



# Bachelor's thesis

Resistance to metaphor in science communication

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## Abstract

Findings in academic papers are often not understandable to the general public. Consequently, academic papers do not fall within the spectrum of articles that people read on a daily basis. Metaphors can help to bridge this gap and offer the needed 'translation', since they allow to make texts more comprehensible by making abstract concepts more concrete. In addition, metaphors have been shown to have persuasive power. Metaphors being a persuasive tool, the use of them may cause resistance among readers. However, this resistance has not been touched upon to date. The current study added to the existent literature by addressing the subject of resistance to metaphors in communication about vaccination. Whether a metaphor is commonly used or not, and the context in which the metaphor is used (describing a familiar or unfamiliar disease) might influence the degree to which metaphors are being resisted to. Therefore, the present study investigated whether people resist more to text with conventional metaphors than with novel metaphors or no metaphors, whether resistance is higher towards metaphors used to describe unfamiliar diseases than familiar diseases, and to what extent there is an interaction effect between the type of metaphor used and the familiarity of the disease on the levels of resistance displayed by the readers. 187 participants read a text after which their motivated resistance to persuasion was determined by means of several questions. No support was found for the two hypotheses. Nevertheless, an interaction effect showed higher levels of resistance towards the unknown disease than towards the well-known disease when no metaphor was used. Further, in case of the conventional metaphor, people resisted more towards the well-known disease than towards the unknown disease. The results add to the theory of reduced counterarguments by adding the topic of resistance and form the basis for further academic inquiry.

## Theoretical framework

Scientific research has important implications for the decisions people make on a daily basis, for instance whether or not to vaccinate against diseases. However, the general public does generally not read the papers that are being published in scientific journals, since these are usually written in academic language that may not be understandable for everyone. Results of scientific research are therefore communicated by the media. Organisations that write about scientific findings have to make the information that they want to publish comprehensible to the public.

Vaccination against diseases is one of the current controversial topics for which public opinion requires scientific knowledge. Some people are in favour of vaccinating, while others are against. When reading a text (e.g. a newspaper article) in favour of vaccinating, the latter group may resist to this message, because it conflicts with their opinion. However, the results of scientific research have indicated that vaccinations contribute to public health (Greenwood, 2014). It is therefore beneficial to society at large if more people would get vaccinated. Hence, organisations that communicate about this issue should dispose of the sufficient communication tools to intelligibly and effectively get this message across.

One of the tools that are often used to make abstract concepts more concrete, is metaphor (Lakoff & Johnson, 1980). Therefore, metaphors can be seen as a useful instrument to make complex texts more understandable. Lakoff and Johnson (1980) introduced the Conceptual Metaphor Theory, which states that people understand concepts from one domain by means of another domain. In order to make an abstract concept more concrete, a source concept is used to talk about a target concept. This happens mentally via conceptual metaphors, which are manifested linguistically. These conceptual metaphors reflect underlying conceptual processes in people's minds, and therefore may shape how people think (Thibodeau, Matlock, & Flusberg, 2019).

Consistent with the ability to influence reasoning, Burgers, Konijn and Steen (2016) argued that metaphors work as a framing device. By using metaphor in text, the writer of the text advertently or inadvertently makes some aspects of the topic more salient than others, thereby promoting a certain interpretation of the message. Especially when it comes to science communication, it may be of great interest for policymakers, politicians or others to find out if the use of a certain metaphor can influence people's behaviour, since their core objective is to get people to think in the same manner as they do. However, the use of

metaphors may also backfire, causing people to resist to the message. The present study therefore aims to answer the following research question:

*To what extent does metaphor use in communication about vaccination cause resistance?*

The effects of metaphor use on behavioural intentions have been studied extensively (Sopory & Dillard, 2002; Van Stee, 2018). Flusberg, Matlock and Thibodeau (2017) allow support for the idea that metaphors can influence people's attitudes towards a certain topic. In their view, there is a big gap between scientific findings and public opinion. The media play an important role in changing this public opinion, which is why Flusberg et al. (2017) tested the idea that framing techniques influence how people think and reason about societal issues. They conducted a study in which they examined the effect of the use of different metaphors in communications about climate change on people's attitude towards climate change (i.e. their urgency and risk perception, as well as their willingness to change behaviour). Besides, they manipulated the time frame of the message, being either in the near or in the distant future. Their findings suggest that the intensity of a certain metaphor frame (i.e. the *war* frame opposed to the *race* frame) leads people to feeling a greater sense of urgency and risk. In this example, the *war* frame is regarded as more intense than the *race* frame, because it involves a higher sense of risk. As such, it has a higher probability to capture the attention of readers as opposed to the *race* frame (Flusberg et al., 2017). This can be explained by the fact that the consequences of losing a war are much greater than those of losing a race. It should be noted, however, that these results only applied to talking about climate change in the short-term. The authors conclude that choosing the right metaphor can help to evoke the desired behaviour or to raise awareness about a specific issue.

Thibodeau & Boroditsky (2011, 2013) researched the idea that metaphors induce different lines of reasoning. They designed an experiment in which they presented participants with a text about crime to find out whether the use of certain metaphors can influence the way people think about crime. They designed two texts, the first one conceiving of crime as a *virus* that should be prevented by making people immune, the second one consisting of a *beast* metaphor, describing crime as a beast that should be trapped. The *virus* metaphor highlights the idea that crime can be solved by reforming people, whereas the *beast* metaphor incites the thought that crime should be solved by the enforcement of strict laws. They found that the use of a certain metaphor indeed causes people to propose the solution to crime that is in line with the metaphor used in the text. This finding can be very useful for individuals, organisations or institutions who want to design a text with the goal of changing people's behaviour.

However, the approach of Thibodeau and Boroditsky (2011, 2013) has been critiqued for various reasons (Steen, Reijniere, & Burgers, 2014). Firstly, they have not used a non-metaphorical control condition as a baseline. Without including a control condition, it cannot be determined whether the effect is due to the specific metaphor frame, or to a general framing effect. In addition, Steen et al. (2014) argue that the number and type of metaphors used in the texts may also be an indispensable variable to consider. They stated that the type of metaphors used by Thibodeau and Boroditsky (2011) were ambiguous and could be used in both the context of the *beast* frame and the *virus* frame. Moreover, Steen et al. (2014) posit that conventionality of the metaphor, which they define as whether the metaphorical meaning is present in the dictionary or not, should be included in the study, since this factor might interact with the effect of metaphorical framing, thereby influencing persuasion. The importance of this variable has indeed been proven by various scholars (Sopory & Dillard, 2002; Van Stee, 2018).

A domain in which metaphors are widely used, is the domain of health and illness. Given this widespread usage, researchers have studied that metaphors can influence the decisions we make about health-related issues. Scherer, Scherer, and Fagerlin (2015) showed participants texts in which the flu was either described literally (as a “virus that infects the body”), or metaphorically (as a “beast that preys on the body” or as a “riot that revolts against the body”). Their interest was finding out whether the use of a certain metaphor can possibly influence people’s intention to get vaccinated. They found that describing the flu metaphorically increases the intention of people to get a vaccination.

One factor that Scherer et al. (2015) did not consider, is familiarity of the disease. The texts they used in their study were limited to the flu. It could however be argued that the familiarity of a disease influences the effect of metaphor use on vaccination intentions. As stated by Sopory and Dillard (2002), people who are more knowledgeable about the target domain will be more persuaded by the metaphor than people who are less informed about the subject. This would mean, in the context of vaccinations, that people who read a text about a commonly known disease like the flu, will be more persuaded by the metaphor and therefore more willing to get a vaccination, than if a metaphor is used in a text about a relatively unknown disease.

Hence, scholars to date agree on the effectiveness of metaphor use in science communication, arguing that the use of a certain metaphor strongly affects people’s attitude towards that topic. However, a subject that has been left aside is whether metaphors can cause the reader to resist the message.

This notion of resistance has been extensively addressed in the advertising literature. It is known from advertising studies that recipients of a certain message have several strategies at their disposal for resisting attitude change: counterarguing, attitude bolstering, message distortion, social validation, source derogation, negative affect, and selective exposure (Zuwerink Jacks & Cameron, 2003). This approach to resistance, which is called the cognitive response approach, focusses on an individual's idiosyncratic reactions to a specific message. These reactions determine whether the message is accepted or rejected. The acceptance of the message will result in persuasion, whereas rejection of the message will result in resistance. Counterarguing is one of the most used strategies and involves directly refuting message arguments. It was also found to be one of the most effective resistance strategies (Zuwerink Jacks & Cameron, 2003). Next to counterarguing, attitude bolstering was shown to be frequently used (Zuwerink Jacks & Cameron, 2003). Attitude bolstering is the opposite of counterarguing and involves supporting the message by generating thoughts that are consistent with and supportive of one's original attitude without directly refuting message arguments. Considering that these strategies are often used to resist advertisements, they might also be used to resist metaphors.

Whereas the literature on resistance to advertisements is extensive, the phenomenon of resistance to metaphors has hardly been studied to date. To present a summary of all research done on the subject of persuasive power of metaphors, Sopory and Dillard (2002) conducted a meta-analysis in which they tried to identify the persuasive effects of metaphors as compared to literal language. Building on the processes that underly the understanding of a metaphor, the authors identified six perspectives on metaphor and persuasion. Their data provide strong support for one of these theories in particular, which is the superior organization perspective. This viewpoint holds that metaphors enhance the structuring and organisation of the message arguments superior to literal language. This increased organisation of the message content leads to an improved comprehension of the arguments in the message. Enhanced comprehension should again lead to higher persuasion. Therefore, it can be predicted that texts without a metaphor cause more resistance than texts containing a metaphor.

In general, Sopory and Dillard (2002) have concluded that metaphors indeed have a greater persuasive power as compared to literal language. Although the other perspectives were not proven false, they found proof that the superior organization theory best explains this result. Superior organization theory encompasses that the use of only a single metaphor instead of multiple metaphors in a text allows for the best organization of message elements, thus being more persuasive. Moreover, superior organization theory implies that a metaphor

can best be placed in the beginning of a text to increase persuasion. Finally, the perspective holds that metaphors are more persuasive when used to describe familiar concepts than when used in texts about relatively unknown topics. These aspects should therefore be taken into account when designing a text aimed at persuading the audience.

An updated meta-analysis has been conducted by Van Stee (2018). This recent meta-analysis has included multiple dependent variables measuring behavioural intention and behaviour, in contrast to Sopory and Dillard (2002), who only measured attitude. In line with the earlier meta-analysis, Van Stee (2018) found that metaphors with high familiarity targets were more persuasive than with low familiarity targets, supporting the superior organization hypothesis. In light of this perspective, it can be argued that a high familiarity metaphor allows for better incorporation of information between the target and source domain of the metaphor, which increases the amount of semantic linkages compared to literal language and thereby reinforces the comprehension and persuasiveness of the message. Therefore, the following hypothesis was formulated:

- 1. When metaphors are used in the context of unknown diseases, resistance will be higher than in the context of well-known diseases.*

In addition, conventionality of the metaphor has been found to impact metaphor comprehension, thereby possibly influencing the effect of metaphor use. According to Thibodeau and Durgin (2011), novel metaphors require more cognitive effort from the recipient than conventional metaphors. Conventional metaphors are therefore processed faster than novel metaphors (Bowdle & Gentner, 2005). Sopory and Dillard (2002) found evidence for the hypothesis that novel metaphors are more persuasive than conventional metaphors, since they require more cognitive effort, consequently requiring the reader to process the message multiple times. This repetition of the message enhances persuasion. Therefore, the following hypothesis will be tested:

- 2. Resistance will be higher when a conventional metaphor is used to describe a disease than when a novel metaphor or no metaphor is used.*

The existent literature has covered the influence on persuasiveness of both conventionality of metaphors and familiarity of the target (Sopory & Dillard, 2002), but the effect of these factors combined has not been studied to date. Since the literature does not allow a prediction of the direction of the interaction effect of familiarity of the disease and type of metaphor on resistance to the use of metaphor, the following research question has been formulated:

- 3. To what extent is there an interaction effect between familiarity of the disease and type of metaphor on resistance to communication about vaccinations for diseases?*

The present study aims to contribute to the relatively untouched subject of resistance to metaphors, drawing on the cognitive response approach. More specifically, this will be studied in the context of texts about vaccinating against diseases.

## Methodology

### **Materials**

To investigate the hypotheses and research question, an experiment was conducted. The study consisted of two independent variables. The first independent variable was type of metaphor, which is a nominal variable. This variable has three levels: beast, weed, or virus. The metaphors were derived from the study of Scherer et al. (2015). Prior to the main experiment, a pre-test was run to ensure that the beast metaphor differed significantly from the weed metaphor in terms of familiarity. The pre-test was run in Dutch, since the study was conducted in the Netherlands. Following the procedure of Jones and Estes (2011), participants were asked to rate the familiarity of the metaphor (“a virus is a beast that preys on the body” and “a virus is a weed that spreads quickly through the body”) on a 7-point Likert scale (1= extremely familiar, 7 = not familiar at all). 20 participants started the questionnaire, of which 19 finished it, since one person did not meet the criterion of having Dutch as a mother tongue. 58% of the participants were female. The age of the participants ranged from 17 to 53 ( $M = 31.16$ ,  $SD = 14.32$ ). The educational level of participants ranged from secondary school to university, with secondary school being the most frequently completed educational level (40%). A paired samples t-test showed a significant difference in familiarity between the beast and weed metaphor ( $t(18) = 3.34$ ,  $p = .004$ ). The weed metaphor ( $M = 4.68$ ,  $SD = 1.97$ ) was shown to be more familiar than the beast metaphor ( $M = 6.16$ ,  $SD = 1.17$ ). Based on these findings, the weed metaphor was used as the conventional metaphor in the main experiment, whereas the beast metaphor was used as the novel metaphor.

The second independent variable was familiarity of the disease, and has two levels, unknown disease (tick-borne encephalitis) or well-known disease (the flu). This is a nominal variable. In choosing a relatively unknown disease, it was ensured that the disease can be caught in the Netherlands and that there exists a vaccine to prevent it.

Concerning the main experiment, participants read a short text about the prevalence of either the flu or tick-borne encephalitis and a call to vaccinate themselves against it. The flu is a commonly known disease, whereas tick-borne encephalitis is much less known. Influenza is a contagious respiratory illness that spreads through tiny droplets in the air and that is commonly known as “the flu”. The flu can cause mild to severe illness. Furthermore, seasonal incidence of the flu affects a large amount of people each year. Tick-borne encephalitis is an inflammation of the brain that is caused by the tick-borne encephalitis virus (TBE). Infected ticks transmit the disease to other animals and sometimes to humans. It occurs in some parts

of Europe, Russia, and Central Asia. In the Netherlands, the virus has been found in some ticks in two national parks, but in the last few years, approximately one patient per year was found suffering from this disease (RIVM, 2020).

In the text, the disease was either described literally (a virus that affects the body) or metaphorically (a beast that preys on the body or a weed that spreads quickly through the body). In total, six texts were manipulated. These descriptions were based on the descriptions used by Scherer et al. (2015) but were adapted and translated into Dutch, since the study was conducted in the Netherlands. The stimulus texts can be found in Appendix A.

## Subjects

261 participants started the questionnaire of the main experiment, of which 197 finished it. Participants who did not give their informed consent, were less than 16 years old or who were no native speakers of the Dutch language were excluded. Moreover, the three upper outliers in terms of duration were excluded, after which the mean duration time was calculated.

Participants who took more than 2 standard deviations from this calculated mean time it took to complete the survey, were excluded. This yielded a total of 187 valid participants. 68% of the participants were female. The age of the participants ranged from 16 to 79 ( $M = 25.52$ ,  $SD = 10.92$ ). The educational level of participants ranged from primary school to university, with secondary school being the most frequently completed educational level (46.5%). Table 1 presents the demographics of the participants in the current study.

Table 1. Demographics of the participants

Characteristic	n (%)
Gender	
Male	60 (32%)
Female	127 (68%)
Completed level of education	
Primary school	5 (3%)
Secondary school	87 (47%)
MBO	11 (6%)
HBO	27 (14%)
WO	57 (30%)

*Note.* Total valid  $N = 187$ . Participants were on average 25.52 years old ( $SD = 10.92$ ).

It was verified that participants were distributed evenly across the six conditions. A one-way univariate analysis of variance showed that participants were distributed evenly across the six conditions regarding their age ( $F(5) = 1.25, p = .288$ ). Additionally, a Chi-square test showed that the distribution of men and women was approximately even across the six conditions. ( $\chi^2(5) = 7.21, p = .205$ ). Furthermore, the distribution of the educational level of participants across the conditions was assessed. Given the low amount of diversity in educational levels of the participants, the first three educational levels (primary school, secondary school and MBO) were merged into one category (low-educated) and the last two educational levels (HBO and WO) were merged into another category (high-educated). A Chi-square test indicated that participants were distributed approximately evenly across the six conditions regarding their level of education ( $\chi^2(5) = 1.55, p = .907$ ).

## **Design**

In total, there were six experimental conditions. Participants were randomly assigned to a condition in a 3 (beast vs weed vs no metaphor) x 2 (flu vs tick-borne encephalitis) between-subjects experimental design.

## **Instrumentation**

The dependent variable was cognitive response, which is an ordinal variable. The variable was measured adapting the motivated resistance to persuasion (MRP) scale used by Nisbet, Cooper and Garrett (2015). MRP refers to a person's motivation to oppose, or resist, perceived efforts to change existing attitudes. The conceptualization of MRP consists of two different experiences: (1) counterarguing, which involves generating thoughts that directly oppose to a message's persuasiveness and credibility, and (2) reactance, which comprises an oppositional response that occurs when a message is perceived to be threatening. MRP was assessed using the eleven items from the study by Nisbet et al. (2015). The items were measured using a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). Items 1, 3 and 5 were reverse-coded. The reliability of 'motivated resistance to persuasion' comprising 11 items was good:  $\alpha = .83$ . Consequently, the mean of all eleven items was used to calculate a compound variable 'motivated resistance to persuasion', which was used in further analyses. The scale, which was translated into Dutch, can be found in Appendix B.

## **Procedure**

The study was conducted in the Netherlands and presented online using Qualtrics software. Participants were asked via social media to fill out the questionnaire (e.g. WhatsApp, Facebook). In order to participate, they had to open a link. When participants opened the link, they were first directed to an opening page, stating the goal of the research and asking for informed consent. Naturally, the actual goal was not revealed. Instead, participants were told that the research was about health communication. Besides, an estimation of the duration of the questionnaire, which was 5 to 10 minutes, was given, as well as an email address which participants could contact in case of questions or remarks.

Before reading the text, participants were asked whether they were native speakers of Dutch, since this was a criterion to participate in the study. Next, some demographic questions asking for age, gender and level of education were presented. After reading the text, participants were asked to respond to several questions that measured their motivated resistance to persuasion. Finally, some control questions were asked to determine whether they identified the metaphor in the text or not, and if so, what metaphor they read. After the questionnaire, participants were debriefed and thanked for their participation. On average, participants took 4 minutes and 3 seconds to complete the survey ( $M = 243.48$  seconds,  $SD = 98.41$ ). Moreover, a one-way univariate ANOVA indicated that the mean completion time did not differ significantly across the six conditions ( $F(5, 181) < 1, p = .431$ ).

## **Statistical treatment**

The 25<sup>th</sup> edition of IBM SPSS Statistics software was used to conduct the statistical analyses. A paired samples t-test was used to check which of the two metaphors was more familiar based on the pre-test. Chi-square tests were performed to verify that participants were distributed evenly across the six experimental conditions regarding their gender and level of education. A one-way univariate analysis of variance was used to verify an even distribution of participants' age across the six conditions, as well as to ensure that the completion time did not differ across the conditions. Moreover, Cronbach's alpha was calculated to ensure the reliability of the items of the questionnaire measuring motivated resistance to persuasion. To test both the two hypotheses and the research question, a two-way univariate analysis of variance test was used. This test determined whether there was a main effect of familiarity of disease on resistance, whether there was a main effect of type of metaphor on resistance, and

whether there was an interaction effect between familiarity of the disease and type of metaphor used on resistance. Furthermore, three separate one-way univariate analyses of variance were performed to explore this interaction effect.

## Results

This study aimed to find out to what extent people resist to metaphor use in communicating about vaccination against diseases. Firstly, the answers to the control questions were evaluated. The first control question asked the participants whether they saw a metaphor in the text or not. The answers to this question were coded as to whether they were correct or incorrect. The number of correct and incorrect answers can be found in table 2. It can be concluded that participants more easily identified the presence of a metaphor in the texts about the flu than in the texts about TBE. Moreover, participants more often responded correctly when they read a text with the weed metaphor than when they read a text with the beast metaphor.

Table 2. Frequencies and percentages (between brackets) of correct and incorrect answers to the first control question in function of type of metaphor and familiarity of disease (flu = familiar, TBE = unfamiliar)

	No metaphor		Beast metaphor		Weed metaphor	
	Flu	TBE	Flu	TBE	Flu	TBE
	n = 31	n = 34	n = 29	n = 32	n = 30	n = 31
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Correct	27 (87%)	27 (79%)	24 (83%)	7 (22%)	22 (73%)	13 (42%)
Incorrect	4 (13%)	7 (21%)	5 (17%)	25 (78%)	8 (27%)	18 (58%)

Subsequently, the second control question was coded, which was an open question asking the participants to indicate what metaphor they saw in the text. This question was only answered by participants who answered ‘yes’ to the first control question (i.e. participants who saw a metaphor in the text). The answers were coded as follows: correct, incorrect, forgot/does not know, and misunderstood. Remarkably, participants often answered ‘zwijnenstal’ to the second control question. This was an example of a metaphor given in the first control question to illustrate the meaning of metaphor and was therefore coded as ‘misunderstood’. The frequencies of the different types of answers given to this question are presented in table 3. From this, it can be inferred that participants more often correctly identified the metaphor in the flu condition than in the TBE condition. In addition, the weed metaphor was more often correctly identified than the beast metaphor.

Table 3. Frequencies and percentages (between brackets) of answers to the second control question in function of type of metaphor and familiarity of disease (flu = familiar, TBE = unfamiliar)

	No metaphor		Beast metaphor		Weed metaphor	
	Flu	TBE	Flu	TBE	Flu	TBE
	n = 4	n = 7	n = 23	n = 7	n = 22	n = 12
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Correct			17 (74%)	2 (29%)	17 (77%)	6 (50%)
Incorrect		4 (57%)	1 (4%)	1 (14%)	1 (5%)	2 (17%)
Forgot/does not know		3 (43%)	3 (13%)			
Misunderstood	4 (100%)		2 (9%)	4 (57%)	4 (18%)	4 (33%)

A two-way univariate analysis of variance with familiarity of disease and type of metaphor as factors showed no significant main effect of familiarity of disease on motivated resistance of persuasion ( $F(1, 181) < 1, p = .642$ ). The results of this analysis can be found in table 4. Type of metaphor was not found to have a significant main effect on motivated resistance to persuasion either ( $F(2, 181) = 2.75, p = .067$ ). Table 5 presents the results of this analysis. The interaction effect between familiarity of the disease and type of metaphor was statistically significant ( $F(2, 181) = 4.42, p = .013$ ). The difference between the motivated resistance to persuasion was found among subjects who read a text without a metaphor ( $F(1, 63) = 5.31, p = .024$ ). Motivated resistance to persuasion was greater in the TBE condition ( $M = 4.83, SD = .74$ ) than in the flu condition ( $M = 4.33, SD = .99$ ). Further, the difference in motivated resistance to persuasion was also found among subjects who read a text with the weed metaphor ( $F(1, 59) = 4.06, p = .049$ ). Participants who were assigned to the flu condition displayed higher motivated resistance to persuasion ( $M = 5.11, SD = .81$ ) than participants assigned to the TBE condition ( $M = 4.63, SD = 1.03$ ). No significant difference in motivated resistance to persuasion was found among participants who were assigned to the beast condition ( $F(1, 59) < 1, p = .441$ ). Table 6 presents the results of the three one-way univariate analyses of variance.

Table 4. Means and standard deviations (between brackets) for motivated resistance to persuasion (MRP) in function of familiarity of the disease (flu = familiar, TBE = unfamiliar) (1 = low resistance, 7 = high resistance)

	Flu	TBE
	<i>M (SD)</i>	<i>M (SD)</i>
	n = 90	n = 97
Motivated resistance to persuasion	4.67 (.98)	4.61 (.97)

Table 5. Means and standard deviations (between brackets) for motivated resistance to persuasion (MRP) in function of type of metaphor (1 = low resistance, 7 = high resistance)

	No metaphor	Beast metaphor	Weed metaphor
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
	n = 65	n = 61	n = 61
Motivated resistance to persuasion	4.59 (.89)	4.47 (1.06)	4.86 (.95)

Table 6. Means and standard deviations (between brackets) for motivated resistance to persuasion (MRP) in function of type of metaphor and familiarity of disease (flu = familiar, TBE = unfamiliar) (1 = low resistance, 7 = high resistance)

	No metaphor		Beast metaphor		Weed metaphor	
	Flu	TBE	Flu	TBE	Flu	TBE
	n = 31	n = 34	n = 29	n = 32	n = 30	n = 31
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Motivated resistance to persuasion	4.33 (.99)*	4.83 (.74)*	4.58 (1.00)	4.37 (1.11)	5.11 (.81)*	4.63 (1.03)*

\*  $p < .050$

## Conclusion

Considering the results of the statistical analyses, the hypotheses and research questions will be discussed. The first hypothesis was that resistance will be higher towards the use of metaphors in the context of unknown diseases than in the context of well-known diseases. This study used the flu as a well-known disease and tick-borne encephalitis as an unknown disease. The results do not support this hypothesis. Hence, the first hypothesis is rejected.

Furthermore, the second hypotheses stated that more resistance will be displayed when a conventional metaphor is used than when a novel or no metaphor is used to describe a disease. The findings do not affirm this hypothesis, which is why the second hypothesis is rejected.

The research question that was posed, namely to what extent there would be an interaction effect between familiarity of the disease and the type of metaphor on resistance to communication about diseases, can be answered as follows. There was an interaction effect between the two independent variables. First, it was found that motivated resistance to persuasion was higher towards the unknown disease (TBE) than towards the well-known disease (the flu) when no metaphor was used. Second, motivated resistance to persuasion in the weed condition was shown to be higher towards the text about vaccinating against a well-known disease than towards the text about vaccinating against an unknown disease. This effect, however, did not occur in the beast condition.

## Discussion

Based on the existent literature, the present study predicted that resistance will be higher towards metaphors used to describe unfamiliar diseases than towards familiar diseases. However, this hypothesis was not supported by the results of this study. This could possibly be explained by the diseases that were used in the texts. TBE being a very rare disease in the Netherlands, it might be the case that people have never heard of the disease in advance. Therefore, they might not have responded in the same way they would have done when a slightly more familiar disease would have been used. Consequently, they may not have displayed higher levels of resistance towards the unfamiliar disease than towards the familiar disease. In addition, it might be the case that resistance does not work in the same way as persuasion. For persuasion, research has shown that metaphors are more persuasive when used in the context of familiar targets than unfamiliar targets (Sopory & Dillard, 2002).

However, resistance being a different phenomenon than persuasion, it is possible that the familiarity of the target does not relate to the degree to which people resist to the message, explaining why the predicted effect was not found. It might be the case that for resistance to occur, the texts need to be longer than the texts used in the present experiment, for instance.

Contradictory to what was hypothesized secondly based on the literature, the conventional metaphor (weed) in the present study was not shown to cause more resistance than the novel metaphor (beast) or no metaphor. This could possibly be explained by the fact that the metaphors were translated from English to Dutch. In English, both metaphors are common in the context of diseases, with the *beast* metaphor being more familiar than the *weed* metaphor (Scherer et al., 2015). In Dutch, however, neither of these metaphors are commonly used to describe diseases, since the metaphorical meaning of both the *beast* and *weed* metaphor is not present in the dictionary. In addition, the pre-test of the current study indicated that in Dutch, contrary to the English language, the *weed* metaphor is more familiar than the *beast* metaphor. However, this was not verified as part of the main experiment. In addition, the results of the present study indicate that all three conditions (i.e. the metaphorical conditions as well as the non-metaphorical condition) evoked similar degrees of resistance. Despite the fact that this has not been studied to date, it could be presupposed that the different metaphors do cause different degrees of resistance in the English language. Therefore, it might be the case that the metaphors do not work similarly (e.g. are not equally persuasive) in the Dutch language as in the English language, possibly resulting in less resistance. Lastly, an explanation for the absence of the predicted effect may again be found in resistance being a different phenomenon than persuasion.

The research question, namely whether there is an interaction effect between familiarity of the disease and type of metaphor on resistance towards the metaphor, showed an interaction effect. When no metaphor was used, higher levels of resistance were displayed towards the texts describing an unknown disease (TBE) than towards the texts describing a common disease (the flu). The existent literature on resistance strategies did not provide sufficient grounds to predict a direction of the interaction effect between familiarity of the disease and type of metaphor. However, an attempt will be made to explain this finding. According to Zuwerink Jacks and Cameron (2003), when perceived knowledge about a certain subject is high, readers will display more resistance strategies. People who read a text about a familiar disease are more willing and capable of finding counterarguments than people who read a text about an unfamiliar disease. However, the vast majority of people might not know TBE, which means that they probably do not have an opinion in advance.

People might first need to acquire some knowledge about the disease before they can take an informed decision on whether or not to vaccinate against it. A possible explanation for the finding of the present study is that since people who read a text about an unfamiliar topic do not have the appropriate knowledge, they might feel that the text is trying to push them in a certain direction, therefore resisting more heavily towards it than they would do towards a familiar topic. In the context of the current study, participants read a text in which it was written that they should vaccinate themselves against TBE. Participants are likely not to dispose of the necessary knowledge about the severity of the illness, consequently resisting the message. Hence, this finding adds to the existent literature by showing that familiarity of the target not only influences persuasiveness of metaphor, but also resistance to texts without a metaphor.

In the texts describing diseases in terms of weed spreading quickly through the body, the reverse effect was found. Participants resisted more towards the familiar disease (the flu) than towards the unfamiliar disease (TBE). In other words, a conventional metaphor in combination with a familiar disease causes higher levels of resistance than a conventional metaphor used when describing an unfamiliar disease. This might be explained by the theory of reduced counterarguments, which states that using a metaphor to describe a familiar target leaves people with more cognitive resources than using a metaphor to describe an unfamiliar target, thereby enabling them to resist more heavily towards the familiar target (Sopory & Dillard, 2002). Interestingly however, no effect has been found for the beast condition, which was the novel metaphor in the present study. It might have been the case that because this metaphor was novel (i.e. non-existent in the Dutch language in the context of diseases), the effect of familiarity of the target on resistance was ruled out. In other words, the present study adds to the existing theory on reduced counterarguments by showing that for messages containing conventional metaphors or no metaphor, people resist differently to messages about familiar subjects than about unfamiliar subjects, whereas for novel metaphors, the degree to which people resist the message does not differ depending on the familiarity of the topic.

In general, the control questions have indicated that, especially in the TBE conditions, the metaphor was often not correctly identified. Given the fact that TBE is a very unknown disease, it might have been the case that participants paid relatively more attention to the disease described and consequently overlooked the metaphor. Nevertheless, Thibodeau and Boroditsky (2011) proved that the persuasive power of metaphors can also be covert, meaning that people do not always conceive of metaphors as playing a role in their decision-making

process after reading a text. In other words, a metaphor can persuade people, irrespectively of them being aware of the metaphor. It might be the case, however, that for resistance to occur, the metaphor needs to be identified by the reader. This would imply that resistance, unlike persuasion, only occurs noticeably.

Moreover, there are some limitations of the present study related to the sample used. First, the participants have been asked to participate by means of convenience sampling, meaning that some parts of the population were overrepresented, while others were underrepresented. This has also been shown by the small variety in the division of educational level of participants. On average, most participants were highly educated. In addition, there were relatively more female participants than male participants. All things considered, the sample does not represent the general population and the findings of this study should therefore be interpreted with caution, since the results could be biased.

Future research should, in contrast to the present study, choose metaphors for their experiment that exist in the respective language of study. Moreover, the familiarity of these metaphors should not only be verified relying on a pre-test with a different set of participants, but also by using a manipulation check within the main experiment. In the present study, it is not clear whether the participants in the main experiment found the weed metaphor more familiar than the beast metaphor. Although the pre-test indicated that the weed metaphor was more familiar than the beast metaphor in the context of diseases, this finding should be interpreted cautiously, since the pre-test had a sample of 20 participants only.

Additionally, future research into the interaction between familiarity of the target and type of metaphor on resistance to metaphors could possibly approach the subject from another angle. The present study built on the cognitive response approach, which states that a message can either be accepted, resulting in persuasion, or rejected, resulting in resistance (Zuwerink Jacks & Cameron, 2003). Nevertheless, when readers do not recognise a persuasive attempt, they have nothing to oppose to. Future research could possibly start from the prediction that metaphors that are generally seen as more persuasive (novel metaphors) induce higher levels of resistance than metaphors with less persuasive power (conventional metaphors), because the former have a stronger, and therefore also more apparent, persuasive attempt. This causes the reader to oppose more heavily. The same holds for the use of metaphors for familiar targets versus unfamiliar targets. Metaphor use in the context of familiar targets is generally seen as more persuasive. This may cause more resistance when compared to unfamiliar targets, because the persuasive attempt is more apparent in the former case than in the latter.

In short, this study presents a first attempt to research to what extent people resist to

metaphors in health communication, more specifically, communication about vaccination against diseases. It has become apparent that resistance to messages about vaccination against diseases differs between familiar and unfamiliar diseases when using conventional metaphors or when using no metaphor, but that this difference does not occur when using novel metaphors. The present study has contributed to the existent body of research on metaphors and persuasion and forms the basis for future academic inquiry. The suggestions for future research that have been brought forward should be used to further delve into the topic of resistance to metaphors as to extend the results presented in the current study. Policymakers, academics and organisations in general would benefit from the insights provided and can adapt their communications accordingly to get their message across more effectively.

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## Appendix A: texts experimental conditions

### *Condition 1: flu x no metaphor*

Griep is een virus dat het lichaam infecteert. Griep komt in Nederland voor en kan grote gevolgen hebben voor de gezondheid. Hoewel u op elk moment van het jaar griep kunt krijgen, komt griep in bepaalde seizoenen vaker voor. Daarom moet u zichzelf er echt tegen laten vaccineren!

### *Condition 2: flu x beast metaphor*

Griep is een beest dat op het lichaam jaagt. Griep komt in Nederland voor en kan grote gevolgen hebben voor de gezondheid. Hoewel u op elk moment van het jaar griep kunt krijgen, komt griep in bepaalde seizoenen vaker voor. Daarom moet u zichzelf er echt tegen laten vaccineren!

### *Condition 3: flu x weed metaphor*

Griep is een onkruid dat zich snel door het lichaam verspreidt. Griep komt in Nederland voor en kan grote gevolgen hebben voor de gezondheid. Hoewel u op elk moment van het jaar griep kunt krijgen, komt griep in bepaalde seizoenen vaker voor. Daarom moet u zichzelf er echt tegen laten vaccineren!

### *Condition 4: TBE x no metaphor*

Tekenencefalitis is een virus dat het lichaam infecteert. Tekenencefalitis komt in Nederland voor en kan grote gevolgen hebben voor de gezondheid. Hoewel u tekenencefalitis op elk moment van het jaar kunt krijgen, komt tekenencefalitis in bepaalde seizoenen vaker voor. Daarom moet u zichzelf er echt tegen laten vaccineren!

### *Condition 5: TBE x beast metaphor*

Tekenencefalitis is een beest dat op het lichaam jaagt. Tekenencefalitis komt in Nederland voor en kan grote gevolgen hebben voor de gezondheid. Hoewel u tekenencefalitis op elk moment van het jaar kunt krijgen, komt tekenencefalitis in bepaalde seizoenen vaker voor. Daarom moet u zichzelf er echt tegen laten vaccineren!

*Condition 6: TBE x weed metaphor*

Tekenencefalitis is een onkruid dat zich snel door het lichaam verspreidt. Tekenencefalitis komt in Nederland voor en kan grote gevolgen hebben voor de gezondheid. Hoewel u tekenencefalitis op elk moment van het jaar kunt krijgen, komt tekenencefalitis in bepaalde seizoenen vaker voor. Daarom moet u zichzelf er echt tegen laten vaccineren!

Appendix B: translated scale developed by Nisbet et al. (2015) measuring motivated resistance to persuasion

- De tekst was erg objectief.
- De tekst probeerde me onder druk te zetten om op een bepaalde manier te denken.
- De tekst heeft niet geprobeerd zijn mening aan mij op te dringen.
- De tekst was erg geloofwaardig.
- De tekst was niet erg betrouwbaar.
- De tekst probeerde me te manipuleren.
- Soms wilde ik 'tegenspreken' tegen wat ik in de tekst las.
- Ik merkte dat ik nadacht over manieren waarop ik het niet eens was met de informatie in de tekst.
- Ik kon het niet helpen na te denken over manieren waarop de informatie in de tekst onnauwkeurig of misleidend was.
- Ik merkte dat ik op zoek was naar fouten in de manier waarop informatie in de tekst werd gepresenteerd.
- De tekst probeerde me te overtuigen.

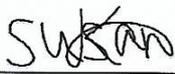
## Appendix C: Statement of own work

Student name: Susan de Kort  
Student number: s1010029

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