However, when Lakoff and Johnson [31] published their *Metaphors we live by*, their approach to the study of metaphors resulted in a cognitive turn in which a metaphor was seen as a matter of thought rather than a matter of language. They stressed the priority of conceptual systems as playing a central role in everyday language use. The argument was that, if our conceptual system is highly surrounded by metaphorical expressions, then it is not only what we utter, but also what we think that is highly a matter of metaphor. Therefore, a metaphor is not an artful deviation but, rather, a way of conceptualizing the world around us.

This cognitive turn directed researchers to explore the mechanisms behind metaphor comprehension mainly in one direction; whether the conceptual mappings between the target and the base terms always require extra cognitive resources or there are circumstances when mappings are equivalent to processing of literal expressions [29]. On the one hand, models such as that of Gentner and Bowdle [10, 11, 3] propose that metaphor comprehension is cognitively taxing because it requires mappings between hypothetical representations of the target and the base terms to derive a non-literal interpretation of a metaphorical expression. In contrast, Giora [17] propose that non-literal interpretations are accessed in the mental lexicon where salient meanings of the base and the target terms are stored.

However, the above models of metaphor comprehension do not address whether mappings between the target and the base terms are influenced by inferences about others' knowledge states. As suggested by Keysar [27], it is essential for readers to take the perspective of the story characters in order to understand the events and the actions described even in a simple narrative. Without such ability, complex prose would be incomprehensible. Therefore, the current thesis focuses on providing insights about metaphor comprehension by examining how it is affected by the prior discourse context and the story character's knowledge state.

1.2 PROPOSAL

The current thesis examines whether the prior discourse context and the story character's knowledge state affects novel metaphor processing in an on-line narrative comprehension. Thus, the following two questions are aimed to be answered; first, I am interested in whether the presence of a supportive discourse context facilitates the processing of novel metaphorical expressions relative to when such context is not present. Second, I seek to answer whether the processing of a novel metaphor is different when the addressee of the metaphorical expression is naïve compared to when the addressee is knowledgeable about the situational context within which the metaphor is used.

The thesis is based on the evaluation of the contemporary metaphor comprehension models, namely the Graded Salience Model [19, 17], and the Structure Mapping Model [10, 11]. The Graded Salience Model suggests that no matter how the prior discourse context sup-

ports the mappings between the base and the target terms, the first meanings to be accessed are the meanings of the target and the base that are most salient based on all previous experiences with language. This view implies that when a novel metaphor is encountered, the literal interpretation will be derived first because it is the most salient one and the metaphorical interpretation will be derived only when the literal one fails. In contrast, the Structure Mapping Model suggests that prior discourse context should facilitate the mapping between the target and the base terms. The conceptual mapping between these two concepts is obtained by matching identical representations of the concepts, and projecting inferences in between. If the prior discourse context supports any of these matching representations, the comprehension process will be facilitated. Consider the following narrative:

John was on his way to the airport. Instead of taking a bus, he caught a cab to get there faster. The taxi driver was an elderly man who was driving very slowly and managed to hit red at every traffic light. When John arrived to the airport, he said to his friend who was in the same cab with him: "The taxi driver was a snail, and he drove so slow that he hit every possible red light."

The above narrative includes a metaphorical expression "The taxi driver was a snail" which refers to a taxi driver, who, as the second sentence implies, was driving very slowly. The models mentioned above suggest different reading times of the base term "snail". The Graded Salience Model proposes that during the initial stages of processing, the reader reaches the salient interpretation of the base term regardless of whether or not she is biased towards the metaphorical meaning of it by having the prior knowledge of the taxi driver being slow. Thus, the model expects similar reading times for "snail" independent of the prior context. The Structure Mapping Model, on the other hand, expects different reading times for the base term "snail" depending on the prior discourse context; if the context is figuratively supported as the one above, the contextual information may facilitate the mapping between the base (e.g., a snail) and the target (e.g., the taxi driver) from the initial stages of processing. However, if the context is neutral, mapping between the base and the target terms may take longer. Thus, to test these the two hypotheses, in the current thesis, I measure the time needed to process the base of a novel metaphorical expression (e.g., a snail) in a reading comprehension task while monitoring the readers' eye movements.

Consider the same narrative again focusing on the knowledge state of the addressee, who, in the narrative, was in the same cab with the protagonist and observed the behavior of the taxi driver before hearing the metaphorical expression “The taxi driver was a snail.” Processing this metaphorical expression may be different when the addressee is naïve to the knowledge that the taxi driver was slow because he was not present when the protagonist was driving in the taxi. If readers are sensitive to the knowledge state of the fictional addressee, then the processing of the base term “a snail” should take more time when the addressee is naïve about the fact that the taxi driver was being slow, compared to when he knows about it. In contrast, similar reading times of the base term across different knowledge states of the addressee would suggest that readers do not take the mental state of fictional characters into account when comprehending novel metaphors.

1.3 PAPER OUTLINE

In the following chapter 2, I will review the literature on metaphor comprehension models focusing on the differences between indirect and direct access approaches to metaphor comprehension. I will discuss whether prior discourse context has an initial effect on metaphor comprehension, and whether taking a story character’s perspective while reading facilitates the comprehension in any way. I will then propose an experiment in chapter 3 and evaluate its results. Chapter 4 will present the conclusions of the thesis.

2 | REVIEW OF LITERATURE

2.1 OVERVIEW

In this chapter, I will discuss the theories attempting to explain how people comprehend metaphorical expressions in terms of the Contemporary Theory of Metaphor [31]. I will introduce the indirect [24, 40, 19, 18] and the direct access models [15, 22, 11, 3] to metaphor comprehension and discuss the effect of prior discourse context within those models. Then, I will review the sensitivity to story characters' knowledge in recent studies of on-line narrative comprehension and propose how it might affect novel metaphor comprehension.

2.2 THEORIES OF METAPHOR COMPREHENSION

2.2.1 The Contemporary Theory of Metaphor

The Contemporary Theory of Metaphor (CTM) [31, 32, 30] assumes that metaphor is not a matter of language nor a deviance from the literal meaning as it had been suggested until the late seventies, but is a matter of thought: metaphor is "a cross-domain mapping in the conceptual system" [36].

To define the way in which metaphors structure how we perceive and think, Lakoff and Johnson [31] identify conceptual metaphors used in everyday language by suggesting that metaphorical expressions are surface realizations of underlying conceptual metaphors. To illustrate a real-life scenario, the authors use the concept ARGUMENT and the conceptual metaphor ARGUMENT IS WAR as an example, suggesting that such metaphors are reflected in various expressions in English language (see *Table 1*), and language users make use of such conceptual domains especially when they need to talk about abstract entities.

The conceptual domain from which the metaphorical expression is drawn is called the source, or the base concept (e.g., war), while the domain the metaphorical meaning is attributed to is called the

<p>ARGUMENT IS WAR</p> <p>Your claims are indefensible. He attacked every weak point in my argument. His criticisms were right on target. I demolished his argument. I've never won an argument with him.</p>
<p>IDEAS ARE FOOD</p> <p>That argument smells fishy. Let me stew over that for a while. We don't need to spoon-feed our students. This is the meaty part of the paper. That idea has been fermenting for years.</p>

Table 1: Conceptual metaphors used in everyday language. [31]

target concept (e.g., argument). For example, in the metaphorical expression "My lawyer is a shark", the hypothetical representations of a literal "shark" carry its meaning across the representations of a literal "lawyer". The base concept "shark" includes features such as being predatory, aggressive, and merciless; having sharp teeth and leathery skin. The target concept "lawyer" includes some of the similar features such as being predatory, aggressive, and merciless and thus carries similar conceptual features. The metaphorical interpretation then arises from the interaction of both concepts, resulting in new ways to perceive and utter our thoughts.

The theory suggests that conventional metaphors such as ARGUMENT IS WAR or IDEAS ARE FOOD are fixed in the conceptual system. Upon being overused in everyday language, such metaphors structure the ordinary conceptual system of speakers. However, there are new ways to make use of the human languages, such as going out of the ordinary conceptual system and using non familiar conceptual domains as metaphorical expressions. Those imaginative and creative metaphors are called novel metaphors, which bring new meanings and new understandings to the way that people use language. A novel metaphor works like a conventional one by providing coherent structure and entailment [31]. It consists of base and target concepts and merges them with a novel conceptual domain, in other words, a novel way of saying things. For instance, the conventional expression "My lawyer is a shark" can be novelized by using a different target domain such as "an intern", resulting in a novel interpretation of "The intern was a shark".

2.2.2 Indirect Access to Metaphor Comprehension

Figurative language comprehension is based on the assumption that speakers heavily depend on the pragmatic information to access the figurative meaning in the context while they depend on semantic information to access the literal meaning [14]. The pragmatic approach to figurative language mainly focuses on whether language users access non-literal meaning indirectly or directly. That is to say, either readers always have to access the literal meaning of a given term first before non-literal meaning can emerge or the non-literal interpretation can be accessed without the need to reject literal meanings.

Standard Pragmatic Model

According to the Standard Pragmatic Model [24, 40], figurative language processing consists of a discrete three-stage process. When a language user encounters an utterance, (a) she will automatically derive the literal meaning first before she even considers any other interpretation that would suit the term of interest. Then, (b) she will assess whether the sentence meaning is plausible in the context, and will either accept literal meaning as the speaker's meaning or not. If it is plausible, she will accept the literal meaning. However, when the literal meaning does not fit the situational context, she will refuse the literal meaning and (c) look for an alternative interpretation. This extra stage for searching for an alternative, figurative meaning should require more effort and cognitive resources relative to the case where a literal meaning is sufficient. The implication is that metaphorical interpretation is literal-dependent. That is, alternative interpretation is optional and is triggered only when the literal meaning does not fit the situational context. Furthermore, because the literal meaning is accessed automatically, it is not influenced by the contextual information.

The claims proposed by the Standard Pragmatic Model were challenged by studies showing that readers do not analyze the literal meaning first when metaphorical expressions are set in situational contexts where the metaphorical meaning is very salient [15, 21]. The experimental results led to the claim that the literal meaning does not have an unconditional priority [20] as suggested by the Standard Pragmatic Model. Moreover, a study by Glucksberg et al. [22] suggested that metaphorical meaning can be automatic and even mandatory rather than optional. In the experiment, participants were

asked to read a set of sentences and decide whether they were literally true or not. The experimental sentences were of four types; (a) literally true, e.g., "Some fruits are apples," (b) literally false, e.g., "Some fruits are tables," (c) metaphorically true, e.g., "Some jobs are jails," and (d) metaphorically false, e.g., "Some jobs are butchers." The results suggested that language users took more time to reject both metaphorically true and metaphorically false statements as literal than literally false ones. If the figurative meaning was to be optional and not automatic, then the alternative interpretation of the metaphorical statements should not interfere when the task is to ignore these alternative interpretations.

One of the questions of this thesis is when and how contextual information affects the processing of metaphorical expressions. The Standard Pragmatic Model suggests that discourse context has no effect on initial language processing because the literal meaning is not optional and is accessed first, with a possible processing cost of further non-literal interpretations. Therefore, contextual information might be observed only after the literal meaning is accessed and does not fit the situational context.

The Graded Salience Hypothesis

Giora [19] proposed the Graded Salience Hypothesis to account for a general view of metaphor comprehension. According to Giora [18], saliency of linguistic expressions determines the cognitive effort required for metaphor processing. The hypothesis suggests that metaphorical interpretation can be derived as fast as literal meanings, if it is salient enough. However, saliency is defined as a property, which is coded in the mental lexicon rather than being dependent on context. In other words, saliency depends on factors such as conventionality, frequency, familiarity or prototypicality rather than prior discourse context. For example, if people encounter metaphorical meaning to understand a linguistic expression frequently enough in their previous experiences, the expression becomes salient, and, consequently, can be derived as fast as the literal meaning. However, if the linguistic expression is novel, its metaphorical meaning is not salient enough to be derived automatically. In such cases, derivation and rejection of the literal meaning comes before the metaphorical meaning is derived. This, in turn, should be reflected in longer processing times of novel metaphorical expressions. Furthermore, because it takes a considerable amount of time for the metaphorical

meaning to become sufficiently salient, immediate linguistic context should not affect novel metaphor comprehension during the early stages of processing.

The hypothesis suggested that conventional metaphorical expressions activate both literal and metaphorical meanings independent of the prior linguistic context when first encountered [14]. The most salient meaning among those two interpretations will be the one attained by the reader. Novel metaphorical expressions, on the other hand, would initially evoke the literal meaning because literal interpretation is more salient than its novel counterpart. Consequently, language comprehension will be completed through two separate mechanisms running discretely: an access to a lexicon to derive the literal meaning and a contextual layer that will benefit from the selection of the intended non-literal meaning. Because the mechanisms are not in parallel, there will be no effect of prior contextual information from the early stages of language processing while comprehending novel metaphors. Therefore, only the salient meaning will be facilitated by the effect of the contextual information.

2.2.3 Direct Access to Metaphor Comprehension

Direct Access View

Contrary to the Standard Pragmatic Model that assigns a primary role to lexical processes, the Direct Access view [15, 14, 22, 20] assumes that both literal and alternative meanings can be accessed directly. Namely, in the early stages of language processing, contextual information interacts with lexical processes, resulting in a direct access of non-literal meanings. In other words, language users do not necessarily need to reach the complete literal meaning of the linguistic expression in order to derive the follow-up pragmatic interpretation. The model suggests that a supportive context will evoke the intended non-literal meaning directly without any additional processing cost. Thus, when a metaphorical expression follows linguistic context which supports non-literal interpretation, it will be processed as quickly as a literal statement. However, it should take more time to process a metaphorical expression, if it is not commonly used in social contexts and there are no prior linguistic context to support its non-literal interpretation. The direct access of metaphorical meanings is supported by Gibbs [15] suggesting that speakers do not necessarily derive the

literal meaning in indirect requests such as "*Could you pass the salt?*". The author argues that in such cases due to social norms, addressees do not even consider the possibility that the question is about them actually being able to perform the action before understanding that it is a request to perform the action.

Direct Access view suggests that context is crucial in the initial processes of metaphor comprehension because there is a single direct mechanism for both the literal meaning and the metaphorical interpretation; contextual information interacts with the lexical access starting from the early stages of processing times [37]. Thus, if the context is supportive, meaning that the metaphorical interpretation of the base term is biased by any hypothetical representation of the metaphorical concept, then a contextually plausible non-literal meaning will be accessed directly without any initial literal interpretation. On the other hand, if the context is neutral, the literal meaning will be derived before the alternative non-literal interpretation can emerge [34]. Therefore, contextual information plays a central role in the access of metaphorical meaning.

The Structure Mapping Model

The Structure Mapping Model [11] proposes that metaphor processing includes two interrelated mechanisms: initial structural alignment and inference projection. Metaphors build up conceptual mappings of two concepts, namely, the base concept and the target concept. These two concepts interact with each other when metaphorical interpretation is accessed by matching identical representations of both the target and the base concepts, and by projecting inferences in between. The metaphorical interpretation then starts with an initial symmetrical alignment in which the commonalities of the base and the target terms are determined. In the later stages of processing, directional alignment takes place by aligning the properties and the structural relations between the two concepts.

This alignment-first approach is sensitive to the structural bindings because metaphorical interpretation includes information obtained by the maximal common connected structure. The model makes use of the mapping algorithm of the Structure-Mapping Engine (SME) [6, 7] to determine the maximal structure. The SME goes through three stages to process a metaphorical expression: first (a) match all the identical predicates of the target and the base of a metaphorical expression, then (b) combine those matches into structurally connected

clusters, and (c) merge the clusters into maximal structurally consistent interpretations. The interpretations, then, are obtained by the effect of the context [8] and the structural bindings that provide the largest and deepest connected interpretations.

Based on the Structure Mapping Model, the Career of Metaphor Model [3] aims to explain the shift in the mode of conceptual mappings while the metaphors are being conventionalized. The model suggests that the conventional and the novel metaphors are processed differently; figurative mapping between the target and the base is achieved through either comparison or categorization process. Novel metaphorical expressions are understood as comparisons and are processed in an alignment-first manner, that is highlighting the commonalities between the target and the base, and projecting inferences between them. When a novel metaphor starts to become conventionalized due to overuse in time, it is no longer understood as only comparison but as categorization because the repetitive use of the metaphorical term causes the base concept to acquire a domain general category. According to the Career of Metaphor Model, processing a novel metaphor is more costly than processing a conventional metaphor due to always having to compare two concepts and generate mappings between them. Thus, the model implies a shift from comparison to categorization when interpreting a metaphorical expression which depends on the degree of conventionality of the specific metaphorical expression.

Consider the following example "*The mind is a computer*" [3]. The target word refers to an abstract entity while the base refers to an electronic device. The base term "*computer*" has a literal meaning, but the metaphorical sense comes from structurally aligning the target term to the base term. Once the metaphor is conventional, the relation between the two terms is accessed through comparing the literal concept "*computer*" to the target concept "*mind*" or categorizing the target concept "*mind*" as a subordinate category of the base concept "*computer*". However, when the metaphor is novel, there is only a comparison process that takes place.

The model puts an emphasis on conventionality while processing metaphorical expressions. It suggests that the context and the structural bindings will define the early processing stages of a metaphorical expression. Once a metaphorical expression is encountered, SME will produce simultaneous interpretations [12]. The selected interpretation will be determined according to (a) the deepest and largest

common structure between the target and the base term, and (b) the relevant current context. Therefore, the comprehension process will be facilitated by the effect of context [8]: the novel inferences for the metaphorical mappings between a target and a base term will be produced with the help of a pragmatic marking, and figuratively biased context will speed up the comprehension of novel metaphorical expressions.

2.3 SENSITIVITY TO OTHER'S KNOWLEDGE IN NARRATIVE COMPREHENSION

To date, studies investigating context effects on novel metaphor comprehension focused primarily on prior discourse manipulations. However, in order to develop more exhaustive theories of figurative language comprehension, it is important to understand how other types of contextual factors including addressee's knowledge state might influence novel metaphor comprehension. For example, consider the following sentence: *Neil pointed to the moon and said to his granddaughter: "I've been there!"*. When readers encounter such sentences, their interpretation, potentially, depends on several factors including prior discourse. For example, if in previous sections of the story, the character *Neil* was described as the well-known astronaut who had been to the moon, then the reader would adopt the literal reading with no need for an alternative interpretation. However, if the previous context described *Neil* as a retired scenarist who likes daydreaming, then the reader would interpret the sentence figuratively. However, it is possible that the knowledge and beliefs that readers attribute to the fictional characters also affects processing of expressions such as in the above example. For example, would readers encounter difficulty in processing the phrase "*I've been there!*" when it is addressed to a person who has no previous knowledge about *Neil* rather than when it is addressed to *Neil's granddaughter*?

Previous research on sensitivity to story character's knowledge during narrative comprehension suggests that readers are sensitive to the perspective of fictional characters in a number of ways [4, 33, 25, 13]. For example, Lea et al. [33] showed that readers were sensitive to others' knowledge when reading stories in which the characters of the story do not share the same degree of mutual knowledge. In their experiment, they represented two kinds of stories to the readers: (1)

stories where characters share the same degree of mutual knowledge and (2) stories with no common ground. The following table represents an example of the story types used:

1

Jane was dreading her dinner with her cousin, Marilyn. She complained loudly to her roommate Gloria. "Every time I go to dinner at my cousin's I get sick." Gloria asked, "Why did you agree to go?" Jane said, "Because I'm too wimpy to say no." Jane went off to have dinner. When she arrived, Marilyn was just finishing the cooking. "You're in luck," she said, "we're having fried squid." Jane knew she was in for a wonderful evening. The two of them sat down to dinner. After dinner, they talked for a while and then Jane left. Gloria was still up when Jane arrived home about midnight. Gloria asked Jane, "Did she play you old disco records?" Jane chuckled and said, "I can't get Disco Inferno out of my mind."

2

Jane and her roommate Gloria were leaving work. "Are you headed home?" asked Gloria. "No, but I'll see you later tonight," replied Jane. Jane drove off to have dinner with her cousin, Marilyn. As she drove, she started to have regrets. She usually got sick when she ate at her cousin's. Jane wondered why she had agreed to go. She decided she was just too wimpy to say no. Meanwhile, Gloria went home and decided to cook something nice for herself. "As long as I'm home alone," she thought, "I'll eat well." Gloria searched her refrigerator for ingredients. She found enough eggs to make a quiche. After dinner, she put the dishes in the dishwasher. Gloria was still up when Jane arrived home about midnight. Gloria asked Jane, "Did she play you old disco records?" Jane chuckled and said, "I can't get Disco Inferno out of my mind."

Table 2: An example of experimental passages from Lea et al.[33]

In the first story (*Table 2*), the protagonist Gloria knew about Jane's dinner plans and it was relevant for her to ask about the dinner when Jane came back home. The two characters of the story shared the same degree of mutual knowledge. However, in the second story, Gloria did not know about Jane's plans and it was irrelevant for her to mention the dinner with Marilyn, because Gloria and Jane did not share the same degree of mutual knowledge. The results of the study revealed that the readers were faster to read the story character's utterance (Gloria asked Jane, "Did she play you old disco records?") when it was congruent with the story character's knowledge state

(i.e., in the story 1, Gloria knew that Jane went to dinner with Marilyn) rather than when it was incongruent with their knowledge state (i.e., in the story 2, Gloria did not know that Jane went to dinner with Marilyn).

A study by Gerrig et al. [13] also supports the view that language users are sensitive to what is versus what is not known to different narrative characters [23, 26, 35]. The study suggests that readers are skilled in evaluating narratives including project knowledge and co-presence; they make inferences while evaluating the knowledge distributed to characters of a narrative. Readers are sensitive to what story characters know and they can differentiate between what they know as readers and what the characters know as a part of the story.

However, as stated by Keysar et al. [27], readers sometimes fail to track a story character's perspective. In their study, readers used irrelevant information that is not presented to them, to access an addressee's understanding of a message. Weingartner et al. [44] supports this view by adding that people are not always successful in tracking a story character's perspective when they encounter sarcastic expressions. The following figure represents an example passage from the study;

Introduction: David asked his office mate, June, to recommend a restaurant. His parents were in town and he wanted to take them to a good place. "I strongly recommend this new Italian place, called Tony's. I just had dinner there last night and it was marvelous. Let me know how you all enjoy it," said June, who really liked Italian food. That evening, David and his parents ate there.

Privileged Information:

(a) Negative event: The food was unimpressive and the service was mediocre. When David arrived at work the next morning, he did not find June at her desk. He remembered she was taking the morning off, so he left a note on her desk:

(b) Positive event: The food was indeed delicious and the service was impeccable. When David arrived at work the next morning, he did not find June at her desk. He remembered she was taking the morning off, so he left a note on her desk:

Critical message: "You wanted to know about the restaurant? Well, it was marvelous, just marvelous."

Backgrounding and conclusion: The next morning June planned a surprise party for David's birthday. He turned 40 in one week. She knew exactly

Target line: how to plan it, since David really liked Tony's.

Post target line: After June made the arrangements she e-mailed all of David's friends to fill them in on the plans.

Table 3: An example of experimental passages from Weingartner et al. [44]

The study observed large slowdowns on the target and post target lines in the negative event versions (where the reader knew that the message of *David* was sarcastic) suggesting that the readers exhibited the illusory transparency of intention. That is, the reader's interpretation of the message influenced how they judge the addressee's interpretation. Consequently, readers failed to differentiate their privileged knowledge from the knowledge of the addressee.

Although previous findings provide a number of interesting insights, they cannot establish whether the processing cost occurs when readers encounter metaphorical expressions and, if so, whether the differences appear in the early or late moments of processing. One of the goals of the present thesis is to shed some light on these issues.

3 | EXPERIMENT

3.1 OVERVIEW

As outlined in Chapter 2, the Structure Mapping Model predicts that supportive discourse context should facilitate the processing of novel metaphors. In contrast, Graded Salience Model predicts that context should not have an effect on the processing of novel metaphors. In addition, none of the models to date consider the role that other's knowledge might have on metaphor comprehension. Thus, to test the two different predictions and to explore the role of other's knowledge, the following experiment will investigate the effects of prior discourse context and a story character's knowledge on the processing of novel metaphorical expressions.

3.2 METHOD

In the current experiment, participants were asked to read short passages for comprehension while their eye movements were recorded. This methodology allows insights about the processing of critical linguistic stimuli in a task closely mimicking naturalistic reading. In addition, it allows a disassociation between the early (i.e., first pass reading time) and later processing stages (i.e., total reading time) as well as providing information about the strategies that readers use when comprehending metaphors (i.e., regressions back). In other words, this methodology has a potential to show whether different contextual factors influence the time it takes to process novel metaphors and at what point processing differences (if any) occur.

3.2.1 Participants

The participants were 24 native German speakers recruited at Saarland University. All participants had normal or corrected to normal vision. An additional 10 participants were excluded due to calibration

problems (n=6), failing to follow the task instructions (n=1), failing to correctly answer the comprehension questions (n=1), and guessing experimental manipulations (n=2). Participants were tested individually in one session. Each session lasted approximately 30 minutes, and participants were paid 6€ for their participation.

3.2.2 Materials and Design

The experimental materials consisted of sixteen short stories created for the current experiment. They were created in English by the experimenter, then the stories were adapted and translated into German by three native speakers of German.

The experimental passages start with an introductory sentence in which the protagonist and the setting are introduced. It is followed by a sentence in which the contextual effect is searched upon the introduction of a secondary character. The third sentence of the story introduces a third character, namely the addressee with whom the protagonist has a final direct discourse with, and searches for the effect of perspective taking. The story ends with a final direct discourse sentence, which starts with a target phrase that has a metaphorical term as a final word (bold in Table 3). The direct discourse ends with a final comment on the metaphorical behavior of the second character. The following table illustrates one of the experimental passages.

1

Introductory Sentence: John was on his way to the airport. Instead of taking a bus, he caught a cab to get there faster.

Supportive Context: The taxi driver was an elderly man who was driving very slowly and managed to hit red at every traffic light.

Neutral Context: The taxi driver was polite, turned on the taximeter, and respected the road rules throughout the journey.

Knowledgeable Addressee: When John arrived to the airport, he said to his friend who was in the same cab with him:

Naive Addressee: When John arrived to the airport, he said to his friend who was just exiting the arrivals gate:

Target Sentence:

(a) **Metaphorical expression:** “The taxi driver was a **snail**,

(b) **Conclusion:** and he drove so slow that he hit every possible red light.”

Table 4: An example of experimental passages

The manipulated variables were prior discourse contexts and addressee's knowledge about the prior contexts. The sentence including contextual effect introduces a side character and the context for the upcoming metaphoric expression. The context is either supportive or neutral. For example, consider the following narrative for the supportive context condition;

Anna was attending the very first meeting with some law intern representing opposing party in a case she just started to work on. He was aggressive from the very beginning: insisted to meet their demands and threatened to tear them apart in a trial. When Anna returned from the meeting, she said to her colleague who was at the same meeting with her: "The intern was a shark, and he threatened to tear us apart in a trial."

In the supportive narratives, context sentences were constructed to highlight the similarities (i.e., "aggressive") between the base (intern) and the target (shark) of the upcoming metaphorical expression (The intern was a shark). In the neutral narratives, context sentences introduced features of the target term (intern) that, typically, are not shared with the base term (i.e., The intern introduced himself, briefly outlined their position, and provided some interesting background documentation about the case).

The third sentence of the story introduced the third character (i.e., "a colleague"), namely the addressee of the metaphorical expression. The addressee either knew about the target (knowledgeable condition) or did not (naïve condition). For example, considering the previous narrative, where Anna talks to her colleague who was present at the same meeting with her, the addressee should know that the secondary character was "aggressive". In the naïve condition, the addressee did not know about the prior context; the colleague was not present at the same meeting with Anna, she just stepped into the office after long holidays. Naïve addressee, in this condition, is a person who was not present during the interaction of the protagonist and the secondary character of the story.

During the experiment, the experimental passages were read in four conditions; (a) supportive context with a knowledgeable addressee (supportive-knowledgeable condition), (b) supportive context with a naïve addressee (supportive-naïve condition), (c) neutral context with a knowledgeable addressee (neutral-knowledgeable condition), and (d) neutral context with a naïve addressee (neutral-naïve

condition). Each of the four versions of the experimental stories were assigned to four stimulus lists.

To hide the experimental manipulations, 24 filler stories were created. 8 fillers had the structure of the experimental materials, but the target sentence included a literal expressions (e.g., Sue is a wonderful parrot) instead of a metaphorical term (e.g., The intern was a shark). The rest of the filler stories (n=16) had a diverse structure, either including a direct discourse in the story (not necessarily at the end of the story), or having only a protagonist but not a side character.

The order of lists were created randomly so that each participant read a specific passage only in one condition and each list contained an equal number of passages in each experimental condition. The filler passages were randomly interspersed among the experimental passages with a constraint that there was at least one filler passage between two experimental narratives.

3.2.3 Procedure

Participants were instructed that they will read short stories about people and their actions, and that they will be asked a Yes/No question after each story. They were asked to read silently, at their own speed for comprehension. The reading task included 40 short stories presented on a computer screen. After each short story, the participant was presented with a comprehension question. For the experimental stories, the comprehension question was always about either the introductory or concluding sentence, the only consistent parts in a story, so that the answer per each experimental passage was the same for all 4 conditions. For the filler stories, the comprehension question asked about various parts of the stories. Eye movements were recorded while participants performed the task.

During each experimental session, the experimenter was present to monitor the performance and to recalibrate the eye tracking system as necessary. Participants' eye movements were recorded using an EyeLink II eye tracking system (SR Research Ltd., Mississauga, Canada). The dominant eye was used to record gaze position for the reading task. The eye tracker was set to detect saccades with an amplitude of 0.5 degrees or greater, using an acceleration threshold of 9,500 degrees/s² and a velocity threshold of 30 degrees/s. The sampling frequency of the eye tracker was 500Hz.

3.3 RESULTS

The average performance on the comprehension questions was 88%, which suggests that participants were indeed reading the passages for meaning. To determine whether the context type, character's knowledge, and their interaction had an effect on reading of the base of the metaphor, I analyzed three dependent measures: (a) first pass reading time, (b) regression path duration, and (c) total reading time of the base term (e.g., "a detective"). Before the calculation of the dependent measures, fixations that were less than 0.5° of the visual angle were merged together and individual fixations less than 80 ms long were excluded [38, 39, 41]. In addition, to remedy for the skewness of the reading time scores, 2% of the largest scores were excluded from further analyses for each dependent measure.

The data were examined in a series of linear mixed effects models with participants and items as crossed, independent, random effects implemented in the lme4 package of the statistical software R 2.15.2 [2, 43]. Overall models for each dependent measure included the context type, character's knowledge, and their interaction as fixed effects. For first pass reading time and total reading time, the models that properly converged included maximal random effects structures allowed by the experimental design. Because the "maximal" model for regression path duration did not converge, the random effects structure was simplified following the "best path" procedures [1]. The linear mixed effects model that properly converged included random intercept, the context type, and character's knowledge slopes for participants as well as random intercept, context type, and character's knowledge slopes for items.

All fixed effects were evaluated by performing likelihood ratio tests implemented in the lmerTest package [43, 28], where denominator degrees of freedom were estimated using the Satterthwaite method. For the fixed effects, we report estimates, standard errors, *t* as well as *p* values associated with the corresponding likelihood ratio test.

FIRST PASS READING TIME First pass reading time was the sum of all fixations within the target region before the eyes were moved to the left or to the right of it. It is used to evaluate the initial processing time of a critical linguistic stimuli. The linear mixed effects model did not reveal a main effect of context type, $p = .452$, character's knowledge state, $p = .674$, or their interaction, $p = .462$.

REGRESSION PATH DURATION Regression path duration is the sum of all fixations from first entering a target region until moving the eyes to the right of it. This measure is used to reveal the difficulty in integrating a fixated metaphorical expression. The linear mixed effects model did not reveal a significant main effect of the context type, $p = .346$, or character's knowledge state, $p = .971$. However, there was a significant interaction between context type and character's knowledge state, $\beta = 67.835$, $SE = 33.228$, $t(295.18) = 2.04$, $p = .042$.

Follow-up pairwise comparisons showed that when the fictional addressee was knowledgeable about the prior context, readers spent less time fixating the target region and the previous text before moving their gaze to the right if the context was supportive ($M = 343.58$) compared to when the context was neutral ($M = 402.74$), $\beta = -53.04$, $SE = 25.14$, $t(47.39) = -2.109$, $p = .040$. However, when the fictional addressee was naïve about the context, readers spent a similar amount of time fixating the target region and the previous text before moving their gaze to the right when the context was supportive ($M = 388.89$) and when it was neutral ($M = 368.45$), $p = .530$. This suggests that prior story context facilitated processing of the metaphorical expression only when the fictional addressee knew about this context.

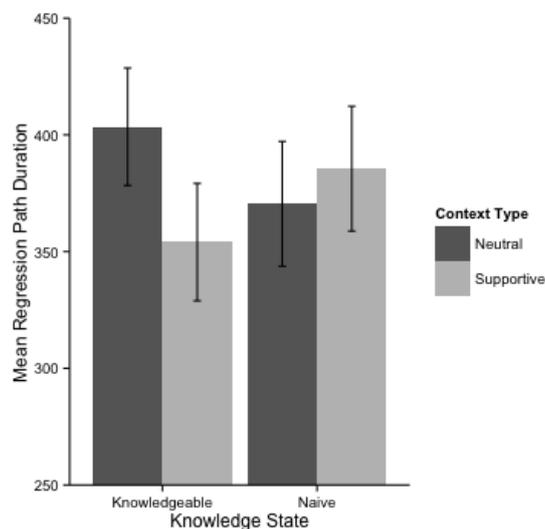


Figure 1: Means across conditions for regression path duration time.

TOTAL READING TIME Total reading time reflects the total time readers spent fixating the target region. Total reading time is used to explore overall (early and late) processing of language stimuli because

they include first pass, second pass and all later fixations to the target region. The linear mixed effects model did not reveal a main effect of context type, $p = .156$, character's knowledge state, $p = .943$, or their interaction, $p = .335$. However, descriptive data of total reading time of the target region shows a similar pattern to the one observed for the regression path duration. Namely, the fastest reading time was observed for the supportive-knowledgeable condition ($M = 348.51$ ms). Similarly, the slowest reading time was for the neutral-knowledgeable condition ($M = 401.64$ ms). In addition, the total reading times for the supportive-naïve and neutral-naïve conditions were very similar ($M = 400.03$ ms and $M = 398.49$ ms, respectively).

3.4 EVALUATION

The goal of the current thesis was to determine whether a novel metaphor comprehension is affected by a prior discourse context and the fictional addressees' knowledge state. The regression path duration revealed that supportive context facilitated novel metaphor comprehension only when the fictional addressee was knowledgeable about this supportive context. When the fictional addressee was naïve about the supportive context, it did not facilitate the processing of the novel metaphoric expressions.

The metaphor comprehension models discussed in Chapter 2 differ from each other in terms of the role assigned to the prior discourse context in the initial metaphor processing. For example, the Standard Pragmatic view [24, 40] suggests that the contextual information should have no effect on the initial processing of a metaphor because a literal meaning is always accessed first. Similarly, the Graded Salience Hypothesis [19, 18] suggests that salient meaning is activated first no matter how supportive the context is. Therefore, the saliency of the novel metaphors should be the same under the different prior discourse contexts. Consequently, the reading times of the same base term of a novel metaphor in supportive and neutral contexts should be similar. On the other hand, the Direct Access view [15, 14, 22, 20] suggests that a supportive context should lead to an immediate or direct access of appropriate non-literal interpretations of a metaphorical expression. Similarly, according to the Structure Mapping Model [11], supportive context should facilitate mapping between the base and target terms of a novel metaphor. Thus, it is expected that sup-

portive context will speed up the processing of the novel metaphoric expressions.

Previous research on perspective taking revealed that the readers are sensitive to the perspective of fictional characters during narrative comprehension in number of ways [4, 33, 25, 13]. On the one hand, Lea et al. [33] suggested that the readers were sensitive to the fictional character's knowledge state and were faster to read the fictional character's utterance when it was congruent with the story character's knowledge state. Thus, it is expected that when the fictional characters of a narrative share the same degree of mutual knowledge, processing of the novel metaphors may be faster. On the other hand, Keysar et al. [27] revealed that the readers failed to track a story character's perspective because they exhibit the illusory transparency of intention. The readers were influenced by their own knowledge while judging the fictional addressee's knowledge state, that caused a slowdown in the interpretation. Thus, the readers may be influenced by the figuratively supportive context even though the fictional addressee is naïve to that prior context.

Our results are partly in line with the Direct Access view. The fact that a supportive context facilitated the processing of the novel metaphorical expressions when the addressee was aware of this context, suggests that contextual information has a potential to influence metaphor comprehension from the earliest stages of processing. However, a supportive context did not facilitate the processing of the novel metaphorical expressions when the addressee was not aware of this context. This suggests that the other's knowledge is also an important factor in novel metaphor comprehension. In other words, the pattern of results reveals that when readers encounter metaphorical expressions they are not only sensitive to the prior context but also how this context is relevant to the fictional participants of the conversation.

One of the possible explanations is that, when the reader but not the fictional addressee is aware of the supportive context, the reader will have much difficulty incorporating the contextual information into an overall representation of the text as when the supportive context is not available at all. This is because the metaphor has been infelicitous from the addressee's perspective. For example, *John's friend* was not in the taxi with *John* when the taxi driver was slow. Therefore, this fictional addressee had no basis for the mapping between the base and the target terms when being told that *The taxi driver was a snail*. Consequently, the reader might seek for an answer why

the protagonist used a metaphorical expression when the fictional addressee had no grounds to understand the relation between the target and the base terms. Thus, the explanation emphasises incorporation of a metaphor use into a situation model rather than conceptual mappings between the base and the target terms.

Furthermore, another explanation is related to the mappings between the base and the target terms. When the readers are mapping the two terms, they make use of the knowledge of the fictional addressee. Thus, when the fictional addressee does not have an access to the supportive context (irrespective of whether this information is available to the reader herself), mappings between the base and the target terms are harder.

Overall, the results suggest that a supportive context facilitates processing of the metaphorical expressions but only when the addressee is aware of such context. These findings reveal the importance of perspective taking in real-time metaphor comprehension and the need to take into account the role of other's knowledge in the models of metaphor comprehension.

4 | CONCLUSION

The thesis focused on how people comprehend novel metaphors when presented in supportive or neutral contexts and when the fictional addressees of the metaphors knew about these contexts or were naïve about them. The evaluation of eye-tracking data was in line with the direct access views, suggesting that contextual information has a potential to influence metaphor comprehension from the earliest stages of processing. Our results show that there is an effect of the context type for the regression path duration measure when the fictional addressee is knowledgeable about the context. Similar to the observations of the Structure Mapping Model[11], it can be interpreted that the contextual information is in play starting from the initial processing stages but it is not enough to speed up the processing of novel metaphorical expressions itself. Therefore, it is proposed that starting from the early processing times, readers are not only sensitive to the prior discourse context itself but also to the knowledge state of narrative characters when they encounter novel metaphorical expressions.

4.1 FUTURE WORK

In our experiment, we focused on people’s comprehension of novel metaphorical expressions. It might also help to add literality as another independent variable so that we can compare the data from both novel and literal expressions to further discuss the metaphor comprehension models.

We might also want to make the definition of salient meanings computationally more clear. Since the Graded Saliency Hypothesis is based on psychological assumptions to model the coded lexicon, it is not clear how to measure the saliency of the current linguistic expressions in a given language. For further steps, it might help to make use of probabilistic language models to control for the saliency of the target and the base term meanings.

APPENDIX A

All critical experimental passages and comprehension questions used in the experiment. Target words are shown in italics.

1

Introductory Sentence: Anna was attending the very first meeting with some law intern representing opposing party in a case she just started to work on.

Supportive Context: He was aggressive from the very beginning: insisted to meet their demands and threatened to tear them apart in a trial.

Neutral Context: He introduced himself, briefly outlined their position, and provided some interesting background documentation about the case.

Knowledgeable Addressee: When Anna returned from the meeting, she said to her colleague who was at the same meeting with her:

Naive Addressee: When Anna returned from the meeting, she said to her colleague who just stepped into the office after long holidays:

Target Sentence:

(a) **Metaphorical expression:** “The intern was a *shark*,

(b) **Conclusion:** and he threatened to tear us apart in a trial.”

Comprehension Question: Did Anna attend the meeting with a law intern?

2

Introductory Sentence: Suzan was attending the very first business lunch with a potential client she was trying to poach. He ordered a rack of ribs and some beer.

Supportive Context: By the time he was done the whole table was covered in fat, barbeque sauce, and dirty napkins.

Neutral Context: When he was done with the food, he asked for a bill and left a regular 10% tip on the table.

Knowledgeable Addressee: When Susan returned from the dinner, she said to her business partner who attended the same lunch with her:

Naive Addressee: When Susan returned from the dinner, she said to her business partner who did not attend the lunch with her:

Target Sentence:

(a) **Metaphorical expression:** “The new client was a *pig*,

(b) **Conclusion:** he obviously made such a mess on the table.”

Comprehension Question: Did the client order some wine?

3

Introductory Sentence: Mary was attending a guided tour to Rome with a licensed and very experienced tour guide.

Supportive Context: First, he talked his way into an ancient cellar, which is usually closed for tourists and then tricked the guards and used back entrance to sneak them into the Vatican Museum.

Neutral Context: He showed them the main monuments including Colosseum and Vatican Museum in the ancient center and suggested a local restaurant where they can eat some traditional pizza.

Knowledgeable Addressee: When Mary returned from the tour, she said to her flatmate who attended the same tour with her:

Naive Addressee: When Mary returned from the tour, she said to her flatmate who, at the time, was visiting Barcelona:

Target Sentence:

(a) **Metaphorical expression:** “The tour guide was a *fox*,

(b) **Conclusion:** and he sneaked us into the Vatican Museum for free.”

Comprehension Question: Did Mary buy a ticket to enter the Vatican Museum?

4

Introductory Sentence: Helen was moving to a new apartment in the city center. She called a moving company to send a mover.

Supportive Context: He was an extremely strong man who one by one threw dressers and shelves on his back and singlehandedly carried them into the truck.

Neutral Context: He arrived early in the morning when it was still dark outside, started to work right away, and finished his work late in the afternoon.

Knowledgeable Addressee: When Helen went back home, she said to her mother who was there to help when the mover arrived:

Naive Addressee: When Helen went back home, she said to her mother who, at the moment, was recovering after surgery in a hospital:

Target Sentence:

(a) **Metaphorical expression:** “The mover was a *bear*,

(b) **Conclusion:** surprisingly he didn’t even have a break to breathe between carrying the shelves.”

Comprehension Question: Did Helen move to a village?

5

Introductory Sentence: John was on his way to the airport. Instead of taking a bus, he caught a cab to get there faster.

Supportive Context: The taxi driver was an elderly man who was driving very slowly and managed to hit red at every traffic light.

Neutral Context: The taxi driver was polite, turned on the taximeter, and respected the road rules throughout the journey.

Knowledgeable Addressee: When John arrived to the airport, he said to his friend who was in the same cab with him:

Naive Addressee: When John arrived to the airport, he said to his friend who was just exiting the arrivals gate:

Target Sentence:

(a) **Metaphorical expression:** “The taxi driver was a *snail*,

(b) **Conclusion:** and he drove so slow that he hit every possible red light.”

Comprehension Question: Did John take a cab to go to the airport?

6

Introductory Sentence: Marc was attending a presentation by a senior student.

Supportive Context: Throughout the talk, the student was very self-opinionated and was stubbornly projecting her ideas without any regard to other’s comments.

Neutral Context: The senior student was talking about the combination of quantum mechanics and general relativity in the context of Black Hole Information Paradox.

Knowledgeable Addressee: When Marc returned from the student presentation, he said to his colleague who was at the same presentation with him:

Naive Addressee: When Marc returned from the student presentation, he said to his colleague who was, at the time, working in his lab:

Target Sentence:

(a) **Metaphorical expression:** “The senior student was a *mule*,

(b) **Conclusion:** and so opinionated that she could not hear any constructive criticism. ”

Comprehension Question: Was the senior student so opinionated?

7

Introductory Sentence: Monika was attending the very first workshop on marketing strategies organized by a well-known media director.

Supportive Context: He started the discussion from the strategies to fool customers instead of talking about the dynamics of marketing plans.

Neutral Context: He clarified marketing objectives and introduced a market plan that is designed to fulfill the company needs.

Knowledgeable Addressee: When Monika returned from the workshop, she said to her colleague who was at the same workshop with her:

Naive Addressee: When Monika returned from the workshop, she said to her colleague who was not at the workshop with her:

Target Sentence:

(a) **Metaphorical expression:** “The media director was a *jackal*,

(b) **Conclusion:** apparently his only aim was to earn much by fooling people.”

Comprehension Question: Was Monika attending a workshop about cooking?

8

Introductory Sentence: Catherine was invited to teach the 5th grade students about preparatory drawing in a one-day painting workshop.

Supportive Context: The tall student was distracted from the beginning of the course, and he insisted on making silly jokes so as to draw all the attention to him.

Neutral Context: The tall student was good at maths, and hardly interested in painting. However, he was responsible and had brought all the necessary equipment.

Knowledgeable Addressee: When Catherine returned from the workshop, she said to her colleague who was at the same workshop with her:

Naive Addressee: When Catherine returned from the workshop, she said to her colleague who was not at the workshop with her:

Target Sentence:

(a) **Metaphorical expression:** “The tall student was a *bird*,

(b) **Conclusion:** he was pointless to annoy the other students.”

Comprehension Question: Did Catherine teach music to the 5th grade students?

9

Introductory Sentence: Stefan suffered from spraining his leg. He went to see a physiotherapist in a clinic located in the city center.

Supportive Context: The physiotherapist was exceptionally gifted; she removed the pain by few elegant strokes with her hands.

Neutral Context: The physiotherapist gave a short massage, showed several stretching exercises, and asked him to do an x-ray immediately.

Knowledgeable Addressee: When Stefan returned from the clinic, he said to his brother who was at the clinic with him:

Naive Addressee: When Stefan returned from the clinic, he said to his brother who was not at the clinic with him:

Target Sentence:

(a) **Metaphorical expression:** “The physiotherapist was a *magician*,

(b) **Conclusion:** and actually, I have no clue how she managed to fix my leg so seamlessly.”

Comprehension Question: When Stefan returned from the clinic, did he talk to his mother?

10

Introductory Sentence: Elia was attending the very first company meeting to introduce himself and to meet his new boss.

Supportive Context: The boss insistently took the turn to talk about his vision and would shut down everyone else before they could even present their ideas.

Neutral Context: The boss introduced his vision for the company, the performance during the previous years, and the high expectations for the future.

Knowledgeable Addressee: When, after the meeting, Elia went to a bar to see his colleague friend who worked at the same company and attended the meeting:

Naive Addressee: When, after the meeting, Elia went to a bar to see his colleague friend who worked in a different city and was in town only for one night:

Target Sentence:

(a) **Metaphorical expression:** “The boss was a *steamroller*,

(b) **Conclusion:** he insistently took everyone down and did not let anyone else to speak. ”

Comprehension Question: Did Elia and the boss meet for the first time in the meeting?

11

Introductory Sentence: Bob was walking in a quiet street in Mitte district in Berlin. He heard a young lady asking for help and ran towards her voice.

Supportive Context: Within a couple of seconds Bob saw the young lady who was intrepidly resisting, kicking, and punching a purse-snatcher.

Neutral Context: When Bob turned the corner, he saw a young lady holding her purse tightly and a purse-snatcher running away.

Knowledgeable Addressee: When Bob arrived to a cafe, he said to his friend who witnessed the purse snatching with him:

Naive Addressee: When Bob arrived to a cafe, he said to his friend who was waiting for him at the cafe:

Target Sentence:

(a) **Metaphorical expression:** “The young lady was a *fighter*,

(b) **Conclusion:** she didn’t give up and protected her purse.”

Comprehension Question: Did Bob help the young lady to protect her purse?

12

Introductory Sentence: John was joining the premiere of the famous ballet performance “The Nutcracker” in the city theater.

Supportive Context: The beautiful principal dancer was lowered down from the ceiling and was stunning with her unearthly graceful movement throughout the ballet.

Neutral Context: The principal dancer was a young lady who joined the company after graduating from the Academy of Ballet Arts several years ago.

Knowledgeable Addressee: When John returned from the performance, he said to his brother who was at the same ballet performance with him:

Naive Addressee: When John returned from the performance, he said to his brother who just came back from watching a movie in a cinema:

Target Sentence:

(a) **Metaphorical expression:** "The principal dancer was a *goddess*,

(b) **Conclusion:** her beauty impressed the audience."

Comprehension Question: Did John join the premiere of an Opera?

13

Introductory Sentence: Johan was attending a family lunch in a newly opened café where only one waitress was responsible for all the tables.

Supportive Context: The waitress swiftly took their order and within an eye-blink brought their drinks and served the other tables.

Neutral Context: The waitress gave them the menu in which the daily offers were written and served some water and nibbles.

Knowledgeable Addressee: When Johan returned home from the lunch, he said to his sister who was at the same lunch with him:

Naive Addressee: When Johan returned home from the lunch, he said to his sister who was not at the lunch with him:

Target Sentence:

(a) **Metaphorical expression:** "The waitress was a *lightning*,

(b) **Conclusion:** she sprightly took the orders and served so quickly. "

Comprehension Question: Were there two waitresses in the cafe?

14

Introductory Sentence: Mary was attending a company meeting where the new office mate who was stolen from an opponent company was introduced.

Supportive Context: During the meeting, the new office mate was acting very bossy and introduced his strategies without accepting any suggestions from the others.

Neutral Context: The new office mate was a young guy who first introduced himself and then talked about his proposal regarding the company needs.

Knowledgeable Addressee: When Mary returned back to her office, she said to her colleague who was at the same meeting with her:

Naive Addressee: When Mary returned back to her office, she said to her colleague who secretly skipped the company meeting:

Target Sentence:

(a) **Metaphorical expression:** “The new office mate was a *tyrant*,

(b) **Conclusion:** he didn’t let us to suggest alternative ways to his proposal.”

Comprehension Question: Was the new office mate transferred from an opponent company?

15

Introductory Sentence: Angelika was attending a free dance workshop for beginners of all ages. After the first course, the attenders went to have lunch together.

Supportive Context: The old guy ordered great amount of food, finished it quicker than the others, and intentionally left the table without paying.

Neutral Context: The old guy was a very talkative person. He was able to speak nonstop while he was eating his pizza and drinking his tea.

Knowledgeable Addressee: When Angelika returned from the workshop, she said to her roommate who was in the same workshop with her:

Naive Addressee: When Angelika returned from the workshop, she said to her roommate who was not in the workshop with her:

Target Sentence:

(a) **Metaphorical expression:** “The old guy was a *parasite*,

(b) **Conclusion:** and he left the table without paying his lunch.”

Comprehension Question: Did the attendees have lunch together?

16

Introductory Sentence: Arthur was attending a live escape-the-room game in Cologne. The participants were expected to find the clues to escape the room.

Supportive Context: Martin was very fast in reasoning and could match the cues easily. He solved more than half of the mysteries.

Neutral Context: Martin was in Arthur's team of six people. He was an old friend from primary school and was a famous pianist.

Knowledgeable Addressee: When Arthur returned from the game, he told to his best friend who was in the game with him / who was not in the game with him:

Naive Addressee: When Arthur returned from the game, he told to his best friend who was in the game with him / who was not in the game with him:

Target Sentence:

(a) **Metaphorical expression:** "Martin was a *detective*,

(b) **Conclusion:** he incredibly solved the cues and helped us to escape."

Comprehension Question: Did Arthur attend the game in Berlin?

APPENDIX B

German translation of all critical experimental passages and comprehension questions used in the experiment. Target words are shown in italics.

1

Introductory Sentence: Anna war bei ihrem ersten Treffen mit einem Rechtsreferendar, der die Gegenseite in einem Fall vertrat, an dem sie gerade zu arbeiten begann.

Supportive Context: Er war von Anfang an aggressiv und bestand darauf, dass sie die Forderungen seiner Klienten erfüllte. Ansonsten würde er sie vor Gericht auseinandernehmen.

Neutral Context: Er stellte sich kurz vor, erläuterte die Position seiner Klienten und gab einige Hintergrundinformationen zum aktuellen Fall.

Knowledgeable Addressee: Als Anna von dem Treffen zurückkam, sagte sie zu ihrem Kollegen, der mit dabei gewesen war:

Naive Addressee: Als Anna von dem Treffen zurückkam, sagte sie zu ihrem Kollegen, gerade von einem langen Urlaub wieder zurück ins Büro kam:

Target Sentence:

(a) **Metaphorical expression:** "Der Rechtsreferendar war ein *Hai*;

(b) **Conclusion:** er hat gedroht, uns in einem Verfahren auseinander zu nehmen."

Comprehension Question: War Anna bei dem Meeting mit dem Rechtsreferendar dabei?

2

Introductory Sentence: Susanne war bei ihrem ersten Essen mit einem potentiellen Klienten, den sie zu werben versuchte. Er bestellte Spare Ribs und Bier.

Supportive Context: Als er fertig war, war der ganze Tisch mit Fett, Barbequesoße und dreckigen Servietten bedeckt.

Neutral Context: Als er mit dem Essen fertig war, fragte er nach der Rechnung und gab die üblichen 10% Trinkgeld.

Knowledgeable Addressee: Als Susanne von dem Essen zurückkam, sagte sie zu ihrem Geschäftspartner, der auch bei dem Essen gewesen war:

Naive Addressee: Als Susanne von dem Essen zurückkam, sagte sie zu ihrem Geschäftspartner, der nicht bei dem Essen gewesen war:

Target Sentence:

(a) **Metaphorical expression:** "Der neue Klient war ein *Schwein*;

(b) **Conclusion:** er hat absolutes Chaos auf dem Tisch hinterlassen."

Comprehension Question: Hat der Klient Wein bestellt?

3

Introductory Sentence: Marie machte eine geführte Tour durch Rom mit einem ausgebildeten und sehr erfahrenen Reiseleiter.

Supportive Context: Zuerst erreichte er mit Hilfe seines Redetalents, dass sie ein antikes Kellergewölbe besichtigen konnten, welches normalerweise für Touristen nicht zugänglich ist. Dann trickste er die Museumswärter aus und schmuggelte die Gruppe durch den Hintereingang in das vatikanische Museum.

Neutral Context: Er zeigte ihnen die wichtigsten Monumente, einschließlich des Kolosseums und des vatikanischen Museums im antiken Zentrum der Stadt und empfahl ein Restaurant, in dem man traditionelle Pizza essen konnte.

Knowledgeable Addressee: Als Marie von der Tour zurückkam, sagte sie zu ihrer Mitbewohnerin, die auch bei der Tour dabei gewesen war:

Naive Addressee: Als Marie von der Tour zurückkam, sagte sie zu ihrer Mitbewohnerin, in der gleichen Zeit Barcelona besucht hatte:

Target Sentence:

(a) **Metaphorical expression:** "Der Reiseleiter war ein *Fuchs*;

(b) **Conclusion:** er hat uns ins vatikanische Museum geschmuggelt."

Comprehension Question: Hat Marie eine Eintrittskarte für das Vatikanische Museum gekauft?

4

Introductory Sentence: Helena zog in eine neue Wohnung in der Stadtmitte um. Sie rief eine Umzugsfirma an, um einen Möbelpacker zu bestellen.

Supportive Context: Er war ein sehr starker Mann, der sich eins nach dem anderen ihre Regale und Schränke griff und sie allein in den Transporter schleppte.

Neutral Context: Er kam früh am Morgen, als es noch dunkel draußen war und begann gleich mit der Arbeit. Er wurde spät am Nachmittag fertig.

Knowledgeable Addressee: Als Helena zurück nach Hause kam, sagte sie zu ihrer Mutter, die dabei gewesen war, als der Möbelpacker kam:

Naive Addressee: Als Helena zurück nach Hause kam, sagte sie zu ihrer Mutter, die sich gerade von einer Operation erholte:

Target Sentence:

(a) **Metaphorical expression:** "Der Möbelpacker war ein *Bär*;

(b) **Conclusion:** er machte zwischen den Schränken nicht ein Mal eine Pause zum Verschnaufen."

Comprehension Question: Ist Helen aufs Land gezogen?

5

Introductory Sentence: Jonas war auf dem Weg zum Flughafen. Statt den Bus zu nehmen, nahm er ein Taxi um dort schneller hinzukommen.

Supportive Context: Der Taxifahrer war ein älterer Herr, der sehr langsam fuhr und es schaffte, jede rote Ampel zu erwischen.

Neutral Context: Der Taxifahrer war höflich, schaltete den Taxameter an und beachtete durchweg die Straßenregeln.

Knowledgeable Addressee: Als Jonas am Flughafen ankam, sagte er zu seinem Kumpel, der im selben Taxi mit ihm war:

Naive Addressee: Als Jonas am Flughafen ankam, sagte er zu seinem Kumpel, der gerade aus der Ankunftshalle kam:

Target Sentence:

(a) **Metaphorical expression:** "Der Taxifahrer war eine *Schnecke*;

(b) **Conclusion:** er fuhr so langsam, dass er jede rote Ampel erwischte."

Comprehension Question: Hat Jonas ein Taxi zum Flughafen genommen?

6

Introductory Sentence: Marc ging zum Vortrag eines älteren Studenten.

Supportive Context: Den Vortrag hindurch war der Student sehr von sich selbst überzeugt und stellte seine Ideen dar, ohne auf die Kommentare der anderen einzugehen.

Neutral Context: Der ältere Student redete über die Kombination von Quantenmechanik und allgemeiner Relativitätstheorie im Kontext des Informationsparadoxons schwarzer Löcher.

Knowledgeable Addressee: Als Marc vom Vortrag zurückkam, sagte er zu seinem Kollegen, der im selben Vortrag mit ihm gewesen war:

Naive Addressee: Als Marc vom Vortrag zurückkam, sagte er zu seinem Kollegen, der die ganze Zeit in seinem Labor gearbeitet hatte:

Target Sentence:

(a) **Metaphorical expression:** "Der ältere Student war ein *Esel*,

(b) **Conclusion:** und so sehr von sich selbst überzeugt, dass er keine konstruktive Kritik entgegennahm."

Comprehension Question: Hatte der ältere Student eine starke Meinung?

7

Introductory Sentence: Monika besuchte den allerersten Workshop über Marketingstrategien, organisiert von einem wohlbekanntem Mediendirektor.

Supportive Context: Er begann die Diskussion damit, über Strategien der Kundentäuschung zu reden, statt über die Dynamiken von Marketingplänen.

Neutral Context: Er definierte Marketingziele und stellte einen Marktplan vor, der dafür konzipiert wurde, den Erfordernissen der Firma nachzukommen.

Knowledgeable Addressee: Als Monika vom Workshop zurückkehrte, sagte sie zu ihrer Kollegin, die auf demselben Workshop mit ihr gewesen war:

Naive Addressee: Als Monika vom Workshop zurückkehrte, sagte sie zu ihrer Kollegin, die nicht auf dem Workshop mit ihr gewesen war:

Target Sentence:

(a) **Metaphorical expression:** "Der Mediendirektor war ein *Schakal*,

(b) Conclusion: anscheinend war sein einziges Ziel, viel Geld mit der Täuschung von Leuten zu verdienen.“

Comprehension Question: Besuchte Monika einen Kochkurs?

8

Introductory Sentence: Katrin wurde eingeladen mit der fünften Klasse einen eintägigen Malkurs abzuhalten.

Supportive Context: Der große Schüler war von Anfang an abgelenkt und zog die Aufmerksamkeit mit blöden Witzen auf sich.

Neutral Context: Der große Schüler war gut in Mathe und kaum am Malen interessiert. Trotzdem war er pflichtbewusst und brachte das nötige Werkzeug mit.

Knowledgeable Addressee: Als Katrin vom Malkurs zurückkam, sagte sie zu ihrer Kollegin, die auch mit ihr den Kurs leitete:

Naive Addressee: Als Katrin vom Malkurs zurückkam, sagte sie zu ihrer Kollegin, die nicht am Kurs teilgenommen hatte:

Target Sentence:

(a) Metaphorical expression: “Der große Schüler war ein *Vogel*;

(b) Conclusion: es gab keinen Grund ständig die anderen Schüler zu nerven.“

Comprehension Question: Brachte Katrin Fünftklässlern Musik bei?

9

Introductory Sentence: Stefan litt unter einer Verstauchung seines Beins. Er besuchte einen Physiotherapeuten in einer Klinik im Stadtzentrum.

Supportive Context: Der Physiotherapeut war äußerst begabt; er beseitigte die Schmerzen durch geschicktes Massieren mit den Händen.

Neutral Context: Der Physiotherapeut massierte das Bein kurz, zeigte mehrere Dehnübungen und ordnete sofort eine Röntgenuntersuchung an.

Knowledgeable Addressee: Als Stefan von der Klinik zurückkam, sagte er zu seinem Bruder, der mit ihm in der Klinik war:

Naive Addressee: Als Stefan von der Klinik zurückkam, sagte er zu seinem Bruder, der nicht mit ihm in der Klinik gewesen war:

Target Sentence:

(a) Metaphorical expression: “Der Physiotherapeut war ein *Zauberer*,

(b) Conclusion: und eigentlich habe ich keine Ahnung, wie er es geschafft hat, mein Bein so gut zu heilen.“

Comprehension Question: Hat Stefan nach seinem Klinikaufenthalt mit seiner Mutter gesprochen?

10

Introductory Sentence: Elias nahm am ersten Treffen der Firma teil um sich selbst vorzustellen und um seinen neuen Chef kennenzulernen.

Supportive Context: Der Chef nahm beharrlich die Position des Redners an sich, um über seine Visionen zu reden und würgte jeden ab, bevor er überhaupt seine Ideen vorstellen konnte.

Neutral Context: Der Chef stellte seine Vision der Firma, die Leistung der letzten Jahre und die zukünftigen hohen Erwartungen vor.

Knowledgeable Addressee: Elias ging nach dem Treffen in eine Bar um einen Freund zu sehen, der in derselben Firma arbeitete und ebenfalls am Treffen teilgenommen hatte:

Naive Addressee: Elias ging nach dem Treffen in eine Bar um einen Freund zu sehen, der in einer anderen Stadt arbeitete und an diesem Abend nur zu Besuch war:

Target Sentence:

(a) Metaphorical expression: “Der Chef war eine *Dampfwalze*;

(b) Conclusion: er hat jeden sofort abgewürgt und niemand anderes zu Wort kommen lassen.“

Comprehension Question: Trafen sich Elias und sein Chef in dem Meeting zum ersten mal?

11

Introductory Sentence: Robert ging durch eine ruhige Straße in Berlin-Mitte. Er hörte eine junge Dame nach Hilfe rufen und rannte sofort ihrer Stimme entgegen.

Supportive Context: Innerhalb weniger Sekunden sah Robert die junge Dame, die furchtlos einen Handtaschendieb abwehrte, gegen ihn trat und schlug.

Neutral Context: Als Robert um die Ecke eilte, sah er die junge Dame ihre Handtasche haltend, während ein Handtaschendieb am weglaufen war.

Knowledgeable Addressee: Als Robert in einem Café ankam, sagte er zu seinem Kumpel, der mit ihm den Tathergang verfolgt hatte:

Naive Addressee: Als Robert in einem Café ankam, sagte er zu seinem Kumpel, der im Café auf ihn gewartet hatte:

Target Sentence:

(a) **Metaphorical expression:** “Die junge Dame war eine *Kämpferin*;

(b) **Conclusion:** sie gab nicht auf und beschützte ihre Handtasche.”

Comprehension Question: Half Robert einer jungen Frau ihre Handtasche zu verteidigen?

12

Introductory Sentence: Johannes war zur Premiere des berühmten Balletts “Der Nussknacker” im Theater der Stadt anwesend.

Supportive Context: Die wunderschöne Primaballerina wurde von der Decke herabgelassen und war atemberaubend mit ihren anmutigen Bewegungen, die nicht von dieser Welt waren.

Neutral Context: Die Primaballerina war eine junge Dame, die dem Theater nach ihrem Abschluss an der Ballettschule mehrere Jahre zuvor beigetreten war.

Knowledgeable Addressee: Als Johannes von der Aufführung zurückkam, sagte er zu seinem Bruder, der auch mit ihm im Balletstück gewesen war:

Naive Addressee: Als Johannes von der Aufführung zurückkam, sagte er zu seinem Bruder, der sich gerade einen Film im Kino angeschaut hatte:

Target Sentence:

(a) **Metaphorical expression:** “Die Primaballerina war eine *Göttin*;

(b) **Conclusion:** ihre Schönheit hat das Publikum verzaubert.”

Comprehension Question: Ist Johannes zur Premiere einer Oper gegangen?

13

Introductory Sentence: Johann traf sich mit seiner Familie zum Mittagessen in einem neueröffneten Café, in dem nur eine Bedienung für alle Tische zuständig war.

Supportive Context: Die Bedienung nahm flott ihre Bestellung auf und innerhalb eines Augenblicks brachte sie bereits die Getränke, während sie auch noch die anderen Tische bediente.

Neutral Context: Die Bedienung gab ihnen eine Speisekarte, in der die Tagesangebote aufgelistet waren und servierte etwas Wasser und Häppchen.

Knowledgeable Addressee: Als Johann vom Mittagessen nach Hause kam, sagte er zu seiner Schwester, die auch beim Essen dabei gewesen war:

Naive Addressee: Als Johann vom Mittagessen nach Hause kam, sagte er zu seiner Schwester, die nicht mit beim Essen gewesen war:

Target Sentence:

(a) **Metaphorical expression:** "Die Bedienung war ein *Blitz*;

(b) **Conclusion:** sie nahm die Bestellung direkt entgegen und bediente wahnsinnig schnell."

Comprehension Question: Waren zwei Bedienungen im Cafe?

14

Introductory Sentence: Maria nahm an einem Firmentreffen teil, bei dem ein neuer Arbeitskollege vorgestellt wurde, der von einer konkurrierenden Firma abgeworben wurde.

Supportive Context: Während des Treffens spielte sich der neue Arbeitskollege durchgehend auf und präsentierte seine Strategien, ohne jegliche Vorschläge der Anderen zu berücksichtigen.

Neutral Context: Der neue Arbeitskollege war ein junger Mann, der sich zuerst vorstellte und dann über Vorschläge redete, wie er sich die Zukunft der Firma vorstelle.

Knowledgeable Addressee: Als Maria ins Büro zurückkam, sagte sie zu einer Kollegin, die auch auf dem Treffen mit ihr gewesen war:

Naive Addressee: Als Maria ins Büro zurückkam, sagte sie zu einer Kollegin, die heimlich das Treffen geschwänzt hatte:

Target Sentence:

(a) **Metaphorical expression:** "Der neue Arbeitskollege war ein *Tyrann*;

(b) **Conclusion:** er ließ uns keinerlei Raum für konstruktive Vorschläge."

Comprehension Question: Hatte der neue Arbeitskollege von einem Konkurrenzunternehmen gewechselt?

15

Introductory Sentence: Angelika nahm an einem kostenlosen Tanzkurs für Anfänger teil. Nach der ersten Stunde gingen die Teilnehmer zusammen Mittag essen.

Supportive Context: Ein alter Mann bestellte eine riesige Portion, aß seinen Teller deutlich schneller als die anderen auf und verließ den Tisch danach absichtlich ohne zu zahlen.

Neutral Context: Ein alter Mann entpuppte sich als sehr gesprächige Person. Er war dauerhaft im Redefluss, während er seine Pizza aß und seinen Tee trank.

Knowledgeable Addressee: Als Angelika vom Tanzkurs zurückkam, sagte sie zu ihrer Mitbewohnerin, die am gleichen Tanzkurs mit ihr teilgenommen hatte:

Naive Addressee: Als Angelika vom Tanzkurs zurückkam, sagte sie zu ihrer Mitbewohnerin, die nicht am Tanzkurs teilgenommen hatte:

Target Sentence:

(a) **Metaphorical expression:** "Dieser alte Mann war ein *Parasit*;

(b) **Conclusion:** er ist aufgestanden ohne zu zahlen."

Comprehension Question: Aßen die Teilnehmer zusammen zu Mittag?

16

Introductory Sentence: Arthur nahm an einem Exit-Game in Köln teil. Die Teilnehmer mussten Hinweise sammeln um den Raum verlassen und das Spiel gewinnen zu können.

Supportive Context: Martin konnte sehr schnell schlussfolgern und die Hinweise leichtfällig kombinieren. Er löste mehr als die Hälfte der Rätsel alleine.

Neutral Context: Martin war in Arthurs Team, das aus 6 Personen bestand. Er war ein alter Freund aus der Grundschule und ein bekannter Pianist.

Knowledgeable Addressee: Als Arthur nach Hause zurückkam, erzählte er seinem besten Freund, der auch an dem Spiel teilgenommen hatte:

Naive Addressee: Als Arthur nach Hause zurückkam, erzählte er seinem besten Freund, der nicht dabei gewesen war:

Target Sentence:

(a) **Metaphorical expression:** "Martin war ein *Detektiv*;

(b) **Conclusion:** er löste die Rätsel unglaublich schnell und half uns damit den Raum verlassen."

Comprehension Question: Ging Arthur zu dem Spiel in Berlin?

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