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# An infecting virus, a preying beast or a sprouting weed: resistance to metaphors in health communication about common vs uncommon diseases


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**Abstract**

This experiment explores the effects of metaphors and disease commonality on resistance towards vaccination. Participants (*N*=187) were randomly assigned to one of six experimental conditions where their resistance to vaccination was assessed. The goal of this study was to find out whether using novel metaphor, conventional metaphor or no metaphor to describe common versus uncommon diseases in a persuasive text about vaccination triggered motivated resistance to persuasion (MRP). Neither metaphors nor disease commonality had a main effect on MRP. However, an interaction was found between type of metaphor and type of disease. Conventional metaphors were found to increase MRP more than literal language when used to describe common diseases. These findings reveal that metaphors can sometimes create resistance rather than being persuasive. This suggests that literal language should be preferred over certain types of metaphors to promote vaccination against common diseases. This research adds to the body of knowledge around the persuasive power of metaphors.

*Keywords:* metaphor, persuasion, conventionality, health communication, resistance, vaccination, flu, tick-borne encephalitis

**Introduction**

Metaphors are useful tools to conceptualize diseases (Wallis & Nerlich, 2003). The conceptual metaphor theory developed by Lakoff and Johnson (1980) defines a conceptual metaphor as "understanding one domain of experience (that is typically abstract) in terms of another (that is typically concrete)" (Kövecses, 2002, p.1). According to this theory, metaphors are not only present in language, but also in thought. They work by tapping into a source domain that is familiar to help people understand a target domain that is less concrete. Thibodeau, Matlock and Flusberg (2019) give the example of a complex target domain such as the "U.S political establishment". They argue that it can be explained by tapping into another domain. For instance, to clarify that the political establishment needs to be removed, Donald Trump uses the metaphor "drain the swamp". The familiar source domain "swamp" facilitates the understanding of the target domain, "the U.S political establishment". Metaphors of health are often found with the health issue or illness functioning as the target (Sopory, 2017). For instance, the Severe acute respiratory syndrome (SARS) epidemic was referred to as a "criminal that ha[d] to be detected" (Wallis & Nerlich, 2003); while the flu was metaphorically described as a "wild beast that prey[ed] on the body" in a study conducted by Scherer, Scherer and Fagerlin (2015).

Metaphors are omnipresent in public health campaigns (El Refaie, 2015). For example, a recent anti-smoking campaign in the United Kingdom used a wrinkled apple to depict premature aging of skin caused by cigarettes (Cameron & Williams, 2015), while a South African health campaign about AIDS used military language to explain the functioning of the immune system (Jansen,van Nistelrooij, Olislagers, van Sambeek, de Stadler, 2010). Metaphors are widely used to encourage or discourage some health-related behaviours because they are thought to be persuasive tools. In fact, several studies have found that metaphors can be used to explain and persuade (Duit, 1991; Lakoff, 2009; McCormac, 1985; Thibodeau, Crow, & Flusberg, 2017).

Although the persuasive effect of metaphors has been demonstrated by a meta-analysis conducted by Sopory and Dillard (2002), metaphors may provoke resistance (van Poppel, 2018) or lead to unwanted consequences. The findings of Hauser and Schwarz (2015) suggest that framing cancer as an enemy might impair prevention strategies. Some of these strategies, for instance, consist of limiting sugar and red meat. Concepts such as limiting and constraining are not associated with the idea of fighting an enemy. Consequently, this metaphor can potentially undermine health recommendations according to Hauser and Schwarz (2015). To harness their persuasive power and avoid negative consequences, it is essential to explore the effects of different metaphors in the context of health communication.

Scientific research has important implications in the development of health campaigns, for instance to promote vaccination. Investigating whether metaphors could be persuasive tools to encourage people to get vaccinated is particularly relevant as vaccine-preventable diseases still threaten the European continent. Despite a high vaccination coverage in the Netherlands, some groups still resist vaccination for cultural, religious, philosophical reasons or because of misinformation, feelings of freedom and individualism (Francois et al., 2018). Between 2004 and 2005, 128 cases of rubella were reported in the Netherlands. None of these patients had been vaccinated, and for the majority it was a deliberate choice (Hahné, Macey & Tipples, 2005). Resisting vaccination can have consequences that go beyond the individual if it happens on a large scale. Diseases that were eradicated by vaccines could resurface and endanger many. For this reason, resistance towards vaccination must be eliminated. The World Health Organization (WHO) (2020) insists on the importance of strengthening immunization. Vaccination saves millions of people from illness, disability and death according to the WHO (2020). For the sake of the community, it is crucial to find the best communicative tools to persuade as many as possible to vaccinate. The purpose of the current study is to find out how different

metaphors impact resistance towards vaccination against common versus uncommon diseases compared to literal language.

*Theoretical background*

Previous research has shown that metaphorical language was overall more persuasive than literal language (Sopory & Dillard, 2002). Scherer, Scherer and Fagerlin (2015) researched whether describing the flu metaphorically would increase behavioural intentions towards getting vaccinated. They discovered that participants who read a metaphor, either novel or conventional, were more inclined to vaccinate than participants who did not read a metaphor. This suggests that both novel and conventional metaphors could be more effective than literal language to persuade people to get vaccinated, thus reducing resistance towards vaccination.

Describing vaccine-preventable diseases with metaphors could be a good strategy to persuade more people to get vaccinated. However, with or without metaphor, persuasion attempts can sometimes be ineffective because people are motivated to resist persuasion (Ringold, 2002). According to Nisbet, Cooper and Garrett (2015), motivated resistance to persuasion (MRP) is a person's motivation to resist perceived efforts to change existing attitudes. People adopt resistance strategies to maintain their current attitudes. Zuwering and Cameron (2003) found that counterarguing was the most effective strategy to resist persuasion. Counterarguing consists of undermining and rebutting a message's arguments to reduce the persuasiveness and credibility of both the message and its source (McGuire, 1964; Petty & Cacioppo 1986; Slater & Rouner, 2002; Zuwerink & Cameron, 2003). Even when a message is not contrary to previously held beliefs, the persuasion attempt can be perceived as a threat and not only be ineffective but also lead to the opposite of the desired result, such as an unhealthy behaviour (Clee & Wicklund, 1980; Ringold, 2002). Reactance is an oppositional attitude emerging from a threat to freedom. Previous research has found that threats to freedom lead to reactance which leads to contesting strategies such as counterarguing to restore freedom (Dillard & Shen, 2005; Fukada, 1986). MRP is a combination of two experiences: counterarguing and reactance (Moyer-Gusé & Nabi, 2010). Persuading someone to get vaccinated might be impaired by this person's MRP. As previously mentioned, metaphors used in persuasive texts may provoke resistance (van Poppel, 2018). The goal is to find out whether describing diseases with different metaphors could increase or decrease MRP compared to literal language.

Different types of metaphor exist. Sopory and Dillard (2002) warned "against the conclusion that any metaphor can be used under any condition to create potent suasory impact"

(Sopory & Dillard, 2002, p.409). Scherer et al. (2015) explain that metaphors are not equal, suggesting that some metaphors may be more persuasive than others. Metaphors can notably be categorized based on conventionality. Conventionality reflects the familiarity of a metaphor according to Thibodeau and Durgin (2011). A familiar metaphor is conventional while an unfamiliar metaphor is said novel. Previous research has found that novel metaphors were more persuasive than not novel ones (Sopory & Dillard, 2002). A relationship between conventionality and resistance to persuasion exist, hence the need to investigate the impact of different types of metaphors on MRP. Sopory and Dillard (2002) explained that novel metaphors lead to less counterarguing than conventional ones, meaning that conventional metaphors are more likely to engender resistance than novel metaphors. This can be explained by the fact that conventional metaphors are easier to comprehend than novel metaphors (Lai & Menn, 2009), which leaves more room for counterarguing (Sopory & Dillard, 2002). Some metaphors may create less resistance towards vaccination than others depending on their conventionality. Based on these findings, we hypothesize that:

H1: Metaphors will create less resistance towards vaccination than literal language, particularly when these metaphors are novel compared to conventional.

Most studies about the effects of metaphors on vaccination have focused on well-known diseases such as the flu (Scherer et al., 2015). The flu is a common disease with 3 to 5 million cases of severe illness a year according to the WHO (2018). However, few studies have looked at uncommon diseases like the tick-borne encephalitis (TBE). TBE is a less common disease with approximately 10,000 to 12,000 clinical cases a year that can be prevented by vaccination according to the WHO (2014). Francois et al. (2008) explain that anti-vaccination movements use arguments such as disease commonality to undermine vaccination. They argue that some diseases are so uncommon that vaccinating is not necessary. If the public encounters the TBE for the first time, they might be resistant to vaccinating against it. This suggests that uncommon diseases are more likely to trigger resistance towards vaccination than common diseases. When described metaphorically, uncommon and common diseases may spur different reactions because of the level of knowledge of the target domain. "Metaphors are most influential when the listener has an intermediate level of knowledge of the target domain: too little knowledge and they may fail to correctly map the source domain onto the target domain (Johnson & Taylor, 1981); too much knowledge makes the metaphor unnecessary and unlikely to change how people think about the target domain (Reuchamps, Dodeigne, & Perrez, 2018; Robins & Mayer, 2000)" (Thibodeau et al., 2019, p.10). If a disease is uncommon, people may be more likely to

have little knowledge about it and therefore fail to map the source domain onto the target domain. Using metaphors to describe uncommon diseases seems risky because the message could be misunderstood and rejected. When using metaphors to describe common diseases, the risk seems smaller because it might simply turn out to make the metaphor unnecessary. This seems to confirm the conjecture that, with and without metaphors, uncommon diseases are more likely to trigger resistance towards vaccination than common diseases. Based on these observations, we hypothesize that:

H2: There will be more resistance towards vaccination for uncommon diseases than for common diseases.

The context in which a metaphor is used can impact the effect it will have. "When a metaphor is somehow unfitting or undesirable, people may resist the metaphor, i.e. they may not accept it or even react critically to it" (van Poppel, 2018, p.2). Few to no studies have investigated the effects of different metaphors on MRP in the context of vaccination against common versus uncommon diseases. Sopory & Dillard (2002) found that both target familiarity and conventionality of metaphors impacted persuasion. They explain that there is a substantial influence of metaphors in persuasive texts "when a single, nonextended, novel metaphor with a familiar target is used early in a message" (Sopory & Dillar, 2002, p.382). This suggests that using a novel metaphor to describe a familiar disease such as the flu in a persuasive text about vaccination might trigger less resistance to persuasion than using a conventional metaphor. It is likely that there is an interaction effect between type of metaphor and disease commonality on resistance towards vaccination. Describing a common disease with a conventional metaphor might have a different effect on MRP than with a novel metaphor or no metaphor; the same applies for an uncommon disease. There is not enough existing literature on the matter to predict which type of metaphors will trigger the most resistance towards vaccination against common and uncommon diseases. Based on these observations, we ask the following research question:

- What are the effects of conventional metaphors, novel metaphors and literal language on resistance towards vaccination when used in the context of common vs uncommon diseases?

## Method

In the present study, two metaphors were used to explore the effect of different types of metaphor on resistance towards vaccination. The metaphors were derived from the study of Scherer

et al. (2015) (see Appendix 1). In this previous research, Scherer et al. (2015) used the following metaphors to describe the flu: 'beast', 'army', 'riot' and 'weed'. The 'beast' and the 'weed' metaphors were chosen for this study because they were found to differ in terms of conventionality according to Scherer et al. (2015). The 'beast' metaphor was described as conventional while the 'weed' metaphor was considered as novel. To create the best stimulus material for the experiment, a pre-test was conducted to reassess the conventionality of these metaphors.

Pre-test

*Materials*

A pre-test was conducted to categorize two metaphors in terms of conventionality. The independent variable was metaphor. Metaphor was a nominal variable that had two levels, namely 'beast' and 'weed'. The stimulus material involved two sentences, one with the beast metaphor and one with the weed metaphor. As shown in Appendix 2, the content of the sentences was kept as simple as possible and only consisted of the metaphors to avoid other factors influencing familiarity.

*Subjects*

Twenty participants were recruited for the pre-test, however only nineteen participants' answers were considered. One of the participants was excluded on the criteria of mother tongue. Table 1 shows the main demographic characteristics of the participants of the pre-test.

Table 1. Demographic characteristics of the participants of the pre-test

| Characteristic | Pre-test |
|---|---|
| *Age – years (SD;* range*)* | 31,16 (14.32;17-53) |
| *Gender – %* female (*N*) | 57.9 (11) |
| *% male (N)* | 42.1 (8) |
| *Level of education completed – %* (*N*) | |
| High school | 42.1 (8) |
| MBO | 10.5 (2) |
| HBO | 21.1 (4) |
| WO (university*)* | 26.3 (5) |

*Note:* Total valid *N* = 19

*Design*

All participants were exposed to both metaphors. The pre-test had a within-subjects design.

*Instruments*

The dependent variable of the pre-test was conventionality. According to Thibodeau and Durgin (2011), conventionality can be directly measured by rating the familiarity of metaphors. Conventionality and familiarity will be considered as overlapping concepts. Familiarity was measured using a scale inspired by Thibodeau and Durgin (2011). Ratings were made on a 7-point Likert scale ranging from "not familiar at all" to "extremely familiar" for each metaphor.

*Procedure*

The pre-test was delivered online. The purpose of the research was not revealed to the participants. Participants were asked to give their informed consent. To participate, they had to be at least 16 years old and be Dutch native speakers. The participants were informed that their answers would remain anonymous. They were free to leave the questionnaire at any time. The participants were asked to fill in the pre-test individually. They were first asked to indicate their age, gender and level of education. Each of them was then presented with the 'beast' and the 'weed' metaphors (see Appendix 2). They were asked to indicate the degree of familiarity of each metaphorical sentence.

*Statistical analysis*

A paired samples t-test was carried out to compare the familiarity of beast and weed metaphors.

*Results*

A paired samples t-test showed a significant difference between weed metaphor and beast metaphor ($t$ (18) = 3.34, $p$ = .004). The weed metaphor was shown to be more familiar ($M$ = 3.32; $SD$ = 1.97) than the beast metaphor ($M$ = 1.84; $SD$ = 1.67). Based on these results, we categorized the beast metaphor as novel and the weed metaphor as conventional in the main experiment.

Experiment

*Materials*

To explore the effects of metaphor on resistance towards vaccination for common vs uncommon diseases, six versions of an experimental text were created. The two independent variables

of this experiment are type of metaphor and type of disease. Type of metaphor is a nominal variable that has three levels. Those levels are as follows: conventional, novel, control group without metaphor. Metaphorical framing is most effective when the metaphor is at the beginning of a text (Sopory & Dillard, 2002; Thibodeau & Boroditsky, 2011). Additionally, a single metaphor leads to a greater persuasion than several according to Sopory and Dillard (2012). A single metaphor was therefore placed in the first sentence of the text as shown in Appendix 1. In the control condition, there was no metaphor but only literal language.

The second independent variable of this experiment is type of disease. Type of disease is a nominal variable with two levels: common and uncommon. The flu was used as a common disease because of its important number of cases. The flu is a virus that can be prevented by vaccination and is thought to severely impact around 5 million cases per year (WHO, 2018). With 12,000 cases a year, the TBE is less common and less known (WHO, 2014). TBE is a virus resulting from infected ticks that attach to the skin. It can be prevented by vaccination (WHO, 2014). The TBE was used as the uncommon disease.

*Subjects*

Two hundred and sixty-one participants were recruited for the experiment. However, only one hundred and eighty-seven participants' answers were included. The participants whose mother tongue was not Dutch were excluded. Those who did not finish the questionnaire were also excluded. The participants who took a too short or too long time to fill in the questionnaire were also excluded. To determine the time frame the participants had to respect for their answers to be valid, several steps were taken. First, the three outliers who took too long to fill in the questionnaire were removed. Secondly, the mean and standard deviation without these outliers were calculated in seconds ($M$=263.88 s , $SD$= 147.5 s). Finally, all participants that deviated more than two standard deviations from the mean were excluded. This means that all the participants who took 559 seconds or more from the mean were excluded. The answers of the participants that took less than 559 seconds were considered as valid. Table 2 shows the main demographic characteristics of the valid participants.

Table 2. Demographic characteristics of the participants of the experiment

| Characteristic | Experiment |
|---|---|
| *Age – years (SD;*range*)* | 25.53 (10.92;16-79) |

| | |
|---|---|
| *Gender – %* female (*N*) | 67.9 (127) |
| % male (*N*) | 32.1 (60) |
| *Level of education completed – %* (*N*) | |
| Elementary school | 2.7 (5) |
| High school | 46.5 (87) |
| MBO | 5.9 (11) |
| HBO | 14.4 (27) |
| WO | 30.5 (57) |

*Note:* Total valid *N* = 187

*Design*

Participants were randomly assigned to a condition in a 3 (no metaphor vs 'beast' metaphor vs 'weed' metaphor) x 2 (common disease vs uncommon disease) between-subjects experimental design. A chi-square showed no significant relation between gender and condition ($\chi^2$ (5) = 7.21, $p$ = .205). Level of education was also found to be evenly distributed across the conditions according to a chi-square test ($\chi^2$ (5) = 5.34, $p$ = .375). To not breach the assumptions of the chi-square test, the five levels of education were collapsed into two categories. A first category comprised Elementary school, High school and MBO while HBO and WO were regrouped into a second category. A one-way ANOVA was conducted to check if age differed across the conditions. No significant relation between age and condition was found ($F$ (5,181) =1.25, $p$ =.288). Another one-way ANOVA confirmed the even distribution of duration to complete the questionnaire across the conditions ($F$ (5181) < 1).

*Instrumentation*

The dependent variable of this experiment was the motivated resistance to persuasion (Nisbet et al., 2015). MRP is an ordinal variable that was measured by means of a scale developed by Nisbet et al. (2015) measuring both counterarguing and reactance (see Appendix 2). Eleven 7-point Likert items assessed the MRP of the participants. Some of these items were for instance: "Sometimes I wanted to "argue back" against what I read in the text" and "I found myself thinking of ways I disagreed with the information in the text" (1 = strongly disagree, 7 = strongly agree). The reliability of 'motivated resistance to persuasion' comprising eleven items was good: α = .83. Consequently, the mean of all even items was used to calculate the compound variable 'motivated resistance to persuasion', which was used in the further analyses.

*Procedure*

The questionnaire was delivered online. Our research intentions were not revealed. The participants were asked to agree to the analysis of their answers for the purpose of this study. The first page informed them that they were free to leave the questionnaire at any moment and that their responses would remain anonymous. The participants had to give their informed consent, be above 16 years old and be Dutch native speakers to be able to start on the questionnaire. There were invited to complete the questionnaire individually. The participants were randomly assigned to one of the six conditions. They read the text of the condition they were assigned to and answered questions measuring their motivated resistance to persuasion. They also had to indicate their age, gender and their level of education. Two control questions were incorporated to the questionnaire to check if the participants properly read the text and noticed the metaphors. At the end of the questionnaire, the participants were thanked for their participation.

*Statistical treatment*

A two-way ANOVA was conducted to explore the main effects of type of metaphor and type of disease on MRP, and the interaction effect between type of metaphor and type of disease. One-way ANOVAs were conducted to further explore this interaction.

**Results**

Two control questions were asked to the participants to check if they noticed a metaphor and if they did which one it was. In the first control question, the participants simply had to indicate whether they saw a metaphor. The answers were coded as correct when the participants saw a metaphor and responded accordingly, but also when they did not see a metaphor and responded that there was no metaphor. Table 3 shows the percentages of participants who were correct or incorrect. According to this table, 63.1% of the participants responded correctly when asked if they saw a metaphor while 36.9% gave an incorrect answer.

Table 3. Percentages of the responses to the first control question (coded as correct or incorrect)

| Response | *N* | Percentage |
|---|---|---|
| Correct | 118 | 63% |
| Incorrect | 69 | 37% |

A Chi-square test was conducted to check if there was an association between type of metaphor and response to the first control question. A chi-square showed a significant relation between type of metaphor and response to the first control question ($\chi^2$ (2) = 17.64, $p < .001$). There

were significantly more correct answers for the no metaphor condition ($n$ = 54) than for the weed ($n$ = 34) and beast metaphors ($n$ = 30). There were significant fewer wrong answers for the no metaphor condition ($n$ = 11) than for the weed metaphor ($n$ = 27) and for the beast metaphor ($n$ = 31). Table 4 shows the answers to the first control question for each metaphor condition.

Table 4. Number of correct and incorrect answers to the first control question per metaphor condition

| | Correct | Incorrect |
|---|---|---|
| | *n* | *n* |
| No metaphor | 54 | 11 |
| Beast metaphor | 30 | 31 |
| Weed metaphor | 34 | 27 |

The second control question was an open question where participants had to write down which metaphor they saw. The responses were coded one-by-one. They were deemed correct if the word beast, animal or weed was included in the participant's answer. They were considered incorrect when none of these words were mentioned. The answers mentioning insects were coded as incorrect. The responses were coded as forgotten when the participant wrote down 'I cannot remember' or 'I forgot'. Finally, they were coded as misunderstood if the participants gave the metaphor showed in the example explaining what a metaphor was rather than the one presented in the text. Table 5 shows the percentages of these responses. According to this table, most of the participants responded correctly when asked which metaphor they saw (56%), 10.7% were incorrect, 8% forgot the metaphor and 25.3% got confused and wrote down the metaphor from the example given in the previous question.

Table 5. Percentages of the responses to the second control question (coded as correct, incorrect, forgotten or misunderstood)

| Response | *N* | Percentage |
|---|---|---|
| Correct | 42 | 56% |
| Incorrect | 8 | 11% |

| | | |
|---|---|---|
| Forgotten | 6 | 8% |
| Misunderstood | 19 | 25% |

Experiment

To test both hypotheses, a two-way analysis of variance was conducted. Contrary to what was predicted, a two-way ANOVA with type of metaphor (no metaphor vs beast vs weed) and disease commonality (flu vs TBE) as factors showed no significant main effect of type of metaphor ($F$ (2, 181) = 2.75, $p$ = .067) and no significant main effect of disease commonality on motivated resistance to persuasion ($F$ (1,181) < 1). However, the interaction between type of metaphor and disease commonality was statistically significant ($F$ (2,181) = 4.42, $p$ = .013).

To further explore this indirect effect, two one-way ANOVAS were conducted. The file was split by type of disease to get a better understanding of the impact of type of metaphor. The tests revealed that the type of metaphor only had an effect on MRP among subjects assigned to the flu condition ($F$ (2,87) = 5.4, $p$ =.006): the MRP was greater for the weed metaphor ($M$ = 5.11, $SD$ = 0.81) than for the no metaphor condition ($p$ = .005, Bonferroni correction; $M$ = 4.33 , $SD$ = 0.99). There was no significant difference between the beast metaphor ($p$ =.904, Bonferroni correction; $M$ = 4.58, $SD$ = 1) and the no metaphor condition. There was also no significant difference between the beast metaphor and the weed metaphor (Bonferroni correction, $p$ = .105). Table 6 shows the means and standard deviations for the MRP in function of the type of metaphor in the flu condition. There was no effect of type of metaphor on MRP among subjects assigned to the TBE condition ($F$ (2,94) = 1.83, $p$ = .167).

Table 6. Means and standard deviations (between brackets) for the MRP in function of type of metaphor in the flu condition (1=low resistance, 7=high resistance)

| Type of metaphor presented in the text | Flu *M (SD)* | TBE *M (SD)* |
|---|---|---|
| No metaphor | 4.33 (.99) | 4.83 (.74) |
| Beast metaphor | 4.58 (1) | 4.37 (1.11) |
| Weed metaphor | 5.11 (.81) | 4.63 (1.03) |

## Conclusion

This study examined the effects of metaphors and disease commonality on resistance towards vaccination. Understanding how metaphors influence audiences has become an important aspect of health communication research. This experiment provides support to the existing literature that recognizes the impairing effect of some metaphors on health communication (Hauser & Schwarz, 2015; Larson & Brendon, 2011).

The hypothesis that metaphors reduce resistance towards vaccination is rejected. Metaphors and literal language were not significantly different with regards to MRP. This finding goes against previous research suggesting that metaphors are more persuasive than literal language (Sopory & Dillard, 2002). The hypothesis that uncommon diseases are more likely to engender resistance towards vaccination is also rejected. Disease commonality did not have a main effect on resistance towards vaccination. This finding suggests that the argument of anti-vaccination movements explaining that vaccination is useless for uncommon diseases is not persuasive.

Even though both hypotheses were rejected, an interaction effect between type of metaphor and disease commonality was found. The effect of metaphors was different for both target domains. The type of metaphor did not impact MRP for the uncommon disease while it did for the common disease. These results can partly be explained by the metaphor target familiarity. Sopory and Dillard (2002) hypothesized that if the target domain is familiar there is less resource demand needed to process the metaphor, leading to more counterarguing. Their results did not directly support this hypothesis, but our findings might be explained by this theory. The flu is a more familiar target domain than the TBE. If we apply this theory, the participants who were assigned to the flu condition needed less resource to process the metaphor and were therefore more likely to counterargue that those assigned to the TBE condition. This can explain why there was an effect of metaphors on MRP for the flu but not for the TBE.

However, novel metaphor, conventional metaphor and literal language did not all have a significant impact on MRP in the flu condition. The novel metaphor ‘beast’ did not have a significant impact on MRP. One of the main findings of this study is that describing the flu with a conventional metaphor was found to create more resistance towards vaccination than using no metaphor. Participants who read the ‘weed’ metaphor in the text about the flu were more

motivated to resist persuasion than those who did not read any metaphor. According to Sopory and Dillard (2002), the metaphor novelty theory suggests that novel metaphors involve more puzzling and are thus more difficult to process than conventional metaphors. Other research has shown that conventional metaphors are comprehended faster than novel metaphors (Lai & Menn, 2009). This more difficult process of novel metaphors results in less counterarguing (Sopory & Dillard, 2002) than for conventional metaphors.

The previous findings suggest that the novel metaphor and conventional metaphors should have differed in terms of resistance. Yet the 'beast' metaphor, considered as novel, did not statistically differ from the conventional 'weed' metaphor. The absence of statistical difference between novel metaphors and the other conditions is unlikely to be due to the categorization of the metaphors as the pre-test clearly showed a difference between the 'weed' and the 'beast' metaphors. However, it could be explained by the fact that the novel metaphor was significantly less noticed by the participants. The answers to the first control question revealed that the participants who read a text with the 'beast' metaphor consistently had less correct answers and more wrong answers than for the other conditions.

The 'weed' metaphor in the flu condition created more resistance than the literal language. The greater impact of the conventional metaphor on MRP compared to the literal language could mean that the conventional metaphor was easier to process than the literal language and therefore led to more counterarguing. This interpretation could be supported by previous research showing that metaphors facilitate comprehension (Duit, 1991; Lakoff, 2009; McCormac, 1985; Thibodeau, Crow, & Flusberg, 2017). Overall, these results suggest that using conventional metaphors to promote vaccination for common disease might be inefficient and ultimately create resistance. These results entail that literal language should be preferred when promoting vaccination for common diseases.

*Limitations and further research*

Despite these findings, there were limitations to this study. The questionnaire was displayed online to a non-representative sample, thus limiting the generalizability of our findings. Additionally, we can question whether the participants resisted to the persuasive aspect of the text rather than the persuasive aspect of the metaphor considering that half of the participants assigned to the conventional metaphor condition did not notice the metaphor. Besides, the cultural

aspect may have influenced the results. The Netherlands has a very high vaccination coverage. The Dutch public health institute RIVM reports that 90.2 % of the children born in 2016 were fully vaccinated. Resistance towards vaccination seems unlikely overall in the Netherlands. Our participants were Dutch. Nationality may impact resistance. It would be interesting to reproduce this research with other nationalities and check if the resistance towards vaccination increases.

The current study provides evidence that some types of metaphor may create resistance towards vaccination against common diseases. Future research needs to investigate further the resistance created by conventional metaphors compared to literal language in other contexts and for other diseases. Besides, future studies could focus on the classification of metaphors. There is a wide array of metaphors that could be classified accordingly to familiarity, interpretability, severity, formality. These dimensions are likely to have different effects on resistance towards vaccination. There are many methods to categorize metaphors but no scientific consensus. To explore these potential effects, future research should first focus on evaluating methods to empirically categorize metaphors. Only then, could we explore and generalize the impact of metaphor type on resistance towards vaccination in the case of common diseases. We can recommend the further investigation of types of metaphors and their effects on resistance with regards to vaccination before implementing changes to health communication.

This study investigated the effects of different metaphors on motivated resistance to persuasion. This did not allow us to find out which aspects of metaphors were resisted or direct resistance to vaccination but rather if metaphors made readers more motivated to resist the persuasive attempt of the text about vaccination. Resistance to metaphor could have been measured differently. Van Poppel (2018) explain that the connection premise of the metaphor can raise criticism. In this study, the connection premise was “the flu is like a beast”. For example, one could have wondered whether all beasts preyed on the body and then question the similarities between the flu and the beast. Resistance to metaphor in argumentation can be expressed in various ways according to van Poppel (2018). Further research could explore different kinds of resistance created by metaphors or direct resistance to vaccination by looking at behavioural intention to vaccinate.

Additionally, interesting results were found in the pre-test and deserve further inspection. Despite a small sample of participants, the results of the pre-test revealed a significant difference of conventionality between the ‘beast’ and the ‘weed’ metaphors. The participants estimated

that the ‘weed’ metaphor was more conventional than the ‘beast’. This finding contradicts previous research from Scherer et al. (2015) who described the ‘beast’ metaphor as conventional and the ‘weed’ as novel. This suggests that conventionality of metaphors may differ from one language to the other. It could be interesting to conduct a cross-cultural study with regards to metaphor conventionality.

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Appendix 1

The texts were based on the work of Scherer, Scherer and Fagerlin (2015). The descriptions used are presented below with the manipulation in bold and the two metaphor conditions in the parentheses.

The **flu/TBE** is a **virus (beast/weed)** that infects **(preys on / quickly spreads through)** the body. It occurs in the Netherlands and can have major health consequences. While you can get it at any time of year, in certain seasons the **flu/TBE** has been found to be more frequent. Therefore, you really need to get vaccinated against it!

The texts were translated to Dutch, the native language of the participants.

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

Appendix 2

A virus is a beast that preys on the body.

Een virus is een beest dat op het lichaam jaagt.

A virus is a weed that quickly spreads through the body.

Een virus is een onkruid dat zich snel door het lichaam verspreidt.

Appendix 3

Motivated resistance to persuasion, based on Nisbet et al. (2015)

- The text was very objective.*
- The text tried to pressure me to think a certain way.
- The text did not try to force its opinions on me.*
- The text was very believeable.*
- The text was not very credible.
- The text tried to manipulate me.
- Sometimes I wanted to “argue back” against what I read in the text.
- I found myself thinking of ways I disagreed with the information in the text.
- I couldn’t help thinking about ways that the information in the text was inaccurate or misleading.
- I found myself looking for flaws in the way information was presented in the text.
- The text was trying to persuade me.

The items with a * were reverse-coded.

Appendix 4. Statement of own work

Student name: Audrey Senecal

PLAGIARISM is the presentation by a student of an assignment or piece of work which has in fact been copied in whole or in part from another student's work, or from any other source (e.g. published books or periodicals or material from Internet sites), without due acknowledgement in the text.

DECLARATION:

a. I hereby declare that I am familiar with the faculty manual (http://www.ru.nl/stip/english/rules-regulations/fraud-plagiarism/) and with Article 16 "Fraud and plagiarism" in the Education and Examination Regulations for the Bachelor's programme of Communication and Information Studies.

b. I also declare that I have only submitted text written in my own words

c. I certify that this thesis is my own work and that I have acknowledged all material and sources used in its preparation, whether they be books, articles, reports, lecture notes, and any other kind of document, electronic or personal communication.